CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0403
FRENCH NITRIC OXIDE SURVEY: A MULTICENTER, PROSPECTIVE, NON-INTERVENTIONAL SURVEY
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Aims & Objectives:

NO therapy despite large usage in France for 20 years is still mostly unknown. Few studies have really described the daily ICU practice. The objective of this study is to determine the gap between guidelines and real life.

Methods

Multicenter, prospective, non-interventional study on iNO administered through an integrated delivery and monitoring device (EZ-KINOX™) in 7 centers. The following parameters were observed: dose, treatment duration, ventilation modes, monitoring procedures, weaning procedures and occurrence of a rebound effect. Concomitant treatments and safety data were collected.

Results

119 patients with pulmonary hypertension (PPHN and children with post-cardiac surgery) were enrolled within one year period. The median dosage of iNO was 16.7 ppm (4;20) for neonates and 20 ppm (2;20) in the pediatric group with a median treatment duration of 3 days (0.3;18.5) and 3.9 days (0.2;61) respectively. iNO was
delivered during controlled ventilation mode, high frequency oscillation and spontaneous ventilation including high flow nasal ventilation and monitored in 63% and 99% of the cases. The clinical effect of iNO was considered sufficient in 94% of the cases. 23 adverse events were identified including rebound effect among each group; 2.6% and 1.3% respectively. Methemoglobinemia exceeds 2.5% in 7.9% of the neonates. Adverse events recovered without sequelae. Pulmonary vasodilators were associated in 95% of the cases in Pediatrics and 23.7% in Neonatology.

Conclusions

This survey confirms the good efficacy and safety of NO therapy in both populations. The usage of last generation of NO devices subject to prior training allows good compliance with recommendations.
Aims & Objectives:

Complex congenital heart surgery may induce long duration of mechanical ventilation. This MV has to be protective avoiding VILI during PSV, VCV HFO, NAVA, and NIV. As a high percentage of these patients experiences pulmonary hypertension, the delivery of pulmonary vasodilators has to be available and accurate in all the ventilation modes.

Methods

With a new device able to deliver and monitor inhaled NO, 51 patients were included, with a median of 4 [2 to 6] measurements per patient. Of the 195 measurements, 115 were performed on pressure controlled ventilation, 9 on volume controlled, 3 on high frequency oscillatory ventilation and 68 on non-invasive mechanical ventilation. The Bland Altman methodology was used to evaluate the agreement between the set and the measured iNO concentrations.

Results

The Bland-Altman plot is shown in Figure 1. The measurement error, as assessed by the mean value of the difference, was significant (mean -1.01, [-3.27 – 1.24] ppm, one sample t-test p value < 0.001), indicating the presence of a fixed bias. We could not identify any proportional bias, and the slope of the linear regression of differences on averages was not significant (p=0.14). The mean bias on controlled ventilation was -1.13 [-3.65 – 1.36] ppm and was -0.76 [-2.36 – 0.84] ppm on non-invasive ventilation.
Figure 1: Bias: the difference between the set and delivered concentrations; Average concentration: the mean of the set ad delivered concentrations; in dotted lines the mean and 95% CIs of the difference.

Conclusions

There was a -8.6 %, 95% CI [-26.0 – 8.8] difference between the delivered concentration and the concentration set at the device. iNO delivery is possible safely and accurately in different ventilation modes including PSV, VCV, HFO, NAVA, and NIV.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0407
TRANSFUSION PATTERN OF FRESH FROZEN PLASMA IN A TERTIARY TURKISH PICU; MORE THAN JUSTIFIED PER GUIDELINES?
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Aims & Objectives:
Recent guidelines suggest more conservative strategies for blood products. We aimed to evaluate the incidence and indications for fresh frozen plasma (FFP) infusions in our tertiary PICU over the last 4 years.

Methods
Design and setting: Retrospective descriptive study, university based medicsurgical PICU

Inclusion: 0-18 year old critically ill patients who received FFP (2012-2015)

Exclusion: Anticoagulated patients

Results
Among 1272 PICU admissions, 171 admissions (13%) of 145 patients were eligible. Median age was 22 months (IQR 8-83). Median PICU stay was 7 days (minimum 1, maximum 290). Sepsis was the most commonly entertained diagnosis (44%), followed by trauma (18%). 28% had malignancy as comorbidity. On 48 occasions (28%) patients had liver failure. Most patients (81%) had additional blood products. 63% had thrombocytopenia, and 44% (n: 75) had bleeding. Hemorrhage was severe in 26 (35%) and mild in 49 (65%).

Most common indication for FFP was abnormality of coagulation tests (32.9%), followed by DIC (± hemorrhage), severe bleeding, mild bleeding with coagulopathy and coagulopathy before risky procedures. Mean FFP administered was 12.4 (± 4.2) ml/kg. 21 patients (12%) had scheduled administration every 12 hrs (n:8), and 8 hrs (n:6) and 6hrs (n:4) respectively. Bleeding resolved in 67%. Overall mortality among FFP recipients was 47%.

Conclusions
Majority of FFP transfusions were triggered by abnormal coagulation tests without bleeding. Reevaluation of practice under current guidelines may help to prevent unjustified use.
SIGNIFICANT DIFFERENCES IN REASONS FOR RAPID RESPONSE TEAM ACTIVATION IN CHILDREN THAT RECEIVE ALTERED CALLING CRITERIA FOLLOWING ASSESSMENT IN A TERTIARY CHILDREN'S HOSPITAL

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Aims & Objectives:

Calling criteria for paediatric rapid response teams (RRT) vary between jurisdictions. Single calling criteria activations are used in NSW Health, Australia with variable “red zone” mandatory activation parameters set for different age groups. Standard parameters may be altered following assessment before or after RRT activation in order to better reflect physiological thresholds that require urgent attention in individual patients.

This study examined single activation criteria in a track and trigger calling system in order to describe differences in frequency of specific calling criteria in children that did or did not receive altered calling criteria following assessment by the RRT.

Methods

Prospectively captured data was reviewed to determine calling criteria in children activating the RRT over a 4 year period (2012 -2015) at Children's Hospital at Westmead, Australia.

Only calls with a single nominated reason for initial activation were included. All calls were in children already admitted to a ward area.

Frequency of specific activation criteria were determined in children that did and did not receive subsequent alteration in calling criteria following assessment by the RRT.

Chi square test of independence was used to determine differences in activation criteria between the 2 groups.

Results

Significant differences were observed in activation criteria for children in whom RRT assessment resulted in altered calling parameters (p<0.0001). Relatively few children activating calls due to abnormal respiratory effort or level of consciousness
had criteria for further calls altered.

Conclusions

Frequency of alteration of mandatory calling criteria following activation and assessment of RRT varies depending on the initial calling criteria.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0737
IMPACT OF DIFFERENT INITIAL EPINEPHRINE TREATMENT TIME POINTS ON THE EARLY POST-RESUSCITATIVE HEMODYNAMIC STATUS OF CHILDREN WITH TRAUMATIC OUT-OF-HOSPITAL CARDIAC ARREST
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Aims & Objectives:

The post-resuscitative hemodynamic status of children with traumatic out-of-hospital cardiac arrest (OHCA) might be impacted by the early administration of epinephrine, but this topic has not been well addressed. The aim of this study was to analyze the early post-resuscitative hemodynamics, survival and neurologic outcome according to different time points of first epinephrine treatment among children with traumatic OHCA.

Methods

Information on 388 children presented to the emergency departments of three medical centers and who were treated with epinephrine for traumatic OHCA during the study period (2003-2012) were retrospectively included. The early post-resuscitative hemodynamic features (cardiac functions, end-organ perfusion and consciousness), survival and neurologic outcome according to different time points of first epinephrine treatment (<15, 15 to 30 and >30 minutes after collapse) were analyzed.

Results

Among 165 children who achieved sustained return of spontaneous circulation (ROSC), 38 (9.8%) survived to discharge, and 12 (3.1%) had good neurologic outcomes. Early treatment with epinephrine (<15 minutes after collapse) increased the post-resuscitative heart rate and blood pressure only in the first 30 minutes but ultimately impaired end-organ perfusion (decreased urine output and initial creatinine clearance) (all p<0.05). Early epinephrine increased the chance of achieving sustained ROSC but did not increase the rates of survival and neurologic outcome.
Total 435 traumatic OHCA children

1. Excluded children who did not receive pre-hospital resuscitation or the duration of pre-hospital was unclear n=18

EMS/Witness resuscitation n=417

2. Excluded children who did not receive any epinephrine during resuscitation n=29

Final study population comprised 388 children

Time between collapse and first epinephrine was <15 min n=97
- Died n=46
- Sustained ROSC n=51
  - Died during hospital stay n=42
  - Survival n=9
  - *Good neurologic outcomes n=3 (PCPCS =1 or 2)

Time between collapse and first epinephrine was 15-30 min n=223
- Died n=131
- Sustained ROSC n=92
  - Died during hospital stay n=71
  - Survival n=21
  - *Good neurologic outcomes n=7 (PCPCS =1 or 2)

Time between collapse and first epinephrine was >30 min n=68
- Died n=46
- Sustained ROSC n=22
  - Died during hospital stay n=14
  - Survival n=8
  - *Good neurologic outcomes n=2 (PCPCS =1 or 2)
Conclusions

Epinephrine (<15 minutes after collapse) temporarily increased heart rate and blood pressure in the first 30 minutes of the post-resuscitative period but impaired end-organ perfusion. Most importantly, the rates of survival and good neurologic outcome were not significantly increased by early epinephrine administration.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0910
UTILIZING ELECTRONIC PAEDIATRIC RESUSCITATION ALGORITHMS IN A MIXED EMERGENCY DEPARTMENT

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Aims & Objectives:

Campbelltown Hospital Mixed (Adult & Paediatric) Emergency Department (ED) serving over half a million people in the South-West Suburbs of Sydney. With attendance rate of over 65,000 per year of which 25% are children. Over 200 different junior medical officers rotate through the ED and are responsible for front-line care of these children. The majority of these doctors; have had limited experience and formal training in paediatric resuscitation. It is vital, therefore, to have prominent protocols for management which can be followed by junior doctors and referred to by experienced nurses in the early moments of resuscitation before more senior paediatricians are able to contribute.

To ensure standards, since 2009, the Department of Paediatrics has displayed algorithms for care in prominent, large screen format, on the walls of the ED above resuscitation bay. These algorithms display step by step management with appropriate medicines and doses calculated per kilogram of the patient.

Aim: To report the usefulness of algorithms displayed on prominent electronic screens bedside resuscitating beds for status management of asthma; epilepsy and drug dosing in a busy suburban hospital.

Methods

A chart review of children in resuscitation area and survey of use by staff in the department.

Results

The algorithms permitted standardisation of care along established protocols. They were a prominent reference for uniform care and avoided the need for consultation with varying protocols from other sources. Thus, they were an immediate source of guidance. They also permitted experienced nursing staff to guide junior doctors with a minimum of confusion and avoided conflict with all parties. Their usefulness was noted to increase in accordance with the urgency for treatment.

Conclusions

The prominently displayed algorithms have proven a valuable adjunct to emergency care, permitting appropriate, rapid, standardised care, reducing the complications of stress and confusion.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0891
CLINICAL SIGNIFICANCE OF GREY-WHITE MATTER RATIO IN POST CARDIOPULMONARY RESUSCITATION IN PEDIATRIC PATIENTS.
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Aims & Objectives:
Approximately 50% of cardiopulmonary resuscitation (CPR) have successful return of spontaneous circulation (ROCS). Predictors of neurologic outcome after CPR are not yet been established in pediatric patients. Computed tomography (CT) scans of the brain shows characteristic findings after cardiac arrest such as a loss of differences between grey matter (GM) and white matter (WM). Herein, we analysed the densities of GM and WM in CT scans of patients after ROSC to evaluate whether the densities can have clinical significance in pediatric patients.

Methods
We retrospective reviewed post-CPR patients from Jan 2010 to Dec. 2015. We enrolled those who underwent brain CT within 24h after ROSC. We excluded those who had underlying brain lesions, hemorrhage or developmental delay. We measured density in housefield unit by using circular regions of interests (10mm²) in GM (caudate nucleus and putamen, medial cortex) and WM (posterior limb of internal capsule, genu of corpus callosum, medial white matter). We calculated GWR and compared GWR with normal controls.

Results
Among 40 pediatric patients who had CPR, 28 met inclusion criteria. The mean average GWR in patients who underwent CPR were 0.94±0.07. The mean av GWR in controls were 1.00±0.06. Av GWR in post CPR patients were significantly lower than controls (p=0.0025). Among those 28 patients, 5 had none to mild neurologic compication, 5 had moderate, 7 were coma, 10 could not survive after CPR. There was no statistical difference in GWR regarding neurologic outcome.

Conclusions
There was clinical significance of GWR in post CPR pediatric patients. Further prospective studies are needed.
Aims & Objectives:

Studies of mature emergency response systems in adult hospitals demonstrate improved patient outcomes with increased number of Rapid Response Teams (RRT) activations and the introduction of nurse led RRT. However no study to date has shown any clear relationship between RRT dose and mortality in hospitalised children.

Study Objectives: To evaluate the relationship between RRT dose and patient outcomes in a predominantly Nurse Practitioner led mature Paediatric Intensive Care Outreach Service (PICOS). Methods

Prospectively collected data for PICOS activity for a 6 year period (2009 – 2014) was analysed to determine PICOS activations per 1000 hospital admissions (RRT dose), number of paediatric intensive care unit (PICU) admissions in deteriorated ward patients, PICU and overall hospital mortality. Data were cross-referenced with the PICU admissions database and the hospital admissions database to ensure relevant data were captured.

Results

RRT dose ranged from 16.1 to 43.0 per 1000 hospital admissions, with an annual increase in dose noted since introduction of a track and trigger system to initiate calls in 2011. PICU admission rate for deteriorated ward patients ranged from 4.8 – 6.3 per 1000 hospital admissions. PICU mortality following a PICOS call ranged from 10.5% to 4.2% per annum and is strongly correlated to the RRT dose ($R^2 = 0.9638$). No correlation is seen between RRT dose and overall hospital mortality (all patients) ($R^2$...
Conclusions

Decreased PICU mortality in deteriorated ward patients is strongly correlated with RRT dose in a predominantly Nurse Practitioner led Paediatric Intensive Care Outreach Service. No correlation with overall hospital mortality is observed.
Aims & Objectives:

To determine if the Hybrid Pediatric Weight Estimation Method (Handtevy) is a more accurate measure of weight in children ages 1 to 10 years old compared to the Broselow Length-Based Tape

Methods

Pediatric patients between the ages of 1-10 years old who were seen at the outpatient department were included in the study. Actual height, weight, body mass index and Broselow tape measurement and Handtevy weight approximations were obtained for all subjects. Percentage differences were used to analyze the discrepancy between estimates and actual weight. Data were entered into a computerized database using SPSS (version 21; SPSS Inc., Chicago, IL USA) software and GraphPad Prism Software. Using the ordinal scale of level of measurement, data were presented in frequency distributions, rates, ratios, and Pearson r correlation. Percentage differences between estimates and actual weight were analyzed by using the Bland-Altman method and the scatter plot.

Results

The relationship between the Handtevy estimated weight and Broselow estimated weight results was a strong positive correlation ($r = 0.900$). The Handtevy weight estimates and actual weight results has linear positive relationship ($r = 0.761$). The Broselow weight estimates, and actual weight results have a strong negative correlation ($r = -0.850$). The percentage of children in Broselow method whose weight was estimated within 10% and 20% was lower for the Handtevy method. Thus, the Handtevy Weight Estimation Method performed significantly better than Broselow Weight Estimation Method. The mean difference of all dosages computed using handtevy method was noted as positive which implicated as overestimated dosages of drugs being administered. Thus, the mean differences in Broselow method were having underestimated dosages.

Conclusions

The Handtevy estimation method was the more accurate and precise method of rapid pediatric weight estimation compared to the Broselow length-based tape method.
Aims & Objectives:

To compare the success rates of UAC insertion in preterm infants born ≤ 27 0/7 weeks of gestation in the delivery room (DR) (i.e., within the first 30 minutes of life) or after admission to the neonatal intensive care unit (NICU) (i.e., at the age of 60 minutes or more).

Methods

Comparative cohort study of all preterm infants born alive at ≤ 27 0/7 weeks of gestation who required an UAC placement and were admitted to our NICU. In infants who were born between January 1, 2008 an September 30, 2010, UAC insertion was attempted after admission to the NICU (cohort I). Starting on October 1, 2010 unit policy was changed and UAC insertion was attempted in the DR (cohort II) and data were recorded till August 30, 2013.

Results

A total of 81 infants were included in the analyses (cohort I: 44 infants, cohort II: 37 infants). The two groups were comparable with respect to gestational age, birth weight, prenatal history (exposure to antenatal corticosteroids, rate of preeclampsia, amnion infection syndrome, vaginal bleeding), delivery mode, and postnatal adaptation (cord pH values, Apgar scores at 5 minutes).

Early attempts of UAC insertion in the DR were associated with higher success rates compared with late attempts in the NICU (97% vs. 77%, respectively, p=0.007 Fisher’s exact test). There were no statistically significant differences in the rate of late-onset sepsis, periventricular/intraventricular hemorrhages, necrotizing enterocolitis, isolated intestinal perforation and mortality. There was a non-significant trend towards a higher mortality rate in cohort I (27%) than in cohort II (19%) (RR 1.44, 95% CI 0.63-3.28).

Conclusions

UAC Insertion in the DR within the first 30 minutes of life is feasible and is associated with a higher success rate when compared with delayed insertion in the NICU.
Aims & Objectives:

We aim to determine if paediatric traumatic brain injury (TBI) patients who presented to district general hospital reach definitive neurosurgical/neurointensive care within the recommended 4 hours post-injury.

The gold standard for paediatric patients with TBI is for transfer to a centre that can provide definitive neurosurgical/neuro-intensive care within 4 hours. It is unclear if Scottish paediatric TBI patients presented to district general hospitals are transferred to definitive neurosurgical/neurointensive care within this recommended time frame.

Methods

A retrospective case note review of all patients admitted to PICU, RHSC Edinburgh through the Scottish Retrieval Service with TBI was undertaken. Referrals over a 20-month period from April 2012 were studied. A pre-designed proforma was used for data collection including demographics, clinical information and interhospital transport.

Results

14 patients were studied. 3(21%) were transferred by the referring team in district general hospitals due to neurosurgical emergency. 11(79%) were transferred by the Edinburgh retrieval team. Two of the patients transported by the referring team were from hospital greater than 50miles from the receiving hospital (256miles,154miles). One of these patients was moved by fixed wing air ambulance. The median distance from the referring hospitals to Edinburgh PICU was 27miles (range 27-256miles). Of those retrieved by the Edinburgh retrieval team, the outgoing method of transport was road ambulance in 10/11(91%), and fixed wing 1/11(9%)
Table 1:

<table>
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<tr>
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<th>Median (Ranges)</th>
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<tbody>
<tr>
<td>Time from decision to team departure</td>
<td>65minutes (35 - 165 minutes)</td>
</tr>
<tr>
<td>Time from decision to team arrival at referring hospital</td>
<td>180minutes (70 -280 minutes)</td>
</tr>
<tr>
<td>Time spent at referring hospital prior to transfer</td>
<td>100minutes (30 – 195 minutes)</td>
</tr>
<tr>
<td>Time from decision to transfer to actual arrival at receiving hospital</td>
<td>280minutes (160 - 540 minutes)</td>
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Conclusions

The time taken to on average to transport patients with TBI to a centre for neurosurgical/neurointensive care was longer than the 4hours currently recommended, and warrants further investigations into how this may be improved.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0482
WHY WAIT? ARE REFERRING HOSPITALS DELAYING INTUBATION BY AWAITING PAEDIATRIC INTENSIVE CARE RETRIEVAL TEAMS?

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Aims & Objectives:

Most critically ill children require intubation for transfer to Paediatric Intensive Care (PIC). Timely intubation by referring teams reduces the time taken for patients to reach PIC, reduces complications of prolonged respiratory failure and improves transport team efficiency. However, there are perceptions that referring hospitals increasingly delay intubation whilst awaiting the retrieval team due to ‘de-skilling’.

Is the introduction of specialist retrieval teams associated with increased time to intubate children?

Methods
Retrospective review – comparing the proportion of patients not intubated within 1h of decision to intubate between November/December 2010 (first two months of the service operating) and November/December 2015.

Results

Patients not intubated >1h after decision:
2010: 10/100 (10%).
2015: 4/89 (4.5%)

Time taken to arrive at referring centres has improved: mean 224 minutes (30 – 530 minutes) in 2010 to 119 minutes (30 - 435 minutes) in 2015.

Reasons for delaying intubation were explored. Prematurity did not seem to be associated with delay (minimum corrected gestational age = 34 weeks). Referring teams appropriately waited for support when difficulty was anticipated. Failure to intubate by the referring team was uncommon (n=4). Documentation of laryngoscopic grade has improved – 12/100 (12%) in 2010 to 64/89 (72%) in 2015.

Conclusions

Our results do not support the hypothesis that the introduction of a retrieval service is associated with delayed intubation. Nevertheless, the number of patients who are not intubated should be further reduced. We believe that case reviews, outreach education and an intubation guideline are empowering referring clinicians to begin stabilising patients whilst awaiting the retrieval team.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0410
PILOT DATA EXPLORING FORCE APPLIED TO CHILDREN’S CHESTS DURING COMPRESSIONS FOR CARDIOPULMONARY RESUSCITATION; FORCE RELATIONSHIP WITH AGE, REAL-TIME CARDIAC RESPONSE AND TO MANIKIN DATA
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Aims & Objectives:

Pediatric chest compressions for resuscitation are commonly used but poorly understood. While International Guidelines specify rate and depth, measuring the force used enables comparison of effort required from birth to adulthood.

Objective: To determine the forces used during cardiac arrest, relating force to age, cardiac response and to existing manikin data.

Methods

A thin force-sensing mat placed over the child’s chest recorded compressions. Compressions were delivered in the rescuers’ usual manner, the mat under their hand. Where already clinically monitoring, Lidco Rapid® provided hemodynamic data. Retrospective consent to use resuscitation data was sought from the children’s families and rescuers. Results were compared with the compression and residual forces (N) we previously recorded from 50 subjects repeatedly treating the same manikin (estimated ‘age’ 6 years; force ranges 142-769 and 0-49, respectively).

Results

Fourteen recordings were obtained from 10 children (5 females; age range 0.08 to 11 [median 2.2] years). Three were monitored with Lidco Rapid®. Compression force was related to age (Spearman’s rₛ=0.51, p<0.05; median 264N range 147 to 476N. Residual force ranged from 0 to 42N (median 26N) and was unrelated to age. The extreme forces recorded during the manikin study were not replicated in this clinical sample. Visual analysis of the inter-related compression and cardiac output data showed varying output effects.

Conclusions

Preliminary data suggest relating compression force to age and cardiac response provides valuable information on treatment effect. Feedback technologies reporting rate plus force could assist clinical trials to evaluate pediatric practice, helping improve staff instruction and children’s survival.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0604
REDUCTION IN MORBIDITY AND MORTALITY FOLLOWING RAPID RESPONSE TEAM IMPLEMENTATION

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Aims & Objectives:

Inconsistent outcomes have been reported for rapid response team (RRT) implementation in children's hospitals. We evaluated effectiveness of a physician-led RRT program upon morbidity and mortality for children requiring unplanned admission to the pediatric intensive care unit (PICU).

Methods

We constructed a dataset of all unplanned admissions from the ward to the PICU that included patient demographics, hospitalization characteristics, resource use and outcome. We divided the dataset into pre- and post-RRT groups for comparison. We calculated a therapeutic intensity scale (TIS) to measure PICU resource use at the time of transfer. We used a Cox proportional hazards model to identify the patient and intervention characteristics associated with unplanned admission PICU mortality.

Results

Implementation was associated with significant improvement in unplanned admission severity of illness, length of stay, and mortality. Therapeutic intensity scale values ranged from 0 (1,110 cases) to 36 (1 case). There was no difference in TIS values in the post-RRT period compared to the pre-RRT period. The relative risk of death following unplanned admission to the PICU after RRT implementation was 0.685.

Conclusions

For children requiring unplanned admission to the PICU, implementation of a rapid response team resulted in a statistically reliable reduction in mortality, admission severity of illness and length of stay. These findings occurred in the setting of greater resource use at the time of PICU admission, suggesting that RRT implementation leads to more proximal capture and aggressive intervention in the trajectory of a decompensating pediatric ward patient.
Aims & Objectives:

Tumor lysis syndrome (TLS) is a metabolic disorder brought about by rapid tumor cell destruction and considered as an emergency. Tumor lysis syndrome commonly occur after initiation of therapy but can also occur without therapy.

Methods

Management of TLS includes hydration, hypouricemic agent, and sometimes renal replacement therapy. This case describes a patient with Non-Hodgkin Lymphoma who has acute TLS after tracheotomy and open biopsy under general anesthesia.

Results

Patient showed good responses to hydration and hypouricemic agent, before his condition deteriorate quickly and going into cardiac arrest.

Conclusions

Tumor lysis syndrome should be taken into consideration in patients with malignancy which will be anesthetized.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0924
QUALITY IMPROVEMENT OF E-CPR PROCESS: DECONSTRUCTING INTERVALS OF CARE TO UNDERSTAND THE SOURCES OF DELAYS IN THE INITIATION OF E-CPR

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Aims & Objectives:

Background: E-CPR involves using extracorporeal membrane oxygenation with cardiopulmonary resuscitation for cardiopulmonary arrests (CPA). The performance of alarm and communication systems, health care provider’s teams, across different locations, must function efficiently, to achieve time to Return of Ciculation (ROC) within 30 min of the event.

Objectives: To measure the duration of intervals A, B and C (Fig 1.); understand the possible sources of delays and propose possible solutions.

Methods

Methods: Retrospective review (eHR, EMR, Resuscitation sheets, Code blue bell and ECPR pager logs, T3™) of the CPA events associated with an ECPR process in 2014. Times of Code blue launch, of cardiac compressions, of ECPR launch and of ROC were recorded. Intervals A, B and C were calculated. Weight and cannulation site were recorded.

Results

Results: Single resource did not have all information. 39 ECLS runs, 13 resuscitation related (11 ECPR and 2 urgent). 15 events – 13 in CCU, 1 in NICU, 1 on Cardiology ward. 11 ECPR: 10 in CCU and one NICU. 11 ECPR Resuscitation time: 21 to 64 min (Mean: 45.3min, Median: 43min). Maximum delay in interval C. Patient’s weight or hour of cannulation do not change the interval C. Four had ROSC. Two were cannulated immediately. Other two ECPR was called off. Cannulation site: 5 chest and 8 neck. Chest cannulations faster than the neck.

Conclusions

Conclusions: E-CPR template in EMR. Deconstruct Interval C: 360 review with all teams critical care, surgeons and ECMO specialists. In situ simulation for practice and improvement.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0676
OUTCOMES OF RAPID RESPONSE CALLS WITHIN A TERTIARY CHILDREN'S HOSPITAL GENERATED FROM SINGLE CRITERIA ACTIVATION ON A TRACK AND TRIGGER OBSERVATIONAL CHART
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Aims & Objectives:

A track and trigger system, Between the Flags (BTF) was designed as an early warning system to detect deteriorating patients and critical illness within the hospital. Several studies have shown that early detection of deteriorating patients can lead to improved patient outcomes and reduce unexpected admissions to ICU.

Aim:

Evaluation of patient outcomes in children that had a single criteria activation from a rapid response track and trigger system within a four year period (2012-2015).

Methods

Prospectively collected data captured in the electronic patient records was reviewed to determine the cause and the outcome for patients following a single criteria activation. Deteriorated ward patients activating a single criteria for rapid response from January 2012 through December 2015 were reviewed in a paediatric tertiary centre. Patients with more than one activation criteria were excluded from analysis.

Results

From 3423 total calls over 4 years there were 1833 patients that had a single activation criteria (54%). Of those patients with a single activation trigger 7% were admitted to the Paediatric Intensive Care Unit (PICU).

The single activation criteria of 'work of breathing' resulted in over 36% of patients requiring PICU admission. In comparison 'Level of Consciousness' 12%, 'Oxygen Saturation' 11%, 'Respiratory Rate' 8%, 'Blood Pressure' 7% and 'Heart Rate' 3%. No patients with a single criteria activation for temperature, were admitted to PICU.

Conclusions

More than half of the rapid response calls were triggered by single criteria activation, with a small portion of these resulting in PICU admission. The single activation criteria 'work of breathing' resulted in the highest number of PICU admissions.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0235
VALIDATION OF THREE PEDIATRIC EARLY WARNING SCORES IN PEDIATRIC INTERMEDIATE CARE UNIT


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Aims & Objectives:

Pediatric Early warning scores were created to quantify severity of illness across in hospitalized children in pediatric ward or emergency unit. Pediatric intermediate care units are alternative structures for moderate ill children. The aim of this study was to assess the validity of three pediatric early warning scores in pediatric intermediate care units.

Methods

Prospective, observational, multicenter cohort study in seven French regional hospitals (09/2012-01/2014) including all consecutive children <18 years. Three scores (bedPEWS¹, PAWS², and PEWS³) were calculated each 8 hours and more if deterioration. Binary outcome criteria were “medical call (MC)”, “MC with complementary exams”, “MC with therapeutic administration” and “admission to
Pediatric intensive care Unit (PICU)*. We used areas under ROC curve (AUC) to estimate discrimination.

Results

2868 children are included for a total of 19071 observations for calculating the three scores. The median age (interquartile range) was 29 months [5-103]. Medians (interquartile range) of scores were respectively 2 [1-4], 2 [1-4] and 1 [0-3]. MC was observed in 11%, MC with complementary exams in 5%, MC with therapeutic administration in 5% and admission to PICU in 0,45%. AUCs calculated for the three scores for predicting only MC, and associated with either complementary exams or either therapeutic administration ranged from 0,84 to 0,88. AUCs for predicting PICU admission ranged from 0,80 to 0,94.

Conclusions

The three scores, developed from pediatric ward and emergency department, can be used to detect deterioration requiring a medical intervention or PICU admission (in hospitalized children) in pediatric intermediate care unit.
Aims & Objectives:

Invasive mechanical ventilation (IMV) is frequently used in the neonatal period. Knowing risk factors of neonatal IMV could help prepare for the birth of at-risk neonates. The aim of this study was to identify those risk factors.

Methods

This is a retrospective cohort study from the Quality of Care, Obstetrics Risk Management, and Mode of Delivery (QUARISMA) study database(1), including all singleton neonates ≥37 weeks gestational age on a 3½-year period. Fifty-seven potentially clinically significant risk factors have been identified and were entered in a multivariate logistic regression.

Results

In all, 170 015 neonates were included: mean gestational age of 39.2±1.1 weeks. A total of 828 patients required IMV (0.5%). We obtained models for multiparous and nulliparous women (table 1). Maternal age, foetal malformation, mode of delivery, foetal distress during labor and general anesthesia were significant risk factors for multiparous and nulliparous women. Placental abruption, polyhydramnios and uterine rupture were significant for multiparous women and referral from another hospital, foetal sex, eclampsia, premature rupture of membranes and chorioamnionitis for nulliparous women. The multiparous model had a sensibility of 13.5% and specificity of 99.5% with a calibration curve $R^2$ of 0.48.

Conclusions

More risk factors need to be identified in order to obtain a predictive model of neonatal mechanical ventilation. The presence of certain risk factors should alert physicians to the possibility of IMV. A predictive model should be developed to encourage them to better organize the resources needed for the birth of these at-risk neonates.

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Beta</th>
<th>OR</th>
<th>OR 95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiparous</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Antepartum factors</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Foetal malformation</td>
<td>2.81</td>
<td>16.53</td>
<td>9.28-29.43</td>
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<tr>
<td>Placental abruption</td>
<td>0.96</td>
<td>2.82</td>
<td>1.31-5.23</td>
</tr>
<tr>
<td>Polyhydramnios</td>
<td>1.28</td>
<td>3.50</td>
<td>1.87-6.93</td>
</tr>
<tr>
<td>Maternal age</td>
<td>0.05</td>
<td>1.05</td>
<td>1.01-1.10</td>
</tr>
<tr>
<td><strong>Peripartum factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method of delivery</td>
<td>0.42</td>
<td>1.53</td>
<td>1.17-1.99</td>
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<tr>
<td>Foetal distress during labor</td>
<td>1.31</td>
<td>3.72</td>
<td>2.51-5.52</td>
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<tr>
<td>General anesthesia</td>
<td>1.30</td>
<td>3.59</td>
<td>1.77-7.66</td>
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<tr>
<td>Uterine rupture</td>
<td>1.73</td>
<td>5.56</td>
<td>1.04-30.9</td>
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<tr>
<td><strong>Nulliparous</strong></td>
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<tr>
<td><strong>Antepartum factors</strong></td>
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</tr>
<tr>
<td>Foetal malformation</td>
<td>2.24</td>
<td>9.35</td>
<td>5.05-17.32</td>
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<tr>
<td>Maternal age</td>
<td>0.04</td>
<td>1.04</td>
<td>1.01-1.08</td>
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<tr>
<td>Referral from another hospital</td>
<td>1.16</td>
<td>3.17</td>
<td>1.41-7.15</td>
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<tr>
<td>Eclampsia</td>
<td>2.71</td>
<td>14.97</td>
<td>1.72-130.18</td>
</tr>
<tr>
<td>Sex of the foetus</td>
<td>0.39</td>
<td>1.48</td>
<td>1.08-2.02</td>
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<tr>
<td>Premature rupture of membranes</td>
<td>-1.03</td>
<td>0.36</td>
<td>0.18-0.73</td>
</tr>
<tr>
<td><strong>Peripartum factors</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Method of delivery</td>
<td>0.31</td>
<td>1.37</td>
<td>1.15-1.63</td>
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<tr>
<td>Foetal distress during labor</td>
<td>1.13</td>
<td>3.10</td>
<td>2.23-4.30</td>
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<tr>
<td>General anesthesia</td>
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<td>5.71</td>
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<tr>
<td>Shoulder dystocia</td>
<td>1.08</td>
<td>2.95</td>
<td>1.66-5.21</td>
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<tr>
<td>Chorioamnionitis during labor</td>
<td>0.57</td>
<td>1.76</td>
<td>1.16-2.67</td>
</tr>
</tbody>
</table>

$R^2$ (Nagelkerke) for multiparous: 0.122 / $R^2$ (Nagelkerke) for nulliparous: 0.115

**Table 1:** Regression model of antepartum and peripartum risk factors of neonatal mechanical ventilation for multiparous and nulliparous women.

**Beta:** Regression coefficient

**OR:** Odds ratio of mechanical ventilation

**OR CI95%:** 95% confidence interval for odds ratio of mechanical ventilation
Aims & Objectives:

The purpose of this study was to construct an endotracheal tube depth prediction model using neck computed tomography (CT) images.

Methods

A retrospective image review including patients who had performed neck CT was analyzed. Using sagittal neck CT images, we calculated the depth between upper incisor and mid-trachea, and then, derived the model by multiple regression. This model was validated externally with patients who underwent endotracheal intubation using chest radiographs and information of intubation depth. Also, to assess the effectiveness of this model, we compared our model with other methods (Broselow tape, APLS formula) using mean difference (MD), mean percentage error (MPE), mean absolute error (MAE).

Results

A total of 1111 children were included in this study. Tube depth derived from CT image analysis demonstrated a linear relationship to body weight [tube depth(cm) = 5.5 + 0.5 × body weight(kg), R²=0.742] in children younger than age of 1, and to height [tube depth(cm) = 3 + 0.1 × height(cm), R²=0.878] in children older than age of 1. After applying our model for the external validation sets, our new model (MD, -0.43 cm; MPE, 4.70%; MAE, 1.31 cm) showed better agreement with measured tube depth than Broselow tape (MD, -1.98 cm; MPE, -17.05%; MAE, 2.22 cm) and APLS formula (MD, -1.64 cm; MPE, -15.45%; MAE, 2.00 cm). Percentage of estimates within 10% of the actual measured values were 33.81%, 16.76%, and 22.44%, respectively (p<0.01).

Conclusions

We expect that our simple estimation method would provide guidelines to other pediatric patient groups.
Aims & Objectives:

There is no diagnostic criteria for critically ill secondary pancreatic injury. This study was to analyze the clinical data from critically ill children secondary pancreatic pathological injury and find effective indicators.

Methods:

We performed a retrospective study which included 79 patients hospitalized in pediatric intensive care unit of Hunan Children's Hospital who died and who were autopsied from Dec, 2010 to Sep, 2014. They were divided into injury group (n=41) and non-injury group (n=38) according to particularities of pancreatic pathological injury. The Modified Schmidt method was used to score the pathological changes. The clinical data, laboratory results were compared. Logistic regression analysis was used to identify the risk factors for pancreatic injury, the diagnostic capacity estimated by AUC.

Results:

(1) Modified Schmidt score was higher in injury group than non-injury group (P=0.000); (2) the incidence of abdominal distension, abdominal muscle tension, abdominal tenderness, lessened bowel sounds, convulsions in injury group higher than non-injury group (all P<0.05); (3) the median level of serum amylase, lipase, urinary amylase, glucose, lactate, ESR, ALT, AST, Troponin-I, the incidence of abnormal C-peptide and insulin were higher; calcium was lower in injury group than in non-injury group (all P<0.05). Serum amylase, lipase, urinary amylase, glucose, severity of sepsis were positively related with Modified Schmidt score ($r_s$1 = 0.420, $P=0.000$; $r_s$2 = 0.303, $P=0.007$; $r_s$3 = 0.325, $P=0.004$; $r_s$4 = 0.336, $P=0.002$; $r_s$5 = 0.386, $P=0.000$). (4) The incidence of hepatic injury, stress ulcer, coagulation dysfunction, severity of organ failure, PCIS, SOFA and PRISM III in both groups had statistically significant (all $P<0.05$). (5) Serum amylase, serum lipase, septic shock, ALT, AST were associated with the presence of pancreatic injury in critically ill children (all $P<0.05$). (6) AUC for serum amylase and serum lipase were 0.731 ($P=0.000$) and 0.727 ($P=0.001$).

Conclusions:

Amylase and lipase have a certain discrimination power for pancreatic injury in critically ill children. Patients with septic shock should be alert to secondary pancreatic injury. Critically ill children secondary pancreatic injury may have a worse clinical severity.
Aims & Objectives:

Whether beta cell dysfunction will affect the severity of disease in critically ill children remains unclear. This study was to analyze the relationship between Beta cell dysfunction and severity of disease in critically ill children.

Methods

1146 critically ill children admitted in pediatric intensive care unit (PICU) of Hunan Children’s Hospital from Nov, 2011 to Aug, 2013 were studied. The pancreatic beta cell function was evaluated by HOMA-β. They were divided into group I (HOMA-β ≥ 100%, n = 339), group II (80% ≤ HOMA-β ≤ 100%, n = 71) and group III (80% ≤ HOMA-β ≤ 40%, n = 293), group IV (HOMA-β < 40%, n = 443). Severity of illness was assessed using the worst SOFA, PRISM III score, the incidence of Organ damage, septic shock, MODS, mechanical ventilation (MV) and mortality. C-peptide, insulin, WBC, CRP, PCT and other laboratory results were recorded.

Results

Incidence of HOMA-β < 100% was 70.41%. C-peptide and insulin level showed a falling trend with worsening HOMA-β (P < 0.01). C peptide and insulin was positively related with HOMA-beta (rs1 = 0.443, rs2 = 0.443, P < 0.01), Positive correlation between insulin and C peptide (rs3 = 0.601, P < 0.01). The WBC level did not differ in four groups (P>0.05); the difference of CRP and PCT levels among groups were significant (P < 0.01). The worst SOFA score in group I, II, III, IV was 1.55±1.85, 1.71±1.93, 1.92±1.63, 2.18±1.77 (P < 0.05). The worst PRISM III score in group I, II, III, IV was 2.57±3.06, 3.20±3.85, 3.91±1.92, 4.36±2.06 (P < 0.05). Incidence of septic shock in Group IV was highest (7.22%), incidence of MODS in Group II was highest (21.12%), rate of MV in group II was highest (32.39%), mortality in Group I, II, III, IV was 7.08%, 12.67%, 5.12%, 12.67%. Incidence of septic shock, MODS, mechanical ventilation and mortality in four groups had Statistical significance (P < 0.05).

Conclusions

Beta cell dysfunction is existed in PICU. It a certain extent reflects the severity of disease in critically ill children.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0254
MANUAL VERSUS MECHANICAL CHEST COMPRESSIONS IN A PEDIATRIC ANIMAL MODEL OF ASPHYXIAL CARDIAC ARREST

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²Gregorio Marañón General University Hospital, Pediatrics, Madrid, Spain

Aims & Objectives:

Manual chest compression could be insufficient during resuscitation. Some studies in adults have shown that mechanical chest compressions are most effective than manual compressions, but there is no change in survival. There are no data in children. The objective of the study is to compare manual with mechanical chest compressions in a pediatric animal model of cardiac arrest.

Methods

An experimental model of asphyxial cardiac arrest in 50 piglets around 2 months old (median weight 9.6 kg) was performed. Two different cardiac massage techniques were employed: manual chest compressions in 30 cases and mechanical compressions in 20 cases with a pediatric chest massage device (Thumper 1007CC®). Systolic, diastolic and mean artery pressure, arterial blood gases and end-tidal CO₂ (etCO₂) values were obtained at 3, 9, 18 and 24 minutes after the beginning of resuscitation.

Results

There were no differences in artery pressure during the resuscitation except at 18 minutes. At this time, mechanical chest compressions obtained higher artery pressure with statistical significance only in diastolic pressure: systolic artery pressure (40 vs 30 mmHg p = 0.057), diastolic artery pressure (13 vs 7 mmHg p = 0.029) and mean artery pressure (22 vs 13 mmHg p = 0.057). There were no differences either in arterial blood gases and etCO₂ values within both chest compressions techniques. However there were lower survival rates in mechanical compressions group than in manual compressions one (20% vs 50%, p = 0.032) and higher incidence of pulmonary haemorrhage (45% vs 20%) without statistically significance p = 0.059

Conclusions

In a pediatric cardiac arrest model mechanical chest compressions group produced lower survival rates and higher incidence of pulmonary haemorrhage than manual one.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0774
TYPE B LACTIC ACIDOSIS DUE TO THIAMINE AND/OR MAGNESIUM DEFICIENCY IN CRITICALLY ILL CHILDREN

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Aims & Objectives:

Metabolic acidosis tied to increased lactate level is a common feature of critical illness. The lactate acidosis proceeds from hypoxia (type A) and hypo perfusion or pseudo hypoxia without evidence of actual hypoxia (type B). In the later form, lactic acidosis is secondary to the shift from the glycolysis towards the lactate pathway, due to dysfunction of pyruvate dehydrogenase complex, the key entry of Krebs Cycle (KC). Thiamine and magnesium seem essential to Mitochondrion pathways and at least thiamine for the KC.

In the past few years, high prevalence of Thiamine deficiency (TD) and magnesium deficiency (MD) have been reported in critically ill children. Could we link a single or combined micronutrient deficiency to the blockage of Krebs cycle and therefore to type B acidosis?

Methods

Scientific literature review from January 1985 up to January 2016: PubMed, Google scholar.

Results

A compelling evidence of thiamine deficiency is consistently associated with type B acidosis during paediatric critical illness. Few articles deal with the combine effect of magnesium and thiamine deficiency whereas many more indicate their individual link with type B acidosis. Furthermore, the worsened clinical signs related to thiamine deficiency might be strikingly reversed by thiamine administration, in all paediatric patients.

Conclusions

The review confirms a strong link between type B lactic acidosis and thiamine deficit. Hence, TD is a main cause of pseudo hypoxia. The interplay role deficit of magnesium in such situation remains neglected in critically ill children.

The potential impact of these findings should call for definitive therapeutic trials measuring clinical outcomes of giving thiamine and magnesium during the resuscitation phase in children in shock or in any pseudo-hypoxic state. There is a pressing need to highlight the potential synergic role of metabolic resuscitation when dealing with critically ill children.
Aims & Objectives:

Medical Emergency Teams (METs) reduce pediatric cardiorespiratory arrest. While most studies focus on MET as an intervention, there are only a few adult studies examining whether MET activations identify patients at high risk for morbidity and mortality, and could be used as an outcome. No pediatric studies have evaluated whether MET activation is associated with worse health outcomes.

The study objective was to determine the relationship between MET activations, mortality and length of stay (LOS) in hospitalized children.

Methods

Data on hospital admissions at the Children’s Hospital of Eastern Ontario (Ottawa, Canada) between 2007 and 2014 was linked to the MET database. Patients over 18 and those never admitted to the in-patient ward were excluded. Generalized Estimating Equation and Cox proportional statistical models were used to evaluate mortality and LOS, respectively. Multivariate models were performed to control for age, admission type and comorbidities.

Results

There were 42,315 admissions, with 1271 MET activations and 40 deaths. After covariate adjustment, increased mortality was observed for one (OR 10, CI: 4.1 – 24) and multiple (OR 35, CI: 14 – 86) activations. A significant difference in time to discharge was calculated for children with one (HR 0.53, CI: 0.47 –0.59) or multiple (HR 0.45, CI: 0.32–0.63) activations. The association persisted after removing the LOS prior to
activation, and controlling for PICU admission (Figure 1).

**Conclusions**

MET activation identified children at increased risk for death and prolonged hospital stay, and has potential as an outcome measure for research purposes. Children experiencing MET activation may benefit from enhanced care.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0540
CREW RESOURCE MANAGEMENT PROGRAM REDUCE MORTALITY IN ACUTE CARE FACILITY IN GUATEMALA
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¹Universidad de San Carlos de Guatemala,
Unidad de Terapia Intensiva Pediatrica / Hospital General San. Juan de Dios,
Guatemala, Guatemala

Aims & Objectives:
Determine the difference and impact in mortality rate in patients admitted to Public Hospital Acute Care Facility

Methods
A study was performed between January and December 2015 in Acute Care (undesigned and adapted ward) facility that complete the Pediatric Intensive Care Unit in Hospital General San Juan de Dios in Guatemala City. Social, economical and administrative challenges were faced in Guatemala during 2015; the impact of health services budget and authorities performance were in extremis for political crisis. Pediatric Surgery, Anesthesia, Pediatrics, Pediatric Intensive Care and nurse staff define common objectives related available resources. A widespread approach of Pediatric Advanced Life Support, Sepsis Guidelines and simulation teamwork multidisciplinary training were performed

Results
At least 1200 patients in emergency ward, 600 patients were admitted each year in this undefined area to acute care; 7 – 15 beds occupancy depends the epidemiological variances, 1:4 ratio nurse:patient and 1:6 to 1:10 doctor:patient ratio. Septic Shock, Infectious diseases, respiratory failure, pneumonia, brain injury and other shock causes leads 85% of patients. Extended shift (24 hours) and multiple non subsequent decision making increase uncertainty follow up strategies, performance and outcomes. 90% of patients are younger 60 months, LOS is shorten in surviving patients, Pediatric Risk of Mortality –PRISM III score was higher in these children. The observed mortality were 35% lower in this area (2014 vrs 2015) in the same period.

Conclusions
A Crew Resource Management plan includes 30 simulation training session, teamwork, learship and confidence enviroment have a result with observed mortality lower in performance 2015 than performance 2014 in worst conditions but improving the common objective and goals. CRM was a useful tool to reduce conflicts and improve performance in multidisciplinary approach to reduce mortality
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0555
OUTCOME BASED IN PREHOSPITAL AND EMERGENCY WARD PERFORMANCE TO RESTORE PHYSIOLOGICAL STABILITY IN PATIENTS ADMITTED TO PEDIATRIC INTENSIVE CARE UNIT IN GUATEMALA
L.A. Moya-Barquin¹, C.P. Orellana-Valiente¹
¹Universidad de San Carlos de Guatemala,
Unidad de Terapia Intensiva Pediatrica / Hospital General San. Juan de Dios,
Guatemala, Guatemala

Aims & Objectives:

Measure the difference in physiological stability and outcome in patients who spent less than 6 hours of initial stabilization approach in emergency ward (inpatient or outpatient) previous Pediatric Intensive Care Unit admittance in Public Hospital in Guatemala City

Methods

A study was performed between June and December 2015 in Pediatric Intensive Care Unit in Hospital General San Juan de Dios in Guatemala City. All patients were admitted to mechanical ventilation, The Pediatric Risk of Mortality Score – PRISM III score were performed as amount. Nutritional status as biochemical, anthropometric and clinical assessment were performed at admittance.

Results

85 patients were admitted. The physiological stability in patients based Pediatric Risk of Mortality – PRISM III score show a complex patient. Higher PRISM III is related with higher mortality, higher FiO2 and lower pH (p<0.003), (p<0.031) and (p< 0.025). There is no difference in nutritional status. In the follow up of acute care patient the risk factors related with mortality described at 6 – 72 hours and 1 week lapse; Higher PRISM III score, higher FiO2 amount and lower PaO2 continues since the admittance and is the result of hipoxia and ischemia prolonged conditions.

Conclusions

Early recognition, time-sensitive treatment, goal directed management and following the golden hour approach in acute care facilities could increase the survival. The prehospital and in hospital approach delays impact in physiological stability and promotes worsening conditions and increase mortality in Guatemala public hospital.
Aims & Objectives:

Introduction: Taking care of the airway as a first and foremost measure in managing critically ill children is ingrained in pediatric critical care medicine. PALS has taught us for a long time to think about taking over the airway in critically ill children with cardiopulmonary failure. This does seem to work in a majority of sick children. However, this could result in irreversible cardiopulmonary arrest in critically ill children who are in extremis.

Hypothesis: Addressing the circulation before the airway may lead to successful outcome in critically ill children in extremis.

Methods

This is a retrospective case review of a small group of critically ill children in extremis.

Results

Four patients who are critically ill with cardiopulmonary failure will be presented. The first child was a 15 years old girl presented to the ER with shock and cardiopulmonary failure. The second patient was a teen presented with shock and acute respiratory failure to the ER. The third was another teen that developed acute cardiopulmonary arrest while playing basketball S/P defibrillated several times at the scene with thready pulses and cardiopulmonary failure. The fourth was a young child with underlying Trisomy 21, S/P previous open heart surgery, presently septic with cardiopulmonary failure. The details of management with respect to airway, breathing and circulation will be presented. One child died while attempting to intubate after sedation and paralysis. The other three children were managed with respect to the circulation initially and other supportive measures with good outcomes.

Conclusions

The sequence of resuscitation in children with cardiopulmonary failure has long relied on airway and breathing as the first steps. This may not be the right sequence in certain critically ill children in extremis. Addressing the shock and providing other supportive measures before intubation may lead to successful resuscitation and outcomes.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0064
PREDICTORS OF CARDIO PULMONARY RESUSCITATION OUTCOME IN POST-OPERATIVE CARDIAC CHILDREN
1Prince Sultan Cardiac centre Qassim, cardiac surgery intensive care, buridha, Kingdom of Saudi Arabia
2Prince Sultan Cardiac centre Qassim, cardiology department, buridha, Kingdom of Saudi Arabia
3King Abdul Aziz Medical City. King Saud Bin AbdulAziz University., Pediatric Cardiac Intensive, Riyadh, Kingdom of Saudi Arabia

Aims & Objectives:

Outcome of cardiopulmonary resuscitation (CPR) in children with congenital heart disease has improved and many children survived after in hospital cardiac arrest. The purpose of this study is to determine predictor of poor outcome after CPR in critical children undergoing cardiac surgery.

Methods

We conducted a retrospective chart review and data analysis of all CPR records and charts of all postoperative cardiac children who had cardiac arrest and required resuscitation from 2011 till 2015. Demographic, pre-operative and post-operative data were reviewed and analyzed.

Results

During study period 18 post-operative pediatric cardiac patients had CPR. Nine of them had return of spontaneous circulation (ROSC) and survived (50%). On average CPR was required on the 3rd postoperative day. Univariate analysis demonstrated that poor outcome was associated with higher lactic acid measured 4 to 6 hours prior to arrest (P=0.045)(P=0.02) coupled with higher heart rate(P=0.031), lower O2 saturation (p=0.01) and lower core body temperature (P=0.019) recorded 6 hours before arrest. Non-survival required longer resuscitation duration and more epinephrine doses (P< 0.05).Conclusion: Higher Heart rate, lower core body temperature, lower O2 saturation and higher lactic acid measured 6 hours before arrest are possible predictors of poorer outcome and mortality following CPR in post-operative cardiac childr

Conclusions

Higher Heart rate, lower core body temperature, lower O2 saturation and higher lactic acid measured 6 hours before arrest are possible predictors of poorer outcome and mortality following CPR in post-operative cardiac children.
A COMPARATIVE STUDY ON THE ACCURACY OF THE THREE PEDIATRIC WEIGHT ESTIMATION MODALITIES: NELSON'S FORMULA, BROSELOW TAPE, AND FOOT LENGTH FORMULA

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Aims & Objectives:
To compare the predictive accuracy of 3 methods, the Nelson formula, Broselow tape and Foot length formula for pediatric weight estimation

Methods
All children, 3 months to 5 years of age, who sought consult or admission to the Under Five Clinic and the Emergency Department of Gov. Celestino Gallares Memorial Hospital and who qualified for inclusion in the study were weighed using a standardized weighing scale. Each patient's predictive weight was computed based on age using the Nelson formula. A predictive weight was also determined using the Broselow tape. And another predictive weight was also computed based on the Foot length formula: Weight = 4.339 + (0.380 x foot length in cm). All the predictive weights were compared to the actual weight and analyzed for accuracy using paired T-test.

Results
There were 559 children included in the study. The average actual body weight was 10.32 kg while the average predictive weights were 11.91 kg, 11.13 kg and 10.52 kg by Nelson's formula, Broselow tape, and Foot length formula respectively. These results showed that the Nelson formula overestimates the patient's weight by 1.59 kg, which is 15.4% of the actual body weight (ABW) with an accuracy of 84.6%. The Broselow tape overestimates the patient's weight by 0.81 kg, which is 7.8% of the ABW with an accuracy of 92.2%. The Foot length formula overestimates the patient's weight by 0.20 kg, which is 1.9% of the ABW with an accuracy of 98.1%. Pairwise comparison of patient's weights gave a p value of <0.001.

Conclusions
Foot length formula is the most accurate means to predict a child's weight. It is superior to both Broselow tape and Nelson's formula in predicting a child's weight.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0654
FEASIBILITY OF CO-ENROLLMENT IN TWO PEDIATRIC RESUSCITATION RANDOMIZED CONTROLLED TRIALS EMPLOYING AN EXCEPTION TO CONSENT
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²University of Ottawa, Pediatrics, Ottawa, Canada

Aims & Objectives:

Background: Conducting randomized controlled trials (RCTs) may be challenging in critically ill children for many reasons. The eligible patient pool is relatively small, and the frequency of outcomes such as mortality is low. One solution to these challenges is co-enrollment: enrolling 1 patient into more than one study. At McMaster Children’s Hospital, two Research Ethics Board approved pilot RCTs evaluating resuscitation interventions in children with septic shock are enrolling concurrently using an exception to consent (deferred consent) model: SQUEEZE [NCT01973907] involves study of a fluid resuscitation intervention while STRIPES [NCT02044159] investigates the effect of hydrocortisone. At the outset, it was unclear whether co-enrollment would be feasible or acceptable.

Primary Objective: To evaluate the feasibility and acceptability of co-enrollment of participants into SQUEEZE and STRIPES.

Methods

The Principal Investigators agreed to co-enroll into both RCTs in January, 2015, based on co-enrollment guidelines developed by our national research network, the Canadian Critical Care Trials Group. A Standard Operating Procedure (SOP) was developed to map participant recruitment into both trials and when and how participants or their decision makers would be approached to seek full informed consent for continued participation.

Results

14 participants have been co-enrolled into these 2 RCTs over the past 12 months. The co-enrollment SOP has not required modification since inception. Co-enrollment has not adversely impacted recruitment or retention in these trials or our ability to expedite study procedures.

Conclusions

Experience at a single centre suggests that co-enrollment of critically ill children into 2 RCTs evaluating resuscitative interventions in septic shock is feasible and acceptable.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0312
MANAGING STATUS EPILEPTICUS -- A REGIONAL PERSPECTIVE
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²Royal Manchester Children’s Hospital, PICU, Manchester, United Kingdom

Aims & Objectives:

To review management of paediatric patients with status epilepticus referred to NWTS (North West and North Wales Transport Service).

Methods

A retrospective audit of paediatric patients with status epilepticus referred to NWTS between 1st November 2013 and 31st October 2015. Patients were excluded if they were younger than one month old or if their seizure was secondary to trauma or a neurosurgical emergency.

Results

196 patients with status epilepticus were referred to NWTS over the study period. Of these, 143 patients were intubated and 138 available case notes were reviewed. 70 patients (51%) were managed locally (fast track extubation) with the support of the NWTS team. This was similar to the previous audit in 2013 (52% extubated locally), which followed the introduction of NWTS outreach education programme. Both figures were much higher than in 2012 (38.7%) and 2011 (19%).

Local extubation was less likely if the patient

- Was over 10 years old (25% extubated locally)
- had seizure activity lasting >1 hour (36%),
- had previous neurological problems (38%) or
- had excess (>2) benzodiazepines (41%).

Conclusions

Over half of the intubated patients were safely managed locally, showing the shift towards local extubation had been sustained. This is beneficial to patients, families and managing regional PICU bed capacity. There were no failed extubations or adverse incidents in patients managed locally. Further work may improve adherence to regional and national guidelines regarding benzodiazepine use.
Aims & Objectives:

Sepsis affects over 100,000 US children annually and is one of the leading causes of pediatric deaths worldwide. Prompt recognition and treatment reduces mortality from sepsis, yet American College of Critical Care Medicine / Pediatric Advanced Life Support (ACCM/PALS) sepsis guidelines for fluid resuscitation are rarely achieved in clinical practice. The LifeFlow™ is a novel device that allows a single user to rapidly infuse fluids through small intravenous (IV) catheters common in children (Image 1). This device improves upon the “push-pull” technique which is commonly used for fluid delivery. The objective of this study was to compare this novel device with standard infusion techniques in a simulated patient.

Methods
Five health care providers infused 1 liter (L) of saline through a 22G IV in a simulated patient using three methods: the push-pull technique, a pressure bag, and the LifeFlow device (Image 2). Time to completion of infusion and flow rate in milliliters per minute (ml/min) were compared.

Results

Average flow rates and time to infusion of 1L are presented in Table 1. Providers delivered 1L using the LifeFlow in an average of 5.3 minutes. Push-pull and pressure bag techniques required an average of 12.1 and 21.5 minutes, respectively.

<table>
<thead>
<tr>
<th>Infusion Method</th>
<th>Flow rate (ml/min)</th>
<th>Time to Infuse 1L (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LifeFlow™</td>
<td>189</td>
<td>5.3</td>
</tr>
<tr>
<td>Push-Pull</td>
<td>83</td>
<td>12.1</td>
</tr>
<tr>
<td>Pressure Bag</td>
<td>5</td>
<td>21.5</td>
</tr>
</tbody>
</table>

Conclusions

LifeFlow facilitates infusion of 1L of saline up to four times as fast as standard techniques, allowing PALS guidelines of 20ml/kg in 5 minutes to be achieved for a 50kg patient. This technique could improve care and outcomes for children with sepsis.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0383
A FALL FROM AN ELEPHANT - OUTCOMES IN PAEDIATRIC OUT OF HOSPITAL CARDIAC ARREST
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¹, North West and North Wales Paediatric Transport Service, Manchester, United Kingdom

Aims & Objectives:

An 11 year old child collapsed in a zoo. Bystander CPR was promptly initiated, ventricular fibrillation confirmed and defibrillation subsequently commenced. She was transferred to hospital and return of spontaneous circulation was achieved at 50 minutes. A poor outcome was anticipated, however she recovered fully. This prompted a review of paediatric out of hospital cardiac arrest (OOHCA) outcomes.

Methods

The North West and North Wales Paediatric Transport Service (NWTS) provides stabilisation and transport of children from 29 regional referring centres to two tertiary Paediatric Intensive Care Units.

The NWTS patient database from 1/1/2015 to 1/1/2016 was reviewed and 20 patients identified as having suffered an OOHCA.

Results

The patients ranged from 2 days to 14 years old (45% under 1, 20% aged 1-9 and 35% aged 10-14). Duration of CPR ranged from 3 to 93 minutes with 30% receiving bystander CPR prior to the arrival of trained practitioners.

10% recovered without PICU. 60% died (35% pre transfer and 25% on PICU). Of those surviving to discharge, 71% had a good neurological outcome.

Good prognostic factors were short duration of CPR and bystander CPR. Poor prognostic factors included PEA/asystole and prolonged CPR (>20 minutes in 92% of non-survivors).

Conclusions

Paediatric OOHCA is usually secondary to prolonged hypoxia/hypoperfusion and has a high mortality and morbidity. However, as in the above case, children with an atypical cause of arrest may have a good outcome. Our findings, which correspond with those of several large studies(Gelberg et al, 2015, Moler et al, 2011, Sasson et al, 2010), prompted revision of regional OOHCA guidance, considering prognostic indicators.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

OUTSIDE THE COMFORT ZONE: SUCCESSFUL REWARMING OF A NEONATE WITH 21,3°C CORE BODY TEMPERATURE

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Aims & Objectives:

In contrast to therapeutic hypothermia after peripartal asphyxia, limited knowledge exists to provide guidance on selecting the best rewarming strategy for severely hypothermic neonates. Therefore we present our experience in the case of an abandoned newborn found in a dustbin with a core body temperature of 21,3°C.

Methods

On arrival at our PICU the newborn was crying and showed good tonicity. Core body temperature of 21,3°C was confirmed by continuous rectal thermometry. The combination of 41°C heated saline via an intraosseous access, incubator care and heated saline lavage of the bladder were used as rewarming strategy. Core body temperature could thereby be increased to 35°C over the following 6 hours. No afterdrop or major cardiovascular complications such as arrhythmia or rewarming shock could be observed. At 31,8°C core body temperature respiratory failure, caused by lung edema, required intubation and artificial ventilation. After 13 days the child could be discharged from the PICU without major neurological deficits.

Results

Aggressive intravenous warmed volume expansion and inhalation of heated humidified oxygen are generally regarded as cornerstones of treatment. Invasive internal rewarming techniques such as heated peritoneal, or even pleural lavage, as suggested by some authors, are remarkably intrusive. Although forced external rewarming is considered risking a further dropdown of core body temperature, we decided to pursue a similar strategy. Providing warmed environment by incubator care in combination with heated intravenous volume expansion and bladder lavage proved to be an effective method.

Conclusions

As severe hypothermia in neonates is extremely rare, we lack evidence based recommendations regarding the best rewarming strategy. We therefore rely on data from individual pediatric case reports, such as this one, to guide our decisions. Our experiences show that incubator care, in combination with heated intravenous volume expansion and bladder lavage, form a promising strategy in rewarming severely hypothermic neonates.
PICC-0181
SEVERE BRONCHIOLITIS HELMET CPAP MANAGEMENT WITH HIGH PEEP LEVEL: IMPACT ON OUTCOME AND LENGTH OF PICU STAY
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1Pediatric Hospital Bambino Gesu’, Emergency- Anaesthesia and Intensive care DEA-ARCO Department, Roma, Italy

Aims & Objectives:

According to our experience, we have developed conviction that application of high peep level during helmet CPAP treatment for severe bronchiolitis may reduce number of intubation rate and length of PICU stay. In order to follow this issue, we have supported all admitted severe bronchiolitis with peep of 10 cmH2O on helmet CPAP, 50 liter per minute flux and 0.5 fraction of inspired oxygen in the period from January to March 2015.

Methods

Inclusion criteria: patients younger than 1 year with bronchiolitis severity score more or equal to 6.
Exclusion criteria: neurologic, malformative or cardiac diseases.
Treatment protocol:
- helmet CPAP with peep 10 cm H2O, 50 L/min gas flux, 0.5 inspired fraction of oxygen
- fluid replacement 20 ml/kg of saline solution 0.9% NaCl
- 5 mcg/kg/h morphine infusion with previous bolus 20 mcg/kg in 5 min
- nasogastric tube positioning to prevent gastric distension and allow early continuos enteral feeding
- arterial blood gases exam at 1h, 24h and 48 h
- pharingeal swab specimen for respiratory virus PCR panel examination at admission
- antibiotic prophylaxis in case of fever higher than 38.5°C, elevated blood PCR or lung opacities on chest x-ray exam

Results

None of enrolled patients required endotracheal intubation for mechanical ventilation. Mean time of helmet CPAP was 4.5 days, mean picu length of stay was 6 days. All patients underwent high flow nasal cannula support after helmet CPAP support.

Conclusions

This experience suggests that high peep level on helmet CPAP treatment of severe bronchiolitis may require randomised clinical trial among picu.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0392
COORDINATION OF CHEST COMPRESSIONS AND INFLATIONS IN NEWBORN MANIKIN RESUSCITATION. COMPARISON OF BAG, T-PIECE-DEVICE AND VENTILATOR

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1University Hospital Zurich, Department of Neonatology, Zurich, Switzerland
2Ulm University Medical Center, Department of Pediatrics- Division of Neonatology and Pediatric Critical Care, Ulm, Germany

Aims & Objectives:

Current neonatal resuscitation guidelines recommend a 3:1 ratio of chest compressions to inflations with 30 cycles or 120 events/min. The high proportion of inflations is deemed necessary, because bradycardia/cardiac arrest in the newborn is almost always caused by hypoxemia. Thus, effective ventilation seems to be extremely important. However, coordination is difficult with 120 events/min. An advantage of T-piece and ventilator devices are the possibility to apply PEEP efficiently. Using a ventilator, inflation rate and inspiratory time can be set and can serve as a metronome. We assessed coordination between inflations and chest compressions in a randomized cross-over study of all three devices in a simulated scenario of newborn resuscitation.

Methods

Teams (physician + nurse or midwife) were asked to resuscitate a newborn manikin in the delivery room for 30 seconds and respiratory variables were recorded. Thereafter, the roles (inflations and chest compression) were switched and the sequence was repeated with the other two devices. Sequence of devices was allocated randomly. The complete sequence was repeated in the same order asking the personnel questions from a quiz game. Primary outcome was number of undisturbed ventilations. Results were compared using two-way repeated measurements ANOVA.

Results

18 teams participated. The number of undisturbed ventilations per 30 seconds was 13.5 (2.5-16), 11.5 (1-14.5)*, and 13.5 (0.5-15) for bag, T-piece-device, and ventilator, respectively (*=p<0.05 bag vs. T-piece-device). Highest count of correct tidal volume inflations was achieved with the ventilator.
<table>
<thead>
<tr>
<th></th>
<th>Bag</th>
<th>T-piece</th>
<th>Ventilator</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>without questions</td>
<td>with questions</td>
<td>mean</td>
<td>without questions</td>
</tr>
<tr>
<td>Inflations count</td>
<td>15.3</td>
<td>15.4</td>
<td>15.4</td>
<td>14.0</td>
</tr>
<tr>
<td>Undisturbed inflations count</td>
<td>13.0</td>
<td>12.6</td>
<td>12.8</td>
<td>10.4</td>
</tr>
<tr>
<td>Tidal volume (ml)</td>
<td>41.9</td>
<td>43.2</td>
<td>42.5</td>
<td>25.8</td>
</tr>
<tr>
<td>Correct tidal volume count</td>
<td>4.1</td>
<td>3.6</td>
<td>3.9</td>
<td>5.6</td>
</tr>
<tr>
<td>Compression count</td>
<td>44.7</td>
<td>44.8</td>
<td>44.7</td>
<td>40.6</td>
</tr>
<tr>
<td>Compression Frequency (1/min)</td>
<td>139.0</td>
<td>150.0</td>
<td>144.0</td>
<td>139.0</td>
</tr>
<tr>
<td>Correct Compression frequency count</td>
<td>31.3</td>
<td>21.9</td>
<td>26.6</td>
<td>28.1</td>
</tr>
<tr>
<td>Compression depth (mm)</td>
<td>36.4</td>
<td>34.9</td>
<td>35.7</td>
<td>35.1</td>
</tr>
<tr>
<td>Correct Compression depth count</td>
<td>22.0</td>
<td>18.9</td>
<td>19.4</td>
<td>16.0</td>
</tr>
</tbody>
</table>
Conclusions

The best coordination between chest compressions and inflations was achieved with the bag and the respirator.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0266
THE EFFECT OF ASPHYXIA DURATION ON THE USE OF END-TIDAL CARBON DIOXIDE (ETCO2)-DIRECTED CHEST COMPRESSIONS

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J. Hamrick³, J. Hamrick³, R. Koehler¹

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²Children’s Hospital of San Antonio, Pediatric Critical Care Medicine, San Antonio, USA
³Arkansas Children’s Hospital, Department of Anesthesia and Pain Medicine, Little Rock, USA

Aims & Objectives:

The end-tidal carbon dioxide (ETCO2) level during CPR represents blood flow and has the potential to provide feedback to improve chest compression delivery during cardiac arrest. It is important to understand how the duration (severity) of arrest affects the risks and benefits of the use of the ETCO2-directed chest compression method before it can be recommended. We compared ETCO2-directed chest compressions to optimized standard CPR for effects on survival, myocardial perfusion pressure (MPP), cerebral perfusion pressure (CPP), and induced injuries at two durations of asphyxia arrest.

Methods

Asphyxia arrest was induced for either 17 or 23 minutes in 16 anesthetized 3 kg piglets prior to 20 minutes of basic and advanced life support using either standard compressions (optimized for rate and depth) or ETCO2-directed chest compressions (ETCO2 level used to decide rate and depth).

Results
Conclusions

Previously, we found improved ETCO2 levels, survival, and hemodynamics with ETCO2-directed chest compressions in this model after 20 min of asphyxia arrest. The current results with the shorter duration of 17 min of asphyxia arrest are similar to previous findings. Unfortunately, in this model as the arrest duration increases to 23 minutes, the ability to improve ETCO2 during CPR is lost, as are the improvements in hemodynamics and outcome.

<table>
<thead>
<tr>
<th></th>
<th>17 min asphyxia arrest</th>
<th>23 min asphyxia arrest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard CPR</td>
<td>ETCO2 CPR</td>
</tr>
<tr>
<td>Survival</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>ETCO2 level</td>
<td>16</td>
<td>35</td>
</tr>
<tr>
<td>MPP</td>
<td>-4</td>
<td>-1</td>
</tr>
<tr>
<td>CPP</td>
<td>10</td>
<td>20</td>
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</tbody>
</table>
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0317
TRAINING SESSIONS USING CONTINUOUS FEEDBACK FROM A MANNEQUIN IMPROVES CHEST COMPRESSION QUALITY

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Aims & Objectives:

Quality of chest compressions affects survival rates in cardiac arrest. We sought to assess the quality of chest compressions provided at baseline by healthcare providers on the paediatric intensive care unit (PICU). We then assessed the impact of a training session, using continuous feedback from the Laerdal infant Q-CPR® mannequin, on the quality of compressions performed.

Methods

A random sample of healthcare professionals on the PICU were invited to attend a chest compression workshop. After demographic information was obtained, participants performed chest compressions on the Laerdal infant Q-CPR® mannequin for 2 minutes. A continuous feedback session was then undertaken, during which the participant received feedback on all aspects of their chest compressions. A second “assessment” session was then performed, during which no feedback was given, and performance was recorded.

Results

56 healthcare professionals (14 doctors, 42 nurses) working on PICU at the Royal Brompton Hospital were included in the study. Four aspects of chest compression quality were assessed, including rate, depth, recoil and hand positioning. Overall performance was also scored as a percentage. The number of participants performing correct depth compressions more than 90% of the time, increased significantly from 61% to 93% after the continuous feedback educational session (p < 0.001). The number of participants that allowed correct chest recoil more than 90% of the time, increased significantly from 46 to 71% (p < 0.001). There was no
<table>
<thead>
<tr>
<th></th>
<th>Baseline Performance*</th>
<th>After Feedback Session*</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall score (%)</td>
<td>84 (49-94)</td>
<td>98 (97-99)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Overall score &gt;90%</td>
<td>20 (35.5)</td>
<td>46 (82.1)</td>
<td></td>
</tr>
<tr>
<td>Correct hand positioning (%)</td>
<td>100 (100-100)</td>
<td>100 (100-100)</td>
<td>0.72</td>
</tr>
<tr>
<td>Hand positioning score &gt;90%</td>
<td>48 (88.9)</td>
<td>51 (94.4)</td>
<td></td>
</tr>
<tr>
<td>Rate (bpm)</td>
<td>119 (113-129)</td>
<td>113 (106-118)</td>
<td>0.03</td>
</tr>
<tr>
<td>Correct depth (%)</td>
<td>97 (45-100)</td>
<td>100 (99-100)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Depth score &gt;90%</td>
<td>34 (60.7)</td>
<td>52 (92.9)</td>
<td></td>
</tr>
<tr>
<td>Correct recoil (%)</td>
<td>72 (20-98)</td>
<td>99 (87-100)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Recoil score &gt;90%</td>
<td>26 (46.4)</td>
<td>40 (71.4)</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusions**

The use of a continuous feedback session using the Laerdal Q-CPR ® mannequin for chest compression training leads to significant improvements in the quality of compression performed by healthcare providers. Depth and recoil are aspects of compression quality that are most improved.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0869
INTRATHECAL BACLOFEN IN THE MANAGEMENT OF TETANUS RELATED SPASM : A CASE REPORT
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2Istanbul University- Istanbul Faculty of Medicine, Pediatric Intensive Care Unit, Istanbul, Turkey
3Istanbul University- Istanbul Faculty of Medicine, Department of Neurosurgery, Istanbul, Turkey

Aims & Objectives:

Tetanus is a central nervous system infection with high mortality characterized by respiratory distress and tonic muscle spasms. The most common cause of mortality is cardiovascular complications, followed by respiratory failure. Despite vaccination programs, it is a serious health issue in developing countries. We presented the 10-year-old case who was treated with intrathecal baclofen pump (ITB) due to persistence of contractions despite high dose sedation and muscle relaxing treatment.

Methods

Results

12 year old female patient presented with contractions in the right foot and the back, trismus and difficulty swallowing. It was learnt that the previously health patient’s vaccination shots were missing, a nail punctured her right foot 14 days ago. Tetanus immunoglobulin and crystallized penicillin was administered to the patient diagnosed with tetanus based on the physical examination and history. Due to an increase in the contractions and development of opistotonus and respiratory distress, the patient was intubated. A treatment of diazepam, morphine, vecuronium and magnesium sulfate infusion was administered for muscle spasms and rigidity. On the 9th day of hospitalization, ITB pump was implanted to the patient whose contractions could not be controlled with medical treatment. The patient would benefit from ITB treatment. Intrathecal baclofen dose was increased to 110 mcg/day and contractions were controlled. 13 days after the ITB pump, she separated from the mechanical ventilator.

Conclusions

Severe tetanus cases need to be followed in the intensive care unit; hospitalization duration increases due to the use of high dose sedatives and muscle relaxants, which
increases the mortality and morbidity rates. With ITB treatment, long term sedation is avoided, the duration of stay in the intensive care unit and connection to the mechanical ventilator decrease, similar to the rate of complications and mortality. As it improves patient outcomes, ITB treatment may be an alternative treatment option to paralytic agent and sedative use.
Aims & Objectives:

Rapid Response (RR) Systems detect clinical decompensation outside ICUs to provide timely interventions and appropriate triage. In addition to the occurrence of cardiopulmonary arrest (CPA) outside ICU, the need for critical support acutely after RR has been validated as a RR system function measure. We hypothesized that the RR events which needed Rapid Escalation of support associated with Critical Transfer (REACT) and the type of critical support required would predict clinical outcomes and a systematic review of all REACT events would identify modifiable system factors to drive quality improvement (QI).

Methods

Over a six-month period all RRs were reviewed to identify REACT events. REACTs were defined as RRs with respiratory or cardiac arrests outside ICU or the need for respiratory (invasive or noninvasive ventilation) and/or hemodynamic (inotropes/vasopressors) support within 24 hours of RR.

Results

Of 358 RR events, 65(18%) qualified to be REACTs. REACT patients’ median age was 6.7 years [0.3-22 years] with 61% being males. The median PIM2 and PRISM scores for REACTs were 4.7 and 6.7. Need for invasive ventilation or hemodynamic support was associated with higher PRISM scores and longer ICU length of stay when compared to non-invasive ventilation [p<0.05]. For every REACT event a mean of 1.4 QI issues were identified with 60% needing some action (education/resource/policy change).
Figure 1. REACT events: Type of Critical Support (% distribution)

Distribution of types of critical support

- ARC/CPA: 31%
- Hemodynamic support: 23%
- Ventilation: 9%
- NIV: 25%
- Ventilation and HDS: 12%

NIV: Non-invasive ventilation, ARC: Acute Respiratory Compromise, CPA: Cardio-pulmonary Arrest

Figure 2: Diagnostic Groups of Patients with REACTs

- Cardiac: 33%
- Pulmonary: 22%
- Neurology: 16%
- Hemeonc: 6%
- GI/Liver: 4%
- Multisystem: 19%
Conclusions

The need and type of critical support acutely after RR could predict eventual outcomes. Careful scrutiny of REACTs identified modifiable factors for RR system quality improvement.

Table: REACT outcomes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Result (medians and range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilator Days</td>
<td>6.6 [0-67]</td>
</tr>
<tr>
<td>Length of ICU stay</td>
<td>11[0.4-108]</td>
</tr>
<tr>
<td>Length of Hospital stay</td>
<td>46.9 [5.8-392]</td>
</tr>
<tr>
<td>Mortality</td>
<td>3 patients died within 30 days of RR</td>
</tr>
</tbody>
</table>
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0363
WHAT IS THE VARIATION IN NATIONAL POLICY ON UTILISATION AND IMPLEMENTATION OF EARLY WARNING SYSTEMS?
L. Tume1, G. Sefton2, D. Roland3, P. on behalf of the PUMA study investigators4
1, Liverpool, United Kingdom
2PICU, Alder Hey Children’s NHS FT, Liverpool, United Kingdom
3Department of Emergency Medicine, Leicester Royal Infirmary, Leicester, United Kingdom
4South East Wales Trials Unit, Cardiff University, Cardiff, United Kingdom

Aims & Objectives:
To examine how national policy influences the implementation of paediatric early warning systems (PEWs) internationally.

Methods
As part of a systematic review, in part of a larger study (NIHR PUMA) to examine PEWS utilisation internationally, we undertook an additional scoping study to explore specific national health policy drivers/enablers. Databases searched were CINAHL, Medline, Health Business Elite, HMIC and BNI from 2005-2015. Search engines were used to identify grey literature. Further clarification was sought from international contacts.

Results
Information was identified across three continents: North America/Canada, Europe and Australasia. In North America the Institute for Healthcare Improvement (IHI) ran an initiative which specifically included utilisation of Rapid Response Teams (RRT) to improve patient safety. In Australia, the Australian Commission on Safety & Quality in healthcare produced a consensus statement (2010) about responding to deteriorating patients in hospital, but left individual states to implement their own initiatives, with no formal evaluation of their effectiveness. In Europe, the European Union network for patient safety and quality of care (PASQ) has included PEWS within its initiatives. Nine countries had some form of programme to reduce deterioration, although nothing was mandated.

Conclusions
National Policy drivers for the implementation of PEWS do exist but are heterogeneous between countries. There is also inconsistency on whether policy is national or state endorsed or mandated. The impact that policy has on patient safety is rarely assessed. Initiatives to prevent deterioration in hospital are varied and influenced by heath budget and local healthcare priorities.
Clinical Care Response Teams / Rapid Response Teams / Resuscitation

PICC-0514
Eye Openers Are Lifesavers! A Child With Burns - Pre-Hospital Care

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¹University Hospitals Leuven, Intensive Care Department and Burn Unit, Leuven, Belgium
²University Hospitals Leuven, Intensive Care Department, Leuven, Belgium
³University Hospitals Leuven, Emergency Department, Leuven, Belgium

Aims & Objectives:
The purpose of this study, conducted within the reference area of the Leuven University Hospitals Burn Centre, is fourfold. Firstly, defining the optimal evidence-based pre-hospital assessment and treatment strategy for children with severe burns. Secondly, measuring the knowledge of pre-hospital burn care in emergency nurses. Allowing to define, thirdly, the essential content or "eye openers" for practical support tools. Resulting, lastly, in a crisp custom-made pocket guide and poster.

Methods:
A literature search of online databases (Medline, ScienceDirect, Cochrane Library, Invert, CINAHL and EMBASE). Questionnaire-based cross-sectional evaluation of pre-hospital burn-care knowledge. Due to non-existence of such validated questionnaire in the Western-European setting (multiple burn centers per country and rather short transport time), a novel tool was designed for this purpose.

Results:
One clear golden standard for pre-hospital care for children with severe burns, based on existing literature, cannot be defined, pleading for novel research. The survey shows, however that the majority of emergency nurses (80%) need and desire additional training. Particularly insufficient cognizance of accurate burn severity assessment and per-transport management were observed and taken into account in pragmatic, clinical poster and pocket guide development.

Conclusions:
Combined literature and care-giver survey yielded improved pragmatic clinical support tools. They were distributed among all participating hospitals. This research sparked a nationwide project, endorsed by the Belgian Association for Burn Injuries and a regional training-day. This interaction between pre-hospital care provider and receiving burn centers contributes to improved quality of care, ultimately saving children's lives by spreading knowledge!
PICC-0067
1-YEAR FOLLOW-UP STUDY OF 22 CHILDREN AFTER TRACHEOTOMY IN CHINA

W. Wang¹, Y. Zhang¹, Y. Gu¹, J. Hu¹
¹Pediatric hospital of Fudan University, Nursing Department, Shanghai, China

Aims & Objectives:

【background】Previous studies have shown an increase in pediatric domiciliary long-term mechanical ventilation. But children who after tracheotomy go back home for long-term mechanical ventilation is new in China, and the follow-up for this children and their family is blank.
【objective】To investigate the quality of life and condition change of the children who after tracheotomy, and improve the children’s quality of life.

Methods

22 children’s parents were investigated with self-made questionnaire and the Pediatric Quality of Life Inventory Measurement Methods(PedsQL4.0) by telephone for 1 year

Results

From 2013 to 2014 the study recruited 22 children aged from 1 to 14 (median age 4.95±4.348 years) with severe pneumonia (8, 36.4%), viral encephalitis (6, 27.3%), congenital subglottic stenosis (3, 13.6%), hand-foot-and-mouth disease (2, 9.1%) and neuromuscular disease (2, 9.1%); tracheotomy mechanical ventilation (2, 9.1%), tracheotomy oxygen inhalation (10, 45.5%), recovered 6 and 4 died;

all the parents had airway nursing training before hospital discharge, except the emergency rescue training and physiological knowledge of tracheotomy training; the number of clinic visit per year was 3.18±2.50; the number for emergency visit was 9 (40.9%); the scores of PedsQL4.0 were lower than the normal children.

Conclusions

The follow-up system for children with tracheotomy has to consummate gradually in China, and ensure the best practice for these children as well as their family.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS / RESUSCITATION

PICC-0914
HIGH FLOW NASAL CANNULA USE FOR SEVERE BRONCHIOLITIS TREATMENT IN FRENCH INTENSIVE CARE UNITS : A CROSS SECTIONAL STUDY

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¹, Garches, France
²Hopital R. Poincaré, 92370, Garches, France
³Hopitale R.poincaré, 92370, GARCHES, France

Aims & Objectives:

Viral bronchiolitis represents 30 000 hospitalizations in France each year of which 8-13% will require a ventilation support (1). Over the past 10 years, Continuous positive airway pressure (CPAP) revolutionized the prognosis of severe bronchiolitis. A relatively new device for respiratory support, High-flow nasal cannula (HFNC) is emerging as an alternative to CPAP. Despite these encouraging results of several clinical and physiologic studies, the experience with this device remains limited and its use and indications controversial and heterogeneous. Our aim was to describe the different ventilation supports utilized for the treatment of severe bronchiolitis during three days at the peak of bronchiolitis epidemic in December 2015.

Methods

We conducted an observational cross-sectional study in 27 French Universities hospitals in intensive pediatric care units. It consisted in a telephone interview of a junior doctor of each unit with a collection of the clinical characteristics and of the ventilation settings of any neonates between 15 days and 3 months

Results

20 units answered positively. 59 patients were hospitalized for severe bronchiolitis. Median age was 4.8 weeks, median weight was 3.98 kg and median day of hospitalization was 4.7 at the time of the interview. 33.55% of the total patient ventilated with HFNC, which is relatively high for a technic that is still a subject of debates. Ventilation settings were homogenous for both CPAP and HFNC and in accordance with the international recommendations. No clinical difference was found between both CPAP group and HFNC group of patients. Patients treated with HFNC appeared less severe than the CPAP neonates.
Conclusions

HFNC is a new respiratory support for moderately severe bronchiolitis but already represent half of the respiratory support in France for severe bronchiolitis. Further studies are needed to better define the exact position of HFNC in severe bronchiolitis respiratory support strategy.
Aims & Objectives:

Variations from informed consent (known as deferred, Exception from Informed Consent or research without prior consent) allow critical care trials to proceed when time constraints prevent prior parental consent. The CONNECT study showed how parents support the use of research without prior consent (RWPC) of interventions already used in clinical care\(^1\). We aimed to explore the reasons why parents under a RWPC arrangement for emergency admissions agreed to the use of their child’s data in the Catheter Infections in Children Trial (CATCH) compared to parents of elective admissions who provided prospective informed consent for CATCH.

Methods

275 parents completed a CONNECT questionnaire after their CATCH recruitment discussion. 24 (8.7%) declined their child’s participation in CATCH\(^1\). Of the 251 who consented, 102/251 (40.6%) were elective admissions (informed consent) and 149/251 (59.4%) were emergency admissions (RWPC).

Results

There were no significant differences in parents' reasons for taking part in CATCH by emergency (RWPC) or elective (informed consent) admissions. Participation to help
other children in the future was the most commonly reported (n= 240/251, 95.6%) and main reason (n=117/185, 63.2%) for participation in both groups. Belief in the importance of medical research was a common reason (n= 214/251, 85.3%). Approximately half reported taking part 'to help my child' (140/251, 55.8%) and because of trust in the CATCH practitioner (118/251, 47.0%).

Conclusions

Parents who experienced RWPC or informed consent report mainly altruistic reasons for participation in CATCH. Providing trial information which highlights how other children may benefit in the future may improve critical care trial recruitment.
CRITICAL CARE RESPONSE TEAMS / RAPID RESPONSE TEAMS /
RESUSCITATION

PICC-0668
INTERNATIONAL APPROACHES TO CONSENT SEEKING IN PEDIATRIC CRITICAL CARE TRIALS: THE VIEWS OF PARENTS AND HEALTH CARE PROVIDERS

K. Woolfall1, L. Frith2, B. Young3

1University of Liverpool, Liverpool, United Kingdom
2University of Liverpool, Department of Health Service Research, Liverpool, United Kingdom
3University of Liverpool, Department of Psychological Sciences, Liverpool, United Kingdom

Aims & Objectives:

Research to improve treatments for critically ill children has historically been limited by the challenges involved in seeking consent in critical care situations. Internationally, changes to legislation have enabled consent to be sought after a child has received the investigational intervention so that research can proceed. However, approaches to consent vary by country. The CONNECT study explored UK parents’ and health care professionals’ views on different approaches to consent seeking in pediatric critical care, such as waived consent, the European model of ‘deferred’ consent, the American ‘exception from informed consent’ (EFIC). We aim to inform future approaches to consent in this challenging setting.

Methods

Qualitative interviews with 40 parents who had experience of pediatric critical care. Focus groups with 13 paediatric intensive health care providers (HCPs) (10 nurses and 3 doctors).

Results

Parents and HCPs supported both deferred consent and EFIC. Many regarded EFIC and deferred consent as similar processes if parents have the opportunity to ‘opt out’ of a trial. Some doctors and parents supported ‘waiving’ consent without informing parents of trial participation where interventions are ‘low risk’ and routinely used. Bereaved parents and HCPs described how discussing research with parents when their child has died requires considerable care. Parents and HCPs questioned the efficacy of mass media community consultation at the pre-trial stage.

Conclusions

Recommendations include the need to provide parents with trial information at the earliest appropriate opportunity after the emergency situation has passed and how discussions with bereaved parents should be personalized.
Aims & Objectives:

To explore the relationship between serum uric acid level and severity of illness or prognosis of children with sepsis/severe sepsis/septic shock, and to provide the basis for treatment.

Methods

Cases of sepsis/severe sepsis/septic shock patients (serum uric acid >90 μmol/L) admitted to the PICU from January 2011 to December 2012, serum uric acid concentration in peripheral blood was examined within 24 h after admission. The hyperuricemia group (n = 162) was defined as uric acid level within 24 h > 350 μmol/L and divided into 2 groups: mildly elevated group (n = 116): (350 ~ 700) μmol/L, increased two times group (n = 46): >700 μmol/L. Serum uric acid level were measured in admission 24 hours, day 3 and 7. Other results about inflammatory markers, lactate, cardiac enzymes, hepatic and renal function as well as indicators related to severity and prognosis were recorded.

Results

(1) The uric acid level peak of mildly elevated group and increased two times group were seen on day 1, then presented a downward trend and closed to the normal level on day 7. (2) the hyperuricemia incidence, mortality of severe sepsis group, septic shock group rates were significantly higher than sepsis group (P < 0.01). PCIS score and mortality differences between sepsis/severe sepsis/septic shock in children were statistically significant (P < 0.05), the mortality rate of mildly elevated group, increased two times group were higher than normal uric acid group (P < 0.05). (4) the survival group the incidence of hyperuricemia (24.03%); death group hyperuricemia incidence (48.21%), the differences of hyperuricemia and uric acid levels between survival group and death group were statistically significant (P < 0.05).

Conclusions

Hyperuricemia is common among children with sepsis/severe sepsis/septic shock and serum uric acid level is closely related to prognosis. Dynamic monitoring of serum uric acid level may contribute to control the symptoms and predict prognosis.
ANALYSIS OF RELATED RISK FACTORS FOR HYPERAMYLASEMIA IN CRITICALLY ILL CHILDREN

Z.H. Xiao¹, Y.M. Zhu¹, P.P. Liu¹, X.L. Lu¹
¹Hunan Children's Hospital, Pediatrics Medical Centre, ChangSha, China

Aims & Objectives:

To analyze the clinical features of the hyperamylasemia in critically ill children and investigate the related risk factors in order to provide the basis for prevention and treatment.

Methods:

A total of 1036 critically ill children admitted in pediatric intensive care unit (PICU) from April, 2011 to Oct, 2012 were studied. They were divided into the high amylase group (n=82) and the normal group (n=954). According to the outcomes, the high amylase group was divided into survival group (n=61) and death group (n=21). The related risk factors of the occurrence and outcome of hyperamylasemia were analyzed by univariate and multivariate Logistic regression.

Results:

There were statistically significant difference in rates of coagulation disorders, convulsions, disturbance of consciousness, pediatric critical illness score (PCIS)≤80, multiple organ dysfunction (MODS)≥3, sepsis, shock, and lactic acid (LA), procalcitonin (PCT), blood glucose (BG) between the high amylase group and the normal group (p=0.05). The difference in the rates of coagulation disorders, convulsions, mechanical ventilation, PCIS≤80, MODDS≥3, and LA, PCT, oxygenation index, albumin, C-peptide, BG were statistically significant between the survival group and the death group (p<0.05). Multivariate Logistic regression analysis showed that the risk factors of the risk factor of the hyperamylasemia’s occurrence were LA, PCT, BG, PCIS <80, MODS >3. Adjusted ORs confidence intervals of them were 1.662(1.236-2.234), 1.042(1.236-2.234), 1.612(1.411-1.843), 3.219(1.311-7.905), 3.411(1.370-8.494), respectively. The hyperamylasemia’s prognostic risk factors were PCT, C-peptide, PCIS ≤80, MODS >3, shock. Adjusted ORs confidence intervals of them were 1.066(1.021-1.113), 1.437(1.017-2.030), 16.137(1.876-138.836), 10.437(1.528-71.925), 20.928(1.938-226.009), respectively.

Conclusions:

The severity of the disease, the levels of LA, PCT, BG in critically ill children were positively correlated to the occurrence of hyperamylasemia. The severity of the disease, the incidence of organ failures, the levels of PCT, C-peptide combined shock in children with hyperamylasemia were positively correlated to the prognosis of hyperamylasemia.
A MODIFIED TWO-FINGER TECHNIQUE VERSUS THE STANDARD TWO-FINGER AND TWO-THUMB TECHNIQUES TO PERFORM CHEST COMPRESSIONS IN AN INFANT MODEL: A PROSPECTIVE, RANDOMIZED, CONTROLLED STUDY

P. Biban¹, F.M. Colla¹, G. Pagano¹, R. Frassoldati¹, S. Spaggiari¹

¹Neonatal and Pediatric Intensive Care Unit,
Department of Pediatrics - Azienda Ospedaliera Universitaria, Verona, Italy

Aims & Objectives:

Two types of chest compression techniques are recommended during cardiac arrest in infants: the two-finger and two-thumb technique, respectively. The latter seems to be superior in terms of compression depth and operator’s fatigability. However, experimental and clinical studies have shown poor quality chest compressions, i.e. not reaching the targets proposed by the international guidelines, regardless the technique being used.

Aim: To compare a new "modified two-finger technique" with the standard two-finger technique to perform chest compressions, in an infant manikin model. Furthermore, to compare the modified technique with the "gold standard", namely the two-thumb chest compression technique.

Methods

We performed a prospective, randomized, single-blind study in a ResusciBaby QCPR manikin equipped with a skill-reporting system (Laerdal, Stavanger, Norway). In the new modified technique, two dominant hand’s fingers are placed over the sternum, while the wrist is grasped by the non-dominant hand, which actively contributes to perform chest compressions. Eighty-four subjects were recruited to perform the three compression techniques, in random order. Quality parameters of chest compressions, including absolute compression depth, correct depth, complete chest recoil and overall score, were recorded. Furthermore, a questionnaire about difficulty, fatigue, and degree of discomfort felt during the individual tests was administered to all subjects.

Results

The modified two-finger technique was significantly superior than the standard two-finger technique in terms of absolute compression depth (37.23 vs 35.47 mm), percentage of correct depth (65% vs 52%), level of discomfort and fatigue, particularly in females.

When compared to the two-thumb technique, the modified two-finger technique was equivalent as regards the compression depth, while it was superior in terms of complete chest recoil.

Conclusions
This new modified two-finger technique may provide better quality chest compressions compared to the standard two-finger technique, while performing similarly to the two-thumb technique. Further studies are needed to verify the applicability of our results in human subjects.
DISCUSSION GROUP 1 – RRT

PICC-0706
CLINICIANS’ AND PARENTS’ EXPERIENCES OF ESCALATION OF CARE IN DETERIORATING CHILDREN ON PEDIATRIC WARDS
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1Bambino Gesù Children’s Hospital, Professional development- continuing education and nursing research, Rome, Italy
2Hospital for Sick Children, Critical Care, Toronto, Canada
3Bambino Gesù Children’s Hospital, Critical Care, Rome, Italy
4Bambino Gesù Children’s Hospital, Clinical Epidemiology, Rome, Italy
5Bambino Gesù Children’s Hospital, Medical Directorate, Rome, Italy
6Bambino Gesù Children’s Hospital, Cardiology Unit, Rome, Italy
7Plymouth University, Faculty of Health and Human Sciences, Plymouth, United Kingdom

Aims & Objectives:
Timely escalation of care in deteriorating children is a key element of the BedsidePEWS preventing PICU admissions and critical outcomes. Clinicians and parent experiences of response to clinical deterioration in a hospital setting where the BedsidePEWS is adopted have not yet been described.

Objective: To explore clinicians’ and parents’ experiences of escalation of care of deteriorating children admitted to pediatric wards in a tertiary care children’s hospital.

Methods
Qualitative design using six focus group sessions with physicians (n=10), nurses (n=13) and parents (n=9) of children admitted to pediatric wards. Thematic analysis of the transcribed audiotaped content was performed by three independent researchers.

Results
Thematic analysis identified 35 sub-themes that were categorized into five major themes: 1) Human and Organizational Influences; 2) Staff Competencies and Skills; 3) Impact of Relationships; 4) Identifying Clinical Deterioration; 5) Decisions to Higher Level of Care. Across themes, participants presented a wide range of experiences related to escalation or care. Timeliness of escalation of care was often described as suboptimal because of communication failure between professionals or other human and organizational factors. Hierarchy was a factor in initiating escalation of care and Rapid Response Team calls were often described as an extreme measure.

Conclusions
The experiences of parents and staff provided a range of sub-themes and themes describing the complexity of escalation of care. The findings present a thematic basis for the development of a quantitative instrument measuring factors associated to timely escalation of care among deteriorating children as described by the BedsidePEWS response algorithm.
Aims & Objectives:

Compression only CPR (Co-CPR) has been shown to be as effective as conventional CPR in adult out of hospital cardiac arrest (OHCA). There are few data on Co-CPR in children. We aimed to characterize Co-CPR in pediatric OHCA and test the hypothesis that conventional CPR would be associated with improved overall survival and neurologically favorable survival at hospital discharge compared to Co-CPR.

Methods

We conducted an analysis of the CARES database. Inclusion criteria were age ≤ 18 years of age and non-traumatic OHCA from January 1, 2013 through December 31, 2014. Neurologically favorable survival was defined as a cerebral performance category Scale of 1 or 2.

Results

A total of 2,176 cardiac arrests were evaluated, 1,059 received bystander CPR and type of CPR was available for 838 arrests (79%). For the events where type of CPR data was available, 50% (n=420) received conventional CPR and 50% (n=418) received Co-CPR. There was no difference in the type of bystander CPR by age categories, gender, witnessed status, etiology, location, rhythm, and automated external defibrillator use (Table 1). However, compared to white children, Hispanic children and black children were more likely to receive Co-CPR compared to conventional CPR (p=0.0003). There were no overall differences in outcomes between Co-CPR compared to conventional CPR. On subgroup analysis (Table 2), conventional CPR was associated with improved overall survival in infants and improved overall and neurologically favorable survival in black children compared to Co-CPR. On multivariable analysis, conventional CPR was independently associated with favorable neurological survival compared to Co-CPR (OR 1.82, 95% CI 1.11-2.99) (Table 3).
<table>
<thead>
<tr>
<th>Patient Characteristic</th>
<th>Conventional CPR (N=420) N (%)</th>
<th>Co-CPR (N=418) N (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (year)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 1</td>
<td>198 (51.7)</td>
<td>185 (48.3)</td>
<td>0.2239</td>
</tr>
<tr>
<td>1-5</td>
<td>67 (54.9)</td>
<td>55 (45.1)</td>
<td></td>
</tr>
<tr>
<td>5-10</td>
<td>78 (49.7)</td>
<td>79 (50.3)</td>
<td></td>
</tr>
<tr>
<td>&gt;10</td>
<td>77 (43.8)</td>
<td>99 (56.2)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>255 (48.7)</td>
<td>269 (51.3)</td>
<td>0.2764</td>
</tr>
<tr>
<td>Female</td>
<td>165 (52.5)</td>
<td>149 (47.5)</td>
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</tr>
<tr>
<td>Race / Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>193 (54.5)</td>
<td>161 (45.5)</td>
<td>0.0003</td>
</tr>
<tr>
<td>Black</td>
<td>86 (42.6)</td>
<td>116 (57.4)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>29 (34.5)</td>
<td>55 (85.4)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>112 (56.8)</td>
<td>86 (43.4)</td>
<td></td>
</tr>
<tr>
<td>Arrest witness status</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Unwitnessed</td>
<td>295 (49.7)</td>
<td>299 (50.3)</td>
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<tr>
<td>Witnessed</td>
<td>125 (51)</td>
<td>120 (49)</td>
<td></td>
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<tr>
<td>Arrest location</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Non-home/public</td>
<td>59 (46.1)</td>
<td>69 (53.9)</td>
<td>0.3224</td>
</tr>
<tr>
<td>Home/residence</td>
<td>361 (50.8)</td>
<td>349 (49.2)</td>
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<tr>
<td>Arrest etiology</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Presumed cardiac</td>
<td>217 (49.2)</td>
<td>224 (50.8)</td>
<td>0.9382</td>
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<tr>
<td>Respiratory</td>
<td>102 (50)</td>
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<tr>
<td>Drowning</td>
<td>37 (52.9)</td>
<td>33 (47.1)</td>
<td></td>
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<tr>
<td>Electrocution</td>
<td>2 (66.7)</td>
<td>1 (33.3)</td>
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<tr>
<td>Other</td>
<td>62 (51.7)</td>
<td>58 (48.3)</td>
<td></td>
</tr>
<tr>
<td>Rhythm</td>
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<td>Non-shockable</td>
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<td>Shockable</td>
<td>37 (48.7)</td>
<td>39 (51.3)</td>
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<td>Missing</td>
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</tr>
<tr>
<td>AED used</td>
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<tr>
<td>No</td>
<td>359 (51.4)</td>
<td>340 (48.6)</td>
<td>0.1075</td>
</tr>
<tr>
<td>Yes</td>
<td>61 (43.9)</td>
<td>78 (56.1)</td>
<td></td>
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<tr>
<td>Sustained ROSC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>108 (25.7)</td>
<td>98 (23.4)</td>
<td>0.4456</td>
</tr>
<tr>
<td>No</td>
<td>312 (74.3)</td>
<td>320 (76.6)</td>
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<tr>
<td>Favorable neurological outcome</td>
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<tr>
<td>CPC 1/2</td>
<td>58 (13.8)</td>
<td>42 (10.1)</td>
<td>0.2439</td>
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<td>CPC 3/4 or Died</td>
<td>360 (85.7)</td>
<td>374 (89.5)</td>
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<tr>
<td>Missing</td>
<td>2 (0.5)</td>
<td>2 (0.5)</td>
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<td>Survival to hospital discharge</td>
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<td></td>
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</tr>
<tr>
<td>Yes</td>
<td>71 (16.9)</td>
<td>59 (14.11)</td>
<td>0.2647</td>
</tr>
<tr>
<td>No</td>
<td>349 (83.1)</td>
<td>359 (85.9)</td>
<td></td>
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</table>
Table 2: Subgroup Analysis Comparison of Conventional CPR and Compression only CPR (Co-CPR)

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Outcome</th>
<th>Characteristic</th>
<th>Conventional CPR N (%)</th>
<th>Co-CPR N (%)</th>
<th>P-value</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≤1 years (N=363)</td>
<td>Favorable outcome</td>
<td>CPC 1/2</td>
<td>13 (5.6)</td>
<td>5 (4.3)</td>
<td>0.3369</td>
<td>0.64 (0.26, 1.56)</td>
</tr>
<tr>
<td>Age &gt;1-19 years (N=451)</td>
<td></td>
<td>CPC 1/2</td>
<td>45 (20.5)</td>
<td>34 (14.7)</td>
<td>0.1156</td>
<td>0.67 (0.41, 1.10)</td>
</tr>
<tr>
<td>Age ≤1 years (N=663)</td>
<td>Survival to discharge</td>
<td>Yes</td>
<td>19 (3.6)</td>
<td>8 (4.3)</td>
<td>0.0495</td>
<td>0.43 (0.16, 1.09)</td>
</tr>
<tr>
<td>Age &gt;1-19 years (N=455)</td>
<td></td>
<td>Yes</td>
<td>52 (23.4)</td>
<td>51 (21.9)</td>
<td>0.6686</td>
<td>0.92 (0.58, 1.42)</td>
</tr>
<tr>
<td>Male (N=521)</td>
<td>Favorable outcome</td>
<td>CPC 1/2</td>
<td>38 (15)</td>
<td>16 (12.2)</td>
<td>0.2831</td>
<td>1.00 (0.51, 1.73)</td>
</tr>
<tr>
<td>Female (N=513)</td>
<td></td>
<td>CPC 1/2</td>
<td>50 (47.9)</td>
<td>21 (19.1)</td>
<td>0.0696</td>
<td>1.00 (0.48, 2.24)</td>
</tr>
<tr>
<td>Male (N=524)</td>
<td>Survival to discharge</td>
<td>Yes</td>
<td>48 (15.2)</td>
<td>36 (14.1)</td>
<td>0.3108</td>
<td>0.89 (0.48, 1.65)</td>
</tr>
<tr>
<td>Female (N=514)</td>
<td></td>
<td>Yes</td>
<td>23 (13.9)</td>
<td>21 (14.1)</td>
<td>0.9686</td>
<td>1.03 (0.54, 1.92)</td>
</tr>
<tr>
<td>White (N=265)</td>
<td>Favorable outcome</td>
<td>CPC 1/2</td>
<td>25 (13)</td>
<td>21 (13)</td>
<td>0.7500</td>
<td>1.00 (0.54, 1.87)</td>
</tr>
<tr>
<td>Black (N=201)</td>
<td></td>
<td>CPC 1/2</td>
<td>16 (16.3)</td>
<td>7 (6.1)</td>
<td>0.2247</td>
<td>0.33 (0.15, 0.67)</td>
</tr>
<tr>
<td>Hispanic (N=92)</td>
<td></td>
<td>CPC 1/2</td>
<td>13 (10.7)</td>
<td>5 (6.3)</td>
<td>0.0134</td>
<td>0.85 (0.19, 3.85)</td>
</tr>
<tr>
<td>Other (N=198)</td>
<td>Survival to discharge</td>
<td>Yes</td>
<td>12 (10.4)</td>
<td>9 (8.2)</td>
<td>0.4242</td>
<td>0.70 (0.20, 2.17)</td>
</tr>
<tr>
<td>White (N=354)</td>
<td></td>
<td>Yes</td>
<td>32 (16.0)</td>
<td>21 (17.4)</td>
<td>0.6935</td>
<td>1.00 (0.36, 1.65)</td>
</tr>
<tr>
<td>Black (N=202)</td>
<td></td>
<td>Yes</td>
<td>17 (19.9)</td>
<td>10 (9.6)</td>
<td>0.1247</td>
<td>0.38 (0.17, 0.85)</td>
</tr>
<tr>
<td>Hispanic (N=84)</td>
<td></td>
<td>Yes</td>
<td>9 (22.7)</td>
<td>8 (24.6)</td>
<td>0.0934</td>
<td>0.65 (0.20, 2.10)</td>
</tr>
<tr>
<td>Other (N=198)</td>
<td></td>
<td>Yes</td>
<td>16 (14.3)</td>
<td>12 (15.1)</td>
<td>0.6058</td>
<td>1.07 (0.46, 2.30)</td>
</tr>
<tr>
<td>Un-witnessed (N=593)</td>
<td>Favorable outcome</td>
<td>CPC 1/2</td>
<td>19 (8.4)</td>
<td>17 (5.7)</td>
<td>0.7076</td>
<td>0.88 (0.45, 1.73)</td>
</tr>
<tr>
<td>Witnessed (N=241)</td>
<td></td>
<td>CPC 1/2</td>
<td>38 (13.7)</td>
<td>25 (21.2)</td>
<td>0.0656</td>
<td>0.58 (0.32, 1.04)</td>
</tr>
<tr>
<td>Un-witnessed (N=500)</td>
<td>Survival to discharge</td>
<td>Yes</td>
<td>24 (8.1)</td>
<td>22 (7.4)</td>
<td>0.7210</td>
<td>0.90 (0.46, 1.64)</td>
</tr>
<tr>
<td>Witnessed (N=245)</td>
<td></td>
<td>Yes</td>
<td>47 (15.6)</td>
<td>37 (30.1)</td>
<td>0.2653</td>
<td>0.74 (0.44, 1.26)</td>
</tr>
<tr>
<td>Non-shockable rhythm (N=758)</td>
<td>Favorable outcome</td>
<td>CPC 1/2</td>
<td>38 (8.9)</td>
<td>24 (8.4)</td>
<td>0.0766</td>
<td>0.62 (0.36, 1.05)</td>
</tr>
<tr>
<td>Shockable rhythm (N=75)</td>
<td></td>
<td>CPC 1/2</td>
<td>20 (55.6)</td>
<td>17 (43.6)</td>
<td>0.3016</td>
<td>0.62 (0.25, 1.54)</td>
</tr>
<tr>
<td>Non-shockable rhythm (N=761)</td>
<td>Survival to discharge</td>
<td>Yes</td>
<td>50 (13.1)</td>
<td>37 (9.8)</td>
<td>0.1881</td>
<td>0.72 (0.46, 1.14)</td>
</tr>
<tr>
<td>Shockable rhythm (N=76)</td>
<td></td>
<td>Yes</td>
<td>21 (56.8)</td>
<td>31 (53.8)</td>
<td>0.7687</td>
<td>0.89 (0.36, 2.20)</td>
</tr>
<tr>
<td>Non-home/public (N=127)</td>
<td>Favorable outcome</td>
<td>CPC 1/2</td>
<td>27 (45.8)</td>
<td>20 (20.4)</td>
<td>0.0886</td>
<td>0.49 (0.24, 1.03)</td>
</tr>
<tr>
<td>Home/residence (N=707)</td>
<td></td>
<td>CPC 1/2</td>
<td>31 (8.6)</td>
<td>22 (6.3)</td>
<td>0.2447</td>
<td>0.71 (0.41, 1.26)</td>
</tr>
<tr>
<td>Non-home/public (N=128)</td>
<td>Survival to discharge</td>
<td>Yes</td>
<td>28 (47.5)</td>
<td>26 (37.7)</td>
<td>0.2861</td>
<td>0.87 (0.33, 2.36)</td>
</tr>
<tr>
<td>Home/residence (N=710)</td>
<td></td>
<td>Yes</td>
<td>43 (11.9)</td>
<td>33 (9.5)</td>
<td>0.2810</td>
<td>0.77 (0.48, 1.25)</td>
</tr>
<tr>
<td>AED not used (N=656)</td>
<td>Favorable outcome</td>
<td>CPC 1/2</td>
<td>46 (12.5)</td>
<td>24 (7.1)</td>
<td>0.0172</td>
<td>0.53 (0.32, 0.86)</td>
</tr>
<tr>
<td>AED used (N=136)</td>
<td></td>
<td>CPC 1/2</td>
<td>13 (21.7)</td>
<td>16 (23.1)</td>
<td>0.6440</td>
<td>1.08 (0.48, 2.44)</td>
</tr>
<tr>
<td>AED not used (N=666)</td>
<td>Survival to discharge</td>
<td>Yes</td>
<td>54 (15.6)</td>
<td>37 (10.9)</td>
<td>0.1035</td>
<td>0.69 (0.44, 1.08)</td>
</tr>
<tr>
<td>AED used (N=139)</td>
<td></td>
<td>Yes</td>
<td>17 (27.9)</td>
<td>22 (26.2)</td>
<td>0.9651</td>
<td>1.02 (0.48, 2.14)</td>
</tr>
<tr>
<td>Non-cardiac (N=395)</td>
<td>Favorable outcome</td>
<td>CPC 1/2</td>
<td>20 (14.4)</td>
<td>21 (10.9)</td>
<td>0.3004</td>
<td>0.73 (0.40, 1.33)</td>
</tr>
<tr>
<td>Cardiac (N=438)</td>
<td></td>
<td>CPC 1/2</td>
<td>28 (13.4)</td>
<td>21 (9.4)</td>
<td>0.1653</td>
<td>0.67 (0.37, 1.22)</td>
</tr>
<tr>
<td>Non-cardiac (N=397)</td>
<td>Survival to discharge</td>
<td>Yes</td>
<td>36 (17.2)</td>
<td>29 (14.9)</td>
<td>0.6369</td>
<td>0.84 (0.46, 1.44)</td>
</tr>
<tr>
<td>Cardiac (N=441)</td>
<td></td>
<td>Yes</td>
<td>36 (16.8)</td>
<td>30 (13.3)</td>
<td>0.3476</td>
<td>0.78 (0.46, 1.32)</td>
</tr>
</tbody>
</table>
**Conclusions**

In this study of pediatric OHCA Co-CPR occurred just as frequently as conventional CPR. A racial disparity exists in the provision of conventional CPR. Conventional CPR was associated with favorable neurological outcome compared to Co-CPR.

<table>
<thead>
<tr>
<th></th>
<th>Survival to hospital discharge Odds Ratio (95% Confidence Limits)</th>
<th>Neurological favorable survival Odds Ratio (95% Confidence Limits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional CPR vs. compression only CPR</td>
<td>1.52 (0.98-2.35)</td>
<td>1.82 (1.11-2.99)</td>
</tr>
<tr>
<td>Non-home vs. home</td>
<td>2.14 (1.25-3.67)</td>
<td>2.80 (1.55-5.04)</td>
</tr>
<tr>
<td>&gt;1-18 years vs. ≤1 year</td>
<td>2.28 (1.37-3.78)</td>
<td>1.96 (1.10-3.50)</td>
</tr>
<tr>
<td>Non-cardiac vs. Presumed cardiac</td>
<td>1.81 (1.14-2.87)</td>
<td>2.12 (1.24-3.60)</td>
</tr>
<tr>
<td>Bystander Witnessed vs. Unwitnessed</td>
<td>3.72 (2.35-5.91)</td>
<td>2.91 (1.71-4.94)</td>
</tr>
<tr>
<td>Shockable rhythm: Yes vs. No</td>
<td>4.06 (2.17-7.57)</td>
<td>5.03 (2.50-9.72)</td>
</tr>
</tbody>
</table>
DISCUSSION GROUP 2 – ORGAN SYSTEMS, EDUCATION

PICC-0055
STRESS ULCER PROPHYLAXIS IN CRITICALLY ILL CHILDREN: A SYSTEMATIC REVIEW
M. Duffett1,2, K. Choong1,2, J. Foster3, E. Gilfoyle4, J. Lacroix5, A. Randolph6, D.J. Cook2
1McMaster University, Pediatrics, Hamilton, Canada
2McMaster University, Clinical Epidemiology and Biostatistics, Hamilton, Canada
3Dalhousie University, Pediatrics, Halifax, Canada
4University of Calgary, Pediatrics, Calgary, Canada
5Université de Montréal, Pediatrics, Montréal, Canada
6Boston Children’s Hospital, Critical Care Medicine, Boston, USA

Aims & Objectives:
Critically ill children are at increased risk of gastrointestinal bleeding and more than 60% receive prophylaxis. Despite common use, it is not clear if the benefits of prophylaxis outweigh the risks. Our objective was to assess the effect of stress ulcer prophylaxis in critically ill children on the outcomes of clinically important bleeding, ventilator associated pneumonia (VAP) and C. difficile infection.

Methods
We searched PICUtrials.net (a comprehensive repository of published randomized controlled trials (RCTs) in pediatric critical care identified by searching MEDLINE, EMBASE, LILACS, and CENTRAL using comprehensive search strategies, updated Oct 8, 2015). We included RCTs comparing any pharmacological prophylaxis with placebo or no intervention. Pairs of reviewers screened studies for eligibility and abstracted data independently. We used the Cochrane Risk of Bias Tool to classify the trials’ risk of bias.

Results
Four trials randomizing 465 children compared any pharmacological prophylaxis (proton pump inhibitors, histamine-2 receptor antagonists, antacids or sulcralfate) to placebo or no intervention were published between 1986 and 2002. Two (50.0%) were at high risk of bias due to lack of clinician blinding and incomplete data. The 3 trials randomizing 340 children that reported macroscopic or important bleeding did not find a difference between prophylaxis with any agent and no prophylaxis (RR 0.71; 95% CI 0.42 to 1.19, p=0.19). The single trial reporting VAP found no difference between prophylaxis with a PPI or H2RA and no prophylaxis (RR =1.14 ; 95% CI 0.74 to 1.77, p=0.54). No RCTs reported the incidence of C. difficile infection.

Conclusions
Any estimate of the effect of stress ulcer prophylaxis in critically ill children is very uncertain. The published RCTs are not sufficient to assess the balance of risks and benefits. A large RCT focusing on outcomes important to clinicians and families is needed.
DISCUSSION GROUP 2 – ORGAN SYSTEMS, EDUCATION

PICC-0515
THE IMPACT OF CRISIS RESOURCE MANAGEMENT TEAM TRAINING ON CARDIOPULMONARY RESUSCITATIONS ON A PAEDIATRIC INTENSIVE CARE UNIT (PICU):
H. Macgloin¹, L. Lofton², D. Sanz¹, K. Gruendler³, C. Korb¹, L. Storey⁴, A. Desai¹, M. Lane⁵, W. Banya⁶, H. Sampaio⁷, K. De Costa⁸, M. Bumester²
¹Royal Brompton and Harefield NHS Trust, Paediatric Intensive Care Unit, LONDON, United Kingdom
²Royal Brompton and Harefield NHS Trust, SPRinT Programme, London, United Kingdom
³University Hospital Tubingen, NICU, Tubingen, Germany
⁴University of Manchester, Medicine, Manchester, United Kingdom
⁵Royal Brompton and Harefield NHS Trust, Statistics, LONDON, United Kingdom
⁶Royal Brompton and Harefield NHS Trust, PICU, London, United Kingdom
⁷Royal Brompton and Harefield NHS Trust, Paediatric Intensive Care Unit SPRinT Programme, LONDON, United Kingdom

Aims & Objectives:
We aimed to assess the impact of Simulated interPRofessional Team Training (SPRinT) on team-working and Crisis Resource Management (CRM) during real cardiopulmonary resuscitations on PICU.

Methods
Cardiopulmonary resuscitations (CPR) on PICU lasting ≥2 minutes, were audited between 1.6.2014 and 31.5.2015. Following each CPR event, staff completed anonymous questionnaires scoring validated measures of team-working (TeamMonitor)¹ and the impact of prior SPRinT training on team and self-rated performance.

Results
234 resuscitation questionnaires from 36 cardiac arrests were analysed.

The number of prior SPRinT courses attended was highly significant particularly for improving individual overall performance and assisting early calls for help for the resuscitation (p=0.001). (Table 1).

Prior SPRinT training improved staff self-rating of performance and confidence during the resuscitation with little variability and strong mean agreement across professional groups.(Table 2).

Consistency of skills during CPR was most frequently reported for leadership and role shifting in response to emerging events during the resuscitation (75.92% n=180).
36 resuscitation team responses were analysed for consistency of CRM reported by ≥ 75% of members. Consistent leadership was reported by 21 teams (58.3%). Average team service length (experience) did not influence the proportion of teams reporting consistent CRM skills for most dimensions of team-working.

Table 1: Prior SPRinT Attendance and Performance:

<table>
<thead>
<tr>
<th>Level of agreement to statements marked on a 0-100% scale.</th>
<th>Number of previous SPRinT courses attended prior to cardiac arrest</th>
<th>1 n=32</th>
<th>2 to 3 n=66</th>
<th>&gt;3 n=48</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPRinT training has improved interprofessional communication on PICU</td>
<td>00(70;90)</td>
<td>80(70;90)</td>
<td>82(80;100)</td>
<td>0.0821</td>
<td></td>
</tr>
<tr>
<td>Attending SPRinT scenarios has helped me perform better overall in today’s resuscitation</td>
<td>80(70; 85)</td>
<td>80(70;100)</td>
<td>91(80;100)</td>
<td>0.001*</td>
<td></td>
</tr>
<tr>
<td>SPRinT training has helped with the following during this event:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calling for help early</td>
<td>80(70;80)</td>
<td>80(60;92.5)</td>
<td>100(90;100)</td>
<td>0.001*</td>
<td></td>
</tr>
<tr>
<td>Clarity of role/appropriate role allocation</td>
<td>80(80;90)</td>
<td>90(70;95)</td>
<td>91(80;100)</td>
<td>0.016*</td>
<td></td>
</tr>
<tr>
<td>Empowerment to speak out</td>
<td>80(60;90)</td>
<td>80(70;90)</td>
<td>91(80;100)</td>
<td>0.0099*</td>
<td></td>
</tr>
<tr>
<td>Communicating with the team</td>
<td>80(70;90)</td>
<td>80(75;95)</td>
<td>90(80;100)</td>
<td>0.0102*</td>
<td></td>
</tr>
<tr>
<td>Reducing my anxiety</td>
<td>80(55;90)</td>
<td>90(60;90)</td>
<td>90(80;100)</td>
<td>0.0131*</td>
<td></td>
</tr>
<tr>
<td>Prioritisation of tasks</td>
<td>80(65;85)</td>
<td>80(70;90)</td>
<td>90(80;100)</td>
<td>0.0029*</td>
<td></td>
</tr>
<tr>
<td>Leadership</td>
<td>70(50;80)</td>
<td>80(70;90)</td>
<td>90(80;100)</td>
<td>0.0038*</td>
<td></td>
</tr>
<tr>
<td>Appropriate use of resources</td>
<td>70(60;80)</td>
<td>80(70;90)</td>
<td>90(80;92)</td>
<td>0.0013*</td>
<td></td>
</tr>
<tr>
<td>Confidence in my role</td>
<td>80(60;80)</td>
<td>80(70;90)</td>
<td>90(80;100)</td>
<td>0.003*</td>
<td></td>
</tr>
</tbody>
</table>

Reported as median (IQR)
Significance tested using Kruskal-Wallis test for non-normally distributed response p<0.05 significance
Table 2: Self-Rated CPR Performance by Professional Group:

<table>
<thead>
<tr>
<th>Level of agreement by professional group (Median (IQR))</th>
<th>DOCTORS(^{a}) n=90</th>
<th>NURSES n=128</th>
<th>SURGEONS(^{a}) n=10</th>
<th>(P) VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPRinT training has improved interprofessional communication on PICU</td>
<td>80(70;90)</td>
<td>80 (70;90)</td>
<td>70(30;80)</td>
<td>0.0123*</td>
</tr>
<tr>
<td>Attending SPRinT scenarios has helped me perform better overall in today’s resuscitation</td>
<td>80(70;100)</td>
<td>80(70;90)</td>
<td>70(60;85)</td>
<td>0.131</td>
</tr>
</tbody>
</table>

SPRinT training has helped with the following during this event:

<table>
<thead>
<tr>
<th></th>
<th>DOCTORS(^{a}) n=90</th>
<th>NURSES n=128</th>
<th>SURGEONS(^{a}) n=10</th>
<th>(P) VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calling for help early</td>
<td>80(70;100)</td>
<td>80(70;100)</td>
<td>80(60;100)</td>
<td>0.778</td>
</tr>
<tr>
<td>Clarity of role/appropriate role allocation</td>
<td>90(75;100)</td>
<td>80(70;95)</td>
<td>80(70;100)</td>
<td>0.619</td>
</tr>
<tr>
<td>Expressing my opinion/Empowerment to speak out</td>
<td>80(70;95)</td>
<td>80(70;90)</td>
<td>80(65;90)</td>
<td>0.823</td>
</tr>
<tr>
<td>Communicating with the team</td>
<td>80(78;92)</td>
<td>80(75;90)</td>
<td>80(70;90)</td>
<td>0.535</td>
</tr>
<tr>
<td>Reducing my anxiety</td>
<td>80(60;90)</td>
<td>80(60;90)</td>
<td>75(60;90)</td>
<td>0.52</td>
</tr>
<tr>
<td>Prioritisation of tasks</td>
<td>80(70;90)</td>
<td>80(70;90)</td>
<td>80(70;90)</td>
<td>0.798</td>
</tr>
<tr>
<td>Leadership</td>
<td>80(70;90)</td>
<td>80(65;90)</td>
<td>80(65;90)</td>
<td>0.504</td>
</tr>
<tr>
<td>Appropriate use of resources</td>
<td>80(70;90)</td>
<td>80(70;94)</td>
<td>80(70;95)</td>
<td>0.316</td>
</tr>
<tr>
<td>Confidence in my role</td>
<td>70(80;90)</td>
<td>80(70;90)</td>
<td>85(75;100)</td>
<td>0.582</td>
</tr>
</tbody>
</table>

Significance tested using Kruskal-Wallis for non-normally distributed response \(p<0.05\) significance

\(^{a}\)Doctors: ICU residents 29(12.39%), ICU consultants 10(4.77%); Cardiologist 1(0.43%); 1 anaesthetist

\(^{c}\)Cardiothoracic surgeons

\(^{d}\)This remained significant after correcting for surgeon sample size
Conclusions

During real CPR, self-evaluated performance improves significantly with prior SPRinT training; particularly attendance at $\geq 3$ sessions. Further research is required to assess barriers to consistency of application of CRM during cardiopulmonary resuscitation and the impact of SPRinT training on patient outcome.

DISCUSSION GROUP 2 – ORGAN SYSTEMS, EDUCATION

PICC-0319
TRANSFUSION RELATED VASOACTIVITY: RELATIONSHIP TO RBC-DERIVED MICROPARTICLES
A. Said1, S. Rogers1, E. Frazier1, S. Keating2, R. Jackups3, P. Norris4, P. Spinella1, A. Doctor1
1Washington University in Saint Louis, Pediatrics, Saint Louis, USA
2Blood System Research Institute, Immunology Core, San Francisco, USA
3Washington University in Saint Louis, Pathology, Saint Louis, USA
4University of California in San Francisco, Laboratory medicine, San Francisco, USA

Aims & Objectives:
Paradoxically, red blood cell (RBC) transfusion may worsen oxygen (O2) delivery. This phenomenon has been attributed to the "RBC storage lesion"; however, recent bench findings suggest RBC-derived microparticles (MP) may limit O2 delivery by scavenging nitric oxide (NO) and thereby, impairing physiologic vasoregulation. We present pilot human data from a project exploring this hypothesis.

Methods
Transfused PICU/CICU patients with central venous or arterial catheters were screened. We excluded those with hemoglobinopathy, on NO donors, on extracorporeal support, with artificial valves, or those transfused with RBCs 3 months prior. We sampled subjects before, during and 1 hour after RBC transfusion. Samples were divided into 3 aliquots for MP phenotyping, quantification of plasma vasoactivity and NO scavenging. Sedated, intubated subjects (wt≥20 kg) were eligible for evaluation of tissue O2 saturation and hypoxic vasodilation capacity, using dynamic NIRS evaluation, at all time points.

Results
We enrolled 17 subjects (age: 5.6±5.5 years; pre-transfusion hemoglobin (Hb): 7.2±1.3 gm/dL; post-transfusion Hb: 10.8±1.7 gm/dL; transfusion volume: 12.9±3.1 mL/kg). RBC, Platelet, Leukocyte and endothelial associated MP were quantified. Transfusion increased RBC-MP density (171% increase from baseline, p=0.8, RM-ANOVA) and plasma vasoconstriction (136% increase from baseline, p=0.09, RM-ANOVA); but did not alter plasma NO scavenging. One subject was eligible for dynamic NIRS, demonstrating improved blood O2 content, but impaired hypoxic
vasodilation.

<table>
<thead>
<tr>
<th>Transfusion Time Points</th>
<th>Pre</th>
<th>Intra</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC-MP ($10^3/\mu L$) n=11</td>
<td>2.1±1.5</td>
<td>3.2±2.5</td>
<td>3.6±2.3</td>
</tr>
<tr>
<td>Vasoconstriction (% constriction $\frac{\text{100} \mu L \text{ plasma}}{50 \text{nmol Hb}}$) n=4</td>
<td>1.0±0</td>
<td>1.3±0.4</td>
<td>1.4±0.2</td>
</tr>
<tr>
<td>NO scavenging (AUC, mV/sec) n=3</td>
<td>6,443±3,602</td>
<td>6,342±950</td>
<td>6,012±1,879</td>
</tr>
</tbody>
</table>

Conclusions

Our preliminary data suggest transfusion increases circulating RBC-derived MPs and alters plasma vasoactivity. In the single patient studied to date, vasoregulation was impaired during and following transfusion. As enrollment continues, we plan further analysis evaluating this association and its mechanism.
Aims & Objectives:

During the summer of 2014, 112 cardiac surgery and cardiac catheterization cases were cancelled or rescheduled due to lack of capacity in the 29 bed cardiac intensive care unit (CICU). In response to this unprecedented demand on resources, an interdisciplinary group was established to develop strategic solutions for capacity management in the CICU.

Methods

The interdisciplinary group met regularly with an external consultant to analyze the capacity impact of patients remaining in the CICU for more than 28 days. Using this cohort of 182 patients, we developed a model to predict ICU length of stay to inform scheduling of cardiac surgical cases. A daily data dashboard was generated to display the daily census, incoming cardiac catheterization and surgical cases, and a prediction of the weekly capacity. Additionally, a smaller interdisciplinary admissions group was developed to assess CICU capacity daily and advise on pending admissions and transfers. A brief daily huddle was implemented for the admissions group to review the predictions and dashboard to ensure adequate capacity management. At six months, these strategic solutions were evaluated to determine feasibility and sustainability.

Results

Since May 2015, a brief daily huddle of the admissions group occurs every morning. During each huddle, the current predictions from the statistical model and the daily dashboard are used to inform surgical scheduling, admission and transfer decisions. This data-driven decision making process has been feasible and helpful to ensuring efficient and effective patient throughput and an improved patient experience. During the summer of 2015, there were zero cardiac surgical patients cancelled or postponed due to lack of CICU bed availability.

Conclusions

The development and implementation of data-driven solutions for capacity management in the CICU has resulted in a dramatic reduction in the number of cardiac surgery cancellations or rescheduling. These strategies have been found to be feasible to implement and sustain.
DISCUSSION GROUP 3 – OUTCOMES

PICC-0591
THE VALIDITY OF ULTRASOUND CARDIAC OUTPUT MONITOR (USCOM®) MEASUREMENTS IN CLINICALLY STABLE AND UNSTABLE PEDIATRIC PATIENTS
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Aims & Objectives:

USCOM is recommended as a method of monitoring hemodynamic endpoints in the resuscitation of septic shock. However, evidence supporting the validity of USCOM in pediatrics is inadequate. The primary objective of this study is to validate USCOM-derived hemodynamic measurements against 2D-echocardiography in 3 patient groups: 1) hemodynamically stable, 2) unstable and 3) mechanically ventilated

Methods:

Prospective observational study. Children under 18 years with normal heart anatomy in whom a 2D-echocardiography was ordered, were enrolled. USCOM was performed within 30 minutes of the 2D-echo. Assessors were blinded to each other’s measurements. The primary outcome was agreement between measures of preload, stroke volume and cardiac index. Interclass correlation (ICC) and Kappa Statistic were used to evaluate continuous and categorical variables respectively

Results:

90 patients were enrolled between July 2014- November 2015. 55.5 % were males, with mean age 108.71 months. The proportion of studies done on hemodynamically stable, unstable and stable mechanically ventilated patients was 69.7, 11 and 19.3 % respectively. Agreement for stroke volume was good in hemodynamically stable children (ICC 0.67), but moderate and poor respectively, in unstable mechanically ventilated (ICC 0.57) and spontaneously breathing patients (0.25). Agreement for cardiac index was only moderate in both hemodynamically stable (ICC 0.44; 95% CI 0.24-0.61) and unstable patients (ICC 0.6 (0.05,0.88). Preload measurements by USCOM (stroke volume variability %) compared to IVC derived measurements on echo did not correlate well (Kappa (95% CI) of 0.08 (0-0.23) for IVC collapsibility index, and 0.07 (0,0.21) for IVC: aorta ratio).

Conclusions:

Caution should be exercised particularly when interpreting preload measurements in children. Directly measured and USCOM calculated hemodynamic variables on are clearly affected by positive pressure ventilation. Further rigorous validation in this population is required before its widespread use of USCOM.
Aims & Objectives:

Health consumer experiences are important to measure and to value any individual experience. The EMPATHIC-30 WA questionnaire, measuring parent satisfaction and experiences, has been validated in Australian pediatric and neonatal settings.

Aim: To explore parents' experiences in a neonatal unit

Methods

Parents of infants, admitted in to the neonatal unit > 24hrs completed the EMPATHIC-30 WA questionnaire which included four open-ended questions about their experiences. The narrative responses were grouped into the EMPATHIC-30 WA questionnaire’s five domains (organisation, parental participation, professional attitudes, information, care and treatment) and then thematically analysed.

Results

Findings: 97 questionnaires were returned and 86(89%) parents provided written comments about their experiences (See Table 1).

Table 1. Domains and main themes

<table>
<thead>
<tr>
<th>Domain</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation</td>
<td>Environment Security Care of twins</td>
</tr>
<tr>
<td>Information</td>
<td>Inconsistent information Limited access to information</td>
</tr>
<tr>
<td>Care and treatment</td>
<td>Well supported</td>
</tr>
<tr>
<td>Parental participation</td>
<td>Accessing baby Feeding practices Negotiated care</td>
</tr>
<tr>
<td>Professional attitude</td>
<td>Compassion Barriers</td>
</tr>
</tbody>
</table>

Parents were concerned about the crowded, brightly lit, noisy physical environment and some perceived a security risk for their baby. Pre-hospital and admission...
experiences were positive. Parents overall felt well informed, yet reported receiving limited and inconsistent information. In some circumstances parents experienced restricted access to their baby (especially for twins and higher order multiples) and mothers reported they would have liked more assistance establishing breastfeeding and more consultation about the decision to introduce bottle feeding. The discharge process was reported as having delays yet parents felt rushed and not prepared for discharge.

Conclusions

Parents were positive about their neonatal unit experiences. Identified areas for practice improvement were to provide more consistent communication, better facilitate the care of twins and address the modifiable physical environmental factors.
Aims & Objectives:

To study short term outcomes and mortality after cardiac surgery in neonates.

Methods

Retrospective study conducted at Childrens’ Heart Centre of Kokilaben Hospital, Mumbai. All newborns (postnatal age < 28 days) who were operated during Sept 2009 to Dec 2013 were included in this study.

Data collection: Demographics, diagnosis, preoperative status, surgical procedure, intraoperative events, post-op ICU course, hospital stay and outcome.

Results

200 neonates who underwent cardiac surgery during the study period were analyzed. Mean age at diagnosis was 8.1 days and at admission was 12.2 days. Only 8 babies were diagnosed antenatally of congenital heart defect and rest were diagnosed postnatally. Overall Mortality was 13.5% among this age group. Only 44% patients were monitored during transport while remaining were transported unmonitored by parents by public or private transport. 90% babies had complete repair while remaining 10% had palliative shunts. In 18.5 % of patients, sternum was kept open in the immediate post-operative period. Mean duration of ventilation was 3.8 days and inotropic support was 3.9 days. 43% babies required more than 2 ionotropes. Requirements of more than 3 ionotropes was associated with higher mortality. Presence of shock (18.6 vs 7.2) and residual lesion (30.4 vs 6.1) were associated with higher mortality. Duration of CPB, cross clamp time and DHCA (Deep Hypothermic Cardiac Arrest) had direct effect on mortality. Mean ICU stay and hospital stay were 10 and 14 days respectively.

Conclusions

Diagnostic and referral delays, unmonitored transport, complexity of the cardiac defect contribute to morbidity and mortality.
DISCUSSION GROUP 3 – OUTCOMES

PICC-0767
RECONCEPTUALIZING LONG-TERM SURVIVAL FROM CHILDHOOD CRITICAL ILLNESS: IMPROVING UNDERSTANDING THROUGH AN ECOLOGICAL PERSPECTIVE

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Aims & Objectives:

The long-term contextualized trajectory of surviving childhood critical illness is unclear, with particular paucity in understanding the longitudinal interplay between psychological and social worlds. PICU clinicians interact with children with critical illness for a relatively short period of time and may not be aware of these long-term consequences. This study aimed to explore how child PICU survival was constructed, experienced and contextualized within relevant theory.

Methods

A qualitative, multiple case study approach was used. Case studies were formed around nine PICU survivors and 23 significant others (including siblings, parents and teachers). Data was collected longitudinally with 42 data collection visits between October 2012 and July 2013. In-depth interviews and art-based methods were used to capture participants’ accounts. Data was analysed sequentially within- and across-cases using iterative, pattern matching techniques.

Results

Within and across contexts, diverse accounts illuminated the chaos and complexity of survivors’ experiences and lives. Four novel themes were revealed: (1) Biographical uncertainties and identity disturbances; (2) Contemplating death and evolving emotional and psychological well-being; (3) Hope, time and professed resiliency; (4) Dynamic identities, transitioning and transforming selves.

Conclusions

Surviving critical illness can expose survivors to numerous challenges and adversities. However, active mediation between biographical, individual, familial, social, and wider societal influences are evident when attempting to readjust to life which is not contained to the bio-psycho-social. Bronfenbrenner’s Ecological Theory offers explanatory power in understanding how surviving childhood critical illness is experienced and constructed as it recognizes the inter-relation between factors, such as history, culture, social groups and self.
DISCUSSION GROUP 3 – OUTCOMES

PICC-0550
TRACHEOSTOMY FOR CHILDREN ADMITTED FOR CONGENITAL HEART SURGERY
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²Boston Children's Hospital, Cardiology, Boston, USA

Aims & Objectives:

To describe the occurrence of tracheostomy placement and outcomes for children during admission for congenital heart surgery in 2006 and 2009.

Methods

ICD-9-CM codes were used to identify patients <18 years of age undergoing both congenital heart surgery and tracheostomy during admission using the Health Care Utilization Project (HCUP) Kids Inpatient Database (KID) year 2006 and 2009. Hospital characteristics, patient demographic, clinical and surgical (RACHS-1 risk categories) characteristics, discharge disposition, and inpatient utilization were summarized.

Results

In 2006, 16,891 cases were admitted for congenital heart surgery of which 179 (1.1%) also underwent tracheostomy. In 2009, 18,765 cases were admitted of which 234 (1.2%) underwent tracheostomy. In both years, the rate of tracheostomy varied significantly by region, with the highest percentage observed in the South (33.5% in 2006; 33.5% in 2009). Among those who had both procedures, the rate of in-hospital death decreased from 2006 to 2009 (26.8% and 16.2%, respectively). When comparing 2006 to 2009, the use of Medicaid insurance decreased (64.8% to 58.6) and use of private insurance increased (29.6% to 35.5%). The percentage of patients with prematurity, non-cardiac anomalies, or non-Downs major chromosomal abnormalities increased. In 2006 and 2009, the majority were categorized as RACHS-1 categories 2, 3, and 4 (56% and 38.5%, respectively). The percent of cases categorized as a RACHS-1 category 6 increased from 2006 to 2009 (1.7% to 4.7%). The median length of stay was 132 days (16 to 356) in 2006 and 139 days (12 to 362) in 2009. In 2006, 38% were discharged from a children's hospital. In 2009, 31.6% were discharged from a children's hospital.

Conclusions

Tracheostomy, although rare during congenital heart surgery admission, is associated with high in-hospital mortality and resource use. Despite having a similar rate of tracheostomy and RACHS-1 classifications, the rate of in-hospital mortality decreased by 10.6% from 2006 to 2009.
DISCUSSION GROUP 3 – OUTCOMES

PICC-0721

LACTATE AND NON-LACTATE BASE EXCESS IMPROVE THE PAEDIATRIC INDEX OF MORTALITY PIM3 MODEL PERFORMANCE IN THE AUSTRALIA AND NEW ZEALAND PAEDIATRIC INTENSIVE CARE REGISTRY

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²Monash University, Department of Epidemiology and Preventive Medicine, Melbourne, Australia
³Australia and New Zealand Intensive Care Society, Centre for Outcome and Resource Evaluation, Melbourne, Australia
⁴on behalf of the Australian & New Zealand Intensive Care Society (ANZICS) Centre for Outcomes & Research Evaluation (CORE)

Aims & Objectives:

Absolute base excess (BE), one of 10 variables in the PIM3 score, includes the effects of lactate and other ions. We aimed to test if the inclusion of venous base excess and separating base excess into lactate and non-lactate components, that is, lactate and (BE+lactate), improved the predictive performance of PIM3 in the ANZPIC Registry.

Methods

All admissions to the Registry January 2012 to June 2015 were included in the analysis. Lactate was collected prospectively from 2012 together with standard PIM3 variables. We considered three alternate PIM3 specifications using multivariate logistic regression; i) inclusion of venous BE values, ii) inclusion of lactate instead of BE and iii) separate variables for lactate and (BE+lactate) (including venous values). We compared the predictive performance of the models against a recalibrated PIM3 using the receiver operator characteristic (ROC) curves.

Results

There were 39,056 admissions during the study period. All PIM3 predictors were significant in these data for all model specifications. The area under the ROC (AUC) for the recalibrated PIM3 model was 0.9077. Inclusion of venous values for base excess improved discrimination slightly (AUC=0.9088). Using lactate in place of BE (AUC 0.9117), or lactate with (BE+lactate) as separate variables gave improved discriminatory performance (AUC=0.9123).

Conclusions

Lactate and venous values of base excess improve the discriminatory performance of PIM3 in this population. These variables should be considered for inclusion in future iterations of the model.
DISCUSSION GROUP 4 – OUTCOMES AND INFECTION

PICC-0043
EXPERIMENTAL EVIDENCES OF HUMAN CORONARY MICROVASCULATURE AND MYOCARDIAL TISSUE COLONIZATION BY NEISSERIA MENINGITIDIS

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2Institut Jacques Cartier-, Cardiac surgery, Massy Palaiseau, France
3Hôpital Européen George Pompidou, Biochimie, Paris, France
4Institut Necker Enfants Malades, INSERM- U1151, Paris, France
5Imagine Institut, SFR-Necker Cell Imaging Plateform, Paris, France
6Institut Necker Enfants Malades-, INSERM- U1151, Paris-, France

Aims & Objectives:

Meningococcal interaction with host cells is restricted to humans and N. meningitidis does not interact with animal cells, thus preventing the use of conventional animal models for the study of meningococcemia. In order to get insights into a potential interaction of Nm with the myocardial microvasculature, we modified a previously described humanized mice model where human skin was grafted on the back of immune-compromised mice [ref], to study human myocardial tissue colonization by N. meningitidis in vivo.

Methods

Myocardial tissues were obtained from pediatric patients undergoing cardiac surgery with myomectomy in accordance with French legislation, human myocardial tissue was obtained from patients whom legal tutor were informed and did not refuse to participate in the study and rapidly grafted.

Bacterial suspension was injected intraperitonealy in grafted mice. To assess bacteremia in infected animals, 10 μL of blood was sampled using a heparinized hematocrit glass tube after puncture or the lateral tail vein, or at the time of death by intracardiac puncture after intraperitoneal injection of a lethal dose of ketamine and xylazine.

Mice were killed 24 hours after infection. Mouse myocardial tissue grafts and mouse heart were carefully removed, fixed in 10% buffered formalin and embedded in paraffin.

Image acquisition was performed on a structured illumination microscope (Apotome 2 Zeiss)

Results

Myocardial tissue Xenograft in SCID mice is revascularized by mouse’s vessels: Neisseria meningitidis colonizes the myocardium venous and capillary microvessels N. meningitidis myocardium vascular colonization induced intravascular thrombosis and vascular endothelial destruction as well as vasculitis.
N. meningitidis adhesion to endothelial cells of the coronary microvascularisation and infectious vasculitis require Type IV pilus

**Conclusions**

We describe for the first time a model of human cardiac muscle tissue xenograft in SCID mice and demonstrate the tropism of *N. meningitidis* for human coronary microcirculation *in vivo*, and its pilus-mediated specificity.
DISCUSSION GROUP 4 – OUTCOMES AND INFECTION

PICC-0731
CLINICAL REASONING BEHIND ANTIBIOTIC USE IN PEDIATRIC INTENSIVE CARE UNITS: A QUALITATIVE STUDY

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¹Montreal Children’s Hospital, Pediatrics, Montreal, Canada
²Centre Hospitalier Universitaire de Québec - Université Laval, Medicine, Québec city, Canada
³Université de Montréal, Pediatrics, Montreal, Canada
⁴University of Ottawa, Pediatrics, Ottawa, Canada

Aims & Objectives:

Between 57% and 95% of children admitted to pediatric intensive care units (PICUs) receive antibiotics. In 33% of cases, the use of antibiotics is unnecessary. Importantly, little is known about how decisions about antibiotic use are made in PICUs. Our study aims to understand the clinical reasoning used by pediatric intensivists to tailor antibiotic treatments.

Methods

Qualitative study using grounded theory. Participants include pediatric intensivists and PICU fellows from three tertiary centers in Canada who made decisions about antibiotic use during morning rounds. We used field notes and conducted semistructured audio-recorded interviews after rounds to understand the cognitive process behind such decisions. After transcribing the interviews, we subjected the data to open, axial, and selective coding.

Results

Preliminary results include 6 interviews. The main emerging theme was using “organized steps” to make decisions about antibiotics, which include the use of clinical information (e.g., type of suspected infection, pathogens, risk factors for infection), results of ancillary tests, and published guidelines. Whenever a decision could not be made using “organized steps”, physicians tended to trust their “gut feeling” (second theme), which seems to evolve with the acquisition of more clinical experience. Interestingly, PICU physicians tend to follow their colleagues’ “gut feeling” if these colleagues were the ones present when antibiotics were started. Other emerging themes included the “absence of a test for cure”, forcing physicians to rely on guidelines recommendations when deciding about treatment duration, and the use of “own algorithms”, which are based on an individual selection of what one learned over the years.

Conclusions

PICU physicians tend to initially use an analytical process to make decisions about antibiotic use. However, they also make use of intuitive processes, especially when there is diagnostic uncertainty.
DISCUSSION GROUP 4 – OUTCOMES AND INFECTION

PICC-0621
TRANSLATING AND VALIDATING THE EMPATHIC-30 QUESTIONNAIRE MEASURING PARENT SATISFACTION IN AUSTRALIAN PEDIATRIC AND NEONATAL SETTINGS

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²Women & Newborn Health Service, Neonatal Clinical Care Unit, Perth- WA, Australia
³Curtin University, School of Nursing- Midwifery & Paramedicine, Perth- WA, Australia
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Aims & Objectives:

Engaging parents in the care of their sick child is becoming an internationally recognised quality indicator. The Dutch EMPATHIC-30 questionnaire measures parent experiences and satisfaction in paediatric intensive care units (PICU).

Aim: To validate the EMPATHIC-30 questionnaire in Australian paediatric and neonatal inpatient settings.

Methods

The 30-items instrument, divided in five domains with a 6-point rating scale (1=definitely no; 6=definitely yes) was translated using a structured process including back and forward translation and consulting parents to ensure cultural adaptation. The EMPATHIC-30 questionnaire was then distributed to parents in PICU, neonatal unit, and pediatric wards for reliability and validity testing.

Results

328 parents returned the questionnaire (wards n=129; PICU n=102; neonatal unit n=97). Reliability was measured by Cronbach alpha and was 0.93 (per domain 0.56 - 0.86). Positive correlation with three overall satisfaction questions showed adequate outcomes confirming congruent validity ($R_s=.381$ to $.698$; $p<0.01$). Non-differential validity was sufficient providing no significant differences between population characteristics and the five domains. Mean domain responses ranged from 5.09 for domain “information” in NICU to 5.80 “professional attitude” in the PICU. The lowest rated items were from parents in the neonatal unit; information of treatment by physicians (mean 4.53; SD 1.34) and information about medication (mean 4.74; SD 1.51).

Conclusions

The EMPATHIC-30 has shown adequate reliability and validity measures and can be used for benchmarking the quality of care in Australian pediatric and neonatal settings. Parental satisfaction outcomes were overall high. However, improvement is needed in the area of information and communication.
Aims & Objectives:

Corrective craniosynostosis surgery is often associated with large amounts of blood loss and metabolic disturbances. The purpose of this article is to examine the postoperative PICU course in terms of complications and blood transfusions at our institution between 2008-2015.

Methods

Electronic records of the patients who were admitted to Akdeniz University Hospital PICU after craniosynostosis surgery were analyzed retrospectively.

Results

A total of 54 patients underwent surgery. Complete data was available in 41, mostly non-syndromic patients without FGFR2-3 mutations. 26 males (63.4%) and 15 females (36.6%) were included in the study with a median age 7 months (2-26 months). The median duration of PICU stay and length of intubation periods were 2 days (range: 1-6 days) and 6 hours (range: 1-96 hours) respectively. The most common type observed was trigonocephaly in 22 (53.7%), scaphocephaly in 10 (24.4%), anterior plagiocephaly in 7 (17.1%), and brachycephaly in 2 (4.9%) patients. Hypotension and metabolic acidosis requiring bicarbonate infusion seemed to be the major complications with the rates 82.9% (34/41 patients) and 87.8% (36/41 patients) respectively. One patient died because of MODS. All patients received blood transfusions to achieve hemodynamic stability intraoperatively. By August 2015, the intraoperative coagulation policy included use of tranexamic acid (TA) in patients. The hematological observations at PICU arrival and at 24th hour, demonstrated a high incidence of blood transfusion postoperatively with a rate of 31/35 (88.6%) in non-TA patients, while the TA-receiving 6 patients did not need any transfusion in postoperative PICU period.

Conclusions

The postoperative blood transfusion seems to be decreased in TA patients, although an ongoing study on the efficacy of TA in decreasing the need of blood transfusion in craniosynostosis surgery still proceeds.
DISCUSSION GROUP 4 – OUTCOMES AND INFECTION

PICC-0301
CHILDREN’S PSYCHOLOGICAL AND BEHAVIORAL RESPONSES FOLLOWING PICU HOSPITALIZATION: THE CARING INTENSIVELY STUDY
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²IWK Health Centre, Psychology & Pediatrics, Halifax, Canada
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⁶McGill University Health Centre, Research Institute, Montreal, Canada
⁷The Hospital for Sick Children, Critical Care & Paediatrics, Toronto, Canada
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⁹The Montreal Children’s Hospital- McGill University Health Centre, Pediatrics, Montreal, Canada

Aims & Objectives:

PICU hospitalization places children at increased risk of psychological problems following discharge. To better understand these problems, identify risk factors, and target areas for health promotion and intervention, we are examining children’s psychological and behavioral responses over a 3-year period post-PICU.

Methods

To-date, 155 children aged 3 to 12 years, and their parents (PICU n=85; ENT comparison n=70) have been enrolled in this multi-site, mixed-methods prospective cohort study. Children’s psychological and behavioral characteristics, and parent anxiety and stress were assessed using standardized measures. Follow-up data from 70 parent-child pairs (PICU n=39; ENT n=31) with 6-month outcomes were summarized.

Results

The PICU group was defined by longer length of stay, higher numbers of invasive procedures, and multiple medical diagnoses and co-morbidities. Groups did not differ on age. PICU parents demonstrated higher trait (p=0.01) and state anxiety (p=0.008) during hospitalization, which was sustained at 6 weeks post-discharge (p<.0001). At 6-months, PICU children demonstrated more behavioral and emotional problems on the Behavioral Symptoms Index of the BASC-2. Of those, 25% scored in the “at risk” (potential functional impairment; n=8), or clinically significant (n=3) range. More than 50% of PICU group strengths and difficulties questionnaire scores were above published norms. Child self-report measures of distress and perceived competence were within normative range.
Conclusions

Children are at increased risk of behavioral and emotional problems following PICU hospitalization, with 25% demonstrating ‘at risk’ or clinically significant problems that remain unresolved at 6 months. The trajectory of these early outcomes and risk factors that impact recovery will be followed.
DISCUSSION GROUP 4 – OUTCOMES AND INFECTION

PICC-0630
COMPLICATIONS OF SCOLIOSIS PATIENTS UNDERGOING SPINAL FUSION SURGERY- A SINGLE CENTER EXPERIENCE

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Aims & Objectives:

Approximately 85% of scoliosis cases are classified as idiopathic while 15% are congenital or secondary to underlying diseases and syndromes. A major indication for scoliosis surgery is an existing or impending respiratory compromise. However, the surgery may be associated with significant morbidity and even mortality. The aim of this study was to review major early complications in the Pediatric Intensive Care Unit (PICU) after spinal fusion surgery for scoliosis.

Methods

The charts of all children and adolescents admitted to the PICU following spinal fusion surgery between 2012 and 2014 were reviewed. Data on demographics, comorbidities, scoliosis classification, Cobb angle and major complications were extracted.

Results

Data on a total of 355 patients were retrieved. Age was 14 (4-20) years (64% were female). 11% underwent surgery before the age of 10 years. Idiopathic scoliosis was diagnosed in 60%. In 17%, scoliosis accompanied a neuromuscular disease, 10% were congenital scoliosis, 10% mesenchymal scoliosis and 3% developed scoliosis secondary to trauma. Major complications were observed in 26 patients (7.3%), all in
the non-idiopathic group (15%) (Table 1). One patient died (0.3%).

Table 1: Major complications, and distribution in non-idiopathic scoliosis surgery

<table>
<thead>
<tr>
<th>Complication</th>
<th>Percent of all cases (n)</th>
<th>Percent of non-idiopathic cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardio pulmonary resuscitation</td>
<td>0.8 (3)</td>
<td>11</td>
</tr>
<tr>
<td>Shock</td>
<td>2.2 (8)</td>
<td>31</td>
</tr>
<tr>
<td>Prolonged mechanical</td>
<td>4.2 (15)</td>
<td>58</td>
</tr>
<tr>
<td>Failed extubation</td>
<td>0.8 (3)</td>
<td>11</td>
</tr>
<tr>
<td>Prolonged non-invasive ventilation</td>
<td>2.2 (8)</td>
<td>31</td>
</tr>
<tr>
<td>Tracheostomy + home ventilation</td>
<td>0.5 (2)</td>
<td>8</td>
</tr>
</tbody>
</table>

Conclusions

Major complications following spinal fusion surgery for scoliosis are not uncommon in children with non-idiopathic scoliosis, nevertheless, they are very rare in otherwise healthy children with idiopathic scoliosis. Correcting scoliosis in idiopathic scoliosis patients is safe.
Aims & Objectives:

Effective communication is paramount in caring for critically ill children and their families. Using a Navigator to support communication in the Pediatric and Cardiac Intensive Care Units (PICU/CICU), we measured perception of communication among healthcare team members (HTMs) from the view of HTMs and parents.

Methods

HTMs who care for patients in the PICU/CICU (attending and trainee physicians, advance practice and staff nurses, and all ancillary services) were anonymously surveyed. We enrolled English-speaking parents of patients with an expected PICU admission of ≥ 24 hours or a Pediatric Index of Mortality Score ≤4. Parents of surviving children completed a survey at the time of discharge from the PICU/CICU. We assessed perception of communication for both groups using the Collaboration and Satisfaction about Care Decisions (CSACD).

Results

Surveys were completed by 109 HTMs and 49 parents of 44 children. For this 9-item tool, 10% of HTMs reported they strongly agreed there is shared decision making among team members, 4% reported complete collaboration and 6% were very satisfied with the decision making process and with decisions made for patients. Alternatively, 57% of parents strongly agreed there was shared decision making among HTMs, 43% reported complete collaboration, 50% were very satisfied with the decision-making process, and 60% with decisions made in the PICU/CICU.

Conclusions

We demonstrate that the healthcare team consistently rated communication less favorably than parents of patients. Future work will examine the impact of the Navigator role on perceptions of communication for healthcare team members through future study.
DISCUSSION GROUP 4 – OUTCOMES AND INFECTION

PICC-0326
BURDEN AND OUTCOMES OF SEVERE PERTUSSIS INFECTION IN CRITICALLY ILL INFANTS

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⁵Royal Children’s Hospital Brisbane, Australian and New Zealand Paediatric Intensive Care Registry- CORE, Brisbane, Australia
⁶Children’s Hospital Westmead, Paediatric Intensive Care Unit, Sydney, Australia
⁷The Royal Children’s Hospital, Paediatric Intensive Care Unit, Melbourne, Australia
⁸National University Health System, Cardiothoracic Intensive Care Unit, Singapore, Singapore
⁹University of Melbourne, Department of Paediatrics, Mebourne, Australia
¹⁰Inselspital- University of Bern, Department of Pediatrics, Bern, Switzerland

Aims & Objectives:

Despite WHO endorsed immunization schedules, Bordetella pertussis continues to cause severe infections, predominantly in infants. There is a lack of data on the incidence and outcome of severe pertussis infections in infants requiring intensive care unit (ICU) admission. We aimed to describe admission rates, severity, and costs of pertussis infections in critically ill infants.

Methods

Design: Binational observational multicenter study.

Setting: 10 pediatric and 19 general ICUs in Australia and New Zealand contributing to the Australian and New Zealand Paediatric Intensive Care Registry.

Patients: Infants below 1 year of age requiring intensive care due to pertussis infection in Australia and New Zealand between 2002 and 2014.

Results

During the study period, 416 (1.0%) of 42,958 infants admitted to ICU were diagnosed with pertussis. The estimated population-based ICU admission rate due to pertussis ranged from 2.1/100,000 infants, to 18.6/100,000 infants. Admission rates were highest among infants <60 days of age (p<0.0001). 206 (49.5%) required mechanical ventilation, including 20 (4.8%) treated with high frequency oscillatory ventilation (HFOV), 16 (3.8%) with inhaled nitric oxide (iNO), and 7 (1.7%) with extracorporeal membrane oxygenation (ECMO). 20 of the 416 (4.8%) children died.
The need for mechanical ventilation, HFOV, iNO and ECMO were significantly associated with mortality (p<0.01). Direct severe pertussis-related hospitalization costs were estimated to be $1,575,168 per year.

Conclusions

Pertussis continues to cause significant morbidity and mortality in infants, in particular during the first months of life. Improved strategies are required to reduce the significant healthcare costs and disease burden of this vaccine-preventable disease.
DISCUSSION GROUP 5 – GLOBAL AND HEART

PICC-0624
INCIDENCE, COMPOSITION AND PREDICTORS OF IN-TRANSIT CRITICAL EVENTS DURING PEDIATRIC CRITICAL CARE TRANSPORT

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²University Health Network, Critical Care Medicine, Toronto, Canada
³Children’s Hospital - London Health Sciences Centre, Pediatric Critical Care, London, Canada
⁴Schulich School of Medicine and Dentistry, Pediatrics, London, Canada
⁵Children’s Hospital of Eastern Ontario, Division of Pediatric Critical Care, Ottawa, Canada
⁶University of Ottawa, Pediatrics, Ottawa, Canada
⁷Ornge Transport Medicine, ____, Mississauga, Canada

Aims & Objectives:

Pediatric patients are commonly transported to specialized pediatric tertiary care hospitals due to regionalization of healthcare resources. Our objectives were to determine the incidence of in-transit critical events (ITCE) during pediatric critical care transport performed by paramedic-providers and identify associated patient- and transport-related factors.

Methods

We conducted a retrospective cohort study of all pediatric patients transported by a provincial Canadian transport provider between January 1, 2005 and December 31, 2010. The primary outcome was ITCE, defined by a modified consensus definition.

Results

ITCE occurred on 1445 (11.6%) of 12,435 transports (table 1) and medical interventions were performed on 566 (4.6%) transports (table 2). The most common ITCE were hypotension (4.0%), tachycardia (3.4%) and bradycardia (2.9%). A Transport Pediatric Early Warning Score (TPEWS) of ≥ 7 predicted ITCE with high specificity and poor sensitivity (92.6% and 18.2%, respectively). The crude incidence of ITCE was lower when paramedic crews had medical escorts (10.1% vs.12.3%; p<0.01), although this was not significant after adjustment for patient- and transport-related factors. In multivariate analysis, an increased risk of ITCE was independently associated with age, mechanical ventilation, pre-transport cardiovascular instability, transport duration, air medical transports, scene calls and paramedic crew type (table 3).
<table>
<thead>
<tr>
<th>Table 1 - Patient Characteristics and Number of Critical Events</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Patients, N</strong></td>
</tr>
<tr>
<td><strong>Age in years, mean (SD)</strong></td>
</tr>
<tr>
<td><strong>Male Sex, N (%)</strong></td>
</tr>
<tr>
<td><strong>Age Category, N (%)</strong></td>
</tr>
<tr>
<td>Early Adolescent 12-18yrs</td>
</tr>
<tr>
<td>Middle Childhood 6-11yrs</td>
</tr>
<tr>
<td>Early childhood 2-5yrs</td>
</tr>
<tr>
<td>Infant &amp; Toddler 28d-2yr</td>
</tr>
<tr>
<td>Neonate &lt;=28days</td>
</tr>
<tr>
<td><strong>Diagnostic Category, N (%)</strong></td>
</tr>
<tr>
<td>Medical</td>
</tr>
<tr>
<td>Surgical</td>
</tr>
<tr>
<td>Neurological</td>
</tr>
<tr>
<td>Trauma</td>
</tr>
<tr>
<td>Other / Not specified</td>
</tr>
<tr>
<td><strong>Mechanical Ventilation, N (%)</strong></td>
</tr>
<tr>
<td><strong>Pretransport Hemodynamic Instability, N (%)</strong></td>
</tr>
<tr>
<td>Pretransport Hypotension</td>
</tr>
<tr>
<td>Pretransport Arrhythmia</td>
</tr>
<tr>
<td>Pretransport Vasopressor</td>
</tr>
<tr>
<td><strong>Transport Pediatric Early Warning Score, median (IQR)</strong></td>
</tr>
<tr>
<td><strong>Medical Escort, N (% of all transports)</strong></td>
</tr>
<tr>
<td><strong>Crew Level, N (%)</strong></td>
</tr>
<tr>
<td>Primary Care Paramedic</td>
</tr>
<tr>
<td>Acute Care Paramedic</td>
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<tr>
<td>Critical Care Paramedic</td>
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<tr>
<td><strong>Transport Call Type, N (%)</strong></td>
</tr>
<tr>
<td>Interfacility transport</td>
</tr>
<tr>
<td>Modified Scene Call</td>
</tr>
<tr>
<td>Scene Call</td>
</tr>
<tr>
<td><strong>Air transport, N (%)</strong></td>
</tr>
<tr>
<td><strong>Distance in km, mean (SD)</strong></td>
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<tr>
<td><strong>Duration Out of Hospital, mean (SD)</strong></td>
</tr>
<tr>
<td><strong>Critical Events, N (%)</strong></td>
</tr>
<tr>
<td>In-transit Medical Intervention</td>
</tr>
<tr>
<td>Hypotension</td>
</tr>
<tr>
<td>Tachycardia</td>
</tr>
<tr>
<td>Bradycardia</td>
</tr>
<tr>
<td>Hypoxia</td>
</tr>
<tr>
<td>Medical Interventions Performed by Transport Crews</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
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<tr>
<td>Administration of New Vasopressor or Inotrope</td>
</tr>
<tr>
<td><em>Dopamine</em></td>
</tr>
<tr>
<td><em>Norepinephrine</em></td>
</tr>
<tr>
<td><em>Phenylephrine</em></td>
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<tr>
<td><em>Milrinone</em></td>
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<tr>
<td><strong>Airway Events</strong></td>
</tr>
<tr>
<td><em>Bag-Valve-Mask Ventilation</em></td>
</tr>
<tr>
<td><em>Orotracheal Intubation Attempt</em></td>
</tr>
<tr>
<td><em>Needle thoracostomy</em></td>
</tr>
<tr>
<td><em>Naso-tracheal intubation Attempt</em></td>
</tr>
<tr>
<td><em>Unintentional extubation</em></td>
</tr>
<tr>
<td><em>Ascherman chest seal</em></td>
</tr>
<tr>
<td><em>Cricothyroidotomy</em></td>
</tr>
<tr>
<td><em>Other airway intervention</em></td>
</tr>
<tr>
<td>Dextrose 50%</td>
</tr>
<tr>
<td>Lidocaine</td>
</tr>
<tr>
<td>Atropine</td>
</tr>
<tr>
<td>Sodium Bicarbonate 8.4%</td>
</tr>
<tr>
<td>Glucagon</td>
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<tr>
<td>Adenosine</td>
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<tr>
<td>Naloxone</td>
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<tr>
<td>External pacing</td>
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<tr>
<td>Effect</td>
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<td>-----------------------------------------------------</td>
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<tr>
<td>Age (versus baseline category of Early Adolescent 12-18yrs)</td>
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<tr>
<td>Early childhood 2-5yrs</td>
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<tr>
<td>Middle Childhood 6-11yrs</td>
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<tr>
<td>Infant &amp; Toddler 28d-2yr</td>
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<tr>
<td>Neonate &lt;=28days</td>
</tr>
<tr>
<td>Female Gender (vs. Male)</td>
</tr>
<tr>
<td>Pretransport Mechanical Ventilation</td>
</tr>
<tr>
<td>Pretransport Cardiovascular Instability</td>
</tr>
<tr>
<td>Diagnosis (versus baseline category of medical diagnoses)</td>
</tr>
<tr>
<td>Neurological</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Surgical</td>
</tr>
<tr>
<td>Trauma</td>
</tr>
<tr>
<td>Presence of Medical Escort</td>
</tr>
<tr>
<td>Paramedic Crew Certification Level</td>
</tr>
<tr>
<td>ACP (vs PCP)</td>
</tr>
<tr>
<td>CCP (vs PCP)</td>
</tr>
<tr>
<td>Transport Duration, log units</td>
</tr>
<tr>
<td>Ambulance Call Type (versus baseline category of interfacility transport)</td>
</tr>
<tr>
<td>Modified Scene Call</td>
</tr>
<tr>
<td>Scene Call</td>
</tr>
</tbody>
</table>

Abbreviations: ACP - Acute Care Paramedic; PCP - Primary Care Paramedic; CCP - Critical Care Paramedic
Conclusions

This is the first study to apply the new pediatric consensus definitions of transport-related critical events. We determined ITCE occur on almost 1 in 9 transports, which was strongly associated with pre-transport cardiovascular instability. TPEWS was not strongly predictive of ITCE. Future prospective studies are required to investigate strategies to mitigate ITCE, including contrasting paramedic with other transport provider models.
DISCUSSION GROUP 5 – GLOBAL AND HEART

PICC-0106
ORAL TRIIODOTHYRONINE SUPPLEMENTATION INCREASES LACTATE-PYRUVATE RATIO AS A MARKER OF EFFECTIVE AVAILABILITY OF ENERGY SUBSTRATES

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2National Cardiovascular Center Harapan Kita, Anaesthesiology, Jakarta, Indonesia
3Cipto Mangunkusumo Hospital and Faculty of Medicine- University of Indonesia, Paediatric, Jakarta, Indonesia
4Seattle Children’s Hospital and University of Washington, USA

Aims & Objectives:

The incidence of euthyroid sick syndrome (ESS) is closely related to the occurrence of low cardiac output syndrome (LCOS) post congenital heart surgery. Thyroid hormones exert their action on cardiovascular function by improving lactate and pyruvate utilization as effective energy substrates for mitochondrial respiratory function. Objectives: to provide evidence that oral T3 can decrease the incidence of LCOS and lactate-pyruvate ratio as a marker of effective utilization of energy substrates.

Methods

The study was a single center, randomized, controlled trial. Inclusion criteria were children ≤3 years of age undergoing corrective open heart surgery. Treatment group received oral T3 supplementation 1 μg/kgBW while the placebo group received saccharum lactis every 6 hours from the induction of anaesthesia until 60 hours after the first dose.

Results

A total of 209 participants were enrolled to the study. LCOS was higher in the placebo group with significant difference at 6 hours post cross clamp removal with odds ratio of 2.55 (1.35–4.81), p=0.003. There was an increase of lactate-pyruvate ratio at 1 hour post cross clamp removal in the treatment group without LCOS compared to those with LCOS [20.99 (15.82 – 31.56) vs. 12.61(8.89 – 18.67), respectively, p= 0.04] and in the placebo group at 24 hours post cross clamp removal [35.22 (22.08 – 65.75) vs.17.05 (11.84 – 26.07)], respectively, p=0.01).

Conclusions

Oral T3 prophylaxis could prevent and ameliorate ESS which subsequently reduced LCOS after cardiac surgery. An increased lactate-pyruvate ratio in the treatment group may be a sign of an early increased pyruvate utilization for energy substrate.
Aims & Objectives:

Background: Optimal allocation of scarce resources necessitates early identification of children likely to have adverse outcomes. However, large cohorts providing such data are lacking.

Objective: To identify clinical features at presentation among children with community acquired pneumonia that can be used to predict the final outcome.

Methods

Children (1 month-12 years) with severe/very severe pneumonia (WHO IMCI definition) constituted the study cohort. Those with symptoms >7 days, prior antibiotics >24 hours, and immune-deficiency; were excluded. Demographic data, presenting symptoms, examination findings, and laboratory investigations, were recorded. Data of those with adverse outcome (i.e death) and those without adverse outcome (i.e survival) were analyzed, to identify predictive characteristics.

Results

The cohort comprised 2191 children; 269 (12.3%) had adverse outcome. Figure 1 summarizes demographic features, presenting symptoms and examination findings at presentation. Figures 2 and 3 show odds ratio [95% CI] of various clinical and laboratory characteristics respectively, that were identified as possible predictors of adverse outcome. History of feeding difficulty, altered sensorium, and convulsions at presentation, strongly correlated with adverse outcome. Respiratory rate >110% and >120% of age-specific cut-off, as well as severe malnutrition, hypoxia, and central cyanosis were additional predictors. Presence of wheeze (on history and/or examination) was associated with favourable outcome. Need for intensive care or assisted ventilation at presentation were strong predictors of adverse outcome. None of the laboratory investigations could predict adverse outcome although Gram negative bacteremia showed an association.
Figure 1: Presenting features of children with and without adverse outcome (n=2191)

<table>
<thead>
<tr>
<th>Demographic features</th>
<th>Children with adverse outcome (n=269)</th>
<th>Children with no adverse outcome (n=1922)</th>
<th>All enrolled children (n=2191)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age ± s.d. (mo)</td>
<td>18.9 (27.9)</td>
<td>19.6 (28.0)</td>
<td>19.5 (28.0)</td>
</tr>
<tr>
<td>Median age (IQR) in months</td>
<td>8 (3-17.5)</td>
<td>8 (4-21)</td>
<td>8 (4-20.5)</td>
</tr>
<tr>
<td>Age &lt;12 mo</td>
<td>190 (70.6%)</td>
<td>1227 (63.8%)</td>
<td>1417 (64.7%)</td>
</tr>
<tr>
<td>Age 13-24 mo</td>
<td>26 (9.7%)</td>
<td>277 (14.4%)</td>
<td>303 (13.8%)</td>
</tr>
<tr>
<td>Age 25-36 mo</td>
<td>13 (4.8%)</td>
<td>129 (6.7%)</td>
<td>142 (6.5%)</td>
</tr>
<tr>
<td>Age 37-60 mo</td>
<td>18 (6.7%)</td>
<td>115 (6.0%)</td>
<td>133 (6.1%)</td>
</tr>
<tr>
<td>Age 61-144 mo</td>
<td>22 (8.2%)</td>
<td>174 (9.1%)</td>
<td>196 (8.9%)</td>
</tr>
<tr>
<td>Female Gender (%)</td>
<td>89 (33.1%)</td>
<td>557 (29.0%)</td>
<td>646 (29.5%)</td>
</tr>
<tr>
<td>Symptoms (noted by parents)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough (%)</td>
<td>229 (85.1%)</td>
<td>1801 (93.7%)</td>
<td>2030 (92.6%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>4 (2-7)</td>
<td>4 (3-7)</td>
<td>4 (3-7)</td>
</tr>
<tr>
<td>Breathing difficulty (%)</td>
<td>257 (95.5%)</td>
<td>1740 (90.5%)</td>
<td>1997 (91.1%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>2 (2-4)</td>
<td>2 (1-4)</td>
<td>2 (1-4)</td>
</tr>
<tr>
<td>Fever (%)</td>
<td>220 (81.8%)</td>
<td>1600 (83.2%)</td>
<td>1820 (83.1%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>3 (2-5)</td>
<td>3 (2-5)</td>
<td>3 (2-5)</td>
</tr>
<tr>
<td>Feeding difficulty</td>
<td>87 (32.3%)</td>
<td>254 (13.2%)</td>
<td>341 (15.6%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>1 (1-2)</td>
<td>1 (1-2)</td>
<td>1 (1-2)</td>
</tr>
<tr>
<td>Altered consciousness</td>
<td>94 (34.9%)</td>
<td>252 (13.1%)</td>
<td>346 (15.8%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>1 (1-2)</td>
<td>2 (1-3)</td>
<td>1 (1-2)</td>
</tr>
<tr>
<td>Convulsions</td>
<td>17 (6.3%)</td>
<td>58 (3.0%)</td>
<td>75 (3.4%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>1 (1-1)</td>
<td>1 (1-1)</td>
<td>1 (1-1)</td>
</tr>
<tr>
<td>Chest indrawing</td>
<td>185 (68.8%)</td>
<td>1229 (63.9%)</td>
<td>1414 (64.5%)</td>
</tr>
<tr>
<td>Audible wheeze</td>
<td>74 (27.5%)</td>
<td>924 (48.1%)</td>
<td>998 (45.5%)</td>
</tr>
<tr>
<td>Examination findings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe malnutrition</td>
<td>178 (66.2%)</td>
<td>907 (47.2%)</td>
<td>1085 (49.5%)</td>
</tr>
<tr>
<td>Oxygen saturation &lt;92%</td>
<td>113 (42.0%)</td>
<td>447 (23.3%)</td>
<td>560 (25.6%)</td>
</tr>
<tr>
<td>Oxygen saturation &lt;95%</td>
<td>165 (61.4%)</td>
<td>864 (45.0%)</td>
<td>1029 (47.0%)</td>
</tr>
<tr>
<td>Central cyanosis</td>
<td>39 (14.5%)</td>
<td>108 (5.6%)</td>
<td>147 (6.7%)</td>
</tr>
<tr>
<td>Crackles</td>
<td>207 (77.0%)</td>
<td>1460 (76.0%)</td>
<td>1667 (76.0%)</td>
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<tr>
<td>Bronchial breathing</td>
<td>5 (1.9%)</td>
<td>46 (2.4%)</td>
<td>51 (2.3%)</td>
</tr>
<tr>
<td>Wheeze</td>
<td>43 (16.0%)</td>
<td>540 (28.1%)</td>
<td>583 (26.6%)</td>
</tr>
<tr>
<td>Need for intensive care</td>
<td>230 (85.5%)</td>
<td>572 (29.8%)</td>
<td>802 (36.6%)</td>
</tr>
</tbody>
</table>
Figure 2: Presenting features predicting adverse outcome

<table>
<thead>
<tr>
<th>Demographic features</th>
<th>Children with adverse outcome (n=269)</th>
<th>Children with no adverse outcome (n=1922)</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &lt;12 mo</td>
<td>190 (70.6%)</td>
<td>1227 (63.8%)</td>
<td>1.36 [1.03, 1.80]</td>
</tr>
<tr>
<td>Female Gender (%)</td>
<td>89 (33.1%)</td>
<td>557 (29.0%)</td>
<td>1.21 [0.92, 1.59]</td>
</tr>
<tr>
<td><strong>Symptoms (noted by parents)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough (%)</td>
<td>229 (85.1%)</td>
<td>1801 (93.7%)</td>
<td>0.38 [0.26, 0.56]</td>
</tr>
<tr>
<td>Breathing difficulty (%)</td>
<td>257 (95.5%)</td>
<td>1740 (90.5%)</td>
<td>2.24 [1.23, 4.08]</td>
</tr>
<tr>
<td>Fever (%)</td>
<td>220 (81.8%)</td>
<td>1600 (83.2%)</td>
<td>0.90 [0.65, 1.26]</td>
</tr>
<tr>
<td>Feeding difficulty</td>
<td>87 (32.3%)</td>
<td>254 (13.2%)</td>
<td>3.14 [2.35, 4.18]</td>
</tr>
<tr>
<td>Altered consciousness</td>
<td>94 (34.9%)</td>
<td>252 (13.1%)</td>
<td>3.56 [2.68, 4.73]</td>
</tr>
<tr>
<td>Convulsions</td>
<td>17 (6.3%)</td>
<td>58 (3.0%)</td>
<td>2.17 [1.24, 3.78]</td>
</tr>
<tr>
<td>Chest indrawing</td>
<td>185 (68.8%)</td>
<td>1229 (63.9%)</td>
<td>1.24 [0.94, 1.63]</td>
</tr>
<tr>
<td>Audible wheeze</td>
<td>74 (27.5%)</td>
<td>924 (48.1%)</td>
<td>0.41 [0.31, 0.54]</td>
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<tr>
<td><strong>Examination findings</strong></td>
<td></td>
<td></td>
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<tr>
<td>RR &gt;110% of age-specific cut-off</td>
<td>232/269 (86.2%)</td>
<td>1331/1922 (69.3%)</td>
<td>2.78 [1.94, 3.99]</td>
</tr>
<tr>
<td>RR &gt;120% of age-specific cut-off</td>
<td>169/269 (62.8%)</td>
<td>969/1922 (50.4%)</td>
<td>1.66 [1.28, 2.16]</td>
</tr>
<tr>
<td>Severe malnutrition</td>
<td>178 (66.2%)</td>
<td>907 (47.2%)</td>
<td>2.19 [1.67, 2.86]</td>
</tr>
<tr>
<td>Oxygen saturation &lt;92%</td>
<td>113 (42.0%)</td>
<td>447 (23.3%)</td>
<td>2.39 [1.84, 3.11]</td>
</tr>
<tr>
<td>Oxygen saturation &lt;95%</td>
<td>165 (61.4%)</td>
<td>864 (45.0%)</td>
<td>1.94 [1.50, 2.52]</td>
</tr>
<tr>
<td>Central cyanosis</td>
<td>39 (14.5%)</td>
<td>108 (5.6%)</td>
<td>2.85 [1.93, 4.21]</td>
</tr>
<tr>
<td>Crackles</td>
<td>207 (77.0%)</td>
<td>1460 (76.0%)</td>
<td>1.06 [0.78, 1.43]</td>
</tr>
<tr>
<td>Bronchial breathing</td>
<td>5 (1.9%)</td>
<td>46 (2.4%)</td>
<td>0.77 [0.30, 1.96]</td>
</tr>
<tr>
<td>Wheeze</td>
<td>43 (16.0%)</td>
<td>540 (28.1%)</td>
<td>0.49 [0.35, 0.68]</td>
</tr>
<tr>
<td>Need for intensive care</td>
<td>230 (85.5%)</td>
<td>572 (29.8%)</td>
<td>13.92 [9.78, 19.82]</td>
</tr>
<tr>
<td>Need for ventilation</td>
<td>222 (82.5%)</td>
<td>164 (8.5%)</td>
<td>50.63 [35.57, 72.07]</td>
</tr>
</tbody>
</table>
Conclusions

The presenting features and examination findings associated with adverse outcome in this cohort can be used to triage children with pneumonia for urgent management, intensive monitoring and prioritization for assisted ventilation; thereby facilitating evidence-based allocation of scarce resources.

<table>
<thead>
<tr>
<th></th>
<th>Children with adverse outcome (n=269)</th>
<th>Children with no adverse outcome (n=1922)</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin ≤10 g/dl</td>
<td>127 (47.2%)</td>
<td>898 (46.7%)</td>
<td>1.02 [0.79, 1.32]</td>
</tr>
<tr>
<td>TLC &gt; 11000/mm³</td>
<td>127 (47.2%)</td>
<td>945 (49.2%)</td>
<td>0.92 [0.72, 1.19]</td>
</tr>
<tr>
<td>TLC &lt; 4000/mm³</td>
<td>8 (3.0%)</td>
<td>46 (2.4%)</td>
<td>1.25 [0.58, 2.68]</td>
</tr>
<tr>
<td>WHO Class I chest xray</td>
<td>150 (55.8%)</td>
<td>1120 (58.3%)</td>
<td>0.90 [0.70, 1.17]</td>
</tr>
<tr>
<td>Bacteria in Nasopharyngeal aspirate</td>
<td>35 (13.0%)</td>
<td>222 (11.6%)</td>
<td>1.15 [0.78, 1.68]</td>
</tr>
<tr>
<td>Pneumococcus</td>
<td>29 (10.8%)</td>
<td>196 (10.2%)</td>
<td>1.06 [0.70, 1.61]</td>
</tr>
<tr>
<td>Staphylococcus species</td>
<td>4 (1.5%)</td>
<td>13 (0.7%)</td>
<td>2.22 [0.72, 6.85]</td>
</tr>
<tr>
<td>Gram negative bacteria</td>
<td>2 (0.7%)</td>
<td>13 (0.7%)</td>
<td>1.10 [0.25, 4.90]</td>
</tr>
<tr>
<td>Bacteria in blood</td>
<td>8 (3.0%)</td>
<td>27 (1.4%)</td>
<td>2.15 [0.97, 4.79]</td>
</tr>
<tr>
<td>Pneumococcus</td>
<td>2 (0.7%)</td>
<td>6 (0.3%)</td>
<td>2.39 [0.48, 11.91]</td>
</tr>
<tr>
<td>Staphylococcus species</td>
<td>3 (1.2%)</td>
<td>16 (0.8%)</td>
<td>1.34 [0.39, 4.64]</td>
</tr>
<tr>
<td>Gram negative bacteria</td>
<td>3 (1.2%)</td>
<td>5 (0.3%)</td>
<td>4.32 [1.03, 18.20]</td>
</tr>
</tbody>
</table>
DISCUSSION GROUP 5 – GLOBAL AND HEART

PICC-0620
NEONATAL PROCALCITONIN INTERVENTION STUDY (NeoPInS): AN INTERNATIONAL, MULTICENTER, RANDOMIZED CONTROLLED INTERVENTION TRIAL TO SHORTEN ANTIBIOTIC THERAPY IN SUSPECTED NEONATAL EARLY-ONSET SEPSIS
M. Stocker¹, W. vanHerk², S. el Helou³, L. Schlapbach⁴, S. Willemsen⁵, A. van Rossum²
¹Children’s Hospital Lucerne, Neonatal and Pediatric Intensive Care, Lucerne, Switzerland
²Erasmus MC-Sophia Children’s Hospital, Division of pediatric infectious diseases and immunology, Rotterdam, Netherlands
³McMaster University Children’s Hospital, Division of Neonatology, Hamilton, Canada
⁴University of Queensland, Paediatric critical care research group- Mater research Institute, Brisbane, Australia
⁵Erasmus MC, Department of Biostatistics, Rotterdam, Netherlands

Aims & Objectives:

Uncertainty about the presence of neonatal early-onset sepsis (EOS) results in unnecessary and prolonged empiric antibiotic treatment. This study evaluates whether PCT-guided treatment for suspected EOS can reduce the duration of antibiotic treatment with unchanged outcome (re-infection/death in the first month of life with 2% margin for non-inferiority).

Methods

Randomized controlled intervention trial recruiting neonates (gestational age ≥ 34 weeks) suspected of EOS requiring antibiotic therapy. Patients were stratified in 4 risk-categories and randomized for duration of antibiotic treatment based on PCT-guided-decision-making or standard care. Analyses were done as intention-to-treat (ITT) as well as per protocol (PP).

Results

1770 neonates were randomized and included in the ITT analysis, 1408 in the PP analysis. The duration of antibiotic therapy was significantly shorter in the PCT-group than in the standard group (ITT: 55.0 vs. 64.4 hours, p<0.001; PP: 39.5 vs. 62.0 hours; p<0.001). Length of hospital stay was significantly (p=0.002) reduced in the PCT group with a small effect size (ITT: -3.2 hours; PP: -5.1 hours). No sepsis related deaths occurred and the rate of possible re-infection was below 1% with a risk difference of 0.1% (exact CI -5.2 to 5.3%). Non-inferiority (margin 2%) could not be statistically proven due to the low occurrence of possible relapse infections.

Conclusions

Initial risk assessment for suspected EOS and PCT-guidance on duration of empirical antibiotic therapy results in a significant reduction of duration of antibiotic therapy and length of hospital stay. The effect size is dependent on protocol adherence. The used approach seems to be safe whereas non-inferiority cannot be claimed statistically.
DISCUSSION GROUP 6 – EOL AND LUNG

PICC-0306
THE NURSES ROLE IN DECISIONS TO WITHDRAW OR WITHHOLD LIFE-SUSTAINING THERAPY IN UK PAEDIATRIC INTENSIVE CARE UNIT (PICU): VIEWS FROM NURSES AND PHYSICIANS
K. Capey¹, S. Mckeever², J. Brierley¹
¹Great Ormond Street Hospital, Paediatric Intensive Care, London, United Kingdom
²London Southbank University, Department of Children’s Nursing, London, United Kingdom

Aims & Objectives:
Introduction: Whilst withdrawing or withholding life-sustaining treatment is ultimately an intensive care consultant’s responsibility, the extensive time nurses spend with children and families gives them a unique perspective, offering valuable insight into this decision. However, no guidelines exist specifying the role of the nurse in the decision and published research for the role has predominately involved nurses themselves, with little contribution from physicians.

Aim: To explore PICU nurse and physician opinions of nurses’ involvement and role in end-of-life (EOL) decision-making.

Methods
Anonymous survey sent to nurses and physicians in our tertiary children’s hospital PICU. Quantitative and qualitative data was collated and categorised by respondent group. Interrogation of qualitative data enabled themes related to how nurses could be more involved in the decision to be developed.

Results
50 of 147 (34%) surveys were returned. Less than half of respondents felt nurses were involved in EOL-decision-making (figure1). All physicians and the majority of nurses believed nurses should be more involved (figure2).
Figure 1: Response to the question:
The bedside nurse is involved in decisions when life-sustaining therapy is withdrawn or withheld on PICU
Thematic analysis

(i) Medical team: consistency in nursing presence and nurse-team message in EOL-MDT meetings.

(ii) Nursing team: Their need to be fully informed; their opinions sought and questions answered; be invited to and attend all EOL-MDT meetings.

Conclusions

This study has shown that both PICU nurses and physicians believe nurses should be more involved in EOL decisions. However, to facilitate this involvement there must be support from consultants, who take ultimate responsibility for decisions made.

Implications for Practice: Nurses should be more involved in decisions to withdraw or withhold life-sustaining treatment in PICU. Strategies are being developed, and implemented, to facilitate full consistent nurse involvement in end-of-life decisions.
DISCUSSION GROUP 6 – EOL AND LUNG

PICC-0611
IN CHILDREN WITH PNEUMONIA IN A DEVELOPING COUNTRY, CAN WE PREDICT THE NEED FOR SUBSEQUENT INTENSIVE CARE, AT THE TIME OF PRESENTATION?

J.L. Mathew1, S. Singhi2, A. Bansal1, P. Ray3
1Postgraduate Institute of Medical Education and Research PGIMER, Advanced Pediatrics Centre, Chandigarh, India
2MM Institute of Medical Science and Research-, Department of Pediatrics, Mullana, India
3Postgraduate Institute of Medical Education and Research PGIMER, Department of Medical Microbiology, Chandigarh, India

Aims & Objectives:

Background: Children presenting with pneumonia often require intensive care subsequently. Prediction (at presentation) of later need for intensive care can facilitate appropriate triage and optimal resource allocation.

Objective: To identify presenting features in childhood pneumonia, that predict the need for subsequent intensive care.

Methods

Methods: Children (1-144 months) with severe/very severe pneumonia (WHO IMCI definition) were prospectively enrolled. Those with symptoms >7 days, prior antibiotics >24 hours, and immune-deficiency; were excluded. Demographic data, presenting symptoms, examination findings, and laboratory investigations, were recorded. Data of those who did, and those who did not require intensive care were analyzed, to identify characteristics predicting the need for intensive care.

Results

Results: A total of 2670 children were enrolled; 815 (30.5%) required subsequent intensive care (defined as subsequent requirement of CPAP and/or mechanical ventilation) and 1855 children did not. Demographic features, most presenting symptoms and their respective durations, were similar in the groups (Figure1). Respiratory rate >110% and >120% of age-specific cut-off values were strong predictors of need for intensive care (Figure2). Symptoms of feeding difficulty, altered sensorium, convulsions and chest indrawing; as well as Examination findings of hypoxemia, central cyanosis, and crackles predicted need for intensive care (Figure2). None of the hematologic, radiographic, and microbiologic investigations were predictors; except Staphylococcal bacteremia (Figure3).

Conclusions
**Conclusion:** Respiratory rate significantly higher than age-specific cut-off can be used at presentation to predict the need for subsequent intensive care, thereby facilitating appropriate triage and resource allocation. Some clinical features reflecting disease severity are also helpful, but probably less specific.

**Figure 1: Presenting features of children with severe and very severe pneumonia (n=2670)**

<table>
<thead>
<tr>
<th>Demographic features</th>
<th>Children requiring intensive care N=815</th>
<th>Children not requiring intensive care N=1855</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age ± s.d. (mo)</td>
<td>17.6±26.0</td>
<td>21.3±29.5</td>
</tr>
<tr>
<td>Median age (IQR) in months</td>
<td>7 (3-17)</td>
<td>10 (4-24)</td>
</tr>
<tr>
<td>Age &lt;12 mo</td>
<td>565 (69.3%)</td>
<td>1108 (59.7%)</td>
</tr>
<tr>
<td>Age 13-24 mo</td>
<td>86 (10.6%)</td>
<td>300 (16.2%)</td>
</tr>
<tr>
<td>Age 25-36 mo</td>
<td>46 (5.6%)</td>
<td>148 (8.0%)</td>
</tr>
<tr>
<td>Age 37-60 mo</td>
<td>52 (6.4%)</td>
<td>118 (6.3%)</td>
</tr>
<tr>
<td>Age 61-144 mo</td>
<td>66 (8.1%)</td>
<td>181 (9.8%)</td>
</tr>
<tr>
<td>Female Gender (%)</td>
<td>232 (28.5%)</td>
<td>545 (29.3%)</td>
</tr>
</tbody>
</table>

**Symptoms (noted by parents)**

<table>
<thead>
<tr>
<th></th>
<th>Children requiring intensive care N=815</th>
<th>Children not requiring intensive care N=1855</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough (%)</td>
<td>724 (88.8%)</td>
<td>1772 (95.5%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>4 (3-7)</td>
<td>4 (3-7)</td>
</tr>
<tr>
<td>Breathing difficulty (%)</td>
<td>776 (95.2%)</td>
<td>1670 (90.0%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>2 (1-3)</td>
<td>2 (1-4)</td>
</tr>
<tr>
<td>Fever (%)</td>
<td>696 (85.4%)</td>
<td>1543 (83.2%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>3 (2-3)</td>
<td>3 (2-3)</td>
</tr>
<tr>
<td>Feeding difficulty</td>
<td>196 (24.4%)</td>
<td>161 (8.7%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>1 (1-2)</td>
<td>1 (1-3)</td>
</tr>
<tr>
<td>Altered consciousness</td>
<td>200 (24.5%)</td>
<td>163 (8.8%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>1 (1-1)</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>Convulsions</td>
<td>38 (4.7%)</td>
<td>48 (2.6%)</td>
</tr>
<tr>
<td>Median (IQR) duration (days)</td>
<td>1 (1-1)</td>
<td>1 (1-1)</td>
</tr>
<tr>
<td>Chest indrawing</td>
<td>572 (70.2%)</td>
<td>1146 (61.8%)</td>
</tr>
<tr>
<td>Audible wheeze</td>
<td>367 (45.0%)</td>
<td>631 (34.0%)</td>
</tr>
</tbody>
</table>

**Outcome**

<table>
<thead>
<tr>
<th></th>
<th>Children requiring intensive care N=815</th>
<th>Children not requiring intensive care N=1855</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD) duration of hospitalization (days)</td>
<td>12.2 (11.8)</td>
<td>6.6 (6.3)</td>
</tr>
<tr>
<td>Mean (IQR) duration of hospitalization</td>
<td>9 (5-16)</td>
<td>5 (3-8)</td>
</tr>
<tr>
<td>Discharged with no morbidity</td>
<td>573 (70.3%)</td>
<td>1349 (72.7%)</td>
</tr>
<tr>
<td>Discharged with morbidity</td>
<td>113 (13.9%)</td>
<td>339 (18.3%)</td>
</tr>
<tr>
<td>Died</td>
<td>129 (15.8%)</td>
<td>167 (9.0%)</td>
</tr>
</tbody>
</table>
Figure 2: Presenting features predicting the need for subsequent intensive care

<table>
<thead>
<tr>
<th>Demographic features</th>
<th>Children requiring intensive care N=815</th>
<th>Children not requiring intensive care N=1855</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &lt;12 mo</td>
<td>565 (69.3%)</td>
<td>1108 (59.7%)</td>
<td>1.52 [1.28, 1.82]</td>
</tr>
<tr>
<td>Female Gender (%)</td>
<td>232 (28.5%)</td>
<td>545 (29.3%)</td>
<td>0.96 [0.80, 1.15]</td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough (%)</td>
<td>724 (88.8%)</td>
<td>1772 (95.5%)</td>
<td>0.37 [0.27, 0.51]</td>
</tr>
<tr>
<td>Breathing difficulty (%)</td>
<td>776 (95.2%)</td>
<td>1670 (90.0%)</td>
<td>2.20 [1.54, 3.15]</td>
</tr>
<tr>
<td>Fever (%)</td>
<td>696 (85.4%)</td>
<td>1543 (83.2%)</td>
<td>1.18 [0.94, 1.49]</td>
</tr>
<tr>
<td>Feeding difficulty</td>
<td>196 (24.4%)</td>
<td>161 (8.7%)</td>
<td>3.33 [2.65, 4.18]</td>
</tr>
<tr>
<td>Altered consciousness</td>
<td>200 (24.5%)</td>
<td>163 (8.8%)</td>
<td>3.38 [2.69, 4.23]</td>
</tr>
<tr>
<td>Convulsions</td>
<td>38 (4.7%)</td>
<td>48 (2.6%)</td>
<td>1.84 [1.19, 2.84]</td>
</tr>
<tr>
<td>Chest indrawing</td>
<td>572 (70.2%)</td>
<td>1146 (61.8%)</td>
<td>1.46 [1.22, 1.74]</td>
</tr>
<tr>
<td>Audible wheeze</td>
<td>367 (45.0%)</td>
<td>631 (34.0%)</td>
<td>1.59 [1.34, 1.88]</td>
</tr>
<tr>
<td><strong>Examination findings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR &gt;10% of age-specific cut-off</td>
<td>655 (80.4%)</td>
<td>933 (50.3%)</td>
<td>4.05 [3.33, 4.92]</td>
</tr>
<tr>
<td>RR &gt;20% of age-specific cut-off</td>
<td>507 (62.2%)</td>
<td>655 (35.3%)</td>
<td>1.62 [1.30, 2.01]</td>
</tr>
<tr>
<td>Central cyanosis</td>
<td>91 (11.2%)</td>
<td>68 (3.7%)</td>
<td>3.30 [2.38, 4.58]</td>
</tr>
<tr>
<td>Oxygen saturation &lt;95%</td>
<td>475 (58.3%)</td>
<td>724 (39.0%)</td>
<td>2.18 [1.85, 2.58]</td>
</tr>
<tr>
<td>Oxygen saturation &lt;92%</td>
<td>373 (45.8%)</td>
<td>458 (24.7%)</td>
<td>2.57 [2.16, 3.06]</td>
</tr>
<tr>
<td>Signs of severe malnutrition</td>
<td>465 (57.1%)</td>
<td>916 (49.4%)</td>
<td>1.36 [1.15, 1.61]</td>
</tr>
<tr>
<td>Stridor</td>
<td>16 (2.0%)</td>
<td>22 (1.2%)</td>
<td>1.67 [0.87, 3.19]</td>
</tr>
<tr>
<td>Grunting</td>
<td>21 (2.6%)</td>
<td>14 (0.8%)</td>
<td>3.48 [1.76, 6.87]</td>
</tr>
<tr>
<td>Subcostal or Suprasternal retractions in addition to intercostal retractions</td>
<td>538 (66.0%)</td>
<td>782 (42.2%)</td>
<td>2.66 [2.24, 3.16]</td>
</tr>
<tr>
<td>Crackles</td>
<td>635 (77.9%)</td>
<td>1359 (73.3%)</td>
<td>1.29 [1.06, 1.56]</td>
</tr>
<tr>
<td>Isolated bronchial breathing</td>
<td>25 (3.1%)</td>
<td>26 (1.4%)</td>
<td>2.23 [1.28, 3.88]</td>
</tr>
<tr>
<td>Auscultable wheeze</td>
<td>192 (23.6%)</td>
<td>517 (27.9%)</td>
<td>0.80 [0.66, 0.97]</td>
</tr>
<tr>
<td>Apnea</td>
<td>168 (20.6%)</td>
<td>5 (0%)</td>
<td>96.07 [39.30, 234.88]</td>
</tr>
<tr>
<td>Generalized seizure on day 1</td>
<td>34 (4.2%)</td>
<td>22 (1.2%)</td>
<td>3.63 [2.11, 6.24]</td>
</tr>
</tbody>
</table>
**Figure 3: Laboratory investigations predicting the need for subsequent intensive care**

<table>
<thead>
<tr>
<th></th>
<th>Children requiring intensive care N=815</th>
<th>Children not requiring intensive care N=1855</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin ≤10 g/dl</td>
<td>416 (51.0%)</td>
<td>870 (46.9%)</td>
<td>1.18 [1.00, 1.39]</td>
</tr>
<tr>
<td>TLC &gt; 11000/mm³</td>
<td>388 (47.6%)</td>
<td>917 (49.4%)</td>
<td>0.93 [0.79, 1.10]</td>
</tr>
<tr>
<td>TLC &lt; 4000/mm³</td>
<td>23 (2.8%)</td>
<td>42 (2.3%)</td>
<td>1.25 [0.75, 2.10]</td>
</tr>
<tr>
<td>WHO Class I chest xray</td>
<td>380 (46.6%)</td>
<td>783 (42.2%)</td>
<td>1.20 [1.01, 1.41]</td>
</tr>
<tr>
<td>WHO Class II chest xray</td>
<td>272 (33.4%)</td>
<td>665 (35.8%)</td>
<td>0.90 [0.75, 1.07]</td>
</tr>
<tr>
<td>WHO Class III chest xray</td>
<td>160 (19.6%)</td>
<td>400 (21.6%)</td>
<td>0.89 [0.72, 1.09]</td>
</tr>
<tr>
<td>WHO Class IV chest xray</td>
<td>3 (0.4%)</td>
<td>7 (0.4%)</td>
<td>0.98 [0.25, 3.78]</td>
</tr>
<tr>
<td>Bacteria in Nasopharyngeal aspirate</td>
<td>87 (10.7%)</td>
<td>284 (15.3%)</td>
<td>0.66 [0.51, 0.85]</td>
</tr>
<tr>
<td>Pneumococcus</td>
<td>76</td>
<td>266</td>
<td>0.61 [0.47, 0.80]</td>
</tr>
<tr>
<td>Staphylococcus species</td>
<td>8</td>
<td>8</td>
<td>2.29 [0.86, 6.12]</td>
</tr>
<tr>
<td>Gram negative bacteria</td>
<td>2</td>
<td>1</td>
<td>4.56 [0.41, 50.37]</td>
</tr>
<tr>
<td>Bacteria in blood</td>
<td>31 (3.8%)</td>
<td>33 (1.8%)</td>
<td>2.18 [1.33, 3.59]</td>
</tr>
<tr>
<td>Pneumococcus</td>
<td>5</td>
<td>7</td>
<td>1.63 [0.52, 5.15]</td>
</tr>
<tr>
<td>Staphylococcus species</td>
<td>16</td>
<td>10</td>
<td>3.69 [1.67, 8.18]</td>
</tr>
<tr>
<td>Gram negative bacteria</td>
<td>5</td>
<td>9</td>
<td>1.27 [0.42, 3.79]</td>
</tr>
</tbody>
</table>
Aims & Objectives:

pDCD has lagged in Canada, where most pediatric hospitals do not have active pDCD programs. This project aims to generate national, pediatric specific clinical practice guidelines (CPGs) to guide the development of ethical and effective Canadian pDCD practice.

Methods

We followed a rigorous process of CPG development based on World Health Organization (WHO) and Canadian Medical Association (CMA) methods. These included application of the Appraisal of Guidelines, Research and Evaluation (AGREE II) tool, and Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology. Questions requiring recommendations were generated based on: 1) 2006 Canadian DCD guidelines (not pediatric specific), 2) a multidisciplinary symposium of national and international pDCD leaders, and 3) a scoping review of the pDCD literature. Input from these sources drove drafting of actionable questions and Good Practice Statements (GPSs), as defined by the GRADE group. The majority of our clinical questions were best answered as GPSs. We performed additional literature reviews for all actionable questions. Evidence summaries were assessed for quality using GRADE, and then formulated into evidence profiles that informed recommendations through the Evidence-to-Decision framework. Recommendations were revised through consensus among the members of 8 topic specific working groups (WGs), and finalized during meetings of WG leads and the planning committee. External review will be provided by pediatric, critical care, and critical care nursing professional societies.

Results

At this writing, all WGs have approved draft recommendations. Final editing is pending the planned meeting of the guideline development committee and external review.

Conclusions

This process demonstrates that despite a dearth of high quality evidence, and a topic that included multiple ethical aspects, CPGs can be generated on a topic using rigorous and transparent methods. Planning of knowledge translation efforts is underway to ensure widespread adoption.
Aims & Objectives:

To compare the safety and efficacy of optical/video-laryngoscopy and direct-laryngoscopy when used to intubate children with regard to: intubation time; number of intubation attempts; changes in oxygen saturation; and adverse effects, including abnormal haemodynamic responses.

Methods

Cochrane Central Register of Controlled Trials, MEDLINE EMBASE, and CINAHL were searched for randomized controlled trials assessing children aged 28 days to 18 years. The pooled relative risk and mean difference were calculated using a random effects model.

Results

We screened 1731 publications from which eleven studies were included. Intubation using indirect/ video-laryngoscopy improved the percentage of glottic opening [MD: 16.9, 95% CI: 6.9-27.0, \(I^2 = 93\%\)], and the vocal cord view scores [RR: 1.2, 95% CI: 1.1-1.2, \(I^2 = 91\%\)]. Intubation time was longer in the indirect/video-laryngoscopy group [MD: 5.9 s, 95% CI: 2.1-9.7, \(I^2 = 92\%\)]. No significant difference was found when assessing intubation first attempt [RR: 0.95, 95% CI: 0.90 -1.0, \(I^2 = 71\%\)]. Unsuccessful intubation was more likely with indirect/video-laryngoscopy [RR: 3.97, 95% CI: 1.1-15.1, \(I^2 = 0\%\)].
Conclusions

Indirect/video-laryngoscopy probably showed better glottic view, but with longer intubation time and a higher rate of intubation failure. Conclusions are limited by the marked heterogeneity ($I^2 > 50\%$).

References


Aims & Objectives:

Pupil size is an extremely important assessment of a critically ill child. Accuracy of this measurement is essential for clinical and legal purposes. In this study we aimed to assess the consistency of pupil measurement between users using standard technique and an electronic pupillometer.

Methods

Prospective observational study evaluating the implementation phase of a new pupillometer equipment in a paediatric intensive care unit. All ventilated children requiring regular pupillary assessment as per our unit protocol were eligible for the study. Eligible patients underwent paired pupillary assessments by a trained investigator and the bedside nurse using both standard technique and an electronic pupillometer (NPI-200, NeurOptics).

Results

We studied 200 paired assessments. Five patients fitted study criteria but were excluded because of technical difficulties in obtaining a pupillometer reading. Pupillary size was discrepant (i.e., size recorded ≥1mm) between examiners in 11 assessments when the standard torch technique was used. Using pupillometer, none of the paired assessment was discrepant (11/200 vs 0/200, p=0.01), and the average difference between user's pupil assessment was 0.18mm. There were two episodes considered ‘critical’ using standard technique, when measurement between users was discrepant in a child with non-reactive pupils.

Conclusions

Discrepancy in pupil assessment of critically ill children is rare, but may be clinically significant when using standard techniques. Use of an electronic pupillometer eliminated inter user discrepancy in our study and may be helpful to prevent documentation errors.
Aims & Objectives:

Pediatric Critical Care Medicine (PCCM) in the U.S. has made marked advancements in the care provided to critically ill and injured children. However, with this progress has arisen a number of ethical questions that are tied closely to the development and application of technology. To date, publications to help guide development of PCCM in developing countries around the world are lacking. In this present study, insights and perspectives of experienced PCCM providers in the U.S. were explored, with particular attention to the ethics and impact of the practice and goal of formulating recommendations based on lessons learned.

Methods

An exploratory qualitative approach with 45-60 mins semi-structured face-to-face interviews was utilized to highlight the perspectives and insights of experienced PCCM providers in the U.S. Purposive sampling identified 24 participants to recruit; 12 consented and were enrolled. Duration of practice ranged from 24-37 years. All participants were actively practicing in the U.S. at the time of the interview with experience in 22 additional countries cumulatively.

Results

Three prominent themes permeated the data and emerged that address the impact and ethics of PCCM practice advancement: 1) More is more: The more we do, the more children we save, but also have to care for and finance. 2) More is less: Enhanced technology has taken away some of the value of what we do. 3) Less is more: A more limited approach may in same ways be more valuable/beneficial than more advanced PCCM practices.

Conclusions

The following recommendations can inform the advancement of PCCM in developing countries: 1) Consider, document and establish resources/technology and the cost/benefit of their utilization; 2) Anticipate and plan for potential practical and ethical issues in applying technology; 3) Account for societal and cultural beliefs and generate a plan to mitigate the burden of applied practices.
Aims & Objectives:

There continues to be a dramatic growth in the number of children living in the community with a tracheostomy and on home mechanical ventilation (HMV). At our institution, this number has doubled between 1991 and 2011. Like many children living with chronic illness, children on long-term HMV may require treatments and/or diagnostic imaging at the hospital. Typically these children have been admitted to the Paediatric Intensive Care Unit (PICU) because of the unfamiliarity with HMV outside the PICU setting. For the child and their family, admission to the PICU is less than desirable, as it leads to increased exposure to nosocomial infections, and disrupts their normal routine. From a hospital perspective, it is also not ideal, as it utilizes PICU resources that could be available for more acute patients. The objective of this project was to develop and evaluate a shared model of care (SMC) which supports children and their families who are tracheostomy and HMV dependent to receive treatments and tests in the ambulatory care setting.

Methods

An inter-professional group came together to develop the SMC that identified and acknowledges the accountabilities of each provider caring for the patient, including the parent/caregiver. This model enables parents/caregivers to remain as the child’s primary care provider, tending to the regular cares and technology associated needs. Education on tracheostomies and ventilation was delivered to the ambulatory care providers and an infrastructure of support and resources was implemented.

Results

A pre and post survey was also conducted with the ambulatory care providers to assess their perceived competence with tracheostomies and ventilation (See Figure
Conclusions

The SMC clearly delineated the responsibilities of each member of the care team, recognizing their unique abilities and expertise. It has created a collaborative partnership between the family and health care team, minimizing disruption in child and family care giving patterns.
THE DEVELOPMENT OF A TOOL TO ASSESS CAREGIVER KNOWLEDGE AND SKILLS NEEDED TO SAFELY CARE FOR CHILDREN RECEIVING INVASIVE LONG-TERM MECHANICAL VENTILATION AT HOME

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Aims & Objectives:

Parents undergo extensive caregiver training prior to hospital discharge but are not reassessed in the home environment on an ongoing basis. This is a serious concern as these children are at risk of morbidity and death given their medical complexity.

Our aim was to formally develop a tool based on a national consensus, to assess the caregivers’ knowledge and skills which are essential to care for a ventilator assisted child (VAC) both at the time of initial discharge home as well as for their ongoing care.

Methods

A prospective study was conducted at SickKids, Toronto, Canada. We planned a 4 step process including: 1) assembly of a national, interprofessional group with pediatric home ventilation expertise; 2) item generation via a scoping literature review and compilation of local documents used by home ventilation programs across the country; 3) item reduction by a national Delphi process in accordance with the Dillman method; 4) sensibility assessment by clinicians and family caregivers to determine completeness and usability.

Results

The study was conducted from January 2012 to present. One hundred and thirty two pediatric home ventilation clinicians from 12 institutions across Canada were involved. After item generation, the KIDS VENT tool was comprised of 18 domains and 255 items. The overall response rate for Delphi round 1 was 95/132 (72%). Nine items were removed after round 1. The overall response rate for Delphi round 2 was
80/95 (84%). No items were removed from round 2. After Delphi round 2, the KIDS VENT tool was comprised of 18 domains and 246 items. The sensibility assessment is ongoing and results will be available by the time of the meeting.

**Conclusions**

Future work is needed to see if standardized, ongoing competency assessments improve the quality of care provided by parental caregivers and subsequently lead to decreased morbidity and mortality.
Aims & Objectives:

In curriculum for school children in India, there is no specific awareness course on how to handle choking and sudden cardiac arrest. We have tailor made a simulation based three hour Kishore-Sanjeevani program for teenage school children to enhance their knowledge about resuscitation and confidence on how to help a cardiac arrest or choking victim. Before implementing this program at mass scale, we aim to evaluate effectiveness of Kishore-Sanjeevani program.

Methods

During initial sessions, awareness, knowledge and level of confidence of 250 teenage school going participants was assessed with the help of pre designed, structured pre test and post test questionnaire. Data was analyzed using simple statistical tools.

Results

Ninty six percent children were aware of cardiac arrest incidences however only 12 % had heard about the term basic life support. Awareness that on the spot, immediate treatment is needed for cardiac arrest victim improved from 44% to 88%. Initially 48% children thought that only medics or paramedics can help such victim while in post test 72% participants realized role of any lay person in saving a life. After the program 88% participants realized that AED should be available on all public places. Before the course 40% children were not confident on their role on witnessing such situation while 96% children became confident on how to react in such situation after attending the course.

Conclusions

Most of the children had heard about cardiac arrest and choking but very few were aware of any program or course on how to help such victim. This simulation based course was found to be effective on increasing their knowledge and confidence. Awareness courses like Kishore Sanjeevani program will be effective in increasing the knowledge and confidence of school children on how to deal with life threatening situation.
AUDITING THE TIDAL VOLUME IN A PEDIATRIC ICU

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Aims & Objectives:

Objective: The main objective was to evaluate the use of tidal volume (TV) in patients undergoing mechanical ventilation (MV) in a pediatric ICU (PICU) during the period of 6 months.

Methods

Methods: All patients undergoing MV at PICU of Hospital Guilherme Álvaro in Santos, São Paulo, are attended by professionals from physiotherapy, which in its records of service note the TV shown on the mechanical ventilator device display (Inter 7 Plus, Intermedica®) three to four times per day. Through this form, we did the study and found the number of hours each patient was in MV for a period of six months. We stratified these data to assess how these patients are ventilated in relation to the TV.

Results

Results: The total of 26 patients were in VM in the analyzed period from January to July 2014. The total patient-hours under MV was 223 hours in six months. The average time each patient spent in VM was 193.9 hours. These patients were ventilated in percentage of hours, with the following TV: 0 to 2 mL / kg = 2.5%; 2 to 4 mL / kg = 9.3%; 4 to 6 mL / kg = 13.45%; 6 to 8 mL / kg = 14.1%; 8 to 10 mL / kg = 13% and above 10 mL / kg = 12.3%. Of the patients studied, 50% died. There was no statistical association between the TV and the outcome.

Conclusions

Conclusion: Although the literature data proposes a TV between 5 to 8 mL / kg, in a significant part of the time (37.1%) patients were ventilated with a tidal volume off target.
Aims & Objectives:

**Aim:** This presentation will explore various ways by which clinical nurses may become involved in research. It will also expose the many challenges that clinical research may pose for novice researchers and how many of these challenges can be transformed into learning opportunities.

Methods

**BACKGROUND:** Clinical nurses working daily with patients hospitalized in a PICU observe phenomena for which there is inadequately developed evidence-based knowledge or for which the impact of new technologies or medications has not yet been studied. As front line workers, many nurses will formulate hypotheses that they may wish to test through rigorous research methods. The perceived complexity of research may discourage many nurses from pursuing their research questions.

Results

Given adequate support and guidance, clinical nurses can develop and conduct research projects that enhance their knowledge and contribute to evidence-based nursing.

Conclusions

Clinical nurses possess a wealth of knowledge and experiences that can inform and guide research in the PICU. Providing opportunities for nurses to contribute to the development of knowledge can ultimately improve patient care and may also help empower nurses to create new evidence to guide their clinical practice.
Aims & Objectives:

Children in the Sub-Saharan African region face multiple challenges to health and child mortality remains high. In 2008, there were only 4 qualified child critical care nurses in the sub-continent and The University of Cape Town was commencing the first Sub-Saharan Postgraduate Diploma in Critical Care Child Nursing. Being the first course of its type offered challenges and it was imperative that it appropriately prepared nurses for the specific and changing child critical care needs of the region. The aim was to continually develop the postgraduate course to ensure that it educates the regions nurses in the care and “treatment of children with life threatening illness or injury in [the] broader sense, without regard for location” (Kissoon et al., 2009:597).

Methods

Educators and clinicians committed to annually review the course curriculum design, content and delivery to ensure that it developed and remained intentionally aligned with national and international norms and the health needs of regions critically ill children, and in consideration of the needs and challenges of the nurses completing the course.

Results

The result is the current postgraduate course, aimed at qualified nurses with no prior paediatric qualification, and minimal child critical care clinical experience. Salient aspects of the course design, as ascertained from student feedback, include:

- The inclusion of a foundation in child nursing

- Content built sequentially around six major systems affected in childhood critical illness in the region.

- Low-tech simulation, diverse clinical placements and a variety of teaching and assessment methods to ensure that students gain an insight into the full critical care pathway and facilitate professional growth.

Conclusions
Constant refinement of the content, design and delivery of this course is revealing that training nurses in the critical care of children can and should be offered in the context of the Sub-Saharan region, with locally available resources.
NURSING RESEARCH PRIORITIES: SETTING A FUTURE RESEARCH AGENDA

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Aims & Objectives:

Nursing research provides a significant body of knowledge to advance the science of nursing. Identification of nursing research priorities within institutions provides meaningful direction for the institutional research agenda. We aimed to identify and compare top research priorities of nurse executives, administrators, scientists, leaders, and bedside care providers at Boston Children’s Hospital.

Methods

Patricia Benner’s (2011) broad domains of nursing practice were examined by a group of nurse scientists and executives to ensure that the scope of nursing within our institution would be well represented. Five additional domains of practice, abstracted from the 2011 IOM report The Future of Nursing: Leading Change, Advancing Health, were added for completeness. An electronic Redcap survey was distributed in February and November 2014. Participants were asked to rank their top five domains of practice as future research priority areas. All responses were anonymous.

Results

96 nurse executives, administrators, scientists, and leadership staff, and 267 bedside RNs and NPs completed the surveys. Improving communication, clinical assessments and teamwork was the top priority area selected by 76.4% of participants. Although priority areas varied based on nurse role and program, over half of all respondents listed development, identification and/or testing of new and existing technologies intended to improve patient care delivery as well as patient safety: monitoring quality, preventing and managing breakdown in their top five priority areas.

Conclusions

This project has provided direction for nursing research at Boston Children’s Hospital. The five domains of practice abstracted from the 2011 IOM report resonated with many of our nurses, but require further definition.
**Aims & Objectives:**

We designed and evaluated a comprehensive, customizable implementation program for a complex inter-professional innovation; Bedside Paediatric Early Warning System (BPEWS). We describe data documenting the impact of implementation interventions and innovation uptake.

**Methods**

A 36-item survey asked clinical users to rate the frequency they used each implementation item, and the extent of implementation uptake at individual, team and organizational levels. A 10-point scale was used. Frequency responses were collapsed into a single variable representing implementation intensity and compared with uptake responses. Hospital implementation leaders completed semi-structured interviews. Survey data was analyzed descriptively and interview data thematically.

**Results**

There were 108 self-report surveys and 11 interviews from 12 hospitals in 4 countries. Survey respondents were nurses (94%). Median ratings (interquartile range) of 10 (10-10) for individual BPEWS use and 10 (9-10) for observed use in others demonstrate strong individual uptake and a ceiling effect that precluded analysis of predictive factors. Implementation intensity was associated with greater use of BPEWS in clinical decision-making (p=0.002) and importance of BPEWS in planning patient care (p<0.001). Observed uptake by teams was 8 (6-10), and was associated with implementation intensity (p=0.07). Organizational uptake was rated lower with policy integration 0 (0-4), and use in quality programs 1(0-6). Both were associated with implementation intensity (p<0.0001 and p=0.0004 respectively). Point of care prompts and senior leadership support were reported in the qualitative data as influential in supporting innovation uptake.

**Conclusions**

Implementation approaches and success varied across sites. Operational use of BPEWS at the level of the individual provider was the strongest area of uptake. Use of multiple implementation interventions was associated with BPEWS integration at the organizational level. BPEWS has had limited penetration in critical components of organizational practices.
PICC-0904
IMPROVING RANDOMIZED CONTROLLED TRIAL EVIDENCE IN PEDIATRIC CRITICAL CARE: THE PERSPECTIVES OF TRIALISTS

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Aims & Objectives:

The care of all critically ill children should be informed by evidence from large high-quality randomized controlled trials (RCTs). Unfortunately such evidence is not always available. Our objective was to identify acceptable, feasible and effective strategies to improve the quality, quantity and impact of evidence from RCTs in pediatric critical care.

Methods

Qualitative descriptive study based on semi-structured interviews with pediatric critical care researchers who have successfully completed an RCT.

Results

Participants were 26 trialists from 8 countries. Most participants (25 [93%]) were from high-income countries, 9 (33%) had published more than 1 RCT, 17 (63%) had published a multicentre RCT, and 8 (30%) had published a multinational RCT. An important theme that emerged was “building communities” — groups of individuals with similar interests, shared experiences, and common values, who are bound together by professional and personal relationships. Participants described a sense of community as a source of motivation and as a means to enable larger, more rigorous trials by enhancing collaboration, increasing researcher and clinician engagement, and creating and maintaining enthusiasm. Strategies to build communities focused on the importance of face-to-face interactions (both professional and social), capable leadership, and trust. Another important theme was “getting started as an investigator.” Participants stressed the importance of specific research training (in addition to clinical training) and high-quality experiential education collaborating on other people’s projects, guided by effective mentorship. Also important was ensuring fair recognition and academic credit for all research contributions, not just for being the principal investigator. Participants also made specific suggestions for improving the design and conduct trials.

Conclusions

Experienced trialists shared practical strategies to increase the rigor, efficiency, and impact of individual trials. They also identified several methods to improve the pediatric critical care research enterprise including building a sense of community and key formal and informal training opportunities for new investigators.
Aims & Objectives:

In order to operationalize an efficient, high quality and innovative pediatric critical care unit there is a need to establish and understand the health care service standards we aim to deliver. Clear and shared standards provide an easily accessible foundation for the complex systems and processes that will evolve in our unit redevelopment.

The Pediatric Intensive Care Unit (PICU) is a specially staffed, equipped, separate and self-contained area of the hospital dedicated to the management of patients with life-threatening illnesses, injuries and complications; providing intervention and monitoring of potentially life-threatening conditions. PICU offers equipment and facilities for support of vital functions and uses the skills of expert medical, nursing and other personnel experienced in the management of these problems.

Methods

For the design, build and operationalization of a modern PICU at BC Children’s Hospital, the development of a model of care incorporating, testing and establishing pediatric critical care standards for practice was required. An iterative cycle of PDSAs were undertaken to introduce, test and evaluate the use of standards in daily operations of a newly designed PICU.

Results

Daily operation of a of a new practice model with standard patient acuity definition and resource to patient ratio was established. Standard work for RN assignment was determined.

Conclusions

Wherever possible critical care standards should be benchmarked and validated by comparative analysis to other intensive care facilities. The development of national Pediatric Critical Care Standards as seen in other countries could be supportive of high quality critical care for all children in Canada.
PICC-0701
CLINICAL EXPERIENCE OR EQUIPMENT: WHAT MATTERS MOST FOR THE INEXPERIENCED INTUBATORS IN THE MANAGEMENT OF THE PAEDIATRIC AIRWAY?
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Aims & Objectives:

Appropriate airway management can be life-saving for paediatric patients. Clinicians inexperienced in paediatric airway management are often the first to attend paediatric patients in the emergency setting. We aim to determine if (1) the use of a video laryngoscope can improve intubation outcomes in the hands of inexperienced users; and (2) clinical experience of trainees affects intubation success rate using either traditional or video laryngoscopes.

Methods

A prospective observational simulation study was conducted involving 22 junior doctors inexperienced in the management of paediatric airways. Following a teaching session, participants were asked to deliver bag-mask ventilation and proceed to intubation of 3 manikins (infant; infant with a difficult airway; child). Intubation of each manikin was attempted with both standard and video laryngoscopes in a random order. The primary outcome measure was successful intubation (chest expansion was demonstrated via a correctly placed endotracheal tube within 120 seconds of removal of the bag-valve mask from the face).

Results

Of the 132 intubations attempts examined, there were 15 failed intubations in the standard laryngoscopy group, and 4 failed intubations in the videolaryngoscopy group (Fishers exact test p<0.01). Video laryngoscopy significantly increased the number of successful intubations in the infant with a difficult airway manikin (p < 0.01). Video laryngoscopy significantly improved intubation success rate among the most inexperienced trainees (1-3 years of postgraduate training) (p < 0.01) but did not make any difference among the more experienced trainees (>3 years postgraduate training) (p > 0.99).

Conclusions

Clinical experience of the clinician and the equipment used both appear to be important factors in improving success rates in paediatric intubation. The limitations imposed by manikins and the artificial nature of the assessment centre need to be translated to the clinical setting with care.
WHO ARE YOU AND WHAT ARE YOU DOING? PARENTS’ UNDERSTANDING OF ROLES AND RESPONSIBILITIES OF PHYSICIANS AND PHYSICIANS-IN-TRAINING IN AN ACADEMIC PEDIATRIC INTENSIVE CARE UNIT

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Aims & Objectives:

The medical hierarchy is complex. Studies in other healthcare environments show that families believe that understanding the roles and responsibilities of healthcare workers (HCWs) is important but that they have a poor understanding of these roles. Pediatric intensive care units (PICUs) are stressful. In this environment, it is especially important for patients and their parents to understand who their caregivers are and what they do. We evaluated patient/parental understanding of the roles and responsibilities of medical team members in an academic PICU.

Methods

To evaluate parental understanding of the roles and responsibilities of PICU team members and its importance to parents, a 57-item survey was administered to parents/caregivers of patients admitted to the PICU at the Montreal Children’s Hospital within 72h of admission.

Results

100/118 parents approached agreed to participate (85%). While 87/97 (89.7%) of participants believe it is important to know the level of training of HCWs, only 39/98 (39.8%) state they were informed about the different roles and responsibilities. Only 66/97 (68.0%) “usually” know if their caregiver is a student, resident, fellow or attending. The attending role is mostly understood with 84/98 (85.7%) agreeing that the attending is fully licensed, certified and requires no supervision. Fellows are most poorly understood, with 21/100 (21%) answering “uncertain” to all questions pertaining to that position.

Conclusions

Parental understanding of the roles and responsibilities of health care workers is suboptimal, and the fellow role is particularly poorly understood. We hope that quantifying this knowledge gap will provide the impetus to improve the way we communicate who we are and what we do.
Aims & Objectives:

In 2015, McGill University’s Montreal Children’s Hospital moved into a new facility. The Pediatric Intensive Care Unit (PICU) underwent a substantial redesign that included a vastly larger space, individual patient rooms and the addition of an Intermediate Care Unit. Concerns for the new environment included team communication, workflow and care processes. We generated simulation scenarios to facilitate the transition. We evaluated the perceived utility of these simulations immediately after completing the sessions and 6 months after the move.

Methods

Participants included nurses, PICU fellows, pediatric residents, respiratory therapists, and PICU staff. Participants completed a written survey 6 months after initial simulations. Responses were recorded on a 10 point Likert scale from strongly disagree to strongly agree. The survey asked questions similar to the initial surveys regarding the impact of the simulations on factors such as comfort with the physical environment, equipment and team function.

Results

The initial survey had a 100% response rate while the follow-up was 73%. Loss to follow-up occurred because of graduating residents and a leave of absence. In the initial survey, participants felt better prepared and more confident to care for real patients (pre 5.49, post 7.41, p<0.005 and pre 6.2, post 7.9, p<0.005 respectively). At the 6 month follow up, the participants still thought it was helpful (7.3, SD 2.2) and still reported improved team confidence (7.1, SD 2.3). 97% (29/30) of respondents felt that the same or more simulation would have helped prepare the team for the move.

Conclusions

Simulation is perceived as an important and useful tool to better prepare a team to care for critically ill children in a complex, new setting.
Aims & Objectives:

Although a pulse oximeter can measure hemoglobin noninvasively, there has not yet been a validation study in pediatric patients who underwent cardiac surgery. Immediately after surgery, there may be a fast decline of hemoglobin because of post bypass coagulopathy. There may also be low peripheral perfusion that can interfere with noninvasive measurement of hemoglobin.

Methods

From June to August in 2013, eleven pediatric patients after cardiac surgery were enrolled in this study. We compared noninvasive SpHb measurement by Masimo® with Hb measurement from arterial blood gas analysis performed at the same time in the intensive care unit. Another comparison was also made in order to investigate the usefulness of SpHb measurement at a low perfusion status.

Results

A total of 151 measurements were made in 11 patients. There was a significant correlation between SpHb and Hb of blood gas analysis ($R^2=0.4616$, $P<0.0001$). Bland-Altman analysis revealed that bias of values between two measurements was 0.1258 and that 95% limits of agreement were -2.94 to 2.69. When samples were divided by the perfusion index(PI) at 0.75 into two groups, a significant difference in
bias was not observed.

Conclusions

SpHb can be useful even at a low perfusion status after pediatric cardiac surgery. However, deviation of values is relatively large for Hb in a clinical setting.
DEVELOPMENT OF NURSE LED VENTILATION WEANING IN PICU: AN EXPLORATORY STUDY

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Aims & Objectives:

INTRODUCTION: Weaning of mechanical ventilation aims to safely and effectively transition patients from full mechanical ventilation to spontaneous ventilation via a clear method. Whilst in the Paediatric Intensive Care Unit (PICU) at the Royal Children's Hospital (RCH) medical staff lead ventilation weaning, nurses have demonstrated the skills and knowledge to perform ventilation weaning both safely and effectively.

AIM: The aim of this project is to evaluate ventilation knowledge and attitudes of PICU nursing staff towards the proposed implementation of a nurse led ventilation weaning program.

Methods

METHODS: Data was collected from nurses via electronic surveys and focus groups to ascertain their readiness for this change in practice.

Results

RESULTS: The survey was completed by 82 nurses (41% of all nursing staff); 12 surveys were incomplete for the knowledge questions. Participants were positive towards the change with 66 (81.4%) either agreeing or strongly agreeing to ventilation weaning being part of a nurse's role in PICU. Staff were positive about the unit's readiness for the program with 59 (72.9%) agreeing or strongly agreeing with this statement. Sixty-eight (97.1%) achieved >50% in the knowledge test. Key themes from the focus groups highlighted the need for: a clear guideline to determine scope of practice and weaning parameters; clinical support from medical and nursing staff; and an education program.

Conclusions

CONCLUSION: Nursing staff are generally very positive about the implementation of nurse led weaning in PICU. The findings have highlighted key areas of ventilation education which will be incorporated into an education package. A clinical guideline will be developed and processes to ensure clinical support from medical and nursing staff will be established prior to implementing any practice change.
CHEST PHYSIOTHERAPY IN THE PICU: A WORKSHOP TO IMPROVE COMPETENCE AND CONFIDENCE OF PHYSIOTHERAPISTS

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Aims & Objectives:

Maintaining clinical expertise and confidence among physiotherapists (PT) working sporadically in the paediatric intensive care unit (PICU) is a challenge. Moreover, high-fidelity simulation is seldom used in physiotherapy training and the literature on this subject is poor.

Research question: Does a workshop including simulation improve PT’s self-assessed competence and confidence in managing patients needing chest physiotherapy in the PICU and is this effect maintained at 6 months?

Methods

The workshop focused on physiotherapy practice in the PICU and consisted of 2 high-fidelity simulation scenarios, 2 interactive group sessions and 2 lectures. A questionnaire was completed before and after the workshop and comprised 17 self-assessed competence items and 8 self-assessed confidence items. Reassessment using the same questionnaire took place 6 months later. Chi-square was applied to compare pre and post workshop assessments.

Results

Immediately after the workshop, both self-assessed competency and confidence significantly improved for the entire group (13 competency questions and 6 confidence questions had a p value < 0.03). Less experienced PTs and those with less clinical exposition seemed to display greater improvement than more experienced PTs and those working more often with this clientele.

Six months after the workshop, significant improvement was still noted in 84% of questions compared to pre-workshop levels. However, 40% of questions showed significant decrease in competence and confidence compared to levels immediately post-workshop.

Conclusions

This workshop significantly improved competence and confidence of PTs working sporadically in managing respiratory patients in the PICU. It seemed to have greater
effect for PTs having less clinical exposition and less experience with this specialized clientele. This improvement was partially maintained over a 6 months period. This workshop used several teaching methods including high-fidelity simulation. The positive results will hopefully open the door to other studies focusing on the use of high fidelity simulation in physiotherapy education.
BELIEFS AND ATTITUDES OF NURSES AND DOCTORS ABOUT PARENTAL PRESENCE IN PICU: AN ITALIAN NATIONAL SURVEY

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Aims & Objectives:

Italian PICUs still have a tendency to apply restrictive visiting policies [1]. To date no information is available about beliefs and attitudes of staff members of Italian PICUs regarding parental presence in the unit. We carried out a national survey to evaluate this issue.

Methods

We administered the Italian version of the Beliefs and Attitudes toward Visitation in ICU Questionnaire (BAVIQ) [2] to nurses and doctors of all the 30 Italian PICUs. Staff members indicated their level of agreement for each statement on a five-point rating scale.

Results

The response rate was 92.3% and 925 questionnaires were completed (632 from nurses, 293 from doctors).

Most respondents believed that visiting has a beneficial effect on the patient (85%) and that an open visiting policy can reduce parental anxiety (68%). However, nearly half of respondents believed that an open policy interferes with direct nursing care (45%) and makes them feel checked up on (49%).

As for attitudes, 46% of respondents thought that an open visiting policy should be applied in their PICU. Most staff members thought that the visiting policy must be modified when the patient is dying (93%).

Conclusions

These findings suggest that although Italian nurses and doctors acknowledge on the whole a positive effect of the open visiting policy in PICU, there still persists among them some skepticism and worries about the liberalization of visiting.
Acknowledgments: The study was supported by Associazione per il Bambino Nefropatico (Milan, Italy).

References:

PICC-0094
THE PEDIATRIC AIRWAY COURSE (TPAC): DEVELOPMENT AND DELIVERY OF A SIMULATION BASED EDUCATION INITIATIVE FOR NON-ANESTHESIOLOGIST PRACTICING PHYSICIANS

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Aims & Objectives:

Introduction

The critically ill child requiring airway support is a rare event; even for physicians working in tertiary pediatric hospitals1, 2. Despite unanticipated difficult airways being uncommon in children3 the incidence of complications with intubation in the emergency department and PICU is high1,4. Data regarding education and maintenance of airway skills for practicing physicians is limited.

History

Alberta Children's Hospital (ACH) undertook airway management education initiatives for non-physician teams of the pediatric critical care transport service and pediatric residents. Local concerns and data from NEAR4KIDS4 indicated a similar need for practicing physicians.

Methods

Development (fig 1)

A multidisciplinary group developed a course for practicing physicians. Specialists in medical education were consulted. Consensus determined core concepts including: structure, content, primacy of maintaining oxygenation, focus on manual skills, high ratio of preceptors to participants, use of simulation and limiting pharmacology.

Results

Rotating stations for bag mask ventilation, supraglottic airways, direct laryngoscopy, videolaryngoscopy and surgical airway were developed. Two individuals from differing backgrounds developed each station. The second half of the course uses rotating simulations to integrate and reinforce concepts from the stations. Pre-existing and new scenarios were utilised by those with expertise in simulation.
Conclusions

Implementation and refinement

A rural physician’s conference enabled a half-day pilot. A-priori needs assessment of participants and review of feedback enabled refinement before and after the course, respectively.

The full day course was first delivered in the KIDSIM centre at ACH during the annual Pediatric Emergencies at ACH (PEACH) conference. An iterative process (fig1) overseen by a steering committee is utilised.
Aims & Objectives:

Training in Paediatric Intensive Care Medicine (PICM) in UK has modeled and taken shape over the last decade mirroring the development of the specialty. Larger training centers with large number of trainees with similar learning objectives; curriculum delivery which is competency based is relatively straight forward. However in centers with fewer trainees aiming to become paediatric intensivists and more trainees with varied background and objectives pose a challenge in curriculum delivery. We report our Education programme at Royal Manchester Children’s hospital attempting to address these challenges.

Methods

Royal Manchester Children’s hospital is Regional PICU; centre for year one training of PICM. Other trainees come from departments of anesthesia, emergency medicine, paediatrics and adult intensive care with diverse objectives. Most of the trainees are novices to the specialty. PICM is a competency based curriculum. However all the competencies listed do not always equate to these varied learner objectives. We have modified our educational programme to be learner centered and cater to both year one PICM training and individual learner objectives

Results

We enquire learner objectives by a written questionnaire at the start. The education programme is revised and delivered every 6 months. Curriculum is delivered through weekly teaching sessions modified to meet individual needs, monthly regional teaching delivering mandatory PICM curriculum and bedside teaching delivering both. Novices complete BASIC paediatric Intensive care course. CRISP handover tool is used as educational tool for handovers. Individual educational records are completed at the end trainees produce ‘Critical Care Bites’ – summarizing their learning in the form of case review and reflection. Assessments are formative. Each trainee is appraised regularly, competency attainment and accomplishment of objectives is evaluated by the educational supervisor

Conclusions

A combination of social efficiency and learner centered curriculum delivery has received positive feedback from trainees and the regional post graduate training evaluation.
Aims & Objectives:

KIDS is a regionalized, paediatric intensive care retrieval service based in the UK Midlands, transporting around 800 critically ill children annually.

The ‘Productive Ward’ (PW) is a lean management, quality improvement programme implemented in the UK in 2005 by the NHS Institute. Its aim was to improve productivity, quality and customer service. Although general interest in PW has declined recently it still retains interest with KIDS.

Methods

‘Productive KIDS’ (Figure 1) was developed by adapting PW creating a programme for a retrieval service. Three modules were implemented in 2013. These saw mobilisation times fall, increased positive parent/user feedback and a reduction in equipment incidents. In 2015, the ‘Teamwork/Crew Resource Management (CRM)’ module was explored. Within the KIDS team, human factors/CRM Simulation training was undertaken, focussing on resilience. Within the region, simulation training (RAPT – Regional Acute Paediatric Training) was taken to district general hospitals, delivered in situ, in a bespoke form, targeting the needs of the multidisciplinary team, aiming to improve confidence, building resilience in the local team.

Results

In situ simulation occurs in the clinical environment with the benefit of the team working in their own environment, with their own equipment. A review of KIDS referrals over the last 12 months has seen an increase in the number of children remaining locally with respiratory support such as CPAP or extubated locally following prolonged seizures. This may be attributed to increased confidence and resilience of local teams allowing ‘smart’ use of critical care beds to improve flow and improve patient health journeys.

Conclusions

References


Figure 1: Productive KIDS
EDUCATION / SIMULATION AND TECHNOLOGY / INNOVATIONS AND ADMINISTRATION

PICC-0091
PEDICATRIC TEMPERATURE REGULATION: ADDRESSING DOCUMENTATION ERRORS WITH EDUCATION IN A PEDIATRIC CRITICAL CARE TRANSPORT TEAM
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Aims & Objectives:

To evaluate the effectiveness of a quality improvement education initiative to the critical care transport team nurse (CCTT) in the importance of accurate temperature documentation for the pediatric population.

Methods

A single departmental retrospective comparative review of pediatric transport charts evaluating temperature documentation in 2014 and 2015 was conducted, followed by a quality improvement education project to the CCTT nurses. The nurses were educated on the importance of temperature regulation and documentation, through the utilization of a power point presentation, email reminder and a notice attached to the chart. The data was then collected and reviewed monthly in the Continuous Quality Improvement (CQI) meeting.

Results

Data from 500 pediatric charts was analyzed in 2014 and compared to 125 post education charts in 2015. It was noted in 2014 that 37% of the charts reported a hand off temperature on arrival to the Children’s Hospital; whereas after education to the CCTT nurses the number increased to 94%. This resulted in a significant improvement.

Conclusions

The quality improvement education project related to temperature documentation was proven effective as evidenced by an increase to 94% documentation of the arrival temperature by the CCTT nurse at nurse handoff.
Aims & Objectives:

It is best practice for research to be undertaken by specialist staff in possession of Good Clinical Practice (GCP) certification, knowledge and extensive experience of protocols, although financial cost and resource implications of running 24/7 research teams presents a challenge. The critical care environment does not recognise the boundaries of working hours adopted by most researchers - an average of 67% of eligible patients were admitted outside of working hours in 2015. In order to ensure all patients have access to safe and scientifically sound research, alternative approaches to recruitment are essential.

Methods

Initiatives were introduced to facilitate research being viewed as an essential element of patients’ care, irrespective of time of admission or presence of research staff:

- Regular teaching sessions for all staff at times convenient to them (bite size sessions after rounds and during handover; slots obtained at ‘team days’; ‘ad-hoc’ sessions delivered at the bed space during quiet periods)

- ‘Research Champions’ introduced amongst existing clinical team (GCP and protocol specific training delivered on study days)

- Simplified research protocols made available to all staff (laminated cards; flowcharts; ‘quick reference’ materials alongside existing electronic resources)

- Progress and results disseminated via noticeboards and newsletters

Results

Clinical staff reported feeling better equipped and more willing to become involved in research following the introduction of initiatives. Incidences of protocol deviations, ‘missed’ opportunities to recruit and inappropriate randomisation of subjects decreased.

Conclusions
Facilitating the recruitment of all eligible patients into research is essential in order to obtain high quality results and equity. In areas where 24/7 specialist research cover is not available, this can be achieved through collaborative working across multi-disciplinary teams. Embedding research into the delivery of all critically ill children, by equipping clinical teams with knowledge, skills and enthusiasm is key to the success of evidence based advancements.
Aims & Objectives:

Introduction:

Information and communication Technologies (IT) have created unprecedented collaboration opportunities for the medical community that are only beginning to be unraveled. Arguably, IT will increasingly bridge huge gaps in health care delivery across low and middle income countries. This benefit might be particularly evident in the intensive care setting where multidisciplinary real-time interaction is particularly critical.

Methods

Bone marrow transplantation, a semi-intensive medical procedure, has hugely benefited from online collaboration tools (Agarwal et al. JAMIA, 2014): In South-East Asia an IT platform like BMTPlus has been able to promote real-time intensive online collaboration among multinational transplant expert and perform on-site over 200 transplants in 6 centers with outcomes comparable to international standards in start up centers with limited resources staffed by relatively inexperienced local personnel.

Results

The system was able to improve value delivered to patients by several components:

- Providing continuing consultation and capacity building
- Involving nursing trough education and core competency assessments
- Promoting continuing quality improvement through development and implementation of standard procedures and clinical practice guidelines as well as incident management
- Managing drugs and consumables inventory, equipment maintenance, alerting on minimum available stocks and monitoring costs.
- Improving coordination between teams and closing communication loops.
Conclusions

In the PICU setting there are several additional potential advantages:

- Promoting common protocols and quality standards
- Facilitate referrals to highly specialized centers
- Foster cooperative studies and increase scientific visibility.
- Identify local epidemiological trends which may expedite the implementation of public health interventions.
Aims & Objectives:

Sidra Medical and Research Center is a Greenfield women and children’s hospital. It will utilize an interprofessional educational model with an international faculty from diverse healthcare settings. The aim was to create a standardized faculty development program to build the capacity of simulation faculty for onboarding and orientation of new staff.

Methods

A rigorous evidence based curriculum was developed using Kern’s six steps of curriculum development and utilizing a mentorship model. The program consisted of a 2.5 day interactive workshop with a mix of didactic sessions and opportunities for deliberate practice through participation in a simulation scenario with senior faculty mentoring junior faculty.

Results

Participants were given surveys at the beginning of the workshop and the end of the workshop. Learners identified overall satisfaction and identified a desire for more time for deliberate practice and mentorship. Post simulation debriefing of faculty was also conducted to identify any gaps in skill and performance. Feedback resulted in a change to the curriculum and program based on both learner and faculty feedback and the revised program was rolled out to additional teams.

Conclusions

A standardized program to develop faculty for a new hospital is valuable. Participants need to have prior simulation exposure to assist them in transitioning from simulation participant to simulation faculty. It is important following the faculty development program for novice faculty to have mentorship and continued exposure in order to gain expertise and confidence.
EDUCATION / SIMULATION AND TECHNOLOGY / INNOVATIONS AND ADMINISTRATION

PICC-0087
AUTOMATIC TWO-DIMENSIONAL ILLUSTRATION SYSTEM AND THREE-DIMENSIONAL MODELING SYSTEM BASED ON ECHOCARDIOGRAPHIC IMAGES FOR UNDERSTANDING OF COMPLEX CONGENITAL HEART DISEASE

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Aims & Objectives:

In the present age, the diagnosis of the complex congenital heart disease of fetuses and/or neonates is made using echocardiography. But understanding the morphology and hemodynamics of complex congenital heart disease using echocardiographic images is difficult for the people who are not familiar with the disease such as obstetricians, anesthesiologists, neonatologists, intensivists and unquestionably parents. Handwritten illustrations have long been used for explanation of the disease. We established an automatic two-dimensional illustration system and three-dimensional modeling system based on echocardiographic images for understanding of complex congenital heart disease with the aid of medical information technology.

Methods

(1) We can automatically make patient-specific two-dimensional illustrations by selecting the diagnoses in letters followed by easy modification with mouse operation (Figure 1). We explained the hemodynamics of 167 fetuses with complex congenital heart disease using this system from April 2013 to November 2015. (2) We can automatically make patient-specific color-coded three-dimensional models of the heart chambers and great vessels simply by clicking mouse of each component (Figure 2). In 5 infants with complex congenital heart disease, we compared our three-dimensional models with the three-dimensional images of computed tomography at the same periods.
Results

Evaluation by inexpert medical doctors supported significant improvements of understanding the disease. These procedures making two-dimensional illustrations or three-dimensional models can be done in several minutes.

Conclusions

These new systems enable better understanding of and facilitate collaboration of all the peoples who take care of the complex congenital heart disease patient.
Aims & Objectives:

Aims and Objectives: Simulation is thought to be an effective teaching method to improve quality of care. We recognized a need to improve not only the response from the junior residents but also the need to better prepare the senior residents for their role as teachers and mentors. In July 2013, a simulation program was introduced with the aim to give first year residents the opportunity to be the first responder to a deteriorating inpatient in a multi-disciplinary setting, and to give the senior resident experience using simulation as a teaching tool. We aimed to evaluate program’s relevance and effectiveness as a teaching tool.

Methods

Methods: Senior residents designed and facilitated monthly high fidelity simulated critical care scenarios with faculty guidance aimed at the multidisciplinary care team. We began evaluating the simulations in March 2014 with surveys using a 5-point Likert scale.

Results

Results: Over 15 months, 87 surveys were completed by 14 senior residents, 11 junior residents, 9 medical students, 48 nurses, and 5 respiratory therapists. The scenarios were rated very highly (average 4.6 / 5). Comments were overwhelmingly positive, with nursing, residents and medical students commenting on the excellent learning experience. Nursing comments noted some confusion with the role of simulation in terms of “reality”; this was not noted by residents or medical students. The senior residents receive feedback (verbal) from faculty as well as the participants through the evaluation forms.

Conclusions

Conclusion: This highly rated novel program has senior residents design, facilitate and debrief multi-disciplinary simulation scenarios with faculty mentorship. Further study is needed to determine if this improves the junior residents’ response to a deteriorating patient and if it helps to create effective teachers and mentors in the senior resident group.
EDUCATION / SIMULATION AND TECHNOLOGY / INNOVATIONS AND ADMINISTRATION

PICC-0268
PHASE 1 DRUG TRIAL FACILITATION IN A PAEDIATRIC CRITICAL CARE UNIT

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Aims & Objectives:

Nottingham University Hospitals NHS Trust (NUH) is conducting a Phase 1 Paediatric commercial, multi-national study, exploring a new paediatric medication for the treatment of opioid induced constipation. Enrolling a sufficient number of participants can be a challenge for any multi-site trial; recruiting patients receiving post elective surgery care in a busy Paediatric Critical Care Unit (PCCU) can present challenges due to medical staff demands, ensuring study awareness and mindfulness of unit culture.

Methods

Over the last two years the NUH has recruited the first global participant and achieved over recruitment before closure of the first cohort. This achievement reflects the decision to reduce the impact of a limited research trained medical/nursing team identified at initial recruitment.

Results

It is now compulsory on PCCU at NUH for Consultants and Registrars to complete Good Clinical Practice (GCP) training when they rotate onto PCCU, rewarding staff with Continued Professional Development (CPD) points as acknowledgment of their wider role. A designated PCCU research nurse provides a direct link between the PCCU clinical team and Children’s Research Team. This role facilitates research training and study exposure; supporting active research on PCCU whilst identifying recruitment barriers and minimising demands on the unit nurses. In conjunction with uniform branding, consistent and regular presence of the research team has been important to ensure visibility in clinical areas, facilitating incorporation into the multi-disciplinary team and raised research profile.

Conclusions

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· More GCP trained staff increasing research activity
  · Research embedded into PCCU team education
  · Raised local research profile

References


Kuusisto, H; Virkki, M; et al (2011) Hospital training program increases awareness of Good Clinical Practice (GCP) Contemporary Clinical Trials. 32(3): 339-41
Aims & Objectives:

The Centre mère-enfant Soleil of the CHU de Québec-Université Laval opened in 2004. This supraregional reference center dispenses specialised and ultra-specialised pediatric care for all the children of the Eastern Quebec and North Eastern New Brunswick. Our center services all children 0-18 years of age in diverse specialities such as, medicine, surgery and oncology, neonatal and pediatric critical care. This new center has had a global increase of 40% in the number of caseloads and in the complexity of care.

With this augmentation of acute care, ward nurses expressed the need to develop their competencies in pediatric recognition of life-threatening situations and resuscitation.

Methods

In order to rapidly address this situation, an interdisciplinary work group was mobilized. A two part training program, based on Pediatric Advanced Life Support (PALS) guidelines, was realized and implanted. The first part of this program consists of reviewing the theoretical concepts in pediatric resuscitation, the second part a simulation program to apply the previously learned concepts.

During these simulations, all caregivers usually present in pediatric resuscitation situations participated to ensure the most realistic simulation scenario possible. These simulations were specifically created, adapted and based on the wards specialities.

Results

Evaluation tools were created to evaluate numerous aspects of the simulation and participants. These tools are used for constructive feedback and to identify the competencies “individually and as a team” that need to be worked on.

Preliminary results seem to indicate that the implemented program provides a positive input of the development of interdisciplinary competencies in our center.

Conclusions
In order to respond to a growing need expressed by ward nurses this two part program seems to be beneficial to all participants of the interdisciplinary team, increasing their competencies, knowledge, self assurance and ability to rapidly identify life threatening situations and to effectively react in case of resuscitation.
Aims & Objectives:

Pediatric and neonatal transport and vehicle design differ across the first world nations, even though the size, nature and spectrum of patients and conditions remain relatively similar. Independent interdisciplinary systems engineering guidance is lacking. The Safe Emergency Transport of Neonatal Patients (SETONP) Project was conceived to address the existing gaps in a systems engineering technical interdisciplinary understanding of the safety of neonatal transport.

Methods

A diverse team of technical experts in engineering, transportation, occupant protection, biofidelity, human factors, neonatal transport and clinical care from across the USA and internationally were assembled and presented with the complex systems engineering issue of the safety of neonatal transport.

A common lexicon and understanding of what neonatal transport entailed bridging all those disciplines was focused upon and was key for the project to progress constructively. An interdisciplinary search of relevant interdisciplinary literature and material was conducted. A synthesis of the core aspects was compiled.

Results

A systems engineering focused framework was developed by the team to bring all the elements that are relevant to optimizing the safety of neonatal transport. This 8 page white paper included scope and incidence of the safety issues, the culture of interdisciplinary collaboration, an understanding of what standards and guidelines exist, fleet management and operations, innovations in vehicle design, transport incubator systems and design, new systems safety technologies and overarching risk management strategies.

The document was disseminated for public comment end October 2015 at the American Academy for Pediatrics Annual meeting and via social media with this link http://www.emssafetyfoundation.org/prelimSETONP.pdf. Public comment to date has been very positive – with interest in expansion of the project and a more detailed document.
Conclusions

A truly interdisciplinary systems engineering focused white paper addressing key elements to optimizing the safety of neonatal transport has been generated. This is considered a foundation for subsequent expansion and further development.
Aims & Objectives:

Advances in computer software and hardware are enabling real-time continuous monitoring and, data integration and analysis for intensive care. The objective of this study is to evaluate the ease of use and potential safety impact of this type of software system.

Methods

The study design is a prospective human factors study with usability testing conducted in a low-fidelity simulation environment with a true-to-setting working prototype. Physicians, nurses, and respiratory therapists were recruited from the paediatric intensive care unit of a large tertiary hospital, in Canada. The two-hour experiment involved audio and video recording of participants interacting with the software in three simulated case scenarios. Qualitative and quantitative mixed methods were used to classify tasks into interface functions. Two raters evaluated the system’s ability to aid the user with their task (success rate) and potential impact was derived from the user’s perceived impact on clinical outcome if the function failed (usability issue severity score).

Results

Twenty-two participants completed the study and usability tested most of the 20 functions. Sample inter-rater agreement of ease of use was 80% and Cohen’s Kappa was 0.67. Common use errors with highest severity and lowest success rate include...
orientation in time, sub-optimal data visualization leading to uncertainty in patient state, and conflicting documentation protocol with other clinical information systems.

Conclusions

Usability testing identified interface functions with potential high severity error. Design solutions could be addressed using the hierarchy of effectiveness. Together both redesigning the interface and developing education are expected to mitigate against software use errors and promote the safe use of such novel software for critical care. A new version has been launched at the site and will be iteratively assessed.
EDUCATION / SIMULATION AND TECHNOLOGY / INNOVATIONS AND ADMINISTRATION

PICC-0941
BLENDING LEARNING TO IMPROVE ADHERENCE OF PEDIATRIC SEPTIC SHOCK PROTOCOL AMONG RESIDENTS OF PEDIATRIC INTENSIVE CARE – PRELIMINARY REPORT

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Aims & Objectives:

The shift from didactic teacher-centered and subject-based teaching to the use of interactive, online and student-centered learning is crucial. The study aimed to establish a blended learning to improve adherence of 2007 ACCM/PALS guidelines.

Methods:

The study consists of four stages. The first was a documentary analysis of medical records with sepsis and septic shock admitted in a pediatric intensive care unit of teaching university hospital. Second phase was carried out analysis of environmental factors, personal, equipment and processes, which could be barriers to deliver appropriate treatment to patients. In the third, implemented a weekly rounds system in order to discuss the cases admitted with septic shock and analyze the procedures adopted. After each, round articles based on the best evidence were made available online via social media group. In the fourth phase a questionnaire will be apply to know learning preferences among residents and to implement an educational model and intervention protocol.

Results:

In the documentary analysis of medical records from 2005 to 2013 we observed: 2144 admissions, 314 sepsis and 174 septic shock patients at the time of admission in the PICU. A overall, septic shock and sepsis mortality rate was 10%, 38% and 12.8%, respectively. With this information, we decided to start immediately the education program with residents, given that they are the first line of PICU care. In the weekly rounds are discussed all sepsis and septic shock admissions. The best evidence are available online through 2 accesses Latin America Pediatric Sepsis Initiative and Saving Septic Kids (open access, https://www.facebook.com/savingseptickidslatinamerica/) and ICU PED EPM/UNIFESP ROUNDS with 200 and 30 accesses daily, respectively.
Conclusions

Blended-learning approach to teaching the best evidence and improve adherence to septic shock protocol was well accepted by the students. Employment hybrid methodology can increase student interest by study reducing the gap between theory and practice.
UNDERSTANDING THE IMPACT OF A TARGETED MENTORING PROGRAM FOR NEW NURSES IN A PEDIATRIC INTENSIVE CARE UNIT

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Aims & Objectives:

Our Pediatric Intensive Care Unit (PICU) established a staff nurse mentoring program in 2007 to support growth and retention. Having informally evaluated the program's success only once in 2008, we felt it important to more formally evaluate the program. Our focus was on understanding the impact of a mentoring program in the PICU.

Methods

A qualitative survey was developed to inquire on three domains from the perspective of the mentee: utilization of the current mentor program, criteria of a good mentor, and satisfaction with the mentor program.

Results

A total of 31/46 (67%) participant's responded. Despite variation in the timing of when the mentorship program was introduced during orientation, 74% believed they had received adequate information and that the timing of receiving information was appropriate. In addition to the information received during orientation, 77% of the respondents agreed the “Welcome book” for new staff was helpful. The most common trait participants considered when choosing their mentor was personality, followed by clinical experience and level of education. 31% of participants currently utilize their mentor. Of those currently utilizing a mentor, 44% communicate with their mentor 2-3 times per month. Of note, 33% of respondents reported it was their mentor who initiated the communication. 89% reported there was no established schedule to communicate. 77% were satisfied or very satisfied with the method and frequency of communication.

Conclusions

Overall most participants were satisfied with the program. Participants appreciated the confidentiality of the relationship and the feedback received. They identified the need to introduce the program earlier during orientation and suggested offering social events to promote the mentor-mentee relationship.
PICC-0609
USING SIMULATION TO IMPROVE PERFORMANCE IN PEDIATRIC CARDIOPULMONARY ARRESTS
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Aims & Objectives:

Pediatric code simulation (mock code) has been shown to decrease fear and anxiety, improve communication between physicians and nurses and increase the knowledge and familiarity with pediatric resuscitation guidelines (Hunt, Walker, Shaffner, Miler, & Pronovost, 2008).

Based on concerns by physicians and nurses, a plan to improve knowledge/competence, confidence and communication during a pediatric code was discussed. A survey was developed to determine knowledge/competence and confidence related to pediatric codes. The survey was distributed to nurses, physicians/residents, and respiratory therapists.

The goal of this program was then established to have 90% of the staff report improved knowledge/competence and confidence during a pediatric code as evidenced by reports through a survey tool. The overarching question was: In a pediatric population, does a simulation process improve staff comfort knowledge/competence and confidence when participating in a pediatric code? Success would be determined by an improvement in staff knowledge/competence and confidence when participating in a pediatric code.

Methods

The mock codes began with a pre-brief that told a brief scenario of the situation. The scenarios had a set length of time with expected actions. A debriefing was held after the mock code for participants to express what they felt was done right and where improvement was needed. The debriefing was always conducted in a constructive manner, enhancing a positive learning environment.

Results

Participants reported that they were more comfortable with pediatric codes compared to the previous year. There was increased comfort using a bag valve mask during an emergency, setting up for intubation, and using the Broselow tape. Increased competence for drawing up and administering medications was reported. Physicians reported increased comfort in leading a code.

Conclusions

Simulation is an effective method to increase staff knowledge/competence and confidence when participating in a pediatric code.
Aims & Objectives:

There is a pressure on nurse staffing skillmix in the UK. The highest acuity patients require a two nurses to one patient nursing ratio (2:1), whereas a lower acuity patient could have their needs met by 1:2 nursing, i.e. a “cohort”. Cohorting means to have an individual care for more than one patient. We aim to examine these practices.

Methods

- Thrice daily survey of cohorting (via Nurse Co-ordinator) using questionnaire
- Examination of surgical flow using data sets
- Survey of nurse experience using interviews (n=50)
- Intervention into increasing cohorting (education of coordinators)
- One month post-intervention evaluation

Results

Survey of practices suggests that cohorting is currently a rare practice (2%, n=12), even when the co-ordinator states that twice as many (4%, n=24) are technically cohortable. The most frequent reason for the failure to cohort is “sufficient staff”, yet 153 (4.7% of total) surgeries requiring PICU were avoidably cancelled over the past year.

Overall, the number of nurses is proportionately high, but their skill mix is reduced due to nurse age and level of expertise.
Conclusions

Co-ordinators currently tend to allocate more nursing cover than is strictly needed, primarily to support inexperienced staff. Nursing staff shortages are frequently met by the use of bank nursing staff rather than cohorting.

To conclude, the practice of cohorting, if applied properly, could free nurses to relieve the pressure from some of the higher acuity patients and open beds to enable surgical cases. This could improve surgical flow, enhance staff experience and reduce bank spend.
Aims & Objectives:

Measure the performance of nurses and doctors from urban and rural hospitals widespread Guatemala in pediatric emergencies simulation based scenario

Methods

A study was performed between June and December 2015. The endorsement of Ministry of Health to participate in labor day was obtained and designed real teams form each hospitals. A Objective Structured Clinical Examination – OSCE- test, a simulation based scenario checklist and attitude scale were developed to each participant. The SOYUTZ (mixed russian-mayan native language means Good Union) Pediatric Emergencies Simulation Center located at Hospital General San Juan de Dios / Universidad de San Carlos de Guatemala.

Results

130 health workers (70 doctors and 60 nurses), there is not found difference in OSCE test score between two groups (60.34 ± 8.5 vrs. 36.33 ± 11.7) (p=0.71 IC95%20.5;27.5). Only 1 participant reach the approval minimun score as 80 points. The checklist in the simulation scenario was failed in all cases; several findings in lack of leadership and teamwork and in the debriefing the best scale was attitude in any case.

Conclusions

Simulation is a useful methodology to design objectives and rubrica in pediatric emergencies course in Guatemala. Knowledge objective improvement, skills, teamwork, leadership and self evaluation is widespread interest in a high mortality country where younger freshmen doctors, senior primary care doctors, freshmen nurses and senior nurses with experience could support togheter them improvement.
EDUCATION / SIMULATION AND TECHNOLOGY / INNOVATIONS AND ADMINISTRATION

PICC-0558
IMPROVEMENT IN SKILLS, KNOWLEDGE AND ATTITUDES IN 4 YEAR PEDIATRICS RESIDENTS IN SIMULATION BASED EMERGENCIES SCENARIOS IN GUATEMALA

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¹Universidad de San Carlos de Guatemala, Unidad de Terapia Intensiva Pediatrica / Hospital General San. Juan de Dios, Guatemala, Guatemala

Aims & Objectives:

Determine the improvement in skills, knowledge and attitudes in last year pediatrics residents in Simulation based emergencies scenarios in Guatemala.

Methods

A study was performed between January and December 2014 in SOYUTZ ( mixed russian –mayan language word means Good Union ) Pediatric Emergencies Simulation Center at Hospital General San Juan de Dios / Universidad de San Carlos de Guatemala in Guatemala City. A Objective Structured Clinical Examination – OSCE- previous test, emergencies scenarios checklist to perform in simulation ( Traumatic Brain Injury, Shock, Cardiopulmonary Arrest, Airway Foreing Body obstruction and electrical injury ) and attitude scale was used in 54 last year pediatrics residents

Results

We found that the 36 % of them are not capable to define the scenario problema and did not perform well the approach of the simualted patient. The baseline knowledge describe in 69/100 low score about OSCE exam and 62 % of them describes and defensive and reactive attitude to improvement. After the debriefing of the scenario based in objectives described in rubrica; the results improve to 76 % in knowledge, 71 % in attitude scale and the better improvement was to 74 % of result in capability to recognition the problem to treat in scenario.

Conclusions

Simulation Based programs could be a useful methodology to improve the performance in postgraduate residents in Guatemala; developing new attitude, increasing the skills and decisión making.
INTRODUCING NEWLY QUALIFIED STAFF INTO THE PCCU ENVIRONMENT - A PERSONAL REFLECTION

J. Noble
1, Lincoln, United Kingdom

Aims & Objectives:

Historically the PICU at Nottingham Children’s Hospital ran a rotation for nurses with 12-18 months experience. As PICU expanded, additional staff were required so an educator was employed dedicated to introducing a one year programme for newly qualified nurses. This programme offers an extensive supernumerary period, structured competencies and supervised shifts alongside the paediatric critical care education team.

Methods

The programme commenced in October 2014 with 5 nurses. Each received 12 weeks supernumerary time alongside a preceptor and buddy, who supported staff through this period. Throughout this time, assessment of clinical skills was completed via a structured competency programme ensuring a good foundation of clinical skills and knowledge. Regular performance reviews were undertaken with preceptors and the programme leader. A series of study days were delivered covering a vast array of topics pertinent to different specialities e.g respiratory, spinal, oncology, renal. This also served as a time to meet informally to reflect and discuss different experiences.

Results

Having now completed the program, it was hugely beneficial to commence the Programme as a group of five as we were able to support each other and form strong relationships, both at work and socially. This programme has been helpful as it has provided an opportunity to work within a complex area whilst also having support of other newly qualified staff, extensive supervision and a dedicated programme lead.

Conclusions

In summary, this programme has:

- Increased my confidence
- Increased my clinical knowledge and skills
- Offered increased support for newly qualified nurses over a 1 year period
Aims & Objectives:

Vocal cord paralysis is a rare complication after aortic coarctation repair and may lead to pulmonary aspiration or delayed oral intake. Fiberoptic laryngoscopy is used for diagnostic tool, but it is invasive and painful. Here, we report successful use of an alternate diagnostic method (ultrasonography) to diagnose vocal cord paralysis.

Methods

Our patient was a term male neonate, who underwent a surgical repair of aortic coarctation at 18 days of life. Because of residual coarctation and acute kidney injury, his ICU course and length of ventilation was prolonged. 8 days after surgery, he was extubated and was found to have significant hoarseness.

Results

We assessed the movement of vocal codes by ultrasonography (Phillips, ie 33, Probe: L15-7io) and detected loss of movement of the vocal cord and arytenoid cartilage on the left side. This diagnosis was confirmed using fiberoptic laryngoscopy. Subsequently, because it was less invasive than fiberoptic laryngoscopy, we used it for daily observation in the pediatric intensive care unit. Because the thyroid cartilage of neonate or infant is less calcified than that of adult, we can use it as an acoustic window and acquire good visualization of the vocal cords. Our initial success in this patient in using ultrasound for diagnosis of vocal cord paralysis calls for further use to verify the diagnostic accuracy of this method. Additionally, we have recorded the images as movies, to aid in education of other physicians.

Conclusions

Ultrasonography is a useful tool to observe the movement of the vocal codes in neonatal patients.
Aims & Objectives:

To evaluate the efficacy of Mass Training CPR (MTCPR) technique to improve quality of Cardio Pulmonary Resuscitation (CPR) competencies in a pediatric ward.

Methods

68 pediatric ward staff were enrolled for the study (M18, mean age 31.69 +/- 8.84 yrs). Of these, 31 (46%) were students, 14 (21%) doctors, 12 (18%) residents and 11 (16%) nurses and laboratory technicians. All performed an initial two minute CPR evaluation using the skill master Recording QCPR manikin (Resusci-Anne, Laerdal), to detect the CPR quality. After the test all subjects participated in a novel 30 minute MTCPR course. Following MTCPR training, all participants performed another 2 minute CPR evaluation.

Results

The total baseline quality of CPR was poor, with a quality score of 27.25% (+/- 3.11); median 22% (IQR: 2.25% (25%) - 42.5 % (75%)) and, in particular, a poor quality of ventilations mouth-to-mouth (score ventilations = 34.85% +/- 4.78%; median = 0% (IQR: 0% (25%) - 76% (75%)). All subjects showed significant improvements in
Conclusions

Mass Training CPR technique, usually applied to laypersons, can be applied to train healthcare staff on pediatric wards. Mass Training techniques can achieve the goal for large numbers of diverse staff at low cost and in a short time.
Aims & Objectives:

Within the United Kingdom National Health Service, the transition from senior trainee to consultant is increasingly challenging due to the shortened training schemes. Current training struggles to provide trainees with adequate experience of senior clinical decision-making, leadership and management all of which are essential for the consultant role.

Methods

We describe a programme introduced on the paediatric intensive care unit at Great Ormond Street Hospital, UK, in 2015 where senior trainees were offered the opportunity ‘step up’ into a supported role as locum consultants. We sought feedback from two trainees involved regarding their experience of the role.

Results

Both senior fellows responded very favourably when questioned about their experience of ‘stepping up’ into a consultant role. One described the experience as one of the ‘most useful experiences’ in her training. The other trainee reported the experience as ‘hugely beneficial’. The programme enabled them to take leadership of a large busy unit and offered them insights into the administrative mechanics and politics of the unit. The importance of the support provided by the existing consultants was recognised. Both senior fellows were subsequently successful in securing substantive consultant posts in other institutions.

Conclusions

This report demonstrates that offering senior trainees the opportunity to step up to a consultant role is feasible even within a busy and high-pressure environment. It provides the trainee with unparalleled real-world experience, which goes some way to addressing the deficiencies in non-clinical training for senior trainees. The authors would encourage other units to consider adopting this practice.
EDUCATION / SIMULATION AND TECHNOLOGY / INNOVATIONS AND ADMINISTRATION

PICC-0728
COMPARISON OF EFFECTIVENESS AND SAFETY OF TWO METHODS FOR INSTALLING FEMORAL CENTRAL VENOUS CATHETERS IN PEDIATRIC INTENSIVE CARE UNITS: ANATOMIC LANDMARK METHOD VS REAL-TIME ULTRASOUND

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2Hospital Roberto del Rio, Pediatric Intensive Care Unit, Santiago, Chile

Aims & Objectives:

We studied if the use of real-time ultrasound guidance (US) is superior to anatomic landmark (LM) technique for femoral vein catheterization in children in a pediatric intensive care units (PICU). (NCT02318940)

Objectives: Comparison in both group effectiveness (success at first attempt, success cannulation, number of attempt) and safety (arterial puncture) of Two Methods for Installing Femoral Central Venous Catheters in PICU

Methods

Patients were prospectively randomized into 2 groups in different pediatric intensive care units. In the LM group, the femoral vein was cannulated using the traditional method palpating the femoral arterial pulse. In the US group, cannulation was guided by real-time scanning with an ultrasound probe. The cannulations on first attempt, successful cannulation, number of needle passes, and incidence of arterial puncture were compared between the 2 groups.

Results

Ninety-nine patients were studied. The success at first attempt and overall success rate was significantly higher in group US versus group LM (LM18% vs US42% p 0.011, LM51% vs US84% p 0.000, respectively). The incidence of artery puncture was low in the US group (LM 12 vs US 5, p 0.056) without reaching statistical significance.
Conclusions

According to our results, femoral CVC installation should be done under ultrasonic guidance. We demonstrated that ultrasonic guidance is a success factor independent of age and nutritional status, with better first attempt and cannulation success rates. Ultrasonic guidance also related to less attempts and less risk.

Table 1. Patient Characteristics

<table>
<thead>
<tr>
<th></th>
<th>LM (n=49)</th>
<th>US (n=50)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (m)</td>
<td>12</td>
<td>14</td>
<td>0.486</td>
</tr>
<tr>
<td>Male (%)</td>
<td>55</td>
<td>56</td>
<td>0.928</td>
</tr>
<tr>
<td>Nutritional Status</td>
<td></td>
<td></td>
<td>0.247</td>
</tr>
<tr>
<td>malnutrition</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>eutrophic</td>
<td>34</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>overweight</td>
<td>2</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>obesity</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Data are median or numbers.
There was no statistical significance between the 2 groups.
P 0.05 is considered clinically significant.
Paired Learning: An Innovative Doctor-Manager Peer Mentoring and Paediatric Critical Care Quality Improvement Programme

**Aims & Objectives:**

Paired Learning is an innovative peer-learning programme which brings different healthcare professionals together in a way that allows them to learn from each other’s expertise and experience.

Junior doctors and managers often have very little understanding of each other’s roles; there is an urgent need to work collaboratively to improve service efficacy, quality and efficiency. This programme aims to break down barriers and create new ways of working.

Specific Aims included:

- Leadership and management skills development
- Creating role-modelled environments with enhanced manager-doctor collaboration
- Shared understanding of organisational and financial challenges, driving service delivery and quality improvement work.

**Methods**

Paediatric critical care directorate doctor-manager pairs followed a six-month programme of work shadowing, peer-mentoring, quality improvement work and monthly leadership/management workshops.

Participants self-assessed their ‘Preparedness to Lead’ across 18 key leadership and management domains (Figure 1). Data was collected pre- and post-programme to establish baseline confidence, learning needs and to assess programme impact.

**Results**

Pre-programme, readiness for leadership roles scored lower in doctors compared to managers (Figures 2 & 3). Post-programme, confidence had increased across all domains for all participants with doctors indistinguishable from managers.

Participants reported Paired Learning to be a highlight of their training, leading to a refreshed understanding, respect and appreciation for their peers.
Conclusions

Paired Learning significantly improves self-assessed preparedness for leadership roles for both doctors and managers. This low-cost, innovative programme effects cultural change through positively altering inter-professional attitudes and doctor-manager relationships. Immediate gains for the healthcare organisation and patient services are provided through the quality improvement projects.

1. Working alongside senior management colleagues
2. Working alongside consultant colleagues
3. Working in a clinician-manager partnership
4. Working within a team to set up a new clinical service
5. Supporting and mentoring junior colleagues
6. Communicating with all members of your department
7. Leading a multi-professional team to improve services
8. Understanding the data streams that can inform quality improvement
9. Understanding how clinical evidence can inform improvement to patient care
10. Developing a business case to support a service development plan
11. Initiating projects to improve local services
12. Project managing a quality improvement initiative
13. Understanding how management decisions are made factoring in the competing priorities for the Trust
14. Understanding the hierarchies within a clinical team of doctors
15. Understanding the key organisations involved in the training of doctors
16. Understanding the hierarchies of a management team
17. Understanding how services are commissioned and funded
18. Knowledge of productivity and efficiency targets and the impact of these on the shop floor

Figure 1. The ‘Preparedness to Lead’ Questionnaire.
Participants were asked: “Reflecting on your experiences and training to date, please use the 1 to 5 scale to rate how prepared you feel for each of the areas of work below” (1= unprepared, 3= somewhat prepared, 5= well prepared).

Figure 2. Combined (Doctors and Managers) Pre- and Post-programme ‘Preparedness to Lead’ scores (mean, 95% confidence interval)
Figure 3. Summary Data for doctors and managers: Pre- and Post-Programme self-assess ‘Preparedness to Lead’ scores (mean, 95% Confidence Interval).
Aims & Objectives:

This study will evaluate how the workforce has adapted to working in smaller teams at Paediatric Intensive Care (PIC) at Birmingham Children’s Hospital (BCH) which is a 31-bed unit with approximately 350 staff.

Introduction

Managing a workforce of this magnitude was complex and organisational change was needed to make our large team feel small. In September, 2014 the frontline bed-opening staff were divided into three teams with an even skill mix.
The unit itself is divided into 3 zones: A, B and C. Each ‘kingdom’ works in a different zone rotating every 4 weeks. In a 3-month period they have all worked in each zone but with the same team. One year forward, staffs were asked to evaluate the change.

**Methods**

A structured questionnaire with quantitative and qualitative questions was given to staff (bands 3 - 8 and consultants). Data collection was gathered and interpreted.

**Results**

Staff responded, highlighting their preference for working in smaller ‘kingdoms’.

![Bar chart showing the response to the question: Do you find the smaller teams work better?](chart.png)

Free text comments included getting to know their colleagues better (particularly their management group and team leaders), which was felt to strengthen teamwork and support. New starters evaluated the smaller teams positively.

“I don’t think they (the team) could do more, I always feel supported.”

Limitations include differences in management style between the kingdoms and an uneven balance of annual and study leave.

**Conclusions**

Management of the BCH PICU workforce is complex, however proactive organisational change, creating smaller teams within the larger one, has optimised staff retention and morale.
EDUCATION / SIMULATION AND TECHNOLOGY / INNOVATIONS AND ADMINISTRATION

PICC-0785
EDUCATION VERSUS SERVICE PROVISION - A BALANCING ACT....?
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¹Great Ormond Street Hospital, Paediatric intensive care, London, United Kingdom

Aims & Objectives:

In order to meet safety standards, our registrar rota was changed to increase night time staffing on paediatric intensive care (PICU). Due to a lack of additional staff, the day time registrar cover on PICU was reduced to enable the extra cover overnight. The aim of this study was to identify whether there has been an effect on training opportunities for registrars as a result of the rota change.

Methods

An anonymous survey to both junior and senior tier registrars, working pre and post the introduction of the new working rota was conducted. Ordinal data was collected from each questionnaire and findings analysed.

Results

85% of registrars felt that the new rota was safer for patient care.

Registrar learning experiences at night on the new rota were generally felt to be unchanged or better (50% unchanged, 35.7% better, 14.3 % decreased).

During the day, 71.4% of registrars felt that their ability to attend ad-hoc bedside teaching / multi-disciplinary meetings / family updates was reduced on the new rota.

Additionally 85.7% of senior fellows felt that the new rota had a negative impact on their learning as "fellow of the week" (junior consultant role), due to understaffing on the unit and a requirement for the fellow to complete jobs that would have previously been done by the missing day time registrar.

Conclusions

Reassuringly night cover on PICU is felt to be safer, and the educational opportunities unchanged or perhaps increased with the greater staff numbers.

Unfortunately reduced staffing in the day has adversely affected educational opportunities for junior and senior registrars during these shifts.

It is important to have identified this impact on educational opportunities. Our challenge going forward is to continue to provide safe care whilst maintaining high standards of training.
Aims & Objectives:

Summary and Background
In May 2015, the Montreal Children’s Hospital part of the McGill University Health Centre moved to a newly constructed merged facility three kilometers away. The transition would include not only the moving of critical ill patients into a single room model of care but also the addition and integration of a new advanced care unit. The planning and preparation for this move occurred over several years, involving multiple departments, team members and simulating workflow processes. The transition period from pre to post move included various process and needs analysis, management of the staff concerns, stakeholder engagement, risk management and ongoing evaluation of progress and move readiness. This work was structured by a step by step process and facilitated by engaging many frontline team members, families and input from patients. This presentation will describe the methods and tools used to operationalize the transition of the Pediatric Critical Care Unit, the outcomes and lessons learned around the experience.

Methods

Utilization of a continuous improvement methods and change management to structure the transition project and engage the frontline team members throughout the transition.

Results

A description of the transition process, staff perspectives and the lessons learned around the experience

Conclusions

The poster presentation will conclude with a look into the summary of the unit 6 months post move.
Aims & Objectives:

Failure in handover is a major preventable cause of patient harm and is principally due to human factors of poor communication and systemic error. Situation, Background, Assessment, Recommendation (SBAR) use in clinical handover provides a consistent and concise framework to communicate patient information. The objective of this study was to investigate whether handover skills using the SBAR tool acquired through practising handing over in a simulated environment are transferred to the clinical environment.

Methods

A prospective educational study was designed. 12 participants were audio recorded giving clinical handover and each participant was then trained on SBAR tool using high-fidelity simulation scenario. Second audio recording was obtained after a period of 4 weeks. Evaluation was done using standard scoring system. A survey was also conducted to determine the trainee's knowledge and use of SBAR.

Results

Wilcoxon Signed Ranks Test was used to detect the difference. Results demonstrated an overall improvement and the improvement of the background aspect was maximum at 15% (70% to 85%) (Figures 1 and 2). However, trainees who scored less than 50% in their pre teaching scores, showed a large improvement of over 25% in the post teaching scores. Although there was an overall improvement, it was not statistically significant with Z-statistic approximation to Wilcoxon signed rank test = -1.483 and p-value = 0.160.
Figure 1-Overall Scores

- Situation
- Background
- Assessment
- Recommendation

Pre
Post
Conclusions

We believe that our study has demonstrated, for the first time that downstream transfer of learning of communication skills using SBAR in the simulation setting to the clinical workplace can be achieved.
Aims & Objectives:

Excessive phlebotomy, defined as blood that is discarded after all laboratory tests have been completed, contributes to anemia in pediatric ICU (PICU) patients. Anemia increases the likelihood of RBC transfusion, which may increase risk of ICU-related morbidity and mortality. Excessive Phlebotomy Reduction (EPR) strategies mitigate the risk of anemia and need for transfusion, but the impact of such strategies has not been evaluated in a PICU population. We hypothesized that use of implementation science principles would facilitate acceptance and adoption of EPR strategies, thus reducing the amount of blood overdrawn and incidence of RBC transfusion.

Methods

Quantitative and qualitative methods were used to evaluate the impact of four EPR strategies in a pre- (n=112) and post-intervention (n=111) study. Patient and blood draw practice data were collected along with survey and focus group data to evaluate knowledge and attitudes before and after the EPR intervention. The Consolidated Framework for Implementation Research (CFIR) was used to interpret implementation data. Bivariate analyses and multivariate regression were utilized to analyze for independent associations.

Results

Prior teaching and experience influenced blood draw practices prior to implementation. The EPR strategies were easy to use and the majority demonstrated excellent adoption and acceptance by staff. Patient populations were similar in pre- and post-intervention groups. The EPR intervention was associated with reduced blood overdraw volume (p< 0.0001), and fewer patients were transfused in the post-intervention period (19.6%) vs pre-intervention (32.1%), (p=0.03) after adjustment with hierarchical regression models.
Conclusions

Use of implementation science methods aided in selection of EPR strategies and enhanced their uptake and adoption. The EPR strategies significantly reduced the amount of blood volume overdrawn and the number of transfused PICU patients. Larger trials are needed to determine if this approach can improve outcomes by reducing unnecessary exposure to blood products.
EDUCATION / SIMULATION AND TECHNOLOGY / INNOVATIONS AND ADMINISTRATION

PICC-0030
NORMATIVE DATA FOR INFERIOR VENA CAVA DIAMETER AND ITS CORRELATION WITH THE SOMATIC PARAMETERS IN INDIAN CHILDREN

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²Lady Hardinge Medical College, Radiodiagnosis, New Delhi, India

Aims & Objectives:

This study aimed to know the normative data for inferior vena cava (IVC) diameter in children and its correlation with height, weight and body surface area. There is lack of cutoffs for IVC diameter for Indian healthy children.

Methods

In this study, we enrolled 475 healthy children aged one month to 12 years visiting out patient clinics (OPD’s). Subjects were divided in to five groups as Group A – 1 month to 1 year, Group B – 1 year to 3 years, Group C – 3 years to 6 years, Group D – 6 years to 9 years and Group E – 9 years to 12 years. Weight and height were measured as per the standard protocol and body surface area was calculated at the time of examination. IVC diameter was measured using M mode ultrasonography during expiratory and inspiratory phase of the respiratory cycle. Collapsibility Index (CI) was calculated by measuring difference between the maximum (expiratory) and minimum (inspiratory) IVC diameters divided by the maximum IVC diameter.

Results

The mean age of study subjects was 4.72 ± 3.72 years ranging between 1 month to 12 years. Out of 475 subjects, 285 (60%) were males and 190 (40%) were females. Mean weight for age (%) of subjects was within normal limit. Mean IVC diameters (in millimeter) during expiratory phase for Group A, B, C, D, E were 4.59±1.10, 5.63±1.56, 6.81±1.91, 8.10±2.14 and 11.30±2.44 respectively. Mean IVC diameters (in millimeter) during inspiratory phase for Group A, B, C, D, E were 3.10 ± 0.97, 3.69±1.18, 4.40±1.17, 5.20±1.42 and 7.28±1.86 respectively. CI of different age groups was also presented. There was statistically significant positive correlation of IVC diameters with age, height and weight.
Table 1: Baseline Characteristics of all subjects according to the age group in the study.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
<th>Group E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
<td>1 to 12mo</td>
<td>1 to 3</td>
<td>3 to 6</td>
<td>6 to 9</td>
<td>9 to 12</td>
</tr>
<tr>
<td>Total number</td>
<td>98</td>
<td>92</td>
<td>101</td>
<td>93</td>
<td>91</td>
</tr>
<tr>
<td>Gender (M /F)</td>
<td>285 / 190</td>
<td>53 / 39</td>
<td>66 / 35</td>
<td>52 / 41</td>
<td>52 / 39</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>4.76±2.81*</td>
<td>1.86±0.58</td>
<td>4.05±0.79</td>
<td>6.99±0.79</td>
<td>10.68±1.01</td>
</tr>
<tr>
<td></td>
<td>(Months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Length/Height (cm)</td>
<td>62.15±6.83</td>
<td>82.12±7.86</td>
<td>98.91±7.76</td>
<td>117.88±7.44</td>
<td>138.8±8.84</td>
</tr>
<tr>
<td>Weight (kgs)</td>
<td>5.97±1.61</td>
<td>10.77±1.99</td>
<td>14.10±2.56</td>
<td>20.21±3.43</td>
<td>31.24±5.61</td>
</tr>
<tr>
<td>Body surface area</td>
<td>0.30±0.05</td>
<td>0.48±0.06</td>
<td>0.62±0.07</td>
<td>0.81±0.09</td>
<td>1.10±0.12</td>
</tr>
<tr>
<td>Mean Minimum IVC diameter [mm]</td>
<td>3.10±0.97</td>
<td>3.69±1.18</td>
<td>4.40±1.17</td>
<td>5.20±1.42</td>
<td>7.28±1.86</td>
</tr>
<tr>
<td></td>
<td>(Range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Maximum IVC diameter [mm]</td>
<td>4.59±1.10</td>
<td>5.63±1.56</td>
<td>6.81±1.91</td>
<td>8.10±2.14</td>
<td>11.30±2.44</td>
</tr>
<tr>
<td></td>
<td>(Range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Collapsibility index</td>
<td>0.32±0.12</td>
<td>0.34±0.11</td>
<td>0.34±0.10</td>
<td>0.35±0.10</td>
<td>0.36±0.07</td>
</tr>
</tbody>
</table>
Graph 1 Nomogram: Minimum IVC diameter for age. (age in years) (1= male, 2= female)

Graph 2 Nomogram: Maximum IVC diameter for age. (age in years) (1= male, 2= female)
Conclusions

This study provides reference values and equations for IVC diameters for Indian children of different age groups.
Aims & Objectives:

Background: On a busy and expanding Cardiac Intensive Care Unit (CICU), advancing nursing roles and nursing education play a vital role in patient flow and journey through ICU. An audit conducted in a given week showed 58% of patients experienced delays in ventilation weaning which potentially delayed extubation. This inspired a QI project to design a weaning guideline for experienced nurses with the aim of weaning patients and so reducing their time on a ventilator with associated risks and potentially ICU stay.

Methods

Methods: A collaboration of an ANP, Educator and Consultant resulted in united vision of a guideline for nurses. With the help of the QI team, using a model for improvement, baseline data; a driver diagram was initiated. PDSA cycles were started as audits for bedside nurses to complete regarding: start/end times of weaning from ventilation, if wean was by nurse/medic and the cause of any delays. Post intervention data was monitored to see effects of change.

Results

Results: A simple, easy to follow ventilation-weaning protocol, approved by senior medic, nurses and a physiotherapist was designed. Targeted study days were conducted for senior nurses to address the specific learning needs they identified during a base line questionnaire. On successful completion nurses were able to commence weaning. Patients were identified as suitable for weaning on the consultant led ward rounds. The weaning was carefully monitored and any deviations from protocol or change in clinical condition were monitored.

Conclusions

Conclusion: This on-going project has shown improvement for patients and at the same time nurses who have completed the study day. They report feeling empowered to engage in patient management resulting in more autonomous practice, this hopefully improves retention. Data being collected may allow a comparison of before/after introduction of weaning guidelines.
RELATING NURSES’ ENDO TRACHEAL SUCTIONING PRACTICE TO REAL PATIENTS: A POINT PREVELANCE SURVEY

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Aims & Objectives:

Background: Endotracheal suctioning is an essential procedure for any intubated child.

We aimed to explore how nurses (RNs) perform endotracheal suction (ETS) on real PICU patients.

Methods

We used a point prevalence e-survey in a single PICU.

Results

54/161 RNs (RR 34%) completed the survey. 36% RNs had >10 years’ experience and 81% had a PICU qualification. Patients suctioned had a primary diagnosis of respiratory infection (24%), post-operative cardiac surgery (22%), general surgery (13%) sepsis (9%) and other (32%). 93% children were conventionally ventilated and 7% on oscillation (HFOV). The median age of the children was 2.9 (Range 0-12 years). The primary indication for ETS was varied (Graph 1). 91% of nurses used an open suction technique and 9% used closed. 50% of nurses pre-oxygenated the patient prior to ETS. 85% nurses stated their patient had no instability during suction, but in the 15% who did, desaturation and tachycardia were the main instability cited. 13% nurses altered the child’s oxygen level post ETS. In both open and closed suction techniques, 80% nurses applied continuous suction pressure. The mean number of suction passes overall was 1.84 (1.6 with closed vs 2.1 with open suction). Suction pressure used was 20kpa in all patients. The saline instillation rate was 20%
with closed suction and 64% with open suction technique.

Conclusions

This study has shown some variation in ETS practice within a single PICU. Relating the nurses’ suctioning technique to real patients provides a more accurate picture of practice.
Aims & Objectives:

A comprehensive international point-prevalence survey of pediatric endotracheal suction practices has not previously been conducted post implementation of lung protective strategies. An international systematic study of common PICU practice will allow international learning. The objective was to develop and pilot-test a valid and reliable data collection instrument for international utilisation.

Methods

Several paper tools, used previously in North America and Australia, were merged and questions were revised and disagreements discussed by an expert international panel through conference call and iterative email sessions until consensus was achieved. Questions were entered into an internet-based survey software and evaluated for clarity, skip-pattern, and respondent burden. In total, 8 versions of the survey were evaluated before pilot testing. Various changes to question wording were made to ensure an international understanding of terms. Questions were shifted to drop-down pick-lists or multiple choice formats to avoid free text fields. This was done to aid in the eventual translation of text in the next phase of the international survey.

Results

The pilot instrument consists of 54 questions within 5 domains that include non identifiable patient information, pre-suctioning, procedural, and post-suctioning care activities and patient response ending with nurse demographics. The E-Survey was then pilot tested over a 21-day period in one UK PICU with 161 bedside nurses. We are now analysing pilot phase data.
Conclusions

An E-survey survey tool, with sufficient face validity, has been developed and refined in English. Results will inform further E-Survey refinement prior to international dissemination.
Aims & Objectives:

The Paediatric Intensive Care Unit (PICU) and High Dependency Unit (HDU) provide care for a broad cohort of patients. The resource information available to the clinical team is extensive.

Aim

To standardise the clinical guidelines, policies and protocols used, which underpins care for critically ill patients.

To create an easily searchable electronic repository to save time for clinicians.

To improve safety by having centralised version control of documents used to underpin clinical care.

To enable all staff (especially new and inexperienced members) access to information in a clear systematic way.

Methods

During Spring 2015, digital versions of current updated information within bedside folders were created, using Microsoft Word and saved as a PDF. These were indexed so they could be easily searched. When the original documentation was unavailable, the paper version was either scanned or recreated. The electronic folder was loaded to each bedside computer on PICU (24), HDU (19), and nursing and medical workbases.

Results

Cardiac, Neurological and general Critical Care guidelines were digitalised and standardised for use in HDU and PICU. Robust centralised version control was put in place with a timeline of document update, to provide context for reports. Centralised version control was put in place with a timeline of document update, to provide context for reports. There was in-direct cost saving from removal of paper-based documentation, which often had to be printed and updated.

Conclusions

The move towards paperless care means that the digitisation of clinical guidelines, policies and protocols is required. This provided an opportunity to improve ease of access, search features, standardise care and provide centralised version control.
PICC-0160
SIMULATION TRAINING - BRIDGING THE GAP IN THEORY TO PRACTICE IN CVVH
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Aims & Objectives:

Introduction

Five years ago the EMEESY network set up a series of simulation scenarios for CVVH, to meet the educational deficit which had been identified by the nursing teams within the regional PICU’s (NCH,SCH & LCH).

Simulation is a rapidly evolving area within healthcare education. A healthcare climate where there are continual technological advances, coupled with greater complexity of patient needs and an ever increasing constriction on budgets and staffing, makes for a significant educational challenge. Simulation attempts to bridge this gap, through replicating the real-life clinical environment and exposing the learners to events in a safe, controlled environment, where patient safety cannot be compromised.

Methods

Three simulation days per annum were organised regionally to encompass both theory and practice. Specialists in each centre are involved in teaching and facilitating the education and simualtions.

Results

Case Summary

Over the last 5 years we have successfully facilitated 12 simulation training days. The initial focus was consolidation of skills within the existing team of CVVH trained staff, but has since incorporated medical staff and other nursing team members. We have trained 107 nursing team members, 7 medical staff. Half these days include didactic sessions on topics such as principles of CVVH and pharmacology. The remainder of the day is devoted to simulation based training and ethics discussions. The simulations are based on real life experiences.

Conclusions

Conclusion
This has led to:

• Increased staff satisfaction

• Increased competence and confidence in troubleshooting

• More CVVH trained staff

• More comprehensive understanding of the care of a child receiving CVVH

• Robust educational team for providing all CVVH training across the network
PICC-0161
BRIDGING THE EDUCATION GAP: IMPLEMENTING A NANO-SIM PROGRAMME ON PAEDIATRIC CRITICAL CARE
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Aims & Objectives:

Over the past five years, there has been increased interest in the application of high-fidelity simulation training for the purpose of improving patient safety¹. Evidence supporting this technique is not well documented within Paediatric Critical Care (PCC).

The objective of the nano sim programme is to implement a series of mock time-critical events replicated from the clinical environment, with specific measurable outcomes. It is envisaged that this programme will streamline practice across all disciplines and shave nano-seconds from emergency situations.

Methods

The PCC Education team devised 25 nano simulations based on real-life scenarios including blocked tracheostomies, asystole and hypovolaemia. This is a multi-disciplinary approach. One scenario was selected to trial using randomised, opportunistic sampling of the available workforce to facilitate streamlining of the systems and processes.

Results

During a 3-week trial period, we undertook 16 identical simulation observations using the chestsplinting scenario.

Participation was Band 5 & 6 Registered Nurses, with medical assistance when requested.

The 4 measurable outcomes were:

1. Time to hand ventilation
2. Time to call for help
3. Time to administer sedative bolus
4. Time to administer paralysing agent

There was variability within our results which requires further analysis, however initial findings suggest 81% of staff hand-ventilated within 20 seconds. 100% of staff called for assistance in under 50 seconds. Sedatives were administered by 81% of staff under 90 seconds and mean time to administer paralysing agents was 5m 30s.

Conclusions

To assess the efficacy of the programme in terms of staff competence and confidence:

§ The remaining nano sims will be facilitated using the same methodology

§ Re-running each nano sim; comparing and analysing the data

§ Qualitative staff survey
Aims & Objectives:

Guidelines state that the transfer of children for emergency neurosurgery is the responsibility of the referring hospital and not that of the accepting tertiary centre.[i] Departure to a neurosurgical centre should occur within a maximum of 60min from the end of the CT Scan. A number of neurosurgical conditions require time critical interventions e.g. Expanding intracranial haematomas and obstructive hydrocephalus. However these transfers are rarely seen by DGH’s and often there is a reluctance to perform these transfers resulting in a need to mobilise the retrieval team.

Methods

Case reviews identified that there are a number of barriers to organising these time critical transfers, including;

- Decision regarding the primary transferring physician
- Availability and understanding of transfer equipment
- Readiness issues

Medical staff change frequently and therefore our focus was on how we could ensure key nursing staff have the skills to facilitate these transfers by ensuring the equipment is ready and understood by staff. Guidelines were developed along with checklists and a transfer bag kitlist for the use by staff preparing for time critical transfers. Study days were also developed focussing on

- Introduction to Time Critical transfers
- Airway Management/ Intubation
- Transport Physiology
- Management of patient with a head injury
Practical simulation sessions putting together the skills that they had learnt throughout the day.

**Results**

Changes have not been in place long enough to prove significant difference however qualitative feedback from the study days developed in the DGHs suggest nursing staff feel more informed and can prepare their units.

**Conclusions**

Staff training for the safe transfer of critically ill patients is vital regardless of who is delivering the service. The use of guidelines, checklists and study days developed following review of these transports will help to empower nurses to facilitate a timely response in a workforce which is changeable.
PICC-0481
USING ONLINE VIRTUAL SIMULATION TO TEACH MECHANICAL VENTILATION TO PEDIATRIC CRITICAL CARE PROVIDERS WORLDWIDE

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Aims & Objectives:
Emerging pressures from a new generation of learners are urging medical educators to develop and study new teaching strategies. Serious games actively engage the adult learner, allow control of learning pace and timing, provide directed feedback, and leverage cognitive motivations inherent in games. Here we describe the use of a virtual ventilation simulator by global pediatric critical care providers.

Methods
The virtual ventilator (Figure 1) was released on OPENPediatrics (www.openpediatrics.org) in November 2012 containing three sections: Knowledge Guide (KG) (text and interactive steps to adjust the ventilator), Tactics (short problems to diagnose and treat), and Cases (scenarios to teach ventilator set-up, titration and troubleshooting). Embedded analytics tracked usage patterns, scoring and actions within simulator for each user, and descriptive statistics report activity.
Results

Between November 2012 and December 2015, 1295 users from 84 countries accessed the virtual ventilator, representing 17% (1295/7751) of all registered OPENPediatrics users. 23% of users were attending physicians, 10% fellows, 31% residents, 5% medical students, 16% nurses, and 7% respiratory therapists. 44% (567/1295) of users completed the KG, 16% (203/1295) completed all 11 tactics, and 5% (69/1295) completed all three cases. Average completion times were 50 minutes for KG, 10 minutes per tactic, and 70 minutes per case. In the KG, 53% of users scrolled to the bottom of the page, representing engagement with this activity. In the tactics, 81% of users correctly diagnosed problem on first attempt. 93% of users that accessed a case, completed all steps.

Conclusions

There is great interest and engagement for using online serious gaming for learning pediatric mechanical ventilation, but more work is needed to identify strategies that promote completion of the entire activity.
EDUCATION / SIMULATION AND TECHNOLOGY / INNOVATIONS AND ADMINISTRATION

PICC-0594
HIGH FIDELITY SIMULATION AS A TRACHEAL INTUBATION TRAINING PROGRAM FOR THE PICU PERSONNEL, HOSPITAL DE LOS VALLES, QUITO - ECUADOR.

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Aims & Objectives:

To describe a training program with high fidelity simulation in tracheal intubation.

Methods

Tracheal intubation (TI) in children can be difficult and associated to life-threatening complications. Conventional training is limited due to lack of opportunities. High fidelity simulation (HFS) could ameliorate this issue. With the objective of improving the TI process in our PICU, we developed a training program with HFS and multidisciplinary teams of health care professionals. Theoretical and practical sessions were established during a period of 23 months. In order to evaluate the theoretical knowledge, a pre-test and post-test were taken. In order to evaluate the practical sessions, we used the Just in Time (JITT-PAPS) scale. To evaluate the JIT-PAPPS score before and after the practical sessions we applied the two dependent proportions testing. A p value of 0.05 was considered significant.

Results

We had 3 theoretical sessions and 22 practical sessions recreated in the PICU with the same personnel and equipment used in real patients (Figure 1). Post-test scores were equal for all health care professionals with a marked improvement for nursing auxiliary personnel which obtained the same scores as physicians (p=0.004) (Figure 2). Physicians attended 22 practical sessions, nurses 53, respiratory therapists 13, and nursing auxiliaries 27. Some people attended more than one session. Final practical score, as a representation of team work, showed a significant improvement (p < 0.05). The improvements were 77%, 40.9%, and 123.5% for the global, technical, and behavioral scores, respectively (Figure 3).

Conclusions

It is possible to improve the efficiency of TI using a training program with HFS. In particular, the behavioral and communicating skills between all the health care personnel substantially improved with HFS.
PRESSURE INJURY IDENTIFICATION AND AWARENESS IN A TERTIARY
PAEDIATRIC INTENSIVE CARE UNIT
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Aims & Objectives:

To Increase awareness of pressure injuries amongst health care professionals throughout a tertiary Paediatric Intensive Care Unit (PICU).

Prevalence of skin breakdown and pressure injuries is now a standard by which hospitals are evaluated and assessed. Pressure injuries are recognised as an international safety problem. The majority of pressure injuries are preventable if appropriate measures are implemented, however, despite a hospital pressure injury prevention and management policy, 80% of the hospital pressure injuries occur in PICU.

Methods

An anonymous electronic survey was conducted to gain insight into the knowledge and attitudes of staff working in the PICU in relation to pressure injuries, the use of screening tools and the management plans. A bedside audit was conducted observing compliance of pressure injury assessment and documentation in accordance with the hospital and state policy.

Results

Survey responses were received from 51 PICU staff, with over half of the responses demonstrating a lack of awareness and knowledge of the pressure injury prevention and management policy.
Bedside audit results showed an 80% compliance with completing the pressure injury assessment tool however there was no documented management plan when a patient was deemed high risk. There was poor compliance with documenting a skin inspection within 6 hours of admission.

Conclusions

Excellent skin care is attributed to quality care, however poor compliance and staff knowledge of the pressure injury prevention and management policy was identified. A change in culture towards pressure injury prevention and management is underway through education, auditing and the development of a pressure injury management plan.
EXTRACORPOREAL SUPPORT

PICC-0874
EXTRACORPOREAL LIFE SUPPORT PRIOR TO SURGICAL PALLIATION FOR HYPOPLASTIC LEFT HEART SYNDROME

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²Dan L. Duncan Institute for Clinical and Translational Research, Biostatistics, Houston, USA

Aims & Objectives:

The role of ECMO support prior to palliation for Hypoplastic Left Heart Syndrome (HLHS) has not been well described. The purpose of our study was to describe outcomes of patients with HLHS supported with ECMO prior to their first surgical palliation (either Norwood or Damus-Kaye-Stansel) using the ELSO database from 2004 – 2015.

Methods

The Institutional review board at Baylor College of Medicine (Houston, TX) approved this study. The ELSO registry (Ann Arbor, MI) was queried for all neonates (≤ 30 days) with HLHS requiring ECMO support prior to any definitive surgical palliation from January 2004 - 2015. Demographics, cardiovascular and ECMO characteristics were stratified by mortality and summarized as median with 25th and 75th percentile or frequency with proportion. Comparisons between survivors and non-survivors were analyzed using Wilcoxon rank sum test or Fisher’s exact test. Simple and multiple logistic regression assess the association between characteristics and the odds of mortality

Results

A total of 76 patients underwent 78 ECMO runs pre surgical palliation for HLHS. The overall survival to discharge home or another facility was 32% (n=24). Simple logistic regression analysis shows a pre ECMO lower mean arterial blood pressure (MAP), longer ECMO duration, the need for inotropes or the need for renal replacement therapy (RRT) were significant predictors of mortality on ECMO. Multivariable regression demonstrates as MAP increases (OR0.89, p<0.03), mortality decreases, but the odds for mortality increase by 1.01 for an hour increase on ECMO (p<0.03) and RRT (OR9.19, p<0.03). Other demographic, hemodynamic and respiratory variables, as well as pre ECMO therapies, did not affect outcome.

Conclusions

Although the overall outcome of HLHS has improved significantly, patients presenting with early deterioration requiring ECMO support prior to surgical palliation represent a very challenging subgroup, ethically as well as medically. The utilization of ECMO for this particular indication should be carefully considered.
EXTRACORPOREAL SUPPORT

PICC-0110
BLOOD PRODUCT USE DURING EXTRA CORPOREAL MEMBRANE OXYGENATION (ECMO) 2013-2015:ONE INSTITUTIONS EXPERIENCE

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Aims & Objectives:
Extra Coroporeal Membrane Oxygenation (ECMO) commenced at the Royal Children's Hospital (RCH) in 1988. During this time period there have been multiple changes of equipment. Currently the Jostra Rotaflow™ and the Medos™ oxygenator are utilised for support. The transfusion of blood products during ECMO is usually based on centre specific protocols.

Methods
The RCH ECMO data base was reviewed for years 2013-2015 with respect to demographics, diagnosis, reason ECMO, cannulation and support mode, support time, and blood and blood product use.

Results
One hundred and thirty four children (male n=67) median age 0.25, weight, 4.5kgs required ECMO support for respiratory (n=21), congenital heart disease (n=78) sepsis (n=13) or cardiomyopathy/myocarditis (n=22). Median support time was 87, 87, 114, 90 hours in each group respectively. Ninety three children were cannulated centrally, 41 peripherally (36 VA, 5 VV).

<table>
<thead>
<tr>
<th>Blood Product on ECMO</th>
<th>Respiratory (median values)</th>
<th>Congenital heart disease (median values)</th>
<th>Sepsis (median values)</th>
<th>Cardiomyopathy/Myocarditis (median values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood mls/kg/day</td>
<td>9</td>
<td>16</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>Platelets mls/kg/day</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Fresh Frozen Plasma mls/kg/day</td>
<td>6</td>
<td>6</td>
<td>13</td>
<td>5</td>
</tr>
</tbody>
</table>

Conclusions
Anti-coagulation on ECMO is a complex balance between risk of clotting and bleeding which is affected by patient diagnosis, type of ECMO equipment, and circuit used. Children cannulated centrally via a sternotomy often require greater volumes of blood transfusion.
EXTRACORPOREAL SUPPORT

PICC-0883
Extracorporeal Membrane Oxygenation (ECMO) for Neonates with Congenital Renal and Urologic Anomalies and Pulmonary Hypoplasia: A Review of the Extracorporeal Life Support Organization (ELSO) Registry
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Aims & Objectives:
Congenital renal and urogenital anomalies constitute up to 30 percent of anomalies in the neonatal period. In utero oligohydramnios leads to pulmonary hypoplasia and neonatal respiratory failure that may not be responsive to mechanical ventilation. It is debated whether or not to offer extracorporeal support in this population due to possible irreversibility of the underlying process. The objective is to query the ELSO database to describe the outcomes and complications of patients with congenital renal and urogenital anomalies with pulmonary hypoplasia who underwent ECMO in the neonatal period.

Methods
Data from the ELSO registry—a large international database, was retrospectively reviewed for patients with congenital renal and urogenital anomalies with pulmonary hypoplasia requiring ECMO support. Descriptive statistics were calculated in Microsoft Excel, distributions of continuous variables were compared between non-survivors and survivors to hospital discharge with the use of the Mann–Whitney U tests, whereas the categorical variables were compared using the t-test.

Results
From 1998-2014, 45 patients met the inclusion criteria with average age at initiation of ECMO being 1.7 days (range 0-14 days) and weight of 3.1 Kg (IQR: 2.5 – 3.3). The patients spent an average of 162 hours (IQR: 81-207). 60% of patients were managed with veno-arterial ECMO and overall survival of this cohort was 42%. Survivors had higher weights (3.4 v. 2.8 kg, P<0.019) and were more likely to be male (90 vs. 44%, p<0.002). Patient with obstructive urogenital lesions had an overall survival of 71% vs. 16.6% in patients with a primary intrinsic renal diagnosis (P=0.004). Renal replacement therapy was required in 51% of the patients during their ECMO support.

Conclusions
Neonates with renal or urogenital disease and pulmonary hypoplasia have an overall survival rate of 42%. Patients with urogenital obstruction have more favorable outcomes when compared to those with intrinsic renal disease such as polycystic kidney disease.
EXTRACORPOREAL SUPPORT

PICC-0892
APPLICATION OF NAFAMOSTAT MESILATES AS AN ANTICOAGULANT DURING EXTRACORPOREAL MEMBRANE OXYGENATION IN NEONATES AND INFANTS
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Aims & Objectives:
Anticoagulation during extracorporeal membrane oxygenation (ECMO) in neonates and infants is important and nafamostat mesilate which is a synthetic protease inhibitor, has recently gained popularity. In this study, we retrospectively reviewed our early experience of ECMO and systemic anticoagulation with nafamostat mesilate in children under 2 year-old.

Methods
We retrospectively reviewed the medical records of 19 infants who were managed by transthoracic, venoarterial ECMO from July 2011 to December 2012 by a single surgeon. The systemic anticoagulation was done by continuous intravenous infusion of nafamostat mesilate. The activated clotting time (ACT) was maintained at 150 to 200 s and aPTT were at 60-80s.

Results
The median age was 1 month (1 day-22 months), body weight was 3.9 kg (2.8-14.5) and male to female ratio was 11:8. Median duration of ECMO run was 136 hours (38-748), the mean dosage of nafamostat mesilate 0.9±0.5 mg/kg/hr and adjusted the dosage with the level of ACT and aPTT. Eight patients successfully weaned from ECMO and 7 were discharged home without significant complication. One patient presented intracardiac thrombosis and remained severe thromboembolic events and there were no other thrombotic complication.

Conclusions
Nafamostat mesilate would be an alternative for the anticoagulation in infants during ECMO run. Further prospective studies with nafamostat mesilate in neonate and infants are also needed.
EXTRACORPOREAL SUPPORT

OUTCOME OF CRITICALLY ILL CHILDREN REQUIRING CONTINUOUS RENAL REPLACEMENT THERAPY: THE EFFECT OF FLUID OVERLOAD, ORGAN FAILURE AND TIMING OF THE THERAPY

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²The Royal Children’s Hospital, Pediatric intensive care unit, Melbourne, Australia

Aims & Objectives:

The objective of this study was to identify risk factors associated with mortality in critically ill children requiring continuous renal replacement therapy (CRRT).

Methods

A retrospective observational study based on a prospective registry was performed in all children undergoing CRRT in a 30 bed pediatric intensive care unit over a 8 year period, from 1 January 2007 to 31 December 2014.

Results

During the study period a total of 161 patients were treated with CRRT, 59 of those were on extracorporeal membrane oxygenation (ECMO). Overall mortality was 36% (48% in patients on ECMO and 29% in patients not on ECMO) and was highest in patients with oncologic disease (77.8%) and previous cardiac arrest (72.7%) and lowest in patients with primary renal disease (5.6%). Acidosis, higher serum lactic acid, multiorgan dysfunction syndrome (MODS), higher vasoactive inotropic score (VIS), greater cumulative fluid overload (%) and presence of ECMO at CRRT initiation as well as lower PIM2 score at admission were the factors associated with increased mortality, whereas acute kidney injury (AKI), defined by pRIFLE category 2 and 3 was not associated with increased mortality.

Conclusions

Mortality among critically ill children requiring CRRT remains high and seems to be related to the underlying disease, the number of organ failed, the level of hemodynamic support, the degree of fluid overload and the timing of the therapy. Early initiation of CRRT to avoid a higher degree of fluid overload might result in better outcomes.
EXTRACORPOREAL SUPPORT

PICC-0692

THERAPEUTIC PLASMA EXCHANGE IN CHILDREN REQUIRING INTENSIVE CARE

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²The Royal Children’s Hospital, Pediatric Intensive Care Unit, Melbourne, Australia

Aims & Objectives:

Therapeutic plasma exchange (TPE) has evolved to an accepted therapy for selected indications over the last decades. However, it is technically challenging in children and requires an experienced staff. Moreover, evidence is poor and mostly derived from adult analysis and case series. The aim of this study was to review the procedure in the context of clinical indications, complications and outcome of the patients.

Methods:

We retrospectively analyzed all patients requiring TPE at our pediatric intensive care unit (PICU) during an 8-year period (2007-2014).

Results:

A total of 48 patients with a median (range) age of 11.8 years (0.5-17.5) underwent a total of 244 TPE sessions. The most common diagnosis were haematological disorders (25%), organ transplantation (25%), neurological disorders (20%) and immunological/rheumatological disorders (15%). Median (range) PIM2 score at admission was -4.25 (-0.92 to -5.8), median (range) number of failed organs was 1 (1-5) and median (range) ICU stay was 5 (0.5-209) days. Overall survival from ICU was 82%. While patients requiring TPE alone had a survival of 97%, those requiring continuous renal replacement therapy and extracorporeal membrane oxygenation survived in 57% and 50% respectively. Other factors associated with increased mortality were younger age, lower PIM2 score at admission, need for mechanical ventilation, higher number of failed organs and longer ICU stay.

Conclusions:

TPE is a safe apheresis method in children. Outcome in children requiring TPE alone is excellent. However, it decreases with the number of organ failed and the need for renal replacement therapy and ECMO.
EXTRACORPOREAL SUPPORT

PICC-0856
PRESSURE RELATED FLOW RATES THROUGH VARIOUS INTRAVENOUS DEVICES: IMPLICATIONS FOR CONTINUOUS RENAL REPLACEMENT THERAPY DELIVERY IN VERY SMALL CHILDREN
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²Nottingham Children’s Hospital, Paediatric Critical Care Unit, Nottingham, United Kingdom

Aims & Objectives:
Continuous Renal Replacement Therapy (CRRT) is extremely challenging in very low weight children. Most CRRT devices are rated to a minimum weight of 8kg, with corresponding intravenous access devices suitably sized. We aimed to quantify the flow rates through a variety of intravenous devices in order to investigate alternative methods of access for very small babies requiring CRRT.

Methods
Room temperature whole milk was used in substitution for blood due to similar viscosity. Milk was run through a standard length CRRT circuit, with each system attached for 3 minutes and repeated 3 times. Fluid was run at pressures of 50, 100, 150, and 200mmHg.

Results
Eight intravenous devices were tested. All vascaths had similar flows through either lumen. At pressure of 125mmHg, 8Fr 12.5cm and 6.5Fr 10cm vascaths allow flows of 110 and 95ml/min, and an 18G 4.5cm cannula 75ml/min. 5Fr 5cm triple central line distal lumen, 5Fr 40cm and 4Fr 40cm umbilical venous lines, and 5Fr 5cm Vascath do not allow sufficient flows for CRRT. A 20G 3.2cm cannula will give flow rates of around 55ml/min at 125mmHg. The addition of a three way tap in to the circuit did not impede flows for any system, but a needle free valve did. Flows increased with pressure non linearly, presumably due to increasing turbulence.
Conclusions

At pressures of 125mmHg, an 18G 4.5cm cannula will give flow rates of around 75ml/minute. In the absence of a suitable length of 6.5Fr or 8Fr Vascath, we advise use of two separate 18G single lumen cannulae for reliable access for CRRT in very small infants.
EXTRACORPOREAL SUPPORT

PICC-0920
THE USE OF ELECTROENCEPHALOGRAM DURING EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) TO DIAGNOSE AND PREDICT BRAIN INJURY. A SYSTEMATIC REVIEW

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⁴The Hospital for Sick Children, Cardiovascular Surgery, Toronto, Canada
⁵The Hospital for Sick Children, Library, Toronto, Canada

Aims & Objectives:

To make a systematic review of the published literature to determine the types of electroencephalogram (EEG) are used in ECMO patients, EEG patterns identified and diagnostic and predictive characteristics of EEG testing published in order to develop an institutional guideline for the use of EEG in ECMO patients.

Methods

Systematic search of Medline, Embase and Cochrane Central Register of Controlled Trials from database inception to December 2014. Inclusion and exclusion criteria were defined a priori. Methodological quality was assessed using QUADAS-2. Sensitivities, specificities and predictive values were extracted when appropriate. Evidence was appraised and the guideline developed based on GRADE methodology.

Results

From 7503 citations, 190 articles were fully read. 144 were excluded and four were identified from hand searching reference lists. Finally 50 articles were included and eight applied EEG (354 children). Three were published within the last decade and five from 1992 to 2001. One study evaluated the diagnostic ability of abnormal EEG or seizures diagnosing acute brain injury (ABI), alone and combined with head ultrasound and didn't find association between abnormal EEG and ABI, but found it when combined with head ultrasound.

Five studies estimated the value of EEG predicting risk of neurodevelopmental outcome (NDO) among survivors (n=2), NDO and survival (n=2), or survival (n=1) alone. Four reported that recordings are of predictive value with moderate levels of bias. Two reported diagnostic and prognostic abilities, and both reported EEG results associated with risk of ABI or death.

Three included newborns and children and five newborns. One study recorded aEEG and EEG.
Conclusions

The data about EEG in ECMO patients for diagnosing ABI or predicting NDO and survival is limited and provides low level of evidence for recommendations. More studies should be performed in the contemporary setting where ECMO is used across populations with different underlying risk for ABI and NDO.
EXTRACORPOREAL SUPPORT

PICC-0937
OUTCOME OF CHILDREN AFTER A SECOND SUPPORT OF EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)
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Aims & Objectives:

To identify the outcome of children after a second support of Extracorporeal membrane Oxygenation (ECMO)

Methods

Patients undergoing two or more times support with ECMO from February 1995 to August 2014 were identified using hospital electronic data bases. Retrospective review of necessary data. To qualify for separate support of ECMO they should be separated for ≥6 hours.

Results

A total of 47 patients were supported twice and 4 had three ECMO run. 40/47 had congenital heart disease (CHD) while 5 had cardiomyopathy. Average age of patients (age ≤90 days) at first run (23/47) was 28.3 days and at second run (13/47) was 45.4 days, while 24/47 and 34/47 patients had age ≥91 days (5.4 years and 4.7 years respectively). Common CHD were HLHS (14/47) and AVSD (7/47). 36 of 47 and 26 of 47 patients had immediate preceding corrective surgery before first and second ECMO run respectively. Commonest indication of ECMO support were cardiac arrest & low cardiac output state. Commonest mode of initiation for first ECMO was E-CPR (27/47) and for second ECMO was elective 28/47. 19/47 underwent E-CPR during second run with mean duration of E-CPR 36.5±14.9min. Open sternum cannulation is most common in both (31/47 Vs 24/47) followed by neck cannulation (12/47 Vs 18/47). Mean duration of first and second run of ECMO was 110±98.6 and 133.1±113.7 hours respectively. During both run of ECMO renal dysfunction (32/47 Vs 35/47) and liver dysfunction (22/47 Vs 25/47) was more evident. 10 patient survived multiple ECMO run. Average duration of follow up of survived patients is 0.4-17 years of that 3 had no disability, 4 had mild disability, 1 had moderate to severe disability, and 2 had severe disability.

Conclusions

ECMO remains an important supportive mode of management. Multiple supports with ECMO is feasible, however, we detected a high rate of mortality and morbidity.
EXTRACORPOREAL SUPPORT

PICC-0916
DEMOGRAPHIC CHARACTERISTICS and INTENSIVE CARE SURVIVAL OF PEDIATRIC CONTINUOUS RENAL REPLACEMENT THERAPY: DATA FROM TURKEY


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Aims & Objectives:

Determine demographic characteristics and intensive care survival for 212 patients who were treated with CRRT.

Methods

Multicenter prospective study. The demographic variables were recorded at admission, continuous variables were recorded for the first seven days. Survival was defined as 28th day survival. The level of significance was defined as a p value of less than 0.05.

Results

Ages were newborn to 22 years, 50.7% were male, and weight were 2.5 kg to 100 kg. The mean PRISM score was 19.8±10.4, PELOD score was 21.2±12.4. The main primary diagnosis of the patients were sepsis and septic shock 21%, acute renal failure 19% and metabolic acidosis 13%. Overall survival was 70.8%. The mortality was found significantly associated with cathether replacement, the filter changing due to cathether dysfunction or filter clotting, receiving RBC transfusion and had hemorrhage and electrolyte imbalance any of the first seven days, respectively. The
mortality was found associated with protein content after the third day and calorie support after the fourth day of CRRT. There was better survival when CVVHD was chosen as CRRT modality (survival for CVVHD was 92%, CVVHDF was 72%, CVVH was 58%) and PAES membrane was used (survival for PAES membrane was 72% and AN-69 membrane was 69%).

**Conclusions**

Technical problems during CRRT may cause significant survival disadvantage. The RBC transfusion should be avoided and proper nutritional support should be aimed. The CRRT modality and biocompatibility of membrane may have survival advantage.
EXTRACORPOREAL SUPPORT

PICC-0333
ADEQUACY OF BETA-LACTAM DOSING IN CRITICALLY ILL CHILDREN ON CONTINUOUS RENAL REPLACEMENT THERAPY: A PILOT STUDY
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Aims & Objectives:

Determine the adequacy of standard beta-lactam dosing in critically ill children on continuous renal replacement therapy (CRRT).

Methods

This prospective pilot study enrolled consecutive patients treated with CRRT and receiving either meropenem (MEM), piperacillin-tazobactam (TZP), cefepime (FEP) or ceftazidime (CAZ). Serum concentrations were determined by high-performance liquid chromatography from 4 samples taken after drug administration. Semi-natural log plots of concentration versus time were used to estimate various pharmacokinetic (PK) parameters including: clearance, volume of distribution, half-life, initial concentration, elimination rate constant and time above minimal inhibitory concentration (MIC). Adequacy of therapy was determined by the duration of drug concentration above MIC for susceptible, intermediate and resistant Pseudomonas spp. The recommended drug concentration is 4 times the MIC for resistant Pseudomonas spp.

Results

Eight patients were included: 4.5 ± 7.5 years old, 21.6 ± 25.6 kg, male 11%. 14 series of serum samples were obtained: MEM, n = 2; TZP, n = 3; FEP, n = 8; CAZ, n = 1. Overall, only 14.3% of patients demonstrated drug concentration at four times the MIC for Pseudomonas spp. for the recommended duration. Table 1 shows data for each antibiotic and different cut-off recommendations.
Conclusions

This pilot study highlights the importance of antibiotic PK studies in critically ill children on CRRT. Standard dosing of antibiotics can be insufficient to treat resistant microorganisms due to pathophysiologic changes of acute illness and extracorporeal therapies. Future studies should focus on beta-lactam therapeutic drug monitoring protocols and PK studies to titrate therapy in this population.
EXTRACORPOREAL SUPPORT

PICC-0391
SEVERE HANTAVIRUS CARDIOPULMONARY SYNDROME SUCCESSFULLY TREATED WITH EXTRACORPOREAL MEMBRANE OXYGENATION AND HYPERIMMUNE PLASMA
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Aims & Objectives:

Hantavirus cardiopulmonary syndrome (HCPS) is an infectious disease with high case fatality rate. We report a pediatric case successfully treated with hyperimmune plasma and extracorporeal membrane oxygenation.

Methods

Case Report

Results

Previously healthy 8-year-old boy, living in an urban area presented to ER with history of 3 days of high fevers, progressive shortness of breath, dry cough and myalgia. He spent 2 weeks in hantavirus endemic area 3 weeks before the first consult. Quickly after admission he developed severe respiratory failure refractory to standard care, refractory shock and renal failure. Wide spectrum antibiotics were given. Due to high suspicion for severe HCPS (history, physical exam and laboratory) he was transferred to pediatric ECMO center 24 after admission. Hanta virus infection was confirmed by positive serology and Hyperimmune plasma (Andes virus neutralizing antibodies1, 5000U/kg) was given. Echocardiogram revealed severe alteration of contractility. He was placed on VA-ECMO 8 hours after admission to ECMO center. Dyoxia markers returned to normal and shock resolved within 3h after ECMO initiation. He was maintained on ECMO 3 days and successfully weaned the 4th day. He was extubated 48h after ECMO discontinuation and transferred to his primary center. Discharged 28 days without supplemental oxygen and normal renal function.

Conclusions

Successful interventions for HCPS include early diagnosis and promptly initiation of supportive care. New adjuvant therapies like hyperimmune plasma are under development. Timing for referral to ECMO center is crucial for adequate treatment.

EXTRACORPOREAL SUPPORT

PICC-0814
ECLS FOLLOW-UP PROGRAM: ESSENTIAL SUPPORT AFTER CHILDHOOD CRITICAL ILLNESS
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Aims & Objectives:

Advances in technological support have catalyzed the emergence of medically fragile survivors of complex critical illness. Children who have been treated with extracorporeal life support technologies (ECLS) are one such group. The Extracorporeal Life Support Organization (ELSO) has established recommendations for the ongoing support of children and families after ECLS therapies. We describe a comprehensive ECLS follow up program, aligned with ELSO recommendations, and adapted to available resources and context.

Methods


Results

The ECLS follow up program is operationalized in two clinical groups; cardiac critical care (CCC) and paediatric intensive care (PIC). Since 2011, 128 CCC and 31 PIC children and families have been enrolled. Working with the child’s primary providers, follow-up support has been provided locally, provincially and internationally with individual components tailored to the needs and context of each child and family. Educational materials for families have been developed. An ECLS family day celebration was held in 2015 with 40 families attending. This event included; an exposition of new ECLS research and technology, sibling support activities, a remembrance of children who have died and parent to parent networking.

Conclusions
Children who have been exposed to ECLS technology during complex critical illness have unique needs in recovery with potential implications for later health and wellbeing. We have designed and successfully implemented a comprehensive interprofessional program for ongoing delivery of evidence based family-centred care for these children and their family.
EXTRACORPOREAL SUPPORT

PICC-0695
PROLONGED LOW FLOW IN ECMO WEANING: IS IT WORTH A TRY?
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Aims & Objectives:

Weaning extracorporeal membrane oxygenation (ECMO) is an important step to determine outcome in patients with cardiac failure. Many strategies of ECMO weaning protocol have been used worldwide. One of the strategies is using low blood flow (30 ml/kg/min) for some periods of time (more than 24 hours). In this research, we reviewed our experience with low flow strategy to wean the ECMO.

Methods

In this study we reviewed medical records of patients who underwent ECMO support from January to October 2015 at National Cardiovascular Center Harapan Kita, Jakarta, Indonesia with patients age ranged from 20 days to 19 years old. Prolonged low flow weaning were performed to 9 out of 13 patients that were on veno-arterial ECMO. The clinical outcomes and the complications of the device were then recorded.

Results

Out of 13 patients, 7 patients were on ECMO in the operating room and the other 6 were at pediatric cardiac intensive care unit (PCICU); with 3 patients were put on ECMO due to low cardiac output and 3 others were ECMO on cardiac pulmonary resuscitation (ECPR). Nine out of 13 patients were weaned from ECMO with low flow strategy, 3 patients were terminated on family request, and 1 patient was terminated due to cerebral haemorrhage. Nine patients had survived from ECMO, 4 died several days after weaned from ECMO and 5 patients were successfully discharged from hospital. Neurological complication (infarct) was present in one patient, and mechanical complication (clots on the tubing) occurred in two patients.

Conclusions

Survival and complications rates using prolonged low flow ECMO weaning strategy are comparable with international data. In certain cases, this strategy may be considered.
EXTRACORPOREAL SUPPORT

PICC-0349
CENTRAL ACCESS ECMO RESCUE IN A CHILD WITH PROBABLE SEROTONIN SYNDROME AND REFRACTORY CARDIOGENIC SHOCK
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Aims & Objectives:

Serotonin syndrome is an increasingly recognized constellation of physiologic abnormalities caused by neurotransmitter excess. Rapidly progressive motor and hemodynamic instability culminating in cardiovascular collapse may be triggered by antidepressants and other serotonergic agents. Presentations range from subtle clonus to fatal shock. Diagnosis is clinical, requiring a high index of suspicion as it may occur with the first dose, during titration, or as a drug interaction, underscoring the need for clinician awareness and patient education.

Methods

A 14 year-old boy, healthy except for depression, developed dizziness, lethargy and abnormal movements 5 days after starting sertraline. He presented to an outside hospital with profound shock, hyperglycemia (>2000mg/dl), hyperpyrexia (>108F), rhabdomyolysis, and multi-organ failure. Resuscitation using fluid boluses, epinephrine and norepinephrine was continued during air transport to our hospital. Central extracorporeal membrane oxygenation (ECMO) was instituted upon arrival for refractory cardiogenic shock (ejection fraction 13% prior to cannulation) associated with bradycardia. Therapeutic plasma exchange and dialysis were provided for suspected thrombocytopenia-associated multiorgan failure during his 5-day ECMO course.

Results

The child's cardiac dysfunction, glucose dysregulation, and all metabolic derangements resolved completely with reversal of shock. No infectious, endocrine, metabolic, toxic or oncologic cause of the illness could be found on extensive evaluation, suggesting sertraline-associated serotonin syndrome as the most likely etiology. The boy is recovering well, albeit with kidney injury and toe necrosis.

Conclusions

Serotonin syndrome should be considered in the differential diagnosis of tone or motor abnormalities, altered sensorium, hyperpyrexia and hemodynamic instability in patients exposed to antidepressants, other psychotropic agents, and many other medications such as dextromethorphan, commonly found in cough preparations.
Management includes stopping any suspected serotoninergic agents. Enteral cyproheptadine may be useful. Shock reversal requires vigorous fluid resuscitation and directly-acting vasopressors; active cooling with neuromuscular blockade and ventilation may be necessary. Mechanical support of the circulation with ECMO was life-saving for our patient.
EXTRACORPOREAL SUPPORT

PICC-0816
DEVELOPMENT AND IMPLEMENTATION OF A HAEMOSTASIS PROTOCOL FOR EXTRACORPOREAL LIFE SUPPORT IN A PAEDIATRIC INTENSIVE CARE SETTING
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Aims & Objectives:
Haemorrhagic and thrombotic complications remain the primary cause of mortality and morbidity in patients receiving Extracorporeal Life Support (ECLS) (Oliver, 2009). Haemostasis management in the paediatric ECLS population presents complex and ongoing challenges. The aim in creating and implementing a streamlined haemostasis protocol is to standardise practice and improve patient outcomes.

Methods
A multidisciplinary ‘Haemostasis on ECLS’ working party was formed; data from The Children’s Hospital Westmead and the Extracorporeal Life Support Organization (ELSO) registry was reviewed, in conjunction with protocols from other ECLS centres and peer reviewed literature.

A two pathway Extracorporeal Membrane Oxygenation (ECMO) Haemostasis Protocol was developed: non-bleeding patient versus bleeding patient, and introduced into clinical practice after a series of in-services and bedside teaching sessions. Data from an audit undertaken six months after implementation of the protocol was compared to historical data.

Results
Changes in haemostasis management introduced as a result of the new protocol include decreased use of ACTs, increased use of AntiXa results to guide heparin management, clearer guidelines on timing and dose of blood product and Antithrombin III (ATIII) administration and increased starting dose of Heparin.

A preliminary audit of four patients over six months following introduction of the protocol shows decreased use of ATIII, less alteration of heparin dosages and lower overall heparin dose administered. One out of four patients had bleeding complications (requiring chest washout) with no thrombotic events (circuit cut out or change), in comparison to eleven months of pre implementation data in which six of eleven patients had bleeding and/or thrombotic complications.

Conclusions
An ECMO Haemostasis Protocol was devised and implemented to standardise practice, rationalise decision-making and improve patient outcomes. Early audit data suggests altered use of ATIII and heparin and may have implications for healthcare safety and costs.
Aims & Objectives:

Checklists are an instrumental method in coordination and survey of complex processes. A consistent application of checklists may increase patient safety and can therefore be an important tool in the contemporary intensive care setting.

The aim of the presented work was to develop and implement a checklist for patient and equipment survey in patients treated with extracorporeal membrane oxygenation on an interdisciplinary pediatric intensive care unit (PICU) and thereby improving handling of ECMO units by the staff and the patient safety.

Methods

The checklist was developed on a 12-bed tertiary center interdisciplinary pediatric intensive care unit with staff working in a three shift system with 17 doctors and 67 nurses in full- and part-time employment. ECMO is applied in approximately 20 cases per year by cardiothoracic surgeons and cardiovascular technologists with PICU staff taking care of monitoring and handling.

Results

After a 12 month period, the newly designed checklist was applied in 309 ECMO cases. There was regular application of the list by most of the nursing staff. The majority of questioned persons stated an increase of safety in the handling of ECMO patients.

Conclusions

A checklist for manipulation of ECMO units should be developed by a consensus-oriented and inter-professional team to increase compliance and subjective contentment as well as standardization of the work-flow. The impact on patient safety should be evaluated in a prospective clinical study.
EXTRACORPOREAL SUPPORT

PICC-0850
Nursing care of extracorporeal membrane oxygenation in pediatric critical care in China: 5 years summary
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Aims & Objectives:
To summary the nursing care of extracorporeal membrane oxygenation(ECMO) support in pediatric critical children in China.

Methods
All 28 cases received ECMO treatment from December 2011 to December 2015 in Children’s hospital of Fudan University. Retrospectively analyze the nursing measures, treatment, complications and outcome during the ECMO treatment.

Results
The ECMO treatment time varied from 14 to 576 hours, with median 157.3 hours. Thirteen of 28 cases survived and discharged from hospital and 5 kids gave up the treatment after termination of ECMO. 10 patients died. There were 48 episodes of complications during the treatment of ECMO in 28 cases, 18 of them were mechanical evens, such as leakage of oxgenator, thrombosis developed in ECMO tube system. There were 30 body complications, including bleeding, cerebral complications. The nursing measures include intensive observation of ABP, SpO2 and SvO2; the nursing of line and oxygenator; the control of infection in hospital and the care of skin/pressure ulcers.

Conclusions
Proper care intervention and effective preventive measures is to ensure that an important part of successful treatment in ECMO.
EXTRACORPOREAL SUPPORT

PICC-0613
HYBRID EXTRACORPOREAL THERAPIES AS A BRIDGE TO PEDIATRIC LIVER TRANSPLANTATION
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Aims & Objectives:

Acute liver failure (ALF) has a high mortality up to 45% while awaiting a liver transplant (LT). Given the scarcity of available organs, keeping patients alive on the wait-list without catastrophic complications is a major challenge to clinicians. Standard medical therapies have proven inadequate, as the accumulation of endogenous protein bound toxins lead to hepatic encephalopathy, hepatorenal syndrome, hepatic cardiopathy and multiple organ failure. Removal of these toxins using various extracorporeal purification approaches as a bridge to LT have come under the spotlight recently, but their efficacy has not been well characterized and was the aim of this study.

Methods

We reviewed our experience at Texas Children’s Hospital – a large tertiary referral center for ALF- which uses a hybrid extracorporeal treatment protocol for ALF combining high-flux continuous renal replacement therapy (CRRT) for hyperammonemia, therapeutic plasma exchange (TPE) for coagulopathy and albumin-assisted dialysis (MARS) for hepatic encephalopathy.

Results

Over 18 months, 11 children (mean age 4.2 ± 5.5 years, 73% male) with ALF, all ventilated and on vasopressors were treated with a combination of CRRT, TPE, and MARS. All patients received CRRT (hemodiafiltration with minimum clearance of 3000 ml/1.73m2/hr), TPE (4, IQR 1-6), and MARS (6, IQR 3-7) treatments. Centrifugal TPE (fresh frozen plasma replacement) was performed tandem with CRRT. 3/11 patients died (27%), 2 prior to listing and one on the wait list. 8 were successfully transplanted with a 6 month survival of 100%.

Conclusions

Protocolized use of complex hybrid extracorporeal therapies CRRT, TPE and MARS can be effectively implemented in pediatric ALF as a bridge to LT.
**EXTRACORPOREAL SUPPORT**

**PICC-0531 ECLS CANNULATION IN THE PCICU FOLLOWING INFANT HEART SURGERY: WHO NEEDS IT AND WHAT IS THE OUTCOME?**

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**Aims & Objectives:**

Veno-arterial (V-A) extra-corporeal life support (ECLS) may be required in the postoperative (PO) period following repair of congenital heart disease (CHD), for failure to separate from cardio-pulmonary bypass (CPB). Some patients require initiation of ECLS in the Pediatric Cardiac Intensive Care Unit (PCICU) due to progressive hemodynamic deterioration or an acute event. We aim to describe reasons for and outcomes of infants requiring V-A ECLS in the early PO period after cardiac surgery for CHD.

**Methods**

Patients ≤6 weeks of age having cardiac surgery with CPB from Jan/03-Dec/12 who had ECLS in the first 48hr PO had their medical records reviewed (patients transitioned directly to ECLS when coming off CPB were excluded).

**Results**

Thirty three of 527 (6.2%) patients underwent PO ECLS; 20/33 (67%) were cannulated in PCICU. Indications for ECLS included: 9 (45%) cardiac arrest requiring ECLS placement during CPR (E-CPR); 6 (25%) for Low Cardiac Output Syndrome (LCOS) with 2 needing CPR pre cannulation, 4 (20%) for cardiac tamponade physiology, 1 (5%) for unstable cardiac rhythm and 1 (5%) for refractory hypoxemia. The predominant diagnoses were: 8 (40%) HLHS, 3 (15%) TAPVD, 2 (10%) TGA and 2 (10%) Pulmonary atresia. Seven (35%) had residual defects (detected by Echo or angiography which required intervention in cath-lab (1) or operating-room (6)). Mean lactate up to 2hr before ECLS was 8.4 (range: 2-19; SD: 4.62 mmol/L), and mean inotrope score was 39 (range: 5-128; SD: 35.7). The survival at hospital discharge was 13/20 (65%); 5 children needed transplantation.

**Conclusions**

A small group of cardiac patients requires ECLS in the PCICU in the immediate postoperative period, most commonly for LCOS and/or E-CPR, and often they have residual defects. Further work is necessary to identify risk factors for initiation of ECLS in the early PO period in order to prevent cardiac arrests and improve outcomes.
Aims & Objectives:

Early mobilization and rehabilitation may positively impact the recovery of patients supported with ECLS. However, significant safety concerns arise when children are cannulated directly to their great vessels through their mediastinum. Time-Out is defined as the full verification performed immediately prior to the start of a procedure and is the final safety stop before a procedure is started. We report the implementation of a time-out strategy to address inter-professional coordination and to maximize safety during these maneuvers.

Methods

Case report of the implementation of a team time-out strategy with a child cannulated for support with a NovaLung® iLA® membrane ventilator. Figure 1 describes the following in full detail. (1) Pre-Time-Out: (a) Preparation of equipment (Mobilization Cart, Wheelchair); (b) Preparation of the Child (pre-medication, toileting). (2) Time-Out at bedside: (a) Anticoagulation; (b) NovaLung® iLA® review; (c) Child readiness; (d) Team member roles and responsibilities. (3) Mobilization process: (a) Transfer bed to wheelchair; (b) Secure patient and devices in wheelchair.
Results

A school aged child with right ventricular and respiratory failure necessitating ECLS as a bridge to lung transplantation with NovaLung® iLA® for 4 months. Acute
rehabilitation included mobilization in-and out-of-bed, both with pre-gait, and gait activities, school, child life and music activities. After implementing this Time-Out procedure, adverse events did not recur.

Conclusions

The utilization of time-out procedure prior to each rehabilitation activity can improve the safety of rehabilitation care plans, does improve the integration of rehabilitation activities with critical care activities, and ultimately improves patient outcomes.
EXTRACORPOREAL SUPPORT

PICC-0687

THE DEVELOPMENT OF A LEVELLING PLATFORM FOR THE SAFE AND EFFECTIVE USE OF AN INTERVENTIONAL LUNG ASSIST MEMBRANE OXYGENATOR

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Aims & Objectives:

The Novalung® Interventional Lung Assist (iLA®) membrane oxygenator and other extracorporeal life support (ECLS) devices provide many advantages in the treatment of children with critical dysfunction of the cardiopulmonary system. Unfortunately, children are often maintained in bed due to safety risks associated with cannulation through the mediastinum to the great vessels unless a system is available to secure the devices. To promote patient repositioning, activity and mobilization, we set out to fill this technological gap.

Methods

We describe a Levelling Platform (LP) (US Provisional Patent Application # 61/608,997) developed to stabilize and secure an Novalung® iLA® device in a paediatric intensive care setting.

Results

The LP system can safely secure the device to a bed, chair, wheelchair, table, pole, walker or cart. The LP includes: (1) an angle adjustment to level the Novalung® iLA® device when the patient surface is at a tilt; (2) a vent to allow for the exhaust of CO₂ and the draining of condensation; (3) slots to accommodate a strap and track system that prevents the LP and Novalung® iLA® from tipping or falling off the bed, thus ensuring safe and effective patient re-positioning; (4) attachment points to affix the LP to a clamp; thereby providing a secure attachment point to a chair, wheelchair, walker, table, pole or many other surfaces.

Conclusions

The Levelling Platform provides a secure, flat and level surface for the Novalung® iLA® and provides the children maximal opportunity to improve their quality of life through activity, mobility, and rehabilitation.
EXTRACORPOREAL SUPPORT

PICC-0316
PLASMA EXCHANGE MAY BE THE BEST SALVAGE THERAPY FOR PEDIATRIC CARDIAC PATIENTS ON ECMO WITH THROMBOCYTOPENIA-ASSOCIATED MULTI-ORGAN FAILURE
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Aims & Objectives:

Plasma Exchange (PLEX) has been described as an effective therapy for critical patients presenting with thrombocytopenia-associated multi-organ failure (TAMOF). We hypothesize that PLEX may be also a useful therapy for the very sick subset of critical pediatric cardiac patients requiring Extracorporeal support (ECMO) together with clinical signs suggestive of TAMOF and to our knowledge its use in this context has not been characterized.

Methods

Retrospective review including pediatric cardiac patients admitted to the CICU receiving PLEX for clinical diagnosis of TAMOF while on ECMO between January 2006 and June 2015. Clinical and demographic data were collected; modified Organ Failure Index was calculated retrospectively for data analysis.

Results

Among 136 patients requiring cardiac ECMO, we identified 45 admissions in 44 patients (29 male, 15 female) meeting study criteria. ECMO-run hours (Mean +/-SD) were 216.37 +/- 327, with patients receiving a median of 3 PLEX sessions (range 1 to 14) and using 1 to 1.5 volume exchange. Fresh frozen plasma or 5% albumin were used as fluid replacement. Overall Hospital survival was 57.8%. Average Platelet counts (x 10⁶, +/- SD) before and after total PLEX sessions were 70.0 ( +/- 36.4) and 90.5 +/- 31.5, respectively (p<0.001).

Conclusions

To our knowledge, this is the first review of use of PLEX in pediatric cardiac ECMO. We postulate that PLEX may improve organ dysfunction and survival in this very sick group of patients. Further investigation is warranted to establish the role and indications of PLEX in the non-rejection pediatric cardiac patient with MOF.
EXTRACORPOREAL SUPPORT

PICC-0523
IMPROVING PATIENT OUTCOMES IN A PEDIATRIC ECMO PROGRAM WITH THE ASSISTANCE OF TELEMEDICINE INTERVENTIONS.
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²Fundacion Cardiovascular de Colombia, Cardiology, Bucaramanga, Colombia
³Fundacion Cardiovascular de Colombia, Epidemiology, Bucaramanga, Colombia
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Aims & Objectives:

Mechanical circulatory support by extracorporeal membrane oxygenation (ECMO) is an invaluable tool in the care of children with heart disease. Nonetheless, availability of this resource is scarce in developing countries and significant medical team expertise is needed to maximize results and decrease complications. We hypothesize that telemedicine-assisted interventions may potentiate the impact of quality interventions (QI) and improve outcomes in a pediatric ECMO program. Multiple QI were implemented in the ECMO program at FCV, and were assisted via telemedicine by physicians at CHP.

Methods

Retrospective review of clinical and Telemedicine databases of pediatric patients on ECMO admitted to the CICU at FCV, who were tele-assisted by CHP between July 2011 and June 2015, compared with patients admitted before the inception of our telemedicine program (2007 to 2010). Information collected included demographic data, cardiac diagnosis and RACHS-1 classification. Primary outcome was composed by Hospital Mortality, with CICU and Hospital length of stay (LOS) as secondary outcomes.

Results

49 tele-consulted patients were identified, receiving a total of 240 tele-consultations and they were compared with 57 patients from the pre-telemedicine group. There were 5 medical and 44 surgical patients. No significant difference was found in weight, gender and RACHS-1 distribution between study periods. Hospital survival was significantly improved in the tele-consulted patients (55 vs 29.8%, p= 0.008). CICU (55 vs 19.5 days) and Hospital (81 vs 28 days) LOS were significantly longer in tele-consulted patients (p< 0.002 each).

Conclusions

Telemedicine-assisted QI in pediatric ECMO patients resulted in significant improvement in patient survival as compared with a historical cohort. Longer LOS in tele-consulted patients may be due to increased survival. We postulate that telemedicine is an excellent tool to accelerate the collective learning curve in medical teams treating pediatric patients on ECMO.
EXTRACORPOREAL SUPPORT

PICC-0851
A Nonrandomized Multi-Center Trial in China of Continuous Renal Replacement Therapies (CRRT) in Pediatric Patients With Severe Sepsis

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²Children's hospital of Vencouver, PICU, Vencouver, Canada

Aims & Objectives:

Objective There is uncertainty on the outcome of continuous renal replacement therapy (CRRT) for the treatment of patients with severe sepsis in Pediatric Intensive Care Unit (PICU). This clinical trial is to observe the effect of CRRT on pediatric patients with severe sepsis.

Methods

Methods A prospective nonrandomized multicenter trial comparing two treatments in patients suffering from severe sepsis admitted to PICU, treated by CRRT or without CRRT. 128 severe sepsis patients were assigned nonrandomly to the treatment group and control group. 28-day survival rate, length of ICU and hospital, respiratory function, heat function, plasma inflammation factors were observed.

Results

Results The changes in the account of WBC and CRP and PCT, PRISM score and heart rate were no statistically significant difference (p > 0.05). Mean artery pressure of treatment group was higher than control group (75.34±0.87 vs. 67.97±0.83, p < 0.05). 28-day survival rate in treatment group was higher than control group (73.77% vs. 52.24%, p < 0.05). The length of ICU in treatment group was shorter than control group (p < 0.05). But there were no statistically significant difference in length of hospital between two groups (p > 0.05).

Conclusions

Conclusions These data suggest that there is no evidence to suggest that CRRT may shorten the time of length of stay in hospital of the pediatric patients with severe sepsis, but it may be reduce the length of stay in PICU and be in favor of improving stability of hemodynamics and the prognosis.
EXTRACORPOREAL SUPPORT

PICC-0852
Investigation on extracorporeal membrane oxygenation application in pediatric intensive care unit in China
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Aims & Objectives:
Extracorporeal membrane oxygenation (ECMO) is currently to rescue patients with life-threatening respiratory or circulatory failure. This study aimed to review the use of non-open chest ECMO in pediatric intensive care unit (PICU) in China

Methods
Reviewed all children <18 years have been supported with non-open chest EMCO in PICU of China tertiary hospital in China. Patient demographics, diagnosis, indication for EMCO, details of ECMO support, complications, and patient survival were analyzed

Results
Six-three pediatric patients were supported with non-open chest ECMO; their mean age was 62.63+54.09 months (1-166 months), and mean weight was 20.05+14.38 kg (2.80-65.00 kg). Cardiac failure was the primary indication in 28 patients, respiratory failure in 21 patients, and both cardiac and respiratory in 2 patients. The average length of ECMO run was 138.16+113.84 hours (12.00-576.00 hours). Forty patients (78.43%) were decannulated from ECMO successfully, and thirty-one (60.78%) patients survived to hospital discharge. The most common complications during ECMO run were bleeding, haemolysis and dysfunction of oxygenation. Of the 25 (49.02%) survivors, we followed up, 8 (15.69%) experienced obvious sequelae, and 5 (9.80%) have neurologic issues. Twelve neonates were supported with non-open chest EMCO; their mean weight was 3.23+0.53 kg. The primary cause of ECMO is neonatal respiratory distress syndrome. All of the neonatal patients were treated with VA-ECMO. The mean duration of ECMO support was 88.42+51.64 hours (10-174 hours). Seven (58.33%) patients were decanulated from ECMO successfully, five (41.67%) survived to hospital discharge

Conclusions
ECMO support can significantly improve the prognosis of pediatric and neonatal patients with refractory respiratory and cardiac failure. More efforts are needed on patient selection, experienced team establishment and ECMO therapy technology improvement in China in the future
EXTRACORPOREAL SUPPORT

PICC-0805
ECMO FOR PEDIATRIC SEPTIC SHOCK - CAN WE PREDICT WHO WILL BENEFIT?
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Aims & Objectives:

Extracorporeal membrane oxygenation (ECMO) is the final step in management of septic shock refractory to medical therapies. The optimal timing of ECMO initiation, patient selection, and predictors of outcome remain unknown. We aimed to identify factors associated with mortality in an institutional cohort of children who received ECMO for septic shock.

Methods

Retrospective review of ECMO cases for septic shock over the past 10 years. Patients with primary cardiac diagnoses, persistent pulmonary hypertension of the newborn and congenital diaphragmatic hernia were excluded.

Results

Twenty patients received ECMO for refractory septic shock, with an overall mortality of 65%. The mortality in the 11 patients cannulated during CPR (eCPR) was 73%. Initial support was veno-arterial (VA) in 12 patients, veno-venous (VV) in 8 patients, and 5 were converted to VA after failing VV. For patients supported on VA ECMO at any time, mortality was 75%, vs. 33% in VV ECMO only.

Seven patients (35%) survived to PICU discharge. Age, time to ECMO, maximum lactate, and lowest pH were not significantly different in survivors compared with non-survivors. Pre-existing comorbidities were present in 5/13 (38%) non-survivors but in none of the survivors (p=0.086). Compared to survivors, the non-survivors had a higher median vasoactive infusion score (VIS) and number of dysfunctional organs (see table).

Table 1. Comparison of patient factors in survivors and non-survivors who received

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*Note: Table 1 details the comparison of patient factors in survivors and non-survivors who received ECMO, including age, time to ECMO, maximum lactate, lowest pH, presence of pre-existing comorbidities, median vasoactive infusion score (VIS), and number of dysfunctional organs.*
veno-arterial (VA) ECMO support for septic shock.

<table>
<thead>
<tr>
<th>Factor (median)</th>
<th>Survivors (N=5)</th>
<th>Non-survivors (N=12)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>5</td>
<td>7</td>
<td>ND</td>
</tr>
<tr>
<td>Lowest pH</td>
<td>6.98</td>
<td>7.03</td>
<td>ND</td>
</tr>
<tr>
<td>Lactate prior to ECMO (mmol/L)</td>
<td>11.2</td>
<td>12.2</td>
<td>ND</td>
</tr>
<tr>
<td>eCPR</td>
<td>3 (60%)</td>
<td>8 (66%)</td>
<td>ND</td>
</tr>
<tr>
<td>Vasopressor Score (VIS)</td>
<td>42.5</td>
<td>60</td>
<td>0.13</td>
</tr>
<tr>
<td>Volume of fluids (cc/kg)</td>
<td>86</td>
<td>75</td>
<td>ND</td>
</tr>
<tr>
<td>Time to ECMO (h)</td>
<td>4 (1-19)</td>
<td>3 (1-42)</td>
<td>ND</td>
</tr>
<tr>
<td># systems</td>
<td>2</td>
<td>3.5</td>
<td>0.19</td>
</tr>
<tr>
<td>Respiratory source of infection</td>
<td>2 (40%)</td>
<td>6 (50%)</td>
<td>ND</td>
</tr>
</tbody>
</table>

**Conclusions**

Potential predictors of mortality in pediatric ECMO for septic shock include higher vasopressor requirement, and higher number of dysfunctional organs and pre-existing comorbidities. Our observations might help inform decisions around pediatric ECMO in septic shock. Additional studies are needed to clarify ideal timing for this therapy.
EXTRACORPOREAL SUPPORT

PICC-0536
THE SUCCESSFUL VENOARTERIAL EXTRACORPOREAL MEMBRANE OXYGENATION TREATMENT IN A CHILD WITH REPETITIVE FULMINANT MYOCARDITIS
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Aims & Objectives:

We report a 6-years-old boy who suffered repetitive fulminant myocarditis and was rescued by VA-ECMO.

Methods

He had had the first fulminant myocarditis at a 2-years-old and had been successfully resuscitated by early initiation of VA-ECMO in our ICU. This time he presented with a history of flu symptoms in the past few days. He was admitted to our ICU with hemodynamic instability, requiring ventilatory support and vasoactive drugs.

Results

The laboratory tests, chest X-ray and echocardiogram suggested myocarditis. He rapidly progressed into a pulseless ventricular tachycardia. After the failure of standard resuscitation to establish spontaneous circulation, VA-ECMO could be started quickly because we expected it and secured jugular venous line and femoral arterial line in advance. VA-ECMO was continued for five days. He recovered well with normal neurocognitive function. In general, after surviving acute phase of fulminant myocarditis, the convalescent is good. In treatment of fulminant myocarditis, it is important to secure blood access line in advance for preparing for cardiac failure. Although carotid artery is commonly used as arterial line in VA-ECMO of infant and pediatric cases, we used femoral artery because selecting femoral artery enables to secure arterial line by sheath in advance. But when femoral artery is used in cases of infant and pediatric patients, lower extremity ischemia frequently happens. We prevented lower extremity ischemia by compulsory retrograde blood perfusion.

Conclusions

This case report describes the patient's clinical course and emphasizes the importance of securing arterial line by sheath in advance for the early introduction of VA-ECMO.
Aims & Objectives:

Protocolized management has been shown to improve survival in Congenital Diaphragmatic Hernia (CDH). CDH is estimated to occur at a rate of 1 in 3000 live births. In Israel the annual live birth rate is 180,000, thus about 60 newborns per year would be expected to be born with CDH. The option of pregnancy termination is discussed with parents prenatally diagnosed with CDH.

Methods

After reviewing previous results, a multidisciplinary protocol was implemented in 2007 at the Schneider Children's Medical Center and the adjacent Obstetric Center aiming to optimize care. The protocol included prenatal diagnosis and counseling, perinatal treatment and delivery room resuscitation, stabilization and treatment in the NICU, indications for ECMO support and timing of surgical repair. The protocol requires a multidisciplinary discussion (Obstetricians, Neonatologists, Pediatric surgeons, ECMO specialists and parents) that constructs a specific treatment plan.

Results

Since 2005 to 2015, 52 infants were born with CDH. Of the 52 infants, 26 were surgically repaired and discharged from the NICU without major complications and 18 required ECMO support. Eight infants died with persistent extreme hypoxemia or hypercarbia and were not considered ECMO candidates.

Since 2006 to 2015, 25 infants required ECMO support (including referrals from other hospitals), with a 52% survival rate consistent with ELSO results.

Conclusions

CDH patients require complex treatment, possibly including ECMO support. A regional referral center, preferably utilizing in-utero transfer, in conjunction with a multidisciplinary and protocolized approach, may contribute to achieving the experience required for optimal care of infants with CDH.
EXTRACORPOREAL SUPPORT

PICC-0725
OUTCOMES OF EXTRACORPOREAL MEMBRANE OXYGENATION AFTER PEDIATRIC HEART TRANSPLANTATION
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²Boston Children’ Hospital, Cardiac Surgery, Boston, USA

Aims & Objectives:
Extracorporeal Membrane Oxygenation (ECMO) is established therapy for low cardiac output and cardiac arrest in pediatric patients, but is less defined following heart transplantation (HT). We sought to characterize outcomes for these children.

Methods
Retrospective review of HT patients in our pediatric referral hospital between 1995 and 2015, with all patients cannulated to ECMO included. Survival was compared between early post-HT ECMO (<7 days post) versus late ECMO (≥7 days post). Early ECMO patients were censored at subsequent ECMO support.

Results
There were 246 HT performed. Congenital heart disease (CHD) and cardiomyopathy (CM) patients were evenly represented (119, 48% vs 115, 47%). ECMO was used 50 times in 44 patients (17.9%), with 28 (64%) surviving to hospital discharge. CHD was the most common indication for ECMO post-HT (28, 64% vs 16, 36% CM p=0.07). Median time to ECMO post-HT was 1 day (range 0 to 11.7 years), with 28 patients (64%) supported for early graft failure (median 1, range 0-2 days) and 16 (36%) supported for late graft failure (median 284 days, range 8 days to 11.7 years). Four patients treated with early ECMO required further ECMO (4/28, 14%) at median time 55 days after decannulation (range 18 to 635 days). There was no difference in ECMO duration between early (median 97 hours, IQR 84, 134) and late (median 106 hours, IQR 80, 138) graft failure, survival to hospital discharge (18/26, 69% early; 10/16 62% late), or survival at 5 years post-discharge (7/18, 39% early; 6/10, 60% late, p=0.43).

Conclusions
ECMO support post-HT in our pediatric center is not uncommon, but is associated with early mortality, with only two thirds of supported patients surviving to hospital discharge, and ongoing risk of death in the following 5 years. Outcomes in our population were not different depending on early or late graft failure.
EXTRACORPOREAL SUPPORT

PICC-0921

PERIOPERATIVE EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) TO ALLOW PNEUMECTOMY IN A CHILD WITH LEFT PULMONARY VEINS OBSTRUCTION.

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Aims & Objectives:

To illustrate the important role of perioperative ECMO in a child with obstruction of pulmonary veins who underwent left pneumectomy.

Methods

Case report. The Hospital Infantil Sabará, Brazil, approved this study.

Results

We report a case of a 4-month-old female. She had pulmonary valve stenosis treated by pulmonary valvuloplasty during the fist week of life.

She presented at our Emergency Department with respiratory failure. Echocardiography on the admission showed pulmonary hypertension and severe pulmonary insufficiency (estimated right ventricular systolic pressure of 79mmH), estimated mean pulmonary artery pressure (MPAP) of 56 mmHg.

To elucidate better the diagnoses, on PICU day 19 a cardiac catheterization was performed and revealed pulmonary hypertension, discrete pulmonary valve stenosis, important pulmonary valve insufficiency. The left pulmonary veins were not seen and the pulmonary vasculature showed pruned tree sign. On day29 a lung computed tomography scan revealed: left and right upper lobe consolidation, with air broncograms and posterior collapse, bilateral areas of “ground glass” opacification and no contrast media seen on left pulmonary veins. Because of the severity of the patient condition, unable to withdraw mechanical ventilation and the evidence of impaired left pulmonary perfusion, left pneumectomy was performed and venovenous ECMO was chosen as the best method to support the patient intra and post operatively, allowing patient stability and pulmonary rest.

Histopathology of left lung revealed passive congestion due a blockage of venous efflux, confirming the hypotesis of left pulmonary veins obstruction.
The patient was successfully off ECMO 9 days postoperatively. Mechanical ventilation was discontinued after 18 days. She was moved to the ward on PICU day 96 and was subsequently discharged 35 days later with oxygen therapy.

Conclusions

The perioperative ECMO is an importante therapy to enable the performance of life-saving procedures that may otherwise prove impossible.
EXTRACORPOREAL SUPPORT

PICC-0375
FEASIBILITY ANALYSIS OF ROTATIONAL THROMBOELASTOMETRY (ROTEM)
GUIDED DOSE CALCULATION FOR INTRAOPERATIVE FIBRINOGEN
CONCENTRATE ADMINISTRATION IN PAEDIATRIC CARDIOPULMONARY
BYPASS SURGERY

K. Siemens¹, B.J. Hunt², J. Harris¹, A. Nyman¹, J. Perkins¹, I.A. Murdoch¹,
S.M. Tibby¹
¹Evelina London Children’s Hospital, PICU, London, United Kingdom
²St Thomas’ Hospital, Haematology, London, United Kingdom

Aims & Objectives:

To demonstrate the feasibility of using intraoperative ROTEM during paediatric
cardiopulmonary bypass surgery to (a) predict postoperative bleeding, (b) detect
intraoperative hypofibrinogenaemia and (c) guide dose calculation for fibrinogen
concentrate (FC) supplementation.

Methods

Nested sub-study within a randomised controlled trial of intraoperative FC
supplementation during bypass. The ROTEM variable FibTEM-MCF was measured 1
hour pre-end bypass, and patients were randomized to receive FC/placebo if
FibTEM-MCF <= 6mm (physiological range 7-24 mm). If FibTEM-MCF =/> 7, mm
patients entered the monitoring cohort. Primary outcome: FibTEM-MCF within 5
minutes post FC administration. Secondary outcome: postoperative mediastinal blood
loss. The formula for individualised FC dose calculation included patient weight,
bypass circuit volume, packed cell volume and intraoperative measured FibTEM-
MCF. Desired MCF was 8 to 13 mm and fibrinogen levels 1.5 to 2.5 g/l.

Results

Preliminary results from 56 patients (FC n=30, placebo n=15, cohort n=11; mean age
6.5 mo; mean weight 6.1 kg) demonstrated lower 4hr blood loss if FibTEM-MCF =/> 7
(cohort) compared to FibTEM-MCF <= 6mm (FC/placebo) (Figure 1). FibTEM-MCF
on bypass correlated well with fibrinogen levels (r = 0.79, p < 0.001). The dosing
formula in the FC group resulted in fibrinogen levels rising from a mean (+SD) of 0.93
(+0.22) g/L to 1.8 (+0.41) g/L at end of CPB. No patient achieved sub-/supra-
therapeutic fibrinogen levels post dosing (range 1.2 to 2.8 g/L).
Conclusions

Intraoperative screening based on FibTEM-MCF identified patients unlikely to bleed and correlated with fibrinogen levels. The dose calculation formula for FC achieved desired fibrinogen levels.
EXTRACORPOREAL SUPPORT

PICC-0380
A SYSTEMATIC REVIEW AND META-ANALYSIS OF ANTIFIBRINOLYTICS FOR BLEEDING FOLLOWING PAEDIATRIC CARDIOPULMONARY BYPASS SURGERY

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¹Evelina London Children's Hospital, PICU, London, United Kingdom
²St Thomas' Hospital, Haematology, London, United Kingdom

Aims & Objectives:

To evaluate the efficacy of the antifibrinolytic agents tranexamic acid (TXA), e-aminocaproic acid (EACA) and aprotinin compared to control in reducing mediastinal bleeding post cardiac cardiopulmonary bypass (CPB) surgery.

Methods


Results

17/926 screened articles were included (n = 1719 patients, mean weight 10.1 kg). Trials were overall small (median 82 pts, range 21 - 300).

All agents reduced mean 24h blood loss: Aprotinin by 6.1 ml/kg [95% CI 3.4 to 8.9], TXA by 9.1 ml/kg [95% CI 6.7 to 11.6], EACA by 16.3 ml/kg/24h [95% CI 14.6 to 18.0] (figure 1). Heterogeneity was low overall for TXA ($I^2 = 38\%$, $p = 0.13$), but high for EACA ($I^2 = 96\%$, $p = <0.00001$) and aprotinin ($I^2 = 59\%$, $p = 0.02$).

All agents also reduced mean 24h RBC transfusion: Aprotinin by 3.7 ml/kg [95% CI 1.3 to 6.1], TXA by 5.9 ml/kg [95% CI 3.7 to 8.1], EACA by 9.2 ml/kg/24h [95% CI 7.5 to 11.0] (figure 2). Heterogeneity was low overall for TXA ($I^2 = 15\%$, $p = 0.32$) and aprotinin ($I^2 = 0\%$, $p = 0.68$) but high for EACA ($I^2 = 91\%$, $p = <0.00001$).

Study quality was generally good across six domains, blinding being the lowest rated area.
Conclusions

All agents reduce post-CPB bleeding and RBC transfusion.
EXTRACORPOREAL SUPPORT

PICC-0807
PRELIMINARY RESULTS FROM A RANDOMISED CONTROLLED TRIAL OF FIBRINOGEN CONCENTRATE ADMINISTRATION FOR THE MANAGEMENT OF BLEEDING IN PAEDIATRIC CARDIOPULMONARY BYPASS SURGERY

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¹Evelina London Children's Hospital, PICU, London, United Kingdom
²St Thomas' Hospital, Haematology, London, United Kingdom

Aims & Objectives:
To determine the dose, safety and efficacy of intraoperative fibrinogen concentrate (FC) supplementation during paediatric cardiac cardiopulmonary bypass surgery.

Methods
Patients were screened using rotational thromboelastometry (ROTEM). If intraoperative ROTEM maximum clot firmness (FibTEM-MCF) <7mm, they were randomised to FC:placebo (2:1 ratio), using an individualized dosing regime, based on measured and desired FibTEM-MCF values. The FC dose was calculated to achieve a desired FibTEM-MCF of 8 to 13 mm and fibrinogen levels 1.5 to 2.5 g/l.

Results
Preliminary results from 60 of 90 planned patients (FC n=40, placebo n=20); mean (+ SD) age 7.09 (+ 6.2) mo, weight 6.1 (+ 2.2) kg. The mean FC dose was 113 mg/kg (range 58 to 218), which increased fibrinogen levels from a mean of 0.92 (+ 0.23) g/L to 1.7 (+ 0.4) g/L at end of bypass. No patient achieved sub-/supra-therapeutic fibrinogen levels post-dosing (range 1.1 to 2.8 g/L). In comparison, the placebo group demonstrated fibrinogen levels of 0.93 (+ 0.23). Eight patients exhibited ten thromboses (three classed as major); none were clearly related to study drug. Mean (+ SD) 4 hour mediastinal blood loss was lower in the FC group (3.9 + 2.9 ml/kg) compared to placebo (6.3 + 6.6 ml/kg) (Figure 1). The proportion of patients requiring >2 blood products during the first 24 postoperative hours was higher in the placebo group (35% vs 20%).

Conclusions
Individualised FC administration on bypass is feasible, safe and achieves therapeutic fibrinogen levels. Full efficacy data will be presented at completion of study.
EXTRACORPOREAL SUPPORT

PICC-0491
OUTCOME OF CHILDREN REQUIRING EXTRA-CORPOREAL MEMBRANE OXYGENATION WITHIN 72 HOURS OF CARDIAC TRANSPLANTATION

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²Freeman Hospital, Paediatric Cardiology, Newcastle upon Tyne, United Kingdom

Aims & Objectives:

Donated hearts may be declined because of concerns regarding function. Children die waiting for transplant, but it may be that more hearts can be used if Extra-Corporeal Membrane Oxygenation (ECMO) is electively deployed to allow the heart to recover. This study aimed to: i) ascertain how many patients required early post-transplant (<72 hours) ECMO ii) investigate ECMO and non-ECMO groups in terms of mortality, length of stay and complications.

Methods

Data was obtained using our transplant and PICU databases.

Results

In the last 5 years (2011-2015), we completed 82 paediatric transplants and 21/82 (25.6%) had early post-transplant ECMO. In 14/21(66%) cases they were cannulated directly from cardiopulmonary bypass. In 2015, 9/19 (47.4%) patients transplanted had early post-op ECMO. Mean duration of support was 5.27 days (range 2-9 days), 3 patients required a 2nd run, of whom 2 were decannulated and 1 patient had a ventricular assist device.

Comparing ECMO and non-ECMO groups, diagnosis was not significantly different. The mean PICU length of stay was significantly increased (36.2 days versus 15.5 days, p = 0.008) in the ECMO group and delayed sternal closure was more common (100% versus 37.7%). There were 2 deaths due to complications of ECMO, 1 stroke on ECMO and 1 early death from sepsis. 6/18 (33%) versus 5/62 (8%) remained on renal support at PICU discharge. 3/18 (16%) versus 9/62 (14%) p=0.44 had post-transplant tracheostomy insertion. Survival at 30 days was reduced in the ECMO group, 18/21 (86%) vs 62/62 (100%).

Conclusions

Use of post-transplant ECMO, suggests a problem with donor function, which is overcome with a short period of mechanical support. Recovery time is significantly prolonged for children whose organ was supported with ECMO but survival rates are good.
EXTRACORPOREAL SUPPORT

PICC-0766
BUILDING A PROGRAMME OF DURABLE VENTRICULAR ASSIST DEVICE (HVAD) SUPPORT IN CHILDREN- PRELIMINARY EXPERIENCE
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2Freeman Hospital, Cardiothoracic Surgery, Newcastle upon Tyne, United Kingdom

Aims & Objectives:
Our adult HVAD programme, at Freeman Hospital, Newcastle, UK has supported 167 adults since 2009. In 2010 we began using the Heartware® Ventricular Assist Device (HVAD) as a bridge-to-transplant for children. Global experience of the Heartware® device in children is in its infancy and there are no published series of RVAD+HVAD in children. We aim to describe our initial experience using HVAD in children.

Methods
Data was obtained using departmental VAD and PICU databases.

Results
Between January 2011 and December 2015, we implanted the Heartware® HVAD in 13 children aged 3.4-17 years (mean 9.2 years), and weighing 13.5-100kg (mean 33.3 kg). Their diagnoses were dilated cardiomyopathy 11/13 (85%), restrictive cardiomyopathy 1/13 (7.5%), hypertrophic 1/13 (7.5%). 6/13 (46%) were INTERMACS classification 1 and 7/13 (54%) were class 2. 1/13 (7.5%) were cannulated from VA-ECMO.

10/13 patients were transplanted, 2/13 remain on the HVAD device and 1/13 have been decommissioned following myocardial recovery. There were no deaths or strokes on HVAD. 2/13 patients had ischaemic bowel on day 3 and day 8 respectively. 4/13 patients were discharged home on HVAD. For 2 patients social issues prevented discharge.

7/13 children required RVAD support (Levotronix®), temporarily in 4/7 (57%). Of these, in 2 children the continuous RVAD was converted to Berlin Heart Excor®. All patients regardless of mechanical RV support were supported in the initial phase medically with inhaled nitric oxide, tight fluid management and phosphodiesterase inhibitors. Longer term, driveline infections occurred in 5/13 (38.5%) of children with HVAD.

Conclusions
Our initial experience with HVAD in children as small as 13.5kg has been positive. Heartware (non-pulsatile) HVAD partnered with the Berlin Heart Excor® (pulsatile) RVAD has not been previously reported. Children referred in INTERMACS 1 and 2 have a high peri-operative risk profile and need for initial RVAD support, deploying HVAD at an earlier stage may mitigate.
EXTRACORPOREAL SUPPORT

PICC-0641
THE ASSOCIATION OF STRAIN ECHOCARDIOGRAPHY METRICS AND SUCCESSFUL DECANNULATION IN INFANTS AND CHILDREN ON EXTRACORPOREAL MEMBRANOUS OXYGENATION

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Aims & Objectives:
Survival to ECMO decannulation has been associated with 50% success at best in some PICU populations, and predictors of outcome during ECMO would be instrumental in managing these critically ill patients. Strain echocardiography (SE) is a recent advancement in cardiac imaging capable of capturing subtle perturbations in function.

Methods
Pediatric ECMO patients admitted to a tertiary medical/surgical PICU from 2014-2015 who received echocardiograms were retrospectively analyzed. Initial and final echocardiograms during the ECMO course were post-processed using SE analysis software. Strain and strain rate parameters, longitudinal strain (LS,), longitudinal strain rate (LSR,), circumferential strain (CS,), and circumferential strain rate (CSR,) were compared for patients receiving eCPR and nonemergent cannulation, between patients successfully decannulated versus those who did not, and between those who did and did not survive the hospital admission. Associations between SE parameters and serum lactate near time of echo were compared.

Results
24 patients with at least one echocardiogram while on ECMO were identified, with 17 surviving to decannulation. Half of the patients received eCPR. Patients who received eCPR demonstrated significantly lower magnitude systolic circumferential strain than patients cannulated nonemergently (p = 0.038.) Systolic LS and LSR were better in patients who received ECMO outside of the context of eCPR (p=0.005 and p=0.005.) Percent change in systolic CSR magnitude from baseline was significantly worse in eCPR on initial echocardiogram (p=0.046.) Patients who did not survive until discharge demonstrated significantly worse percentage change in CS and CSR after cannulation from baseline (p=0.010 and p=0.004). Lactate proximate to the time of echocardiogram was significantly correlated with both systolic circumferential strain and strain rate (p = 0.033 and p = 0.043 respectively.)
Conclusions

Worsening CS parameters may indicate compromised cardiac function seen in pediatric patients on ECMO. Further investigation could help determine the utility of SE as an outcome assessment instrument in the PICU.
EXTRACORPOREAL SUPPORT

PICC-0665
PERCUTANEOUS VENTRICULAR ASSIST DEVICE FOR LEFT HEART DECOMPRESSION DURING EXTRACORPOREAL LIFE SUPPORT: PEDIATRIC EXPERIENCE
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Aims & Objectives:
Peripheral extracorporeal membrane oxygenation (ECMO) is often the primary mode of circulatory support in children with cardiogenic shock. Left atrial hypertension and pulmonary edema (PE) is a feared complication in this setting. Various methods of left atrial decompression have been described. Atrial septostomy remains a standard intervention but with risk of insufficient shunt or residual septal defect requiring future intervention. Recent emergence of temporary percutaneous ventricular assist devices (PVAD) provides a potential mode of left heart (LH) decompression. Experience with PVAD support during peripheral ECMO support in children is limited. We present case series of Impella® PCVAD used for LH decompression in children on peripheral ECMO support.

Methods
We conducted a retrospective chart review of institutional experience with PVAD support in the setting of peripheral ECMO. Data is presented as median (range).

Results
Four patients age 12 (6.5-19) years, weight 59 (22-74) kg, and BSA 1.62 (0.91-1.97) m² underwent PVAD support concomitantly with peripheral ECMO. The devices used were Impella® 2.5 (n=1) and CP (n=3). PVAD support preceded ECMO support in 2 patients, and in 2 patients PVAD was added to ECMO due to worsening PE with resultant improvement of PE. In all ECMO was weaned with PVAD in place. Median length of ECMO support was 6.5 (5-12) days and PVAD 7 (5-18) days. PVAD was placed using femoral artery in all. No vascular complications were reported except for site bleeding (75%). PVAD support was discontinued 0.5 (0.5-5) days after ECMO decannulation. All patients survived to discharge from ICU.

Conclusions
We describe the feasibility of PVAD as an adjunctive therapy to peripheral ECMO support. PVAD has potential to prevent PE on peripheral ECMO and may facilitate ECMO weaning upon recovery of myocardial function. The PVAD device can be considered as an alternative method of LA decompression in children on peripheral ECMO support.
EXTRACORPOREAL SUPPORT

PICC-0328
CAN WHATSAPP BE USED FOR BETTER PURPOSE IN ECLS?

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²Universidad Católica, Pediatric intensive care, Santiago, Chile
³Clínica Alemana, Pediatric Intensive Care, Santiago, Chile
⁴Clínica Santa María, Pediatric Intensive Care, Santiago, Chile
⁵Hospital Roberto del Río, Pediatric intensive Care, Santiago, Chile

Aims & Objectives:

Introduction: In Chile, there are five centers (four private and one public health system) with pediatric and neonatal ECMO, only in Santiago (Capital of Chile). One of these centers do mobile ECMO. In a normal year, about 50 pediatric and neonatal patients should be connected to ECMO in Chile. In winter, sometimes there are not enough beds for pediatric population who require ECLS. For this reason, we create a Chilean ECMO group using “whatsapp®” mobile application between the heads of the ECMO programs in these five centers. This was done to share information about beds for ECMO in different centers and discuss about some complex patients.

Objectives: to show our experience with multimedia whatsapp application and communication between centers with pediatric and neonatal ECMO.

Methods

The data of this whatsapp group was loaded to a computer, and analyzed retrospectively.

Results

Results: this group of whatsapp was created in June 2015. Sixteen patients were exposed to the opinion of this group between this date and November 2015. In six patients admission in an ECMO center was reached, five of these patients survived. Five patients were discussed sharing doubts about indication or duration of ECMO, or alternative therapies. In two patients the decision was not offering ECLS, and those patients died. Two patients who had indication of ECMO, could’t reach it, because they were too sick and finally died.

Conclusions

Discussion: Searching in the literature, we didn’t find any experience like this, that’s why we share this unique teamwork between different centers, that normally should compete for this patients, and in this case, we work together to offer the best therapy available.
Aims & Objectives:

Continuous venovenous hemofiltration (CVVH) is widely used for renal replacement therapy in critically ill children but the experience on combined therapy with extracorporeal membrane oxygenation (ECMO) is limited. In addition to the frequency of usage, demographics, and outcomes; we aim to present the most common obstacles encountered.

Methods

The data was collected during a three-year period. CVVH wasn't routinely started in the first 24 hrs but used whenever indicated. Venous cannula of ECMO was used for access in order to minimise the thromboembolic complications. The CVVH therapy was ended when either the metabolic and fluidic homeostasis was secured or when the patient was in terminal stage.

Results

CVVH was used in 2.76% of total number of patients admitted annually and 33% of patients on ECMO. Forty six sessions of CVVH were carried out on ECMO patients and the mean duration of therapy was 123 hrs (range 24-600 hrs). The common indication for CVVH was fluid overload and 50% of the patients had renal injury. The most common complications were electrolyte imbalance, hypothermia and bradykinin syndrome which were successfully managed.

Conclusions

CVVH is a preferable method for management of fluid and metabolite imbalances in ECMO patients since it provides continuous replacement and slow but steady compensation of fluid overload with better caloric intake. Along with these advantages, it is not without drawbacks. Although the rate of survival wasn't higher for ECMO patients receiving CVVH, volume status was improved in all. The clinical and technical challenges can be overcome easily by increasing experience and regular training.
PICC-0663
PATTERN AND CHARACTERISTICS OF PEDIATRIC TRAUMATIC INJURIES REQUIRED TERTIARY CRITICAL CARE IN OMAN
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²SQUH, CHD, Musact, Oman
³SQUH, Pediatric Surgery, Musact, Oman

Aims & Objectives:
to determine the pattern and characteristics of trauma in children who admitted to Pediatric intensive care unit (PICU) in Sultan Qaboos University Hospital (SQUH), Oman.

Methods
This retrospective descriptive hospital-based study, review of electronic medical records (EPR) of patients who admitted to PICU with trauma during a period between January 2010 and December 2014, demographic and clinical data were collected and types of injuries were determined according to the International Classification of Disease, ICD-10 criteria.

Results
Total of 86 pediatric patients admitted to the PICU with trauma, male to female ratio 1:1.05. Preschool age children were the most common age group < 5 years (n=38, 44.1%). The most common mechanisms of injury were Motor Vehicle Accident (MVA), followed by pedestrian & bicycle accidents and fall from height represents 28 (32.6%), 26 (30.2%) and 22 (25.6%) respectively. The majority 47 (54.7%) present with Glasgow Coma Scale (GCS) score 3--8 on initial assessment and no convulsion in the majority (n=75, 87.2%), mechanical ventilator was used for respiratory support in 56 (65.1%), abnormal CT finds in 77 (89.5%). Head injury in the vast majority 60 (69.8%), there is significant correlation between GCS score 13--15 and good outcome with p- value 0.05. The majority 76 (88.4%) patients were discharged alive, and 8 patients (9.3%) were dead.

Conclusions
The study findings revealed that traumatic injuries are common in children under- five years, with high rate of head injury. Most of the patients required respiratory support, and mild GCS score at initial assessment associated with better outcome.
Aims & Objectives:

Hospitalized pediatric oncology patients are at high-risk for clinical deterioration requiring pediatric intensive care unit (PICU) transfer and resulting in high inpatient mortality rates, particularly in resource-limited settings. We investigated the admission risk factors for mortality among pediatric oncology patients experiencing an unplanned PICU transfer.

Methods

We conducted a retrospective cohort study of all hospitalized patients in 2013 requiring unplanned PICU transfer at Unidad Nacional de Oncología Pediátrica (UNOP), the national referral hospital for pediatric oncology in Guatemala. Data were analyzed using univariate and forward stepwise multivariate regression.

Results

There were 157 unplanned PICU transfers among 122 patients, with an average PICU length of stay of 7.8 days. The average patient age was 7.9 years, with the majority having acute lymphoblastic leukemia (60.5%). The most common transfer diagnoses were sepsis (52.2%) and pneumonia (19.1%). Of PICU transfers, 18.5% required mechanical ventilation, 42% needed vasoactive infusions, and 3.8% received dialysis during their PICU course. Twenty-one patients died during their PICU admission (13.4%, compared to an overall PICU mortality of 11.3%), with only three deaths related to progression of oncologic disease. Multiple risk factors for PICU mortality were identified and are presented in Table 1. Age and type of cancer did not significantly affect mortality. Independent risk factors for mortality were blood culture positive for a drug-resistant organism, mechanical ventilation within 24 hours...
of PICU admission, and relapsed oncologic disease.

**Table 1:** Admission risk factors for mortality among unplanned PICU transfers at UNOP

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relapse of oncologic disease</td>
<td>4.41</td>
<td>1.31 – 14.8</td>
<td>0.016</td>
</tr>
<tr>
<td>Neutropenia (&lt;500 cells/mm³)</td>
<td>3.67</td>
<td>1.17 – 11.5</td>
<td>0.025</td>
</tr>
<tr>
<td>Thrombocytopenia (&lt;50,000 cells/mm³)</td>
<td>3.80</td>
<td>1.39 – 10.4</td>
<td>0.009</td>
</tr>
<tr>
<td>PIM2 &gt; 6%</td>
<td>6.02</td>
<td>2.27 – 16.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Septic shock</td>
<td>4.31</td>
<td>1.56 – 11.9</td>
<td>0.005</td>
</tr>
<tr>
<td>Mechanical ventilation within 24 hrs of PICU transfer</td>
<td>16.5</td>
<td>4.29 – 63.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Vasopressors within 24 hrs of PICU transfer</td>
<td>5.60</td>
<td>2.09 – 15.0</td>
<td>0.001</td>
</tr>
<tr>
<td>Organ dysfunction at time of PICU transfer (2+ organs)</td>
<td>8.00</td>
<td>2.52 – 25.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Blood culture positive for multidrug resistant organism</td>
<td>73.7</td>
<td>14.3 – 379.1</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Conclusions**

Oncology patients requiring unplanned PICU transfer in this resource-limited setting have multiple risk factors for mortality. Identification of these risk factors at the time of PICU transfer can aid in appropriate case selection when PICU resources are limited, and can provide further information to families about a child’s prognosis. Further study of this high-risk population is needed to improve hospital outcomes for children with cancer worldwide.
Aims & Objectives:

The shock index (SI) (heart rate/systolic blood pressure) identifies children who are most severely injured. The SI predicts mortality in adult trauma patients. We evaluate the index of shock in pediatric trauma patients of trauma center level I.

Methods

Observational retrospective study. From the International Trauma registry did an exploratory analysis between January 2012 and December 2014 for all children ≤18 years.

The collection of data exclude those patients with an ISS (Injury Severity Score) in head and neck greater than or equal to 4. The database was built from the clinical records of patients 6223; previously the study had been approved by the institutional ethics Committee

Results

Identified 6223 subjects average age of 10.3 ±5, 5 years, 69% were men,

The falls mechanism (41%), accidents fall of traffic (19%), and gunshot wounds (8.7%). The SI of the different types of trauma is situated more common between 0.7 and 1.2. The blunt trauma and penetrating trauma were respectively (72% vs. 20%).

The injury score severity (ISS) < 9 was 93%, between 9-15 was 5%, and > 15 was 2%. The SI was <0.7 21%, between 0.7-1.2 was 72% and > 1.2 was 7%

The overall Mortality was 1% (58 cases). The 66 % of the deceased with penetrating trauma had an SI >0.7 and 69% an ISS >9
Conclusions

The SI identifies who are most severely injured and are highest risk of death.

We find that the child with penetrating trauma with SI > 0.7 and ISS >9 to the hospital admission increases the chances of dying.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE/ PANDEMICS

PICC-0364
ESTABLISHING PEDIATRIC INTENSIVE CARE UNIT IN A RESOURCE POOR COUNTRY: THE GHANA EXPERIENCE
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Aims & Objectives:

To describe the processes involved in the setting up of the first pediatric intensive care unit in Ghana

Methods

SETTING:

Multi-directorate university-affiliated tertiary referral hospital in Kumasi, Ghana.

DESIGN:

Retrospective description of processes, development and implementation of pediatric critical care service

PARTICIPANTS:

Hospital staff including chief executive, medical and nursing directors, and directorate management.

INTERVENTIONS:

Development and application of hospital’s PICU policy. Review of directorate’s manpower need and training required, refurbishment and allocation of hospital space and equipment for the facility. These processes were guided by fairness and justice of healthcare prioritization.

Results

Through series of meetings and consultations PICU was established. Resource allocation was mindful of competing responsibilities of the hospital through just and fair process.
Collaboration with Africa Pediatric Fellowship Program of University of Cape Town to assist with manpower training. Technical support was obtained from local hospital expertise to refurbish the PICU ward.

It was a challenge to get all stakeholders on board especially parties that felt their grip or influence in their area will probably be adversely affected in terms of resource allocation and clout.

**Conclusions**

We have described the development and implementation of PICU in a resource poor country to address the need of critically ill children. This was achieved through a process of fairness in distribution of resources. Collaboration with institutions from countries with similar profile offers a good starting point. Implementation may still not be without problems and that awareness of potential challenges could facilitate its success.
STRIDOR IS NOT ALWAYS A CROUP

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Aims & Objectives:

The aim of this study is to alert physicians that Guillain–Barré syndrome (GBS) could appear with atypical symptoms.

Methods

A case report study of a four years old girl who presented with headache, stridor, dyspnea and generalized weakness.

Results

After admission in the pediatric ward as a case of croup, she developed a generalized muscle weakness, increased work of breathing, minimal spontaneous speech and areflexia. Patient symptoms not improved, so she transferred to Pediatric Intensive Care Unit (PICU) for further evaluation and management. During the next six hours from admission to (PICU), she developed sinus arrhythmia, hypertension (150/90 mmHg), bradycardia, decrease conscious level (Glasgow Coma score was less than eight) and desaturation (oxygen saturation was 50-70%). She urgently intubated by anesthesiologist under general anesthesia and connected to mechanical ventilation. Finally, she was diagnosed as a case of GBS based on her investigations which showed CSF protein level was elevated (more than six times the upper limit), MRI brain and spinal cord study showed thickening and enhancement of filum terminale nerve root, Nerve conduction velocity study revealed severe demyelination more affecting bilateral upper and lower extremities and Antiganglioside antibodies were normal.

Conclusions

We emphasized that the early recognition of atypical presentation of GBS warrants further evaluation and appropriate management.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE/ PANDEMS

PICC-0474
THERMOREGULATION IN THE BURNS PATIENT: A REVIEW OF NURSING PRACTICE IN PEDIATRIC INTENSIVE CARE

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Aims & Objectives:

Introduction

In England and wales 3,750 children are admitted to hospital with burns each year. 250 of these children are admitted with a severe burn.

Severe burns patients are at risk of hypovolemia and hyperthermia. Profound heat and water loss can cause a hypermetabolic state therefore the patients are at risk of whole body catabolism. A hypermetabolic state can cause the core body temperature to increases by 2c.

Aims

· To explore the physiology changes in thermoregulation in in a severe burns in PICU.

· To review current literature and nursing guidelines

· To understand nurses’ knowledge regarding thermoregulation and suggest recommendations to improve practice

Methods

Methodology

A literature review was undertaken investigating the significance of ambient room temperature when caring for a child with severe burns on PICU.

A questionnaire was devised. 15 nurses (Band 5-7) employed in a PICU were questioned to gain an understanding of their knowledge of caring for patients with severe burns.

Current UK hospital guidelines were compared.
Results

Although literature is dated his results are still supported by recent articles and current hospital guidelines

When questioned 86% of nurses were able to name the classifications of burns. 33% of nurses could describe the metabolic response and 0% were able to identify what the room temperature should be set at according hospital’s guidelines.

Conclusions

Conclusion

Research concluded keeping an ambient temperature between 28 – 32c will slow down the patients’ hypermetabolic state as the energy required for vaporisation will be sourced from the environment rather than the patient. Studies and Nursing Guidelines support this theory.

The survey investigating nurses’ knowledge of thermoregulation suggests training and education is required. However, limitations are acknowledged and the small sample may not reflect current practice in other PICUs.

The poster will raise awareness of the importance of ambient room temperature in the treatment of patients with severe burns.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA,
TRIAGE AND TRANSPORT / MASS CRITICAL CARE/ PANDEMICS

PICC-0164
NEUROPSYCHOLOGICAL OUTCOME OF CHILDREN WITH TRAUMATIC BRAIN
INJURY AND ITS CORRELATION WITH TRAUMA SEVERITY AND LATE
FINDINGS OF MAGNETIC RESONANCE IMAGING
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Aims & Objectives:

We aimed to evaluate long-term neuropsychological outcome after traumatic brain injury (TBI) and its association with trauma severity and late magnetic resonance imaging (MRI) findings.

Methods

A prospective cohort study of patients with TBI admitted to the PICU from January 1/2007 to December 31/2011. Severity of trauma was determined by medical records analysis, neurological assessment by Glasgow Outcome Scale (GOS), Extended Glasgow Outcome Scale (eGOS) and King’s Outcome Scale for Childhood Head Injury (KOSCHI) and neuropsychological assessment by Wechsler Intelligence Scale for Children 4th Edition.

Results

Twenty-five children with a median age of 6 years at trauma and 12 years at study time were included. Twelve (48%) patients had severe TBI, 4 (16%) had moderate TBI and 9 (36%) had mild TBI. Patients were divided into Disability (DIS) (n=10) and Good Recovery (GR) (n=15) groups. Initial Glasgow Coma Scale was not significantly different in DIS and GR groups (median 6.5 vs. 10, respectively; p=0.34). Patients in the DIS group had longer length of PICU stay (p=0.009) and greater duration of mechanical ventilation (p=0.02), and showed lower values of working memory index (median 74 vs. 94; p=0.004), processing speed index (median 74 vs. 97; p=0.013) and total intelligence quotient (median 65 vs. 87; p=0.008). Sixty percent of patients in the GR group had normal MRI examination while 90% of patients in the DIS group had severe MRI abnormalities (p=0.03).

Conclusions

Neuropsychological impairment was observed in 40% of children and adolescents who suffered a TBI and was associated with late MRI abnormalities.
A REVIEW OF PAEDIATRIC TRAUMA IN A REGIONAL TRAUMA CENTRE IN HONG KONG FROM 2003 TO 2013

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Aims & Objectives:
To review the epidemiology of injury pattern of paediatric trauma patients and study the correlation between trauma scoring and outcomes.

Methods

101 patients below 12 year old who were admitted to Paediatric Intensive Care Unit or died upon arrival of hospital for traumatic injuries were included. Comparison of demographic and clinical factors was done between survivors and the deceased by Fisher’s exact test and Mann-Whitney U test. Negative binomial regression and logistic regression was used to predict the likelihood of the outcome variables including mortality, residual deficiency, need of operations and length of hospital stay based on Injury Severity Score (ISS) or Paediatric Trauma Score (PTS). The predicting power of these 2 trauma scorings on outcome variables was analyzed with the receiver-operator characteristic (ROC) curve and area under curve (AUC) with 95% confidence interval.

Results

Male showed preponderance with the bimodal peak age at 6 and 10-11 years old. Blunt mechanism of injury accounted for 99% with head as the commonest affected region. Mortality rate was 8.9% with mean ISS and PTS of 9.8 and 7.8 respectively. Survivors and the deceased showed statistically significant difference in ISS, PTS, first haemoglobin level, serum alanine aminotransferase level and the presence of hypothermia. PTS and ISS showed excellent discriminatory power in predicting mortality with area under curve (AUC) of 0.991 and 0.954 respectively. Both scores showed moderate discrimination in predicting residual deficiency and the need of operation. In general, PTS yielded slightly higher AUC in these three outcomes than ISS.

Conclusions

Blunt mechanism and road traffic accidents were the commonest cause of trauma in children in this locality. Fall from height was another important cause given the unique characteristics in the living environment. Both PTS and ISS were good at predicting mortality in this study.
PICC-0768
4 TO 142 IN EIGHT YEARS - BUILDING CAPACITY AND ESTABLISHING PICU NURSE TRAINING IN SUB-SAHARAN AFRICA

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Child Nurse Practice Development Initiative-, Cape Town, South Africa

Aims & Objectives:

Sub-Saharan Africa still has the highest infant and child morbidity rates globally. Concerted efforts to improve basic health care have begun to shift these rates but the provision of paediatric critical care is an increasing need. By 2007 more PICUs had begun to be commissioned but no PICU nurse training existed on the sub-continent, so the aim was to build PICU nursing capacity in the region.

Methods

The building of a programme that previously did not exist involved establishing PICU nurse credentialing with the South African Nursing Council; a participative curriculum design process with clinicians, nurses, managers and nurse educators ensured a purpose and region-fit curriculum which was submitted for national accreditation. Pioneer teachers and students worked together to align teaching and learning to local clinical and practice needs.

Results

The first programme was established in Cape Town at the then only PICU in southern Africa. 122 nurses have graduated in eight years, exponentially increasing regional capacity for PICU service delivery and planning.

Training clinician nurses and partnering with education facilities from other SA provinces, Kenya, Namibia, Uganda and Ghana, led to significant up-skilling and commissioning of more PICUs and a second training programme. In east Africa, a programme in Nairobi began in 2013 and has graduated 20 PICU nurses. Programme planning in Ghana hopes to serve West Africa.

Conclusions

Lessons learnt include the understanding that critical care is delivered in more than the PICU, and that working relationships with intensivists and early enrolment of local stakeholders is key. A commitment to practice development and improvement has yielded elegantly simple graduate projects with measurably improved outcomes.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE/ PANDEMICs

PICC-0202
AN AUDIT OF TRANSFERS INTO THE PICU AT THE RED CROSS CHILDRENS WAR MEMORIAL HOSPITAL: A FOLLOW UP STUDY
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1Red Cross War Memorial Children’s Hospital, Paediatric Intensive Care Unit, Cape Town, South Africa

Aims & Objectives:
Children are transferred from various facilities into PICU without a specialised paediatric transfer service. A 2003 audit reported a high incidence of technical, clinical and critical adverse events during transfers. We conducted a follow-up audit on interfacility transfers into PICU to determine changes in practice and outcome.

Methods
Prospective observational study of all patients transferred into PICU between 1 December 2013 and 30 November 2014.

Results
Analysis was performed on 204 transfers (median (IQR) age 1.8 (0.2 – 12.6) months and compared to results reported by Hatherill et al (2003). The proportion of medical transfers and referrals from metropolitan hospitals decreased (49% to 34.3% p=0.003) and (34.7% to 17.6%, p = 0.0001) respectively, whilst the number of referrals from academic hospitals increased from 35.1% to 44.6% (p = 0.05). Staff accompanying transfers and transfer times remained unchanged. The proportion of fixed wing transfers increased from 14.4% to 25.5% (p=0.006). 58.4% of patients were intubated for transfer in 2003 compared to 69.1% in 2014 (p = 0.02). The rate of technical (35.6% to 39.7%, p = 0.4), clinical (26.7% to 31.9%, p = 0.25), and critical (8.9% to 8.8%, p = 0.97) adverse events remained unchanged. PICU Mortality decreased from 16.8% to 9.45% (p=0.03), however three children died on arrival to PICU.

Conclusions
The rate and staffing structure of interfacility transfers into PICU have remained unchanged, and associated adverse event rates remain high. Efforts to formalize the paediatric transfer service must be strengthened whilst using interim measures to improve the current standard.
Aims & Objectives:

Injury and infection are leading causes of death and disability in children in resource limited settings (RLS). We aimed to study the epidemiology and outcomes of children with traumatic brain injury (TBI) and central nervous system (CNS) infections in order to develop programs that lead to improved outcomes.

Methods

We prospectively studied children aged 7 days-17 years diagnosed with TBI or CNS infection from Addis Ababa University (Ethiopia, ETH) (n=51) and Kenyatta National Hospital, (Kenya, KEN) (n=50) over a 4-week period. The primary outcome was frequency of disease and mortality at hospital discharge.

Results

We studied 44 (44%) children with TBI and 57 (56%) children with CNS infection with mortality rates of 9% and 10% (p>0.05). ETH had 36 (82%) children with TBI and KEN had 42 (74%) children with CNS infection, p<0.001. Overall, children with TBI were older than those with CNS infection (10 [5-13] vs. 1 [0.3-3] median [25-75%] years, p<0.001). High energy fall (39%) and motor vehicle accidents (25%) were the leading causes of TBI in ETH and KEN, respectively. Meningitis was the leading
cause of CNS infection at both sites (75% and 93%). Loss of consciousness occurred in 81% and 45% while seizures occurred in 10% vs. 68% of children with TBI and CNS infection, respectively. Six (14%) children with TBI and 1 (2%) with CNS infection were admitted to an ICU.

**Conclusions**

The epidemiology and outcomes of pediatric TBI and CNS infection varied by site and disease. Neurocritical care interventions should be tailored to RLS, patient, and disease processes.
SURVEY OF PEDIATRIC CRITICAL CARE RESEARCH ACTIVITIES IN RESOURCE LIMITED SETTINGS

Aims & Objectives:

Most child deaths occur in resource limited settings (RLS) but few research activities to improve child outcomes are performed in these settings. We surveyed pediatric critical care clinician-researchers in RLS to understand challenges and potential solutions to improving research opportunities.

Methods

We surveyed 56 pediatric critical care medicine faculty in RLS from Asia, Africa, and Central and South America via a secure web-based and IRB-approved questionnaire.

Results

Our response rate was 27/56 (48.2%). Twenty (74%) respondents were trained as pediatric intensivists. Respondents classified their primary research focus as clinical (84%), quality improvement (11%), and basic science (5%). All but 2 respondents reported that their hospital provides invasive mechanical ventilation and 21 (78%) have reliable emergency ground transport. All respondents considered research as important to improve child health with 12 (44%) deeming it critically important. Six (24%) respondents have research funding and 10 (42%) have published their findings. Chief challenges for researchers were a large clinical burden and insufficient research funding. Top solutions for researchers were improved medical record keeping, increasing funding opportunities, and access to formal research training. Over half (58%) have collaborated with researchers in high-income countries. The main benefit of these collaborations was access to research protocols to inform clinical guidelines. The top challenges were the collaborator’s lack of understanding of local settings, inability to sustain research gains, and lack of data-sharing.
Conclusions

In conclusion, survey results strongly suggest a need for improved collaboration, research training and funding resources to facilitate pediatric critical care research in RLS.
USE OF A MOBILE REMOTE DEVICE TO OPTIMIZE PEDIATRIC INTER-FACILITY TRANSPORTATION: A PILOT STUDY  

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Aims & Objectives:

Universal and timely access to pediatric critical care and transport is a substantial challenge. This study evaluates the utilization of the RP7i Robot (InTouch Technology) to assess, manage, and triage pediatric patients prior to inter-facility transportation. The primary objective was to compare the number of transports that occur in the cases (with the RP7i) to the controls (without). Secondary objectives included length of hospital stay (LOS) and use of regional centres.

Methods

Prospective pilot study. 38 acute pediatric patients recruited, after presenting to a northern remote clinic and identified by the local medical team as requiring transport out. They were triaged and managed using the RP7i. Cases compared to matched controls using severity of illness, age, diagnosis and location.

Results

14/38 (36%) cases required transport. 7/14 (50%) cases requiring transport, were regionalized to a nearby centre. 38/38 (100%) of the control group were transported. 8/38 (21%) were regionalized. Mean LOS for cases transported- 5.0 days; matched controls- 4.67 days. Cases triaged to receive care at the local centre with RP7i, matched with controls LOS of 4.87 at tertiary/regional hospital.

Conclusions

It is feasible to assess, manage and triage pediatric acutely ill patients prior to inter-facility transport, using a mobile remote presence device. This technology can enhance clinical decision-making and refine resource allocation for paediatric transport, disposition and early management. Changing our clinical standards to incorporate remote technology, provides an extraordinary opportunity to expand the realm of the possible in paediatric critical care access and transport decision-making.
AN EXTERNAL VALIDATION OF THE RESPIRATORY INDEX OF SEVERITY IN CHILDREN (RISC) SCORE FOR USAGE IN HIV UNINFECTED CHILDREN IN MALAWI

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Aims & Objectives:

RISC is a clinical prediction score developed and internally validated to identify hospitalized South African children aged < 24 months at risk of death due to respiratory illness. Two RISC scores were developed, one for HIV-infected and another for HIV-uninfected children. Neither score was validated in a population with unknown HIV status. In the RISC (HIV uninfected) score points are assigned for oxygen saturation < 90%, chest indrawing, refusal of feeds, WHO weight-for-age z-score < -2 and deducted for wheezing. The RISC scores have not been formally externally validated.

Methods

We retrospectively analyzed the performance of the RISC (HIV uninfected) score in a child pneumonia surveillance dataset prospectively collected during routine care at seven hospitals in Malawi between 2011-2014. Children < 24 months old with clinical pneumonia according to World Health Organization (WHO) case management guidelines were included. We analyzed RISC (HIV uninfected) score performance using Receiver Operating Characteristic (ROC) curves and c-statistics.

Results

Table 1 compares the c-statistics of the RISC (HIV uninfected) score in the Malawian dataset with the original RISC study data. The Malawian dataset is stratified into two groups: HIV-uninfected and all children with pneumonia, regardless of HIV status.
Conclusions

In our population of Malawian children with WHO pneumonia the RISC (HIV uninfected) score did identify children at high risk for mortality. Incorporation of additional routinely assessed parameters into the RISC (HIV uninfected) score may improve the clinical applicability of this tool in Malawi.

| Table 1: Comparison of c-statistics of the RISC (HIV uninfected) score |
|-------------------------|-----------------|--------|-----------------|
|                         | N               | Deaths (mortality) | C-statistic | Confidence Interval |
| HIV-uninfected Malawian pneumonia cases | 1356            | 29 (2.14%)        | 0.627        | 0.506 - 0.747       |
| All Malawian pneumonia cases (HIV-infected, HIV-uninfected, HIV status unknown) | 6278            | 193 (3.07%)       | 0.730        | 0.692 - 0.767       |
| South African RISC Study HIV-uninfected children | 2646            | 33 (1.25%)        | 0.923        | 0.742 - 0.926*     |

*300 replaced bootstrap samples of 2646 from the original dataset
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PICC-0289
PEDIATRIC RESPIRATORY SUPPORT TECHNOLOGY AND PRACTICES : A GLOBAL SURVEY
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Aims & Objectives:

Pneumonia is the leading cause of childhood mortality worldwide, mostly in Sub-Saharan Africa and Southern Asia. Effective management of severe pneumonia is reportedly challenging in these settings due to presumed lack of critical supplies. This global survey aimed to assess the current pediatric respiratory support capabilities in different economic settings.

Methods

An online survey of medical providers with experience in managing acute pediatric respiratory illness was distributed to members of the World Federation of Pediatric Intensive and Critical Care Society, and critical care websites for 3 months.

Results

The survey was completed by 295 participants from 64 countries: 4 low-income (LI), 12 lower-middle (LMI), 20 upper-middle (UMI), 28 high-income (HI) economies. Most respondents (≥84%) worked in urban centers. For managing acute respiratory failure, endotracheal intubation with mechanical ventilation was the most common form of respiratory support (94-95%), followed by CPAP in ≥85%, and high flow nasal cannula in ≥70% of all economies. BiPAP use was reported by >78% UMI/HI and 49% LI&LMI participants. Bubble-CPAP was used by 36%-40% respondents. ECMO was utilized in 45% of UMI/HI economies, compared to 19% of LI/LMI. Oxygen, air, gas humidifiers, breathing circuits, interfaces, and oximetry were reported to be almost universally available.
Conclusions

This survey indicates the presence of respiratory support systems in urban care centers around the world, though LI economies were under-represented. Support of pediatric respiratory failure is similar amongst economic regions with differences in use of ECMO and BiPAP. LI&LMI economies could benefit from increased BiPAP and low-cost Bubble-CPAP use.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE / PANDEMICS

PICC-0485
PEDIATRIC RESPIRATORY SEVERITY OF ILLNESS DOCUMENTATION: A GLOBAL SURVEY
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Aims & Objectives:

Pneumonia is the leading cause of childhood mortality worldwide, with widely discrepant outcomes based on economic setting. Comparison of patients across settings requires severity of illness measurements for degree of respiratory failure to assess which parameters of care or therapies contribute to differences in outcome. We conducted a global survey to assess the current clinical documentation and respiratory scoring practices in children with acute respiratory failure in different economic settings (Esegs).

Methods

An online, anonymous survey of medical providers with experience in managing acute pediatric respiratory illness was distributed electronically to members of the World Federation of Pediatric Intensive and Critical Care Society (WFPICCS), and other critical care websites for 3 months.

Results

The survey was completed by 295 participants from 64 countries including 4 low-income (LI), 12 lower-middle (LMI), 20 upper-middle (UMI), and 28 high-income (HI) economies. Parameters most commonly recorded in the medical record were respiratory rate (98-99%), O2 saturation (98-100%), heart rate (95-98%), and fraction of inspired oxygen (FiO2) (89-94%). Use of respiratory score was less routine (32%) and type of score varied widely (n=28). Parameters included in published respiratory scores were not charted as often including mental status (51-82%), chest retractions (64-70%) and dyspnea (58-59%).

Conclusions
This survey highlights the complexity of comparing respiratory failure patients using recorded clinical data to establish severity of illness. The most common elements of the medical record do not allow compilation of respiratory score. Many different respiratory scores are used, but at lower frequency than other clinical variables.
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PICC-0098
CROSS-SECTIONAL SURVEY OF CANADIAN PEDIATRIC CRITICAL CARE TRANSPORT
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Aims & Objectives:

To better understand the unique needs and roles of pediatric critical care transport programs across Canada, and to characterize the current workforce in each transport program.

Methods

A cross-sectional questionnaire was sent to the 13 medical directors of Canada’s pediatric critical care transport teams, and to two non-hospital affiliated transport services.

Results

Eight out of the 13 PICUs surveyed have unit-based pediatric transport teams. The median annual transport volume for the 8 hospital-based teams was 371 (range; 45-2,300) with a total of 5,686 patients being transported annually. Among patients transported by the 8 teams, 45% (2,579 patients) were pediatric patients and 18% (1,022 patients) were admitted to the PICUs. The proportion of patients that were admitted to the PICUs by these teams ranged from 18% to 100% (Median; 63%). 88% of the responding teams also transported neonates (except premature infants), and 38% transported premature infants.

A team composition of RN-RT-Physician was used by 6 teams, however, it accounted for only a small proportion of the transports for most of the teams (Median; 2%). RN-RT was the next most common team composition (5 teams), but it actually represented the largest proportion of transports performed by those teams (Median; 85%).

The average transport time from dispatch to arrival at receiving facility was reported by 6 teams, and was a median of 195 minutes. The median distance from home site to the farthest referral site in the catchment area was 700km (range; 15-2,500km). Five teams used jets that were not-dedicated to their teams. Ground transport was the most common transport mode (Median; 43%), followed by fixed wing/propeller (Median; 38%).

Conclusions
This is the first Canadian nationwide study of pediatric critical care transport programs. It revealed a complexity and variability when comparing transport team demographics, transport volume, team composition, decision-making process, and database and quality assurance activity.
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PICC-0793
A PORTABLE INFANT WARMER WITH REALTIME MONITORING THAT PROVIDES THE COZIEST SWADDLE - A PILOT STUDY WITH 'EMBRACE ANGEL AND NEST' IN A HOSPITAL SETTING
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4Embrace Innovations, Technology, Bangalore, India

Aims & Objectives:

Embrace Nest™ is an easy to use, portable infant warmer that doesn't need continuous power. An innovation designed to be used anywhere, it has been adopted by doctors for use in NICU, maternity ward and transport. Embrace Nest™ is intended to provide warmth to clinically stable newborns weighing between 1.5 to less than 2.5 kilograms.

Embrace Angel is a battery run remote monitoring and diagnostic device. It is intended to measure real time temperature, heart rate, pulseoximetry, breathing patterns and baby movements and transmit them to the cloud database using bluetooth and Internet. The nurse receives real time alerts on the baby’s vitals. The doctors and public health officials have access dashboard which provides them with health trends. Embrace Angel can be used along with Embrace Nest™ as well as a standalone independent device.

For this study, Embrace Angel and Embrace Nest™ were used together.

Methods

15 babies were enrolled into the project; all the parameters were being monitored and transmitted real time to a mobile application which was held by the duty nurse. The alarm limits were set according to standard physiological parameters. Nurses were alerted by the mobile alarm in case of any drift in values.

Results

We noted 3 episodes of hypothermia. True heart rate and SpO2 alarms were noted in 4 babies. False alarms because of motion artifacts were noted in 3 babies. 50 babies were transported uneventfully. No baby developed adverse events attributable to the device which warranted discontinuation of the study.

Conclusions

At fraction of a cost of traditional incubators – Embrace Nest/ Angel has created an ecosystem that combines cost efficiency with human centered design, sensors and big data analytics. Further studies are needed to test it in community setting and also for further refinement of technology and removal of artifacts.
Aims & Objectives:

Delivery of pediatric critical care in the developing world is limited by lack of infrastructure, resources and trained providers. Although, historically, foreign aid has been targeted to combat specific diseases, few studies have analyzed the exact needs of a pediatric intensive care unit (PICU) in a developing country. The aim of this study is to document the diagnoses and associated mortality encountered by medical providers in a tertiary PICU in Mozambique and to use this data to build collaborative projects as part of an international academic partnership.

Methods

With Institutional Review Board and local institutional approval, all available records of patients admitted to the PICU at Hospital Central de Maputo, Mozambique from January-December 2013 were analyzed retrospectively. Demographic, clinical and discharge data were collected from standardized forms completed at patient admission and discharge. Incomplete records were available from July and August.

Results

The patient median age was two years. Fifty-seven percent of admissions were male. The most common discharge diagnoses were malaria (22%), sepsis (18%), respiratory tract infections (12%), trauma (6%), meningitis/encephalitis (6%), gastroenteritis (6%), surgical abdomen (5%), cardiovascular pathology (3%) and burns (3%). The overall mortality rate was 25%. Mortality rates were highest among patients with sepsis (56%), neoplastic diseases (36%), burns (31%) and neurological pathologies (31%). The mean length of PICU stay was 2.4 days. Patients admitted for burns had the highest mean length of PICU stay (5.4 days). The majority of trauma admissions were male (74%), and approximately half of all trauma admissions had an associated traumatic head injury (55%).

Conclusions

Infectious disease and trauma were highly represented in this Mozambican PICU. In addition, the burden of mortality was high compared to developed countries. With this knowledge, targeted collaborative projects in Mozambique can now be created and modified. Further research is needed to monitor the potential benefits of such interventions.
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PICC-0293
PREDICTORS OF SEVERE ILLNESS AT ADMISSION AMONG HOSPITALIZED CHILDREN IN SOUTHWESTERN KENYA

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Aims & Objectives:

Southwestern Kenya experiences the highest child mortality in Kenya, over twice the national rate. Specialty pediatric care is provided at Kisii Teaching and Referral Hospital (KTRH), where pediatric inpatient mortality exceeds 10%. Three-quarters of these deaths occur within 48 hours of admission, suggesting that presentation late in the course of illness may be an important factor contributing to mortality. The current study aimed to identify factors associated with severe illness upon presentation to KTRH.

Methods

We conducted a case-control study of 50 children admitted to KTRH with severe acute illness and 50 control patients with non-severe acute illness with similar diagnoses to evaluate associations between pre-hospital factors and admission with severe illness as defined by WHO criteria. Information on pre-hospital management was assessed via chart review and caregiver interview. Multivariate logistic-regression was used for case-control comparisons, adjusted for patient age, patient sex, caregiver age, and caregiver education.

Results

Patients were more likely to present severely ill if caregivers incorrectly diagnosed the problem at symptom onset (OR 4.3, 95%CI 1.2-15.3), if they had difficulty accessing care (OR 3.4, 95%CI 1.2-9.4), were initially evaluated by a traditional healer rather than a health facility (OR 26.2, 95%CI 1.5-460.4), received home remedies (OR 5.3, 95%CI 1.8-15.7), had more evaluations prior to KTRH presentation (OR 2.9 per evaluation, 95%CI 1.7-4.8), or had longer pre-admission symptom duration (OR 1.2 per day, 95%CI 1.1-1.4), with severely ill patients symptomatic for over twice as long (7.5 vs 3.6 days, p<0.001).

Conclusions
Limitations in illness recognition, prolonged home management, and slow referral through multiple sources of care may contribute to hospital presentation late in the course of illness among children in southwestern Kenya. Efforts to reduce child mortality should include a community-level focus on severe illness recognition, early care seeking, and a well-functioning referral system incorporating traditional healers along with health facilities.
Aims & Objectives:

To describe the changes to Paediatric Intensive Care Unit (PICU) admission patterns and ventilation requirements for children with bronchiolitis following the introduction of humidified high-flow nasal cannula oxygen outside the PICU.

Methods

A retrospective study was conducted comparing patients <24 months of age with a discharge diagnosis of bronchiolitis admitted to the PICU. A comparison was made between those before humidified high-flow nasal cannula oxygen use (year 2008) to those immediately following the introduction of humidified high-flow nasal cannula oxygen use (year 2011) and those following further consolidation of humidified high-flow nasal cannula oxygen use outside the PICU (year 2013).

Results

Implementation of humidified high-flow nasal cannula oxygen up to 1L/kg/min outside the PICU did not reduce PICU admission. There was an associated reduction in intubation rates from 22.2% in pre-humidified high-flow nasal cannula oxygen use to 7.8% following humidified high-flow nasal cannula oxygen use outside the PICU. There was a non-significant trend towards decreased length of stay in PICU following humidified high-flow nasal cannula oxygen implementation. Hospital length of stay showed a significant decrease following the introduction of humidified high-flow nasal cannula oxygen. Age <6-months and RSV bronchiolitis were associated with an increased chance of failing humidified high-flow nasal cannula oxygen therapy.

Conclusions

Humidified high-flow nasal cannula oxygen utilized outside of the PICU in our institution for children with bronchiolitis did not reduce admission rates or length of stay to the PICU but has led to a decreasing need for invasive ventilation and reduced hospital length of stay.
Aims & Objectives:

**Background:** The pediatric intensive care unit at the Montreal children’s Hospital (MCH) is a twelve bed unit, with medical, surgical and trauma patients. In May 2015, the MCH moved to a new site. Without a pre-existing experienced pediatric transport team, we needed to prepare for this historic move.

Critically ill patient are prone to changes in their condition and are especially susceptible to the physiologic stress inherent to transport. Complications may occur and equipment failure or technical problems are common. Our goal during transport was to provide high-quality, safe ICU care while anticipating and preventing complications.

Successful transport requires preparation. A team of experienced and qualified physicians, nurses and respiratory therapists was then selected. We reviewed transport literature and used the air ambulance care model to guide our interventions. Equipment was chosen to meet the needs of our population. Check lists and guidelines were developed to support the team. We used training and simulation to prepare the team for any complications that might occur during transport. Our social work and child life teams helped patients and families prepare for the move.

This is our journey to a successful and uneventful move.

During this presentation you will learn the principles of safe critical care patient’s transport and the preparation behind moving critical care patients. The goal is to inform, share our experience and to stimulate discussion. This presentation will interest pediatric critical care professional who regularly move patients to scan, MRI or other facilities for diagnostics or treatment.

**Methods**

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**Results**

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**Conclusions**
Aims & Objectives:

In Sub-Saharan Africa mortality among critically-ill children remains high. Common causes of death in children “under-five” are infectious diseases often associated with late presentation to health-facilities. Living conditions, access to preventive and curative health-services are among factors with significant impact on child-survival. Well-functioning basic, acute paediatric hospital-care can have a significant impact on child-mortality.

Methods

Over decades MSF has gained significant experience in the provision of health-care in low-resource settings and conflict-zones, often in rural settings. A large percentage of patients treated in MSF-projects are children. The introduction of a well-organized “critical-care pathway” outlined in WHO-guidelines (ETAT) as well as appropriate emergency-room care can help to reduce paediatric hospital-mortality. MSF emphasises on quality medical and nursing-care in the emergency and hospitalisation-phase.

Results

International guidelines for the management of critically ill septic children in high-resource settings exist. Once a good basic level of care is provided further elements of paediatric critical-care should be considered in low-resource settings: Non-invasive ventilatory support (e.g. bubbleCPAP), “low-dose Adrenaline infusions”, review of fluid management guidelines for resuscitation etc. Specific clinical conditions need to be considered: Malaria, malnutrition, HIV-infection etc. Advanced critical-care options will require adaptation in the organisational set-up of facilities and training programs. Introduction of context-adapted guidelines and equipment as well as monitoring and evaluation of innovative interventions are needed.

Conclusions

We present the experience of MSF in the provision of acute paediatric-care in low-resource situations. We suggest broader discussion regarding the introduction of more advanced paediatric critical-care options for severely sick children in resource-limited settings. Further research in this context is needed.
Aims & Objectives:
Child abuse (CA) is a worsening world-wide problem. Its diagnosis requires high clinical suspicion and teamwork. Parents-reported history poorly relatable to child conditions must rise suspicion for CA, especially in the setting of critical care.

Methods
We report three cases of CA admitted to our PICU during the last three months.

Results
Patient 1, 11 months, admitted after emergent right extradural hematoma drainage. Fall from a sofa (height 40-50 cm) was reported. First symptom (unresponsiveness) occurred 9 hours later. At the ED critical conditions with fixed right anisocoria were found. Parents history repeatedly changed during admission.
Patient 2, 9 months, admitted for trivial dynamic head trauma that required CPR. A fall from his height was reported followed by sudden hypotonia and gasping. At EMTs arrival cardiac arrest was present. CPR was started, ROSC in 10 minutes. Head CT scan 4.5 hours after trauma showed hemispheric subdural hematoma. Mother history deeply changed between interviews. Brain death developed.
Patient3, 6 weeks, admitted after ALTE that required CPR. Sudden unresponsiveness, with central cyanosis and apnea was reported. The father reported mouth-to-mouth ventilation with good clinical response. At EMTs arrival the child was in bathroom sink, only head not submerged, in pre-agonic conditions. CPR was started, ROSC in 5 minutes. Investigations at arrival were suggestive for possible near-drowning (white lungs, hemolytic anemia, macroscopic hematuria). Parents
never changed their history, denying child submersion.

Conclusions

In all these cases inconsistency between parents history and child conditions prompted further evaluations and involvement of Child Abuse & Neglect Unit, leading to CA diagnosis.
Characteristics of Intermediate Care Transfers in a Resource-Limited Pediatric Oncology Hospital in Guatemala

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Aims & Objectives:

The goal of this study is to describe patients requiring transfer to the IMCU at Unidad Nacional de Oncología Pediátrica (UNOP), a resource-limited pediatric oncology hospital in Guatemala, and identify patients at risk for early ICU admission.

Methods

Data on patients at UNOP requiring IMCU transfer from January to June of 2015 were collected as part of quality improvement efforts. Demographics and transfer characteristics were collected via retrospective chart review. Patients requiring subsequent transfer to the ICU within 24 hours of IMCU admission were compared with those remaining in the IMCU.

Results

Thirty-nine patients required IMCU transfer during the study period. Of these, 77% had Acute Lymphocytic Leukemia. The most common transfer diagnoses were fever and neutropenia, pneumonia, respiratory distress, mucositis, and fever without neutropenia. The majority (51.35%) of patients were neutropenic at time of transfer. Six patients (15.38%) required transfer to the ICU, 5 within 24 hours of IMCU admission. Of these, 2 died (30%). Compared with patients remaining in the IMCU, those requiring early ICU transfers had higher Pediatric Early Warning Scores (PEWS) prior to IMCU admission (3.1 vs 5.6, p=0.03), respiratory distress as a reason for transfer (2.9% vs 40%, p=0.04), and a trend to more neutropenia (45.2% vs 80%, p=0.17).

Conclusions

We describe characteristics of patients requiring transfer to the IMCU at UNOP. These patients are generally neutropenic with infectious diagnoses. Early transfer to the ICU among these patients are common and result in poor outcomes. In this setting, the PEWS tool is effective in identifying patients requiring ICU vs IMCU level care, and may lead to better resource utilization.
INTERHOSPITAL TRANSFER OF CHILDREN IN RESPIRATORY FAILURE: A CLINICIAN INTERVIEW QUALITATIVE STUDY

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Aims & Objectives:

To determine factors that influence the decision by Level II PICU physicians to transfer a patient with respiratory failure.

Methods

Methods: In-person interviews with physicians at 7 Level II PICUs in Midwest U.S. Hypothetical scenario of a 2 year old girl with respiratory failure was presented:

- Baseline: Mechanical ventilator settings: Rate 25, Peak inspiratory pressure 28, Positive end-expiratory pressure 8, fraction of inspired oxygen concentration (FIO₂) 100%; PaO₂ 140.
- Escalation Point #1: After 8 hours, PaO₂ 59, on higher settings with mean airway pressure (Mean Paw) 19, and oxygenation index (OI) 32.
- Escalation Point #2: Mean Paw 26; OI of 40.

Results

19 of 20 eligible physicians completed interviews. At baseline, indices reported as critical to management of respiratory failure were: OI (10), P/F ratio (6), inflation pressures (3); two respondents followed no specific critical indices. Indices that raised concern for poor response to therapy included elevated OI (11), high inflation pressure (6), high FIO₂ (5), and low P/F ratio (4). At Escalation Point #1, 70% (12/17) of the respondents felt the patient had <50% probability of clinical turnaround without escalation of treatment, and would initiate high frequency oscillatory ventilation–HFOV (17) or inhaled nitric oxide therapy–iNO (2). Four respondents would call for transfer, though two of them would initiate HFOV first. At Escalation Point #2, 63% (12/19) of the respondents would maintain HFOV, with 4 of them making a call for transfer. Five respondents would transfer the patient at this time without trying any adjunctive therapies, while some would try various adjunctive therapies. All respondents would call for transfer if the escalated therapies failed to reverse the patient’s clinical deterioration.
Conclusions

Transfer of critically ill children with respiratory failure from Level II to Level I PICUs is triggered by failure of response to escalation of locally available intensive care modalities.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE/ PANDEMICS

PICC-0315
INTERHOSPITAL TRANSFER OF CHILDREN IN SEPTIC SHOCK: A CLINICIAN INTERVIEW QUALITATIVE STUDY
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Aims & Objectives:
To determine factors influencing the decision to transfer by Level II PICU physicians when managing septic shock.

Methods
In-person interviews were conducted with physicians at 7 Level II PICUs in Midwest U.S. A hypothetical scenario involving a 14 year old boy in septic shock, at two time points, was presented:

- Baseline - 40 mL/kg fluid resuscitation, central venous and peripheral arterial access, and high-dose vasopressor infusions have been provided;

- Escalation point: Patient is oliguric, in catecholamine-resistant shock, and invasive mechanical ventilation is initiated.

Results
19 of 20 eligible physicians completed interviews. At baseline, respondents would assess measures of perfusion and hemodynamics including: blood pressure (15), lactate (12), and central venous saturations (10). Indices that raised concern for poor response to therapy included low blood pressure (11), elevated lactate (9), low urine output (8), and low central venous saturation (6). At the escalation point, 7 (37%) respondents reported they would have given more fluid, while 8 (42%) would have used central venous pressure (CVP) to guide additional fluid resuscitation. While 13 of 18 (72%) respondents felt the patient at the escalation point had < 50% probability of clinical turnaround without escalating treatment, only 4 (21%) would call to discuss transfer. Rather, transfer decision-making was conditioned on poor response to additional, varying adjunctive therapies, including vasopressin infusion [yes (11), maybe (3), no (3)]; and steroids [yes (12), maybe (1), no (1)]. Ultimately, 15 (79%) of the respondents would request transfer for either extracorporeal membrane oxygenation (ECMO) or continuous renal replacement therapy (CRRT) only if there
was no response to escalation of available therapies over time. Four (21%) respondents would not transfer the patient at all.

**Conclusions**

Decision-making regarding transfer of critically ill children with septic shock from Level II to Level I PICUs is conditioned on poor response to escalated, locally-available intensive care therapies.
Aims & Objectives:

The true benefits behind the use of ECHO performed by intensivists for improved outcomes in the pediatric patient population are not well studied. The purpose of this study is to understand the demographics and frequency behind the use of ECHO in the PICU at the National Hospital of Pediatrics (Hanoi) and to determine whether the methods in which ECHO is used at NHP results in enhanced patient management.

Methods

Following Institutional Review Board approval, we prospectively collected data on any patient who was less than 18 years of age admitted to the NHP PICU through July 8th, 2015 to October 30th, 2015. Data collected included patient age, sex, diagnosis at admission, status for transthoracic ECHO, major findings of ECHO, and whether or not there was a change in treatment due to ECHO findings.

Results

Of the 594 patients admitted to the PICU, 62 patients (10%) received transthoracic ECHO. Of the 62 patients, 26 (42%) were initially diagnosed with respiratory conditions, 7 (11%) with cardiac conditions, 5 (8%) with CNS conditions, and 14 (23%) with sepsis. Following ECHO, a total of 60 (69%) patients had a change in treatment plan, with 39 (45%) receiving inotropic support and 21 (24%) being referred to surgery. The majority of patients who received change in their therapy were
admitted for respiratory causes (Table).

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Inotropic Treatment</th>
<th>Surgical Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory (n=26)</td>
<td>9 35%</td>
<td>7 27%</td>
</tr>
<tr>
<td>Cardiac (n=7)</td>
<td>5 71%</td>
<td>2 29%</td>
</tr>
<tr>
<td>CNS (n=5)</td>
<td>2 40%</td>
<td>0 0%</td>
</tr>
<tr>
<td>Sepsis (n=14)</td>
<td>8 57%</td>
<td>3 21%</td>
</tr>
</tbody>
</table>

Conclusions

At the NHP, ECHO performed by intensivists often lead to a change in patient management. Further studies investigating preventative ECHO screening for such patient populations admitted to the PICU is of interest.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / Mass Critical Care / Pandemics

PICC-0198
VENTILATION OF PEDIATRIC PATIENTS SUFFERING FROM (NON-NEONATAL) TETANUS - DOES IT CONSTITUTE A MAJOR CHALLENGE FOR OUR CRITICAL CARE UNITS IN MALAWI?

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Aims & Objectives:

Malawi is an extremely poor country in Southeast Africa with around 12 critical care beds for 14 million inhabitants.
We tried to evaluate whether ventilated pediatric patients suffering from severe tetanus after the neonatal period put significant pressure on the low resources of our four critical care units in Malawi.

Methods

We conducted a retrospective analysis of all ventilated patients suffering from tetanus in Malawi's four central hospitals.
For Blantyre we did so from 1/2007 to 11/2015 and for Lilongwe, Zomba, Mzuzu from 1/2012 – 11/2015 in order to retrieve all pediatric cases after the neonatal period.
There are no further ventilation facilities in ICUs or HDUs in Malawi outside these hospitals.

Results

From January 2007 to November 2015 we ventilated 20 patients with tetanus in our ICU in Blantyre.
One was a ten year old boy (5%). All the others were adult patients.
Informal interviews in the pediatric department revealed no cases in which admission might have been refused due to our extremely limited resources.
No tetanus patients were ventilated in Mzuzu and Zomba since 2012.
In Lilongwe two patients were ventilated during that period. Their age was not traceable.
The low number of paediatric cases does not allow a correlation to the harvesting season, geographical distribution, gender or immunization status.

Conclusions

Currently paediatric tetanus after the neonatal period does not pose a major challenge for our four intensive care units in Malawi.
DO WE FIND QUALIFIED STAFF IN ANAESTHESIA TO RUN OR CO-RUN FUTURE CRITICAL CARE UNITS FOR PEDIATRICS AND PEDIATRIC SURGERY IN MALAWI?

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Aims & Objectives:

Pediatric intensive care units are currently not available for the 14 million inhabitants of Malawi.
In order to be prepared for plans at the University of Malawi and the Ministry of Health to introduce such units we evaluated, whether we have (considering the absence of qualified paediatric Malawian intensivists) enough qualified anaesthesia staff in the country to run them or to co-run them with pediatrics.

Methods

Through interviews, national literature and personal knowledge we identified and evaluated staff working in anaesthesia and intensive care, whom we found suitable as candidates who could either run an ICU or work in a responsible position as a physician or “non-physician doctor “ on a pediatric intensive care unit in Malawi.

Results

We identified two Malawian MMEDS (specialists in anaesthesia and intensive care) working in the country who potentially could run a pediatric/pediatric-surgical critical care unit in the country (5 specialists in the country).
The three colleagues in training to become a specialist in anesthesia and intensive care are too junior (or still have to start practical work) to give a judgement on their qualification.
Six, out of 28 Bachelors of Anaesthesia and Intensive Care (21.4%) were identified as possible deputies or as heads of smaller high dependency units in larger district hospitals.
Around twelve our 100 non-physicians (12%) doing a physicians work (the “Anesthetic Clinical Officer“) could be, with additional training, considered suitable to work in a doctors position on a paediatric HDU in the districts.
There are, to our knowledge, currently no Malawian ICU nurses qualified in pediatric critical care, experienced and available for practical work in the governmental system, in the country.
Conclusions

There is probably enough anaesthesia staff in the country to run (on the physicians side) two small paediatric intensive care units in the two largest central hospitals and four HDUs in the districts.
PICC-0260
PEDIATRIC CEREBRAL MALARIA IN AFRICA - SHOULDN'T WE JUST VENTILATE ALL THESE CHILDREN?
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Aims & Objectives:

Twenty percent of all children dying from malaria in Africa succumb to cerebral malaria (c.M.).
Despite an unclear pathophysiology there are many reasons to acknowledge a pivotal role for an raised intracranial pressure (ICP).
We argue, that many more ventilation facilities in Africa are necessary.

Methods

We evaluated guidelines, textbooks, pubmed and personal experiences in African intensive care of most disciplines dealing with challenges through a raised ICP.
In search of factors influencing the decision to ventilate a child with suspected cerebral malaria and not excluded raised intracranial pressure in a situation without full evidence of the pathophysiology of c.M. we identified five points which can guide us.

Results

1 Seydel et al. suggest an elevated brain volume in fatal pediatric c.M. With a closed fontanelle this means (Monroe-Kelly) most probably a raised ICP.

2 A raised ICP is very well explainable through the pathophysiological theories for c.M. This holds, whether sequestration or inflammation is favoured.

3 There are almost no other reasons (besides edema and raised ICP) for a primary, “pure” cerebral death known at all.

4 Guidelines the world over state, that all patients in coma – whatever the reason might be – should be intubated and ventilated (independent of ICP and diagnosis).

5 There are no medical reasons not to ventilate children in coma +/- a raised ICP and the complications should be manageable through a standard protocol with a cheap WHO-sponsored ventilator. More PICUs improve the situation for the non-malarious children outside the rainy season.

Conclusions
We found various theoretical, pathophysiological and practical reasons to ventilate children with c.M.
We did not find a medical argument not to do so.
The challenge is a financial one. Nevertheless we should be able to fight an existing mass killer- consider the money put into the fight against an only potential one like Ebola.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE/ PANDEMICS

PICC-0610
AN AFRICAN PICU - BLOCKED BY RARE PATHOLOGIES?
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Aims & Objectives:

Queen Elizabeth Central Hospital is the largest hospital in Malawi and one of the largest hospitals in sub-Saharan Africa. Despite 100,000 pediatric patients per year we can only offer one or two beds with ventilation facilities as a PICU in our 4-5 bed critical care unit, because more beds are needed for 580,000 adult patients per year.

ICU-beds (10 for a country with 14 million inhabitants) are a precious resource, with which we have to deal carefully.

As the central pediatric referral hospital of Malawi and due to an enormous catchment area we regularly see patients with rare pathologies.

We evaluated, whether these rare pathologies an overproportioned part of our ICU beds.

Methods

The presented material is based on a retrospective data analysis from ´07 – ´15 in our PICU at Queen Elizabeth Central Hospital.

Methods was defined either by a prevalence of the condition or of the operation lower than around 1 : 3000.

Results

In our PICU we treated around 40 patients under five per year and around 40 more below 15 years.
Under these 640 patients in 8 years we found 195 patients suffering from rare diseases (30.5%).
10% of our files showed a serious amount of lacking data.

Besides 4 pairs of conjoint twins we treated patients suffering from: ectopia cordis (2), Wilms tumor (40), malignant hyperthermia (3), operation for Pott’s disease (19), tetanus (1), fused gums (1), pneumonectomy (3), large intracranial tumours (5), cloacae (3), gastrochisis/omphalocele (around 80), esophageal atresia, diaphragmatic hernia or M. Hirschsprung (30).

Conclusions
Rare pathologies put a significant pressure on the resources of our critical care unit. Management of PICU beds is a constant challenge and has to balanced children with rare diseases in need of sophisticated treatment against children with common conditions like cerebral malaria, sepsis or trauma. Many more PICU-beds are mandatory.
Aims & Objectives:

Tropical pediatric intensive care units suffer from a continuous lack of resources. We wanted to assess, whether we find negative influences of the various large, successful and well-funded international health programs in Africa on the function of the few pediatric intensive care units in the developing African world.

Methods

Evaluation of the authors clinical experiences in PICUs, ICUs and HDUs in various hospitals and countries in Africa, their involvement in budget discussions at hospital and university level, in research and public health projects.

Results

We identified well established programs putting direct or indirect pressure on our PICUs:

Antiretrovirals are responsible for a better prognosis of HIV reactive patients with sepsis in our PICUs. Twenty years ago patients often were not admitted due to their prognosis. Today more beds are needed and non-reactive septic patients have a lower chance to be admitted.

The fight against Ebola received more money then the entire health budget of Malawi. With this money we could have build PICUs for all diseases fully covering Malawi for the next 30 years.

Pregnancy related projects in the districts make mothers survive until they reach the central hospitals alive; they come with an extremely low Hb, renal insufficiency or in shock- and there is no space to ventilate the child.

Children survive the first hours of cerebral malaria through new antimalarials and improved pediatric emergency care. But we can’t provide them with the basis of all coma care: ventilation. **Conclusions**
The implementation of successful international programs is responsible for a significant improvement of health in Africa. This success has underreported repercussions. Almost none of the programs reflects on the consequences of their successes for our PICUs. In future they will endanger their own credibility in the population by this omission. PICUs need to be considered in the planning of all large clinical programs.
Aims & Objectives:

World Health Organization defines drowning as pulmonary damage process due to liquid submersion/immersion and classifies in four severity grades (I - IV) by the presence of respiratory and circulatory alterations. To determine drowning’s death risk markers in patients admitted to PediCU is important to guide medical interventions and help to define prognosis.

Methods

Retrospective study, reviewing hospital records of patients 0-13 years admitted to PediCU at our both university hospitals with drowning diagnosis, from 2005-2013. Data collected: age, gender, month of occurrence, drowning place, swimming skills, safety equipment, adult supervising, estimated time of submersion, rescuer, resuscitation length and first attendance health service. Data on admission: blood pressure, Glasgow Coma Scale (GCS) and laboratorial profile. Patients were divided into death and survivors groups, comparing laboratory values and identification factors associated with poor prognosis. Logistic regression analysis used to study death risk factors and Mann-Whitney test for compare variables relation to sequel and death with SAS 9.4 software.

Results

The study included 42 patients (male: 23), most patients were under 3 years old, found at the swimming pool without safety equipment or adult supervision. Compared to survival group, the death group had lower serum pH (p=0.0001) and higher levels of serum potassium (p=0.0293), creatinine (p=0.0042) and liver enzymes AST (p=0.0018) and ALT (p=0.0061). Risk factors for death identified were presence of mydriasis and high serum potassium admission. Protective factors for death were high levels of bicarbonate and anion gap.

Conclusions

In this group of patients admitted to the PediCU with submersion accident, the predominant age was under 3 years, pool accident without adult supervision. Presence of mydriasis and elevated serum potassium at admission, were identified as risk factors for death.
PICC-0494
OUTCOMES OF IN-SITU PEDIATRIC DISASTER SIMULATIONS
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Aims & Objectives:

Disasters have significant impact on the population and health care workers (HCW) must be prepared to execute a Disaster Plan. Disasters include natural disasters as well as chemical, biological, radioactive, nuclear and explosives (CBRNe). Disasters require a collective response, and make lessons from team-based practice in 'hands on' disaster training and readiness critical. We conducted the first two documented large-scale, in situ, real-time simulated disasters involving pediatric patients. The goal of both simulations was disaster specific learning experience in a Canadian pediatric centre targeted at whole-hospital team learning with the ultimate goal of improving the hospital’s readiness for a mass casualty event.

Methods

Two large scale simulation disasters along with extensive debriefs occurred in 2012 and 2015 (45 simulated patients in 2012 and 65 simulated patients in 2015). Hospital personnel were encouraged to participate, and were asked to complete detailed surveys, that included medical and non medically focused items as well as satisfaction ratings, following the simulations. The 2012 simulation focused on a large scale disaster trauma response, the 2015 simulation focused on a contaminated spill and secondary trauma from explosives.

Results

In the 2012 simulation 93 participants (representing various health professions) completed the survey, reporting the simulation as valuable to their learning 5.7/6 (6 = strongly agree) and practice 5.7/6. In the second simulation, 82 participants completed the survey and rated the simulation as being valuable to their learning (mean (SD)=5.3(1.0)) and practice (5.1(1.3)). Post simulation ratings were higher for all items in both simulations for medically and non-medically focused items and were consistent across participant groups.

Conclusions
Participants felt this simulation improved their ability to respond to any form of disaster and was valuable to their learning and practice. Beyond an individualized focus of much medical education, this experience endorses large-scale in-situ simulations as an opportunity for whole-team learning.
EFFECT OF PRE-HOSPITAL TRANSPORT FACTORS ON SHOCK INDEX, SERUM LACTATE AND MORTALITY IN CHILDREN WITH SEPTIC SHOCK

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Aims & Objectives:

Data on effect of transport related factors on outcomes of children with septic shock requiring admission to pediatric intensive care unit (PICU) is scarce. We planned to study the effect of pre-hospital transport factors on 1) shock index (SI; heart rate/systolic BP); 2) serum lactate at admission; and 3) in-hospital mortality.

Methods

Children < 17 years of age presenting to the Emergency with a diagnosis of septic shock over a period of 4 months (Jan-April 2014) were evaluated. Data collection included transport related variables such as referral status, mode of transport; physiologic variables at arrival such as SI, serum lactate at admission and key clinical outcomes.

Results

Fifty one children with septic shock were admitted to the ICU from the emergency. Forty one percent (21) were referred from other hospitals of which only half (10/21) were transported in ambulance while the rest arrived in private vehicles. Twenty two children died (43%) of which 15 (29%) were referred. On comparing the children referred versus those who walked in, the median serum lactate (mmol/L) (4 vs. 2.4; p=0.02), shock index (1.6 vs. 1.5; p= 0.03) and mortality (68% vs. 38%;RR: 1.80 (1.04, 3.1); p=0.03) were significantly higher in those referred from other hospitals. On multi-variable analysis, the referral status remained significantly associated with higher shock index/ serum lactate at admission.

Conclusions

Children with septic shock referred from other hospitals were sicker at admission with higher shock index, serum lactate and had higher mortality rates. Inter-hospital transfer was often sub-optimal in these patients.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE / PANDEMICS

PICC-0433
A SYSTEMATIC REVIEW INVESTIGATING THE EFFECT OF FLOODS ON NUTRITIONAL OUTCOMES AMONG CHILDREN
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Aims & Objectives:

Despite a large literature on child health and nutrition there is relatively limited evidence on how floods affect the nutritional status of children. This paper aims to identify and review current evidence of the impacts of floods on nutritional status of children under five in developing countries.

Methods

We systematically searched PubMed, ISI Web of Science, Embase, Google Scholar and hand-searched bibliographies updated until June 2014 to summarize the evidence on nutritional risks imposed by flooding in developing countries.

Results

This review provides a qualitative assessment of thirteen selected studies, which with limitations, deliberated that a critical consequence of flooding is crop destruction and subsequent undernutrition. 11 out of 13 studies reported high levels of stunting and wasting among the flood affected children population. Flooding disrupts the existing health structure contributing to ill health and high nutritional risks. These results are consistent across flood-affected settings. We establish that floods do lead to nutritional crises in the flood-affected populations especially among 0-59 months old children. Based on the limited evidence, it is difficult to identify flood as the sole exposure responsible for undernutrition in the flood affected area. However, a conceptual framework should be developed to include natural disasters as a determinant of undernutrition to increase effective coverage of nutrition services by supporting the causal analysis of identified bottlenecks and barriers.

Conclusions

Continued efforts are required to examine the unobserved differences across affected and unaffected areas within countries after floods on health outcomes especially nutritional risks. Future studies with robust methodologies to assess nutritional risks associated with floods will support flood policy, mitigation and adaptation measures locally, nationally and internationally.
Aims & Objectives:

Immunization is the safest and effective measure for preventing and eradicating various communicable diseases. A glaring immunization gap exist between developing and industrialised countries in child immunization. This study aims to access the prevalence and factors of missing immunization under 5 year old children of Karachi, Pakistan.

Methods

A cross sectional study was conducted from June 2015 to October 2015 among different outpatient clinics of Karachi. Parents who had child less than 5 year of age were approached by non-probability convenience sampling. A total of 382 parents were interviewed regarding child immunisation. Data was analyzed by using Statistical Package of Social Sciences version 17.

Results

More than 30% (n= 121) parents reported that their child has not completed the recommended immunisation package. 35% had children who missed more than one vaccine of their recommended immunisation schedule. Among them Measles(7.4%), Pneumococcal(6.6%) and MMR (5%) were the frequently missed vaccines. 40% parents did not remember the name and timing of the vaccination. The major reasons identified for missing vaccination were lack of knowledge regarding immunization schedule(28%), concern about vaccine safety(19%), child sickness(18%) and lack of trust about government policies (11%).

Conclusions

There is a dire need for health advocacy and health system development among the parents and healthcare organization regarding immunization importance, coverage, scheduling and follow-up. A vaccination reminder system needs to be developed with follow-up mechanism. This will facilitate vaccine compliance and reduce missed vaccinations in children of Pakistan.
PICC-0223
THE PREVALENCE STUDY OF CONSTIPATION IN CHILDREN RECEIVING CHEMOTHERAPY
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Aims & Objectives:

Objectives: To describe the current status of constipation in children receiving chemotherapy, then analyze their causes and to explore the countermeasures.

Methods

A descriptive study by convenience sampling was delivered and self-designed questionnaire was used to investigate pediatric patients receiving chemotherapy in hematology and oncology unit in a comprehensive children’s hospital in Shanghai from August 2013 to April 2014.

Results

Totally 100 patients were investigated. 65% patients had constipation during chemotherapy. 24% patients had constipation before chemotherapy. 13 patients had constipation related complications during chemotherapy, 10 of them got periderm skin damage, only 1 got hemorrhoids, and 2 of them got fecal impaction. The risk factors of constipation during chemotherapy were related to lack of knowledges and abilities, physical training, administration of chemotherapy.

Conclusions

To change the way of health education to help caring people improve their knowledges and abilities, help children to make a habit of regular defecation. Strength diet management and physical training intervention, promote nurses’ more attention to constipation in children receiving chemotherapy.
Aims & Objectives:

The purpose of this survey-based study was to assess pediatricians' knowledge of disaster-preparedness in natural disasters, domestic terrorism, and other forms of disasters.

Methods

An online multiple-choice questionnaire designed to assess knowledge about disaster plans was distributed to pediatricians working in academic institutions, community hospitals, and private practices. Participants also included residents and fellows. Collected data included participants' comfort levels in various aspects of disaster management, including team formation, team leadership, skill sets required for patient stabilization, knowledge of resources available to them, and their own role during a disaster within their community.

Results

The survey was administered using Qualtrics, an online survey tool. The response rate was 14.5% (146 out of 1007) over 10 weeks. By clinical setting, the majority of participants were from academic pediatric hospitals (65%), and by profession, most were general pediatricians (54%). 98% of respondents were willing to respond in the event of a disaster within their community, but only a quarter reported receiving pediatric-specific disaster training. Only one-third of the physicians participated in annual disaster drills. More than two-thirds of respondents were not familiar with their hospital's and/or clinic's disaster response plan and felt they needed further training. The majority of our participants reported being comfortable managing airways (73%), shock (63%) and disaster triage (56%). However, many other aspects reported low comfort including familiarity with emergency communication devices (25%), knowledge of stocks of equipment for disasters (37%), techniques for victim identification (24%), processes for family reunification (27%), and managing bioterrorism (24%) and radiation exposures (10%).

Conclusions

This study reveals an immediate need for pediatric-specific disaster training among general pediatricians, physicians in training, and sub-specialists including pediatric emergency physicians and critical care practitioners.
SPINAL MUSCULAR ATROPHY(SMA) PATIENT IN PEDIATRIC CRITICAL CARE UNIT(PICU): IF YOU GIVE A CHANCE THEY CAN ACHIEVE.

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Aims & Objectives:

Spinal muscular atrophy (SMA) is an autosomal recessive motor neuron disease. It is the first genetic cause of infant mortality. We present SMA patients who were observed in PICU between 2002-2014.

Methods

Metod: A retrospective analysis of 30 SMA patients (Girl:15,Boy:15), aged between 2 month-12 years, were observed in PICU was performed.

Results

Result: 29 had genetic diagnosis. Two of them were SMA type-2, one was SMARD, the others were SMA type-1. Mean diagnosis time was 4 month of age.

We had reached 21 patients by phone call. 42% of them were survived. 23% of them could not discharged and were died in hospital. 13% of them were died during follow-up. Mean age of survived SMA patients was 3.4 year of age(1-12 year). All of survived patients need home-mechanic ventilation. Although one of them SMA type-1, as he grows it was reduce the need for mechanical ventilation.

22 of them had tracheostomi (2 had pneumothorax as complication).

Five of survival patient had gastrostomy, rest of them had nasogastric-tube. Only 4% of them had malnutrition.

All of them had regular both chest and extremity physiotherapy. 9% of them had scolysis. 66% of them had home care health services which was provided by ministry of health. All of parents thought lived with SMA patient is very difficult but all of them used to live with SMA. 75% of parents never complain about that kind of life-style.

Conclusions

Conclusion: Early physiotherapy and home care are important to increase life-span in SMA. If you give chance, they can survive.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE / PANDEMICS

PICC-0846
SYNTHETIC CANNABINOIDS KNOWN AS “BONZAI” VICTIMS IN PEDIATRIC CRITICAL CARE UNIT. MANAGEMENT OF THREE CASES:
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Aims & Objectives:
In recent days, most popular known synthetic cannabinoids abused in pediatric population in Turkey is “Bonzai”. Pediatric admisions to emergency departments constantly increases in Turkey.

Methods
We retrospectively evaluated patients who abused synthetic cannabinoids and were observed in PICU in 2013-2015. We want to share three patient who were abused synthetic cannabinoids and observed in PICU.

Results
Case-1: 17-years-old boy was brought to the emergency department. He was hypotensive and bradicardic. Saline and dopamine infusion was started. The urine toxicology screen for drugs of abuse was negative. On his blood gase evaluation he had marked asidosis. His biochemical tests revealed that he had acute kidney injury, hepatic failure and his cardiac enzyme were elevated. He had diagnosed as multi- organ failure. He had QT prolongation (QTc: 0.52). He had systolic dysfunction. He was mechanically ventilated. His blood pressure increased and dopamine was titrated. One day later he was extubeted. As EKG evaluation repeated it was seen that it was turned to normal QTc.

Case-2
16 years-old was brought to complain of respiratory depression. He was bradicardic, hypotensive and hypotermic. Saline and dopamine infusion was started. He had dilated pupils and hyperreflexia. He had severe asidosis. He had uric asid elevation and allopurinol was started. His cardiac enzyme were elevated. He had sinus byradicardia, He had mild systolic dysfunction.

Case-3
17 years-old boy he was entubated. He was hypotensive. Saline infusion and dopamine infusion was started. Neurologic examination revealed hyperreflexia on both upper and lower extremities. He had severe asidosis. He had mild elevation in kidney and liver function. He had systolic dysfunction under inotropic treatment.

Conclusions
The most dangerous side effect of synthetic cannabinoids are respiratory and cardiac depression. There is a lack of information about the complete chemical composition and toxicology of the chemicals contained in these products so their side effect may differ from one to another. Treatment is supportive.
LETHAL DOSE METFORMIN INTOXICATION SUCCESSFULLY MANAGED BY A NEW TREATMENT OPTION: HYPERBARIC OXYGEN THERAPY

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Aims & Objectives:

Lactic acidosis is infrequent during therapeutic metformin intake. But as in the case of taken high dose, it is related with lactic acidosis and mortality. The mortality of metformin associated lactic acidosis is high, urgent and long hemodialysis is recommended. We present two cases who benefited from only one session hyperbaric oxygen therapy and they did not need to recurrent hemodialysis. We would like to emphasize as a new treatment option, hyperbaric oxygen, for lethal dose metformin intoxication.

Methods

We present two patients who had lethal dose metformin intoxication much higher than previous cases in literature.

Results

Case-1: 16-year-old girl presented with vomiting after 40 tablets of metformin 850 mg suicidal intake. Gastric decontamination and activated charcoal treatment were applied. Her lactate level was above detectable range. Urgent hemodialysis was started. She was drowsy and developed hypotension treated with inotropic agents. After dialysis blood lactate level decreased at first but than increased after 6 hour (2.9, 4.3, 7.9, 3.3 (after dialysis) increased again 7.9mmol/L). After one session of hyperbaric oxygen therapy dropped lactate level to 1.9 mmol/L. She was discharged on day third.

Case-2: 14-year-old girl presented with vomiting after 24 tablets of metformin 850 mg suicidal intake. Gastric decontamination and activated charcoal treatment were applied. Her lactate level was high. Urgent hemodialysis was started. She was developed hypotension treated with inotropic agents. After dialysis blood lactate level decreased at first but than increased after 2 hour (2.7, 4.1, 7.7, 3.2 (after dialysis) increased again 8mmol/l). After one session of hyperbaric oxygen therapy dropped lactate level to 1.1 mmol/L. She was discharged on day second.

Conclusions

Metformin showed mitochondrial dysfunction in various tissues in previous study. We hypothesized that if soluble oxygen concentration is increased via pressure rise, mitochondrial oxygen use could be augmented. Correspondingly, lactate levels were decreased after hyperbaric oxygen therapy in two cases.
EVALUATION OF THE COMPLICATIONS AND ITS CLINICAL IMPLICATION DURING INTERFACILITY PEDIATRIC TRANSPORT IN A BRAZILIAN MEDICAL CENTER

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Aims & Objectives:

Medical transport of critically ill children involves particularities that increase the risk of complications and could contribute to a poor clinical outcome. We evaluated the frequency and type of complications related to this transport and the impact of these complications in the mortality and hospital stay.

Methods

We performed an interview with the physician who admitted any children in the ICU or emergency department and that required medical transportation to identify possible complications. These data were reassessed for three independent physicians to judge the presence or absence of complications. Patients were followed for 60 days observing the outcomes of survival and hospital discharge.

Results

We evaluated 143 children and observed complications during transportation in 74 patients (51%). Complications most frequent were related to airway (69%), followed by failure in devices and monitoring (68%), metabolic disorders (47%) and cardiovascular alterations (41%). Comparison between the groups with and without complications showed higher distance of transportation (p=0.02), higher frequency of respiratory disease (p=0.02), higher previous disease (p=0.001) and higher number of children with weight <10 Kg (p=0.01) in the first group. Complications during transportation were associated with higher mortality [hazard ratio (HR): 6.2; 95%CI: 0.34-0.77; p=0.007] and lower hospital discharge [HR: 0.52; 95%CI: 0.34-0.77; p=0.001]. After adjusting for possible bias, the complications during transportation remained associated with mortality [HR: 4.9; 95%CI: 1.0-24.0; p=0.04], however it was not associated with hospital discharge [HR: 0.82; 95%CI: 0.53-1.26; p=0.37].

Conclusions

In conclusion, complications were frequent during pediatric transport. These complications were associated with increased mortality.
METHYLENE BLUE FOR REFRACTORY SHOCK IN POLYTRAUMATIZED PATIENT: A CASE REPORT

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Aims & Objectives:

Methylene blue (MB) has been advocated for the treatment of shock refractory to standard measures. MB is proposed to increase blood pressure in shock by interfering with guanylate cyclase and nitric oxide synthase activity. Several studies have evaluated the vasoconstrictive and positive inotropic effects of MB in septic shock patients. However, there is a paucity of studies involving trauma patients.

Methods

Chart review for case report

Results

A 4-year-old boy hit by a truck while riding his bicycle was treated with fluid resuscitation at the emergency room and then taken to the operating room for damage control. He had liver, diaphragm, rectal and pulmonary injuries. At the Pediatric Intensive Care Unit (PICU), he remained hypotensive despite volume, dopamine, epinephrine and norepinephrine infusion. A dose of 0.5 mg/kg of intravenous MB was administered. Over the next 24 hours following MB administration, we were able to wean him off epinephrine and norepinephrine. Ultimately, he was discharged from the PICU 13 days later in good condition.

Conclusions

In a patient with multiple trauma and refractory shock, the use of low dose of MB resulted in hemodynamic stability. Further research is warranted on the use of MB in trauma patients and dose-dependency.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE/ PANDEMICS

PICC-0209
THE FIRST EPIDEMIC OF MEDITERRANEAN SPOTTED FEVER CAUSED BY RICKETTSIA CONORII IN CHILDREN
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Aims & Objectives:

Mediterranean spotted fever (MSF) is a disease caused by Rickettsia conorii subspecies conorii, belonging to the spotted fever group rickettsiae. The greatest challenge to clinicians is the difficult diagnostic dilemma posed by MSF infections early in their clinical course, when antibiotic therapy is most effective.

Methods

This study was conducted in Duzce University School of Medicine Department of Pediatric Emergency Medicine. Blood samples were taken from children having symptoms like fever or rash and from dogs which might be the source. The presence of IgM antibodies to R. conorii was measured by immunofluorescence assay in patients with clinical findings.

Results

To the best of our knowledge, this study is the first study describing an MSF epidemic in children, which affected 25 children who had been found out to had MSF occurring simultaneously after dog tick contact in Yigilca district of Duzce (in Western Black Sea Region of Turkey), and were treated with doxycycline.

Conclusions

MSF may cause an epidemic. Therefore, this disease should be considered and epidemiologic investigations should be started when one more patients are admitted with the complaints of fever, maculopapular rash, headache, myalgia and/or arthralgia, especially in summer and spring.
GLOBAL HEALTH / CAPACITY BUILDING / DISASTER MEDICINE / TRAUMA, TRIAGE AND TRANSPORT / MASS CRITICAL CARE/ PANDEMICS

PICC-0881
OUTCOMES AND RESOURCE UTILIZATION ASSOCIATED WITH INTER-FACILITY TRANSPORTS FOR CRITICALLY ILL CHILDREN IN ONTARIO, CANADA

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Aims & Objectives:

The transport processes and outcomes associated with the inter-facility transport of critically ill children are complex and have yet to be evaluated in our setting.

Methods

We performed a population-based retrospective cohort study for 2004 to 2012. All pediatric patients who underwent an inter-facility transfer employing hospital-based teams (HBT) or provincial critical care transport system (PCC) with direct admission to a pediatric intensive care unit (PICU) in Ontario were included. We studied the patient characteristics, outcomes and resource utilization involved in this cohort of inter-facility transfers.

Results

There were 4074 patients transferred during the study period, 1018 (25%) required a transport team for more than 3 hours for a distance of more than 180 kilometers; 2532 (60%) transfers occurred at night; and 2355 (57.8%) were transported by HBT. There were 347 patients (8.52%) who died within 6 months of transfer. Of these, one third died within 24 hours of PICU admission. The median (IQR) PICU length of stay was 54 (25, 128) hours and hospital stay was 7 (3, 14) days. Ten percent of patients required 5 or more days of ICU interventions (mechanical ventilation, continuous renal replacement therapy, extra-corporeal membrane oxygenation). Patients transported by HBT were younger (2.9 (5.2) versus 7.1 (5.8) years), more likely to have a respiratory or cardiac primary problem, be transported at night, and travelled...
further. Their PICU admission was longer and they were less likely to die within 24 hours of PICU admission (all p<0.001).

Conclusions

Transported critically ill children consume significant ICU resources. Patient populations and outcomes differ in association with transporting team and will be evaluated in future analyses.
ESTABLISHMENT OF A VOLUNTEER PEDIATRIC BIO-CONTAINMENT TEAM

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Aims & Objectives:

Boston Children’s Hospital provides care to international families from more than 100 countries. The Ebola outbreak in West Africa served as a catalyst for developing a bio-containment unit and a dedicated team of providers that could deliver care to pediatric patients with highly infectious diseases.

Methods

The hospital-wide Nurse Executive Committee assisted in promoting recruitment of nurses from across the institution. Volunteers were required to have 1 year of direct inpatient care. In addition, they were to demonstrate effective communication skills, commitment to teamwork, critical thinking and excellent coping skills. Applications included a letter of intent, curriculum vitae and recommendation letter. A formal interview process was completed.

Results

27 nurses from across the organization were accepted. A training program for the nurses was developed based on Centers for Disease Control (CDC) guidelines and recommendations. It consists of 4 education days per year and 2 team building projects. Education days include team building exercises, case scenarios, infectious disease updates, and personnel protective equipment (PPE) donning and doffing techniques. Nurses will be required to successfully demonstrate PPE donning and doffing 4 times per year. Subsequent education days include a virtual tour of the University of Nebraska’s Medical Center’s Bio-containment unit and presentations by Emergency Management and Ethics. A website for protocols and updates by the Bio-containment unit is being developed.

Conclusions

Serving as a bio containment nurse appealed to nurses desiring a unique educational and professional development opportunity. Recruiting volunteers from across the institution provided a group of skilled nurses that could meet the needs of our diverse population of patients and reinforced the shared institutional responsibility. The Bio-containment unit staff will serve as leaders as we continue to provide optimal care to our patients with highly infectious diseases and their families.
Aims & Objectives:

Mortality prediction models and organ dysfunction scores are commonly used in the pediatric intensive care unit (PICU). Applicability of these models depends on the case-mix which changes with time and geographic location. The Pediatric Index of Mortality 3 (PIM 3) and Pediatric Logistic Organ Dysfunction 2 (PELOD 2) scores are models that have recently been updated. We aim to assess the performance of PIM 3 and PELOD 2 scores in a contemporary cohort of critically ill children in Singapore.

Methods

We prospectively collected epidemiological data, PIM 3 and PELOD 2 scores in all consecutive admissions at a 16 bed multidisciplinary, tertiary care PICU in Singapore from April 2015 to September 2015. Our primary outcome was PICU mortality and secondary outcomes were 28-ventilator free days and 28-PICU free days. The performance of each of the scores was evaluated by assessing discrimination between death and survival by calculating the area under the receiver operator characteristic (ROC) plot.

Results

A total of 302 patients were included in this study (Table 1) aged 2.7 (0.4, 9.2) years. Overall mortality rate was 17/302 (5.6%). The PIM 3 score and PELOD 2 score on admission was 1.0 (0.4, 63.1)% and 2 (0, 3) respectively. PIM 3 and PELOD 2 scores on admission had excellent discriminatory power in predicting mortality with area under the ROC curve of 0.9975 and 0.9189 respectively (Table 2).

Conclusions

PIM 3 and PELOD 2 scores are robust severity scores in contemporary cohort critically ill children in Singapore.
SUCCESSFUL IMPLEMENTATION OF A PAEDIATRIC CARDIAC SURGICAL PROGRAM IN A DEVELOPING COUNTRY WITH AN AIM TO REDUCE CHILDHOOD MORBIDITY AND MORTALITY

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Aims & Objectives:

Congenital Heart disease is a common and correctable cause of childhood morbidity and mortality worldwide. The Millennium Development Goal 4 (MDG4) of 2000 set a target of 20 deaths/1000 in under 5s in Guyana. Although making progress, Guyana has no established Paediatrics Cardiac or Critical Care program. As such, there is a growing number of old and new cases of Congenital Heart Disease (CHD) contributing to childhood morbidity and mortality.

Methods

The aim of this study was to evaluate the outcomes of patients in the first year of introducing a paediatric cardiac surgical program in Guyana.

Results

A total of 53 children (20 females), 23 of who were less than 5 years old had a corrective or palliative surgical procedure. The range of cardiac diagnoses, interventions and the outcome were comparable to those seen in established cardiac centres in developed countries with paediatric critical care programs (Table 1). In this series, zero per cent 30 days mortality was observed and at the latest follow-up, all patients were still alive.
Table 1: (n=53) Children who underwent Paediatric Cardiac Surgery in Guyana by the ICHF team.

**Conclusions**

Paediatric cardiac surgery can be performed with good outcomes in developing countries. Sustainable capacity building programs may contribute towards the reduction of childhood morbidity and mortality. ICHF structured training missions may benefit more children in developing countries as the skills gained will be transferable in caring for critically ill children and neonates including non-cardiac patients. Continued studies are required to ascertain the impact of this program on the morbidity and mortality of children in Guyana and to determine if this program is adaptable to countries with similar demographics.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0733
BACTERIAL PROFILE AND THEIR ANTIBIOGRAMS, 5.5 YEARS EXPERIENCES IN TERTIARY HOSPITAL, OMAN

A.A. Abdelmogheth

Aims & Objectives:

Bacterial infection is the leading cause of mortality and morbidity of both community-acquired and hospital-acquired infections. A retrospective observational study was conducted in the pediatric intensive care unit (PICU) at Sultan Qaboos University Hospital (SQUH), Oman, over a period of 5.5 years (January 2009 to June 2014). Our Objective to determine the pattern of bacterial profile and their susceptibility to antimicrobials

Methods

During the study period, Samples were collected from different body parts and fluid products includes blood, urine, stool, CSF, Pleural fluid, pericardial fluid, throat swab, skin swab, eye swab, ear swab, wound swab. Samples culture was performed to determine the exact bacterial infection, and antimicrobial susceptibility testing for all organisms isolated from cultures according to the criteria of the National Committee for Clinical Laboratory Standards.

Results

A total of 974 children were admitted to the PICU during the study period with various medical conditions. Total collected samples were 2341, among them 388 samples showed positive culture growth. Out of 96 positive blood cultures, Coagulase-negative Staphylococcus was the commonest 21 (21.9%) with 95% sensitive to vancomycin, Staphylococcus epidermidis 12 (12.5%), Pseudomonas aeruginosa (PSAE) 8 (8.3%) with 100% sensitivity to ceftazidime. The commonest isolated respiratory organisms are PSAE 73 (34.9%) with sensitivity 88.2% to meropenum. The commonest organism grew in urine culture are E Coli represent 8 (27), and PSAE 4 (13.8%) with 100% sensitivity to ceftazidime and gentamycin. PSAE represent the commonest organism grew from pus swab 3 (33.3%), eye swab 4 (20%) and wound swab 7 (53.8%).

Conclusions
Coagulase-negative Staphylococcus isolates were the commonest pathogen in blood, and the highest antibiotic sensitivity is vancomycin. E Coli was the common isolate from urine culture with highly sensitive to ceptriaxone. Our findings reinforce the need for ongoing study to show the trends of anti-microbes resistance.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0741
INCIDENCE OF INFECTIOUS COMPLICATIONS ASSOCIATED WITH CENTRAL VENOUS CATHETERS IN PEDIATRIC INTENSIVE CARE

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1faculty of medicine - cairo university, Pediatrics, cairo, Egypt

Aims & Objectives:

Central venous catheterization has become an important tool in management of critically ill children. Central venous catheter (CVC) cannulation is associated with complications like pneumothorax, thrombosis, sepsis etc. Sometimes those complications add an extra burden on critically ill patients. We present our experience of tertiary care center in Oman that retrospectively followed up CVC used in our institute.

To study the incidence of complications like infection, thrombosis and malfunction of CVC cannulation from three different routes femoral vein (FV), internal jugular vein (IJV) and subclavian vein in critically ill patients were studied.

Methods

This was a retrospective review of 266 CVC cannulations done for pediatric patients admitted in PICU during 4 years period from January 2011 to December 2014.

Results

Total of 266 CVC cannulations were done, out of which 64(24%) had complications. Incidence of infection 31(48.4%), occlusion 20(31.2%), accidental removal of line 4(6.3%), displacement 4(6.3%), thrombosis 3(4.7%) and others like hemoperitonium (3.1%). Different actions were taken for management of the complications like line removal in 41(64%), addition of antibiotics 11(17.2%), changing the site of CVC 9(14%) and use of thrombolytic agent in occluded line 3(4.7%). Regarding infection, the commonest organism grown from CVC blood culture was the coagulase negative Staphylococcus 11(31.4%).

Conclusions

The incidence of CVC related complications are still high inspite of presence of highly skilled personels. We conclude that we should pay close attention to ensuring optimal care of CVC to minimize CVC-associated complications, ultra sound guided insertion and use of bundle care may improve the outcome.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0336
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Aims & Objectives:

To identify predictors of severity and mortality of invasive community-acquired S. aureus (CASA) infections in hospitalized children.

Methods

Observational study, which included patients (pts) <16 years hospitalized between 2010-2015 with invasive CASA infections. Pts were stratified in two groups according to the requirement of admission to intensive care unit (ICU) or not. Demographic-clinical variables, laboratory/microbiological data, and outcome were compared. Statistical essay was used to evaluate the association between ICU admission and mortality with clinical and microbiological features.

Results

418 pts were included, 107 pts (26%) had severe invasive infections, 150 pts (47%) bacteremia, 150 (47%) pneumonia and 21 pts (19%) sepsis multiple focal. The mean age: 75±56 months. Was no statistical differences comparing pts admitted to ICU [n=44 (41%)] vs those who did not require [n=63 (59%)], however, the frequency of previous use of antibiotics (33/44 vs 14/63, p<0.05), bacteremia (27/44 vs 23/63, p=0.01), comorbidity (12/22 vs 44/63, p<0.05) and sepsis with multiple focal (18/44 vs 3/63, p<0.01) was higher significantly in those who required ICU admission. The overall mortality was 15% (16 pts). Risk factors associated with mortality were: hypotension (RR8.89, p <0.001), WC<5000 (RR6.49, p <0.0001), Hb<7g/dl (RR7.65, p<0.001), metabolic acidosis (RR6.64, p <0.0001), bacteremia (RR4.94, p=0.002), multiple septic focal (RR7.58, CI3.8-15, p=0.0001), pneumonia (RR6.17, CI p=0.0001), ARM requirement (p<0.0001) and resistance to clindamycin (RR5.69, CI 0.9-37.5, p<0.05).

Conclusions

Mortality in invasive S. aureus infections is significant. Identification of predictors of mortality may guide an intensive therapy and provide prognostic clarity for patients with invasive CASA infections.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0012
ACQUIRED INFECTIONS IN PAEDIATRIC PATIENTS AFTER CARDIAC SURGERY

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Aims & Objectives:

Hospital acquired infections (HAIs) are an important cause of morbidity and mortality following paediatric cardiac surgery. The aim of the study was to determine the incidence, risk factors for and outcome of postoperative HAIs in the Paediatric Intensive Care Unit (PICU) of the Red Cross War Memorial Children’s Hospital (RCWMCH) in Cape Town.

Methods

A prospective observational study of all postoperative cardiac patients admitted to PICU from September 2011 to March 2012. The definitions of laboratory confirmed blood stream infections (BSI), urinary tract infections (UTI), and surgical site infections were based on the Centres of Disease Control criteria. Ventilator associated pneumonia (VAP) was diagnosed using a modification of the Clinical Pulmonary Infection Score (CPIS).

Results

110 patients (median age 19 months; 43% male) undergoing 126 surgical procedures were enrolled. Sixty HAIs occurred in 43 (39%) patients (68.3% pulmonary; 13.3% blood; 13.3% surgical site infections; 5% urine). Nine (8.2%) patients died.

Causative organisms for HAIs were gram negative isolates (57.3%), viral isolates (22.7%), gram positive isolates (16%) and fungal isolates (2.7%).

Being underweight for age (adjusted odds ratio, OR: 2.77; 95% CI 1.04 – 7.36, p = 0.04), increased duration of days in hospital prior to surgery (OR 1.04; 95% CI 1.0 – 1.09; p = 0.04) and increased duration of arterial lines (OR 1.47; 95% CI 1.21 – 1.78; p = 0.0001) were identified as being independently associated with acquiring HAI on multivariate analysis.

Patients with HAI spent median (IQR) 6 (4 – 13) and 21 (9 – 38) days in PICU and hospital compared to 3 (2 – 5) and 9 (7 – 13) days in uninfected patients (p < 0.0001).

Conclusions

The incidence of HAI in this population was high with identified associations and clinical implications. Gram negative and viral isolates were most prevalent in HAIs.
Aims & Objectives:

Pediatric evidence on usefulness of echocardiographic and biochemical parameters of septic myocardial dysfunction is scanty. We evaluated and compared the echocardiographic and biochemical characteristics of myocardium among septic-shock-patients compared to sepsis-only-patients during initial 10 days.

Methods

Septic-shock-patients (3mo-12yrs) and sepsis-only-patients (40 each) presenting in ER/PICU were enrolled post-resuscitation. Pre-existent heart disease, cardiorespiratory event during last 1 month, healthcare-associated infection, persistent hypotension were excluded. Troponin T card test (positive, >0.08ng/dL) was done at enrolment, and serial Creatine Kinase-MB levels (CK-MB) (cut off, >25mg/dL) and echocardiography on days 1, 3, 7 and 10. Systolic function was assessed by EF, FAC, and SF. All had follow up echocardiography at 1 month.

Results

Two groups had similar baseline characteristics. CK-MB was elevated in all; significantly more in septic shock patients (52.7 vs 180.9; p=0.0001). Troponin T test was positive in only 2 septic-shock-patients. Shock patients had significantly reduced systolic functions at enrolment compared to sepsis-only-patients (EF, 58.8 vs 54.9; FAC, 45.7 vs 36.2; SF, 31.8 vs 29.4; p= 0.0001). Later, these parameters had significant intra-group improvement (p=0.0001), while intergroup differences continued until day 7 and day 10 for echocardiographic parameters and CK-MB respectively (p=0.0001). At 1 month, echocardiography was normal in all.

Conclusions

Biochemical dysfunction was evident in all patients, more so with shock. All patients had systolic dysfunction; more and persistent during first week among shock patients. CK-MB may be more sensitive indicator at admission while echocardiography may be more sensitive for monitoring. Two relatively economical tests may be used for severity assessment and prognostication at presentation, prioritization for myocardial support, and monitoring.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0131
HYDROGEN SULPHIDE IN PULMONARY GASES FROM VENTILATED SEPTIC NEONATES AND CHILDREN: A POTENTIAL MARKER OF INFECTION

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Aims & Objectives:

To determine whether Hydrogen Sulphide (H2S) is detectable in pulmonary gases from ventilated children or neonates with sepsis compared with ventilated control subjects.

Methods

Following ethical approval, patients were allocated into the control or sepsis group based on suspected infection, two or more systemic inflammatory response syndrome criteria and one organ failure. A chromatograph (OralChroma®, Envin Scientific Ltd, Cheshire CH3 9GA) was used to measure H2S in parts per billion. A 1-2ml sample of expired gas was taken from the endotracheal tube and analysed. A repeat sample was taken after 30 minutes and repeated daily up to a maximum of 5 days or until the patient was extubated. Clinical data including C Reactive protein (CRP) around the time of sampling was collected. Room air was analysed for background levels of H2S.

Results

Each group contained 15 subjects. Levels of H2S were significantly higher in septic patients (Mann Whitney U-test (p=0.008) (Table) and trended to control values over five days. Both control and septic levels tracked the decrease in CRP levels (Graph).

<table>
<thead>
<tr>
<th>Study Group</th>
<th>Age (m) Median (range)</th>
<th>CRP Mean (SEM)</th>
<th>Expired H2S Day 1 (ppb) Mean (SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Septic (n=15)</td>
<td>6 (3-20)</td>
<td>132.5 (27.5)</td>
<td>451.4 (65.7)</td>
</tr>
<tr>
<td>Control (n=15)</td>
<td>5 (2-15)</td>
<td>36.1 (14.8)</td>
<td>132.1 (29.8)</td>
</tr>
</tbody>
</table>
Conclusions

There is increasing interest in using plasma H2S or its metabolites as markers of pathological conditions or a predictive marker of outcome. We speculated that if H2S does increase in the blood it may diffuse into alveolar gas and be detected in expired gas.

Our results demonstrate that H2S can be detected in expired pulmonary gases in very low concentrations of parts per billion. The pattern of rise was similar to that of CRP. Significantly higher levels are seen in septic patients compared with controls, both were higher than environmental levels. More detailed information on correlation with other septic markers, timing of rise and predictive value are on-going.
The Glasgow Meningococcal Database: 10 years' experience of meningococcal disease in a tertiary Paediatric Intensive Care Unit

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Aims & Objectives:

Despite addition to the childhood immunisation schedule of vaccines against group C(1999) and group B(2015) Neisseria meningitidis, meningococcal disease remains a small but highly significant health problem in the UK, with significant mortality and life-altering morbidity in affected individuals. After a small outbreak in 2015, we sought to review our institutional experience - aiming to enumerate meningococcal disease, describe demographics and outcomes of these children and identify future avenues for investigation.

Methods

Retrospective case review. 22-bedded tertiary PICU. Case finding performed by querying clinical electronic record database(IMDSof, Tel Aviv, Israel) for terms "meningococcal" and "meningococcus" between November 2005-December 2015. Patient details collated, then electronic record reviewed to obtain desired dataset. Datasets combined using Microsoft Excel(Seattle, USA), basic descriptive statistics performed, followed by multivariate analysis.

Results

95 patients came into PICU with meningococcal disease. Average age: 2.6yrs(median 1.2) with slight female preponderance (51.6%). Incidence quite constant: mean of 8.64(2-15) cases per annum; nadir of 2 cases in 2013 rising again in 2014-2015. Mortality higher (5/95,5.26%) than our institutional SMR of 3.20%. Morbidity is high: 50/95(53%) mechanically ventilated, 59/95(62%) received vasoactive infusions; 5/95(5.26%) received ECLS (mean run 230h, survival 60%); oliguria occurred in 56%; 14(14.7%) received CRRT (mean duration 215h).

Mean length of stay (LoS,4.96d) & length of ventilation (LoV,65.6h) prolonged but skewed by subpopulations of severely affected individuals. 4/95(4.2%) had fasciotomies, 6/95(6.31%) had multiple amputations or major soft tissue loss.

Multivariate analysis showed no statistically significant risk factors for mortality, prolonged LoS or LoV - but younger age, socioeconomic deprivation index, higher vasoactive inotrope score and neutrophil count <2x10⁹/L showed trends towards poorer outcome. Socioeconomic deprivation correlated with higher vasoactive inotrope score 1h after admission(p=0.05).
Conclusions

Meningococcal disease remains a significant problem in our PICU population. Further work will map this clinical database to our laboratory database for potential host-pathogen risk profiling.
Aims & Objectives:

RT-PCR is widely not available in India and even if available; results are often retrospective. Therefore treatment of children with swine origin influenza H1N1/A (S-OIV) is mainly empirical. This has led to widespread over and underuse of oseltamivir. We aimed to analyze the characteristics of severe H1N1 pneumonia and identify the predictors of H1N1 positivity.

Methods

We prospectively collected the data of all consecutive children admitted to PICU with suspected H1N1 pneumonia. We compared demographic, clinical, radiological and laboratory data of RT-PCR positive and negative cases. Univariate analysis was done to identify the predictors for RT-PCR positivity. Significant variables were subjected to multiple logistic regression analysis to identify independent predictors.

Results

Of total 46 children admitted with severe viral pneumonia from Jan-2015 to Oct-2015; 20 were positive for S-OIV H1N1/A by RT-PCR. The mean(SD) age was 33±20 (PCR-positive) and 24.5±24(PCR-negative) months respectively. LOS-ICU was longer in positive patients (5.96±6 vs. 3.4±2.3 days; p=0.010) and also severe respiratory distress/failure (45% vs. 19%; p<0.001). All were treated with oseltamivir with mean days(SD) of initiation 1.5±0.8. Univariate analysis showed high grade fever(p=0.016), leucopenia(4811±2245vs.12270±7182;p<0.001), lymphopenia(2271±1179vs.4945±2474;p<0.001), neutropenia(2141±1684vs.6489±5284;p=0.002), thrombocytopenia(1.98±1.17vs.3.35±1.8;p=0.011), severe radiological abnormalities(p=0.019) were significant predictors. Multiple logistic regression showed leucopenia (p=0.006; OR 0.99, 95% C.I. 0.99-1.01), neutropenia(p=0.006 OR 1.0, 95% C.I.0.996-1.017), lymphopenia (p<0.001; OR 1.007, 95% C.I. 0.996-1.018) and, thrombocytopenia (p=0.023 OR 1.023 95% C.I. 0.419-2.497) were independent strong predictors of possible H1N1 infection. AUC (ROC) were; 0.73 (thrombocytopenia), 0.90 (leucopenia), 0.85 (lymphopenia) and 0.86(neutropenia) respectively.

Conclusions
In contrary to belief; H1N1/A (S-OIV) infection in children in India in post pandemic era is occurring throughout year. PCR confirmed cases had severe radiological abnormalities i.e. consolidation, ground glass opacity and white out lungs. Leucopenia, lymphopenia and thrombocytopenia are independent predictors of H1N1 positivity and are useful tool to initiate oseltamavir therapy promptly and prevent its inadvertent over as well as under-use.
PICC-0730
ACCESSING CENTRAL VENOUS ACCESS DEVICES IN A TERTIARY PAEDIATRIC INTENSIVE CARE UNIT

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Aims & Objectives:

The goals in the clinical management of Central Venous Access Devices (CVADs) include prevention of catheter and insertion site infection, maintaining patency of catheter and avoiding dislodgment. It has recently been highlighted that in the Paediatric Intensive Care Unit setting there is a lack of standardised practice and poor compliance of the hospitals CVAD practice guideline recommendations. This is problematic and can result in high levels of CVAD infections. The aim of this study was to review compliance with CVAD Policy and develop a safe work practice for accessing CVADs aiming to reduce the risk of CVAD infections in a tertiary Paediatric Intensive Care Unit.

Methods

An audit of current practice when accessing CVADs using the approved hospital aseptic technique audit tool was completed. Staff were reviewed in both a live and simulated environment. Data was reviewed and staff were educated on an identified individual needs basis relating to aseptic technique and standard practice when accessing CVADs in accordance with the hospital CVAD practice guideline recommendations.

Results

Bedside audit results identified poor compliance with the hospital practice guidelines when accessing CVADs in the live environment. When in a simulated environment nursing staff demonstrated poor knowledge of the hospital’s practice guidelines related to aseptic technique and accessing CVADs.

Conclusions

Poor compliance with aseptic technique and standardised practice in accordance with a hospital practice guideline has been identified. Education on current hospital CVAD practice guidelines and implementing medication trays has allowed for a more standardised practice in PICU and has led to improved Clinical care.
Aims & Objectives:

Healthcare associated infections (HCAI) in children in intensive care are common. Infections associated with blood stream infection are of higher impact than localised infection but there is little data examining the extent and severity of these.

Methods

Review of microbiology and PICU data examining numbers of children with a HCAI and proportion of these with positive blood cultures between 2013-2015.

Centers for Disease Control National HealthCare Safety Network definitions were used. Categories analysed included: central line associated BSI (CLABSI), ventilator associated pneumonia (VAP), catheter associated urinary tract infection (CA UTI), mucosal barrier injury BSI (MBI BSI), hospital acquired BSI (HA BSI) and surgical site infections (SSI). Infections were classed as PIC acquired if the child had been on PICU for at least 48 hours.

Survival was classed as survival to PICU discharge.

Results

4058 children were admitted to PICU between 2013-15. 117 (2.9%) had a confirmed HCAI. Of these 31 (26%) died.

54 / 117 had positive blood cultures for a pathogenic organism and features of a systemic inflammatory response in association with their HCAI.

46% were hospital acquired primary BSI in children with low cardiac output state or primary gastrointestinal pathology with organisms suggesting gut translocation.

50% (27/54) children died, all with multiple organ failure. Infection was temporally related to death in 14 of these.

Rates of all infection types were comparable over the three years apart from CLABSI’s where rates fell from 1.2/1000 CVC patient days in 2013 to 0.2/1000 in 2014-15. There was no difference in mortality between the subgroups.
**Conclusions**

Blood stream infection as a result of a HCAI carries a high mortality. Children with shock or gastrointestinal pathology appear to be at high risk of gut translocation and hence high risk for health care acquired sepsis.
Aims & Objectives:

We aimed to investigate the clinical and epidemiological features of pertussis in children admitted to a tertiary-care university hospital in Brazil.

Methods

This was a retrospective cohort study of all pediatric hospital admissions with pertussis from January 1/2008 to December 31/2014.

Results

Fifty-five patients admitted to the hospital over the study period had laboratorial confirmation of *Bordetella pertussis* infection, 17 (30.9%) needed intensive care support and 6 (10.9%) died. Their median age was 58 days, 54.6% were female, 25.3% had a history of prematurity and 63.7% hadn’t received any dose of pertussis vaccine. The most common viral co-infection agent was respiratory syncytial virus (21%). Patients who required intensive care support had greater white blood cell count (median 42600/mm$^3$ vs. 24400/mm$^3$; p = 0.002) and higher heart rate (median 152 bpm vs. 142 bpm; p=0.002) at admission. Deaths occurred in patients with best weight-to-age ratios (median 43 vs. 4; p = 0.04), higher average heart rate (median 163 bpm vs. 149 bpm; p=0.02) and higher white blood cell count at pediatric intensive care unit (PICU) admission (median 62050/mm$^3$ vs. 24700/mm$^3$; p = 0.01).

Conclusions

Children with pertussis with higher heart rate and greater white blood cell count at presentation have higher risk of PICU admission and death.
Aims & Objectives:

Acute viral respiratory infections (VRI) are the most common diseases in humans and are associated with high morbidity and mortality in infants and the elderly. Children with congenital heart disease (CHD) are more susceptible to get severe forms of VRI due to their altered lung mechanics, leading to several complications, such as increased hospital stay, longer mechanical ventilation time, and higher mortality rates. This study aimed to identify the epidemiology of VRI in children with CHD, and to compare the outcomes: hospital stay, duration of mechanical ventilation and mortality, according to the presence or absence of a VRI.

Methods

This was a longitudinal, observational cohort study. Nasopharyngeal secretion samples were collected pre- and postoperatively for all patients undergoing cardiac surgery, from May 2013 to May 2014. Respiratory viruses were detected using CLART Pneumovir®.

Results

Forty-three patients were enrolled. We found a high prevalence of respiratory viruses (39%) in children with CHD undergoing surgery. However, in this study, there was no statistically significant difference in outcomes in relation to VRI in bivariate and multivariate statistical models. In the multivariate regression model, major outcomes were analyzed with respect to independent variables: age, RACHS-1 and presence of VRI. VRI showed a statistically significant effect only on the outcome arteriovenous oxygen difference, while the covariates age and RACHS-1 showed significant effects on all outcomes investigated in the study.

Conclusions

In conclusion, the prevalence of VRI in children undergoing cardiac surgery is high, but they do not seem to affect major postoperative outcomes.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0539
VENTILATOR ASSOCIATED PNEUMONIA AND VENTILATOR ASSOCIATED EVENTS IN PEDIATRIC INTENSIVE CARE: PRELIMINARY RESULTS OF A SINGLE CENTER STUDY
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2Sainte Justine Hospital, Microbiology, Montreal, Canada
3Sainte Justine Hospital, Department of Medical Imaging, Montreal, Canada

Aims & Objectives:

Ventilator associated pneumonia (VAP) is the second cause of nosocomial infection in pediatric intensive care. Recent modifications of the CDC criteria for VAP diagnosis include: VAP diagnostic criteria for children and criteria to identify ventilator associated events (VAE) in adults.

Objectives: To determine retrospectively the incidence, risk factors and management of VAP using the new definition and to study the validity of adult VAE diagnostic criteria in critically ill children.

Methods

Single center retrospective study in the pediatric intensive care unit (PICU) including patients invasively mechanically ventilated (IMV) > 48 hours between November 2013 and November 2015. Patient records were analyzed for VAP and VAE diagnoses. Median and range of descriptive data are reported, comparison between two groups performed with Mann-Whitney test with a significant level: p<0.05.

Results

We report the analysis of the first 65 children out of the 280 patients included during the study period. Eleven of the 65 patients had a VAP episode and none died prior to PICU discharge. Patients with VAP compared to patients without VAP had a statistically significant longer median duration of ICU (17days vs 8d, p=0.016) and duration of IMV (11.5d vs 5d, p=0.008). Endotracheal aspiration was the main bacteriological source used to identify VAP pathogens (9/11), with pathogens being identified in 8 patients. Only six VAP also met VAE criteria.

Conclusions

According to preliminary results, VAP incidence is high (17%), with a low mortality rate. VAE definition criteria for adults may not be useful for the detection of VAP in children.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0189
EXCHANGE TRANSFUSION IN CRITICALLY ILL CHILDREN WITH SEVERE PERTUSSIS

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Aims & Objectives:

Pertussis is an important cause of infant mortality and morbidity. Hyperleukocytosis is a severe form of the disease with up to 80% mortality rate. This study aimed to determine clinical outcomes of exchange transfusion in infants with severe pertussis.

Methods

Retrospective review of patients < 1 year admitted to the Pediatric Intensive Care Unit (PICU) with clinical diagnosis of severe pertussis over a 5-year period

Results

Sixty-seven infants (M/F:31/36), aged 2 (1-2) months (median, 25th-75th IQR), and PICU Length of Stay (LOS) and Mechanical Ventilation (MV) days of 6 (3-13) and 3 (0-7) days, respectively. White blood count (WBC) on admission was 35890/mm3 (20940-52870). Forty-eight patients received supportive treatment (ST) and 19 patients had exchange transfusion (ET). Patients in ET group had higher WBC. Overall mortality was 19.4%. Admission WBC >35,000 was associated with mortality (unadjusted OR 7.4, 95%CI 1.5-36.7), and was an independent predictor of mortality (OR 8.6, 95%CI 1.4-51.4) adjusted for age, prematurity, MV and inotrope requirement. No mortality difference between ET and ST.

<table>
<thead>
<tr>
<th>Age months</th>
<th>Bordetella CX (+) n (%)</th>
<th>WBC Count/mm3 n (%)</th>
<th>Inotropic use days</th>
<th>PICU days</th>
<th>MV days</th>
<th>Mortality n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST 1 (1-2.0)</td>
<td>24 (50)</td>
<td>29875 22 (45)</td>
<td>5 (3-10.5)</td>
<td>3 (0-6)</td>
<td>8 (16)</td>
<td></td>
</tr>
<tr>
<td>ET 1 (1-2.8)</td>
<td>11 (57)</td>
<td>55200* 14 (73)</td>
<td>10 (6-19.8)*</td>
<td>6 (2.3-9.8)*</td>
<td>5 (26)</td>
<td></td>
</tr>
</tbody>
</table>

Values are median (25th-75th IQR); * p < 0.05 by Mann-Whitney
Conclusions

Exchange transfusion had no effects on mortality. Patients who received exchange transfusion had increased PICU length of stay and duration of mechanical ventilation. Admission WBC was a strong predictor of mortality. Additional studies are required to identify exchange transfusion candidates according to admission WBC.
Aims & Objectives:

Most western countries offer routine scheduled childhood immunisation for a variety of bacterial and viral infections. In the Republic of Ireland the schedule of state-funded immunisation is comprehensive and includes diphtheria, pertussis, tetanus, pneumococcus, hepatitis B, meningococcus C, haemophilus B, polio, measles, rubella and mumps. Varicella and meningococcal B vaccines are available but are not currently funded by the government.

Parents of infants and young children are provided with information about the schedule of immunisation and vaccines, and make a choice to immunise their child or not.

Each of the illnesses preventable by these vaccines can cause substantial morbidity, and rarely mortality, in the paediatric population.

We audited our admissions due to a vaccine-preventable illness to our 23-bed university-affiliated PICU over a four year period 2011-2015. Data was extracted retrospectively from our clinical information system, and Picanet information.

Methods

A retrospective audit of admissions to PICU with a vaccine-preventable illness as primary admitting diagnosis.

Results

There were 32 admissions with a vaccine-preventable illness, with 28 children surviving to discharge. Streptococcus pneumoniae infection accounted for 9 admissions, meningococcus B infection precipitated 15 admissions, varicella 7 admissions, and there was one admission due to pertussis infection. Mean length of stay across the group was 6 days. Mortality occurred in children infected with pneumococcus and pertussis infections.

Conclusions

None of the 32 children admitted to the PICU had received all of their scheduled childhood immunisations. Most infections occurred in previously healthy children. These preventable conditions represent a significant burden on children, families, and on social and healthcare system resources.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0590
INDEPENDENTLY TAILORED FLUID MANAGEMENT REGIMES IN SEVERE SEPTIC SHOCK: EFFICIENT USE OF HAEMODYNAMIC MONITORING

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Aims & Objectives:

The precise amount of fluid to give to a septic child is difficult to quantify. Research seems to be contradictory. Clinical examination is based around assessment of cardiac output, however the element mainly limiting cardiac output (preload or contractility) cannot be examined clinically. We present four cases of severe meningococcal shock treated efficiently with a haemodynamic monitor leading to a carefully balanced fluid regime.

Methods

Four consecutive cases with severe septic shock were treated with an USCOM haemodynamic monitor. All cases had clinical and objective measures of severe shock. Using frequent haemodynamic measurements, fluid balance and inotropy was carefully balanced, with careful use of the Flow Time (corrected) parameter. Systemic vascular resistance measurements allowed judicious choices of appropriate inotropic agents.

Results

Fluid bolus needs were only between 40 and 80 ml/kg. Extubation occurred between 24 and 60 hours after admission. All patients’ management was altered by use of the haemodynamic monitor and they made full recoveries.

Conclusions

Haemodynamic monitors have the ability to materially change management. Assessing a patient as shocked is easy: knowing whether to increase preload or contractility is impossible without advanced monitoring. An understanding of the physiology, backed up with a suitable haemodynamic monitor, is an essential part of management of a shocked child.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0219
BACTERIAL SUPERINFECTION BIOMARKERS, ANTIBIOTHERAPY AND GRANULOCYTE CD64 EXPRESSION IN CRITICAL BRONCHIOLITIS: MAYBE THE PAST IS STILL THE FUTURE
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²Hospital Infantil Universitario Niño Jesús, Pediatric Hematology and Oncology, Madrid, Spain

Aims & Objectives:

Flow-cytometry (FC) is an unknown technical tool for clinicians. The granulocyte CD64 expression (gCD64), constitutively expressed in monocytes (mCD64), could be a useful data in severe acute bronchiolitis (SBA). Its relation with classic bacterial superinfection biomarkers or its association with antibiotherapy has not been studied.

Objectives: 1) To assess the gCD64 and mCD64 in children with SAB 2) To study the association between gCD64 and mCD64 with classic biomarkers of bacterial superinfection 3) To compare gCD64 and mCD64 expression in patients with and without antibiotherapy.

Methods

Prospective study of children admitted to the Pediatric Intensive Care Unit because of SAB. Clinical, analytical and management data were collected. A FC, using FACS Canto II, was done at PICU admission to obtain mCD64 and gCD64. After demonstrating normal distribution, parametric tests were applied in the statistical analysis.

Results

Thirty two patients were enrolled (median age 52,5±91,1 days and PICU stance 5±2,9 days); 23/32 received antibiotherapy. mCD64 and gCD64 values were higher, without signification, in antibiotherapy group (12158±3950 and 4808±2525 versus 10483,7±3247,5 and 3137±2069). gCD64 showed a positive correlation by bivariate analysis with procalcitonin (r=0,44; p=0,026), mCD64 (r=0,71; p=0,00) and percentage of CD64⁺ granulocytes (r=0,59; p=0,00). There was a non significative higher percentage of CD64⁺ granulocytes in antibiotherapy group (p=0,09).
Figure 1. gCD64 in antibiotherapy versus not antibiotherapy groups (p=0.09).
Figure 2. Percentage of CD64⁺ granulocytes in antibiotic therapy and not antibiotic therapy groups (p=0.09).
gCD64 appears to be higher in case of antibiotherapy and showed strong positive correlation with procalcitonin. Antibiotherapy, considering clinical status and/or classical biomarkers, matches with the CD64 granulocyte expression at admission. Larger clinical studies are necessary.

**Figure 3.** gCD64 shows a significant positive correlation by bivariate analysis with procalcitonin (r=0.44; p=0.026).

**Conclusions**

gCD64 appears to be higher in case of antibiotherapy and showed strong positive correlation with procalcitonin. Antibiotherapy, considering clinical status and/or classical biomarkers, matches with the CD64 granulocyte expression at admission. Larger clinical studies are necessary.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PROGNOSIS FACTORS OF MORTALITY IN PEDIATRIC SEPTIC SHOCK, A RETROSPECTIVE STUDY ABOUT 117 CASES

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Aims & Objectives:

Paediatric sepsis and septic shock remain a major health care problem despite recent progress made in its early recognition and early goal directed therapeutic management. Defining prognosis factors of mortality can help establish which patients might benefit from a more aggressive treatment and a closer monitoring.

Methods

Methods: It is a retrospective cohort study of children (from 28 days up to 18 years) treated for septic shock in our PICU from January 1, 2009 to December 31, 2013. The main outcome was mortality at 28 days. We performed univariate and multivariate analysis to identify risk factors of mortality.

Results

Results: 117 patients were included, 78.6% of them had an underlying comorbidity. Overall, the mortality rate at 28 days was 35.9%. Haematological or oncologic underlying illness (p = 0.05); 4 to 6 organ dysfunctions (p = 0.001); a volume of fluid resuscitation < 20mL per kg (p = 0.02); the use of more than one inotropic/vasopressor agent (versus 1; p < 0.0001) and a lactate clearance at 24 hours < 10% (versus >= 10%; p = 0.03) were significant risk factors of mortality in the univariate analysis. After adjustment, the use of more than one inotropic/vasopressor agent (p = 0.05), a volume of fluid resuscitation < 20mL per kg (p = 0.02) and a lactate clearance at 24 hours < 10% (p = 0.02) remained independent prognosis factors of mortality at 28 days.

Conclusions

Conclusions: Our study demonstrates that, even in a specific population of septic shock with a high proportion of underlying comorbidities, the risk factors of mortality remain high. It also constitutes the first paediatric work to emphasise the prognosis value of lactate clearance, suggesting that it should be implemented in our monitoring strategy of septic shock.
Aims & Objectives:

Several international pediatric therapeutic guidelines about septic shock have been published. As for epinephrine, those recommendations are only based on adult or neonatal. Thus, our study constitutes the first specifically pediatric work on epinephrine use in septic shock.

Methods

Retrospective, single center, observational study of all children (newborn excluded) treated for septic shock, in our ward, between January 1, 2009 and December 31, 2013. The patients were divided in two groups: “with” and “without” epinephrine use. Clinical and biological data were collected. We then performed a comparison between the two groups in univariate and multivariate analysis.

Results

117 patients corresponded to the pediatric definition of septic shock and were included: 68 (51.8%) in the group without epinephrine use, 49 (41.9%) in the group with epinephrine use. Compared to patients without epinephrine use, patients treated with epinephrine were more severe at the onset of the septic shock, both clinically (with 4 to 6 organ dysfunction in 68.7% versus 45.2% cases; p = 0.02) and biologically (lactate level of 4.15 versus 2.20 mmol/l; p = 0.0008). Above all, patients treated with epinephrine had a worse outcome than patients treated without. They had a higher mortality rate at 28 days (63.3 % versus 16.2%; p < 0.0001) in univariate and multivariate analysis after adjustment on the initial gravity. Finally, we highlighted a potential association between the maximum epinephrine dose used and death.

Conclusions

Patients treated with epinephrine have a higher mortality rate than patients treated without. Several questions can be raised. As patients were clinically and biologically severe when epinephrine was prescribed, would an earlier initiation of epinephrine have a beneficial effect on the mortality rate of these patients? As a potential relation exists between the maximum dose of epinephrine used and the mortality rate, would alternative therapeutics such as the ECMO be beneficial?
CAMPYLOBACTER ENTERITIS: A SIGNIFICANT CAUSE OF MORBIDITY AND MORTALITY IN INFANTS

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2University of California at San Francisco-Fresno, Pediatrics, Madera, USA

Aims & Objectives:

Campylobacter is a common cause of enteritis in infants and children. Campylobacter bacteremia and meningitis have been reported in neonates, but patients reportedly recovered well. Few fatal cases have been described in infants. We present five cases of Campylobacter enteritis in infants living in the San Joaquin Central Valley of California.

Methods

Stool samples from in-patients admitted to the pediatric intensive care unit with diarrhea were collected for culture and Campylobacter jejuni/coli antigen testing. Data on patients with a positive Campylobacter test were collected.

Results

Mean age was 7.6 weeks (range 6-12). Three patients had been born preterm (31, 32, and 36 weeks gestation age). Three patients presented with a history of diarrhea; hematochezia was first discovered on admission in the other two patients. Other symptoms included fever (n=2), hypothermia (n=1), vomiting (n=2), hypoglycemia (n=2), metabolic acidosis (n=4, anion gap acidosis in three patients), and status epileptics (n=1). Laboratory data was relevant for hyperleukocytosis (mean 23,000, range 7,300-41,500). Blood cultures obtained in three patients were negative. Stool antigen testing was positive for Campylobacter (jejuni/coli) in all patients. One patient’s diarrhea self-resolved; two were treated with azithromycin with complete recovery; one patient expired despite initiation of antibiotic; fifth patient expired before positive test was reported. Both patients that died developed multi-organ system failure.

Conclusions

Although Campylobacter usually self-resolves, it can be a significant cause of morbidity and mortality in young infants. Empiric treatment with a macrolide in unstable patients with diarrhea may be warranted while awaiting stool culture results.
Aims & Objectives:

Up to 33% of patients admitted to pediatric intensive care units (PICUs) receive antibiotics for inappropriate reasons. Reducing unnecessary antibiotic exposure is crucial to decrease bacterial resistance. However, the determinants for antibiotic use in this setting are not clear. This survey aims to describe the clinical and laboratory markers currently used to tailor antibiotic treatment in Canadian PICUs.

Methods

Sampling frame included all pediatric intensivists and pediatric infectious diseases specialists working in Canada in 2014-2015. We designed our survey using focus groups and refined it after assessing its clinical sensibility and test-retest reliability. We created four clinical scenarios (sepsis, pneumonia, meningitis and intra-abdominal infections) to evaluate the impact of different clinical and laboratory markers on the duration of antibiotic treatment. Statistical analyses included descriptive statistics and logistic regression.

Results

Our response rate was 60% for pediatric intensivists (62/103) and 36% for pediatric infectious diseases specialists (37/103). In 64% of PICUs (9/14), both specialists share decisions about antibiotic use. Variables associated with prolonged use of antibiotics (extra 0.9±1.6 to 6.3±5.1 mean treatment days; p<0.05) included presence of multiple organ failure, sepsis, immunodeficiency, co-morbidities, purulent fluid collections, and positive culture for Gram-negative bacteria. Shorter antibiotic courses were associated with positive PCR for virus (from -1.0±2.0 to -5.1±4.3 mean treatment days; p<0.05) and positive cerebrospinal fluid or blood culture for N. meningitidis (-1.2±4.1 and -2.3±2.7 mean treatment days, respectively; p<0.05). Importantly, 68% to 82% of respondents would still use a full course of antibiotics despite positive PCR for virus when sepsis, pneumonia, or intra-abdominal infections are clinically suspected.
Conclusions

Severe clinical presentation is associated with a prolonged use of antibiotics in PICUs. The presence of a positive PCR for virus does not appear to shorten clinicians' duration of antibiotic treatment when sepsis, pneumonia, or intra-abdominal bacterial infections are suspected in the PICU.
Aims & Objectives:

Between 9% and 33% of patients admitted to pediatric intensive care units (PICUs) receive antibiotics for inappropriate indications. Current recommendations about antibiotic use lack evidence and are mainly based on expert opinion. The use of infection biomarkers could potentially reduce unnecessary antibiotic exposure and, consequently, bacterial resistance. This prospective cohort study aims to describe the evolution of different infection markers in critically ill children once antibiotics are started.

Methods

We included children admitted to three Canadian PICUs between 1 month and 17 years of age, who received antibiotic treatment for suspected severe bacterial infections. We collected data on demographics, infectious process, fever, infection markers (white blood cell count [WBC], C-reactive protein [CRP] and procalcitonin levels), PICU/hospital length of stay, and all-cause 28-day mortality. Statistical analysis included descriptive statistics.

Results

For this pilot study, we enrolled 22 patients with mean age of 3.7±4.1 months. Most patients had pneumonia (58%) and/or sepsis (37%). Mean duration of antibiotic treatment was 7.3±3 days, with most treatments initiated in the PICU (53%) or emergency department (42%). All patients had an uncomplicated course without evidence of relapse or hospital-acquired infection. Procalcitonin and CRP presented a consistent decline in their levels once antibiotics were started, while WBC showed greater variability (“rebounds”) in its course. Core temperature normalized by day 2 of treatment.
Conclusions

Procalcitonin and CRP seem to correlate well with the clinical evolution of infected critically ill children successfully treated with antibiotics. However, more data are needed to confirm their suitability as markers to support stopping antibiotic therapy.
Aims & Objectives:

While viral bronchiolitis is the most common respiratory illness in infants and young children, little is known about current management practices amongst Canadian pediatric intensivists. This survey aims to describe management practices and the factors guiding admission and treatment decisions for bronchiolitis across Canadian pediatric intensive care units (PICUs). Survey results were subsequently compared to the 2014 American Academy of Pediatrics (AAP) clinical practice guideline for bronchiolitis.

Methods

Survey was designed using focus groups and it was refined after we assessed its clinical accuracy and test-retest reliability. The final survey, distributed to all pediatric intensivists in Canada, included two clinical scenarios to evaluate current management practices. Results were analyzed using descriptive statistics.

Results

Survey response rate was 55% (57/103). PICU admission was most dependent on the degree of respiratory distress (50/50, 100%), level of consciousness (50/50, 100%), presence of bradycardia (48/50, 96%), oxygen requirement (47/50, 94%), presence of co-morbidities (40/50, 80%), serum pH (43/50, 86%), pCO2 (40/50, 80%), and age (35/50, 70%). Twenty respondents (36%) started antibiotics within 1-hour of admission, which increased to 39 respondents (71%) if the patient required mechanical ventilation (MV). Inhaled therapies were used by 75% of respondents (42/56), with nebulized epinephrine (33/56, 59%) and salbutamol (20/56, 36%) being the most common ones. High flow nasal cannula (32/56, 57%) and continuous positive airway pressure (16/56, 29%) were preferred for non-invasive respiratory support, while pressure controlled ventilation (34/55, 62%) was the commonest MV strategy. Most respondents used opioids (37/55, 67%) and benzodiazepines (34/55, 62%) as sedative agents. Compliance with AAP guidelines is showed in Table 1.
Conclusions

Clinical management of bronchiolitis appears to be similar across Canadian PICUs. However, several current practices are not supported by the AAP treatment guideline.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0552
SEPSIS PROTOCOL IN AN EMERGENCY DEPARTMENT IN ARGENTINA
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Aims & Objectives:

Prospective Study, Observational, longitudinal.

Describe the implementation of a protocol for the recognition and early treatment of Sepsis in an Emergency Department (ED).

Methods

Patients presumed to have Sepsis, Severe Sepsis or septic shock were collected from the ED between April and December 2015. Protocollled intervention was applied under standardized rules. The adherence level to the protocol was measured at three levels. Complete adherence if the patient receives fluids within 10 minutes and antibiotics or inotropic within the hour of diagnosis. Partial adherence if the patient receives fluids within the first 10 minutes but after the first 30 minutes or if patient receives antibiotics or inotropic agents after the first hour, and incomplete adherence if patients receives fluids after the first 30 minutes or inotropic agents and antibiotics after the first two hours.

Results

In a series of 43 patientes, 42% was male population of average age 79 months [IQR 4-192 months]. All the patients received fluids within the first 10 minutes, 93% patients received antibiotics within the first hour and inotropic agents were given in 17% of the patients within the first hour. 45% of the patients received one fluid bolus; two fluid boluses 25 % and 30% received three fluid boluses with normal saline. 12 patients (27%) showed positive blood culture and 18 % had a high lactic acid leves.

Only 3 patients (7%) had partial adherence. The rest showed complete adherence. There were no dead in these 43 patients. 13 (30%) of the patients had Sepsis, 23 (53%) had severe Sepsis and 7 (17%) had Septic Shock. 4 patients (9.3%) required mechanical ventilation support.

Conclusions

The protocol disclosed a high level of adherence and contributed to optimizing results. Despite the small sample of patients, there were no deaths and the hospital stay was 8.9 days.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0270
LEFT VENTRICULAR DYSFUNCTION IN PEDIATRIC SEPSIS: RELATION TO DISEASE SEVERITY
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Aims & Objectives:
Myocardial dysfunction is a important component in septic shock and contributes to the persisting high mortality from the disease. The objective of this study was evaluate if echocardiographic study could act as a marker of sepsis development and severity in pediatric patients.

Methods
A prospective cohort study was conducted in the PICU of an University Hospital between March and December of 2014. All patients with suspected sepsis who had between 28 days and 18 years, and were requiring mechanical ventilation for more than 48 hours and cardiovascular support by vasoactive drugs were included in this study. Patients underwent transthoracic echocardiography on the first and third day after admission to determine ejection fraction and fractional shortening of the left ventricle. The outcomes assessed were: length of hospital and PICU stay; duration of mechanical ventilation and ventilator-free hours; duration of inotropic use and maximum vasoactive inotropic score; Pediatric Index of Mortality 2 (PIM2) and mortality.

Results
Overall, 20 patients have completed the study protocol. Patients with cardiac dysfunction determined by echocardiography in the first day after admission had prolonged hospital and PICU stay (p = 0.047 and p = 0.01), extended duration of mechanical ventilation (p = 0.011), higher vasoactive inotropic score (p = 0.001), higher PIM2 (p<0.001) and less ventilator-free hours (p = 0.02).

Conclusions
The results of our study showed that cardiac dysfunction detected by echocardiography was associated with unfavorable outcomes in pediatric patients with sepsis.
Aims & Objectives:

Sepsis is a systemic inflammatory condition that has an infectious agent as “trigger”. Finding tools that make it possible to recognize severity is essential in the Pediatric Intensive Care Unit (PICU). The objective of this study was evaluate the evolution and performance of pediatric sepsis markers and their relationship with severity.

Methods

A prospective cohort study was conducted in the PICU of an University Hospital between March and December of 2014. All patients with suspected sepsis who had between 28 days and 18 years and were requiring mechanical ventilation for more than 48 hours and cardiovascular support by vasoactive drugs were included in the study. Serum levels of C-reactive protein, ferritin, triglycerides, total cholesterol, LDL cholesterol, growth hormone, insulin like growth factor 1 and white blood cell count were performed on the first day, 24 hours and 72 hours after recruitment. The outcomes assessed were: length of hospital and PICU stay; duration of mechanical ventilation and ventilator-free hours; duration of inotropic use and maximum vasoactive inotropic score; Pediatric Index of Mortality 2 (PIM2) and mortality.

Results

Lastly, 20 patients have completed the study protocol. As results we found that patients with elevated ferritin on the first day had lower free mechanical ventilation hours (p = 0.046), higher maximum inotropic score (p = 0.009) and higher PIM2 (p <0.001). Other biomarkers were not related with the analyzed outcomes.

Conclusions

Concluding, ferritin levels had the best performance as a marker of severity in pediatric sepsis, being the only one that was related to unfavorable outcomes.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0281
SCRUB TYPHUS- A MAJOR CAUSE OF PICU ADMISSION AND MODS-A SINGLE CENTRE EXPERIENCE FROM INDIA

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Aims & Objectives:

Scrub typhus(ST) has been globally recognised as an emerging infectious disease contributing significantly to pyrexia of unknown origin(PUO) and a potential cause of multi-organ dysfunction syndrome(MODS). Severe Scrub typhus infection is now reemerging in our part of the country. We studied the incidence of ST as a cause of PICU admission and MODS in our hospital and its clinical and laboratory characteristics.

Methods

This study was done in a Paediatric teaching hospital in Kolkata, India. Records of patients admitted with PUO from March-2012 to December-2015 were reviewed. Rathi-Goodman-Aghai(RGA) scoring system was used to identify potential ST patients and confirmed by serological testing. Clinical characteristics, laboratory findings and treatment response were noted of those needing PICU admissions. MODS was defined by simultaneous involvement of 2 organ system.

Results

ST was the serologically confirmed final diagnosis in 97 out of 861 children i.e. 11% of PUO admissions. PICU admission was needed in 30 of them (31%). It contributed 8.43% of total PICU admissions and 18.29% of MODS. Septic shock and encephalopathy (60%) followed by ARDS/ALI (43%) was the main cause of PICU admissions. Typical rash, generalised lymphadenopathy, normal to low leucocyte and platelet counts, hypoalbuminemia and hyponatremia with elevated CRP are significantly associated with MODS due to ST. Patients were treated with either Doxycycline alone or in combination with Azithromycin. Mean time to complete defervescence was 32 hours after first dose of Doxycycline. Outcome was excellent without a single mortality.

Conclusions

Scrub typhus is an important cause of MODS in this part of the World, specially in fevers associated with features as identified and not responding to conventional antibiotics. Early treatment even empirical with Doxycycline is safe and life saving.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0284
CHANGING PARADIGM OF SEPTIC SHOCK- FROM COLD TO WARM…A SINGLE CENTRE EXPERIENCE FROM INDIA
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Aims & Objectives:

Traditionally, Pediatric septic shock has been described as cold shock where Dopamin is the initial inotrope of choice followed by Adrenalin. However, recently we have observed an increase in warm shock which resulted in a significant shift in our inotrope use in our PICU. We tried to analyse this changing trends and their etiology in our unit.

Methods

This retrospective, observational study was done in a teaching hospital in Kolkata, India. Patients admitted in PICU with septic shock needing inotropes from March 2011 to December 2015 were included. Patients were divided into two groups. Group A, from March 2011 to August 2013 and Group B, from August 2013 to December 2015. Initial blood pressure, inotropes used and diagnoses were noted. Inotropes were chosen as per the discretion of the physician based on survival sepsis guidelines.

Results

186 patients were included – of which 68 were in group A and 118 in group B. Overall, Dopamine was the most commonly used inotrope(80%), followed by Noradrenalin(NA)(41.4%) and Adrenalin (37.5%). In group A, Dopamine was used in 100% patients, Adrenaline in 31 % and NA in 9.5%. In Group B, Dopamin was used in 69%, Adrenaline in 42% and NA in 58%. This significant change has been found due to the increased incidence of warm shock contributed by scrub typhus(ST), staphylococcal toxic shock syndrome(STSS) and Acute Encephalitic Syndrome(AES) rather than gram negative sepsis or shock due to unknown etiology.

Conclusions

Warm septic shock contributed by ST, STSS and AES are now increasing in numbers and making noradrenalin as the initial inotrope of choice in majority of the cases in our PICU.
Aims & Objectives:

Introduction:

Central line associated blood stream infections (CLABSI) are a significant cause of morbidity, mortality, and added medical costs to hospitalized adult and paediatric patients. We are a 16 bedded tertiary general PICU with annual admission of around 700 patients per year. In August 2014 we started monitoring for CLABSI. Specific care bundles and best practice measures for preventing CLABSI were followed since 2010.

Over a period of 10 months from April to December 2014, we had 13 blood stream infections (BSI) attributed to central lines with an average CLABSI rate of 5.7/1000 central line days.

Methods

Interventions:

Evidence based interventions were introduced targeting various aspects of Central venous line (CVC) care.

1) Care bundle: Simplified care bundle implementation with help of highly motivated group of nurses

2) Biopatches (Chlorhexidine impregnated sponge dressing): Introduced in February 2015 to minimise catheter colonisation.

3) Bionectors (closed needle free access devices): Introduced in June 2015 to protect line open ends.

4) Dermol 500 body washes: Introduced in August 2015 to minimise skin colonisation

5) Trash the tubes: encouraging early removal of CVC’s which are not required.

All these interventions were audited regularly.

Results
CLABSI rate reduced from 5.7 to 2.44 per 1000 central line days during February to December 2015. Following table shows monthly CLABSI rate and introduction of interventions.

Conclusions

We were able to reduce CLABSI rate by 42% by implementation of evidence based practices. This can only be achieved with help of motivated multidisciplinary PICU team and regular review of current practices. Biopatches appear to have a significant role in reducing our CLABSI rate but this needs further study.

Reference:
1. CDC CLABSI prevention 2011
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0271
THE RISK FACTORS OF SEPSIS ASSOCIATED ENCEPHALOPATHY IN CHILDREN AND ITS RELATIONSHIP TO THE PROGNOSIS

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Aims & Objectives:

Sepsis associated encephalopathy (SAE) is a severe complication in children with sepsis, but what are its risk factors and influencing on the prognosis are not very clearly. This study aims at To investigate the risk factors of SAE in children and its relationship to the prognosis so that guide practing on monitoring and treating of sepsis in children.

Methods

Collecting the clinical data of 152 cases of children of ShenZhen Children’s hospital with sepsis, according to if SAE was complicated, the patients was divided into SAE group and non SAE group. the clinical data included vital signs, blood gas, blood chemistry, liver function, kidney function, PT, ATTP, D-dimer, Fb, shock or not, GSC, Pediatric Clinical Illness Score (PCIS) etc, using single factor analysis and multi-factor logistic regression analysis to study on the risk factors of the occurrence and mortality of sepsis associated encephalopathy in children.

Results

The incidence of SAE was 30.3% among sepsis. The mortality rate of children with sepsis associated encephalopathy was obviously higher than that of children without encephalopathy (17.4 vs %1.9%). Logistic regression analysis showed that coagulation disorder, hepatic insufficiency and PCIS were independent risk factors of SAE. Coagulation disorder were independent risk factors of SAE death.

Conclusions

SAE has a high incidence and mortality. Children with coagulation disorder, hepatic insufficiency and PCIS≤80 should be observed closely.
A CASE OF SEVERE ACUTE RESPIRATORY FAILURE DUE TO ENTEROVIRUS D68 REQUIRED EXTRACORPOREAL MEMBRANE OXYGENATION

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Aims & Objectives:

Enterovirus D68 (EV-D68) is one of the major pathogens causing respiratory failure and neurological complications in children. Outbreaks of EV-D68 have been reported from several countries, and epidemic of EV-D68 in US was widely broadcasted in 2014. In 2015, we faced EV-D68 outbreak in Japan, and accumulated cases of paediatric respiratory failure were reported from Tokyo (Ito, IASR 2015). We also experienced a severe case required extracorporeal membrane oxygenation (ECMO), however, no previous ECMO case of EV-D68 can be found in our literature search.

Methods

case report

Results

A 4-year-old girl was presented with fever, cough and wheezing. Initially she was diagnosed as asthma. Despite standard treatment including beta stimulant inhalation and steroid, her respiratory failure was progressed and finally was intubated on day 5. Because of the further deterioration with desaturation and barotrauma, she was transferred to our ICU on day 6. After ICU admission we strengthened treatment against asthma such as intravenous beta stimulant and magnesium without success, and we tried nitric oxide inhalation (iNO) and high frequency oscillatory ventilation (HFOV). Oxygenation index (OI) was high (OI=41, HFOV: FIO2 1.0, MAP 25cmH2O, SV 90, iNO 40ppm) and we finally put her on veno-venous ECMO (VV-ECMO). Bronchoscope and direct vision suctioning were required frequently because of a lot of characteristic mucus sputum. She was successfully weaned off ECMO on day 13, extubated on day 26, and finally transferred back to the previous hospital on day 32 without any neurological sequelae. Enterovirus was detected from her airway secretion by PCR, and specific assay confirmed EV-D68 afterwards.

Conclusions

This is the first report of ECMO case of severe acute respiratory failure due to EV-D68 infection. Indication of ECMO was severe hypoxemia and barotrauma, and was
able to be treated successfully. Mucus sputum was characteristic and frequent direct suctioning through bronchoscope was required during ECMO.
A META-ANALYSIS OF THE EFFECT OF CHLORHEXIDINE-GLUCONATE-IMPREGNATED DRESSINGS ON CATHETER-RELATED BLOODSTREAM INFECTIONS IN PAEDIATRIC PATIENTS

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Aims & Objectives:

Catheter-related bloodstream infection (CRBSI) is a serious complication of central venous catheterisation (CVC) which can lead to multiple organ failure, mortality and increased healthcare costs. Strategies to reduce its incidence include chlorhexidine gluconate-impregnated (CHG-impregnated) dressing which has proved to be effective in adults. We reviewed the effect of CHG-impregnated dressing on CRBSI in children compared to other types of catheter-site dressings.

Methods

Structured literature search performed on PubMed, EMBASE and Cochrane Library. Patients aged 0-21 years requiring CVC were included. Intervention was CHG-impregnated dressing. Primary outcome was CRBSI; catheter colonization, exit-site infection and adverse reaction were secondary outcomes.

Results

Of 531 abstracts identified, 4 articles met the inclusion criteria with a total of 948 patients included in this study, of which 2 were RCTs included in the meta-analysis. Four studies reported on CRBSI but no significant effect of CHG-impregnated dressing was found (RR=1.21, 95CI=0.60-2.44, p=0.6). Two studies reported a significant decrease in catheter colonization (RR=0.60, 95CI=0.45-0.80, p=0.0005). One study reported lower rates of exit-site infections (P<0.05). The CHG-impregnated dressing group had more redness or contact dermatitis (RR=14.14, 95CI=3.02-66.20, p=0.0008).

Conclusions

CHG-impregnated dressing does not show a significant reduction in incidence of CRBSI in children with a CVC. This is possibly due to the lack of studies with enough power to detect a difference in CRBSI-rates. However CHG-impregnated dressing does decrease catheter colonization and exit-site infections, which assumes
effectiveness. Large well-designed trials with enough power to detect CRBSI are urgently needed to ultimately prove effectiveness of CHG-impregnated dressing in children.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0089
EPIDEMIOLOGIC SURVEILLANCE OF DEVICE-ASSOCIATED HEALTHCARE-ASSOCIATED INFECTIONS IN A PEDIATRIC INTENSIVE CARE UNIT OF A TERTIARY CARE CENTER IN PAKISTAN

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Aims & Objectives:

Infection prevention and control Program has significantly reduced the rate of device Associated infections (DAI) in several intensive care units (ICUs). But limited Data is available from Pakistan using international Benchmarks. Objective is to assess the rate of DA-HAI in a pediatric intensive care unit of a developing country according to CDC-NNIS and current NHSN definitions and guidelines.

Methods

This was a retrospective cross-sectional study conducted at the PICU of AKUH from Jan-2012 to Dec-2014. All children aged from 1 month to 16 year were included. CDC- NHSN guidelines are used for diagnosis of DA-HAI.

Results

A total of 1050 patients were admitted in PICU (3293 patient days). The mean age was 4.02 ± 4.29 year and 69% were male. There were total 18 DAI reported with incidence rate of 0.541/1000 Patient days. Rate of CLABSI was 4.9/1000 CV-lines days. Rate of VAP was 1.55/1000 ventilator days and rate of CAUTI was 0.32/1000 UC-days. Most frequently isolated organisms included Acinetobacter (22%), Enterococcus (16%) and K. pneumoniae (16%). MDR rate was 22%. Mortality rate was 15.08%.

Conclusions

There is high rate of DAI and associated cost, morbidity and mortality. Active surveillance and low cost interventions can reduce this burden.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0228
LONGITUDINAL PROSPECTIVE COMPARATIVE TRIAL OF ANTIBIOTIC CYCLING VS MIXING ON EMERGENCE OF GRAM NEGATIVE BACTERIAL RESISTANCE IN A PEDIATRIC INTENSIVE CARE UNIT
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Aims & Objectives:

Compare antibiotic mixing vs. cycling for gram negative infections with respect to acquisition of resistance, incidence of HCAI and mortality

Methods

Prospective trial conducted in PICU of a teaching hospital from Sept 2012 to 2014, divided into baseline, mixing and cycling phases with wash out interval of 3 months between two antibiotic schedules. The existing practice of scheduled antibiotic rotation constituted baseline phase (3 months). The sequential intervention phases were two Latin squares (3 x 3 for mixing over 1 week repeated 4 times/month for 3 months) and (3 x 3 for cycling over 9 months). The antibiotic classes mixed/cycled were β lactamases, carbapenems and fourth generation cephalosporins. Rectal, nasal, nasopharyngeal and endotracheal cultures during each phase at admission, weekly and within 2 days of PICU discharge were sent. Acquisition of resistance was primary while incidence of HCAI and mortality were secondary outcomes

Results

A total of 778 children, baseline (99), mixing (146), cycling (362), and washout phases (171) were enrolled. The mean (SD) time to acquisition of resistance was 6.6(7.3) of PICU days. The acquisition of resistance in baseline (56.6%) was significantly higher than mixing (22.6%) and cycling (18.5%) strategies (p=0.0001). When the mixing and cycling phases with their respective washout periods were compared, (27.2%) in former as against (18.7%) in latter showed acquisition of resistance (p=0.01) with the relative risk of acquired resistance in cycling reduced by 80% (RR 0.18, 95% CI 1.09-1.92; p=0.009). The HCAI rate was significantly lower in mixing (15.8%) and cycling (24%) as compared to baseline phase (29.3%) (p=0.018). The mortality rates were similar [mixing (17.8%) vs cycling (19%); p=0.118]

Conclusions

Both mixing and cycling were better than baseline with respect to acquisition of resistance. Both rates and time to acquisition of resistance was better in cycling than mixing. Antibiotic heterogeneity either cycling or mixing for gram negative infections must be practised to reduce antibiotic resistance
Successful management of otogenic tetanus with Intravenous Magnesium Sulphate and Intrathecal Human Tetanus immunoglobulin (HTIG) in a 7 year old girl: a case report.

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Aims & Objectives:

Tetanus, an acute infectious disease caused by Cl. tetani, continues to be an important cause of mortality and morbidity in India. We present a case of Otogenic Tetanus treated with Intrathecal Human tetanus immunoglobulin (HTIG) and high dose of Magnesium Sulphate (MgSO₄), an effective strategy in management of severe spasms.

Incidence of tetanus is very low after widespread immunization practices. Tetanus resulting from external ear injury is rare. We report a case of a 7 year old girl presented with abnormal limb movements and locked jaw for one day, diagnosed and managed as a case of otogenic tetanus.

Methods

A 7 year old unimmunized girl, from lower socio-economical class, residing in a slum area of Mumbai presented with history of recurrent ear discharge bilaterally since a year presented with muscle spasms, trismus and opisthotonus posturing. She received Injection Tetanus Toxoid Intramuscular, Tetanus Immunoglobulin 500 International Units (IU) Intravenous and 1000 IU Intrathecal. Intravenous Mgso₄ loading dose (50mg/kg) was given followed by infusion at the rate of 30 mg/kg/hour. The infusion rate was increased up to 50 mg/kg/hr to control spasms while retaining the patellar tendon reflex, which proved an effective guide to overdose. Diazepam was used for the first 2-3 days to tide over severe spasms. Serum magnesium concentrations were maintained at 4-5 mg/dl.

Results

Ventilatory support, median duration of PICU and hospital stay was significantly less in comparison to available studies.

Conclusions

MgSO₄ infusion can be used as the sole agent for the control of spasms in otogenic tetanus with a good outcome.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0443
DENGUE FEVER: PRESENTATION, COURSE AND COMPLICATIONS: A YEAR’S EXPERIENCE FROM A TERTIARY CARE CENTRE IN MUMBAI, INDIA
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Aims & Objectives:
Presentation of dengue fever, a common seasonal illness in India, varies widely from single to multiorgan involvement, presence or absence of shock and complications. The aim of this study was to analyse the characteristics of presentation and short term outcomes.

Methods
We conducted a retrospective analysis of 21 dengue patients admitted in tertiary level pediatric critical care unit in age group of 1 month to 18 years, from January to December, 2015.

Results
Out of 21 included patients, 14 (66.6%) were male while 7 (33.3%) were female. Mean age was 7.9 years. All cases were seen during rainy season (from June to October) which is the typical pattern. Mean duration of ICU stay and hospital stay were 3.1 days and 4.5 days respectively. Out of 21 patients, 7 patients presented with shock, 6 with encephalitis and 1 with myocarditis. Out of 21 patients, 5 (23.8%) had two system involvement, while 5 (23.8%) had > 2 system involvement. Circulatory system was most commonly involved. 4 (19%) required invasive ventilation and 5 (23.8%) needed inotropic support. Only 1 patient (4.7%) required platelet transfusion.

No mortality reported in patients who presented with single or two organ involvement. However, 3 out of 5 patients (60%) with multiorgan involvement did not survive, all of whom presented with severe encephalitis. Overall mortality rate was 14.2%.

Conclusions
Mortality of dengue patients is high in encephalitis and multiorgan involvement. Early referral and aggressive management for organ failure can reduce mortality in dengue patients.
Aims & Objectives:

Swine flu is a highly contagious respiratory disease caused by H1N1 influenza virus. Manifestations of H1N1 influenza are varied from simple seasonal flu to severe forms of multi organ involvement. This study aims to describe experience of our unit regarding various presentations, course and outcome of patients suffering from swine flu in a metropolitan city in India.

Methods

We conducted retrospective analysis of 14 patients (H1N1 positive) admitted from January to December 2015 in the age group 1 month-18 years.

Results

In our analysis, we found the average age of patient was 4.5 years, with male predominance of 64.2%. All patients presented with respiratory failure, 1 had myocarditis.

Mean duration of ICU stay and hospital stay were 8.7 days and 9.2 days respectively. Out of 14 patients admitted to our hospital, 21.5 % (3/14) needed ventilatory assistance: 2 needed invasive ventilation (1- High frequency oscillatory ventilation; 1- High frequency ventilation + Extracorporeal membrane oxygenation) and 1 needed non invasive ventilation. 3 patients required inotropic support. The different complications encountered were empyema, culture proven sepsis, ARDS, pneumopericardium, pneumomediastinum and supraventricular tachycardia.

Observed overall mortality was 14.2 % (2/14). 4 patients had multi organ involvement, out of which 2 died. 10 patients with single system involvement got discharged.

Conclusions

Swine flu can involve multiple systems with respiratory as commonest one. It can have several life-threatening complications. Early & prompt treatment prior to multi organ involvement has good outcome. Mortality increases as number of organs involved increases.
Diagnosis of Treatable Cystic Fibrosis Gene Mutation in a 2 Year Old Female with Septic Shock

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Aims & Objectives:

Background: Severe sepsis and septic shock are common diagnoses in the pediatric critical care setting. The Surviving Sepsis Campaign has encouraged early recognition and treatment of sepsis in order to decrease patient morbidity and mortality. Although rare, there are some patients that have an undiagnosed disorder of immunologic compromise that precipitates their septic shock. The diagnosis and early treatment of immune compromise in the ICU can prevent further morbidity and mortality if recognized early in the course of the patient’s treatment.

Case Presentation: 2 year old Hispanic female with the past medical history of chronic cough and poor weight gain for one year presented to the ED with fever and unresponsiveness. The patient presented in decompensated septic shock with acute respiratory failure requiring intubation. The patient was noted to have bilateral interstitial infiltrates with bilateral pleural effusions on initial chest x-ray. The patient’s physical examination was also significant for digital clubbing of the hands and feet. History revealed that the patient was admitted to the general inpatient floors a week prior to admissions with a prolonged hospital stay due to oxygen dependence.

The patient had multiple co-morbidities during her ICU stay including DIC resulting in a left middle cerebral artery stroke, acute renal insufficiency necessitating dialysis and prolonged ventilator dependence. Prolonged ventilator dependence with no clearance of infiltrates on the patient’s chest x-ray prompted bronchoscopy. Bronchoscopy cultures grew MSSA and two strains of Pseudomonas. 25 days after her initial presentation, DNA analysis confirmed cystic fibrosis gene mutation S549N, a treatable strain of cystic fibrosis.

Methods

N/A

Results

N/A

Conclusions
Conclusions: Septic shock is a common ICU diagnosis, but patients with an abnormal disease course should not be overlooked. High clinical suspicion for underlying diseases that will affect a patient’s disease course should allow for prompt interventions that will help improve patient outcomes.
Aims & Objectives:

Drawing blood samples and cultures can be challenging in the pediatric population, especially in pediatric intensive care patients. The use of an arterial line can facilitate frequent and painless blood sampling. However, the validity of a culture drawn from an arterial line has not been established. Our objective was to assess the sensitivity and specificity of an arterial blood culture as compared to a peripheral blood culture in the diagnosis of bacteremia.

Methods

In this retrospective analysis, we reviewed the results of paired blood cultures (one from an arterial line and the other from a peripheral site) of patients hospitalized in a pediatric intensive care unit between September 2014 and September 2015. For each pair, blood was drawn at the same time and in the same blood volume for the two cultures.

Results

During the study period, 152 paired blood cultures were obtained from 100 patients. Twenty seven blood cultures were positive [10 (7%) peripheral site cultures and 17 (11%) arterial line cultures]. Results were equivalent in 143 (94%) of the paired blood cultures [positive - 9 (6%); negative -134 (94%)]. Amongst the 9 (6%) discordant paired blood cultures, arterial line cultures grew 6 gram positive and 2 gram negative bacteria. On clinical correlation, 5 (3%) of the gram positive bacteria were found to reflect contamination. The sensitivity and specificity of an arterial line culture as compared to a peripheral site culture was 90% and 94%, respectively.

Conclusions
An arterial line blood culture has high sensitivity and specificity as compared to a peripheral site culture and can serve as an alternative method for obtaining a blood culture in pediatric intensive care unit patients.
Aims & Objectives:

Our study aimed to compare the clinical effectiveness of chloride liberal versus chloride restricted fluid therapy in children with severe dengue admitted in shock

Methods

All consecutive children aged 2 months to 18 years admitted with severe dengue requiring fluid bolus based on WHO management guidelines were approached for enrollment after informed consent. As randomization was not feasible, alternate patients were allocated to Fluid protocol A (0.9% saline for bolus and 5% Dextrose 0.9% saline for maintenance) and Fluid protocol B (Plasmalyte A for bolus and Plasmalyte 148 with 5% Dextrose for maintenance). Admission PCV, platelet count, ANC, Lactate, Ferritin, LDH, liver enzymes, INR, bleeding manifestation, number of organ system involvement, duration of parenteral fluid prior to PICU admission were recorded in both groups. Admission electrolytes, Lactate, Ferritin, LDH, their trend over PICU stay and Change (Δ value) over time were compared. New onset organ dysfunction, eCrCl at admission, Change in eCrCl over time (Δ eCrCl), duration of PICU stay, duration of hospital stay were also compared between the two therapeutic groups.

Results

Of 49 eligible children enrolled, 45 (91.8%) completed the study, 25 (55.5%) received fluid protocol A and 20 (44.5%) received protocol B. Baseline variables were comparable in both groups. Admission eCrCl was comparable in both groups. Δ eCrCl, Δ Na, Δ Cl, Δ HCO3 and Δ Lactate were comparable in both groups. No difference was observed in new onset organ dysfunction. Duration of PICU stay was higher (p < 0.03) in protocol B group though the duration of oxygen therapy, ventilation and total duration of hospital stay were similar.

Conclusions
Both Chloride liberal and chloride restricted fluid therapy remained equally effective in management of electrolytes, acid status and disease related inflammation in children with severe dengue. There was no difference in renal function status observed in both therapeutic groups.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0368
PROFILE OF HOSPITAL ACQUIRED INFECTIONS IN A PEDIATRIC INTENSIVE CARE UNIT OF A CHILDREN'S HOSPITAL IN SOUTH INDIA

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²Kanchi Kamakoti CHILDS Trust Hospital, Pediatric Intensive Care, Chennai, India
³Kanchi Kamakoti CHILDS Trust Hospital, Microbiology, Chennai, India

Aims & Objectives:

Hospital acquired infections (HAIs) are an important risk factor associated with morbidity & mortality in critically ill children. Drug resistant infections are a growing concern. The aim of our study was to determine the incidence of hospital acquired infections & the mortality due to Hospital Acquired Infections in PICU

Methods

Children with ICU acquired infections from January 2013 to December 2015 were included. Patient demographics, diagnoses and microbiological data were collected retrospectively & analyzed

Results

Out of 2141 children admitted, there were 98 HAIs in 83 children. HAI incidence was 10.2/1000 patient days. Incidence of CLABSI, VAP & CA-UTI in our PICU was 15.27/1000 central line days, 2.86/1000 ventilator days & 2.12/1000 urinary catheter days, respectively. Peripheral blood stream infection rate (in patients without Central venous catheters) was 3.85/1000 patient days. Gram-negative organisms caused 84.7%, Gram-positive 8.2% and fungi 7.1% of HAIs. Klebsiella species (19.3%) were the predominant organism followed by Pseudomonas species (15.3%), Acinetobacter species (14.2%) & E. coli (13.2%). Seventeen HAIs (17.3%) were carbapenem resistant. There were no instances of Colistin resistance. Children with HAI had a longer PICU length of stay (20.7 vs. 4.2 days, p<0.001). PICU mortality was higher in children with HAIs (54% vs. 7.3%, p<0.0001)

Conclusions

Gram negative organisms are the commonest causes of HAIs in our population. HAI’s increase the PICU length of stay and mortality in critically ill children
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0642
POST-NEONATAL TETANUS IN A PICU OF A DEVELOPING ECONOMY: INTENSIVE CARE NEEDS, OUTCOME, AND PREDICTORS OF MORTALITY
S. Kumar\(^1\), J. Muralidharan\(^1\), A. Bansal\(^1\), S. Singhi\(^1\), K. Nallasamy\(^1\)
\(^1\)PGIMER, Department of Pediatrics- Advanced Pediatric Center, chandigarh, India

Aims & Objectives:

To study the intensive care needs, outcome, and predictors of mortality of post-neonatal tetanus in patients admitted to PICU of a developing economy.

Methods

Retrospective data of 30 post-neonatal tetanus cases admitted to a PICU of a teaching hospital in north India over 10 years (January 2006-December 2015) was reviewed for demographics, portal of entry, vaccination status, type and severity, management, complications and outcome. Univariate and multivariate analysis was done to determine predictors of mortality.

Results

Three fourths (n=23) of cases were boys with mean(SD) age of 7.2(2.9) years. None were completely immunized. The most common portal of entry was CSOM (n=16, 53.3%) followed by acute trauma (n=10, 33.3%). All cases had generalized tetanus with severity grades of IIIb (n=19, 63.3%) and IIIa (n=11, 36.7%). All cases received tetanus toxoid, HTIG, and appropriate antibiotics. Intrathecal HTIG was administered in 7 (23.3%) cases. Common complications were respiratory failure (93.3%), rhabdomyolysis (76.7%), autonomic dysfunction (63.3%), AKI (63.3%), and HCAIs (46.7%). Intensive care needs were: requirement of ventilation (100%); benzodiazepine (100%), morphine (96.7%), and magnesium sulphate (86.7%), neuromuscular blockade (70%) infusion; inotropes (66.7%); tracheostomy (40%); and RRT (33.3%). Twelve children (40%) died. Multivariate analysis revealed that grade IIIb severity (p=0.01), no intrathecal HTIG (p=0.004), inotrope use (0.002), and autonomic dysfunction (p=0.02) were significantly associated with mortality. The mean(SD) length of PICU stay among survivors (n=18) was 22.2(10.3) days.

Conclusions

Post-neonatal tetanus is associated with high mortality. Severity grade IIIb, no intrathecal HTIG, requirement of inotropes, and autonomic dysfunction were independent predictors of mortality. Early recognition, prompt treatment, and intense supportive care in PICU improved morbidity and mortality.
EVALUATION OF EFFECT OF PROBIOTICS ON CHANGE IN CYTOKINE LEVELS IN CRITICALLY ILL CHILDREN WITH SEVERE SEPSIS: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL (PILOT STUDY)

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¹PGIMER, Department of Pediatrics- Advanced Pediatric Center, Chandigarh, India
²PGIMER, Immunopathology, Chandigarh, India

Aims & Objectives:
To evaluate the effect of probiotics on change in cytokine levels in critically ill children with severe sepsis.

Methods
Prospective double blinded, randomized trial conducted in PICU of a tertiary care teaching hospital in north India. Forty children, 3 months-12 years admitted with severe sepsis were randomized to receive probiotics (n=20) or placebo (n=20), one sachet twice a day for 7 days. Probiotic (VSL#3) contained *Lactobacillus paracasei*, *L. plantarum*, *L. acidophilus*, *L. delbrueckii*, *Bifidobacterium longum*, *B. breve*, *B. infantis*, and *Streptococcus salivarius*; and maltose and silicon dioxide as base. Placebo contained only maltose and silicon dioxide. Blood samples collected on day 1 and 7 for estimation IL-6, IL-12p70, IL-17, TNF-α, IL-10, and TGF-β1. Primary outcome: To compare change in cytokine levels in probiotic and placebo group. Secondary outcomes: SOFA score on day 1 and 7, incidence of health care associated infection (HCAI), length of PICU stay, and mortality.

Results
Baseline variables and cytokine levels on day 1 were similar in two groups. On day 7, probiotic group had lower levels of IL-6, IL-12p70, IL-17, and TNF-α (p=0.03, 0.001, 0.25, and 0.001, respectively) and increased levels of IL-10, and TGF-β1 (p=0.008, and 0.33, respectively) than placebo. Probiotic group had significant fall in IL-6, IL-17, and TNF-α (p=0.001, 0.04, and 0.001, respectively) and increase in IL-10 and TGF-β1 (p=0.001) from day 1 to 7. SOFA score (2.6 vs. 4.1), HCAI (25% vs. 40%), PICU stay (9.9 vs. 11.8 days), and mortality (10% vs. 15%) were non-significant in probiotic and placebo group.
Table 1: Primary outcome: Cytokines levels on day 1 and day 7 and change in cytokine levels from day 1 to 7 in probiotic and placebo group.

<table>
<thead>
<tr>
<th>Cytokine levels</th>
<th>Probiotic group (n=20)</th>
<th>Placebo group (n=20)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL-6 (pg/ml) mean (SE)</td>
<td>Day 1: 293.8 (68.2)</td>
<td>Day 7: 104.7 (27.5)</td>
<td>0.001 (0.47)</td>
</tr>
<tr>
<td></td>
<td>Day 7: 282.9 (65.1)</td>
<td>Day 7: 251.4 (60.6)</td>
<td>0.03</td>
</tr>
<tr>
<td>IL-12p70 (pg/ml) mean (SE)</td>
<td>Day 1: 21.4 (1.5)</td>
<td>Day 7: 17.6 (1.6)</td>
<td>0.09 (0.08)</td>
</tr>
<tr>
<td></td>
<td>Day 7: 22.9 (1.6)</td>
<td>Day 7: 28 (2.1)</td>
<td>0.54</td>
</tr>
<tr>
<td>IL-17 (pg/ml), mean (SE)</td>
<td>Day 1: 331.1 (17.9)</td>
<td>Day 7: 265.3 (29.4)</td>
<td>0.04 (0.25)</td>
</tr>
<tr>
<td></td>
<td>Day 7: 338.6 (32.6)</td>
<td>Day 7: 315.4 (34.2)</td>
<td>0.84</td>
</tr>
<tr>
<td>TNF-α (pg/ml), mean (SE)</td>
<td>Day 1: 444.6 (18.1)</td>
<td>Day 7: 309.2 (21.7)</td>
<td>0.001 (0.54)</td>
</tr>
<tr>
<td></td>
<td>Day 7: 432 (11.5)</td>
<td>Day 7: 417.2 (17.4)</td>
<td>0.001</td>
</tr>
<tr>
<td>IL-10 (pg/ml), mean (SE)</td>
<td>Day 1: 388.1 (25.4)</td>
<td>Day 7: 496.5 (28.5)</td>
<td>0.001 (0.78)</td>
</tr>
<tr>
<td></td>
<td>Day 7: 383.3 (22.8)</td>
<td>Day 7: 373.6 (33.1)</td>
<td>0.008</td>
</tr>
<tr>
<td>TGF-β1 (mg/ml), mean (SE)</td>
<td>Day 1: 231 (32.9)</td>
<td>Day 7: 331.9 (36.2)</td>
<td>0.001 (0.04)</td>
</tr>
<tr>
<td></td>
<td>Day 7: 248 (29.8)</td>
<td>Day 7: 281.7 (35.5)</td>
<td>0.33</td>
</tr>
</tbody>
</table>
Table 2: Secondary outcomes: SOFA score on day 1 and 7, incidence of HCAI, duration of PICU stay, and mortality in probiotic and placebo group.

<table>
<thead>
<tr>
<th>Secondary outcomes</th>
<th>Probiotic group (n=20)</th>
<th>Placebo group (n=20)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOFA score, mean (SD)</td>
<td>Day 1</td>
<td>5.8 (2.8)</td>
<td>5.4 (2.5)</td>
</tr>
<tr>
<td></td>
<td>Day 7</td>
<td>2.6 (1.9)</td>
<td>4.1 (2.5)</td>
</tr>
<tr>
<td>Healthcare associated infection, n (%)</td>
<td></td>
<td>5 (25)</td>
<td>8 (40)</td>
</tr>
<tr>
<td>Type of HCAI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood stream infection, n (%)</td>
<td>1 (5)</td>
<td>3 (15)</td>
<td></td>
</tr>
<tr>
<td>Ventilator associated pneumonia, n (%)</td>
<td>3 (15)</td>
<td>2 (10)</td>
<td></td>
</tr>
<tr>
<td>Urinary tract infection, n (%)</td>
<td>1 (5)</td>
<td>3 (15)</td>
<td></td>
</tr>
<tr>
<td>Duration of PICU stay in days, mean (SD)</td>
<td>9.9 (6.1)</td>
<td>11.8 (8.9)</td>
<td>0.44</td>
</tr>
<tr>
<td>Deaths, n (%)</td>
<td>2 (10)</td>
<td>3 (15)</td>
<td>0.63</td>
</tr>
</tbody>
</table>

Figure 1: Demonstrating levels of different cytokines [mean (SE)] on day 1 and 7 in probiotic and placebo group.

Conclusions
Probiotics supplementation could reduce the inflammation in critically ill children with severe sepsis and their use might be considered as adjunctive therapy among these patients.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0186
LATE COMPLICATION OF NECROTIZING STAPHYLOCOCCAL PNEUMONIA AND SEPSIS PRESAGED BY TRANSCUTANEOUS CARBOXYHEMOGLOBIN
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Aims & Objectives:
Carboxyhemoglobin can now be measured transcutaneously (SpCO%). While sequentially measuring SpCO% in children with acute and chronic pulmonary problems, a 12 year old female with methicillin sensitive Staphylococcus aureus necrotizing pneumonia, sepsis, shock, and acute renal failure was followed with sequential SpCO% measurements during 3 weeks of ICU care and follow-up.

Methods
The Rainbow-SET Rad-57 Pulse CO-Oximeter (Masimo Inc., Irvine, CA) was used to measure SpCO%. The Institutional Review Board approved exploratory measuring and waived the need for informed consent. No treatment decisions were made based on SpCO%.

Results
SpCO% was initially 0, rose to 14 at 34 days, and returned to 0 two months later. During outpatient follow-up, productive cough resolved, and spirometry and physical endurance improved although SpCO% rose to 6 then to 15 at 6 and 7 months after initial admission. At 7.5 months, productive cough, right sided chest pain, and dyspnea recurred. Chest radiograph showed a right pneumothorax and air and liquid filled cysts. Right upper lobe pneumatoceles, bronchopleural fistulae and right visceral and parietal pleura were found and resected. Subsequently SpCO% fell to 6 and remained stable over the next year with no acute illnesses and improved clinical status and spirometry.

Conclusions
This report describes a late effect of severe necrotizing pneumonia that was preceded by a progressive rise in SpCO% despite ongoing clinical improvement. This suggests that SpCO% may be an easily attainable measure of ongoing, subclinical inflammation and may reflect endogenous heme oxygenase activity.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0079
INVESTIGATION ON THE EFFECTS OF HEPARIN DEFENDS AGAINST THE TOXICITY OF EXTRACELLULAR HISTONES ON VASCULAR ENDOTHelial CELL IN SEPSIS

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Aims & Objectives:

The objective of this research is to investigate the change of extracellular histones lever in sepsis, to explore the mechanism of toxicity of extracellular histones on vascular endothelial cell and the possibility heparin as an antagonist in sepsis.

Methods

Children with mild or severe sepsis and children from healthy control group were concluded in this research. Their concentrations of extracellular histones were measured and analyzed its correlation with prognosis. Established animal models of sepsis, extracellular histone levels was measured in these mice. Human umbilical vein endothelial cell (HUVEC) were incubation with calf thymus histone (CTH) at various concentration and different treatment time. The treated cells were subject to flow cytometer to measure the survival rate and scanning electron microscopy and transmission electron microscopy to observe their morphological changes. Heparin was used to antagonist histones both in vitro and in vivo.

Results

The levels of circulating histones in the severe septic children (19.17 ± 10.20) were significantly increased which was correlated with the severity of sepsis. The survival rate of CTH-treated HUVEC was decreased in a dose- and time-dependent manner. Heparin can significantly improve the survival rate (P<0.001). By observing CTH-treated HUVEC with EM, we found that histones may be able to cause membrane disruption directly. In vitro, heparin significantly prolonged the survival time in CLP model.

Conclusions

The levels of circulating histones in the septic children were correlated with the severity of sepsis. Circulating histones may mediate the progress of sepsis by its endothelial cytotoxicity, which could cause endothelial dysfunction. This cytotoxicity might be associated with destruction of endothelial cell membranes. Heparin could defend against the toxicity of extracellular histones, and its antagonism was dependent on its anticoagulant activity.
Aims & Objectives:

To review the evidence on which clinical signs or combination of signs indicate the presence of severely impaired circulation and when intervened upon early with intravenous fluids would have favorable outcomes in children 2-59 months of age presenting with signs of critical illness.

Methods

Literature search was performed (MEDLINE, CENTRAL, The Cochrane Library, EMBASE) upto September 2014 using pre-specified criteria. Peer reviewed published studies which prospectively recruited children between 2-59 months of age presenting with severely impaired circulation (not due to hemorrhage or burns or anaphylaxis or cardiac condition) and had data reported on clinical signs were eligible for inclusion.

Results

No studies were identified in which clinical signs could be compared with a ‘reference standard’ for severely impaired circulation. Only one RCT involving 3141 children presented data to determine the predictive ability of various clinical signs and combination of clinical signs for 48 hour mortality. Of the clinical signs, cold hands or feet, temperature gradient or deep acidic breathing had a sensitivity of more than 75% while their specificity was less than 50%. Weak pulse, delayed capillary refill (>2 seconds), coma or moderate hypotension had specificity more than 80% while the sensitivity of these signs was low (<50%). None of these signs had an optimal sensitivity and specificity.

Conclusions

There is a need for further studies for revision in combination of clinical signs that could identify majority of children with impaired circulation early in the course of illness.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0321
FULMINANT COMMUNITY-ACQUIRED METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS SEPTICEMIA IN A NON-IMMUNOCOMPROMISED PEDIATRIC PATIENT WITH EXTERNAL FIXATION
D. Gomes Luque¹,², S. Camera Gregory¹,², R.J. Moreira Novelli¹,³,⁴
¹Hospital Estadual da Criança, Pediatric Intensive Care Unit, Rio de Janeiro, Brazil
²Instituto Nacional de Traumatologia e Ortopedia, Pediatric Intensive Care Unit, Rio de Janeiro, Brazil
³Hospital Federal Cardoso Fontes, Pediatric Intensive Care Unit, Rio de Janeiro, Brazil
⁴Hospital Universitário Pedro Ernesto - Universidade Estadual do Rio de Janeiro, Pediatric Intensive Care Unit, Rio de Janeiro, Brazil

Aims & Objectives:

Community-acquired methicillin-resistant Staphylococcus aureus (CA-MRSA) infections are emerging diseases with increasing incidence worldwide. Most of the reports about illness caused by CA-MRSA have focused on skin and soft tissue infections, also being involved in life-threatening infections.

Methods

We are reporting a case of a patient who developed a CA-MRSA septicemia.

Results

A 3-year-old boy diagnosed with rickets and bilateral genu varum was submitted to a bilateral osteotomy with external fixation on 22/10/2015, being discharged after 48 hours. He came to his routine visits on 30/10/2015 and 27/11/2015 without complaints or abnormalities in his physical exam. On December 28th, he was admitted with a 3-days history of fever, swelling and pain in left high. He had symptoms of septic shock, with tachycardia, tachypnea and low blood pressure. There was bloody secretion in one of the pins of the left thigh. He was submitted to aggressive fluid resuscitation, empirical antibiotic therapy (cefepime) and was admitted to the pediatric intensive care unit. Then, he developed acute respiratory failure, requiring endotracheal intubation, mechanical ventilation, besides vasoactive drugs and stress corticotherapy. Due to the suspicion of staphylococci infection, vancomycin and oxacillin were prescribed. Laboratory tests showed pancytopenia, hypocalcaemia and hypercapnia (PaCO₂ > 100). Chest echocardiography showed ventricular dysfunction, with no valve vegetations. Despite our efforts, the patient died 23 hours after admission.

Conclusions
The blood cultures and culture from fluid aspiration from left knee revealed Staphylococcus aureus oxacillin-resistant and susceptible to linezolid, ciprofloxacin, gentamicin and sulfamethoxazole-trimethoprim concluding that the infection was caused by CA-MRSA. Although there was a previous hospitalization, the infection was probably community acquired, with the external fixation functioning as a risk factor. The physician should be alert to the risk factors of MRSA and CA-MRSA infection, a highly virulent microorganism, that requires an aggressive treatment.
Aims & Objectives:

Introduction: Septic shock is a global burden in development and developed countries. Few researches have explored the sequence of signals and symptoms before hospital admission.

Objective: To determine frequency and time course of signals and symptoms of severe sepsis and septic shock based to admission history obtained with parents and careers.

Methods

Methods: Prospective and exploratory study based on admissional questionnaires records about time course of early signals and symptoms of septic shock until hospital admission. We analyzed 900 admissions in pediatric intensive care (PICU) between 2013 and 2016. Included 74 severe sepsis and septic shock patients a, aged 16 years or younger included neonatal period.

Results

Results: The time course analysis of symptoms was large, some patients presented had first prodrome of infection 15 days before hospital admission, for severe infection 7-10 days before hospital admission. Severe symptoms of septic shock were present 12 h or before hospital presentation. Classic signals for septic shock (fever, impairment consciousness, abnormal skin color, breathing difficulty) were present at least 0-3 hours before hospital admission (100% of patients). Between 12-24 h, were prevalent breathing difficulty (17%), Fever (27%), Increase of cardiac rate (11%). Conscience of level alterations was an early symptom.

Conclusions

Conclusion: Classical signals of septic shock (drowsiness, cold extremities, abnormal skin color) were observed in late stages of septic shock. Fever, respiratory distress, drowsiness were observed 24 hours before hospital admission. The approach of septic shock should emphasize early identification of symptoms by caregivers and health care providers. The earlier identification of cases is an additional tool for rapid intervention.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STewardship

PICC-0938
FACTORS ASSOCIATED WITH FATAL AND NON-FATAL OUTCOMES FROM IN HOSPITALIZED SEPTIC SHOCK – PRELIMINARY REPORT
C. Mangia¹, M.C. Andrade¹, N.F. Oliveira¹, B.A. Lima¹
¹Universidade Federal de São Paulo, Pediatrics, Sao Paulo, Brazil

Aims & Objectives:
Objective – To determine the clinical and health care service factors associated with fatal and non-fatal outcomes in hospitalized septic shock

Methods

Methods – Case-control study of children who died from septic shock comparing hospital care between fatal and non-fatal cases. We analyzing in the first moment aspects related to differences of care among high income setting and middle and low income settings. The criteria defined for optimal management was full adherence to ACCP 2007 guidelines for septic shock definitions and management. Others aspects analyzed were: poor recognition for the parents and health care providers, resistant organisms, delay for first presentation and transport. For bundle we analyzed in the first and second hour: diagnosis empirics antibiotics, fluids, peripheral inotropes or vasopressors, central inotrope or vasopressors, specific antibiotics, fluids, central inotropes or vasopressors, reparation of deficits (glucose, bicarbonate), oxygen support or mechanical ventilation.

Results

Results – We identified between 2013 to 2015, 10 cases and 65 controls, interim analysis has shown delayed for first presentation and late recognition of septic shock by physicians (25% of cases) was main point associated to fatal cases, failure to identify septic shock between survivals was 25%. In survivals group in the first hour: Antibiotics (100%), fluids (100%), oxygen and pulmonary mechanical ventilation (25%), peripheral inotrope (25%), central inotrope (20%). In the second hour: fluids (100%), central inotrope or vasopressor (40%), mechanical ventilation (56%). Failure of sufficient supervision of residents with consequent sub-diagnosis of septic shock, failure in timely appropriated antibiotics (100%), failure to identify complications related to sepsis, severe sepsis and multiple organ dysfunction syndrome mainly cardiac dysfunction were observed, also.

Conclusions

Conclusions – The interim analysis has shown that improving the training of residents, fast action of nurses, timely adherence to published protocol, strict vigilance in the first week of shock all actions together may improve outcome.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0616
COMPARISON OF DIRECT FLUORESCENT ANTIBODY (DFA) AND MULTIPLEX VIRAL PCR (MvPCR) METHOD IN DETECTION OF VIRAL RESPIRATORY PATHOGENS AND EFFECT ON INFECTION CONTROL MEASURES
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¹St Georges Hospital NHS TRust, Paediatric Intensive Care, London, United Kingdom
²St Georges Medical School, Students, London, United Kingdom

Aims & Objectives:

Early and accurate identification of viruses contributes to the prevention of viral respiratory disease transmission in PICU by implementation of infection control measures. DFA method of viral detection had been used in our hospital until mid-June 2013, when MvPCR method (Respiratory pathogens 21, Fast-track Diagnostics ®) was adopted. Retrospectively compared two cohorts of patients admitted to PICU to evaluate the frequency of detection of respiratory viral pathogens by DFA and MvPCR method and adherence to recommended cubicle isolation measures and nosocomial infection rate (defined as new virus isolated >3 days after admission) in a 14 bedded PICU with 3 cubicles.

Methods

A total of 424 patients with a respiratory diagnosis were analysed in two periods - March 2011 to mid-June 2013 (DFA method) and mid-June 2013 to September 2015 (MvPCR method). Patient demographics, viruses detected and cubicle isolation advice and implementation data were collected from the PICU database, the Electronic Patient Record, patient location history and general clinical notes.

Results

Virus detection rates (Table-1) were significantly higher with MvPCR (229/256; 89%) than DFA method (84/168; 50%) because of new virus detection and increased detection of adenovirus and parainfluenza; isolation of multiple viruses were significantly higher with MvPCR (29.6% vs 3.6%). RSV, Metapneumovirus and
Influenza detection rate were similar.

Recommendation for cubicle isolation (Table 2) increased due to isolation of new viruses by MvPCR (28.1% vs 1.2%). Strong advice for cubicle isolation did not increase significantly due to MvPCR (63% vs 49.1%). Non-adherence to cubicle isolation advice increased in both strong advice and recommended for cubicle isolation group. Nosocomial respiratory viral infection didn’t increase significantly with MvPCR (9.8% vs 5.4%).

<table>
<thead>
<tr>
<th>Groups</th>
<th>Strongly Advised for Cubicle Isolation (RSV, Adenovirus, Parainfluenza, Influenza, and Metapneumovirus)</th>
<th>Adherence to Advice</th>
<th>Recommended for Cubicle Isolation (Rhino, Corona, Boca, Entero, Pareco)</th>
<th>Adherence to Advice</th>
<th>Nosocomial Infection Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA</td>
<td>82/168 (49%)</td>
<td>42/62 (51%)</td>
<td>2/168 (1.2%)</td>
<td>2/2 (100%)</td>
<td>5.4%</td>
</tr>
<tr>
<td>MvPCR</td>
<td>157/256 (61.3%)</td>
<td>45/157 (28.6%)</td>
<td>72/256 (28.1%)</td>
<td>19/72 (26.4%)</td>
<td>9.8%</td>
</tr>
<tr>
<td>(p= 0.1827)</td>
<td>(p= 0.0281)</td>
<td>(p= 0.001)</td>
<td>(p= 0.1460)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Cubicle isolation advice and adherence rate and nosocomial infection rate

Conclusions

MvPCR method increased virus detection and recommendation for cubicle isolation; non-adherence to cubicle isolation advice increased due to restricted cubicle numbers. Increase in cubicle numbers may facilitate adherence to isolation advice.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0667
MYCOPLASMA PNEUMONIAE ASSOCIATED ISCHEMIC STROKE IN CHILDREN - A CASE REPORT
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¹Hospital Municipal Moysés Deutsch - M Boi Mirim, Pediatric Intensive Care Unit, São Paulo, Brazil
²Albert Einstein Hospital, Pediatric Intensive Care Unit, São Paulo, Brazil
³Albert Einstein Hospital, Pediatric Department, São Paulo, Brazil

Aims & Objectives:
Mycoplasma pneumoniae (MP) is a common cause of community-acquired pneumonia, but little is known about the extrapulmonary manifestations. Stroke is a rare complication and the mechanism behind that remains unclear. We report the clinical findings of MP associated ischemic stroke on a 4-year-old male.

Methods
Case report of a MP associated ischemic stoke, including clinical, laboratory and imaging findings

Results
A previously healthy 4-year-old male was admitted to the Pediatric Intensive Care Unit. Physical examination revealed an alert, oriented, afebrile and hemodynamic stable child. Motor strength was decreased to grade III/IV in the left arm and leg and central type facial palsy was observed on the left side of face. Magnetic resonance angiography showed occlusion of the right middle cerebral artery and a lesion involving the middle cerebral artery territory. Coagulation studies revealed normal prothrombin, activated partial thromboplastin, fibrinogen and fibrin D-dimer levels. Anti-cardiolipin antibody and complement factors (C3, C4) levels were normal. Cerebrospinal fluid (CSF) was sterile and PCR for herpes virus was not detected. Blood serology for Varicella zoster, Cytomegalovirus and Epstein Barr were negatives. Acyclovir and Acetylsalicylic acid were initiated. Clarithromycin was added when immunoglobulin (Ig) M for MP was detected increased. On the fourth day, Acyclovir was discontinued after confirming negative PCR for herpes virus in CSF. After discussion with specialists, Clarithromycin was changed to Levofloxacin and therapy with high dose steroids (30mg/Kg/day - five days) was initiated. He was treated with Levofloxacin for fourteen days. On day fourteen, he was discharged with hemiplegia in regression, to remain as an outpatient of the rehabilitation multidisciplinary team.

**Conclusions**

Ischemic stroke is a rare manifestation of MP infection. Early use of macrolides or fluoroquinolones antibiotics, steroids and anticoagulant therapy may improve the prognosis.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0673
THE IMPACT OF A PEDIATRIC SEPSIS PROTOCOL IMPLEMENTATION AT A BRAZILIAN SECONDARY CARE HOSPITAL

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²Hospital Municipal Moysés Deutsch - M Boi Mirim, Pediatric Emergency Care Department, São Paulo, Brazil
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Aims & Objectives:

In the pediatric age group, sepsis can be accounted for high morbidity and mortality.

Despite scientific evidence, the translation to clinical practice of the Surviving Sepsis Campaign and Pediatric Advanced Life Support sepsis management recommendations has been slow.

Objectives: 1) To describe the implementation of a sepsis protocol in a secondary care hospital in Sao Paulo. 2) To describe its impact on severe sepsis and septic shock mortality.

Methods

Retrospective, transversal study of indicators obtained from chart review.

A protocol was developed in 2014 based on the Surviving Sepsis Campaign 2012’s diagnostic and treatment parameters. A week of training was provided to all pediatric attending physicians and multidisciplinary team on how to apply the recommendations in January 2015 and, in February 2015, the protocol was implemented. Data from May of 2008 to December of 2013 was compared to data after Feb 2015 (ten months). The results are presented with a 95% confidence interval and the Fisher exact test was used for comparisons.

Results

Before the protocol implementation, the mortality associated with sepsis was 20.8% (9.9-31.7), hospital mean length of stay was 35 days and there were 11 deaths in a ten months period. After the protocol implementation there were 76 diagnoses of sepsis and 54 of severe sepsis in a ten-month-year period. The mean length of stay decreased to 5 days and the sepsis mortality decreased to 3% (0.4-5.6, p <0.001)
Conclusions

There was a decrease in hospital mortality and hospital length of stay after the implementation of the pediatric sepsis protocol
Aims & Objectives:

Bronchiolitis is the leading cause of lower respiratory tract infection in children less than 1 year of age. Severe forms need non-invasive or invasive ventilation. Contemporary obstruction and restriction can make conventional ventilation difficult and may require high-frequency-oscillatory-ventilation (HFOV) and extracorporeal-life-support. Bronchodilator therapy has not shown beneficial effects in randomized controlled trials, but sevorane might play a role as rescue therapy in severely obstructed patients.

Methods

A 2-months-old baby affected by severe bronchiolitis was admitted to our paediatric intensive care unit for hypoxemic respiratory failure. We started continuous-positive-airway-pressure, but the baby developed severe respiratory acidosis and hypoxia and required intubation. Respiratory system resistance (Rrs) and respiratory system compliance (Cplrs) impaired over 3 days in spite of maximal bronchodilatatory therapy. We tested sevorane (MAC 2) as a rescue therapy before starting HFOV. We measured Rrs and Cplrs with intravenous sedation and with sevorane. Air flow and pressure traces were recorded with SERVOi ventilator monitoring. Rrs and Cplrs were obtained with inspiratory and expiratory pause.

Results

Few minutes after Sevorane inhalation both components of Rrs (airway and tissue resistance) reduced (Tab 1). We continued sevorane for 5 days because any attempt to restore endovenous sedation failed with fast impairment of the respiratory mechanism. We successfully extubated the baby nine days after intubation.

<table>
<thead>
<tr>
<th>TAB1</th>
<th>Intravenous sedation</th>
<th>Sevorane sedation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory system resistance</td>
<td>75</td>
<td>25</td>
</tr>
<tr>
<td>(cmH2O/l/s)</td>
<td>37.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Airway resistance</td>
<td>37.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Tissue resistance</td>
<td>37.5</td>
<td>12.5</td>
</tr>
</tbody>
</table>
Respiratory system compliance (ml/cmH2O/kg) 0.7 0.67

Conclusions

Sevorane permits reduction of both components of Rrs with improvement in MV in severe bronchiolitis. Further studies are needed to explore the role of the sevorane in severe bronchiolitis.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0569
EXTENDED MULTIMODAL MONITORING IS USEFUL FOR OPTIMIZING HEMODYNAMICS IN PEDIATRIC SEPTIC SHOCK

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²Apollo childrens Hospital, Pediatric critical care, chennai, India

Aims & Objectives:
Cardiovascular decision making in shock refractory to the initial 30ml/kg fluid may be challenging. We aimed to study whether ECHO and or USCOM(ultrasound cardiac-output monitoring) provided value-addition to physical examination (PE) in this setting. Also, whether ECHO or USCOM was the preferred monitoring modalit

Methods
We performed PE in 32 patients with unresolved shock, and decisions regarding fluids, inotrope and/or pressors were noted. Following this, ECHO+USCOM monitoring was performed by an Investigator blinded to PE plan.

Regarding 3 shock therapies (fluid, inotrope, pressor), we compared (1)PE vs Echo+USCOM and (2)Echo vs USCOM

The final decision necessitated at least 2 parameters demonstrating fluid responsiveness, abnormal cardiac function or vasodilatory shock. Ethics committee clearance and waiver of informed consent obtained.

Results
Our data demonstrate that compared to PE alone, USCOM+Echo altered decisions regarding fluid, inotrope and pressor(Table 1). Notably, further fluids could be discontinued in most.

Regarding USCOM vs ECHO, each had its strengths and weaknesses. Both USCOM and ECHO were not useful in deciding fluid therapy. USCOM was far superior in detecting low SVRI/vasodilatory state, which was especially useful in presence of PE of cold shock. USCOM directed early pressors, improved preload and MAP, thus minimizing fluid volumes.

ECHO was superior in diagnosis of cardiac dysfunction in vasodilatory shock although not statistically significant but was unmatched in detecting diastolic-dysfunction. Presence of lung fluid on lung ultrasound pointed to “fluid intolerance”, reinforcing the decision to discontinue fluids.
Rather than one or the other, the combination of ECHO+USCOM provided the entire hemodynamic picture and directed rapid cardiovascular therapy.

<table>
<thead>
<tr>
<th></th>
<th>Fluid required</th>
<th>Actual fluid given</th>
<th>Inotrope required</th>
<th>Actual inotrope given</th>
<th>Pressor required</th>
<th>Actual pressor given</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE vs ECHO+USCOM</td>
<td>26 vs 6</td>
<td>6</td>
<td>7 vs 20</td>
<td>20</td>
<td>7 vs 28</td>
<td>28</td>
</tr>
<tr>
<td>P value</td>
<td>0.0001</td>
<td>=0.0021</td>
<td></td>
<td></td>
<td>0.0001</td>
<td></td>
</tr>
<tr>
<td>ECHO Vs USCOM</td>
<td>4 vs 2</td>
<td>4</td>
<td>14 vs 6</td>
<td>14</td>
<td>7 vs 21</td>
<td>21</td>
</tr>
<tr>
<td>P value</td>
<td>0.571</td>
<td>0.0577</td>
<td></td>
<td></td>
<td>0.0009</td>
<td></td>
</tr>
</tbody>
</table>

Conclusions

Extended multimodal-monitoring (eMMM) including PE, Echo+USCOM provided the most comprehensive information in children with fluid-refractory shock.
Aims & Objectives:

Acquired brain injury during sepsis is a serious complication of critically-ill patients. We used magnetic resonance imaging (MRI) and immunohistochemistry (IHC) to define neuropathology in a murine model of sepsis.

Methods

Polymicrobial sepsis was induced in 6-10 w.o. male C57/BL6 mice by cecal ligation and puncture (CLP). Mice underwent MRI of the brain 1 and 4 days (d) after CLP (n=4-12/group). To assess blood brain barrier (BBB) permeability, T1-weighted images were obtained after i.v. injection of gadolinium (Gd). Cerebral edema was evaluated with diffusion tensor imaging (DTI) and apparent diffusion coefficient (ADC). Brains were harvested to identify microglia via IHC with anti-Iba-1 Ab. Signal intensities and ADCs were calculated with Paravision 5.1. Data are presented as medians with 25th-75th% interquartile ranges.

Results

MRI studies demonstrated cytotoxic cerebral edema (lower ADC) in multiple brain regions 1 and 4d after CLP (Fig 1; \( P<0.001 \), ANOVA on ranks, post-hoc Dunn’s method); and suggested BBB disruption (Gd uptake) in right-sided regions 1d after CLP that resolved by 4d (Fig 2; \( P=0.9 \), ANOVA on ranks). There also appeared to be microglial proliferation 1d after CLP, particularly in the right thalamus (Fig 3; \( P=0.8 \), ANOVA on ranks). Our data show that neuroradiographic and histologic changes peak on d1 after CLP and may diminish by d4 in septic animals.
Fig 1. Brain ADC values after CLP

Abbreviations: Right hippocampus (R hip), left hippocampus (L hip), right thalamus (R thal), left thalamus (L thal), right cortex (R ctx), left cortex (L ctx).
Fig 2. Gd uptake in the brain after CLP

% change in Gd uptake

R hip L hip R thal L thal R cx L cx R hip L hip R thal L thal R cx L cx

Day 1 Day 4

Sham CLP
Conclusions

In sepsis, cerebral edema, BBB disruption, and neuroinflammation may occur early in the illness and vary by brain region. Correlations between cellular changes and MRI findings will help establish a neuroradiologic signature of brain injury in sepsis.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0092
PILOT STUDY FOR THE SQUEEZE TRIAL
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²McMaster University, Clinical Epidemiology and Biostatistics, Hamilton, Canada
³McMaster University, Department of Medicine, Hamilton, Canada

Aims & Objectives:

Background: Current pediatric septic shock resuscitation guidelines from the American College of Critical Care Medicine (ACCM) focus on the early and goal directed administration of intravascular (IV) fluid followed by vasoactive medication infusions for persistent and fluid refractory shock. The ACCM guidelines suggest that fluid resuscitation should be aggressive, however, accumulating adult and pediatric data suggest that excessive fluid administration is associated with worse patient outcomes and even increased risk of death.

Overall Research Aim: To determine in pediatric patients 1 month to 17 years of age with septic shock whether use of a Fluid Sparing strategy to meet ACCM goal directed targets results in improved clinical outcomes without an increased risk of adverse events, compared to Usual Care.

Primary Objective Pilot Trial: To determine the feasibility of proceeding to a definitive multi-centre trial.

Methods

Design: pragmatic, 2-arm, parallel group, open label, pilot randomized controlled trial.
Setting: Pediatric Tertiary Care.
Sample size: 50 participants.
Participants: Children 1 month to 17 years of age who have persistent fluid refractory septic shock requiring ongoing resuscitation despite administration of 40 mL/kg (2 litres for children ≥50 kg) of isotonic crystalloid or colloid.
Interventions: Eligible children are randomized to further resuscitation according to 1) Fluid Sparing Strategy OR 2) Usual Care.
Ethics: This study is approved by the Hamilton Integrated Research Ethics Board and utilizes an exception to consent (deferred consent) process.
Trial Registration: NCT01973907.

Results

We have enrolled 42 of the planned 50 participants and anticipate completion of the pilot trial by March 2016. To date, study procedures are feasible, consent for ongoing study participation is 95%, and there is separation between the 2 study groups in terms of the volume of resuscitation.
Conclusions

The definitive multi-centre SQUEEZE Trial appears to be feasible to conduct.
Aims & Objectives:

Viral bronchiolitis usually presents on Paediatric Intensive Care Units (PICU) with respiratory failure and has a predictable recovery. However, there is increasing evidence supporting the presence systemic manifestations in these infants. In this study, we looked at the incidence of extra-pulmonary manifestations according to their clinical outcomes and the pathogens involved.

Methods

Retrospective study of 101 infants with viral bronchiolitis admitted to a single UK PICU over 21 months. Patient electronic records were analysed according to: intravenous fluid bolus administration for resuscitation, inotropic support, cardiopulmonary resuscitation (CPR) and need for High Frequency Oscillatory Ventilation (HFOV). Other outcome measures included: viral pathogen detected, raised liver enzymes (ALT), presence of comorbidities, length of stay and patient demographics.

Results

A substantial number of patients required cardiopulmonary support with fluid resuscitation (n=82 [81%]), inotropic support (n=18 [18%]) or HFOV (n=11 [11%]). 4 patients (4%) required CPR and 3 patients died (3%). RSV infection was the most frequent nasopharyngeal aspirate result (n=48 [47%]) and 37 patients (37%) had two or more pathogens detected.

The length of stay of those who required intravenous fluid resuscitation (6 days), inotropic support (11.5 days) and HFOV (15 days) was increased compared to those who required simple respiratory support (3d). There was a strong correlation between total volume of fluid boluses required and length of stay.
Structural heart disease and prematurity had a high incidence in this cohort, particularly in those requiring inotropic support, HFOV and those that died.

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
<th>Cohort n=101</th>
<th>Intravenous Fluid Bolus n=82</th>
<th>Required Inotropic Support n=18</th>
<th>Escalation of Ventilation (HFOV) n=11</th>
<th>Elevated ALT n=27</th>
<th>CPR n=4</th>
<th>Death n=3</th>
<th>Simple Respiratory Failure n=18</th>
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</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Median Age (Weeks)</td>
<td>12</td>
<td>13.5</td>
<td>8.5</td>
<td>8</td>
<td>9</td>
<td>8.5</td>
<td>27</td>
<td>12</td>
</tr>
<tr>
<td>Male</td>
<td>61 (61)</td>
<td>51 (62)</td>
<td>9 (50)</td>
<td>6 (55)</td>
<td>16 (59)</td>
<td>2 (30)</td>
<td>2 (66)</td>
<td>11 (61)</td>
</tr>
<tr>
<td>Female</td>
<td>39 (39)</td>
<td>31 (38)</td>
<td>9 (50)</td>
<td>5 (45)</td>
<td>11 (41)</td>
<td>2 (30)</td>
<td>1 (33)</td>
<td>7 (39)</td>
</tr>
<tr>
<td>Pre-term</td>
<td>48 (48)</td>
<td>37 (45)</td>
<td>12 (67)</td>
<td>10 (51)</td>
<td>15 (55)</td>
<td>4 (100)</td>
<td>1 (33)</td>
<td>10 (56)</td>
</tr>
<tr>
<td>Term</td>
<td>51 (50)</td>
<td>43 (52)</td>
<td>6 (33)</td>
<td>1 (6)</td>
<td>11 (41)</td>
<td>0 (0)</td>
<td>2 (66)</td>
<td>8 (44)</td>
</tr>
<tr>
<td><strong>Median LOS (Days)</strong></td>
<td>5</td>
<td>6</td>
<td>9.5</td>
<td>15</td>
<td>5</td>
<td>11</td>
<td>10</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>Cardiopulmonary Comorbidity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHD</td>
<td>19 (19)</td>
<td>13 (16)</td>
<td>7 (39)</td>
<td>4 (36)</td>
<td>5 (19)</td>
<td>2 (50)</td>
<td>3 (100)</td>
<td>5 (28)</td>
</tr>
<tr>
<td>CLD</td>
<td>10 (10)</td>
<td>5 (6)</td>
<td>3 (17)</td>
<td>2 (18)</td>
<td>2 (7)</td>
<td>1 (25)</td>
<td>1 (33)</td>
<td>5 (28)</td>
</tr>
<tr>
<td>PHTN</td>
<td>3 (3)</td>
<td>3 (4)</td>
<td>3 (17)</td>
<td>1 (6)</td>
<td>1 (4)</td>
<td>1 (25)</td>
<td>0 (0)</td>
<td>0 (0)</td>
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<tr>
<td><strong>NPA result</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSV</td>
<td>48 (48)</td>
<td>39 (48)</td>
<td>10 (56)</td>
<td>5 (45)</td>
<td>13 (48)</td>
<td>2 (50)</td>
<td>1 (33)</td>
<td>8 (44)</td>
</tr>
<tr>
<td>Non-RSV</td>
<td>53 (52)</td>
<td>43 (52)</td>
<td>8 (44)</td>
<td>6 (55)</td>
<td>14 (52)</td>
<td>2 (50)</td>
<td>2 (66)</td>
<td>10 (56)</td>
</tr>
<tr>
<td>Rhinovirus</td>
<td>34 (34)</td>
<td>28 (34)</td>
<td>6 (33)</td>
<td>3 (27)</td>
<td>9 (33)</td>
<td>3 (75)</td>
<td>0 (0)</td>
<td>5 (28)</td>
</tr>
<tr>
<td>Bocavirus</td>
<td>15 (15)</td>
<td>12 (15)</td>
<td>4 (22)</td>
<td>3 (27)</td>
<td>3 (11)</td>
<td>2 (50)</td>
<td>0 (0)</td>
<td>3 (17)</td>
</tr>
<tr>
<td>Metapneumovirus</td>
<td>8 (8)</td>
<td>7 (9)</td>
<td>2 (11)</td>
<td>2 (18)</td>
<td>2 (7)</td>
<td>0 (0)</td>
<td>1 (33)</td>
<td>1 (6)</td>
</tr>
<tr>
<td>Isolated RSV</td>
<td>27 (27)</td>
<td>21 (26)</td>
<td>8 (44)</td>
<td>5 (28)</td>
<td>11 (41)</td>
<td>4 (100)</td>
<td>0 (0)</td>
<td>6 (33)</td>
</tr>
<tr>
<td>2+ Organisms</td>
<td>37 (37)</td>
<td>26 (32)</td>
<td>8 (44)</td>
<td>5 (28)</td>
<td>11 (41)</td>
<td>4 (100)</td>
<td>0 (0)</td>
<td>5 (28)</td>
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<tr>
<td>Negative</td>
<td>6 (6)</td>
<td>5 (6)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (6)</td>
</tr>
</tbody>
</table>

Table I.
Patient characteristics of the study cohort and several clinical outcome groups, comparing demographics, LOS, comorbidities and NPA results.

ALT, Alanine Transaminase; CLD, Chronic Lung Disease of Prematurity; CPR, Cardiopulmonary Resuscitation; HFOV, High Frequency Oscillatory Ventilation; LOS, Length of Stay; PHTN, Pulmonary Hypertension; RSV, Respiratory Syncytial Virus; SHD, Structural Heart Disease.
Conclusions

Bronchiolitis caused by different viruses within individual hosts demonstrates varying degrees of systemic inflammatory response and extra-pulmonary involvement. Structural heart disease has high incidence in this cohort, however, it is not proportionally substantive enough to completely explain the high number of infants requiring organ support.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0840
CLINICAL AND HEMODYNAMIC PROFILE, COMPLICATIONS AND OUTCOME OF PATIENTS ADMITTED IN A PEDIATRIC INTENSIVE CARE UNIT WITH DENGUE SEVERE IN DOMINICAN REPUBLIC

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¹Hospital General Plaza Salud, PICU, Santo Domingo, Dominican Republic

Aims & Objectives:

To review clinical and hemodynamic features, complications, atypical manifestations and outcome of children with dengue severe- dengue shock syndrome admitted in our Pediatric Intensive Care Unit trying to evaluate and compare results with international literature.

Methods

Retrospective chart review of patients admitted to the Pediatric Intensive Care Unit (PICU), of a referral Hospital In Santo Domingo, Dominican Republic with dengue severe over 2015 dengue epidemics (january-december 2015).

Results

Data from 103 pediatric patients were included of which 13 patients died (12.5% mortality).52 were under 5 years old (50%)and 27 (26%)was less than 1 year old. 58 were female (56%). 13 were adolescents. The commonest dengue warning sign was persistent vomiting (n:67 50%)and abdominal pain (n:39 38%). 47 children (45%) had persistent dengue shock needing vasopressors and fluids. Was required mechanical ventilation in 29 children (28%). 14 patients had abdominal compartmental syndrome needing decompression, 39 had cardiac failure needing inotropes (38%) and 7 had severe myocarditis. 27 patients were infected (26%). All patients had thrombocytopenia and 70% was abnormal clotting but only 3 patients developed a DIC. High transaminases were common but only 3 patients made a severe hepatic failure. Was very common the rapid progression of early shock (peripheral hypoperfusion, oliguria) into a profound shock in toddlers and adolescents even a fluid resuscitation. 20 patients needed a furosemide drip because of overhydration and 19 had severe pulmonary edema.

Conclusions

It was found that vomiting and abdominal pain are important warning signs before shock. Early shock signs progressed fast to profound shock in first 5 years of life and adolescents, sometimes even an standard fluid resuscitation. Abdominal compartmental syndrome and cardiac failure were common in dengue shock patients, late referrals were related to a high morbi-mortality. Severe refractory shock was the commonest cause of death.
Aims & Objectives:

Effect of early continuous veno-venous hemofiltration (CVVH) on hemodynamic and outcomes of pediatric septic shock remains controversial. This study aimed to assess the effect of early application of CVVH on hemodynamic course, metabolic status, and outcome of intractable septic shock in children.

Methods

Twenty three children with septic shock were admitted to PICU of Vietnam National Children's Hospital from June to December 2015. Conventional septic shock management was provided based on the surviving sepsis guideline. CVVH was indicated using PrismaFlex machine (Gambro, Germany) with AN69 hemofilter membrane when hemodynamic endpoints of resuscitation protocol were not met and high doses of inotropes-vasopressors were required. Hemodynamic, metabolic parameters, and vasoactive-inotropic score (VIS) were recorded during CVVH. Survival was assessed at 28 days from PICU admission. Linear spline mixed-effect models were used to assess changes in hemodynamic and metabolic parameters over time.

Results

Median time from ICU admission to therapy initiation was six hours. Median CVVH duration was 57.5 and 90.0 hours for survivors and non-survivors, respectively, and median ultrafiltration rate was 50 ml/kg per hour. After starting CVVH, mean arterial blood pressure, pH, and bicarbonate level increased while heart rate, VIS, and lactate level decreased significantly. During first six hours of CVVH, heart rate dropped 5.5 beats per hour (mean heart rate was 186.5 ± 23.8 bpm at initiation and 154± 28.5 bpm at 6 hours), and gradually decreased about one beat in every three hours. Median VIS decreased from 105.0 at CVVH initiation to 30.0 at 24 hours, and to 8.5 at 48 hours after CVVH initiation. Mortality was 30.4%. Time interval from PICU admission, from shock identification to CVVH initiation, CVVH duration, and hemodynamic-metabolic response were significantly associated with survival.

Conclusions
These data suggested that early continuous venovenous hemofiltration improved hemodynamic status, metabolic response, and survival of children with intractable septic shock.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0522
INCIDENCE OF HOSPITALIZATION FOR RESPIRATORY SYNCYTIAL VIRUS INFECTION AMONGST CHILDREN IN ONTARIO, CANADA: A POPULATION-BASED STUDY USING VALIDATED HEALTH ADMINISTRATIVE DATA

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3Institute for Clinical Evaluative Sciences ICES uOttawa, Research, Ottawa, Canada
4Children’s Hospital of Eastern Ontario, Research Institute, Ottawa, Canada
5Children’s Hospital of Eastern Ontario, Pediatric Intensive Care, Ottawa, Canada

Aims & Objectives:
Respiratory Syncytial Virus (RSV) is a common cause of severe illness in young children. Routinely collected Health Administrative Data (HAD) has been proposed as a method to facilitate novel RSV research. However, due to the risk for misclassification bias, the accuracy of HAD-elements should be validated prior to use. The primary objective of this study was to validate whether an algorithm of ICD-10 codes can accurately identify children hospitalized for RSV within Ontario’s HAD.

Methods
A retrospective chart-review was performed to establish a reference-standard cohort of children from Ottawa admitted to CHEO for RSV in 2010 and 2011. Extracted-data was linked to Ontario’s HAD (Institute for Clinical and Evaluative Sciences) and used to establish the accuracy of the algorithms. Age- and sex-standardized incidence rates were calculated from 2005-2012 and trends were assessed using simple linear regression.

Results
Following chart-review, data-linkage and restriction to first admission, 289 RSV-positive patients were identified for the reference-standard cohort. When the algorithm was applied to CIHI-Discharge Abstract Database, it was calculated to have a sensitivity 97.9% (CI:95.5-99.2%), specificity 99.6% (CI:98.2-99.8%), PPV 96.9% (CI:94.2-98.6%) and NPV 99.4% (CI:99.4-99.9%), as represented in Image 1. The incidence of hospitalized-RSV in Ontario from 2005-2012 was 10.2 per 1000 children under 1 year and 4.8 per 1000 children aged 1 to 3 years. Of the hospitalized cohort, 5.6% (CI:5.2-5.9%) and 3.1% (CI:2.9-3.3%) were admitted to PICU and required endotracheal intubated, respectively. No significant linear trend in incidence, length-
of-stay, PICU admission or intubation rate was evident. Among the RSV-cohort, 16.3% had one or more major risk factors, with a decreasing trend observed.

Image 1: Algorithm validation results of full RSV-positive cohort and specific disease pathophysiology.

<table>
<thead>
<tr>
<th></th>
<th>N = 2287</th>
<th>URTI</th>
<th>Bronchiolitis</th>
<th>Apnea</th>
<th>Pneumonia</th>
<th>RSV Admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specificity (95% CI)</td>
<td>100</td>
<td>99.3</td>
<td>(98.8, 99.6)</td>
<td>100</td>
<td>99.6</td>
<td>(99.2, 99.8)</td>
</tr>
<tr>
<td>Sensitivity (95% CI)</td>
<td>14.3</td>
<td>94.6</td>
<td>(91.3, 97.0)</td>
<td>44.4</td>
<td>34.0</td>
<td>(21.2, 48.8)</td>
</tr>
<tr>
<td>Negative predictive value (95% CI)</td>
<td>99.5 (99.1, 99.7)</td>
<td>99.3 (98.8, 99.6)</td>
<td>99.8 (95.5, 99.9)</td>
<td>98.5 (98.0, 99.0)</td>
<td>99.4 (99.4, 99.9)</td>
<td></td>
</tr>
<tr>
<td>Positive predictive value (95% CI)</td>
<td>100 (15.8, 100)</td>
<td>94.6 (91.3, 97.0)</td>
<td>80.0 (28.4, 99.5)</td>
<td>63.0 (42.4, 80.6)</td>
<td>96.9 (94.2, 98.6)</td>
<td></td>
</tr>
</tbody>
</table>

*URTI ICD-10 codes are B974 plus one of the following codes: J00, J01.0-J01.9, J02.8, J02.9, J03.0-J03.8, J04.0-J04.2, J05.0, J05.1, J06.9
All algorithms represented in image 1 were applied to the CIHI-DAD
Exact 95% CIs were calculated using the binomial distribution.
Image 2: Incidence, per 1000 children, of hospitalized RSV from 2005-2013 with 95% confidence intervals.

Legend: Incidence per 1000 person years is given for each fiscal year from 2005 to 2013. Closed circles (●) represent the incidence in the full Ontario cohort of children under 3 years of age. Closed triangles (▲) represent the incidence for children under 1 year of age. Open circles (○) represent the incidence for children between 1 and 3 years of age. Error bars shown are the calculated 95% confidence intervals. No significant increasing or decreasing trend was observed over the study period (Beta 0.21, 95% CI -0.39 to 0.83, P=0.42).
Conclusions

Children hospitalized for RSV can be accurately identified within Ontario’s HAD. The lack of change in hospital or PICU admission rates, endotracheal intubation rates or length-of-stay suggest no improvements in RSV prevention or treatment over the past decade.

Legend: The image shows the percentage of hospitalized RSV cases that were admitted to PICU and that required endotracheal intubation. Closed circles (•) represent the percentage of patients admitted to PICU each fiscal year. The open circles (○) represent the percentage of hospitalized RSV cases that required intubation. The error bars represent calculated 95% confidence intervals.
A PROFILE OF CHILDREN WITH VARICELLA ADMITTED TO A TERTIARY LEVEL PICU

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¹ROYAL MANCHESTER CHILDREN’S HOSPITAL, Paediatric Intensive Care Unit, Manchester, United Kingdom

Aims & Objectives:

Varicella is a vaccine preventable disease and vaccination is offered in the UK for the same. We reviewed cases requiring admission in a tertiary level PICU in UK to assess the severity, morbidity and mortality caused by varicella.

Methods

A retrospective case note review of patients admitted to PICU between January 2007 and December 2015 was conducted. Patients were identified from the PICU database with primary or secondary codes for varicella.

Results

Forty one patients were identified of which 34 were included. The male:female ratio was 1.4:1. Mean age of patients was 42 (± 37.3) months. Three (8.8%) patients were immune-compromised. The presentation to PICU included sepsis and shock in 53%, respiratory distress in 38.2% (empyema in 17.6%, pneumonia in 20.6%), meningoencephalitis (29.4%), and others (8.8%). Seven (20.6%) received intravenous immunoglobulin for suspected toxic shock syndrome. Sixteen (47%) required inotropes and nearly a fourth (23%) had Acute Kidney Injury. None needed renal replacement therapy. Two patients were referred to other centres for ECMO.

Eighteen (52.9%) patients had co-existing bacterial infection at presentation to PICU out of which 61% had group A streptococcal infection. Twenty seven (79.4%) patients were ventilated with mean ventilator days of 6.1 (±17.9). The mean PICU stay was 7.1 days (±18.2). None of our patients died. Both the patients who were referred for ECMO survived.

Conclusions

Secondary bacterial infection and septic shock are common in patients presenting to the PICU with varicella. Toxic shock syndrome is not infrequent and necessitates the use of intravenous immunoglobulin. The overall outcome of patients is good.
**Aims & Objectives:**

Procalcitonin is considered as a useful marker for bacterial infection. Breakpoints of Procalcitonin are used to predict bacterial and non-bacterial infections. Hence this study was undertaken to compare the various factors that are associated with high and low procalcitonin levels.

**Methods**

In the prospective observational study 44 consecutive patients who presented with features of SIRS/sepsis were grouped into two groups. Patients were classified into either Group I (Procalcitonin value > 2 ng/dl) and Group II (procalcitonin value of < 2 ng/dl). Clinical and laboratory parameters were noted.

**Results**

A total of 44 children (N=44) were included. The male: female ratio was 27:17. There were 28 children in the Group I and 16 children in the Group II.

The median age in Group I was 4.5yr (Interquartile range – 1.9-7.75). Localized infection (bronchiolitis, pneumonia, viral encephalitis, enterocolitis) accounted for 50% of this group. The average duration of illness prior to presentation was 5.05 days (Range: 1-10). The median TLC (total leucocyte count) in this group was 9400/cumm (Interquartile range -5175-14150/cumm). The median CRP 40.2mg/dl (Interquartile range15.08-102.65mg/dl). The median PCT was 17.5ng/dl (Interquartile range 7.375-60.75ng/ml). Tissue and blood culture was positive only in 10 children. 6 children (21.42%) had shock whose PCT was >50ng/dl.

The median age in the Group II was 6 yr (Interquartile range – 0.83-10.5yr). Localized infection was seen in 11/17 children (64%). The average duration of illness was 6.32days (Range: 1-30days). The median TLC in this group was 13,100/cumm (Interquartile range-10,575-18,275/cumm). The median CRP was 24(Interquartile range 4.225-29.925). The median PCT in this group was 0.23ng/ml (Interquartile range- 0.12-1.01ng/ml). Two children has blood and tissue culture positive. Statistical analysis was done comparing both the group.

**Conclusions**
Procalcitonin is a reliable marker for disseminated bacterial infection though localized infection may not elicit a very strong procalcitonin response. Presence of shock may be associated with a high procalcitonin.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0069
DENGUE CEREBELLITIS, REVERSE CONING AND SUPER-REFRACTORY STATUS EPILEPTICUS - A CASE REPORT
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¹SIMS- SRM Institutes for Medical Sciences- Hospitals- Vadapalani, Pediatric Intensive Care Unit, Chennai, India
²SIMS- SRM Institutes for Medical Sciences- Hospitals- Vadapalani, Pediatrics, Chennai, India
³SIMS- SRM Institutes for Medical Sciences- Hospitals- Vadapalani, Neurosurgery, Chennai, India

Aims & Objectives:

Dengue cerebellitis, CNS presentation of severe dengue, is one of the rare manifestations. We herewith describe a child with Dengue cerebellitis and reverse coning who progressed to have super refractory seizures leading to severe brainstem dysfunction.

Methods

Thirteen year old boy presented with seizures, altered sensorium and shock. His investigations revealed positive dengue serology and thrombocytopenia. CT scan done at admission showed hypodense lesion in the thalamus, cerebellar hypodensities, hemorrhagic areas and features of upward coning/herniation of the cerebellum with acute hydrocephalus which was confirmed later with MRI(Magnetic Resonance Imaging), once he stabilized. Urgent posterior fossa decompression with EVD(extra-ventricular drainage) placement was done along with pulse dose methylprednisolone. A dose of Intravenous Immunoglobulin(IVIG) was also given. Brain biopsy done from the cerebellum confirmed dengue cerebellitis. PCR(Polymerase chain reaction) testing in CSF was negative for all bacteria and viruses. With the drainage of CSF(Cerebrospinal fluid), his ICP(Intracranial pressure) normalized and a programmable ventriculo-peritoneal shunt was placed along with intraprenychymal ICP monitoring probe which was removed once the ICP stabilized. The child was weaned off with tracheostomy and gastrostomy was also done. He developed status epilepticus requiring multiple anti-convulsants following development of new lesions seen in fronto-temporal, insular and parietal cortex on MRI. A possibility of Post-infectious autoimmune encephalitis was suspected, pulse dose methylprednisolone, second dose of IVIG and plasmapheresis was initiated. Investigations to rule-out autoimmune encephalitis were all negative. Despite these measures, he progressed to super refractory status epilepticus resistant to multiple anti-convulsants and whole body cooling and developed severe brainstem dysfunction, confirmed with CT- Angiography.
The child died due to severe brainstem dysfunction.

**Conclusions**

Dengue cerebellitis with upward herniation is a rare finding in the spectrum of Severe Dengue. There are various other case reports wherein the outcome has been fatal. Our child also had a fatal outcome.
Aims & Objectives:

Carbapenem resistant enterobacteriaceae (CRE) infections are increasing in hospitalized patients. Isolation of patients infected with CRE by itself may not be enough to decrease the spread of these organisms. It is also essential to identify and isolate patients colonized with CRE. The aim of our study was to study the rate of CRE colonization in PICU and to determine the effectiveness of active surveillance in reducing the incidence of CRE infection.

Methods

Due to an increase in CRE infections despite contact isolation of all infected children, we started active surveillance for CRE colonization in our PICU from July 2013. Rectal swabs were sent for all children at admission and weekly thereafter, until PICU discharge. Patients with positive CRE swabs were placed in contact isolation.

The incidence of CRE infection before and after starting surveillance was analyzed

Results

Between July 2013-June 2015, 1262 swabs were sent from 1022 patients. Swabs were positive in 199 patients. One hundred and fifty patients (14.7%) were colonized at admission and 49 (5.6%) were positive after 1 week, indicating ICU acquired colonization. Prior to initiation of surveillance, 7 CRE infections (4.65/1000 patient days) were identified from January-June 2013. After initiation of surveillance, the incidence of CRE infections gradually decreased. There was a significant reduction (p<0.0001) in the incidence of CRE infections after initiation of surveillance when compared with the pre-surveillance period. There were no CRE infections from July 2014 to June 2015.

Conclusions

Control of CRE infection is possible with active surveillance combined with contact isolation precautions
Aims & Objectives:

Patients with Severe Dengue (SD) and catastrophic dengue (CD) can be complex, with shock, massive fluid collections, major bleeding and multi-organ failure contributing to significant mortality. The WHO Dengue Guidelines have comprehensive protocols for SD but have limited recommendations for severest forms of dengue.

We applied lessons from well-researched conditions that occur globally (burns, trauma, Emergency resuscitation) and formed a set of bundled interventions (BI), Table 1, in attempts to maximize outcomes of CD.

Methods

We included all patients with SD and created a separate new category for “Catastrophic Dengue” (CD) which includes SD with life-threatening and complicated manifestations, Table 2.

The BI were instituted from October 2011 and we evaluated its impact with mortality as primary end-point and also 24-hour fluid requirement, incidence of compartment syndromes, need for intubation, and blood products for major hemorrhage. The Hospital Ethics committee approved the study and waived need for informed consent. The interim results in 38 patients were compared to a historical cohort of 30 patients in whom the WHO Dengue protocols were followed (Standard Therapy, ST).
Table 1: Bundled Interventions in Severe and Catastrophic Dengue

1) Controlled Fluid Resuscitation:
   ✓ Early Albumin in the critical phase if crystalloid infusions are leading to large positive fluid balance (Adapted from Burn Resuscitation)

2) Avoid Lethal triad, especially Hypothermia
   ✓ Monitoring core temperature to maintain >36° C (Adapted from Trauma Guidelines)

3) Hemostatic measures (Adapted from Trauma Guidelines)
   ✓ Suturing of bleeding sites, cauterization in mucosal bleeds whenever possible
   ✓ Tranexemic acid infusions

4) Targeted blood component therapy

5) Preserving spontaneous breathing with preference for Non Invasive Ventilation

6) Use of intubation bundle with prior blood pressure resuscitation if intubation is inevitable (Adapted from Emergency and Resuscitation Guidelines)

7) Identification and early relief of compartment issues, controlled ultrasound guided paracentesis if necessary.
<table>
<thead>
<tr>
<th>Category A</th>
<th>Category B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shock</strong></td>
<td></td>
</tr>
<tr>
<td>Fluid requirement</td>
<td>Hypotensive shock</td>
</tr>
<tr>
<td>&gt; 30ml/kg in 4 hours</td>
<td></td>
</tr>
<tr>
<td>Urine output</td>
<td>pH &lt; 7.2 (or) Lactate &gt; 2 times upper limit of normal</td>
</tr>
<tr>
<td>&lt; 1 ml/kg/hour for 6 hours</td>
<td>Need for high dose vasopressors:</td>
</tr>
<tr>
<td></td>
<td>Epinephrine/norepinephrine</td>
</tr>
<tr>
<td></td>
<td>&gt; 0.2 mcg/kg/min or</td>
</tr>
<tr>
<td></td>
<td>vasopressin &gt; 0.001 units/kg/min</td>
</tr>
<tr>
<td><strong>Respiratory</strong></td>
<td></td>
</tr>
<tr>
<td>Respiratory distress</td>
<td>Need for Positive Pressure</td>
</tr>
<tr>
<td>with tachypnea</td>
<td>Ventilation</td>
</tr>
<tr>
<td></td>
<td>(Noninvasive or Invasive)</td>
</tr>
<tr>
<td>Hypoxemia</td>
<td></td>
</tr>
<tr>
<td>SpO2 &lt; 90% in room air</td>
<td></td>
</tr>
<tr>
<td><strong>Bleeding</strong></td>
<td></td>
</tr>
<tr>
<td>Platelets &lt; 20,000/cumm</td>
<td>Major bleeding requiring</td>
</tr>
<tr>
<td></td>
<td>transfusion of blood products &gt;30ml/kg</td>
</tr>
<tr>
<td>INR &gt; 2.5 or aPTT &gt; 3 times normal</td>
<td></td>
</tr>
<tr>
<td><strong>Fluid collections</strong></td>
<td></td>
</tr>
<tr>
<td>Compartment syndrome not requiring drainage</td>
<td>Large pleural fluid or Abdominal</td>
</tr>
<tr>
<td></td>
<td>Compartment syndrome necessitating drainage</td>
</tr>
<tr>
<td><strong>ORGAN FAILURE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Neurological</strong></td>
<td></td>
</tr>
<tr>
<td>Irritability/ drowsiness</td>
<td>CNS: GCS &lt; 12 or seizures</td>
</tr>
<tr>
<td><strong>Liver</strong></td>
<td></td>
</tr>
<tr>
<td>Elevated Transaminases (ALT/AST &gt; 1000 Units/L)</td>
<td>Elevated Transaminases (ALT/AST &gt; 1000 Units/L) with</td>
</tr>
<tr>
<td></td>
<td>encephalopathy</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Kidney</strong></td>
<td></td>
</tr>
<tr>
<td>Creatinine &gt; 1.0 mg/dl,</td>
<td>AKI requiring dialysis</td>
</tr>
<tr>
<td>not requiring dialysis</td>
<td></td>
</tr>
</tbody>
</table>

**Results**
Overall, BI were successful in SD and CD with significant reduction in mortality (table 3). Controlled resuscitation, including albumin and fluid-removal therapies resulted in decreased requirement for positive pressure ventilation. Hemostatic measures were successful in decreasing the number with major hemorrhage; while amongst the bleeders, controlled transfusions resulted in lower volumes of blood product use.

**Table 3 – Results**

<table>
<thead>
<tr>
<th></th>
<th>Bundled Interventions (BI) Group</th>
<th>Standard Therapy (ST) Group #</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients (total = 68)</td>
<td>38 SD = 13 CD = 25</td>
<td>30 SD = 5 CD = 25</td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td>1/38</td>
<td>8/30</td>
<td>0.008</td>
</tr>
<tr>
<td>24 hour fluid requirement (ml/kg)</td>
<td>104.82 ± 38.87</td>
<td>125.5 ± 63.04</td>
<td>0.101</td>
</tr>
<tr>
<td>(mean ± SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>72 hour % Fluid Overload^</td>
<td>7.19 ± 5.74</td>
<td>14.52 ± 11.69</td>
<td>0.004</td>
</tr>
<tr>
<td>(mean ± SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory compromise requiring positive pressure ventilation in CD</td>
<td>10 / 25 (7 intubation + 3 NIV)</td>
<td>19 / 25 (15 intubation + 4 NIV)</td>
<td>0.020</td>
</tr>
<tr>
<td>Peri-intubation complications*</td>
<td>0 / 7</td>
<td>3 / 15</td>
<td>0.5</td>
</tr>
<tr>
<td>Major haemorrhage (no. of pts)</td>
<td>9</td>
<td>16</td>
<td>0.011</td>
</tr>
<tr>
<td>Blood products used (ml/kg/pt)</td>
<td>48.4 ± 16.64</td>
<td>97.56 ± 66.81</td>
<td>0.039</td>
</tr>
<tr>
<td>(mean ± SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

# Standard Therapy Group: Historical controls treated as per WHO Dengue protocol(2009)
* Peri-intubation complications: Hypotension, arrest
^ %Fluid Overload = ((Fluid In – Fluid out)/admission weight) x 100

**Conclusions**

Interim results suggest that lessons learnt from diverse conditions with similar pathophysiology can be usefully applied to improve outcomes in severe and catastrophic forms of dengue.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0747
HAND HYGIENE EDUCATION AND CCTV MONITORING ON COMPLIANCE OF HAND HYGIENE AND IMPACT ON HEALTH CARE ASSOCIATED INFECTIONS IN PICU-PROSPECTIVE SEQUENTIAL BEFORE-AFTER PERIOD STUDY

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¹Jawaharlal Institute of Postgraduate Medical Education and Research JIPMER, Pediatrics, Puducherry, India

Aims & Objectives:
Control of multidrug resistance organisms is critical and urgent as the number of antibiotics available is extremely limited. To study the hand hygiene education module with/without CCTV monitoring with respect to compliance and clinical outcomes.

Methods

Design: Prospective open labeled sequential before–after period study. Setting: Level III-PICU of a tertiary care hospital. Period: August-2014 to January-2015 (before-period) and February-2015 to July-2015 (after-period). Participants: All health care persons working in and visiting to PICU. Interventions: Hand hygiene education module (running of daily video, bi-weekly classes, reinforcement and display of posters). Monitoring by CCTV was introduced after-period of study. Each day divided into four blocks, 1-hour in each block was randomly selected by using random table with stratification (day/night shift) by the person not involved in study. Hand hygiene practice were noted according to WHO “My Five Moments of Hand Hygiene. Outcome measures: Hand hygiene compliance rate and health care associated infections.

Results

751 patients (before-period n=369, after-period n=382) were admitted. Compliance rate was higher in after-period as compared to before-period (56.6%,n=5953/10519 vs 36%, n=2178/6028;p=<0.001). Compliance rate highest in consultant (99%vs77%) followed by nursing-staff (77%vs57%), resident doctors (52%vs32%), and visiting healthcare providers (22%vs12%) and nursing orderly (9%vs4%) (p=<0.001). Reason for non-compliance was not significant, forgetfulness (67.2%vs63.4%), was in hurry (34.5%vs33.2%), didn’t knew importance (13.8%vs12.5%) and unavailability of product (1.7%vs1.5%). After-period, VAP and CLABSI was 4.7/1000 ventilation-days and 6.6/1000 central line-days as compared to 12/1000 ventilation-days and 1.9/1000 central line-days in before-period respectively. No difference in PICU mortality (21.2% vs 18.4%, odds ratio 1.20, 95% CI 0.83–1.71;p=0.340).

Conclusions
CCTV-monitoring for hand hygiene practice was associated with improved hand hygiene compliance rate and lower health care associated infections.
Aims & Objectives:

We previously reported on the prominent role that vasodilatation plays in pediatric septic shock. Thus, norepinephrine (NE) may be a useful first-line vaso-active agent in these cases since it can reverse underlying pathophysiology by venoconstriction thus improving venous return (VR), improve myocardial function via mild inotropy and increase SVRI.

We primarily aimed to study the effect of early NE after the initial 20-30ml/kg fluid on resolution of shock, VR and fluid balance as compared to a historical cohort of 41 patients managed as per ACCM-PALS septic shock algorithm where early epinephrine was employed. We also aimed to study the effect of NE on myocardial performance including the diagnosis, treatment and outcomes of severe septic myocardial dysfunction (SMD).

Methods

This is an observational study where we closely monitored hemodynamics and myocardial performance using extended multimodal-monitoring (physical examination [PEx], ECHO, USCOM) before and after NE. Historical cohort were consecutive patients from our previous study. We also followed lactate trends, fluid balance, response to therapy and outcomes. Hospital Ethics Committee approved the study and waived need for informed consent.

Results

(Figure1,2)

27 patients received early NE after 20-30ml/kg fluid. As compared to our historical cohort, the 6- and 24-hour fluid requirement and ventilated days were significantly reduced, however, no difference in mortality was seen. Low SVRI confirmed in most patients using USCOM was improved by NE administration as was VR [significantly decreased stroke-volume-variation (SVV)]. The hyperdynamic shock associated elevated CI decreased towards normal while lactate trends were favorable. Severe SMD unmasked in 5/27 during NE administration improved with additional inotropy (dobutamine/epinephrine).
Table 1: Demographics and Outcomes between early Norepinephrine and Retrospective Cohort groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Early NE group (n= 27)</th>
<th>Retrospective Group* (n=41)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>24.3 ± 19.04</td>
<td>21.1 ± 12.7</td>
<td>0.856</td>
</tr>
<tr>
<td>PRISM</td>
<td>19.9 ± 7.8</td>
<td>16.02 ± 8.4</td>
<td>0.05</td>
</tr>
<tr>
<td>Number with hypotensive shock at presentation</td>
<td>19 (70.4%)</td>
<td>20 (48%)</td>
<td>0.09</td>
</tr>
<tr>
<td>0-6 hour fluid requirement</td>
<td>37.4 ± 15.1</td>
<td>88.9 ± 31.3</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>24-hour positive fluid balance (% mL/kg)</td>
<td>4.8 ± 4.5</td>
<td>9.6 ± 3.8</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Days on invasive ventilation (median) (survivors)</td>
<td>1(1-1.7)</td>
<td>4(2.5-5.25)</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>PICU days (median) (survivors)</td>
<td>4(3-6)</td>
<td>6 (4-8)</td>
<td>0.002**</td>
</tr>
<tr>
<td>Mortality</td>
<td>3(11.1%)</td>
<td>4 (9.8%)</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*Retrospective group: Managed according to ACCM-PALS with ECHO

** p value Significant
Conclusions

Early NE offers important benefits in pediatric vasodilatory septic shock by limiting positive fluid balance and ventilation time. Cardiac function may improve in most, however severe SMD may be unmasked with NE, which may be reliably detected by physical examination and responds well to additional inotropy.

Table 2: ECHO and USCOM parameters before and after Norepinephrine (NE) in 27 patients

<table>
<thead>
<tr>
<th>Fluid Responsiveness (USCOM)</th>
<th>Stroke volume variation (SVV)%</th>
<th>Pre-NE</th>
<th>Post-NE</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>23.8 ± 7.9</td>
<td></td>
<td>18.3 ± 9.1</td>
<td>0.001*</td>
</tr>
<tr>
<td>Flow Time corrected (FTc)</td>
<td>367.8 ± 34.1</td>
<td></td>
<td>370.4 ± 36.8</td>
<td>0.71</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Myocardial function (Echo)</th>
<th>Ejection fraction %</th>
<th>Pre-NE</th>
<th>Post-NE</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>61.2 ±13.9</td>
<td></td>
<td>59.7 ±15.3</td>
<td>0.49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Myocardial function (USCOM)</th>
<th>Inotropy index (INO) #</th>
<th>Pre-NE</th>
<th>Post-NE</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.6 ± 0.49</td>
<td></td>
<td>1.6 ± 0.57</td>
<td>0.92</td>
</tr>
<tr>
<td>Stroke Volume Index# (mL/m²)</td>
<td>48.4±13.4</td>
<td></td>
<td>46.2±14.5</td>
<td>0.11</td>
</tr>
<tr>
<td>Cardiac Index#(L/min/m²)</td>
<td>6.64±1.66</td>
<td></td>
<td>6.08±1.6</td>
<td>0.03*</td>
</tr>
<tr>
<td>Peak Velocity (VPk)#</td>
<td>1.65±0.34</td>
<td></td>
<td>1.6±0.35</td>
<td>0.251</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Systemic vascular resistance (USCOM)</th>
<th>SVRI# (dyne/s/cm²/m²)</th>
<th>Pre-NE</th>
<th>Post-NE</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>679.7 ± 204.5</td>
<td></td>
<td>873.5 ±198.9</td>
<td>0.0001*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perfusion</th>
<th>Lactate (mmol/L)</th>
<th>Pre-NE</th>
<th>Post-NE</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.5 ± 4.1</td>
<td></td>
<td>3.6 ± 2.9</td>
<td>0.183</td>
</tr>
</tbody>
</table>

**NOTE:**
Post NE studies done between 2-6 hours of starting NE.

# Assessed by USCOM.
SVRI: Systemic vascular resistance index
Aims & Objectives:

Leucocyte profiles change over the early course of sepsis. In adult critical illness and sepsis, the neutrophil:lymphocyte ratio (NLCR) has been shown to predict outcome. We hypothesised that in pediatric sepsis, absolute NLCR is associated with early mortality, and a change in NLCR is associated with late mortality.

Methods

We undertook a retrospective observational cohort study of children admitted to two paediatric intensive care units (PICU) with septic shock over a 4 year period. Death within 2 days of admission was classified as early. Receiver-operating curves (ROC) were used to analyse the predictive value of the absolute and change in NLCR. Multi-variable regression analyses were used to seek associations with the Paediatric Index of Mortality (PIM) score, weight-for-age and temperature.

Results

Two hundred and fifty nine immune-competent children were admitted with septic shock in the 4 year period, with a mortality rate of 18.1%. The NLCR decreases over the first 4 days of admission. The absolute NLCR moderately predicts early death (area under ROC 0.72); a day 1 NLCR≤1.63 has an odds ratio of 6.93 (95% CI 1.23-39.13, p=0.03) for early death. The change in NLCR moderately predicts late death (area under ROC 0.71); no decrease in NLCR has an odd ratio of 3.58 (95% CI 1.29-9.89, p-value=0.01).

Conclusions

Absolute and changes in NLCR predict early and late death, suggesting the importance of both an early rise in NLCR and decrease back to a 'normal' by day 4 of septic shock in PICU.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0746
A RETROSPECTIVE COMPARISON OF EARLY VASO-ACTIVE AGENT USE AND OUTCOMES IN PEDIATRIC SEPSIS: WE BECOME WHAT WE BEHOLD
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2University College London Institute of Child Health, Respiratory- Critical Care and Anesthesia, London, United Kingdom
3University Hospitals of Leicester NHS Trusts- Leicester, Department of Anesthesia, Leicester, United Kingdom
4Addenbrookes Hospital NHS Trust- Cambridge, Paediatric Intensive Care Unit, Cambridge, United Kingdom
5Imperial College Healthcare NHS Trust- London, Paediatric Intensive Care Unit, London, United Kingdom
6Great Ormond Street Hospital, Paediatric Intensive Care Unit, London, United Kingdom

Aims & Objectives:
Comparisons of vaso-active agents in sepsis have suggested superiority of epinephrine and norepinephrine over dopamine. We describe outcomes according to agents used in the early phase of sepsis in a cohort of children transported to a pediatric intensive care unit (PICU).

Methods
We undertook a retrospective analysis of a cohort of children with sepsis transported to a PICU by a specialist pediatric intensive care retrieval service over a 7 year period. Data were collected from the point of referral to the service until admission to a PICU.

Results
Three hundred and sixty four children were referred to PICU over a 7-year period (2004-2011, with a mortality rate of 25% (91/364). The crude mortality ratio for a child receiving dopamine was 1.39 (95% CI 0.91-2.10, p-value=0.12); 1.80 (95% CI 1.17-2.76, p-value=0.008) for norepinephrine, and 3.84 (95% CI 2.50-5.91, p-value=<0.0001) for epinephrine. Following risk adjustment using the Paediatric Index of Mortality (PIM) score, the standardised mortality ratios were 1.14 (95% CI 0.88-1.41) for dopamine, 1.15 (95% CI 0.82-1.49) for norepinephrine and 1.30 (0.98-1.63) for epinephrine. Furthermore, following propensity score matching for adrenaline use, there was no difference in outcome (Mann-Whitney-Wilcoxon p-value=0.8).

Conclusions
Inferences of superiority of one vasoactive agent over another from observational studies are flawed. In our cohort severity of illness determined epinephrine use, and therefore children on epinephrine had worse outcomes. Formal randomised trials or prospective clinical improvements studies are required to quantify the impact of these drugs on mortality.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0309
CELLULAR IMMUNE RESPONSE IN CHILDREN WITH SEPSIS: A PROSPECTIVE OBSERVATIONAL STUDY
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1Hospices Civils de Lyon- Hôpital Femme Mère Enfant, Pediatric Intensive Care Unit, Lyon, France
2Hospices Civils de Lyon- Edouard Herriot Hospital, Immunology Cellular Laboratory, Lyon, France

Aims & Objectives:

Immunosuppression induced by sepsis is well described in adults, but rarely explored in children. We hypothesized that sepsis may induce a similar immunosuppression in children, defined by decreased HLA-DR expression on monocytes (mHLA-DR). Furthermore, Toxic Shock Syndrome (TSS) and Septic Shock (SS) differ by their pathophysiological mechanisms. Here, we compared the cellular immune response between these 2 types of severe sepsis.

Methods

We performed a monocentric prospective study of children under 18 years-old admitted to PICU for TSS or SS between September 2014 and November 2015. We recruited controls from patients hospitalized for an elective surgery, without any criteria of infection. mHLA-DR and CD4 T-cell count were determined by flow cytometry. Samples were analyzed at Day1, 3 and 7, after admission.

Results

Twelve controls and 24 patients (17 SS and 7 TSS) were recruited and considered comparable regarding the age. At Day1, CD4 T-cell count median for patients was lower than controls (479 versus 1225G/L, respectively, p<0.0001, Mann-Whitney test). After, there was no significant difference, either between TSS or SS and controls. Both TSS and SS presented CD4 normalization between Day1 and 3, slower for SS. Similarly, at Day1, mHLA-DR median for patients was reduced than controls (10931 versus 28635ab/c, p<0.0001). mHLA-DR was lower in SS than TSS at Day1 (4572 versus 16744, p=0.027). At the 3 time points, SS mHLA-DR values were lower than controls, while TSS values corrected faster and were similar than controls at Day3.

Conclusions

Children with severe infections seem to share with adults some alterations in cellular immune response. TSS seems to present less severe alterations than SS. A more powerful study is necessary to determine whether immunosuppression induced by sepsis may be associated to deleterious outcomes, as those described in adults.
Aims & Objectives:

To assess diagnostic and prognostic value of mid-regional pro-adrenomedullin (MR-proADM) for the pediatric patients in PICU with sepsis.

Methods

Prospective observational study set in PICU. 113 pediatric patients were included. 47 patients were sepsis and 66 patients infected but no sepsis. At admitted PICU first 24 hours, MR-proADM levels were tested.

Results

MR-proADM levels were 1.18 nmol/L (0.25–5.83) in septic patients versus 0.63 nmol/L (0–2.20) in no sepsis patients (P = 0.001). MR-proADM levels were 1.65 nmol/L (0.63–5.82) in nonsurvivors versus 0.79 nmol/L (0-5.70) in survivors (P < 0.01).

Conclusions

MR-proADM may be helpful for diagnostic and prognostic assessment in pediatric septic patients.
MONOMICROBIAL *ESCHERICHIA COLI* NECROTIZING FASCIITIS IN A CHILD AFTER CHEMOTHERAPY: A CASE REPORT

P. Correa Rodrigues¹, C. Freitas Pizarro¹, J. Sztajnbok¹, E. Juan Troster¹, V. Odone Filho¹, M.T. Cabedo¹

¹Instituto de Tratamento do Câncer Infantil - ITACI- Instituto da Criança do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, Centro de Terapia Intensiva Pediátrica, São Paulo, Brazil

**Aims & Objectives:**

Necrotizing fasciitis is a destructive and quickly progressive bacterial infection, associated with high levels of mortality if not treated early. We here describe a case of fasciitis necrotizing and refractory septic shock due *Escherichia coli* in an oncologic patient with a successful evolution.

**Methods**

We reported the case of a 8-year-old child with acute lymphoblastic leukemia, who had received chemotherapy for induction with L-Asparaginase, Vincristine, Dexamethasone, Mitoxantrone and intrathecal Methotrexate. She was admitted to the Pediatric Intensive Care Unit (PICU) for neutropenic fever and septic shock within twenty days after induction. Antibiotic therapy with Vancomycin and Meropenem were initiated empirically.

**Results**

*Escherichia coli* was identified in the urine culture and blood culture collected in the admission at PICU. Since the entry, child referred pain in her left thigh, site where L-Asparaginase was previously administered (two days ago), but with no signs of inflammation and ultrasonography doppler unchanged. However, when patient began to recover neutrophil count, by the fifth day after PICU admission and twenty five days after induction, she presented with edema and hyperemia in her left thigh. The patient evolved with necrotizing fasciitis diagnosed by image studies (ultrasonography doppler, contrast-enhanced computed tomography scanning). Surgical debridement was performed and *Escherichia coli* was identified in the
secretion culture. Her condition improved after surgical debridement.
Conclusions

Necrotizing fasciitis with Escherichia coli, monobacterial, is rarely seen in clinical practice. In this case, the patient developed this located infection after neutrophil recovery. Successful treatment involves early diagnosis, surgical debridement of the necrotic tissue and broad-spectrum parenteral antibiotic therapy.
Aims & Objectives:

Background: Severe sepsis and septic shock are common conditions affecting live of infants & children worldwide. The benefit of using surviving sepsis campaign in septic children is not clear. Thus our aim of this study was to investigate the efficacy of a modified sepsis bundle care to reduce sepsis mortality as a multicenter trial.

Methods

Methods: Prospective-Interventional multicenter trial. Infants & children (aged 1 month – 15 years) with diagnosed with severe sepsis or septic shock at 7 different Academic centers in Thailand and had no exclusion criterias were enrolled in the study. They were treated by physicians in Emergency department, general Pediatric wards, and PICU according to modified surviving sepsis campaign guideline. (2 sepsis bundles were applied, 6 hrs resuscitation bundle and 24 hrs treatment bundle).

Results

Results: A total of 519 (188 Intervention +331 control) children with severe sepsis & septic shock were enrolled to the study. There were 302 male (58.3%) and 217 female (41.7%). There was no significant different in baseline clinical severity compare between intervention and historical control group. Baseline PRISM III score was at 6.2 ± 4.6 and PELOD score was at 18.5 ± 10.4 in intervention group. The initial hemodynamic resuscitation is the most important element in our sepsis trial. (P<0.01). We also found significant reduction of our sepsis mortality from 56 % (Pre-intervention) down to 16 % (post-Intervention) (P<0.001)
Conclusions

**Conclusion:** This study demonstrated significant reduction of our sepsis mortality after implementing the modified 2 sepsis-bundle care.

Funding: National research council of Thailand.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0118
FLUID BOLUS OVER 15-20 MINUTES VS. 5-10 MINUTES EACH IN THE FIRST HOUR OF RESUSCITATION IN CHILDREN WITH SEPTIC SHOCK - A RANDOMIZED CONTROLLED TRIAL

J. Sankar¹, J. Ismail³, S. CP², M.J. Sankar¹, A. C²
¹All India Institute of Medical Sciences, Pediatrics, South delhi, India
²PGIMER- Dr RML Hospital, Pediatrics, New Delhi, India

Aims & Objectives:

To compare the effect of administration of fluid boluses over 15-20 minutes each with that over 5-10 minutes each in the first hour of resuscitation on the composite outcome of need for mechanical ventilation and/or impaired oxygenation—increase in oxygenation index (OI) by 5 from baseline in the initial 6 and 24 hours of fluid resuscitation in children with septic shock.

Methods

We randomly assigned children (<18 years) with septic shock to 15-20 minutes bolus (‘Study group’ ) or 5-10 minutes bolus group (‘ Control group’). The study was terminated after enrolling 96 children because the interim analysis – conducted as per the mandate of IEC – revealed safety concerns in the 5-10 minutes group. Data was analyzed using Stata 11.

Results

Of the 96 children, 45 were randomly assigned to ‘15-20 min group’ and 51 to ‘5-10 min group’. Key baseline characteristics were not different between the groups. When compared to ‘5-10 min group’, fewer children in ‘15-20 min group’ needed mechanical ventilation or had an increase in OI at 6 hours (36% vs. 57%; RR (95% CI): 0.62(0.39 to 0.99)) as well as 24 hours (43% vs. 68%; 0.63 (0.43 to 0.93)). There was no difference in mortality or duration of mechanical ventilation between the groups.

Conclusions

The potentially increased risk of ventilation and/or worsened oxygenation in the first few hours after fluid resuscitation raises important concerns about the current recommendation of administering each fluid bolus over 5-10 minutes in children with septic shock.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0490
PROFILE, RISK FACTORS AND OUTCOME OF CENTRAL LINE ASSOCIATED BLOOD STREAM INFECTION IN PICU
S. Sankaranarayanan¹, V. Krishna¹, R. Padur Sivaraman¹
¹Sri Ramachandra Medical College and research institute, Pediatrics, Chennai, India

Aims & Objectives:
To study the rate, profile, risk factors and outcomes of Central Line Associated Blood Stream Infections (CLABSI) in the Pediatric Intensive Care Unit.

Methods
Retrospective study of patients admitted to the PICU between January 2010 and December 2015

Patients from 1 month to 18 years admitted to the PICU, who had a Central Venous Catheter were included while patients who had a stay in PICU or CVC in place for less than 48 hours or incomplete records were excluded

The profile of the microorganisms causing CLABSI including their antimicrobial sensitivity patterns was studied.
Statistical analysis done using Chi square and Man Whitney U test

Results
· During the study period, there were a total of 4492 admissions to the PICU
· 372 (8.3%) patients had central line
· 67 patients excluded based on exclusion criteria and so 305 patients were included
· 31 patients had 2 central lines and 1 had 3 lines
· Sepsis was clinically suspected in 94 patients (30.8%)
· CLABSI was detected in 31 patients and rate was 13.3 per 1000 catheter days
· Age and primary diagnosis was not a significant risk factor between the group
- 62% had femoral line and there was no significant risk of CLABSIs based on site (p 0.11)

- Duration of CVC was 9.25 days in CLABSIs group and 6.95 in non-CLABSIs group which was significant (0.04)

- Mortality was not significant between the groups (p 0.23)

  The mean duration of PICU stay was 14 days in CLABSIs group and 8.5 days in non CLABSIs group

  Gram negative bacilli was the most common organism (80.6%) commonest being Pseudomonas and all were ESBL while Candida was 9.6%

Conclusions

- The CLABSIs rate 13.3 per 1000 catheter days

  Duration of line and PICU stay were longer in the CLABSIs group but mortality was not significantly higher

  Gram negative bacilli was the most common organism
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0596
SEVERE HEPATIC-NEUROLOGICAL COMPLICATIONS OF DENGUE FEVER IN CHILDREN FROM A TERTIARY CARE CENTER IN NORTH INDIA
P. Sharma¹, M. Kumar¹, R. Goyal², G.K. Aggarwal², V. Kumar², A. Sahani², R.D. Srivastava², D. Guha²
¹Sri Balaji Action Medical Institute, Pediatric Critical Care and Pulmonology, New Delhi, India
²Sri Balaji Action Medical Institute, Pediatrics, New Delhi, India

Aims & Objectives:
Dengue is a common tropical infection and can have severe complications. Neurological involvement occurs in 4-5% of dengue cases. Acute liver failure (ALF) is a rare complication of dengue having poor outcome with 50% mortality in children. There is little information on the management of these severe dengue complications. We present clinical experience and outcome of severe hepatic-neurological complications of dengue fever.

Methods
From August to November 2015, all confirmed dengue cases admitted to Pediatric intensive care unit were analyzed. A confirmed case was defined as positive NS1antigen and IgM antibody against dengue virus by enzyme linked immunosorbent assay. Among 196 cases 11(5.61%) had severe hepatic-neurological manifestations. Data from all 11 case records was collected and retrospectively analyzed.

Results
Out of 11 cases 4 were diagnosed to have ALF and 7 had neurological manifestations. Demographic, clinical and laboratory parameters are presented in Table 1 and 2. Out of 7 neurological cases 2 had meningoencephalitis, 2 had meningitis and 3 had seizures. All patients recovered completely except one who had significant neuro-deficit at discharge. Out of 4 ALF cases 3 recovered completely without any deficits except one which expired. The expired child had shock and hypoalbuminemia at presentation. Other causes of ALF like hepatitis A, B etc. were ruled out.
Table 1: Demographic, clinical and laboratory features at admission of patients with Neuro-complications

<table>
<thead>
<tr>
<th>Parameters</th>
<th>N=7 Median(range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>5 (0.75-12)</td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
</tr>
</tbody>
</table>

**Clinical Profile**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>100%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>86%</td>
</tr>
<tr>
<td>Headache</td>
<td>43%</td>
</tr>
<tr>
<td>Bleeding</td>
<td>14%</td>
</tr>
<tr>
<td>Seizures</td>
<td>72%</td>
</tr>
<tr>
<td>Altered Sensorium</td>
<td>43%</td>
</tr>
<tr>
<td>Poor Perfusion</td>
<td>Nil</td>
</tr>
<tr>
<td>GCS</td>
<td>13 (9-15)</td>
</tr>
<tr>
<td>Meningeal Sign</td>
<td>57%</td>
</tr>
</tbody>
</table>

**Laboratory**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>11.7 (10.6-13.1)</td>
</tr>
<tr>
<td>White cell count (10^3/μL)</td>
<td>9700 (3800-15600)</td>
</tr>
<tr>
<td>Platelet Count (10^3/μL)</td>
<td>237 (36-587)</td>
</tr>
<tr>
<td>Sodium (meq/L)</td>
<td>134 (129-137)</td>
</tr>
<tr>
<td>Calcium (meq/L)</td>
<td>8.8 (8.9-9.3)</td>
</tr>
<tr>
<td>Hematocrit %</td>
<td>34 (33-38.9)</td>
</tr>
<tr>
<td>Minimum Platelet (10^3/μL)</td>
<td>148 (22-202)</td>
</tr>
</tbody>
</table>

**CSF**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell count (/cumm)</td>
<td>7.5 (5-10)</td>
</tr>
<tr>
<td>Differential cell count</td>
<td>100%lymphocytes</td>
</tr>
<tr>
<td>Glucose mg/dl</td>
<td>62 (58-71)</td>
</tr>
<tr>
<td>Protein mg/dl</td>
<td>19 (14-24)</td>
</tr>
<tr>
<td>MRI (Abnormal)</td>
<td>28%</td>
</tr>
</tbody>
</table>

**Outcome**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital days</td>
<td>7 (5-11)</td>
</tr>
<tr>
<td>Residual neuro Deficit</td>
<td>14%</td>
</tr>
</tbody>
</table>
Conclusions

Hepatic-neurological complications are rare manifestations of dengue and have significant morbidity. Shock at presentation was associated with poor outcome. Use of N-acetyl cysteine in ALF is found to be beneficial. In our experience outcome of these complications is good, however larger trials are needed to investigate further.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0021
ACCURACY OF PROCALCITONIN FOR DETECTING SEVERE BACTERIAL INFECTIONS IN CRITICALLY ILL CHILDREN

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²Queen Sirikit National Institute of Child Health- College of Medicine Rangsit University, Pediatric Critical Care & Respiratory Medicine, bangkok, Thailand

Aims & Objectives:

To determine accuracy of serum procalcitonin (PCT) for early detecting severe bacterial infection in critically ill children and to determine the correlation between change of PCT and clinical outcome including pediatric logistic organ dysfunction (PELOD) score and length of PICU stay.

Methods

A prospective observational study was conducted at the Queen Sirikit National Institute of Child Health between 1st March 2014 – 31st December 2014. The patients presenting with acute severe life-threatening conditions were included. Microbiologic specimens from various sources were sent for multiplex PCR and bacterial culture on day 1st of hospitalization. Serum PCT were obtained on day 1st, 2nd, 3rd and 5th and PELOD scores was evaluated on day 1st and 5th.

Results

61 patients with the mean age of 21.2 months were included. Patients presented with various clinical features includes pneumonia with acute respiratory failure (68%), pneumonia with shock (21%), meningoencephalitis (8%), myocarditis and cardiogenic shock (1.6%) and scalp abscess with septic shock (1.6%). Medians of PCT level on day 1st and day 2nd from bacterial infection group are significantly higher than the PCT of the viral infection group or mixed bacterial and viral infection group. According to PCT on 1st day and microbiologic results, the accuracy of PCT to predict bacterial infection is moderate with a cut off of ≥1.1 ng/ml, sensitivity of 67.7%, specificity of 73.7%, and area under curve of 0.73. The percentage change of procalcitonin on day 2nd–5th correlates significantly with percentage change of PELOD day 1st–5th but not correlates with length of stay in the PICU.
Conclusions

Serum PCT can be used for early detecting bacterial infection in children with acute severe life threatening conditions with moderate accuracy. Change of PCT has a good correlation with change of PELOD score but not the length of stay in the PICU.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0871
THE EFFECTS OF BUNDLES ON CATHETER-ASSOCIATED URINARY TRACT INFECTIONS IN THE PEDIATRIC INTENSIVE CARE UNIT

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¹Istanbul University - Istanbul Faculty of Medicine, Department of Nursing Administration, Istanbul, Turkey
²Istanbul University, School of Health Sciences, Istanbul, Turkey
³Okan University, School of Health Sciences, Istanbul, Turkey
⁴Istanbul University- Istanbul Faculty of Medicine, Pediatric Intensive Care Unit, Istanbul, Turkey

Aims & Objectives:
To evaluate the two-year CAUTI rates in a pediatric intensive care unit in Turkey, a developing country, where a CAUTI Bundle had been implemented for infection prevention.

Methods
The research design is an observational and interventional prospective study. The study was conducted with 390 patients in the PICU of Istanbul Faculty of Medicine, Turkey, from July 2013 to July 2015. A new “CAUTI Prevention Bundle” was implemented in the PICU involved in this study. The patients were selected based on the diagnostic criteria of the Centers for Disease Control and Prevention (CDC). Urine samples were gathered and sent to the laboratory when suspected of infection or after catheter removal with no delay. The results were evaluated as clean, contamination, colonization, and CAUTI. The gathered data were evaluated based on the statistical methods defined in the SPSS 17 program.

Results
Of the patients admitted to the PICU, 65% had a urinary catheter inserted after 48 hours, and of those who received urinary catheterization, 95.6% had no change of catheter, and 87.9% had their catheter removed because it was no longer needed. Some 3.8% of the patients’ urine cultures were positive, 0.7% had colonization, and 1.5% were contaminated. The CAUTI rate was 1.8/1000 urinary catheter days. The specified time prevalence rate for CAUTI was 1.5%.

Conclusions
The risk of CAUTI development increases as the time of urinary catheterization extends. To conclude, only half the cases of CAUTI in our PICU were caused by Klebsiella pneumonia. Using CAUTI Bundles in PICUs is an effective way to
decrease catheter-associated urinary tract infections. It is advisable for PICUs in developing countries to use CAUTI Prevention Bundles in order to decrease the rates of CAUTI infections.
Aims & Objectives:

To report the prevalence and mortality associated with sepsis in children admitted to Pediatric Intensive Care Units (PICU) in Brazil.

Methods

A subset analysis of the LAPSE study (unpublished data). All children from 29 days to 17 years old admitted to ten PCIU in Brazil during a four month period were evaluated for the presence of sepsis within the first 24 h of admission and followed until PICU discharge or death.

Results

599 children were admitted to the PICU and 240 fulfilled sepsis criteria. The prevalence of sepsis, severe sepsis and septic shock were 40.1%, 20.0% and 13.2%, respectively. The median age of sepsis children was 16 months (IQR: 4.0 – 61.6), 52.9% were male. The mean PIM2 was 9.5% ± 16.6. Most (91.6%) sepsis patients were admitted for medical conditions and 49.2% patients were admitted from the ED. Forty-three percent patients had one or more chronic conditions. At the time of admission to the PICU, 73.8% had MODS; respiratory and cardiovascular dysfunctions were the most frequently observed dysfunction, in 122 (50.8%) and 92 (38.3%) patients, respectively. The most frequent (65.1%) infection source was the respiratory system. Mechanical ventilation and vasoactive drugs were used in 50.8% and 30.6% children with sepsis, respectively. The mortality related to sepsis, severe sepsis and septic shock was 5.8%, 10.0% and 11.4%, respectively, and lesser than expected when compared with the SMR 0.55. Sepsis prevalence (43.6% x 32.4%, p=0.01) and mortality (7.3% x 1.6%, p=0.125) were higher in patients admitted to public PICU compared with private PICU.

Conclusions

Sepsis is a common cause of admission to Brazilian PICU. Despite the high prevalence, sepsis-related mortality is similar to that reported in developed countries.
Aims & Objectives:

In many high income countries, children of indigenous populations have higher mortality but the contribution of severe infections to excess mortality in this highly vulnerable group is unknown. We assessed the incidence and mortality of severe infections in critically ill indigenous children in Australia.

Methods

Retrospective multicenter cohort study including Indigenous Australian children under 16 years of age requiring admission to general and pediatric intensive care units (ICUs) in Australia between 2002 and 2013.

Results

Invasive infections accounted for 726 (23.0%) of 4864 non-elective intensive care admissions in indigenous children. The population-based admission rate due to all
invasive infections was 47.6/100,000. *S.aureus* was the leading pathogen accounting for 22% of sepsis/septic cases. The population-based *S. aureus* sepsis incidence rate was 4.42/100,000 in indigenous children in comparison to 0.57/100,000 in non-indigenous children (Incidence rate ratio 7.69, 95%-CI 5.81-10.06, p<0.0001). Risk-adjusted mortality was not significantly different between indigenous and non-indigenous children (OR 0.75; 95%-CI 0.53-1.07, p=0.115). We estimated a population-based age-standardized mortality rate due to invasive infections in indigenous children of 2.67/100,000 versus 1.04/100,000 in non-indigenous children (IRR 2.65 95%CI: 1.88-3.64, p<0.001).

**Conclusions**

Indigenous children had higher rates of intensive care admission due to severe infections than non-indigenous children, with a predominance of staphylococcal infections. While ICU case fatality rates were similar, the population-based mortality was more than twice as high for indigenous children. Our study highlights an important area of inequality in health affecting indigenous children in a high income country that warrants urgent attention.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0860
CHANGE IN ANTIMICROBIAL PRESCRIPTION BEHAVIOUR IN a TERTIARY LEVEL PICU/NICU: A QUALITY IMPROVEMENT PROJECT

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Aims & Objectives:

To ensure that a complete prescription for anti-microbials is written for all our Intensive care patients as per NICE and Department of Health guidelines (clearly mention indication to start, the plan and duration of therapy) as a part of the antibiotic stewardship programme.

Methods

We reviewed all antibiotic prescriptions twice a day for compliance. Interventions were done over a period of 4 weeks (every Monday). Interventions in order of application included; Visual aids and reminders, Email to all registrars, senior fellow reminders, Consultant and Pharmacist reminders. Data was measured prior to every intervention and then midweek and continued for a period of 6 months as follow up. SPC charts were run.

Results

An improvement in prescription behaviour from <10% complete prescriptions to >80% complete prescriptions was seen over time and was well sustained over a 6 month period. NICU lagged behind PICU with only 50% complete prescriptions at the end of 3 months of study. This could be secondary to absence of daily pharmacist and consultant reminders in NICU. NICU however caught up by the end of the 6th month with >75% complete prescriptions once there was consultant and pharmacist engagement in the project. Overall dips in the SPC runs were mainly observed during week-ends (no pharmacist cover).

Conclusions

By selecting target behaviours prescribing can change. These changes are better implemented and then sustained when there is engagement from all tiers of staff and a cultural change in the team.
Aims & Objectives:

In 2015, we faced EV-D68 outbreak in Japan, and accumulated cases of paediatric respiratory failure were reported from Tokyo (Ito, IASR 2015). Outbreaks of EV-D68 have been reported from several countries including US epidemic in 2014, however, the report from critical care field is limited and severity of respiratory failure due to EV-D68 is not well known.

Methods

To investigate clinical features and management of severe respiratory failure due to EV-D68, chart review was performed retrospectively.

Results

In 2015, within cases of respiratory failure needed hospitalization into our institution, 16 cases were found positive with EV-D68. In these, 4 cases (2-11 y) were admitted to our ICU due to severe respiratory failure. Initial symptoms were similar to bronchial asthma in all cases, and two had past history of asthma. They were treated with standard management including beta stimulant, steroid and magnesium, but efficacy was limited. All 4 cases required intubation and mechanical ventilation in the end, one case was treated by ECMO. They needed slightly higher peak pressure (29.0 vs. 26.6 cmH2O) and longer duration of mechanical ventilation (10.5 vs. 2.0 days) comparing with those in usual asthma. All patients survived to hospital discharge and neurological sequelae, such as acute flaccid paralysis, were not documented.

Conclusions

Clinical presentation of severe acute respiratory failure due to EV-D68 is difficult to distinguish from bronchial asthma, however, response to asthma treatment seems to be limited and duration of mechanical ventilation is longer than those in asthma. Further investigation and setup, such as ratio of neurological sequelae, indication of steroid, epidemiological reporting systems and laboratory networks, are warranted.
Aims & Objectives:

Severe sepsis is one of the leading causes of death in children but there is no much data available on incidence of sepsis in developing countries. Aim of this observational pilot study was to examine incidence of sepsis on admission over period of four months in pediatric ward at newly established All India Institute of Medical Sciences Patna.

Methods

All patients admitted to pediatric ward were screened for SIRS and sepsis on the basis of clinical examination and leucocyte count at the time of admission. SIRS and sepsis definition was followed as defined ACCP and SCCM.

Results

A total of 126 children admitted consecutively in pediatric ward over period of four months were studied. Incidence of sepsis on admission was 24.4% with 32 children having sepsis. Eighty nine children were male with male: female ratio of 2.4:1. Mean age of study population was 6.7 years. Average hospital stay for children with sepsis was 10.75 days. Mortality rate in children with sepsis on admission was 9%. Leukocytosis (93.8%) was the commonest finding in patients diagnosed for sepsis, followed by tachypnea (71.9%), tachycardia (56.5%), and temperature more than 38.3 degree Celsius (34.4%). Definite evidence of infection was present in 37.5% children initially leveled as having sepsis.

Conclusions

Severe sepsis is common in children admitted to hospital. Incidence of sepsis in this study is more than and adult studies in India. Having such a high incidence of sepsis, interventions like making sepsis registries will help understand true burden of sepsis in hospitals.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0934
Epidemiology of Sepsis and Risk Factors for Mortality in a Tertiary Pediatric Intensive Care Unit in Mexico


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2Hospital Infantil de Mexico Federico Gomez, Pediatric Intensive Care Unit, Mexico, Mexico
3Hospital Medica Sur, Pediatrics Department, Mexico, Mexico

Aims & Objectives:

To describe the epidemiology of sepsis in a pediatric intensive care unit (PICU) in Mexico and establish factors that increase risk of mortality.

Methods

We performed a prospective study and included all consecutive patients with diagnosis of sepsis from September 2012 to February 2013. We described epidemiological characteristics. In a second phase, clinical factors were evaluated for association with mortality through chi-square or Fisher’s exact test and we considered statistical significance with p value < 0.05. Finally, we performed a logistic regression model to identify factors with independent association.

Results

During the study period 466 patients were admitted to PICU and 205 (43%) accomplished criteria of sepsis. Age range was from 0 to 17 years old and 74% of patients had an underlying disease. Infection was acquired at community in 61% of patients and microbiological isolation was obtained in 22%. Gram-negative bacteria were the most frequent, followed by fungus and gram-positive bacteria. Mortality rate was 10.7%. Of all clinical factors considered, those significantly associated with mortality were: immunosuppression, nosocomial infection, underlying disease, treatment with steroids, superinfection, abdominal infection, gram-positive bacteria, viral and fungal infection, bacteremia and PIM2 > 13. When we included these factors in a logistic regression model, just the following variables had significantly association: treatment with steroids (OR 29), PIM2 > 13 (OR 7) and nosocomial infection (OR 5).

Conclusions

Sepsis is a frequent diagnosis in our PICU and there are factors that highlight the probability of mortality in this population. This knowledge let us to establish strategies for prevention and control of infections and mortality in our center.
PHARMACOLOGIC CARDIOVASCULAR SUPPORT ASSESSED BY THE VASOPRESSOR INOTROPIC SCORE (VIS) IN CHILDREN WITH SEPTIC SHOCK

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1University Hospital of The University of São Paulo, Pediatric Intensive Care Unit, São Paulo, Brazil

Aims & Objectives:

To describe the clinical characteristics and the vasopressor inotropic score (VIS) in survivors and non-survivors of pediatric septic shock.

Methods

Post-hoc analysis of a randomized control trial of 120 children with septic shock from 02/2008-07/2013. We compared clinical characteristics, the Pediatric Logistic Organ Dysfunction (PELOD), the Pediatric Risk of Mortality (PRISM) scores, different categories of the VIS and the mean VIS in the first 24 (day 1) and 48 hours (day 2) between survivors and non-survivors.

Results

The group was composed of 120 children being 58.3 % male, median age of 28 months, mortality of 14.2% and standard mortality ratio of 0.64. There was no significant differences between groups in regard to gender, age, weight and presence of comorbidities. Survivors (103/120) had a longer duration of ICU stay (7.2 days, [IQR 25-75=5-13] x 5.5 days, [IQR 25-75=2.7-7.8];p=0.023), lower PRISM score (13.3 ±7.41 x 26.5 ±15.7,p=0.006) and lower PELOD score on first PICU day (12, [IQR 25-75=11-14] x 23, [IQR25-75=13-33],p=0.0002). Non-survivors used significantly more hydrocortisone (100% x 20.4%; p<0.001), and required significantly more renal replacement therapy (6/103 x 11/17,p<0.001). The majority of non-survivors presented a higher VIS category (4 and 5) on day 1 (94.1% x 39.6%; p=0.001) and on the second ICU day (84.6% x 29.1%; p=0.0002). The criterion of 25.7 of the mean VIS-day 1 had a sensitivity of 88.2% (95%CI:63.6-98.5) and specificity of 64.1% (95%CI:54-73.3) to predict death. The criterion of 40 of the mean VIS-day 2 was able to predict death with a sensitivity of 84.6%(95%CI:54.6-98.1), specificity of 88.4% (95%CI:80.5-93.8) and an AUC of 0.921.

Conclusions

The VIS presented a good performance to predict mortality in this cohort of septic shock children.
INFECTIONS IN THE CRITICAL CARE UNIT / SEPSIS / ANTIMICROBIAL STEWARDSHIP

PICC-0925
INCIDENCE OF FEVER AND INFECTIONS IN PEDIATRIC TRAUMATIC BRAIN INJURY PATIENTS; SINGLE CENTER DATA FROM TURKEY
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²Marmara University - School of Medicine, Pediatric Infectious Disease, Istanbul, Turkey

Aims & Objectives:
Infections are associated with increased morbidity, increased duration of stay and health care costs. We aimed to analyze the incidence of fever and infections in moderate - severe traumatic brain injury patients extracranial injuries.

Methods
Retrospective descriptive study in a tertiary university hospital pediatric intensive care unit
Pertinent data obtained from medical records and infection control surveillance.

Results
63 patients with moderate and severe head trauma were admitted between 2012 and 2014 to our tertiary PICU. Majority of the patients were male (68%). Median age was 36 months (IQR 12-96). There were 5 cases (8%) with infections; 3 ventilator associated pneumonia, 1 urinary tract infection, and 1 central line associated blood stream infection. None of these infections occurred before 72 hours of PICU stay. During the initial 24 hours 24 patients (38%) had documented fever (n:24), of which 3 developed infections later during the stay. Age and gender were not associated with development of infection (p>0.5), so were the type of CT lesions (fracture, bleeding, brain edema, etc) and antiedema management (mannitol vs hypertonic saline). Mean duration of PICU stay was 9.4±10.6 days. Children with nosocomial infections had longer PICU hospitalizations (10.2± 10.8), but this was not significant (p>0.05).

Conclusions
Febrile episodes were not related to infections in majority of patients. The early occurrence rate of fever was higher than expected, since our trauma protocol aims for normothermia during early days of brain injury. This finding may have implications on our temperature management.
Serum high-mobility group box protein-1 (HMGB1) levels in children with sepsis

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²Çukurova University Faculty of Medicine, Pediatric Intensive Care Unit, Adana, Turkey

Aims & Objectives:

Sepsis is one of the leading causes of morbidity and mortality in children as well as in adults. Early recognition of sepsis is the most important step for the reducing morbidity and mortality. High mobility group box protein-1 (HMGB1) is one of the late mediators of sepsis however studies have been mainly performed with experimental studies or among adult patients with sepsis. The aim of this study was to evaluate the serum levels of HMGB1 levels in children with sepsis at the time of diagnosis and also to evaluate potential relationship with scoring systems, laboratory findings and prognosis.

Methods

Forty-three consecutive children who have been diagnosed as sepsis according to “Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock” in two tertiary pediatric intensive care unit in Turkey, have been enrolled, and 28 healthy children served as a control group. Demographical factors, laboratory results, PRISM and PELOD scores, and prognosis have been recorded. Serum HGMB1 concentrations have been evaluated with ELISA. Statistical analysis have been performed with SPSS Package Program 16.5 and p values as <0.05 considered significant.

Results

Median serum HGMB1 levels were significantly higher in children with sepsis than the controls(p<0.0001). When we compared the serum HGMB1 levels among children with sepsis, severe sepsis and septic shock, statistically significant increased levels of HGMB1 levels were observed in children with septic shock (p<0.05, for both). Serum HGMB1 levels were not associated with PELOD and PRISM score (p>0.05). Serum HGMB1 levels were higher in exitus group comparing the surviving children, however without statistical significance(p>0.05).

Conclusions

Serum HGMB1 levels could be the good indicator for the presence of sepsis and also the definition septic shock in children. Further studies with serial evaluation of serum
HGMB1 levels during the follow-up period of children with sepsis in pediatric intensive care unit, are needed.
Aims & Objectives:

Pediatric oncology patients have increased susceptibility to infections that may progress to sepsis and septic shock and fluid is necessary to restore hemodynamic homeostasis. However, studies have shown that positive cumulative fluid balance is associated with higher morality. Our objective was evaluated fluid accumulated and mortality in oncologic children who presented severe sepsis and septic shock.

Methods

We conducted a retrospective cohort study analyzing fluid accumulation impact in pediatric oncologic patients mortality with severe sepsis and septic shock, on the third
and seventh day.

**Results**

78 patients were included. Mortality was 14.1%. Median age was 91 months and weight 29 kilogram. Forty-three patients (55%) required mechanical ventilation, 29 (37.1%) vasopressors and 14 (17.9%) renal replacement therapy. The median fluid accumulation on the third day was 3% (-15.7 to 26.2%) for survivors and 5.3% (-4.8 to 35.9%) for non-survivor patients, p=0.145. At the seventh day was 4.8% (-27.4 to
36%) and 6.1% (-4.0 to 17.3%), respectively, p=0.714. PRISM showed a correlation of 0.276 with the accumulated fluid balance on the third day, p=0.014, and 0.135 on the seventh day, p=0.373.

<table>
<thead>
<tr>
<th>Variables</th>
<th>n (%)</th>
<th>Median [min - max]</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid accumulated in 3rd day (mL)</td>
<td>78 (100)</td>
<td>667 (6685 - 4340)</td>
<td></td>
</tr>
<tr>
<td>Survivors</td>
<td>67 (88.9)</td>
<td>633 (6000 - 6300)</td>
<td>0.28</td>
</tr>
<tr>
<td>Deaths</td>
<td>11 (14.1)</td>
<td>1311 (-315 - 14340)</td>
<td></td>
</tr>
<tr>
<td>Fluid accumulated in 3rd day (%)</td>
<td>78 (100)</td>
<td>3.2 (15.7 - 35.9)</td>
<td></td>
</tr>
<tr>
<td>Survivors</td>
<td>67 (88.9)</td>
<td>31 (15.7 - 20.2)</td>
<td>0.14</td>
</tr>
<tr>
<td>Deaths</td>
<td>11 (14.1)</td>
<td>5.1 (4.8 - 35.9)</td>
<td></td>
</tr>
<tr>
<td>Fluid accumulated in 7th day (mL)</td>
<td>48 (100)</td>
<td>600 (5900 - 6470)</td>
<td></td>
</tr>
<tr>
<td>Survivors</td>
<td>39 (84.8)</td>
<td>960 (5000 - 6470)</td>
<td>0.01</td>
</tr>
<tr>
<td>Deaths</td>
<td>7 (15.2)</td>
<td>411 (-390 - 5390)</td>
<td></td>
</tr>
<tr>
<td>Fluid accumulated in 7th day (%)</td>
<td>48 (100)</td>
<td>5.2 (27.6 - 35)</td>
<td></td>
</tr>
<tr>
<td>Survivors</td>
<td>39 (84.8)</td>
<td>4.8 (27.4 - 35)</td>
<td>0.71</td>
</tr>
<tr>
<td>Deaths</td>
<td>7 (15.2)</td>
<td>6.1 (-4 - 17.4)</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

In this study we found no statistically significant difference between the median percentage of fluid accumulation among survivors and non-survivors patients on the third and seventh day. There was a correlation between the prognostic score and fluid accumulation on the third day, which could be explained by higher inflammatory response. One of the study's limitations is the small number of deaths. A larger study is necessary to conclude if fluid balance impacts in mortality in these patients.
Aims & Objectives:

Liver transplantation (LT) recipients <10kg is a medical and surgical challenge. The literature reports a higher incidence of complications and reduced survival in LT in patients <10 kg. The objective of this report was to compare the results over the past five years, in LT <10 kg, and those > 10 kg, analyzing differences in intensive care management and surgical aspects.

Methods

A retrospective analysis using our series of pediatric LT between 2011 and 2015. The group of <10 kg was compared with >10Kg (PELD, nutritional status, PICU stay, mechanical ventilation (MV), cardiovascular dysfunction, renal dysfunction, cold ischemia time, operative time, surgical technique were analyzed

Results

54 LT were performed on 54 patients, 19 (35%) <10 kg, 35> 10 kg groups differ LT technique (<100% 10Kg reduced grafts vs 48.5%), living donors (<10kg 84.2. % vs. 25.7%). 7.2 Hrs operating time 6.1 hrs (<10 kg /> 10 kg), cold ischemia time 139 min vs 274 min. In relation to PELD no statistical difference 20 vs 22 (<10 kg /> 10 kg), no statistical difference was demonstrated in VM days, PICU stay, cardiovascular or renal dysfunction. Patient’s survivals at 1 and 5 years: 73.7% in <10 kg and 97.1% and 94.2% in> 10 kg (p <0.02)

Conclusions

In this series, patients <10 kg do not had significant differences in clinical variables. Survival is lower in the group of patients <10 kg, which continues to represent a challenge.
The combine liver and kidney (L/K) in children is rare. The main indication is Polycystic Liver and Kidney Disease (PLD/PKD). Transplant surgery and immediate postoperative management of (L/K) combined Transplantation remain difficult and challenging. Patients should be operated before they are seriously ill or develop significant systemic manifestations of the metabolic disorder. Our aim was to describe the experience in combined (L/K) Transplantation in the pediatric transplant program at the Hospital Luis Calvo Mackenna, Santiago, Chile.

Methods

Retrospective data review from 8 (L/K) combined Transplantation conducted from November 1996 to July 2015. We determine their results (graft and patient survival) and demographic data.

Results

4 male and 4 female patients, with average weight 28.9 kg (13-50 kg), mean age 10.5 years (5-15 years). The etiology was PLD/PKD in 6 patients, 1 metabolic disease and 1 patient with liver re-transplantation associated with kidney failure due to calcineurins agents. Patient survival was 75% at 1 and 5 years, the liver graft survival was 75% and kidney graft survival was 75%. At the same time period, the survival of pediatric patients with isolated liver transplantation (LT) was: 86.2% and 79.5%, and for isolated kidney transplant (RT): 96, 2% and 95.4% at 1 and 5 years. Patients who died were; a patient with methyl malonic acidemia who relapse in the post-transplant and a liver transplant patient with secondary biliary cirrhosis associated with renal failure secondary to calcineurin.

Conclusions
Although (L/K) combined Transplantation indication is uncommon in children, this is an effective treatment option, properly using a scarce resource and significantly improving the quality of life in the receptor. In this series, the largest in our country, our results confirmed that survival after (L/K) combined Transplantation is lower than that of isolated liver and kidney transplants, but offers a good alternative for patients with PLD/PKD
A rare cause of spinal cord compression in an infant presenting to the PICU with recurrent failure to extubate: A case report.

R. Al-Abdwani, Ruwi, Oman

Aims & Objectives:

Atlanto-axial subluxation and spinal cord compression secondary to cervicovertebral junction (CVJ) anomalies is a rare but potentially treatable cause in pediatrics. Thus, identifying these patients is important. We present the clinical findings, images and management of an infant admitted to the PICU with extubation failure.

Methods

A 9-month old infant with uncomplicated birth was referred from a regional hospital for extubation failure after being intubated for pneumonia. She had history of severe delayed motor milestones since 2 months of age. Other milestones were normal. On examination, she had generalized hypotonia, quadriplegia with power 2/5 in upper limbs and 3/5 in her lower limbs. She was hyporeflexic but had sustained induced clonus. MRI brain was normal. MRI of cervical spine showed atlanto-axial subluxation with rotation and posterior displacement of dens causing cord compression and cord contusion/syrinx. CT of CVJ additionally showed widely non-ossified anterior and posterior C1 arch with 45 degrees rotation of C2. Metabolic and genetic tests for conditions associated with atlanto-axial instability were negative. There was no history of trauma.

The infant underwent tracheostomy and excision of the posterior arch of C1 and occiput to C2 fusion. Post-op CT showed partial reduction of the dens in AP plane, correction of rotatory component and widening of space available for cord. Currently 4 weeks post op, her muscle power is 3/5 for upper limbs and 4/5 for lower limbs. She is slowly being successfully weaned off the ventilator.

Results
Conclusions

In the PICU, hypotonia, quadripareisis, delayed motor milestones with ventilator dependance is often seen in neuromuscular disorders. Less common is CVJ instability. This can be due to CVJ anomalies, trauma, trisomy21 and metabolic disorders. Sustained induced clonus prompted MRI spine which revealed the diagnosis. In a patient with generalized hypotonia and quadripareisis requiring ventilator support, one must carefully assess for upper-motor-neuron-lesions and suspect atlanto-axial-subluxation with spinal cord compression as a differential diagnosis.
Aims & Objectives:

There has been little study of the short-term PICU outcomes after liver transplant in young children. We aimed to determine these outcomes and their predictors over a 10-year period.

Methods

Charts of all 65 children having liver transplant at age 0-<3yo [from 2005-2015] were reviewed. Predictors of outcomes were determined using multiple logistic or linear regressions (p≤0.05).

Results

Age 11.9 (SD 7.1) months, weight 8.5 (SD 2.1)Kg, PELD 24 (SD 12), biliary-atresia 39 (60%). Outcomes included: ventilator-days 12.5 (SD 14.1) days, PICU-LOS 21 (SD 21) days in survivors; PICU- and 6-month-mortality 5 (8%) and 7 (11%); 6-month graft survival 52 (80%); re-operation 33 (51%), infection 38 (59%), HAT 12 (19%), PVT 11 (17%), any-thrombosis 19 (29%), bile-leak 15 (23%), bowel-perforation 5 (8%), dialysis 9 (14%), and any severe-complication [HAT, PVT, bile-leak, bowel-perforation, intra-abdominal infection, re-transplant, or death] 32 (49%). Multivariable analyses included pre-defined clinically-significant variables (weight, PELD, year, and surgeon), and variables p<0.1 on univariate analysis. Predictors of primary outcomes were: 1) HAT: split/reduced (OR 0.06 [0.01,0.76]; p=0.030) or LRD (OR 0.16 [0.03, 0.95]; p=0.044) versus whole liver graft; and 2) ventilator-days: surgeon (p<0.05), lowest anti-thrombin (AT) postoperative d2-5 (Effect Size -0.24 [-0.47,-0.02];p=0.034), and split/reduced (ES -12.5 [-21.8,-3.2]; p=0.009) versus whole liver graft. Predictors of secondary outcomes were: 1) any-thrombosis: LRD (OR 0.10 [0.01,0.71]; p=0.021) or split/reduced (OR 0.10 [0.01, 0.85]; p=0.034) versus whole graft, and lowest AT postoperative d2-5 (OR 0.93; [0.87, 0.99];p=0.038), and 2) severe-complication: surgeon (p<0.05), lowest AT postoperative d2-5 (OR 0.92 [0.86-0.98]; p=0.016), and split/reduced (OR 0.06 [0.01, 0.78]; p=0.032) versus whole liver graft.

Conclusions
Young children having liver transplant have frequent early complications with low mortality. Whole-liver graft is associated with more complications, and higher AT postoperative d2-5 is associated with fewer thrombosis, severe complications, and ventilator days. Replacement of low AT levels post-operatively should be studied.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0169
NUTRITIONAL ADEQUACY IN NEONATES WITH CONGENITAL DIAPHRAGMATIC HERNIA REQUIRING ECMO: IMPACT OF THE TIMING OF SURGICAL REPAIR

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²Boston Children’s Hospital, Department of Gastroenterology/Nutrition, Boston, USA
³Boston Children’s Hospital, Department of Critical Care Medicine, Boston, USA

Aims & Objectives:

Suboptimal nutrient intake contributes to morbidity in neonates with congenital diaphragmatic hernia (CDH). Macronutrient intake impacts optimal growth and nutritional status at 12 months in this population. We aimed to describe the correlation between nutrient delivery and the timing of surgical repair.

Methods

After Institutional Review Board (IRB) approval, the institutional ECMO (extracorporeal membrane oxygenation) registry was queried from January 2012 – August 2015 for all CDH patients on ECMO who survived to day 14. Macronutrient delivery, operative repair, and demographics were reviewed. The timing of surgical repair in relation to initiation of ECMO was classified as early (≤ 48 hours) or late (>48 hours). Energy and protein delivery was analyzed.

Results

25 neonates were identified, 17 (68%) with left-sided defect, 9 (36%) were female. The median (IQR) age of repair 3 (1, 15) days, and 14 (56%) had early repair. Weight for age z –score (WAZ) at admission was 0.05 (-0.73, 0.41), ECMO duration 13 (9, 22.5) days and 90-day mortality 32%. Figure 1 shows the mean intake of energy and protein from day 1-7 and 14. Table 1 compares the adequacy of energy and protein delivery in early vs. late repair groups.
**Figure 1:** Energy (A) and Protein (B) intake via enteral (EN) and parenteral (PN) routes during the first 7 days and at day 14 in CDH patients on ECMO. Data are expressed as mean standard error.
Conclusions

Although most neonates received recommended energy or protein goals, less than a third were able to achieve both energy and protein intake goals. By day 14, the early repair group was more likely to achieve adequate energy intake and protein intake as well as receive enteral nutrition. Nutrient intake was predominantly via the parenteral route.

Table 1: Adequacy of Energy and Protein Intake in Early vs. Late CDH Repair

<table>
<thead>
<tr>
<th>Variables</th>
<th>Early Repair (n=14)</th>
<th>Late Repair (n=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at repair in days (median, IQR)</td>
<td>15 (10, 22.5)</td>
<td>16 (13, 18)</td>
</tr>
<tr>
<td>% Energy Intake – Day 7</td>
<td>99 [94, 101]%</td>
<td>92 (87, 96)%</td>
</tr>
<tr>
<td>% Energy Intake – Day 14</td>
<td>99 [96, 104]%</td>
<td>92 (89, 96)%</td>
</tr>
<tr>
<td>% Protein Intake – Day 7</td>
<td>100 [98, 102]%</td>
<td>100 [98, 102]%</td>
</tr>
<tr>
<td>% Protein Intake – Day 14</td>
<td>100 [100, 105]%</td>
<td>100 [95, 100]%</td>
</tr>
<tr>
<td>Patients receiving recommended energy AND protein intake by Day 7, n(%)</td>
<td>6 (43%)</td>
<td>2 (18%)</td>
</tr>
<tr>
<td>Patients receiving recommended energy AND protein by Day 14, n(%)</td>
<td>5 (36%)</td>
<td>1 (9%)</td>
</tr>
<tr>
<td>Patients receiving any enteral feeding by Day 14, n(%)</td>
<td>5 (36%)</td>
<td>2 (18%)</td>
</tr>
</tbody>
</table>

*P<0.05, **% of recommended value (Energy=90kcal/kg/day, Protein=3gm/kg/day).
We aimed to identify the levels of soluble TLR in the cord blood of infants healthy and diabetic mothers, investigate the possible changes in the cord blood of the infants of diabetic mothers.

Methods

In this study, we examined thirty one diabetic, (n=31) and thirty healthy mothers infants (n=30). We evaluated the levels of soluble toll like receptor with Human sTLR 2,4,9 ELISA Kit that are tests accepted internationally.

Results

It's stated that statically STLR4 and 9 scale value of infants of diabetic mother are statistically significant higher than the ones of infants of undiabetic mother (p<0.05).

Conclusions

sTLR 4,9 levels high in the infants of diabetic mothers to the infants of healthy mothers contributes about infection proclivity or excessive response to these infants, in the explanation of pathogenesis of clinical statements such as necrotizing enterocolitis and the sepsis that are often met in preterm infants. There is need of experimental and clinical studies to have more certain information about these subjects.

The balance between soluble TLRs and TLR is important for immunity.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0400
CHANGES IN SERUM LIPIDS PROFILE DURING SEPSIS AND SEVERE SEPSIS
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Aims & Objectives:

Serum lipids have important role in inflammatory response and high-density lipoprotein cholesterol (HDL) can be a prognostic biomarker and modulate some immune processes. We performed a study in critically ill patients to evaluate serum lipids evolution in children and adolescents with sepsis admitted in the PICU. Objectives: 1) To characterize whether changes in lipid profile are related to intensity of inflammatory response; 2) To evaluate serum concentrations of HDL considered the most important serum lipid in prognosis in intensive care.

Methods

We analyzed the serum lipids profile of 40 patients with sepsis, admitted in a tertiary level PICU in a developing country on day 1 and day 7. C-reactive protein (CRP) was used to characterize inflammatory response. Triglycerides, total cholesterol (TC), HDL, low-density lipoprotein (LDL) and apolipoproteins concentrations were measured. A control group of 42 healthy patients had serum lipids evaluated. Pediatric Risk of Mortality score (PRISM) and nutritional classification was performed in all patients.

Results

Patients on admission had significant lower concentrations of TC, HDL, LDL and apolipoproteins as well as higher concentrations of triglycerides in comparison with control group. HDL increased significantly between day 1 and day 7. There was a significant reduction of CRP and a increasing of HDL with lower concentrations of this parameter during the main period of inflammatory response.

Conclusions

Low levels of lipids were found in the initial phase of sepsis with inverse association with CRP concentration. HDL is recognized how a protection factor against inflammation and can be used with a prognostic biomarker during sepsis.
Aims & Objectives:

Hemophagocytic lymphohistiocytosis (HLH) is a rare life threatening disorder in which profound dysregulation and activation of the immune system results in multi-organ dysfunction. There is limited data of outcomes of critically ill children with HLH. Our aim was to document the clinical features, treatment and outcomes of children with HLH who require admission to the critical care unit (CCU).

Methods

Retrospective review of pediatric HLH patients admitted to the CCU between January 2007 and December 2013. Data collected included: demographics, reason for admission, length of stay, HLH criteria present on admission, supportive management (ventilation, vasoactives, renal replacement) and treatment. Organ dysfunction was assessed at admission and then daily using Pediatric Logistic Organ Dysfunction Score (PELOD) scores. Outcomes included overall mortality, survival to discharge from CCU and to 6 months from the initial admission. Results are reported as median (interquartile ranges,) or number (%).

Results

26 patients accounted for 51 admissions. Median age at admission was 9.23 years (range 33 days-18 years) and 54% were male. Median CCU length of stay was 5.5 days (IQR 2.5-10.8). Respiratory failure was the most common indication for admission (35%). Median PELOD score at admissions was 11 (IQR 11-21.5). Mechanical ventilation was required in 33 (65%) admissions, vasoactives in 24 (47%) and renal replacement therapy in 12 (24%) admissions. Most common targeted HLH therapy included steroids (92%), cyclosporine (69%) and etoposide (62%). The overall mortality rate of patients in this study was 9/26 (35%), with 24/26 (92%) surviving their first PICU admission and 17/26 (65%) surviving to 6 months after their first PICU discharge.

Conclusions

This is the largest series of paediatric HLH patients who required CCU admission and shows improved survival. Aggressive supportive management combined with a timely
diagnosis and anti-HLH therapy can result in improved survival for this group of patients.
Aims & Objectives:

We present a case of life-threatening dual upper airway pathology in a preterm neonate, posing significant management dilemmas.

Methods

An ex 33-week neonate had a respiratory arrest, aged 20 days, preceded by episodes of upper airway obstruction. Intubation was difficult, with copious fresh blood and a large white airway mass. She was transferred, bleeding via the endotracheal tube.

Results

Laryngobronchoscopy revealed a bleeding subglottic hemangioma. MRI confirmed subglottic and tongue-base hemangiomas, with a second tumour in the postnasal space. She was commenced on propranolol, steroids and tranexamic acid. Bleeding resolved within 24 hours.

Microlaryngoscopy and bronchoscopy (MLB) a week later showed resolution of the subglottic and reduction of the tongue-base haemangiomas. The postnasal mass was excised after a further week. Histopathology confirmed this was a hairy choristomatous polyp.

She was extubated two days later and discharged home once feeds were established. She remains well on oral propranolol, with follow-up MLBs showing haemangioma resolution.

Conclusions

Challenges included intubation of a 1.9kg neonate with an airway full of blood. Bleeding subglottic hemangiomas in preterms have not previously been described. Surgical management would be technically difficult and evidence for medical treatment in preterms is lacking. Propranolol managed active bleeding, avoiding the need for surgery. Adjunct steroid use was controversial, due to associated risks.
The choristoma, extremely rare in neonates, contributed to airway obstruction and needed treatment to allow successful extubation. Removal from such a small postnasal space posed another technical challenge.

This case highlights the seriousness of neonatal upper airway obstruction, which warrants full airway assessment and multidisciplinary input.
Aims & Objectives:

Critically ill patients, including children, are at a high risk of developing acute kidney injury (AKI). AKI is associated with increased morbidity, mortality and risk of chronic kidney disease. We aimed to identify the occurrence of AKI in a cohort of critically ill transported children.

Methods

Retrospective review of transfers by our paediatric critical care transport service between July and September 2015 was undertaken. We included 46 acutely ill children after excluding neonates, HDU level and elective transfers. Transfer notes were reviewed and missing creatinine values were obtained by phone calls to the District General Hospitals (DGH). Status after 48 hours of transfer was obtained from the destination PICU. We used the modified Schwartz formula to calculate eGFRs. The worst eGFR was used to identify AKI according to the RIFLE criteria.

Results

In our cohort of 46 critically ill children, the commonest illnesses were respiratory (30.4%) followed by neurologic (28.3%), sepsis (17.4%), cardiac (13%) and others (10.9%).

1 patient was not investigated for AKI. 23 patients (50%) had AKI. 65.2% were in the Risk category, 21.7% in the Injury category and 13.1% had Failure. Only the patients with Failure were recognized to have AKI. The other two categories were not recognized by the DGHs. Most DGH labs had no age specific ranges for creatinine. After 48 hours, all children with Failure were on renal replacement therapy (RRT), 26% had persisting AKI but not on RRT and 60.9% had resolving or resolved AKI.

Conclusions
AKI is common in critically ill transported children but is grossly under recognized. AKI should be actively sought for in critically ill children. Age specific norms for creatinine and, ideally, eGFR values should be provided by labs for easier recognition. Once diagnosed, AKI should be highlighted so that measures are taken to prevent further renal damage and for proper monitoring and management.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0684
CENTRAL VENOUS LINE PLACEMENT ASSOCIATED MECHANICAL COMPLICATIONS IN CHILDREN WITH THERMAL INJURIES: A DESCRIPTIVE STUDY
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²St. Andrew’s Centre for Burns and Plastic Surgery, Burns Intensive Care Unit, Chelmsford, United Kingdom

Aims & Objectives:
Central venous lines are commonly used and routinely changed in children with thermal injuries. Their use is not without risk of complications. Our aim was to study the prevalence of line related mechanical complications in these children.

Methods
Retrospective review of prospectively collected data of children (<16 years) admitted to a tertiary burns intensive care unit (BITU) between 2010 and 2015.

Results
A total of 157 children (161 admissions); median age 2 (1, 5) years and Burn Area of 18.5% (10%, 38%) had 177 lines (973 line days). Their median length of stay was 2.8 (Range: 1-128) days, 40% were ventilated and 12.5% required inotropes.

Of children admitted to BITU 52.8% (85/161) required central venous access and 16.2% (26/161) required more than one line (Range: 1-22). The median duration of placement was 5.7 (2.6, 7) days. Ultrasound guidance was used in 145 (81.9%) of cases. Site of insertion was: Femoral (57%), Internal jugular (37%) and Subclavian (6%). Line rewiring was required in 4%. Enoxaparin thromboprophylaxis was used in 79.7% and treatment doses in 5.6%.

Line insertion problems were documented in 14/177 (7.9%) and included failure of insertion at initial site (6/177), difficulty in placement (6/177) and 2 attempts were abandoned due to intravascular thrombus.

Post insertion mechanical problems requiring early removal and replacement were noted in 12/177 (6.8%) lines. These included blocked line (6/177), leakage (1/177), extravasation (1/177), swollen/cold leg (2/177) and dislodgement (2/177).
Conclusions

Central lines in thermally injured children are associated with significant rates of mechanical complications despite use of routine ultrasound and thromboprophylaxis.
Aims & Objectives:

The mediastinal masses are a group of tumors with different histological types and embryonic origin. The management of mediastinal masses is challenging, because the patients may have many complications such as hemodynamic dysfunction and difficulties in airway management.

Aim: to review the presentation, intensive care management and complications of children with a mediastinal mass in the Pediatric Intensive Care Unit of the Brazilian National Cancer Institute.

Methods

Report Case: database review.

Results

Main results: 15 patients were admitted with mediastinal mass (March 2014-December 2015). Of 15 patients, six were boys and nine were girls. The mean age in the diagnostic was 5.6 years. Most frequent diagnosis was neuroblastoma (n=5), followed by lymphoma (n=3), ganglioneuroma, primitive neuroectodermal tumors, teratoma (n=2), ganglioneuroblastoma (n=1) and thymic hyperplasia (n=1). Emergency intubation for arrest situation before admission to ICU: one (had 5 min CPR assisted); semi elective/controlled intubation: four. Five required mechanical ventilation (MV): four patients needed non invasive ventilation (NIV) and two of these needed MV and NIV. Fourteen patients survived to PICU discharge, 1 death followed by progression of tumor despite of the therapy that lead to compression of airways. Three patients had hemodynamic complications such as: cardiac tamponade (n=1), arterial pulmonary hypertension (n=1) and low cardiac output by compression of aorta (n=1). All three were management respectively by pericardial puncture, milrinone and postural changes.

Conclusions

The management of Mediastinal masses are very challenging and requires a proper intensive care expertise for better outcomes.
Aims & Objectives:

Despite advances in transplantation and supportive care, a considerable number of patients still have poor prognosis with pulmonary complications (PCs) after hematopoietic stem cell transplant (HSCT). This retrospective study evaluated the clinical characteristics, outcomes, and prognostic factors of PCs in HSCT recipients followed-up for 2 years.

Methods

We retrospectively analyzed the medical records of 109 recipients of HSCT between 2010 and 2012.

Results

In this study, 55 PC episodes developed in 38 recipients. Non-invasive diagnostic work-ups were preferred, including sputum examination, serology test, and chest computed tomography (85.5%, 72.7%, and 76.4%, respectively). Infection was the most commonly discovered etiology of PCs (61.8%). The incidence of PCs was lower in patients who received autologous transplantation than in those who received other type of transplantation (65.8% vs. 49.3%, p=0.009). Analysis of PCs and morbidities (Table 1.) revealed that the mortality rate was 32.7% in 18 episodes that were closely related with multi-organ dysfunction syndrome (MODS) when the PCs were diagnosed (OR, 26.178; p=0.001). Hematological dysfunction was the main factor for poor outcome in PCs (OR,11.6; p=0.03). Of the HSCT recipients with PCs, 41.8% were transferred to the pediatric intensive care unit (PICU) for respiratory failure, and the associated mortality rate was 73%. After PICU admission, continuous renal replacement therapy was significantly more commonly administered in patients who died than in those who survived (70.6% vs 16.7%, respectively;p=0.041). Figure 1 shows the 2-year survival rate according to MODS and PICU admission. Survived 5 patients of 16 patient with fatal primary PCs after HSCT showed lesser progression to MODS and more frequently received corticosteroid therapy for acute respiratory distress syndrome than those who died.
Table 1. Risk factors related with mortality of pulmonary complications after hematopoietic stem cell transplant

<table>
<thead>
<tr>
<th>All patients with PCs</th>
<th>Total (n = 55)</th>
<th>Non-surviving (n = 18)</th>
<th>Surviving (n = 37)</th>
<th>Univariate</th>
<th>Multivariate</th>
<th>Multivariate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of PCs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infectious</td>
<td>34 (61.8)</td>
<td>25 (70.9)</td>
<td>9 (50.0)</td>
<td>0.446</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noninfectious</td>
<td>16 (29.1)</td>
<td>9 (24.3)</td>
<td>7 (38.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infectious + noninfectious</td>
<td>5 (9.1)</td>
<td>3 (8.1)</td>
<td>2 (11.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active GVHD</td>
<td>30 (54.5)</td>
<td>8 (44.4)</td>
<td>17 (45.9)</td>
<td>0.916</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td>10 (18.2)</td>
<td>6 (35.3)</td>
<td>4 (10.8)</td>
<td>0.052</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td>15 (26.3)</td>
<td>2 (11.1)</td>
<td>13 (35.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOD</td>
<td>11 (20.0)</td>
<td>8 (44.4)</td>
<td>3 (8.1)</td>
<td>0.004</td>
<td>0.113</td>
<td></td>
</tr>
<tr>
<td>CMV treatment</td>
<td>13 (23.7)</td>
<td>8 (44.4)</td>
<td>5 (13.5)</td>
<td>0.016</td>
<td>0.206</td>
<td></td>
</tr>
<tr>
<td>Organ failure within 48 h</td>
<td>15 (27.3)</td>
<td>13 (72.2)</td>
<td>5 (27.3)</td>
<td>0.000</td>
<td>26.18 (4.14-165.44)</td>
<td>0.001</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>9 (16.4)</td>
<td>8 (44.4)</td>
<td>1 (2.7)</td>
<td>0.003</td>
<td>0.462</td>
<td></td>
</tr>
<tr>
<td>Respiratory</td>
<td>13 (23.6)</td>
<td>9 (50.0)</td>
<td>4 (10.8)</td>
<td>0.003</td>
<td>0.462</td>
<td></td>
</tr>
<tr>
<td>Neurological</td>
<td>4 (7.3)</td>
<td>2 (11.1)</td>
<td>2 (5.4)</td>
<td>0.454</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hematological</td>
<td>15 (27.3)</td>
<td>11 (61.1)</td>
<td>4 (10.8)</td>
<td>&lt;0.001</td>
<td>11.60 (1.22-110.70)</td>
<td>0.033</td>
</tr>
<tr>
<td>Renal</td>
<td>7 (12.7)</td>
<td>6 (35.3)</td>
<td>1 (2.7)</td>
<td>0.011</td>
<td>0.337</td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>2 (3.6)</td>
<td>2 (11.1)</td>
<td>0</td>
<td>0.999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatic</td>
<td>4 (7.3)</td>
<td>3 (16.7)</td>
<td>1 (2.7)</td>
<td>0.099</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The patients transferred to PICU with PCs

| PICU transfer          | 23 (41.8)     | 17 (94.4)              | 6 (16.2)          | 0.000      |             |             |
| PICU length of stay, days (IQR) | 10.0   | 14.0       | 8.5               | 0.728      |             |             |
| Time of PICU admission from HSCT, days, median (range) | 50      | 50.0       | 55.5               | 0.104      |             |             |
| Life-sustaining therapy |             |                        |                   |            |             |             |
| Mechanical ventilation | 21 (91.3)     | 16 (91.4)              | 5 (83.3)          | 0.439      |             |             |
| CRRT                   | 13 (56.5)     | 12 (79.6)              | 1 (16.7)          | 0.041      |             |             |
| Vasoactive agent       | 15 (65.2)     | 15 (88.3)              | 0                 | 0.999      |             |             |
| ECMO                   | 2 (8.7)       | 2 (11.8)               | 0                 | 0.999      |             |             |
| CPR                    | 9 (39.1)      | 9 (52.9)               | 0                 | 0.999      |             |             |
| Number of therapy      |               |                        |                   |            |             |             |
| 1                      | 5 (21.7)      | 1 (59)                 | 4 (66.7)          | 0.011      |             |             |
| 2                      | 1 (4.3)       | 0                      | 1 (16.7)          | 0.999      |             |             |

PCs, pulmonary complications; HSCT, hematopoietic stem cell transplantation; GVHD, graft-versus-host disease; VOD, veno-occlusive disease; CMV, cytomegalovirus; PICU, pediatric intensive care unit; CRRT, continuous renal replacement therapy; ECMO, extracorporeal membrane oxygenation; CPR, cardiopulmonary resuscitation; IQR, interquartile range; CMV treatment includes curative and preemptive treatment;
Conclusions

Physicians have to closely observe the possibility of existence of other organ dysfunction in HSCT recipients with PCs, especially hematologic conditions. To manage MODS, early intervention with PICU admission should be considered.

Figure 1. Comparison of 2-year overall survival rate according to (A) multi-organ dysfunction syndrome (MODS) and (B) requiring pediatric intensive care unit (PICU) admission in pulmonary complications (PCs) by using Kaplan-Meier analysis and log-rank test.
Aims & Objectives:

Review the use of recombinant activated Factor VII in paediatric patients undergoing cardiopulmonary bypass. To determine if the use of recombinant activated factor VII was associated with intravascular thrombus formation.

Methods

Design: A retrospective case review of 193 patients who received recombinant activated Factor VII following cardiopulmonary bypass.

Setting: 23 bed paediatric intensive care unit in a university-affiliated children’s hospital.

Subjects: All cardiopulmonary bypass patients who received recombinant activated FVII between 2007 and 2014 at the Children’s Hospital at Westmead, Sydney, Australia.

Results

Cardiac surgery requiring cardiopulmonary bypass was performed on 2338 patients during this time period. In total, 193 (8%) received recombinant Factor VII for excessive bleeding. The dose given to patients ranged from 90–110 mcg/kg and adequate haemostasis was achieved after a single dose in 190 (98%) patients. The majority of these patients received recombinant Factor VII intra-operatively (98%). Vascular thrombus was subsequently detected in 32 (17%) of patients who received recombinant activated FVII. Of the patients who received recombinant activated Factor VII, 28 (14%) had ECMO and 24 (12%) died. Overall, vascular thrombosis in patients after cardiopulmonary bypass who did not receive recombinant activated FVII was 1-2%.

Conclusions

Thrombus occurred in 32 (17%) patients who received recombinant activated Factor VII after cardiopulmonary bypass. Administration of recombinant activated Factor VII may be associated with increased thrombus formation in cardiopulmonary bypass patients with congenital heart disease. This is important information to consider along
with the perceived benefits of using recombinant activated Factor VII off label in the setting of cardiac surgery.
NUTRITIONAL STATUS AND NUTRITION SUPPORT PRACTICES (NSP) IN CHILDREN ADMITTED TO THE PEDIATRIC INTENSIVE CARE UNIT (PICU)

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⁴Texas Children’s Hospital and Baylor College of Medicine, Pediatrics, Houston, USA

Aims & Objectives:

Critically ill children are at high risk of developing nutritional deficiencies and malnutrition presents with metabolic and functional alterations. The aim of the study was to assess nutritional status and NSP for critically ill children admitted to the PICU.

Methods

Children admitted >48 hrs (11/14-8/15) followed after PICU admission. Nutritional status assessed by WFA (underweight), WFH (wasting), and HFA (stunting) z-scores by WHO criteria were obtained. Caloric (CI) and protein (PRO) intakes and deficits (% of ideal intake) calculated from parenteral and enteral nutrition for the first week of admission. Energy and protein needs estimated by Schofield and the American Society of Parenteral and Enteral Nutrition, respectively.

Results

One hundred children (M/F: 49/41), age 26±5(SE) months and PICU length of stay of 9.3±0.8 days were included. WFA, WFH, and HFA z-scores of -1.64±0.23; -0.90±0.24; and -1.40±0.25, respectively. The prevalence of underweight, wasting, and stunting was 56%, 43%, and 50% respectively.

<table>
<thead>
<tr>
<th>Day</th>
<th>n</th>
<th>CI Kcal/kg/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>10</td>
<td>24±3</td>
</tr>
<tr>
<td>Day 2</td>
<td>98</td>
<td>37±3</td>
</tr>
<tr>
<td>Day 3</td>
<td>94</td>
<td>51±4</td>
</tr>
<tr>
<td>Day 4</td>
<td>88</td>
<td>61±3</td>
</tr>
<tr>
<td>Day 5</td>
<td>82</td>
<td>69±4</td>
</tr>
<tr>
<td>Day 6</td>
<td>72</td>
<td>79±5</td>
</tr>
<tr>
<td>Day 7</td>
<td>57</td>
<td>71±6</td>
</tr>
<tr>
<td>CI Deficit (%)</td>
<td>46±5*</td>
<td>74±7*</td>
</tr>
<tr>
<td>PRO g/kg/d</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>PRO Deficit (%)</td>
<td>7±2*</td>
<td>21±3*</td>
</tr>
</tbody>
</table>

Values are mean ± SE; * p < 0.001 by paired t-test vs. recommended intake

**Conclusions**

Malnutrition in critically ill children was prevalent with half of the patients being undernourished and stunted. There was clinically significant caloric overfeeding after day 4 and protein underfeeding that persisted during the first week of PICU admission.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0218
NUTRITION IN MECHANICALLY VENTILATED CHILDREN IN A PEDIATRIC INTENSIVE CARE UNIT: ESTIMATION OF ENERGY REQUIREMENTS USING INDIRECT CALORIMETRY

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²University Hospital,
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Aims & Objectives:

Optimal nutrition therapy is a vital component of pediatric critical care. Scientific society agrees that indirect calorimetry (IC) is the only accurate method to assess energy requirements in critically ill patients.

In this study we registered with IC the measured resting energy expenditure (MREE) and compared it to energy intake (EI) in mechanically ventilated children.

Methods

From January 2014 to August 2015 in the Pediatric Intensive Care Unit of Padua we registered 34 patients between 14 months and 18 years, mechanically ventilated from at least 24 hours. They were enterally fasted for 2 hours before the IC measurement that was performed with the portable CCM Express Indirect Calorimeter.

Results

we registered 34 patients (22 males and 12 females), mean age was 9.1 years. We found an adequate nutrition in 14.7% of the patients, overfeeding in 26.4% and underfeeding in 58.8%. We divided the patients in five cohorts: 20 neurological patients (adequate fed 15%, underfed 55%, overfed 30%), 5 oncological patients (40% adequate fed, 40% were underfed, 20% overfed), 4 postoperative (50% underfed and 50% overfed), 3 respiratory patients (100% underfed), 2 cardiac patients (100% underfed).

Conclusions

In this study we observed a high variability between MREE and total EI that could be due to the high variability of metabolic demand of such different patients in a PICU. Our preliminary data suggest the need of a more accurate measurement of real metabolic need of critical patients in PICU and the use of IC should be implemented.
Aims & Objectives:

Lactic acidosis (LA) is defined as pH less than 7.35 along with plasma lactate concentration greater than 5 mmol/l. LA can be hypoxic (type A) or non hypoxic (Type B). Type B LA has been described in adult lymphoma and leukaemia and the association has been found to carry a very poor prognosis.

Aims and Objectives:
Therefore we reviewed the outcome of children admitted with new diagnosis of lymphoma in our PICU who had lactic acidosis at presentation.

Methods

We identified all the children admitted in our PICU from 2008-2015 with a new diagnosis of Lymphoma. We noted the demography, PIM2 score, cardio-respiratory status, liver and renal function parameters and haematological parameters of those with hyperlactatemia. Changes in plasma lactate in relation to other organ function parameters were examined.

Results

24 patients between the age of 2-16 years with median PIM2 score 1.03 (Interquartile range 0.8-3.96) were admitted during the study period with a new diagnosis of Lymphoma; 6 (PIM 2 score) had significantly and persistently raised plasma lactate. 2 patients had no cardiovascular instability and had normal renal and liver functions. 2 patients had cardiovascular instability or impaired renal or liver functions but hyperlactatemia did not resolve with improvement in organ function. Hyperlactatemia resolved in all patients with reduction in tumour mass following chemotherapy in 4-23 days.

Conclusions

Tumour mass of lymphoma can cause hyperlactatemia which resolves with reduction in tumour mass and it is not associated with worse outcome in children unlike adults.
Aims & Objectives:

To highlight the need for early consideration of graft versus host disease (GVHD) in multivisceral transplant (MVT) recipients who develop respiratory failure.

Methods

Case report of a MVT recipient who developed pulmonary GVHD.

Results

A 3 year old girl with Berdon syndrome developed respiratory failure on day 117 post MVT and was mechanically ventilated. Endotracheal culture grew Klebsiella and Pseudomonas, and a course of antibiotics was completed. After 2.5 weeks of worsening hypoxia and hypercapnea a CT scan was done which showed bilateral peribronchovascular consolidation and ground glass opacities in both lungs. Bronchoalveolar lavage failed to identify an infectious etiology. On day 146, a lung biopsy showed GVHD with significant interstitial fibrosis. High dose steroid was given. However respiratory failure progressed to cardiopulmonary arrest on day 155. Autopsy showed over ninety percent fibrosis of the lung and no sign of viral cytopathic effects and negative immunohistochemistry stains.

Of note, she had developed an erythematous rash on day 40 which prompted a skin biopsy. The biopsy suggested a drug reaction. The rash persisted, and a repeat skin biopsy done on day 105 was positive for CMV but could not rule out GVHD. On day 107, immunosuppression was decreased because of CMV enteritis and suspected pneumonitis. The suspicion of skin GVHD was heightened when the rash became violaceous and disseminated. Photopheresis was started on day 118 and the rash improved.

Conclusions
The intestinal graft has an abundance of donor lymphocytes that can attack their new host. The constellation of clinical findings associated with GVHD of the skin, and native GI tract are well known. Less is known of the effects of donor lymphocytes on the lungs. Lung GVHD must be given early consideration because its presentation may be insidious and the only treatment is immunosuppression. Early identification of lung GVHD may reduce morbidity and mortality.
Aims & Objectives:

Anemia is prevalent at pediatric intensive care unit (PICU) admission and incident during PICU stay, but little is known about anemia at PICU discharge. This study aims to describe the prevalence and risk factors for anemia at PICU discharge.

Methods

This study has been conducted in the PICU of a tertiary university hospital. This is a post-hoc analysis of a prospectively collected database aiming to study transfusion practices in PICU. We retrospectively collected the hemoglobin at PICU discharge, defined as the closest Hb from PICU discharge, collected after PICU admission and within 7 days before PICU discharge. Anemia was defined according to the world health organization criteria.

Results

We analyzed 679 children, among which 390 (57.4%) were anemic at PICU discharge. Anemic children were older than non anemic children (median (IQR), 57.5 (10.8-159.3) versus 20 (4-89) months, p<0.001). Children with cyanotic heart disease were at lower risk of anemia at PICU discharge (OR (IC95%) 0.48 (0.3, 0.77), p=0.002). Several admission characteristics were significantly associated with anemia at PICU discharge: severity of disease as reflected by a higher PELOD score (p=0.001), anemia (p<0.001), thrombocytopenia (p<0.001), and admission for non-cardiac surgery (p<0.001) or polytrauma (p=0.02). Red blood cell and platelet transfusions during PICU stay were associated with an increased risk of anemia at PICU discharge (OR 1.82 (1.23, 2.69), p=0.003, and 2.77 (1.46, 5.26), p=0.001, respectively), as well as hematological dysfunction (OR 2.16 (1.39, 3.36), p<0.001), renal dysfunction (OR 3.86 (1.31, 11.42), p=0.009), and septic shock (OR 1.81 (1.03, 3.18), p=0.036). The PICU length of stay did not differ between anemic and non anemic children (3 (2-6) and 3 (2-6) days, respectively, p=0.702).

Conclusions

Anemia is highly prevalent at PICU discharge and is associated with admission and PICU stay characteristics. This phenomenon deserves further scrutiny because anemia may impact the outcome after PICU discharge.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0477
ALTERATIONS OF SUBLINGUAL MICROCIRCULATION DURING LOW CARDIAC OUTPUT SYNDROME AFTER NEONATAL CARDIOPULMONARY BYPASS: CASE REPORT
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Aims & Objectives:
Sublingual microcirculation is altered in shock states and may be a surrogate of organ hypoperfusion. We present sequential assessment of sublingual microcirculation in a newborn with hypoplastic left heart syndrome (HLHS) after surgery.

Methods
Case: Term newborn with HLHS underwent Sano-Norwood. Upon ICU admission, child had open sternum, required low doses of vasoactive medications and had no bleeding complications. 6-12h post-CPB, child developed low cardiac output syndrome (LCOS) and hypoxemia despite FiO2 0.6 and iNO 18 ppm. Child was stabilized; sternum was closed on POD#2, extubated POD#3, with no further complications.

Microcirculation evaluation: Sublingual circulation was recorded with side stream dark field (SDF) video-microscopy preoperatively and 2h, 6h, 12h, 24h, 48h after surgery. A researcher blinded to all clinical data performed video analysis (capillary density and flow). Macro-hemodynamics and markers of oxygen delivery were simultaneously recorded. (Table 1)

Results
22 videos included in analysis (Table 2). Evaluation of sublingual microcirculation showed only mild alterations preoperatively and at ICU admission. Perfused small vessel density decreased at 6h and 12h, coinciding with increase in vasoactive and respiratory support. All microcirculatory parameters trended toward baseline at 24h, achieving preoperative values at 48h. Changes in microcirculation index inversely correlated with vasoactive inotrope score.
Conclusions

Alterations in sublingual microcirculation occurred 6-12h post-CPB during the well-described LCOS “slump” after neonatal cardiac surgery; these changes paralleled the clinical condition and vasoactive support of the patient. Studies to define a potential role for microcirculation in early diagnosis and management of post-CPB LCOS after neonatal cardiac surgery is warranted.
Aims & Objectives:

Stress ulcer prophylaxis, most frequently with histamine-2 receptor antagonists (H2RA) or proton pump inhibitors (PPI), is commonly used in pediatric critical care. The risk/benefit ratio is uncertain today, as data from randomized clinical trials (RCTs) on the effectiveness and harms of prophylaxis in children are limited. Our objective was to describe the views of Canadian pediatric intensivists about a future RCT of stress ulcer prophylaxis.

Methods

We conducted an online survey of Canadian pediatric critical care physicians. We emailed potential respondents a link to a 10-item survey with 2 reminders for non-respondents.

Results

68 physicians (61%) replied, reporting a median (Q1, Q3) of 12 (5, 20) years of experience. 66% stated that a large rigorous RCT of stress ulcer prophylaxis in children is needed. Regarding the design, 94% stated that it should include a placebo group: the most common designs suggested were a 3-arm trial comparing PPI, H2RA, and placebo (56%), PPI vs. placebo (15%), and H2RA vs. placebo (5%). The 5 patient groups that respondents most commonly stated should be excluded because they should not receive placebo were children receiving acid suppression pre-PICU (66%) or corticosteroids (59%), those with severe coagulopathy or on ECMO (both 36%), and those with burns (31%). The 5 most frequent stated indications for stopping prophylaxis were receiving any feeds (49%), receiving full feeds (38%), extubated receiving any feeds (29%), discharged from the PICU (25%), and extubated receiving full feeds (20%). 63% of respondents reported willingness to participate in an RCT; 28% stated that their participation would depend on the trial design or funding, while only 7% were disinclined to participate.

Conclusions
There is considerable interest in a placebo-controlled RCT of stress ulcer prophylaxis among pediatric critical care physicians in Canada, but no consensus on key elements of the design of such a trial.
Aims & Objectives:

A previous retrospective study in our unit suggested hyperchlaemia was associated with a prolonged PICU stay in patients undergoing surgery for non-idiopathic spinal deformity\(^1\). Increasing evidence acknowledges potential harm of hyperchlaemia in adults\(^2\). We aimed to prospectively examine the association between post-operative chloride level and outcomes in paediatric patients undergoing scoliosis surgery.

Methods

A prospective pilot study of consecutive spinal surgery patients at a single centre over 6 months. Correlations between the chloride levels, intra-operative fluid management and outcomes were examined.

Results

Data was collected on 64 patients (table).
Patients with non-idiopathic curves were younger, were more likely to be admitted to PICU and had longer hospital admissions.

Overall, post-operative formal laboratory serum chloride levels were positively correlated with volume of 0.9% saline given intra-operatively ($r=0.31$, $P=0.02$). Hyperchloraemia was not associated with an increased length of hospital stay in either idiopathic ($r=-0.01$, $P=0.98$) or non-idiopathic patients ($r=-0.01$, $P=0.99$) (figure). There was no mortality and no significant morbidity. There was no association between post-operative chloride levels and early post-operative complications.

There was a poor correlation between the laboratory and arterial blood gas (ABG)
chloride levels ($r=0.22$, $P=0.13$).

**Conclusions**

Hyperchloraemia was not associated with increased morbidity or mortality following spinal surgery in this pilot study. There is a poor correlation between the laboratory and ABG chloride levels which warrants further investigation.

1. Cowie *et al*, APAGBI poster 2014
Aims & Objectives:

Malnutrition in pediatric intensive care units is a seldomly diagnosed and quantified problem. Validated nutritional risk scores alert us about this problem that increases comorbid conditions in intensive care units. **Objectives:** Describe malnutrition impact on a pediatric intensive care unit. Apply a nutritional screening tool to identify patients at risk of malnutrition while in PICU

Methods

The following data was recorded: age, sex, anthropometric measurements (skinfold), weight loss > 2% of baseline weight, kind of nutrition administered (parenteral, enteral), baseline diagnosis, reason for admission into PICU, PIM at admission, vasoactive drug requirements, need for mechanical ventilation, number of days in PICU, biochemical parameters, and total hospital stay. Nutritional risk screening using Stamp Score was done on admission, on day 5 and on day 11 of hospitalization. The malnutrition risk was correlated to a weight loss higher than 2% through multinominal logistic regression

Results

80 PICU children were examined during a one-year period (from 1/6/2013 to 1/6/2014). Among them 66% were males of an average age of 69.5 months (1-192 month range). A weight loss of > 2% affected 50% of all patients. Albumin levels decreased in 55% of the patients, 79% of the children suffered a decline in the brachial fold; 68% in the tricipital fold, 65% showed a fall in measurements of subscapular bursa on day 11 of hospitalization. The multinominal analysis associated severe Stamp Score, need of inotropes, ventilatory assistance, hospital stay, lower percentage of tricipital fold, and drop in albumin values with statistical significance of malnutrition.

Conclusions
Malnutrition is common among critically ill pediatric patients. Nutritional risk Scores could aid in the prevention of this complication. The use of biochemical parameters and the measurement of skinfolds provides valuable data and may be considered in the search for new tools to explore nutritional risk in pediatric intensive care units.
Aims & Objectives:

Compare anthropometric data of patients in two moments of a Pediatric Intensive Care Unit.

Methods

A retrospective cohort study, with patients in the Pediatric Intensive Care Unit of an university hospital in two periods of one year long, with a four years interval. The data was from the unit's database. The nutritional assessment was performed based on weight and height measured at hospitalization. Parameters and classification of nutritional status used were the recommended by World Health Organization for respective age groups. The Body Mass Index for age was the parameter chosen to assess malnutrition and relate it to severity and outcomes.

Results

The total patient sample was 881 (406, current sample and 475, previous sample). There was a significant reduction of malnutrition in the current sample ($p = 0.03$). In relation to outcomes, malnourished patients of previous sample had a significant association with mortality and prolonged length of stay, while malnourished of current sample, did not show this association. Malnourished of the previous sample also showed significant association with severity on admission (measured by Pediatric Index Mortality 2), which was not observed in the current sample of malnourished ones.

Conclusions

There was a significant reduction of malnutrition among patients of the same PICU when we compare two moments, suggesting that the nutritional transition is also present among pediatric critical patients.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0724
CRITICAL ILLNESS INDUCES AN INCREASE IN SEX HORMONES LEVELS IN PREPUBERTAL CHILDREN
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Aims & Objectives:
During critical illness in adults, the degree of both central and peripheral suppression of the reproductive axis is related to disease severity. The aim of the current project was to, first, document the presence of gonadal axis suppression in prepubertal children with critical illness; and second, to determine whether these is evidence of increase in sex hormones as part of a "stress" response.

Methods
Prospective analysis of serial estradiol E, progesterone (P), luteinizing hormone (LH) and follicular stimulating hormone (FSH) levels in prepubertal children (Tanner stage I) admitted to two pediatric intensive care units (PICUs), with evidence of two or more organ dysfunctions. Samples were collected on days 1, 3, and 5 after admission. Serum levels of E, P, Sex hormone binding globulin (SHBG), LH, and FSH were measured using a commercially available immunofluorescence kit (Immulite 2000, Siemens Healthcare).

Results
Twenty-seven critically ill children aged 1.5 (0.6-3) years were studied. Age-adjusted E and P levels were high on admission to PICU. E levels remained high throughout PICU stay but P levels reduced over time. SHBG levels were low on admission and increased significantly from day 1 to 5. LH and FSH levels were initially at the lower limit for age on admission. LH levels had a small (not statistically significant) reduction over time and FSH levels had a significant fall from day 1 to 5. We also observed a weak correlation between P levels and risk of mortality.

Conclusions
These hormonal changes in critically-ill prepubertal children confirm evidence of reduced or suppressed central (pituitary) function. However, elevated peripheral (gonadal) hormone levels are consistent with an acute "stress" effect. Increase in E and P levels may also be in the range that influences cardiovascular and cerebral homeostasis.
RED BLOOD CELL EXCHANGE IN CHILDREN WITH SICKLE CELL DISEASE COMPLICATIONS: A MANUAL VS AUTOMATED PROCEDURE EXPERIENCE

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Aims & Objectives:

Red blood cell exchange (RBCX) is used in sickle cell disease (SCD) to remove abnormal red blood cells (RBC) and replace them with donor RBCs. To date, the benefits of manual versus automated RBCX have rarely been documented and studies in children are scarce.

Methods

Observational study of children (<18 years) with complications of SCD and criteria for RBCX (Spectra-Optia Apheresis System®-TerumoBCT) in 2015 in a Pediatric Intensive Care Unit in Portugal. Data was compared to a retrospective cohort treated with manual RBCX (isovolumetric exchange of 10-15mL/kg) during a 3-year period (2011-2013). Clinical, laboratory and technical data were analyzed.

Results

Forty five RBCX procedures (30 manual, 15 automated) in 13 patients were included. Indications for RBCX: acute complication (23), chronic regimen for stroke prevention (22). All patients needed a central venous catheterization for blood removal. Baseline hematological values had no significant differences. Packed RBC volume used was higher in the automated procedure [10.4(5.21) vs 16.7(23)mL/kg; p=0.056]. Automated RBCX allowed to achieve a greater reduction of HbS [30.16(53)% vs 40.22(55)%; p=0.042] with a no significant variation of hematocrit (p=0.211) and less time-consumption [90.60(180) vs 70.45(180) minutes]. There were minor complications in both techniques. No cases of alloimmunization were reported in these patients.

Conclusions

Automated RBCX requires less time to perform, involving higher RBC use and more donor exposure, but a greater HbS reduction, permitting preserve the hemodynamic stability, contributing to achieve better, haematological and clinical, goals for these patients. Major limitation, in both methods, was central line requirement.
Aims & Objectives:

A recent meta-analysis has suggested pentoxifylline may confer a mortality benefit in neonatal necrotising enterocolitis (NEC) and sepsis. We report our experience of pentoxifylline use in a single centre over a 10-year period (2004-2014).

Methods

We undertook a retrospective case-note review of all neonates who received pentoxifylline for NEC. Data were collected on demographics, treatment received, 7-day laboratory values and outcomes. In addition, we collected data on a control group of neonates who did not receive pentoxifylline, but were admitted with NEC, undergoing surgery or 5 days of conservative treatment. We compared the use of pentoxifylline and outcomes using propensity score analysis and Cox-proportional hazards regression.

Results

Over a 10-year period, 27 neonates received pentoxifylline for NEC and sepsis or NEC. Eighteen control neonates with NEC were selected who did not receive pentoxifylline. The odds ratio of death in those who received pentoxifylline was 1.86 (95% CI 0.54-6.40, p=0.33). Due to small sample size we were unable to propensity score match. Platelet count, the haemodynamic component of the pSOFA (pSOFA_haem) score and surgery were univariate predictors of pentoxifylline use, but these associations were not apparent in a multi-variate regression model. Platelet count and pSOFA_haem recovered in the pentoxifylline group but not in the control. This difference was not significant in a Cox proportional hazard regression model.

Conclusions

In our centre pentoxifylline did not show the reported mortality benefit. This is likely due to the late use of pentoxifylline. A randomised control trial is necessary to prove the effectiveness of pentoxifylline in this population.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0259
USE OF PENTOXIFYLINE IN A TERTIARY PAEDIATRIC INTENSIVE CARE UNIT: A 10 YEAR REVIEW
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Aims & Objectives:
A Cochrane review (2011) of the effects of Pentoxifylline use in neonates with sepsis/NEC may improve survival. We undertook a retrospective review of Pentoxifylline use over a 10 year period in a large tertiary paediatric intensive care unit.

We reviewed the use of Pentoxifylline over a 10 year period, identifying mortality as a primary outcome.

Methods
A retrospective case note review of 44 neonates who received Pentoxifylline from 2002 to 2012 was conducted. Data was collected on clinical variables and treatment course.

Results
A total of 41 patients with complete patient notes were reviewed. Neonates had received Pentoxifylline for sepsis and/or NEC. Of these 21 (51.2%) had died and 20 (48.8%) were alive. Each of the clinical variables were analysed with data divided into survivors and non-survivors. After initial descriptive data analysis, variables were investigated using Mann-Whitney U test and Cox regression. By Cox regression, fluid balance at baseline (Exp (B) 1.003; 95% CI 1.000-1.006), urea at day 7(Exp (B)1.256; 95% CI 1.029-1.536) and the change in the number of inotropes between baseline and day 7 (Exp (B) 3.514; 95% CI 1.532 – 8.059) were significant independent predictors of mortality.

Conclusions
Mortality in our group was 51.2%. On reviewing the variables, the group who died had higher baseline fluid balance and urea, which did not change with treatment; this may be a reflection of an advanced stage in the inflammatory process or a later decision to use Pentoxifylline. No conclusion could be drawn on the effectiveness of Pentoxifylline as a treatment. Retrospective analysis of a small cohort is a significant limitation of this study. Further investigation is required to determine the efficacy of timely use of Pentoxifylline in the neonatal population.
Aims & Objectives:

Anaemia is common in children on paediatric intensive care units (PICU). Many children receive red blood cell (RBC) transfusions to improve oxygen delivery and avoid the consequences of tissue hypoxia. Some data suggest RBC transfusions can adversely affect blood biochemistry. It is important to define whether PICU patients' are at risk of this complication. We aimed to document any electrolyte, metabolite and acid-base changes in patients' post-transfusion and analyse the biochemical composition of an average donor blood unit.

Methods

PICU patients' requiring transfusion, with pre-existing arterial lines, were enrolled. Arterial blood gas samples were collected from 49 participants pre- and post-transfusion. Patients received 5-28ml/kg of RBCs following standard PICU protocol. Samples were also taken from the donor blood bags. All samples were analysed using a blood analyser (ABL 800 flex).

Results

We observed: (i) significant increases in haemoglobin (Hb) (29.98±12.32, \( p<0.001 \)) and haematocrit (Hct) (9.04±3.69, \( p<0.001 \)); (ii) a significant increase in total bilirubin concentration (ctBil) (3.61±7.97, \( p=0.003 \)); and (iii) a significant decrease in the fraction of methaemoglobin (FMetHb) (-0.13±0.26, \( p=0.001 \)). No other measured variables displayed significant changes post-transfusion. The composition of the donor units showed unphysiological levels of nearly all measured biochemical variables; our observations are comparable with pre-existing literature.

Conclusions

The changes in Hb, Hct, and FMetHb are beneficial. The significance of the bilirubin increase is unclear, however monitoring of infants with pre-existing high ctBil and those with risk factors for kernicterus may be recommended. Despite the
unphysiological composition of donor units, patients did not exhibit clinically important changes in any of the other parameters.
Aims & Objectives:

4 to 18% children develop deep venous thrombosis on PICU. Peak incidence is in less than 1 month of age (75/1000) and 13 to 18 years (90/1000). Venous thrombo embolism (VTE) is associated with increased length of stay (28 days VTE vs 8 d non-VTE) and increased mortality (8% VTE Vs 1% non-VTE). Prophylaxis reduces VTE rate in adult studies by 20 to 50%.

Aims: To measure the number of adolescent patients (13 years and above) who might benefit by implementation of new protocol for VTE prophylaxis and to gather data on current practices in a tertiary general PICU.

Methods

Patients were assessed for thrombosis risk (presence of central line, decreased mobility, active cancer, major surgery etc.) and bleeding risk (active bleeding, bleeding disorders, neurosurgery etc.). In the new VTE protocol high risk patients should be considered for enoxaparin thrombo-prophylaxis in the absence of bleeding risk factors.

Results

11 children were assessed for VTE risk over a period of 1 month (July 2015). As per new guidelines, 7 children were at high risk, 1 at medium risk and 3 at low risk for developing DVT. Among 7 patients in high risk group, 4 were started on low molecular weight heparin or heparin infusion for venous thrombosis and 1 in low risk group. This was independent of the new guidelines. 7 of 11 patients received mechanical thrombo-prophylaxis.
Conclusions

Venous thrombosis is substantial problem in adolescent children on PICU and maybe reduced with active intervention. Use of clear guidelines helps in early recognition of ‘at risk’ children and offer appropriate thrombo-prophylaxis.

Reference:
1. Raffini et. al, Pediatrics 2011;127;e1326
Aims & Objectives:

Maple Syrup Urine Disease (MSUD) (McKusick #248600), due to the deficiency of branched chain 2-keto acid dehydrogenase complex (BCKD), results in the accumulation of branched chain amino acids (BCAAs); leucine, isoleucine and valine, with consequent neurotoxicity. Acute treatment aims to inhibit protein catabolism and promote anabolism through a high caloric intake, devoid of protein. UK national newborn screening (NBS) started in January 2015. We describe the management of a MSUD infant with acute encephalopathy.

Methods

A 3-day old, breast fed, term, male infant, birth weight 3.5kg, presented with 12.5% weight loss. Supplemental formula feeds were established and discharged within 48 hours. On day seven MSUD was suspected through NBS (leucine 3397µmol/L). On admission, he was acutely encephalopathic. Protein intake was stopped; IV Dextrose 20% and 20% Intralipid was started to provide 120% calories with valine and isoleucine supplements. In intensive care, he was intubated, ventilated, and continuous veno-venous haemodiafiltration (CVVHDF) initiated. Haemodynamic support, insulin for hyperglycaemia and serial plasma BCAA 6-8 hourly were done.

Results

Leucine decreased to 2101, 1225 and 477 µmol/L within four, ten and 34 hours respectively of commencing CVVHDF. He was extubated within 48 hours and discharged home within three weeks on BCAA restricted diet with valine and isoleucine supplements titrated to maintain leucine levels 150-300µmol/L. Neonatal MRI was abnormal with extensive high T1W signal and restricted diffusion throughout the white matter, cortex and cerebral peduncles. At nine months of age his neurodevelopment was normal.
Conclusions

In severe MSUD a multi-professional approach, using emergent nutritional and intensive care support, including haemofiltration, may secure successful clinical outcomes. Where haemofiltration is challenging, peritoneal dialysis may be indicated. Normal developmental outcome is possible despite florid MRI changes.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0090
EXPERIENCE OF INTRAVENOUS IMMUNOGLOBULIN USE IN PEDIATRIC INTENSIVE CARE UNIT OF A DEVELOPING COUNTRY
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Aims & Objectives:

Intravenous immunoglobulin (IVIG) has broad range of activity. Its use is progressively increasing in intensive care setting.

We described our experience with IVIG use in Pediatric intensive care unit (PICU).

Methods

Retrospective database review conducted at the PICU of Aga Khan Hospital, from January 2010 to June 2014. We assessed demographic data, indications and adverse effects related to use of IVIG.

Results

56 patients received IVIG treatment. 58.9% were male. 12 patients (21.4%) were < 1 year of age, 21 (37.5%) between 1 year to 5 years and 23 (41.1%) between 6 to 16 years old. Table shows indications of IVIG. Minor adverse events like fever, allergic rash and hypotension occurred in 8.9% patients. Indications for IVIG had an evidence category Ia / Ib in 7.1%.

<table>
<thead>
<tr>
<th>Diagnostic Categories</th>
<th>Number (%) Evidence category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocarditis</td>
<td>22 (37.5) IIIc</td>
</tr>
<tr>
<td>Septic shock</td>
<td>12 (21.4) III</td>
</tr>
<tr>
<td>Post cardiac surgery capillary leak syndrome</td>
<td>05 (8.92) IV</td>
</tr>
<tr>
<td>Encephalitis</td>
<td>04 (7.14) III</td>
</tr>
<tr>
<td>Toxic shock syndrome</td>
<td>04 (7.14) IIIc</td>
</tr>
<tr>
<td>Gullain Barre syndrome</td>
<td>03 (5.35) Ia</td>
</tr>
<tr>
<td>Status Epileptic</td>
<td>03(5.35) Ia</td>
</tr>
<tr>
<td>Stevenson Johnson syndrome</td>
<td>02 (3.57) IIa</td>
</tr>
<tr>
<td>JRA with HLH</td>
<td>01(1.78) IIb</td>
</tr>
<tr>
<td>ITP with intracranial hemorrhage</td>
<td>01(1.78) Ia</td>
</tr>
<tr>
<td>Dilated cardiomyopathy</td>
<td>01 (1.78) Ib</td>
</tr>
</tbody>
</table>

Conclusions
Use of IVIG was found safe in our PICU setting. However most of the indications were not meeting high level of evidence.
Aims & Objectives:

Diabetic ketoacidosis (DKA) remains one of the most common endocrine emergencies. Limited data is available on the spectrum of acute complications of DKA in children.

Objective is to describe spectrum of acute complications and outcome in children admitted with DKA in the Pediatric Intensive Care Unit (PICU).

Methods

Retrospective review of the medical records of all children admitted with the diagnosis of DKA in our PICU from January 2010 to August 2015 was done. Data was collected on a structured proforma and descriptive statistics were applied.

Results

Total 37 children were admitted with complicated DKA (1.9% of total PICU admissions). There was an increase in admissions with complicated DKA from 1.8% in 2010 to 3.4% in 2015. Mean age was 8.1±4.6 years and 70% were females (26/37). Mean Prism III score was 9.4±6, mean GCS on presentation was 11±3.8 and mean pH was 7.00±0.15. 13 children (35%) needed inotropic support, 11(30%) required mechanical ventilation while only 1 patient required renal replacement therapy. 2 patients (5.4%) died during their PICU stay. Frequency of different complications is shown in table 1.

<table>
<thead>
<tr>
<th>System</th>
<th>Complication</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>Shock (inotropic support)</td>
<td>13</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Arrhythmia</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Myocarditis</td>
<td>1</td>
<td>2.7</td>
</tr>
<tr>
<td>CNS</td>
<td>Cerebral edema</td>
<td>16</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Stroke</td>
<td>1</td>
<td>2.7</td>
</tr>
<tr>
<td>Renal</td>
<td>AKI</td>
<td>10</td>
<td>27</td>
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<tr>
<td></td>
<td>Hyperchloremia</td>
<td>35</td>
<td>94</td>
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<tr>
<td></td>
<td>Hypokalemia</td>
<td>30</td>
<td>81</td>
</tr>
</tbody>
</table>
Hyponatremia 26 70
Hypernatremia & Hyperkalemia 17 46
Respiratory ARDS 1 2.7
Hematology TTP 2 5.4
Sepsis + blood culture 5 13.5

**Conclusions**

Cerebral edema, shock and AKI with electrolyte abnormalities are the most common complications of DKA in children
Aims & Objectives:

Serum Procalcitonin (PCT) is a promising biomarker for early detection of bacterial infection. Its use as a marker for prognosis has not been well studied. We report our experience of measurement of PCT level for early detection of bacterial infection and prognosis from our Pediatric Intensive Care Unit (PICU). Our objective was to determine the utility of PCT levels as a predictor of outcome in critically ill children.

Methods

Retrospective review of medical records of all children (1 mo – 16 years) admitted in PICU from July 2013 to January 2015 who had their serum PCT levels measured was done. Data collected included demographics, diagnosis, PICU and hospital length of stay, PRISM III score, Blood CS, CBC and all PCT levels. Results are presented as mean ± SD. Independent sample t-test was applied and p-value <0.05 was considered as significant.

Results

A total 167 patients were identified, 58% were males and median age was 3 years. Primary diagnosis included cardiovascular diseases in 27%, pneumonia/bronchiolitis in 20%, sepsis/septic shock in 11%, neurological infections and diseases in 20%. Blood cultures were positive in 34 patients (20%). Median PRISM score was 4 (IQR 10). Median hospital and ICU length of stay were nine and three days. PCT levels were <10 ng/ml in 56% of patients and > 90ng/ml in 11% patients. There was no significant association of PCT levels with outcome in univariate and multivariate analysis. ROC curve value for PCT fell at 0.65 with sensitivity 68% and specificity of 60%.

Conclusions

PCT level is not a good marker for prediction of outcome in critically ill children.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0227
PEDIATRIC EXTERNAL VENTRICULAR DRAINS EXPERIENCE FROM A DEVELOPING COUNTRY
M.T. Jamil
\(^1\)Aga Khan University & Hospital Karachi Pakistan, Pediatrics, Karachi, Pakistan

Aims & Objectives:

To describe the clinical indications and complications of external ventricular drain (EVD) placement in children

Methods

Retrospective review of medical records of all children (1 mo - 16 years) who underwent EVD placement during January 2007 to December 2014 was done after approval from ethical research committee. Data collected included age, gender, diagnosis, GCS on presentation, after EVD insertion and on discharge, complications and microbiological data. Results are presented as frequency with percentages and mean and standard deviation.

Results

A total of 177 patients underwent EVD placement, 66% of them were males and median age was 4 years with IQR of 9. GCS on presentation was 11.5 ± 3.9 and discharge was 12.2 ± 4.4 (p-value 0.047 95%CI -1.42 - -0.008). Major diagnostic categories were tumor 50 patients, bacterial meningitis in 45, tuberculous meningitis in 33, hemorrhage in 27, meningocele in 9, congenital hydrocephalus in 7 and traumatic brain injury(TBI) in 6 patients. Clinical indications for EVD insertion included acute hydrocephalus secondary to infections (89), tumor (39) and hemorrhage (13). EVD insertion due to Ventriculoparitoneal malfunction/ infection was done in 25 patients and TBI in 11 patients. All EVD insertions were done in OR. Infection was the major complication observed in 24, followed by malfunction in 11, hemorrhage in 6, misplaced in 3 and obstruction in 2 patients, making overall complication rate of 26 %. Staphyococcus aureus and epidermidis were the main organisms isolated.

Conclusions

Acute hydrocephalus was the main indication for EVD insertion and infectious etiology was the major diagnostic category
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0418
PREVENTABLE HOSPITAL MORTALITY: LEARNING FROM RETROSPECTIVE CASE REVIEW FROM A PEDIATRIC INTENSIVE CARE UNIT (PICU) OF A DEVELOPING COUNTRY

M.T. Jamil1, Q. Abbas1, A. Haque1, H. Jurair1
1Aga Khan University & Hospital Karachi Pakistan, Pediatrics & Child Health, Karachi, Pakistan

Aims & Objectives:

Mortality remains high in PICU in developing world which is a quality indicator. Evaluation of the patient course who dies in PICU can help detect errors and hence improve the quality of care in PICU. Objective of the study is to determine the proportion of preventable PICU deaths.

Methods

Retrospective review of medical records of all children (age 1 month to 16 years) who died in PICU from January 2013 to December 2014 was done. Data was collected on a designed proforma. Data collected included basic demographics, diagnosis, PRISM III score, PICU therapy and outcome. Preventability of death was classified by using a 1-6 point preventability scale. Results are presented as mean± SD or percentage as appropriate using SPSS v. 19.

Results

Of total 613 admissions, all 92 deaths (mortality rate-15%) were included. The median age was 17 mo (range 1mo – 16yr), 20% (19) were infants and 56.5% (52) were male. The mean PRISM-III score was 17.52±3.9. The major diagnostic categories were infectious diseases (31%), GI illnesses (18%) and CNS disorders (16%). The mean period between ICU admission and death was 4.8±4.6 days and 19% (17) were died within 24 hour. 92.4% (89) patients were in multiorgan failure within 24 hrs of ICU admission. 77% (71) deaths were not avoidable (score1-2). Four patients had preventability scale of 4(three of them were malnourished and had late presentations) while 15 patients had preventability scale of 3(5 patients had underlying oncologic diagnosis, 1 had ebstein anomaly, 1 with hypoplastic lung). Six patients had hospital acquired infections and 10 patients had failed CPR. There was no patient detected in preventability scale of 5 and six.

Conclusions

Most of the patients in our cohort had late presentations or had multiple comorbid while others had developed MODS within 24 hours of admission. While infections can be prevented.
Aims & Objectives:

The use of checklist during rounds in ICU has been shown to improve multiple aspects of patient care. Objective is to evaluate the compliance of ICU physician to different aspect of patient care during daily patient rounds in a PICU.

Methods

A prospective evaluation of daily rounds by the attending physicians in PICU was done over four month period. A structured Rounding checklist including 35 parameters was designed and all medical and nursing staff was made aware of its components on basis of which daily rounds would be evaluated. During each patient round a nurse not related to that patient care was assigned to observe and note the deficiencies in round according to the checklist. Data was analyzed to assess the quality of ward rounds on the basis of components addressed and missed. Results are presented as frequency and percentages.

Results

Rounding check list was completed for 213 patients’ rounds on 122 patients. Most frequently missed parameters were pupils reaction in 31(14.6%) rounds, surgical site infection in 25 (11.8%), bed sores 24 (11.3%), ventilator associated pneumonia/catheter associated urinary tract infection control bundles 23 (10.8%), deep venous thrombosis prophylaxis 22 (10.4%), residents' teaching 22(10.4%), intravenous site exam 19(9.0%), head position 18(8.5%), gut dysfunction (8.5%), ETT cuff pressure 16 (7.5%), glycemic control 14 (6.6%), biomarkers 14(6.6%), perfusion 13(6.1%) and plastics in 12(5.7%) patient round.

Conclusions

Papillary reaction, bedsores care and infection control bundles were the most frequent aspects missed during daily patient rounds in our PICU.
Aims & Objectives:

Renal replacement is established as an effective therapy for rapidly reducing serum ammonia in cases of neonatal hyperammonaemic encephalopathy. Which indicators predict outcome, and the impact of renal replacement on survival, require further evaluation.

Methods

On a PICU (Paediatric intensive care unit) offering CVVH (Continuous veno-venous haemofiltration) for neonatal hyperammonaemia, data were collected on all neonates with two ammonia levels >200µmol/L admitted since 01/01/2000. Outcome measures were: survival to PICU discharge, and survival at two years.

Results

Over 13 years 31 infants were admitted to the PICU for treatment of hyperammonaemia due to a urea cycle disorder (19/31) or organic acidaemia (12/31). 48.4% (15/31) of infants survived to PICU discharge. At two years of age 14/15 PICU survivors were still alive.

In the PICU survivors group CVVH was attempted in all 15 cases. In the PICU non-survivors group CVVH was attempted in 13/16 cases (in three cases treatment was considered futile). All but one infant received pharmacological priming of alternative pathways for nitrogen excretion.

Ammonia level on admission to the PICU differed significantly between survivors and non-survivors (median ammonia 597 vs 1265µmol/L, p=0.0002); as did lactate on admission (median lactate 1.9 vs 4.7mmol/L, p=0.00009). All survivors had a first ammonia on PICU <1000µmol/L; the lowest ammonia amongst PICU non-survivors was 485µmol/L. See figure 1 for group comparison.

A smaller proportion of the survivors suffered seizures (29% vs 75%, p=0.026). Other surrogate indicators of organ dysfunction did not differ between groups (figure 2).
Figure 1. Comparison of patient characteristics between PICU survivors and non-survivors. Median values with range in parentheses.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PICU survivors (n=15)</th>
<th>PICU non-survivors (n=16)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak ammonia pre-PICU (μmol/L)</td>
<td>598 (82-1200)</td>
<td>1750 (462-5000)</td>
<td>0.0015</td>
</tr>
<tr>
<td>First ammonia on PICU (μmol/L)</td>
<td>597 (253-997)</td>
<td>1265 (485 - 3103)</td>
<td>0.00022</td>
</tr>
<tr>
<td>Age at presentation (days)</td>
<td>3 (1-10)</td>
<td>2 (2-4)</td>
<td>0.1</td>
</tr>
<tr>
<td>Age at admission to PICU (days)</td>
<td>5 (3-14)</td>
<td>4 (2-6)</td>
<td>0.036</td>
</tr>
<tr>
<td>Urea on admission (mmol/L)</td>
<td>3.5 (1-11.2)</td>
<td>2.2 (1-14.4)</td>
<td>0.4</td>
</tr>
<tr>
<td>Lactate on admission (mmol/L)</td>
<td>1.9 (0.4-3.5)</td>
<td>4.7 (2.7-17.7)</td>
<td>0.00009</td>
</tr>
<tr>
<td>Time from admission to starting CVVH (hrs)</td>
<td>7 (4-24)</td>
<td>6 (1-11)</td>
<td>0.3</td>
</tr>
<tr>
<td>Duration of CVVH (hrs)</td>
<td>33(14-89)</td>
<td>12 (3-26)</td>
<td>0.00034</td>
</tr>
<tr>
<td>Time to reach ammonia &lt;150μmol/L (hrs)</td>
<td>14 (3-25)</td>
<td>17 (4-38)</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Figure 2. Comparison of surrogate indicators of organ dysfunction between PICU survivors and non-survivors.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>PICU survivors (n=15)</th>
<th>PICU non-survivors (n=16)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasoactive drug infusion on admission</td>
<td>73.3%</td>
<td>75%</td>
<td>0.9</td>
</tr>
<tr>
<td>Ventilated on admission to PICU</td>
<td>73.3%</td>
<td>93.3%</td>
<td>0.14</td>
</tr>
<tr>
<td>pH &lt;7.25 on admission to PICU</td>
<td>20%</td>
<td>18.8%</td>
<td>0.9</td>
</tr>
<tr>
<td>Seizures at any time during admission</td>
<td>28.6%</td>
<td>75%</td>
<td>0.026</td>
</tr>
</tbody>
</table>

Conclusions

Despite treatment with CVVH, mortality from neonatal hyperammonaemia is 50%. Ammonia and lactate levels at admission to PICU correlate with survival and may be used in future to inform decision making.
Aims & Objectives:

- To identify the indications, outcomes; and risk factors for poor outcome of HSCT patients requiring PICU admission.

Methods

Design: A Retrospective Cohort Analysis.
HSCT recipients <18 year who were admitted to PICU from August 2013 to June 2015, were identified. After an informed consent data was collected from systematically reviewing the charts. Pediatric Index of Mortality – PIM 3 score was calculated for all cases on admission to PICU.

Results

Of 141 patients who received HSCT; 33 (23%) required PICU admission, of which 10 died resulting in 8.5% of overall mortality and 36.4% of PICU mortality. Major indications for PICU admissions were Seizures (30.3%); Hypotension (21.2%) and Respiratory distress (18.2%). Mortality was noted among 100% of patients with Ventilator Associated Pneumonia (VAP) (p=0.004), 64.3% with cardiac dysfunction (p=0.004), 70% with hepatic dysfunction (p=0.008), 72.7% with renal involvement (p=0.002); 68.8% requiring invasive ventilator support (p=0.001) and 100% requiring ventilation for > 1 week (p=0.014) and 80% with high inotropic score (p<0.01). Septic shock (50%) and GVHD (16.7%) were significant (p<0.001) causes of death. The PIM-3 score of -0.47 had prediction of mortality in 91.7% cases (AOC=0.885, p<0.001).
Conclusions

It can be postulated that early recognition of co-morbidities; efficient PICU care by decreasing duration of ventilation, inotropes, avoidance of VAP, early recognition of end organ dysfunction, can reduce mortality in this subset of patients; as risk factors like primary disease, conditioning, patient profile were not significant in mortality prediction.
Aims & Objectives:
Hemophagocytic lymphohistiocytosis (HLH) is a multisystem illness with variable clinical presentation. Mortality is high in the pediatric age group, especially infants. The aim was to study the profile and outcomes of children presenting with HLH in our pediatric ICU.

Methods
We conducted a retrospective analysis of 12 HLH patients diagnosed by HLH 2004 criteria from age group 2 months to 15 years admitted to a tertiary level pediatric intensive care unit from January 2009 to July 2015.

Results
In our analysis we found that out of the 12 patients, 2 had primary HLH and 10 patients had secondary HLH. HLH is a multisystem illness characterized by fever, organomegaly, cytopenias, hyperferritinemia, hypertriglyceridemia and hemophagocytosis on bone marrow. In our analysis we found that 5 had either EBV or Dengue infection, 1 developed HLH post tetralogy of Fallot repair and 1 patient had associated central diabetes insipidus. Fever, splenomegaly and hemophagocytosis on bone marrow were the most common findings. Liver dysfunction was found in 67% of the patients. Dengue and EBV were the two infections associated with HLH. Fever, liver dysfunction (8/12) and splenomegaly were the most common clinical features in these patients. Out of the 12 patients, 4 went into spontaneous remission, 1 underwent bone marrow transplant and rest were treated as per HLH 2004 protocol. Mortality rate was 40%.

Conclusions
HLH is a multisystem illness with variable presentations and high mortality. Clinicians should have high index of suspicion regarding this illness since prompt recognition and targeted therapy improves outcome of such patients.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0885
Successful desensitization of Granulocyte Monocyte - Colony Stimulating Factor (GM-CSF) in a 17 year old patient with Acute Myeloid Leukemia.

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3Kokilaben Dhirubhai Ambani hospital, Oncology, Mumbai, India
4Kokilaben Dhirubhai Ambani hospital, Oncology, Mumbai, India

Aims & Objectives:

Introduction:

Patient receiving chemotherapy for malignancy frequently has severe neutropenia requiring Granulocyte- Colony Stimulating Factor (G-CSF). Severe anaphylaxis needing desensitisation to GM-CSF is very rare in patients receiving the drug for neutropenia.

Methods

Case:

A 17 year old boy, with excessive fatiguability, was investigated and diagnosed as Acute Myeloid Leukemia (AML). He was posted for induction chemotherapy. Fludarabine, Cytarabine, and Idarubicin (FLAG-IDA) were selected for induction chemotherapy. Post chemotherapy, he developed severe neutropenia requiring G-CSF. After 1st dose of G-CSF (Sub Cutaneous) patient developed severe anaphylactic reaction requiring cardiopulmonary resuscitation. Neutrophil counts were dropping further. A diluted test dose (0.00005 microgram) was given, but he developed anaphylaxis again. In view of neutrophil counts dropping to zero, he received granulocyte concentrate for neutropenia. In view of these reactions, it was decided to start him on GM-CSF. We used very slow desensitization protocol, 1st dose starting from 0.00005 microgram. Subsequent doses were 0.001, 0.002, 0.005, 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 250 and 500 microgram (total 19 doses, intravenous) given 30 minutes apart with close hemodynamic monitoring. Fortunately, patient tolerated GM-CSF desensitization. On subsequent doses of GM-CSF, patient had no anaphylactic reaction and his neutrophil count increased. Eventually, patient received bone marrow transplant.

Results

Patient was successfully desensitised.
Conclusions

Conclusion:

Severe anaphylaxis following G-CSF is not common, but it must be kept in mind while prescribing it for neutropenic patients. In patients who are allergic to these drugs, protocolised desensitization can be tried successfully.
Title: Intracranial space occupying lesion presenting as pulmonary edema: a case report

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²Kokilaben Dhirubhai Ambani hospital, Pediatric ICU, Mumbai, India
³Kokilaben Dhirubhai Ambani hospital, PICU, Mumbai, India

Aims & Objectives:

Intracranial space occupying lesions (ICSOL) commonly present neurological signs and symptoms and usually over a period of time depending upon the growth of the lesion.

Methods

An 11-year-old boy presented with 2 days history of lethargy, fever and vomiting and occasional headache. Clinical examination revealed signs of shock, respiratory failure and pulmonary edema requiring inotropic and ventilatory support. 2D echo showed biventricular dysfunction. Computed Topography (CT) Pulmonary angiography showed no abnormality. In view sudden unequal pupillary size and abnormal light reflex, CT scan of the brain was done, which showed cystic lesion in right frontal horn, extending to 3rd ventricle, causing compression at level of foramen of Monroe with resultant supratentorial hydrocephalus, mild uncal herniation & tonsillar herniation. A ventriculo-peritoneal shunt was placed to decompress ventricles and posted for surgery. Right parasagittal and pericoronal craniotomy was done with complete excision of tumor and third ventriculostomy. Post-operative recovery was uneventful. On follow up child had no focal neurological deficit. ICSOL was ependymoma, as confirmed by histopathological examination.

Results

In the present case, ICSOL presented with autonomic disturbances rather than typical neurological presentation. High index of suspicion is required to diagnose and manage this type of challenging cases.

Conclusions

In this case, an intracranial pathology presented as a cardiac emergency, and high index of suspicion is required in such life-threatening cases which led to prompt diagnosis and management.
Aims & Objectives:

Outcome of pediatric oncological emergencies has steadily improved in last two decades. However, febrile neutropenia and number of organ system failure are important prognostic factors in these patients which is what we aimed to study.

Methods

We conducted retrospective analysis of 27 admissions of 24 children in the age group 1 month to 18 years with oncological emergencies admitted to tertiary level pediatric intensive care unit of Mumbai.

Results

Overall survival in this group was 77%. In patients with one and two organ system failure, survival was 100% whereas all patients with > 3 organ system failure died. We found that children with associated febrile neutropenia had 30.8% mortality as compared to 14.3% in non-neutropenia group. Mean duration of ICU stay was more in AML group as compared to ALL group.

Outcome of pediatric oncological emergencies has improved form 75-80% mortality to 75-80% survival over last few decades. In our analysis we found 77% survival of these patients which is comparable to current western literature. In our study, we observed that febrile neutropenia was a bad prognostic factor for mortality. Children with AML had more frequent need of advanced mode of ventilation like HFOV. Encephalopathy and shock were most common indication of PICU stay, PRES being the most common cause of encephalopathy.

Conclusions

Overall survival of pediatric oncological emergencies has greatly improved over time. In these patients, febrile neutropenia and the presence of more than 3 organ system failure carried poor prognosis.
Coronary insufficiency (Triple vessel disease) in a case of Familial Hypercholesterolemia: a case report

V. Joshi¹, R. Thumar¹, G. Upadhyay¹, P. Joshi¹
¹Kokilaben Dhirubhai Ambani hospital, Pediatric ICU, Mumbai, India

Aims & Objectives:

Coronary artery disease secondary to familial hypercholesterolemia is a rare condition in children. Ignorance of specific signs and symptoms can prove fatal.

Methods

A 7 year old boy, having frequent chest pain, easy fatiguability and exertional dyspnea since last 4 months, was referred with history of sudden onset giddiness followed by cardio-vascular collapse, requiring cardio-pulmonary resuscitation, mechanical ventilation and inotropic support. On examination, child was in a state of shock, had pallor, unequal pupils and multiple xanthomas over both knees and right arm. CT Brain was done which revealed no abnormality. Blood investigations showed high levels of cholesterol and dyslipidemia. 2D echo was showing significant Left ventricular systolic and diastolic dysfunction with dilated left ventricle. Left ventricular ejection fraction was 30%. CT cardiac angiography showed >90% stenosis at origin of left anterior descending (LAD), circumflex and distal left main coronary artery; >80% narrowing in the proximal LAD and right coronary artery origin. Marked atherosclerotic changes were seen in descending thoracic aorta. Child had sudden cardio-vascular collapse in CT room, requiring cardio-pulmonary resuscitation and increment in inotropic support. Eventually the child did not survive.

Results

Two siblings (5 yrs and 1 ½ year old), both asymptomatic, were worked up and tested positive for hypercholesterolemia. Both siblings are undergoing treatment in form of dietary modification and pharmacological therapy.

Conclusions

Familial hypercholesterolemia can cause coronary atherosclerotic changes at an early age. High index of suspicion in childhood coronary artery disease, early intervention, family screening, lifestyle modification and pharmacotherapy can alter the course of the disease significantly.
KETOSIS AFTER CARDIOPULMONARY BYPASS IN CHILDREN IS ASSOCIATED WITH A LOW CARDIAC OUTPUT

Aims & Objectives:

Hyperglycemia after cardiac surgery and cardiopulmonary bypass (CPB) in children has been associated with worse outcome, however causality has never been proven. Furthermore, the benefit of tight glycemic control is inconsistent. The purpose of this study was to describe the metabolic constellation of children before, during, and after CPB, in order to identify a subset of patients that might benefit from insulin treatment.

Methods

96 patients aged 6 months to 16 years and undergoing cardiac surgery with CPB were included into this prospective observational study performed in a tertiary pediatric intensive care unit (PICU). Metabolic tests were performed before anesthesia, at the end of CPB, at PICU admission, and 4 and 12 hours after PICU admission, as well as 4 hours after initiation of insulin treatment.

Results

Ketosis was present in 17.9% patients at the end of CPB and in 31.2% at PICU admission. Young age was an independent risk factor for this condition. Ketosis at PICU admission was an independent risk factor for lower cardiac output 4 hours after admission ($p=0.05$). Insulin corrected ketosis within 4 hours.

Conclusions

In this study we found a high prevalence of ketosis at PICU admission, especially in young children. This was independently associated with low cardiac output and was corrected by insulin. These results suggest that this subgroup of patients might benefit from increased glucose intake and insulin during surgery to avoid ketosis, as this might improve cardiac output.
Aims & Objectives:

To determine the incidence and severity of liver dysfunction in children with Dengue Fever (DF).

To compare morbidity and mortality in DF with and without liver dysfunction.

To determine the predictive value of INR for survival.

Methods

A retrospective study enrolling all serologically confirmed DF children admitted from Jan 2015 to Jan 2016. Patients were stratified to Mild Hepatitis (MH) (SGPT 50 to 300 U/L), Severe Hepatitis (SH) (SGPT > 300 U/L) and Acute Liver Failure (ALF) (Acute hepatitis and INR >1.5 and/or otherwise unexplained encephalopathy). All patients received standard supportive care including N Acetyl Cysteine (NAC) for SH and ALF groups.

Results

Total 407 children with DF were studied of whom 268 (66%) had hepatic dysfunction. Of these 268, MH was present in 163 (61%), SH in 86 (32%) and ALF in 19 (7%), i.e. 40%, 21% and 4.7% of the total 407 patients respectively.

Mean (±SD) hospital stay was significantly higher in SH (3.90±2.5) (p<0.01) and ALF (5.4±3.2) (p<0.01) vs. no hepatitis or MH group (3.78±2.13).

Rate of complications such as acute renal failure (p<0.01), secondary sepsis (p=0.04) and pulmonary bleeding (p<0.01) was higher with hepatic dysfunction compared to without; and highest amongst ALF.

Overall mortality rate 3.2% (n= 13); 61% of mortality (n=8) (RR=22.05) due to ALF

Mortality in ALF was 42% (n=8) compared to 3.5% (n=3) in SH and 1.4% (n=2) in no liver dysfunction groups.

INR was a strong predictor of mortality (p<0.01; RR 242.5) with only 1 of 9 children with INR >3.5 surviving.
Conclusions

Majority of DF have liver dysfunction; ALF a major cause of death. Elevated INR at presentation might be a strong predictor of survival and should be incorporated in routine evaluation of DF. INR >3.5 might identify a high risk group for whom best current management is inadequate and novel interventions might be required.
Aims & Objectives:

**Background:** Pediatric diabetic ketoacidosis (DKA) is a life-threatening metabolic emergency that can complicate type one diabetes mellitus. Interventions such as insulin boluses and bicarbonate have been associated with morbidity in the pediatric population. Pediatric DKA practice guidelines seek to inform optimal patient management, however there is a paucity of literature assessing guideline adherence.

**Co-Primary objectives:** (1) To determine the proportion of critically ill children with DKA whose initial resuscitation was non-adherent with the 2009 Ontario emergency room management guidelines for children with Type 1 diabetes and DKA, and (2) to identify independent predictors of non-adherence.

**Methods**

**Design:** Retrospective study.

**Participants:** Children 0-17 years old admitted to McMaster Children’s Hospital’s Pediatric Intensive Care Unit (PICU) with DKA between April 1, 2010 to December 31, 2014.

**Data Collection:** Demographic, treatment, laboratory and clinical outcome data was abstracted from medical records.

**Analysis Plan:** Co-primary outcomes will be analyzed by (1) calculation of simple proportion for guideline non-adherence, and (2) multiple logistic regression will be used to assess potential independent predictors of guideline non-adherence, reported as Odds Ratio point estimates with 95% confidence intervals. Potential predictors include age, non-pediatric vs. pediatric centre, DKA severity, provider’s specialty training, and time to PICU consultation.

**Results**

We identified 129 DKA episodes in 115 unique patients. Participants experienced 1-3 DKA events. Primary outcome analyses will be completed by March 2016. Final results will be presented at PICC.
Conclusions

Our findings will contribute new knowledge regarding pediatric DKA guideline non-adherence and identify potential targets for future knowledge translation efforts.
Aims & Objectives:

Acute Kidney Injury (AKI) is associated with increased morbidity & mortality in critically ill children. There are very few data about the incidence of AKI in Indian PICUs. We conducted this study to identify the incidence of AKI and the associated mortality in our population.

Methods

In this prospective observational study, all children aged 1 month–18 years admitted to the PICU from March 2014 to May 2015 were included. Children with estimated GFR <75 ml/min/1.73 m² were classified as having AKI, using pRIFLE criteria. Demographic details, vital signs & laboratory parameters were recorded. Mortality was compared between the AKI and non-AKI groups. In children with AKI, risk factors for kidney injury were compared between survivors & non-survivors and between the Risk, Injury & Failure groups.

Results

Out of 839 children admitted during this period, 120 (14.3%) had AKI. Mortality in the AKI group was 22.7% as compared to 7.8% in the non-AKI group (p=0.00001). In children with AKI, PIM2 score, fluid overload percent and requirement for mechanical ventilation, inotropes & Renal Replacement Therapy were higher in the non-survivors compared to survivors (p<0.05). Children in the failure group had higher median PIM2 scores, fluid overload percent, RRT requirements and mortality when compared to the risk & injury groups (p<0.05).

Conclusions

Acute Kidney Injury is a major risk factor associated with mortality & morbidity in critically ill children. Incidence & mortality rates in our study were comparable to other studies.
Aims & Objectives:

Early enteral nutrition initiation (ENI) using feeding protocols may improve outcomes in pediatric critical illness. We implemented a Critical Care Nutrition Pathway (CCNP) to standardize nutrition support in our pediatric intensive care unit (PICU).

Methods

As an IRB-exempt quality improvement initiative, we compared times to ENI in mechanically ventilated (MV) CCNP subjects admitted between May 2014 – July 2015 with a historical group of MV subjects admitted between August 2013 – December 2013. We analyzed demographics, diagnoses, severity of illness using the Pediatric Index of Mortality 2 (PIM2), MV duration, and PICU length of stay (LOS). Statistical analysis was by t-test and Fisher’s exact test.

Results

We compared 57 MV CCNP subjects with 167 MV historical subjects. While MV CCNP group was younger (5 years vs 7 years, p=0.03) and sicker (PIM2 risk of mortality 9% vs 5%, p=0.04) with a longer ICU LOS (20 days vs. 10 days, p<0.001) and longer MV duration (7 days vs 5 days, p=0.04), time to ENI trended lower (65 hours vs. 83 hours, p=0.16) compared to MV historical group. Further, 42 MV CCNP subjects and 74 MV historical subjects received MV > 3 days with greater ICU LOS in the CCNP group compared to the historical group (23 days vs. 15 days, p=0.03). Similar trends in time to ENI were observed (67 hours in CCNP vs. 83 hours in historical, p=0.35).

Conclusions
Implementing a CCNP in our PICU was associated with improved trends in time to ENI. Further study is needed to validate the ability of the CCNP to standardize nutrition support and improve outcomes.
IMPROVING NUTRITIONAL OUTCOMES IN PICU: DEVELOPMENT AND IMPLIMENTATION OF AN ALGORITHM FOR THE ESTABLISHMENT AND TOLERANCE ASSESSMENT OF CONTINUOUS NOSOGASTRIC FEEDS IN PICU

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Aims & Objectives:

An internal audit of the documentation of nutritional intake in conjunction with a nursing staff survey related to the practice of enteral nutrition delivery via nasogastric tubes was conducted. This identified a need for change to optimise the nutritional intake of PICU patients within the 23 bed PICU.

Methods

Patient’s enteral nutritional intake was audited for a three week period during routine daily dietetic assessment. Nursing staff also completed an electronic survey pertaining to the delivery, tolerance and grading up sequence for patients receiving nasogastric feeds in PICU. Results from both data sets were collated. A multidisciplinary working party was formed and following a literature review and discussion, developed an algorithm tool to trial for the establishment and tolerance of nasogastric feeds.

Results

Examination of the data collected by dietetics identified that patient enteral energy requirement targets were, on average, less than 20% achieved. The nursing staff survey identified that nutrition was important to optimise patient outcomes, however there was variation and inconsistency with nasogastric feeding practices and 80% of staff identified that the availability of a clinical tool to guide the practice of nasogastric feeding would be useful as would enhanced education regarding enteral feeding.

Conclusions

An algorithm to guide the establishment and assess the tolerance of enteral feed delivery was developed and implemented after a one month pilot trial. On recollection of nutritional data 12 months post algorithm implementation, the achievement of enteral energy requirement in PICU patients who are medically suitable for enteral feeding has increased significantly.
Aims & Objectives:

Pulmonary agenesis is a rare congenital malformation, with few cases reported in literature. It consists of the complete or partial absence of the pulmonary parenchyma, bronchi or lung vessels and is commonly associated with other congenital malformations involving the cardiovascular system, musculoskeletal, gastrointestinal and, less frequently, genitourinary and central nervous system.

The aim of this study is to describe a case of unilateral pulmonary agenesis in an critically ill infant.

Methods

Retrospective analysis of medical records and patient database in a private pediatric critical care unit (PICU), in Rio de Janeiro, Brazil.

Results

We report a four months old girl, admitted to a private hospital in September 2014 with fever, cough and runny nose, followed by respiratory distress. She had moderate tachyypnea on physical examination at admission and pulmonary auscultation revealed breath sounds on both sides, with wheezing and rales on the left side. A chest X-ray performed at admission showed opacity of the right hemithorax. Because of respiratory distress, the patient was referred to PICU with the diagnosis of bacterial pneumonia and atelectasis of the right lung. On the second day of PICU, the clinical picture worsened and non-invasive ventilation was installed for the next 48 hours, without significant clinical improvement.

Due to the maintenance of pulmonary imaging in chest X-ray, a thoracic CT scan was performed and agenesis of the right lung was diagnosed. No other congenital anomaly was detected.
The infant evolved with progressive improvement of the breathing pattern and was discharged of the hospital a week later. Another five admissions were recorded after her diagnosis in a period of six months, all of them related to respiratory symptoms.

**Conclusions**

Despite of being a rare condition, pulmonar agenesis can be an isolated congenital malformation and should be remembered as a possible cause of respiratory distress in small children.
Aims & Objectives:

To investigate the variation of VCAM-1 levels according the severity in circulatory shock in children.

Methods

A prospective cohort study was conducted in 27 children aged 2.6 to 164 months (median 25.4 months) who had systemic inflammatory response. VCAM-1 serum levels were assessed on hospital admission and on the third day in the Pediatric Intensive Care Unit (PICU). Patients were classified post hoc (after discharge or death) in two groups according to hemodynamic definitions of shock based on ACCP/SCCM consensus conference criteria. The S group (n=13) corresponded to patients with any of the following conditions: fluid-refractory shock, dopamine-resistant shock, catecholamine-resistant shock or refractory shock. The NS group (n = 14) consisted of patients without hypotension. VCAM-1, arterial lactate, procalcitonin (PCT) were measured using ELISA, and C-reactive protein (CRP) by turbidimetry. Nutritional status was assessed by body mass index z score (WHO standards).

Results

Nutritional status, sex and age did not differ between groups. VCAM-1 levels differed significantly (p=0.03) from baseline to day 3 in patients without hypotension (NS group). Lactate (but not CRP and PCT) differed in S group from baseline to day 3 (p=0.04). Only two patients in the S group died. VCAM-1 levels did not differ between groups during in both measures.
VCAM-1 and arterial lactate according to time and groups

<table>
<thead>
<tr>
<th></th>
<th>On admission to the ICU</th>
<th>Day 3</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VCAM-1</td>
<td>134 [123 – 211]</td>
<td>172 [151 – 222.5]</td>
<td>0.17</td>
</tr>
<tr>
<td>Arterial lactate</td>
<td>18.6 [10.5 – 31.5]</td>
<td>11.5 [6.6 – 20.9]</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>NS group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VCAM-1</td>
<td>141.4 [118 – 164.1]</td>
<td>178.3 [152.3 – 193.0]</td>
<td>0.03</td>
</tr>
<tr>
<td>Arterial lactate</td>
<td>10.5 [8.8 – 13.8]</td>
<td>9.1 [5.3 – 12.6]</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Values are presented as median and 25% - 75% interquartile ranges (in square bracket).

**Conclusions**

VCAM-1 levels increase from admission to day 3 in patients with circulatory shock without hypotension. Further studies are necessary to determine when and in which patients endothelial activation is likely to be dysfunctional.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0140
EXHALED HYDROGEN TEST AFTER LACTULOSE INTAKE TO MEASURE OROCECAL TRANSIT TIME IN CRITICALLY ILL CHILDREN

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2Gregorio Marañón University Hospital, Pediatric Gastroenterology, Madrid, Spain

Aims & Objectives:

Orocecal transit time (OCTT) can be measured by exhaled hydrogen after the administration of lactulose (lactulose-eH2) test. The objectives of this study were to assess whether it is possible to carry out this test in critically ill children and to analyze if the results are consistent with clinical findings.

Methods

Patients admitted to the Pediatric Intensive Care Unit for more than three days were included. Those with gastrointestinal disease prior to admission were excluded. A modified technique to obtain eH2 from the ventilator tubes were performed. Test is positive when a 10 ppm eH2 peak from baseline is obtained. Relationships between demographic and clinical data and lactulose-eH2 test measurements were analyzed.

Results

Sixteen patients (37.5% boys), 19 (5-86.5) months old were included. Five patients were breathing spontaneously but the test could not be performed due to anxiety because of breathing in a mask in 3 of them. The other 11 were on mechanical ventilation and the test was performed: 7 (63.3 %) did not show any peak during the 6 hour-study after lactulose intake; 4 showed a median time to the peak of 130 (78.7 - 278.7 min). There were no differences in any of the variables between children with and without eH2 peak. Children with eH2 peak had intestinal movements earlier [6.5 (1.5-38.5) vs 44 (24-72) hours], but no significant differences were found either.

Conclusions

Although the designed adaption is useful for collecting breath samples, lactulose-eH2 test is not useful for measuring OCTT in critically ill children.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0250

CLINICAL SCORE TO PREDICT CONSTIPATION IN CRITICALLY ILL CHILDREN

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²Gregorio Marañón General University Hospital, Pediatric Gastroenterology, Madrid, Spain

Aims & Objectives:

Constipation is a very common disorder in critically ill children but with very few studies have analyzed its incidence and repercussion. Constipation is a late-diagnosis pathology and treatment is delayed most of times until complications are present. The objective of this study is to develop a score to make earlier diagnosis and treatment to avoid complications.

Methods

Prospective observational study with children admitted to the Pediatric Intensive Care Unit more than 3 days. Patients with abdominal surgery or digestive disease were excluded. Constipation was defined as no intestinal transit for more than 3 days after admission if enteral nutrition has been established at least the previous 24 hours. Clinical and demographic data were collected during first 2 days of PICU admission and a multivariate analysis with ROC curves was obtained to develop the clinical score.

Results

150 patients were studied. Constipation incidence was 46.7%. Multivariate analysis detected 5 independent risk factors related to constipation [OR (IC95%)]: weight > 7 kg [12.68 (4.48-35.85)], delay in enteral nutrition started > 48 hours [4.01 (1.48-10.86)], fentanyl > 2 mcg/kg/h [3.5 (1.38-8.89)], needing of epinephrine or norepinephrine [8.67 (2.61-28.81)] and postsurgical admission [2.73 (1.06-7.04)]

A score was created with these risk factors and showed an area under the curve of 0.89 (IC 95%: 0.84-0.94), p < 0.01. Constipation was preset if patients obtained more than 5.75 points. This score has a sensibility of 74.3%, specificity of 81.3%, positive predictive value of 78.8% and a negative predictive value of 77.2%.

Conclusions

This constipation score is easy to apply and permit to improve constipation diagnosis and management in critically ill children. This score must be validated to prove its external validity and usefulness.
Aims & Objectives:

Chylous ascites is a rare condition. It is a milky peritoneal fluid that is rich in triglycerides, due to the presence of thoracic or intestinal lymph in the abdominal cavity. It develops when there is a disruption of the lymphatic system, which occurs due to traumatic injury or obstruction. The most common causes are abdominal malignancy, lymphatic abnormalities, and cirrhosis, but it can happen after abdominal surgery. It frequently presents as progressive and painless abdominal distention, occurring over weeks or months, depending upon the underlying cause. Patients may complain of weight gain, shortness of breath, and dyspnea resulting from increased abdominal pressure. The triglyceride levels in ascitic fluid are critical in defining chylous ascites, and values are typically above 200 mg/dL.

Methods

We are reporting a case of a 4 month infant who had cholestatic jaundice, progressing to liver cirrhosis due to biliary atresia.

Results

It was performed a liver transplantation, followed, a week later, by peritoneal closure. Maternal breast feeding started two days later. The infant had abnormal peritoneal fluid aspect of the abdominal drain, with high triglyceride levels in ascitic fluid (TG = 262 mg / dL). The ingestion of fats was suspended, maintaining modulated diet with medium chain triglycerides. After changing the diet, there was an improvement in the appearance of drainage, closing the diagnosis. Unfortunately, the patient developed infectious condition, unrelated to the primary disease, and died. Therefore, no monitoring of the case was possible.

Conclusions

Although it is a rare condition, the attending physician should be aware of the risk factors to make an early diagnosis and to establish proper treatment.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0936
CONGENITAL TRACHEOBILIARY FISTULA – CASE REPORT
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¹Universidade Federal de São Paulo, Pediatrics, São Paulo, Brazil

Aims & Objectives:

Tracheobiliary fistula is defined as an abnormal communication between the biliary system and tracheal tree.

Methods

We report a case of a 21-day-old newborn who presented with respiratory distress and bilioptysis, originally transferred for our center to investigation of tracheo oesophageal fistula.

Results

Child presented on the fourth day of life apnea, fatigue after feeding, and cyanosis. Admitted for investigation and ruled out heart disease by echocardiography. Maintained episodes of coughing, cyanosis and hypoxemia crises. Developed until the 10th day of life with progressive worsening of respiratory distress and right base pneumonia difficult resolution being intubated and observed output of bile secretion by the tracheal cannula. Bronchoscopy showed erosive lesions in the trachea but not viewed the origin of the fistula. Referred for chest CT scan that showed tracheal fistula bileo near the carina. Finding confirmed surgical fistula between the left lobe of the liver and trachea.

Conclusions

It is a complication associated with a high mortality rate and requires a well-planned management strategy in the PICU and careful planning of maintenance and weaning from mechanical ventilation.
Aims & Objectives:

ICU transfusion decision-making should maintain hemoglobin (Hb) above thresholds that limit O2 delivery. Historically, normal Hb values were presumed necessary during stress. We now better appreciate anemia tolerance and donor RBC impairment; as such, conservative transfusion approaches are emerging based upon non-inferiority trials of permissive anemia (e.g. restrictive Hb-based thresholds). However, we currently lack decision-making structure that: identifies specific individuals for whom permissive anemia is unsafe and guides transfusion timing and amount, based upon outcome-linked O2 delivery-based targets.

Methods

We employed proctored group model building (GMB) to map transfusion decision-making (TDM) by studying responses by 20 pediatric intensivists (St. Louis Children’s Hospital) to open-ended questions characterizing TDM. We then composed a formal TDM systems dynamics model that was refined and validated by two PCCM groups (Boston Children’s Hospital and BloodNet Research Group).

Results

26 factors influencing TDM were identified and organized into 5 groups that comprised 4 balancing causal loops. A decision path emerged for individualized physiologic goal-based TDM: (1) O2-delivery fails to meet need, (2) O2-delivery failure is sufficient to injure or threaten injury, (3) the risk and impact of injury exceeds risk and impact of harm anticipated from transfusion, (4) transfusion is appropriately sequenced with other interventions, and (5) TDM is conditioned by patient trajectory (decompensation versus recovery).

Conclusions

GMB clarified the complexities of physiologic goal-directed TDM and enabled composition of a formal systems dynamics model of this process. The model identified knowledge gaps to be resolved prior to implementation of this approach: ability to quantify O2 delivery/consumption and sufficiency/reserve relationships (global/organ/tissue) and ability to specifically attribute these parameters to anemia.
Aims & Objectives:

The ability to predict which critically ill children are most likely to develop central venous catheter-associated thrombosis, while the incidence is still low, maximizes the likelihood of preventing thrombosis. We determined whether in critically ill children with an untunneled central venous catheter, the risk of catheter-associated deep venous thrombosis can be accurately predicted within 24 hours after insertion of the catheter.

Methods

Children admitted to the intensive care unit within 24 hours after insertion of a central venous catheter were included. Excluded were children who received anticoagulation. Active radiologic surveillance was performed to detect catheter-associated thrombosis. We used logistic regression (models 1 and 2) and recursive partitioning (models 3 and 4) methods to develop risk prediction models with predictors present at any time while catheterized (models 1 and 3), or within 24 hours after insertion of the catheter (models 2 and 4). Areas under the receiver operating characteristic curves were compared.

Results

Of 174 children analyzed, 53 (30.5%) developed catheter-associated thrombosis. Age, recent surgery, catheter in the subclavian vein, and blood product transfusion were included in models 1 and 2. Areas under the curve were similar (model 1: 0.74 vs. model 2: 0.73, p=0.24). Except for recent surgery, predictors in model 1 were identified as partitioning variables for model 3. In addition to the predictors in model 2, severity of illness was used in partitioning for model 4. Area under the curve of model 3 appeared smaller than model 4 (0.74 vs. 0.80; p=0.08). Groups of children at low, intermediate, and high risks of catheter-associated thrombosis were identified using model 4, the model with the best performance.
Conclusions

Critically ill children at high risk of catheter-associated thrombosis can be accurately identified within 24 hours after insertion of an untunneled central venous catheter.
Aims & Objectives:

Optimal enteral nutrition (EN) delivery is often limited in the PICU due to intolerance, a manifestation of delayed gastric emptying (GE). The role of gastric residual volume (GRV) measurement in the PICU, as a marker of delayed GE, remains controversial. We aimed to compare existing bedside markers of delayed GE, including GRV, to a reference method.

Methods

PICU patients ≥1 year and eligible for EN were tested for delayed GE by the acetaminophen absorption test. Timed plasma acetaminophen levels were obtained after gastric administration of the drug, and the truncated area under the curve at 60 minutes (AUC$_{60}$) < 600 mg.min/L was diagnostic of delayed GE. Markers of delayed GE, GRV >3ml/kg, ≥2 increases in abdominal girth, ≥2 episodes of emesis, ≥3 diarrhea episodes, and/or abdominal discomfort in 24h, were recorded and compared between children with and without delayed GE.

Results

We studied 17 patients, median age 11.4 years, 53.9% male. Thirteen (76.5%) had delayed GE and 4 had normal GE (AUC$_{60}$, 127 vs. 843.1 mg.min/L p=0.0008). Figure 1 demonstrates the peak acetaminophen concentration between children with and without delayed gastric emptying (175.6 vs 854.9 mcg/ml p<0.0001). Children with and without delayed GE had similar demographic features and EN delivery rates at the time of the study. There were no statistically significant differences between median GRV (0.43 vs. 0.89 ml/kg), frequency of GRV >3ml/kg or other clinical markers for delayed GE.

Conclusions
Delayed GE was diagnosed in over ¾ of our study cohort. Existing clinical markers of EN intolerance, including GRV, did not identify children with delayed GE. The utility of GRV measurement in the PICU is questionable.

Figure 1. Acetaminophen plasma concentration in children with and without delayed gastric emptying
Vitamin D status and mortality in critically ill children: A systematic review and meta-analysis

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Aims & Objectives:

Vitamin D deficiency (VDD) has been hypothesized a risk factor for worse outcome in critical illness. Although confirmed in the adult critical care setting, the relationship between vitamin D status and clinical course in the Pediatric Intensive Care Unit (PICU) remains uncertain due to fewer studies with smaller sample sizes. Study objectives were to perform a systematic review with meta-analysis to synthesize the available data on vitamin D status and evaluate the relationship with clinical course (primary outcome, mortality).

Methods

MEDLINE, EMBASE and CENTRAL were searched until Dec 24, 2015 with no date or language restrictions. Two reviewers independently screened titles, abstracts and full text for observational studies reporting total 25-hydroxyvitamin D levels in critically ill children. Random effects meta-analysis calculated the pooled proportion of patients with VDD, compared levels relative to healthy controls, and evaluated for association between VDD, mortality and other markers of illness severity and organ dysfunction.

Results

From 2649 citations, 13 publications meeting study eligibility were identified. The studies reported on a total of 2098 children, had a median size of 120 (range: 12-500) and generally defined deficiency using the 50 nmol/L. Meta-analysis calculated the VDD event rate to be 49.6% (95% CI: 39.3 – 59.9) and determined 25(OH)D levels in PICU patients to be lower when compared to healthy controls (-17.3 nmol/L, 95% CI: -14.0 to -20.6) - Table 1. Meta-analysis suggested that VDD was associated with significantly increased mortality (OR: 1.80, 95% CI 1.11-2.36), increased mechanical ventilation and vasoactive agent use, and positive cultures (all p < 0.001) - Figure 1.
<table>
<thead>
<tr>
<th>Trial, Year</th>
<th>Threshold VDD (nmol/L)</th>
<th>PICU participants</th>
<th>Control participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n)</td>
<td>%VDD</td>
<td>Average 25(OH)D (nmol/L)</td>
</tr>
<tr>
<td>Ayudo, 2014</td>
<td>37.5</td>
<td>215</td>
<td>28%</td>
</tr>
<tr>
<td>Dayal, 2014</td>
<td>50</td>
<td>92</td>
<td>25%</td>
</tr>
<tr>
<td>Ebenezer, 2015</td>
<td>50</td>
<td>52</td>
<td>40%</td>
</tr>
<tr>
<td>Gauthier, 1990</td>
<td>22.5</td>
<td>12</td>
<td>NR</td>
</tr>
<tr>
<td>Hebbner, 2014</td>
<td>50</td>
<td>61</td>
<td>61%</td>
</tr>
<tr>
<td>Korwutthikulirangrl, 2015</td>
<td>50</td>
<td>32</td>
<td>78%</td>
</tr>
<tr>
<td>Madden, 2012</td>
<td>50</td>
<td>511</td>
<td>40%</td>
</tr>
<tr>
<td>McNally, 2012</td>
<td>50</td>
<td>326</td>
<td>69%</td>
</tr>
<tr>
<td>Onwunene, 2015</td>
<td>50</td>
<td>120</td>
<td>59%</td>
</tr>
<tr>
<td>Ponnarmeni, 2015</td>
<td>50</td>
<td>124</td>
<td>51%</td>
</tr>
<tr>
<td>Prasad, 2015</td>
<td>50</td>
<td>80</td>
<td>84%</td>
</tr>
<tr>
<td>Rey, 2014</td>
<td>50</td>
<td>156</td>
<td>30%</td>
</tr>
<tr>
<td>Rippel, 2014</td>
<td>50</td>
<td>315</td>
<td>34%</td>
</tr>
</tbody>
</table>

Table 1 – Vitamin D status for critically ill children and healthy controls.  
° Total number of enrolled patients, by group, for which a measure of vitamin D status was available.  
* Reported as median, unless otherwise specified as mean.  
* Distribution reported as either IQR (I-XX) or Standard Deviation (±XX).  
* 25(OH)D = 25 hydroxyvitamin D, NR = Not reported; PICU = Pediatric Intensive Care Unit; VDD = Vitamin D deficiency.
**Conclusions**

Our systematic review suggests VDD to be both highly prevalent and associated with illness severity, organ dysfunction and mortality in the PICU setting. Clinical trials will
be required to determine if optimization of vitamin D status improves clinical outcomes.
SHORT BOWEL SYNDROME AFTER MIDGUT VOLVULUS: A CASE REPORT

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3Instituto da Criança- FMUSP, Pediatric Intensive Care Unit, São Paulo, Brazil
4Hospital Sírio-Libanês, Pediatric Intensive Care Unit, São Paulo, Brazil

Aims & Objectives:

Short bowel syndrome (SBS) during childhood is caused by trauma, volvulus or Crohn’s disease, whose severity correlates with the length and site of resection. We discuss a 13-year-old male with SBS.

Objectives: Case report and literature review

Methods

Chart review

Results

Previously healthy 13-year-old male was brought to the hospital with septic shock, acute abdomen due to complete midgut volvulus. Extensive bowel resections with third duodenal portion-transverse anastomosis were made. He was started early on oral and total parenteral nutrition (TPN) plus supplements. He failed to tolerate oral feeds exclusively (weight loss and dehydration). Within a one-year period he suffered five catheter related blood-stream infections (two fungal) and a deep vein thrombosis, then he was referred to a transplantation center

Conclusions

The patient had a ultra-short SBS, with no ileocecal valve (ICV), but had no diarrhea. With no ileum, the colon receives a larger load of fluid, electrolytes and bile salts what reduce its ability to absorb salt and water. Small bowel length (SBL), intact ileocecal valve (ICV), intestinal continuity, and preservation of the colon relate to survival. Patients with ICV even with <15 cm of SBL or with SBL >15 cm without ICV have a chance of intestinal adaptation, what occurs within the first 3 years. He failed to that matter.

This patient’s indications of transplantation was multifactorial. Transplantation indication should be individualized, since there is a trend of higher survival rates on home TPN versus transplanted patients.
Aims & Objectives:

Combined methylmalonic acidemia (MMA) and homocystinuria, cobalamin C disease (cblC) type, is an inborn error of intracellular cobalamin metabolism with a wide spectrum of clinical manifestations. The diagnosis can be complicated by the history of normal newborn screening and absence of metabolic acidosis. We described two cases including clinical manifestations, diagnosis, treatment and outcome.

Methods

Review of medical records and literature

Results

We described a case of two male newborns, with 25-day-old and 30-day-old, admitted at Pediatric Intensive Care Unit with history of feeding difficulties, failure to thrive, hypotonia, hydrocephalus and hematological abnormalities (anemia, neutropenia and thrombocytopenia). One of newborns (case one) evolved with renal failure and seizures. They had normal newborn screening and absence of metabolic acidosis in the early tests, which complicated the initial diagnosis. Clinical suspicion of cblC disease was made and then collected serum MMA, homocysteine and Vitamin B12. Exome and Tandem mass spectrometry were performed. In case one, MMA level reached 378.195µmol/L (normal ≤ 318 µmol/L) and homocysteine level reached 10 µmol/L. Both patients started treatment, even before the results of the tests, with betaine, folinic acid, levocarnitine, pyridoxine and hydroxocobalamin and were submitted peritoneal ventricular shunt. An adequate caloric intake was provided. The result of Exome showed methylmalonic acidemia with homocystinuria type cobalamin C (cblC). The two patients improved dramatically with the initiation of treatment and were discharged to remain as an outpatient of the rehabilitation multi-disciplinary team. Six months after, case one evolved with West Syndrome. Case two evolved with minimum neurological deficit.

Conclusions
The diagnosis of cblC disease can be challenging because the clinical manifestations and age of presentation are highly variable. The importance of the early diagnosis is highlighted by relentless progression of the disease in the absence of appropriate treatment.
Aims & Objectives:

Background: Hyperammonaemia is a medical emergency and prompt recognition and treatment is vital for good neurological outcome. As a regional referral centre for metabolic disorders, the PICU at Royal Manchester Children’s Hospital receives neonates with hyperammonaemia from hospitals across the North and North-West of England. Regional guidelines for optimum management of these neonates and infants were introduced in July 2013. These focus on clinical management and also set a timeline to initiate metabolic drugs and commence haemofiltration.

Aim: To assess the impact of the regional guidelines on clinical practice in management of infants with hyperammonaemia.

Methods

A ‘before-after’ review of medical records of all infants admitted with hyperammonaemia was undertaken. 31 infants (Group A1) admitted to PICU between 2002 and 2011 were compared with 8 infants (Group B) admitted 2013-2015 after introduction of regional guidelines. Sub-group analysis of group A2 from 2007-2011 was undertaken to ensure any improvement seen was not solely due to changes in haemofiltration practices. Seven quality indicators were compared between the two groups of patients.

Results
Conclusions

Introduction of the regional guideline has led to improved outcomes. The time taken for patients to reach PICU and the time for ammonia to drop <400mmol/l have both significantly reduced and this has been associated with improvement in neurological outcome.

There is still room for improvement. Reduction of journey times may still be possible. Development of a similar guideline on PICU admission to commencement of haemofiltration.

Table 1. Comparison between the groups.
For significance, Group A1 (2002-2011) was compared to Group B (2013-15).

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Patients in whom NICE lowering drugs started</td>
<td>23 (74%)</td>
<td>15 (76.4%)</td>
<td>8 (100%)</td>
<td>P&lt;0.5</td>
</tr>
<tr>
<td>Median time from first Ammonia to PICU admission (in hours)</td>
<td>14±4.1</td>
<td>14±4.1</td>
<td>8.2±3.4</td>
<td>P&lt;0.01°</td>
</tr>
<tr>
<td>Median time from first Ammonia to haemofiltration (in hours)</td>
<td>18±4.8</td>
<td>17±4.5</td>
<td>12.5±1.9</td>
<td>P&lt;0.01°</td>
</tr>
<tr>
<td>Median time from PICU admission to Haemofiltration (in hours)</td>
<td>4±4.8</td>
<td>5±4.5</td>
<td>4.7±4.3</td>
<td>p=NS</td>
</tr>
<tr>
<td>Mean Time for NICE to fall below 400 μmol/l from first Ammonia (in hours)</td>
<td>30.8±11</td>
<td>20.8±5.6</td>
<td>11.4±12.8</td>
<td>P&lt;0.01°</td>
</tr>
<tr>
<td>Survival</td>
<td>24 (77.4%)</td>
<td>11 (64.7%)</td>
<td>7 (87.5%)</td>
<td>P=0.1</td>
</tr>
<tr>
<td>Patients with Favourable Neurological Outcome at 6 months from PICU admission (using Glasgow outcome score)</td>
<td>13 (42%)</td>
<td>7 (41.1%)</td>
<td>7 (87.5%)</td>
<td>P&lt;0.01°</td>
</tr>
</tbody>
</table>
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0857
HIGH-VOLUME HEMOFILTRATION IN CRITICALLY ILL PATIENTS WITH SECONDARY HEMOPHAGOCYTIC LYMPHOMATOSIS: A PROSPECTIVE STUDY IN THE PEDIATRIC INTENSIVE CARE UNIT

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Aims & Objectives:

Hemophagocytic lymphohistiocytosis (HLH), which includes primary (familial) and secondary HLH (SHLH), is a fatal disease in children. High-volume hemofiltration (HVHF) has shown beneficial effects in severe sepsis and multiple organ dysfunction syndrome (MODS). SHLH shares many pathophysiological similarities with sepsis. The present study assessed the effects of HVHF in children with SHLH.

Methods

A single-center prospective trial. Thirty-three patients were divided into two groups: HVHF + HLH-2004 group (17 cases) or HLH-2004 group (16 cases). HVHF was defined as an ultrafiltrate flow rate of 50-70 mL/kg/hr. Clinical and biological variables were assessed before initiation and after 48 and 72 hours of HVHF therapy.

Results

The total mortality rate was 42.4% (14/33), but mortality at Day 28 was not significantly different between the two groups (HVHF + HLH-2004 group: 5 deaths, 29.4%; HLH-2004 group: 9 deaths, 56.3%; X²=2.431, p=0.119). Children received HVHF for 60.2±42.0 hours. After 48 and 72 hours respectively, a significant decrease in serum ferritin (p<0.001), aspartate aminotransferase (p=0.037 and <0.001), total bilirubin (p=0.041 and =0.037), and serum creatinine (p=0.006, and =0.004) levels were observed. Moreover, the NK-cell activity up-regulated (p=0.047) after 72 hours. Furthermore, significantly decreased levels of serum tumor necrosis factor (TNF) α (from 91.5±44.7 ng/L at 48h to 36.7±24.9 ng/L at 72 h, p=0.007) and interleukin (IL)-6 (from 46.9±21.1 ng/L at 48h to 27.7±14.5 ng/L at 72 h, p<0.0001) were observed. After 7 days, patients receiving HVHF had significantly lower bilirubin, creatinine, ferritin, PCT, LDH, TNF-α, and IL-6 levels, and needed less mechanical ventilation compared to HLH-2004 group patients. No serious adverse events were observed.

Conclusions

HVHF may improve organ function by decreasing cytokine levels (TNF-α and IL-6). HVHF may be an effective adjunctive treatment in SHLH.
Aims & Objectives:

Measure the difference in oxygen consumption and outcome in malnourished children admitted to Pediatric Intensive Care Unit in Public Hospital in Guatemala City. Determine if the physiological stability and adaptation in malnourished children is related with poor outcome.

Methods

A study was performed between June and December 2015 in Pediatric Intensive Care Unit in Hospital General San Juan de Dios in Guatemala City. All patients were admitted to mechanical ventilation, The Pediatric Risk of Mortality Score – PRISM III score were performed as amount. Nutritional status as biochemical, anthropometric and clinical assessment were performed at admittance.

Results

85 patients were admitted. There is no difference in observed mortality in anthropometric values as Weight/Age, Height/Age and Weight/Height. There is no difference related with outcome in CaO2 value, Cvo2 value, Arterial – Venous Difference content and Oxygen extraction at admittance, 72 hours and 7 days of stay. Higher PRISM III score, Lower pH and Higher FiO2 use are significant since the admittance and is related with mortality if maintain the values in the following measures at 72 hours and 7 days. (p <0.003),(p <0.03 ) and (p< 0.02 ) respectively.

Conclusions

The oxygen consumption in malnourished children admitted to Pediatric Intensive Care Unit in Guatemala could have the behavior as the same of well nourished child. Acidosis (pH < 7.2 ), Higher FiO2 requirement and Higher PRISM III score are predictors since admittance as the same in 72 hours and 1 week measurement. The ischemia adaptation, the previous physiological stability and endocrine adaptation in malnourished children could increase the risk of mortality and is adjusted to PRISM III values. The initial approach in order to reduce acidosis and hypoxemia may reduce the mortality in thus patients.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0562
OPERATING ROOM PHYSIOLOGICAL STABILITY AND OUTCOME OF SURGICAL PATIENTS ADMITTED TO PEDIATRIC INTENSIVE CARE UNIT IN UNIVERSITY PUBLIC HOSPITAL IN GUATEMALA
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Guatemala, Guatemala

Aims & Objectives:

Determine the previous, trans and postoperating room risk factors and medical management related with outcome of surgical patients pediatric patients admitted to Pediatric Intensive Care Unit university public hospital in Guatemala City.

Methods

Between July 2013 and June 2014 in Hospital General San Juan de Dios in Guatemala City. 50 Surgical patients admitted to the Pediatric Intensive Care Unit immediatly of emergency surgical procedure or patient who develop a surgical condition during the PICU stay. A physiological stability values were obtained until 6 hours previous the procedure, transoperative and postoperative condition compared with the outcome.

Results

39 surviviors. Higher values in Preoperative measurement in SaO2 ( 97.13 % ± 29.94 vrs. 93.78 % ± 8.78 ), p=0.001 Lower Respiratory Rate ( 28.49 ± 8.5 vrs. 32.00 ±12.39 ), Lower Conjugated Bilirubin (0.615 mg/dl ± 1.26 vrs. 1.50 mg/dl ± 3.44) and Lower Total Serum Proteins (3.515 mg/dl ±2.71 vrs. 5.027 mg/dl ±1.98 ) (p=0.29) and (p=0.30) respectively are related with survival. Higher values of Blood glucose ( 118.97 mg/dl ± 50.92 vrs. 167.82 ± 103.31 ) was related with poor outcome (p=0.004)

As the same in tranoperative values (p<0.001); and higher values of Systolic, Dyastolic and Mean Arterial Pressure, SaO2 were related with survival. ( 108.76 mmHg ±15.65 vrs. 97.81 mmHg±39.14 ), ( 68.28 mmHg ± 11.40 vrs. 62.63 mmHg ±28.15), (84.61 mmHg± 15.30 vrs. 83.50 mmHg ±30.55), ( 97.48% ±2.07 vrs. 95.70 % ±4.29) (p<0.01) respectively. Lower Blood Glucose ( 137.43 mg /dl ±63.88 vrs. 191.50 mg/dl ±126.77), Higher ionized calcium (0.8549 mmol/l ± 0.22 vrs. 0.76 mmol/l ±0.38) and Higher pH values ( 7.41 ± 0.06 vrs. 7.40 ±0.10 ) were realted with better outcomes.(p<0.01)

Conclusions
Preoperative conditions avoiding ischemia/hypoxia and postoperative goals to increase blood pressure are objectives to the surgical patient and better outcomes.
IMPACT OF TRANSFUSION THERAPY ON POST-OPERATIVE COMPLICATIONS IN PEDIATRIC LIVER TRANSPLANTATION

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**Aims & Objectives:**

Intraoperative transfusion therapy seems associated with patient death and graft failure after pediatric liver transplantation (PLTx). Impact of the intraoperative transfusion on the major complications after PLTx hasn’t been explored yet and this is the aim of the present study.

**Methods**

Retrospective analysis of the characteristics of the recipients, the characteristics of the donors and the characteristics of the transplantations in patients undergoing PLTx from 2002 to 2013 was performed. A two-stage hierarchical Cox proportional hazard regression with forward stepwise selection was used to identify the main risk factors for major complications. In addition propensity score analysis was used to adjust risk estimates for possible selection biases in the use of blood products.

**Results**

319 pediatric patients underwent PLTx. One-year patient and graft survival were 90% and 80.7%, respectively. When looking at the Kaplan–Meier estimates it appears that the main decrease in both graft and patient survival occurs during the first months post-transplantation. At the same time it appears that the main decrease of the surgical, thrombotic, renal, and cardiac complications occurs during the first month post-transplantation. One month and one year patient disease free survival (DFS) was respectively 21.8% and 11.8%. Our study shows that intraoperative transfusion of RBC and PLTs are independent risk factors for developing one or more major complications in the first year after PLTx.
Conclusions

This is the first pediatric study that shows the negative effect of the intraoperative RBC and PLTs transfusion on patient disease free survival after PLTx. Decreasing major complications will improve the overall long-term patient survival after pediatric PLTx.
Aims & Objectives:

Abdominal compartment syndrome (ACS) is caused by a pressure-volume dysregulation of the intra-abdominal contents, causing an abnormal increase in the intra-abdominal pressure. Hemodynamic compromise, multi organ dysfunction and death may occur. This life threatening condition indicates an urgent surgery to enable temporary decompression of the abdominal cavity until the primary injury has healed. The “Bogota-Bag” (BB) technique is a tension-free method which covers the abdominal contents with a sterilized fluid bag. Although widely published data exists in adults, we found only solitary cases in children.

Methods

All Pediatric cases that underwent temporary abdominal closure were reviewed.

Results

Between January 2000 and August 2014, 17 patients had a BB placed. Our cohort included 14 patients. Surgical indications were: multitrauma (6 cases), chronic disease complications (3), and acute disease complications (5). Indications for placement were: need for re-exploration (6 cases), inability for primary abdominal closure (4), and high risk for ACS development (4). Median BB time was 5 days. Bacteremia upon admission was evident in 5 patients, abdominal cultures were positive in 7 cases. Median Intensive care length of stay (LOS) was 10 days, hospital LOS was 27 days.

Conclusions

This report represents the largest series of children treated with BB. The technique is simple to perform, inexpensive, with minimal complications and shows good recovery. Our opinion is that the procedure is suitable for all ages, and can be used for a variety of indications without major complications.
PROTEOSTASIS, MUSCLE WASTING AND AMINO ACID SUPPLEMENTATION IN PEDIATRIC CRITICAL ILLNESS.

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2Baylor College of Medicine, Children's Nutrition Research Center, Houston, USA

Aims & Objectives:

High protein diets have shown to be beneficial to minimize sarcopenia, cachexia and malnutrition. Of those amino acids [AA], leucine [leu] and analogues appear to play an important role in sustaining proteostasis. We wish to review of our experimental data and published clinical literature on the physiologic basis of AA and protein turnover kinetics during critical illness, the effects of development on proteostasis, and the importance of AA signaling regulation in protein metabolism in the pediatric patient.

Methods

Review of our experimental data and published clinical literature

Results

The prevalence of protein malnutrition in the PICU has been estimated between 25-45%, and cachexia is poorly recognized. In critical illness, patients lose more protein than they can assimilate. However, rapid protein turnover in the developing organism may allow more efficient utilization of circulating AA into lean mass. Even though pediatric patients utilize protein and AA more efficiently, anabolic resistance and cachexia limit this efficiency. Albeit several AA possess a functional physiological or regulatory activity, the excess in dosing a single AA may lead to disequilibrium in circulating AA and alteration in proteostasis. Important concepts such as metabolic partitioning, cumulative protein deficit, and epigenetic adaptation and plasticity suggest the need for metabolic markers that will help monitor protein therapy and a better understanding of the individual and AA and protein needs.

Conclusions

Current evidence on metabolic partitioning and protein metabolism in the pediatric critically ill suggests individualizing protein and AA therapy to achieve proteostasis, and not simply to provide protein to balance estimated nitrogen losses.
Aims & Objectives:

Acute kidney injury (AKI) may be promoted by critical illness, pre-existing medical conditions and treatments received both before and during intensive care unit (ICU) admission. We aimed to estimate the incidence of AKI during ICU treatment and to determine factors, occurring both before and during the ICU stay, associated with the development of AKI.

Methods

We conducted a cohort study of children admitted to a university-affiliated paediatric ICU. Eligible patients were admitted to the ICU between January 2006 and June 2009. Patients admitted with known primary renal failure, chronic renal failure or post-renal transplant, conditions with known renal complications, or metabolic conditions treated with dialysis were excluded. Patients were also excluded if they had a short ICU stay (<6 hours) or had no creatinine or urine output measurements during their ICU stay.

Results

Of the 3,865 patients who met the inclusion criteria, 915 (23.7%) developed AKI, as classified by the RIFLE criteria, during their ICU stay. Patients at high risk for development of AKI included those urgently admitted to the ICU (adjusted odds ratio, AOR=1.88), those who developed respiratory dysfunction (AOR=2.90) and those treated with extracorporeal membrane oxygenation (ECMO, AOR=2.72). The single greatest risk factor for AKI was the administration of nephrotoxic medications during ICU admission (AOR=3.37).

Conclusions

This study, the largest evaluating the incidence of RIFLE-defined AKI in critically ill children, found that one-quarter of patients admitted to the ICU developed AKI. We identified a number of potentially modifiable risk factors, the largest of which was the administration of nephrotoxic medication. The results of this study may be used to
inform targeted interventions to reduce AKI and improve the outcomes of critically ill children.
Nephrotoxic Medication Exposure in Critically Ill Children: A Nested Case-Control Study

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Aims & Objectives:

Exposure to nephrotoxic medications is the second most common cause of acute kidney injury (AKI). Critically ill patients receive more medication than other inpatients and the risk of nephrotoxic medication-induced acute kidney injury (AKI) in these children remains unknown. The objective of this study was to determine the association between the development of AKI and nephrotoxic medications administered in the ICU setting among critically ill children.

Methods

We conducted a nested case-control study among patients admitted to a university-affiliated paediatric intensive care unit between January 2006 and June 2009. Case patients were identified as having AKI according to the RIFLE criteria. Control patients were identified using incidence density sampling and were matched 1:1 according to pre-ICU nephrotoxic drug exposure. Administration of nephrotoxic medications was evaluated during the ICU stay prior to the diagnosis of AKI.

Results

Eighty-seven percent of cases and 74% of controls were exposed to one or more nephrotoxic medications during the study period. Furosemide (administered to 67.8% of patients), vancomycin (28.7%) and gentamicin (21.4%) were the most frequently administered nephrotoxic drugs. Patients who developed AKI were more likely to be exposed to at least one nephrotoxic medication and risk increased with increasing number of nephrotoxic medications. Ganciclovir (adjusted OR (AOR)=4.23, 95% CI: 1.54-11.58), furosemide (AOR=1.88, 95% CI: 1.45-2.43), and gentamicin (AOR =1.73, 95% CI: 1.32-2.29) significantly increased the odds of developing AKI after adjusting for underlying differences in risk factors of AKI.

Conclusions

This is the first study to assess the association between nephrotoxic medication exposure and the development of AKI in critically ill children. Nephrotoxic medication
exposure was common and we found AKI was associated with the administration of specific drugs after adjustment for other risk factors. Alternative therapies and surveillance monitoring should be considered to reduce the burden of nephrotoxicity in this high-risk population.
Aims & Objectives:

To describe the haptoglobin level of packed red blood cells (RBC) before and after administration by infusion pumps.

Methods

Experimental study developed in the Laboratory of Nursing Experiments of the Federal University of São Paulo, Brazil, after ethical merit approval. The laboratory was maintained with a temperature of 22(±1)°C and humidity of 65%(±6). Nine units of packed RBC (CPDA-1 preservative) from different donors, type A positive, with storage time within recommended limits (11.2±9.6 days of storage) were maintained at room temperature one hour before the beginning of the experiments reaching a mean temperature of 17.8(±1.3)°C. Two different linear peristaltic infusion pumps (A and B) were randomly studied. The haptoglobin level was measured directly from the packed RBC and after infusion. Haptoglobin was measured by nephelometry (Minineph Plus®, The Binding Site, Birmingham, UK). Data were analyzed according to mean±SD and t test, significance level set at 0.05.

Results

The level of haptoglobin identified in the packed RBC was of 1.093 (±0.815) g/L, ranging from 0.237 g/L to 3.788 g/L. After RBC administration by the peristaltic infusion pumps the level of haptoglobin was of 0.927 (±0.586) g/L, with a minimum of 0.125 g/L and maximum of 2.156 g/L. The decreasing of the haptoglobin levels identified before infusion were not statistically significant (p=0.1484) and similar between the infusion pumps A and B (p=0.1907).

Conclusions

A variation on haptoglobin level before and after administration by peristaltic infusion pumps was observed, with a non-significant decrease of the haptoglobin level of
packed RBC after infusion through peristaltic infusion pumps in the analyzed samples.

Aims & Objectives:

To analyze red blood cells (RBC) markers of hemolysis after infusion by a syringe infusion pump.

Methods

In vitro transfusions of RBC simulating nursing clinical practice were performed with nine units of packed RBC, from different donors, type A positive, preserved in CPDA-1. The RBC were randomly submitted to administration in three syringe infusion pumps from the same manufacture. The hemolysis biomarkers analyzed before and after RBC administration by the syringe infusion pumps were total hemoglobin (g/dL), free hemoglobin (mg/dL), hematocrit (%), potassium (mmol/L) and lactic dehydrogenase (U/L); hemolysis ratio(%) was calculated through the formula: free hemoglobin×100-hematocrit/total hemoglobin. Data obtained were analyzed according to mean±standard deviation and Student t-test (p≤0.05).

Results

The nine packed RBC had 15.8±9.9 days of storage, with an initial temperature of 8.4±0.9°C reaching 21.7±2.7°C during the experiment. The laboratory conditions of temperature and humidity during the experiments were of 21.4±1.2°C and 57.4±5.4%, respectively. A total of 138 analysis were accomplished. The hemolysis biomarkers analyzed before and after the experiment demonstrated: total hemoglobin 28.8±5.5 to 24.1±24.1 (p=0.0727); free hemoglobin 0.08±0.06 to 0.12±0.10 (p=0.0692); hematocrit of 73.0±3.3 to 71.7±3.7 (p=0.2994); potassium 37.30±11.8 to 37.1±12.7 (p=0.6884); lactic dehydrogenase 615.2±412.2 to 705.46±565.8 (p=0.2308). The hemolysis ratio before (0.075±0.060) infusion was significantly (p=0.0227) lower than after (0.146±0.125) infusion by the syringe infusion pumps.

Conclusions
The infusion of RBC by syringe infusion pumps caused a significant increase of the hemolysis ratio. The limitations of this study can be related to the number of RBC samples analyzed and the use of one type of syringe infusion pump. Acknowledgment: CNPq-National Council for Scientific and Technological Development for grants n. n. 474906/2013-2 and n. 303006/2012-9.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0155
DETERMINING THE OPTIMAL SITE FOR IMAGING THE MICROCIRCULATION IN NEONATES USING SIDESTREAM DARK - FIELD (SDF) IMAGING

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Aims & Objectives:
We wished to determine the optimal site on the neonate from which to obtain images of capillary microcirculation using side stream dark-field imaging (SDF).

Methods
We investigated five body areas using SDF in order to obtain microcirculatory videos. SDF images were obtained using a MicroScan Video Microscope (MicroVision Medical, Amsterdam, The Netherlands). Video output was visualized on a computer directly and digitally record images onto a hard drive as DV-AVI files enabled off-line analysis of the images. The sites of measurement were (a) the bottom lip (b) the upper ear (c) the upper inner arm above the elbow (d) the chest wall and (e) the fingertip nail bed. Three to five video images were obtained from each site. The duration of the videos acquired, was maximum 1 minute while the stable cuts lasted for maximum 10 seconds. Qualitative assessments of the images were made. Capillary diameter and flow were looked for within each video, verification came from the reports generated after the semi-quantitative analysis using AVA 3.2 software.

Results
A total of 10 neonates (4M:6F, 26-27 weeks) were recruited. All participants were fully recovered and awaiting discharge. In 8 out of 10 videos the clearest images were obtained consistently from the chest wall. The second best site (5/10) was the upper pinna. The upper arm had too much adipose tissue subcutaneously and the lower lip and finger bed were too small to get any images. The quality of the video images captured by SDF correlated with the offline analysis and supported our observation that the chest wall is an optimal measuring site on the skin when using the SDF technique.
Conclusions

Our results indicate that when using SDF in the neonate, the chest wall may provide an easier, more accessible and reproducible site to obtain measurements of capillary microcirculation.
Aims & Objectives:

Intra-abdominal Hypertension (IAH) and Abdominal Compartment Syndrome (ACS) has been the subject of increasing research for the past decade, once it interferes with morbidity and mortality in critically ill patients. Most studies include adults and show that unrecognized or untreated entities can result in disturbances in several organ systems. The aim of this study is to determine the prevalence, incidence and risk factors for IAH and ACS in an Oncology Pediatric ICU.

Methods

A prospective cohort evaluated from May to November/2015. Intra-abdominal Pressure was measured (IAP) by intra-bladder indirect technique with closed system in patients with clinical indication of indwelling catheter. WSACS’s definitions were used and Protocol was approved by Ethics Committee of HC-FMUSP. Data were input in an Excel database and analyzed with STAT Program/SPSS 13.

Results

We admitted 97 patients and added 22. The average age was 194 months. The average PRISM was 11,1%. The prevalence and incidence of IAH were 17,5% and 13,4%, respectively. There were no cases of ACS, 90% were exposed to risk for HIA, out of which, 80% had HIA. The mortality of this sample was 36%. We found no statistically significant results.

Conclusions

In 2015, Thabet et al published a prospective cohort of 175 patients in a pediatric ICU with a prevalence of 12.6% of HIA and 4% of SCA, the HIA was an independent factor of increased mortality and prolonged length of stay in ICU. We believe that more studies are necessary and increasing this sample is a must.
Aims & Objectives:

Background and objectives: Caring children with major burns is one of the most challenging situations in the PICU. The aim of this study was to present the characteristics, the management, and the outcome of 140 burned children admitted to a referral Brazilian PICU dedicated to trauma and burns.

Methods

Methods: The medical charts of all children admitted to the PICU at H Pronto Socorro in Porto Alegre (Brazil) between January 2013 and December 2014 with burns as the main diagnostic were reviewed. Anthropometric data, the clinical aspects, the management, and the outcome were evaluated. The local Ethics and Research committee approved the study.

Results

Results: 140 burned children were admitted (median age of 24 months being 85% male). Burns affecting more than 15% of body square surface (BSS) was observed in 40% of patients. The overall mortality was 5%. The length of PICU and the mortality rate (2.7%; 14.3% and 80%) increased according to the BSS (15-30%; 30-50 and >50%, respectively). Mortality was associated with the burning cause (fire presenting the highest rate) and the presence of respiratory injury (mortality of 1.7% versus 32.8%; p<0.001). Mechanical ventilation was required in 21% of cases with a median length of 9 (1-732) days.

Conclusions

Conclusion: Caring burned children demands a complex management in the PICU including analgesia, sedation, infectious control, mechanical ventilation, nutritional and psychological support. The deep and extension of the lesions as well as the main cause are strongly associated with the outcome.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0114
CORRELATION OF VITAMIN D LEVELS WITH THE OUTCOME OF CHILDREN ADMITTED TO PICU OF DEVELOPING COUNTRY
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²Dayanand Medical College and Hospital, Biochemistry, Ludhiana, India

Aims & Objectives:

Adult critical care studies have suggested vitamin D as a modifiable risk factor. This study was carried out to determine the prevalence of hypo-vitaminosis D in critically ill children and to study the association of vitamin D deficiency on the outcome of children admitted to PICU.

Methods

This prospective study was done in PICU of teaching hospital over 1 year including children from 1 month-18 years.

Results

Total of 228 patients were included. Median age was 4 years, male to female ratio 3:1. At admission 67.1% patients had vitamin D deficiency (< 20ng/ml), 12% had insufficiency (21-29.9 ng/ml). There was no significant association of in Vit D deficiency in relation to gender or nutrition of children. Higher incidence of vitamin D deficiency was seen in patients above 10 years of age (p 0.038). Patients with respiratory system involvement and sepsis had significantly more vitamin D deficiency (p<0.05). During PICU stay, 32.5% patients required inotrope support with no significant correlation with vitamin D levels (p=0.697) and 56.1% patients on ventilatory support had significantly more deficiency (p=0.039) Vitamin D deficiency was significantly associated with hypocalcaemia (p=0.015). Patients with higher PRISM score had significantly more vitamin D deficiency (p 0.029). No correlation of vitamin D deficiency was seen with length of stay or mortality in our study. Total 5.3% patients died.

Conclusions

Majority of the critically ill patients are vitamin D deficient. Deficiency is more in patients with higher PRISM score, on mechanical ventilation, and with sepsis as main diagnosis. There was no effect on ultimate outcome including length of stay or mortality in patients with vitamin D deficiency.
A STUDY OF ABNORMAL BLOOD GLUCOSE LEVELS AND ITS CORRELATION WITH OUTCOME IN CHILDREN ADMITTED TO PEDIATRIC ICU OF DEVELOPING COUNTRY

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Aims & Objectives:

Study was carried out to find number of patients admitted in PICU with hypoglycemia, hyperglycemia and variable blood glucose levels and to correlate its effect with outcome of patients.

Methods

Prospective study was done on children (1mo-15years) admitted to 10 bedded PICU of teaching hospital over one year.

Results

Total 307 patients were included. At admission, nearly half patients had normoglycemia. During PICU stay, majority had abnormal blood glucose levels, hyperglycemia most common. There was no correlation of abnormal blood glucose at admission and during stay with age. There was higher incidence of hyperglycemia in surgical patients (p 0.027). Patients with abnormal blood glucose at admission had a higher incidence of abnormal records during the stay (p<0.001). In PICU 32.24% required inotropic support and having more glucose variation (p 0.030); 46.58% were on ventilatory support and had abnormal blood glucose records mostly hyperglycemia (p<0.001). Higher PRISM score, more was abnormal blood glucose, particularly hyperglycemia (p <0.001). Abnormal blood glucose levels, especially hyperglycemia was associated with higher incidence of nosocomial sepsis, (p=0.011). Children with moderate/severe malnutrition had significantly higher incidence of hypoglycemia at admission (p=0.001). 8% patients died. Survival was almost same in all age groups. Patients with hypoglycemia at admission and abnormal blood glucose during PICU stay had higher mortality (p<0.001). In patients on ventilatory support (p=0.063) and on inotropes (p=0.011) higher incidence of mortality was seen in abnormal blood glucose group.

Conclusions

Normoglycemia has better outcome both in terms of morbidity (duration of stay, hospital acquired sepsis) and mortality.
Aims & Objectives:

The aim of this study was to present our experience with the pediatric intensive care unit (PICU) stays of liver recipients to understand ICU management and closed multi-disciplinary cooperation in 2 hospitals.

Methods

A retrospective chart review of patients admitted to PICU in our center following orthotopic liver transplantation (OLT) performed in Renji Hospital between 2006 and 2015. Our cooperation in the 2 hospitals since 2008 is divided into 2 stages. The first stage (2008-2013) is to learn from each other and to explore cooperation mode, postoperative patients hospitalized in Renji ICU and our center provide the medical consultation. The second stage (2014-2015) is the transport model, more complex critical patients after OLT in Renji hospital were transferred to PICU in our center.

Results

There are 237 patients of OLT in Renji hospital and 16 patients were transferred to PICU in our center during the first stage. There are 310 OLT patients in Renji hospital and 45 patients were transferred to our PICU during the second stage. this retrospective study included 61 patients who underwent 62 transplantations. We summarized the diagnosis and therapeutic intervention associated with subjects experiencing complications of rejection episodes, surgery, or infection during PICU stay. Median ICU stay was 12.9 days. There was 3 perioperative death from primary graft nonfunction. The most common complications were severe infections (lung, abdomen and blood), gastrointestinal bleeding, perforation, vascular occlusions, internal environment and metabolic disorders, hypertension, seizures, relapse of primary disease and foreign body inhalation. Rejection episodes occurred among 17.6% of patients. The most common isolated pathogenic bacteria were Enterococcus faecalis, and Pseudomonas aeruginosa.

Conclusions

The postoperative course of children after OLT is associated with multiple complications. Multi-disciplinary cooperation including pediatric intensive care in hospitals is an effective means to improve the outcome of those complex critical children.
EVALUATING THE IMPACT OF HIGH FLOW NASAL CANNULA ON ORAL FEEDING IN PEDIATRIC PATIENTS WITH BRONCHIOLITIS IN THE PICU

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Aims & Objectives:

High-flow nasal cannula (HFNC) therapy is increasingly utilized as non-invasive respiratory support in children, particularly in bronchiolitis. However, there is no strong evidence to guide oral feeding regimens in these patients. The purpose of this study was to explore whether the level of HFNC was associated with poor tolerance of oral feeding.

Methods

A retrospective cohort study included all patients age 1-24 months admitted to the Seattle Children’s Hospital PICU with a primary diagnosis of bronchiolitis from 2013-2015. We recorded demographic, respiratory and oral feeding clinical parameters. Patients receiving enteral tube feeding prior to admission to the PICU were excluded.

Results

The cohort included 125 patients (median age 218 days, 55% male). The most common viruses were RSV (n=78, 62%), rhinovirus (n=15, 12%) and 2 different viruses (n=15, 12%). Oral feeding on HFNC was initiated in 72 patients (58%), 42 (58% of those receiving feeds) of whom had tube feeds prior to initiation of oral feeds. HFNC level at initiation of oral feeding was ≤3L in 32 patients (44%), 4-5L in 30 patients (42%), and ≥6L in 10 patients (14%). Only 2 patients had worsening in their clinical status after initiation of oral feeds. Patients who received oral feeds on HFNC had lower median time to oral feeding and length of stay (LOS) in ICU and hospital (Figure 1).
Conclusions

Though numbers are limited, initiation of oral feeding on HFNC appears to be safe, even at higher flow levels and may be associated with decreased hospital LOS.
PICC-0359
VALIDATION OF RENAL ANGINA INDEX AS A PREDICTOR OF ACUTE KIDNEY INJURY IN CRITICALLY ILL CHILDREN - A PILOT STUDY
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Aims & Objectives:

Markers that predict kidney damage early can help optimize treatment. Rising serum creatinine and decreasing urine output are late markers of Acute Kidney Injury (AKI) in children. Renal Angina Index (RAI) has been recently proposed as an early predictor of AKI. The aim of this study was to validate RAI as a predictor of AKI in critically ill children in our population.

Methods:

Children admitted to the PICU from October-November 2015 were studied. Children with pre-existing renal failure or those expected to stay <72 hours were excluded. Urine & serum creatinine were measured and PRISM-III scores calculated at admission. Creatinine clearance and RAI scores were calculated at 24 hours post admission. AKI defined by pRIFLE criteria was deduced at 72 hours post admission. The sensitivity of RAI to predict AKI was determined by ROC curve analysis.

Results:

Fifty eight children were studied. RAI on Day 1 had a sensitivity of 95.2% and specificity of 75.7% in predicting AKI on Day 3. Compared to this, admission serum creatinine had a sensitivity of 19% and specificity of 85%. Positive Predictive Value [69% vs 66%] and Negative Predictive Value [96% vs 67%] for predicting AKI on day 3 were both higher for RAI compared with admission creatinine. RAI score > 5 predicted day 3 AKI with a sensitivity of 95.2% & specificity of 75.7% with AUC 0.81.

Conclusions:

RAI is a sensitive early predictor of AKI in critically ill children and may be better than serum Creatinine.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0045
PERITONEAL DIALYSIS AFTER SURGERY FOR CONGENITAL HEART DISEASE

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Aims & Objectives:

Peritoneal Dialysis (PD) is often used for renal insufficiency and fluid management in post-operative infants undergoing congenital cardiac operations. We reviewed our PD practice, to establish how PD was being used, its effectiveness, complications and outcomes.

Methods

A retrospective case review was undertaken from January 2014 – March 2015.

Results

420 cardiac operations were undertaken in this period. 16 patients (4%) were actively dialysed with PD: of these 75% were aged less than 3 months. Common operations that required PD were; aortic arch repair (n=3), Norwood Sano Shunt (n=3) and Tetralogy of Fallot repair (n=3). Mean bypass time was 150±60mins and mean lactate on admission was 5±4.3. Median time from PICU admission to commencement of PD was 14.5hrs (IQR 7.3-28.7) and all patients were commenced on PD because of oliguria/anuria. Median duration of PD was 96hrs (IQR 69-168). All patients were initially commenced on 1.36% dialysate, with 10mls/kg hourly cycles. 85% patients had their dialysate concentration increased to 3.86% to increase fluid removal (72%) and because of biochemical derangement (28%).

Mean fluid removal increased from 50mls/kg/day on day 1 to 127mls/kg/day on day 5 (graph 1). Mean urea and creatinine continued to rise, even after 24hours of peritoneal dialysis (graph 2). Complications were encountered by 19% patients (2 peritonitis and 1 leakage around catheter site).

20% patients who required PD died (compared to 1.2% total cardiac post-operative patients).

Conclusions
PD was successful in all patients. Patients who require PD in the post-operative period are higher-risk patients, with significant co-morbidities and more complications in the peri-operative period.
Aims & Objectives:

3,4-methylenedioxy-methamphetamine (MDMA; ecstasy) is a synthetic psychoactive recreational drug commonly used for its euphoric properties. Long-term effects of MDMA include depression, memory and cognitive disturbance. The use of MDMA can be fatal, particularly if used in large quantities or combined with other substances. There are case reports of hepatic failure in association with MDMA ingestion leading to death without rescue by liver transplantation. In lieu of liver transplantation, a molecular adsorbent recirculating system (MARS) can eliminate circulating toxins produced by the damaged liver. Here we present a case of hepatic failure secondary to concomitant ethanol and MDMA ingestion that was successfully treated with the MARS.

Methods

Results

A 17 year old male presented to our institution’s emergency department with altered mental status and a reported history of ethanol and MDMA consumption at a music concert. At initial presentation, his blood alcohol level was 12 mg/dl (normal <10mg/dl), creatine kinase/myoglobin was 19.3 ng/ml (0-3.5ng/ml) and creatinine was 2.42 mg/dl (0.66-1.25mg/dl). He was admitted to the pediatric intensive care unit for acute intoxication with subsequent rhabdomyolysis and acute kidney injury. CCRT was initiated due to oliguria and ongoing renal impairment. He later developed fulminant hepatic failure with secondary coagulopathy and encephalopathy. MARS therapy was initiated on day three of illness and he was subsequently transferred to a solid organ transplant center. Ultimately, with ongoing dialysis and supportive care his liver function recovered and his encephalopathy reversed. He was discharged on hemodialysis three times per week.
Conclusions

MDMA ingestion is an important etiology in the differential diagnosis of adolescent acute hepatic failure. Concomitant use of MDMA with ethanol results in an additive insult to the liver parenchyma resulting in possible fulminant hepatic failure. MARS therapy is an effective means to remove toxins and can be a bridging therapy for hepatic function recovery.
Aims & Objectives:

Acute lung injury associated with transfusion (TRALI) is an infrequent complication, but severe that occurs within a few hours after the transfusion of blood products and is characterized by respiratory distress, hypoxia, pulmonary edema, hypotension and fever. Underreported in the pediatric population in postoperative pediatric surgery.

Methods

Describe a patient with TRALI syndrome that was done heart surgery for atrial septal defect closure (ASD).

Results

ALFA patient, 3 years old, with ASD, done surgery to correction on 23/2/16 receiving 40ml/kg of blood products, and leading high pediatric ICU two days with persistent heart murmur. Observed at echocardiography ineffective surgery and done another surgery on 03/02/16, being made in the operating room 50 ml/kg of blood products and in order to hypoxemia and bradycardia requiring epinephrine and chest compression lasting less than two minutes, with stabilization in the use of adrenaline and leading to ICU where evolved stable in the early hours was extubated and low dose of vasoactive drugs, but after 6 hours in the unit has evolved with significant worsening of the hemodynamic and respiratory condition with persistent hypoxemia and hypotension coming to 2 cardiorespiratory stops, and requiring high doses of epinephrine and milrinone in addition to high parameters on mechanical ventilation was observed in x-ray diffuse bilateral infiltrates in lungs, required PRONE position for 24 hours, persistent high ventilatory parameters, persistent fever as well. Showed significant improvement after 48 hours with x-ray already without infiltration noted earlier, without vasoactive drugs and without hyperthermia with cardiac function unchanged and effective surgery ASD plasty; extubated 3 days after, and went to the ward with six days.

Conclusions

In the literature the incidence of TRALI due to blood products transfusions in children is 5% of which 0.2% after congenital cardiac surgery and if well not recognised have a high incidence of mortality.
Aims & Objectives:

Introduction: The optimal amounts of protein required during critical illness to prevent or limit loss of children’s lean body mass are unknown.

Objective: To examine the influence of protein and energy enteral intake on protein balance in critically ill infants.

Methods

A multicenter randomized controlled open-label trial including infants between 1-24 months old admitted to PICU was performed. Patients were randomized to receive: 1) standard diet (1.7 g protein/100mL), 2) protein-enriched diet (2.6 g protein/100mL), 3) high protein-enriched diet (5.1 g protein/100mL). Blood and urine biochemical determinations, and nitrogen balance were performed on day one and between the days 3 to 7.

Results

Sixty two infants were included. Increase of total protein, pre-albumin and retinol-binding-protein was significantly higher in infants receiving protein-enriched diets (groups 2 and 3) than in the standard diet group. Nitrogen balance increase was higher in the group 2 than in groups 1 and 3 (Table). In one patient from group 2 and three from group 3 urea levels higher than 80 mg/dL were observed.

<table>
<thead>
<tr>
<th></th>
<th>Standard diet (1.7 g/100mL)</th>
<th>Group 2 (2.6 g/100mL)</th>
<th>Group 3 (5.1 g/100mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase p-value</td>
<td>0.14</td>
<td>0.47</td>
<td>0.77</td>
</tr>
<tr>
<td>Pre-albumin (mg/dL)</td>
<td>0.75</td>
<td>4.61</td>
<td>7.82</td>
</tr>
<tr>
<td>Increase p-value</td>
<td>0.453</td>
<td>0.003</td>
<td>0.031</td>
</tr>
</tbody>
</table>
Retinol-binding-protein (mg/dL)  
-0.26  0.706  2.39  0.016  3.80  0.02
Nitrogen balance 3.56  0.329  9.69  0.000  4.61  0.114

**Conclusions**

A positive relation between higher protein intake and positive metabolic balance was observed enterally fed critically ill infants. However, high protein-enriched diets could not be tolerated by some patients.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0502

SEMI-ELEMENTAL OR POLYMERIC DIET AFTER CONGENITAL HEART SURGERY

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Aims & Objectives:

To compare the feeding tolerance and the calorie delivery of a semi-elemental and polymeric diet after congenital heart surgery.

Methods

Design: Comparative study: one part (semi-elemental diet) was prospective, the other one (polymeric diet) retrospective, in a before and after protocole change design.

Settings: Intensive care unit of the University Children’s Hospital Queen Fabiola in Brussels

Subjects: 55 children were included, 33 received a semi-elemental diet, 22 a polymeric diet. Patient’s age ranged between 4 days and 6 years.

Results

Feed intolerance was similar in the two groups (emesis occured in 18% of the semi-elemental group and 32% of the polymeric group, pvalue 0.290; diarrhea in 3% versus 14%, pvalue 0.334; post pyloric feeding was used in 9% versus 4%, pvalue 0.818). Calorie delivery was also similar for the two groups. On post-operative day 2, 5 and 10, patients of the semi-elemental diet and patients of the polymeric diet group received respectively 50% of the caloric target versus 52%, pvalue 0.875; 75% versus 71%, pvalue 0.788; 87 versus 96%, pvalue 0.812). The maximum enteral caloric delivery met 64% of the caloric target in the semi-elemental group versus 79% in the polymeric group, p value 0.179. The caloric delivery on post-operative days 2,5, and 10 was too low. The size of the cohort was small.
Conclusions

Polymeric diet is as safe as semi-elemental diet for enteral nutrition after congenital heart surgery. More patients need to be included to increase the power of the results. Determination of caloric goals will improve the quality of our enteral nutrition protocol after congenital heart surgery.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0566
PREDICTING ACUTE KIDNEY INJURY IN INFANTS AFTER CARDIOPULMONARY BYPASS SURGERY: NIRS AND BIOMARKERS CAN MAKE AN EARLY DIAGNOSIS

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Aims & Objectives:

Acute Kidney Injury (AKI) is common after cardiopulmonary bypass (CPB) surgery and is associated with unfavorable outcomes. Urine biomarkers and Near-Infrared Spectroscopy (NIRS) technology may predict renal dysfunction at earlier stages. We aim to determine the ability of NIRS and biomarkers to improve AKI detection in infants, post-CPB.

Methods

We conducted a prospective study (October 2015-January 2016) including infants (<12m) undergoing CPB. Preexisting renal dysfunction or preoperative ECMO patients were excluded. AKI was diagnosed according to Kidney Disease-Improving Global Outcomes (KDIGO) criteria. INVOS (®) Cerebral and Somatic Oximeter Sensors (Covidien; Boulder, CO) were utilized intraoperatively and 48h postoperatively. Urinary TIMP-2/IGFBP7 (NephroCheck™; Astute Medical; San Diego, CA), NGAL, and Cystatin C (R&D Systems; Minneapolis, MN) were measured pre-CPB, post-CPB, 12h and 24h post-CPB. Demographic and clinical data were recorded.

Results

Twenty-nine infants (48.3% male) were recruited. Overall incidence of AKI was 58.6% (n=17). Specifically, 11 of the 23 (66.7%) patients undergoing biventricular repair and 4 of the 6 (56.5%) patients with univentricular repair met AKI criteria. There were no significant differences in AKI incidence based upon CPB, crossed clamp, or circulatory arrest times. Patients with AKI had more hospital (19.56±2.5 vs 13.1±4.2, p= 0.21), ICU (11.69±2.4 vs 9.6±4.0, p= 0.66), and mechanical ventilation (6.31±2.4 vs 4.15±2.5, p= 0.56) days. Intraoperative (OR) and ICU NIRS values were lower for AKI patients (OR: cNIRS 55.88±1.65 vs 64.08±3.14, p=0.03; sNIRS 73.76±3.2 vs 78.33±2.8, p=0.29 and ICU: cNIRS 59.05±2.4 vs 68.41±3.87, p=0.05; sNIRS
79.52±3.0 vs 85.5±2.8, p=0.68). Biomarkers were elevated post-CPB in patients with AKI: TIMP-2/IGFBP7 (1.36 vs 0.11, p=0.01), Cystatin-C (72.27 vs 59.6, p=0.67) and NGAL (15.05 vs 1.11, p=0.25).

**Conclusions**

Regional NIRS and urine biomarkers may provide early identification of patients with renal dysfunction, allowing for timely AKI diagnosis and initiation of medical therapy.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0117
SEVERE VITAMIN D DEFICIENCY AT ADMISSION AND AFTER 72 HOURS OF ICU STAY IN CHILDREN WITH FLUID REFRACTORY SEPTIC SHOCK- A PROSPECTIVE OBSERVATIONAL STUDY

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Aims & Objectives:

To evaluate 1) the prevalence of severe vitamin D deficiency at admission and after 72 hours of ICU stay in children with fluid refractory septic shock and 2) association of severe deficiency at admission with clinically important outcomes.

Methods

In this prospective cohort study we enrolled children aged ≤ 17 years with fluid refractory septic shock over a period of 6 months. We estimated prevalence of severe vitamin D deficiency (serum 25 (OH) <10 ng/mL) at admission and after 72 hours of stay and examined its association with clinically important outcomes. Data was analysed using STATA 11.

Results

Forty three children were enrolled in the study. The prevalence of severe vitamin D deficiency was 72% (n=31/43; 95% CI: 53 to 81) and 69 % (n=25/36; 51 to 79) at admission and 72 hours of ICU stay respectively. The mean (SD) vitamin D levels declined from 6.7 (2.3) to 4.5 (2.8) after 72 hours and the difference was statistically significant (p=0.0003). On univariable analysis, severe vitamin D deficiency at admission was associated with greater need for fluid boluses (p < 0.0001) and inotrope score (p=0.04). However, on multivariable analysis, only the need for fluid boluses remained significant (OR (95% CI): 1.85 (1.45 to 4.06)).

Conclusions

The prevalence of severe vitamin D deficiency is high in children with fluid refractory septic shock admitted to PICU and the levels decline further during the course of illness. Severe vitamin D deficiency at admission may predict greater need for fluid boluses in these children.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0100
PROLIFERATION AND APOPTOSIS OF MESENCHYMAL STEM CELLS IN COMBINATION WITH IMMUNOSUPPRESSIVE DRUGS

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Aims & Objectives:

When we use mesenchymal stem cells in transplantation and intensive care, we often do this in combination with immunosuppressive drugs. But how do these stem cells react to the immunosuppressive drugs? To answer this question we analyzed proliferation and apoptosis of human and murine mesenchymal stem cells in combination with CD25 antibody, Thymoglobuline, ATG, tacrolimus, cyclosporine and Lymphoglobuline in vitro.

Methods

We tested different concentrations of the immunosuppressive drugs and analyzed them with the „Cell Proliferation ELISA, BrdU“ and the „Cell Death Detection ELISA plus“.

Results

We could show, that none of the immunosuppressive drugs utilized here have a negative effect on the proliferative potential of the stem cells if they are used in a therapeutic range. Regarding the apoptosis of the stem cells, we similarly could not find an increased amount of apoptosis in any of the analyzed immunosuppressive drugs. Instead we found that tacrolimus and cyclosporine even reduced apoptosis of human stem cells.

Conclusions

It is possible to use mesenchymal stem cells in combination with immunosuppressive drugs without

a negative effect on the proliferative potential of the stem cells and without an increase of stem cell apoptosis.
PICC-0772
PACKED RED BLOOD CELL TRANSFUSION ASSOCIATED WITH INCREASED MORTALITY IN PEDIATRIC INTENSIVE CARE UNIT - PROSPECTIVE OBSERVATIONAL STUDY
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Aims & Objectives:
In PICU, packed red blood cell transfusions are done frequently with concept of systemic oxygen consumption will be improved in critically ill children when they are transfused, but this concept is not proven. The study of RBC transfusion practice involving Indian children is scarce.

Methods
Study was conducted in 19 bedded-PICU of a tertiary care referral academic institute. Data of RBC transfusion, ventilation duration, and stay in PICU, hospital and 28days mortality were collected prospectively from December 2014 to August 2015. All children aged 1month to 12 years with evidence of severe sepsis divided into transfused vs non-transfused. Hematological malignancies, on immunosuppressant, those who received repeated transfusions like thalassemia major, aplastic anemia and received RBC transfusion prior to PICU admission and imminent death within 24 hours were excluded. Decision about blood transfusion was taken by primary treating team.

Results
Of 412 eligible patients 126 received transfusion and 286 non-transfused. Median (IQR) age 9.5 (3-60) vs 24(8-84) months (p=<0.001), PRISM-III 18 (12-22) vs14 (12-18) (p=<0.001) and baseline Hb 7.5 (7-8) vs 10 (9.6-11) mg% (p=<0.001) respectively. All cause 28-days mortality was high in transfuser as compared to non-transfuser (37.3%, n=47/126 vs 9%, n=26/286; p=<0.001, OR=5.9, 95% CI 3.5-10.2). Median (95%CI) days of length of ventilation [7 (5-9) vs 6 (5-7), log-rank p=0.039], PICU stay [8 (6.8-9.2) vs 4 (3.6-4.4),log-rank p=<0.001] and hospital stay [10 (8.3-11.7)vs 6 (5.3-6.7),log-rank p=<0.001] was significantly longer in transfuser vs non-transfuser respectively.

Conclusions
Packed red blood cell transfusion was associated with increased mortality, longer stay in ventilation, PICU and hospital in critically ill children.
Aims & Objectives:

To determine the incidence of renal failure in birth asphyxia and to correlate the severity of ARF with HIE.

Methods

This prospective, cross-sectional study was conducted at BPKIHS, over a period of 1 year. 200 term neonates born with Apgar score of ≤ 7 at 5 minutes after birth were selected by purposive sampling technique. Findings were recorded in a pre-designed proforma. Blood samples were collected after 72 & within 96 hrs of life for relevant investigations. The neonates were managed according to the standard protocol. Data was analyzed using SPSS 11.5. Chi-square & student t-test were used to find the significance of the study.

Results

Study showed that Meconium Stained Amniotic Fluid (30%) followed by prolonged second stage of labor(21%) were most commonly associated with birth asphyxia. A total of 132(66%) babies had Acute Renal Failure and 68(34%) were without any renal dysfunction. Comparison of renal parameters in babies with and without birth asphyxia showed significant differences in the values of urea, creatinine, and creatinine clearance. Incidence of ARF showed a significant correlation with the staging of HIE with more babies having ARF as the stage of HIE progressed.

Significant association was found between neonates with shock and ARF (p=<0.001). Those in shock had 2.46 times higher chance of ARF (Odds Ratio=2.46). Mortality was 2.7 times higher in babies with ARF. Mortality was 6%.

Conclusions

Acute renal failure (ARF) is a serious complication of birth asphyxia in the neonates. ARF in birth asphyxia shows a strong positive correlation with HIE. Renal parameters should be strictly monitored & prompt treatment instituted to prevent permanent renal damage in these neonates.
Aims & Objectives:

Central venous catheterization is frequently performed in multiple clinical settings by pediatric emergency physicians, pediatric critical care specialists and pediatric surgeons. Complications of central vein catheterization are not uncommon and can be fatal. Despite such frequent application, the evidence-base describing the relevant surface landmarks involved is missing. The aim of the current study was to critically investigate the surface markings of the central venous system in children.

Methods

The superior vena cava/right atrial (SVC/RA) junction, superior vena cava (SVC) formation, and brachiocephalic vein (BCV) formation were evaluated independently by two investigators. Three-hundred computed tomography (CT) scans collected across multiple centers were categorized by age-group into: 0-3 years, 4-7 years and 8-11 years of age. Scans with pathology that distorted or obscured the regional anatomy were excluded.

Results

BCV formation was commonly found behind the ipsilateral medial clavicular head across childhood. This is contrasted with the variable levels of: SVC formation, the length of SVC, and SVC/RA junction. In the youngest group, SVC formation was most commonly at the 2nd costal cartilage (CC), and moved to the 1st CC/1st intercostal space (ICS) as the child grew. The SVC/RA junction was at the 4th CC in the youngest group and, moved to the 3rd CC/3rd ICS as the child grew.

Conclusions

This study demonstrates the variable anatomy of SVC formation and the SVC/RA junction in respect to rib level. This variability underscores the fact that surface anatomical landmarks of the SVC/RA junction are not a reliable guide to catheter tip position.
Aims & Objectives:

Guillain-Barré Syndrome (GBS) is an autoimmune demyelinating polyradiculoneuropathy characterized by progressive ascending weakness and areflexia. Viral infection is the most common antecedent. Accompanying clinical features of GBS can include altered mental status, ataxia, and dysautonomia.

Methods

We report a case of concurrent GBS and myocarditis triggered by Influenza A infection in a pediatric patient.

Results

A 6-year-old boy presented with acute bilateral ascending paralysis and paresthesia following 1 day of upper respiratory viral symptoms. The patient had rapid deterioration in respiratory status requiring intubation and mechanical ventilation. He also had self-resolving transient dysrhythmias. After initial stabilization, an echocardiogram was performed to evaluate for cardiac function. Results of echocardiogram revealed left atrial enlargement, echogenic left ventricular myocardium, septal hypokinesis and a reduced ejection fraction of 28%. His initial laboratory findings were significant for high concentration of protein in cerebrospinal fluid sample, elevated B-type Natriuretic Peptide (BNP) level at 2432 pg/mL, and elevated Troponin I level at 5.1 ng/mL. The patient received 2 grams/kg of Intravenous Immunoglobulin (IVIG) for treatment with improvement in ejection fraction to 54%. The patient’s respiratory failure resolved after 3 weeks of ventilator dependence. A cardiac magnetic resonance imaging (MRI) study was completed and confirmed the resolution of myocarditis with no residual scarring.

Conclusions

The main feature of GBS is progressive symmetrical ascending paralysis with or without autonomic dysfunction. Myocarditis is a devastating disease that may present with dysautonomia and dysrhythmias. It is important for physicians to recognize other causes of systemic inflammation and autoimmune dysregulation to prevent increased morbidity and mortality in these patients.
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Aims & Objectives:

Familial hemophagocytic lymphohistiocytosis 2 (FHL2) is a disorder caused by a mutation in the perforin gene leading to the inability of cytolytic CD8 T-cells to eliminate virally infected cells leading to a cytokine storm. When perforin-knockout (PKO) mice are infected with LCMV, a virus cleared by wild-type mice, they develop a cytokine storm. Only mice naïve to LCMV have been studied, however, humans with FHL may have prior exposure to antigens that may result in immunologic memory to the triggering infection. We hypothesized that immune memory would alter disease phenotype.

Methods

PKO mice were immunized against LCMV using peptide antigen. Two different peptides, GP33 and NP396 were tested. After the a 30-day rest period to allow for the development of CD8 T-cell memory, PKO mice were infected with LCMV. Disease course was followed, serum samples were tested using ELISA and flow cytometry was used to examine splenic peptide-specific CD8 T-cell characteristics in both uninfected and mice 7 days following infection with LCMV.

Results

The disease course was significantly enhanced with a change in life span from 12 days in nonimmunized mice to 9 days in immunized mice. Immunized mice developed worsened anemia and thrombocytopenia, more severe weight loss, significant hepatitis and higher elevation in ferritin, sCD25, and IFNg and decreased IL10. In uninfected mice, the number of memory T-cells was 10-fold increased compared to naïve. These cells produced significantly more TNFa and had a higher cytolytic capacity. Following infection, immunized mice continued to have a 6-fold increase in LCMV-specific CD8 T-cells and increased production of TNFa and IL2.

Conclusions
Immune memory in FHL leads to more severe disease characterized by alteration in numbers, cytokine profiles, and cytolytic profiles of the CD8 T-cell response. Thus, immune memory status may be an important disease modifier in patients with FHL.
Aims & Objectives:

The gut microbiome is likely to play an important role in critical illness pathophysiology, yet the gut-host synergy is poorly characterised in children. Age and environmental exposure are known to influence the gut microbiome, and adult studies have demonstrated that acute severe illness profoundly and negatively alters the gut-host relationship.

We undertook a study to examine the feasibility and yield obtained from extracting bacterial DNA from faecal samples of critically ill children, alongside profiling of gut and host metabolic shifts in critical illness.

Methods

Following informed consent, we extracted DNA from faecal samples from 43 children admitted to the PICU. This was amplified using 16S primers and DNA concentrations were determined using a high sensitivity Qubit kit.

Results

Faecal DNA of >30ng/mcl was obtained in 80 out of 103 (78%) of critically ill children and from 14 out of 14 healthy children. Correcting for faecal sample volume there was no difference in DNA yield between critically ill compared to healthy children (p = 0.7879). Where DNA yield was low we extended amplification cycles to generate adequate DNA for MiSeq analysis.

Conclusions

Faecal DNA extraction is practical in paediatric critical illness. By increasing the volume of faecal sample collected, and extending amplification cycles we are now able to generate sequencing information on the majority of critically ill children. Age matched controls are a vital part of interpreting the relevance of host-microbiome studies in paediatrics.
Aims & Objectives:

Hemophagocytic Lymphohistiocytosis (HLH) is a potentially fatal hyper inflammatory condition caused by a highly stimulated but ineffective immune response, which simulates severe sepsis. The present study is a case series with aim of documenting the myriad presentations of HLH and their outcome in PICU.

Methods

All cases with clinical features suggestive of HLH were investigated for HLH 2004 criteria. Immunosuppressive therapy as per HLH 2004 therapeutic guidelines was started along with aggressive management of underlying infection as appropriate. Clinical outcomes in terms of mortality and morbidity were noted.

Results

Over period of one year three cases were found fulfilling the HLH 2004 criteria. All the three cases were initially treated with broad spectrum antibiotics for sepsis. In two cases definite etiology of any infection could not be established. Both of them showed clinical response to immunosuppressive therapy. First case was referred to another center where she showed partial response but eventually died. Second child showed resolution on immunosuppressive therapy and was discharged home however she had a relapse after 2 months and eventually died. Familial origin of HLH in these cases could not be established due to financial constraints. Rickettsial infection was confirmed in the third case and was promptly treated with doxycycline. Complete resolution was achieved in this case without immunosuppressive agents.

Conclusions

A high index of suspicion is required to diagnose HLH as it mimics severe sepsis, especially in PICUs of the developing world. Prompt treatment of underlying etiology and early appropriate immunosuppressive therapy may prevent mortality from HLH.
Aims & Objectives:

Immune-mediated diseases leading to renal failure require treatment with plasmapheresis (PP) and hemodialysis (HD). We describe the details of “tandem” use of both techniques with simultaneous regional citrate anticoagulation (RCA).

Methods

2006 to 2015 six patients (14 to 60 kg) were admitted for renal failure and additional indications for PP and treated with tandem PP and HD. For the PP blood was drawn from the HD device after the filter. Both return lines and the calcium substitution were connected via a Y-piece and a stopcock.

The following restrictions were made: the post-dilution was reduced to 5% of the blood flow, the blood flow in plasmapheresis was limited to 70% of the blood flow rate in HD, the plasma filtration was limited to 20% of the blood flow in plasmapheresis and the ionized calcium samples of patients were monitored every 30 minutes during tandem therapy.

Results

101 tandem treatment sessions were performed. None of the patients had disorders due to plasma volume shifts. Electrolyte and acid-base balance were easily controlled by adjustments in HD. There were no episodes of hypotension or systemic bleeding. During simultaneous PP the need for calcium substitution was 30% higher than in sole HD treatment.

Conclusions

Simultaneous HD and PP reduces treatment time and also enables the RCA on the plasmapheresis treatment. By HD both a metabolic balance and a volume correction is possible. In addition, this treatment reduces the risk of systemic bleeding during plasmapheresis.
Aims & Objectives:

The Twinstream® ventilator (Carl Reiner GMBH, Vienna, Austria) is an electric driven microprocessor controlled jet ventilator which allows simultaneous application of two different jet-streams (low frequency and high frequency) resulting in a pulsatile BiLevel Ventilation (p-BLV) mode. We describe its effectiveness in infants and children with acute hypoxemic respiratory insufficiency (ARI).

Methods

7 patients (6 months to 15 years) with hypoxemic ARI (postoperative, 3; viral or bacterial infection, 4) failing conventional mechanical ventilation (median oxygen saturation index=OSI 10.4 (7.8-27.4).

P-BLV was instituted after a median length of conventional mechanical ventilation of 3 days (3-11 days).

Results

| Table 1: Oxygen saturation, CO2 and ventilatory parameters before and after p-BLV (mean, range) |
|-----------------------------------------------|-----------------------------------------------|
| Pre-pBLV | Post-pBLV | Pre-pBLV | Post-pBLV |
| SpO2/FIO2,% | 114 (73-160) | 262 (217-320)** |
| OSI | 12.8 (7.8-27.4) | 4.1 (2.7-4.2)** |
| Paw, mbar | 12.6 (10-20) | 10.2 (8.8-12)** |
| VI | 34.4 (10.3-45) | 25.9 (12-34)** |
| Pa-ETCO2, mmHg | 6.4 (0.5-15) | 1.4 (-0.9-8)** |

Primarily, all patients were on pressure controlled or adaptive pressure controlled mechanical ventilation with tidal volumes of 6 to 8 ml/kg. PEEP and FIO2 were selected to obtain SpO2 of 90% or more. Sedative, analgetic, and neuromuscular blocking agents were administered according to the patient’s requirements. Pulsatile
BiLevel ventilation was started with a high frequency rate of 600 cycles/min combined with a conventional frequency rate about 25% lower than on conventional mechanical ventilation, an I:E ratio of 1:2, and the same FiO2 and the same mean airway pressure previously measured on conventional mechanical ventilation and were adapted in order to maintain normocapnia and SpO2 > 90%.

Pulse oximetry/fraction of inspired oxygen (SpO2/FiO2), pulse oximetry saturation index (OSI=(Paw*FiO2*100/SpO2)), mean airway pressure (Paw), ventilation index (VI= (RR*PIP*PaCO2/1000)) and Pa minus etCO2 were recorded before and after p-BLV.

Mean duration of p-BLV was 72 hours (37-117). Mean duration of conventional mechanical ventilation before starting p-BLV was 5 days (1-11) and after p-BLV 9 days (3-24).

Conclusions

P-BLV using the Twostream ventilator® significantly increased the clearance of airway debris and secretions associated with improved gas exchange in infants and children with different forms of hypoxemic ARI.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0713
PEDIATRIC CRITICAL CARE TRANSFUSION AND ANEMIA EXPERTISE INITIATIVE: CREATING CONSENSUS AND SAFETY FOR TRANSFUSIONS IN THE PICU
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Aims & Objectives:

Despite evidence that a lower hemoglobin threshold for RBC transfusion in the PICU is safe, multiple studies have shown that the threshold in practice is much higher, exposing children to the significant morbidity and mortality associated with RBC transfusion. Therefore there is need for blood management strategies for those caring for critically ill children that target physiologically relevant hemoglobin concentration, optimize hemostasis, and minimize blood loss. We aim to create an evidence based consensus regarding the risks, benefits and appropriate threshold for transfusions in the critically ill children.

Methods

The Pediatric Critical Care Transfusion and Anemia Expertise Initiative has brought together a group of 49 international experts in pediatric transfusion/critical care in collaboration with the Pediatric Critical Care Blood Research Network (BloodNet), and the Pediatric Acute Lung Injury and Sepsis Investigators (PALISI), to conduct a consensus conference series on pediatric critical care blood management. Over 2 years, this group will create a series of consensus statements via an organized and structured process that will outline existing data and future research foci in the area of RBC transfusions in critically ill children. Novel features of this initiative include engagement with implementation science and medical anthropology to enable consensus uptake.

Results

One of three expert meetings has been conducted in October 2015 with the second one combined with WFPICCC in Toronto. Ten subgroups have been created: transfusion in 1) general population with hemoglobin triggers, 2) general population with physiological triggers, 3) traumatic brain injury, 4) congenital heart disease, 5) hematologic/oncologic disease, 6) respiratory failure, 7) shock, 8) bleeding, 9)
extracorporeal support, and 10) alternative processing, with each group aiming to create specific consensus recommendations.

**Conclusions**

The consensus statements will include specific strategies for adaptive dissemination and implementation into clinical/research environments to improve outcomes and safety for children at risk for, or who require, RBC transfusions.
ORGAN SYSTEMS (GASTRO INTESTINAL / RENAL / HAEMATOLOGY & IMMUNOLOGY / ENDOCRINE / NUTRITION)

PICC-0525
GOOD INTRA OBSERVER REPRODUCIBILITY OF ULTRASONOGRAPHY TO MEASURE THIGH MUSCLE THICKNESS IN CRITICALLY ILL CHILDREN

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Aims & Objectives:

Muscle mass monitoring during PICU stay is crucial to quantify muscle wasting, in order to understand adaptive mechanisms of the critically ill child, to assess various feeding regimen potential impact on muscle waste and to detect early PICU acquired weakness. We investigated the intra observer reproducibility of thigh anterior ultrasonography.

Methods

We prospectively enrolled 37 critically ill children (median age 30 months, min 0, max 14 years; median weight 10 kg, min 1, max 61 kg). A trained PICU intensivist subsequently performed 4 thigh ultrasound measurements of rectus femoris and vastus intermedius muscle thickness (2 axial measurements and 2 sagittal measurements), and repeated these 4 measurements once at the same location. The first series of measurements was compared to the second series obtained. Ethical approval was obtained previous to the study.

Results

The reproducibility of one single measurement (axial or sagittal) and of the mean value obtained from two measurements (axial and axial; axial and sagittal, sagittal and sagittal) was insufficient to detect a 5% difference in muscle thickness. We found a good reliability comparing the mean values obtained from the four measurements: mean relative difference was 0.36% (+/-2.5%).
Conclusions

Thigh muscle ultrasonography has a good intra observer reliability in the critically ill child when considering the mean value from 4 repeated measurements. Inter observer reproducibility should be further investigated to allow for muscle monitoring protocol implementation. Muscle mass qualitative assessment could also be investigated, focussing on muscle echogenicity over PICU stay, as described in the adult setting.
Aims & Objectives:

To study the effect of TEG on the assessment of coagulation disorders in septic children.

Methods

100 patients with sepsis or severe sepsis in PICU from February 2014 to January 2015 were included. All patients had TEG and CCTs tests on the day of diagnosis. The effects of TEG and CCTs tests on the assessment of coagulation disorders in septic children were evaluated. ROC curves were used to assess the diagnostic strength of severe sepsis.

Results

56 patients with sepsis and 44 severe sepsis were included. 71% patients suffered from underlying disease. According to TEG, 72 parities had coagulation disorders, including 28 with hypercoagulation and 44 with hypocoagulation. CCTs tests showed 50 parities had coagulation disorders, including 29 with non-overt DIC and 21 with overt DIC. The rate of hypercoagulability was significantly higher in non-DIC group than in non-overt DIC group (46% vs. 17.2%, P=0.016). The rate of hypocoagulability was significantly higher in overt DIC group than in non-overt DIC group (100% vs. 44.8%, P<0.001). Patients with hypercoagulation disorders had significantly shorter R and K and greater α, MA and CI compared with healthy controls (P<0.001). Compared with sepsis group, severe sepsis group had significantly prolonged R and K and lower α, MA and CI (P<0.001). AUC of TEG and CCTs variables for diagnosis of severe sepsis were significantly greater than 0.5. Both variables of α (P=0.0002) and K (P=0.0041) had significantly greater AUCs compared with Fib.

Conclusions

72% of patients with sepsis occurred coagulation disorders, patients with sepsis in early stage had hypercoagulability, and patients with severe sepsis developed hypercoagulability.
IATROGENIC CALCINOSIS CAN BE MISTAKEN FOR A SOFT TISSUE INFECTION; RARE BUT BEWARE!

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Aims & Objectives:

Background: Calcinosis of soft tissues is a rare in infancy, and it can be of dystrophic, metastatic, idiopathic, and iatrogenic origin. Iatrogenic form is due to extravasation of medications, mainly calcium salts. We report a case of iatrogenic calcinosis, which was mistaken for a soft tissue infection.

Methods

Case: A four month old male infant with severe hypoxic ischemic injury during surgery for inguinal hernia was transferred to PICU for evaluation of brain death. His neurological examination was consistent with BD, but confirmatory tests showed flow to the brain. Ulcerated lesions with underlying hyperemia and warmth were noted on the volar surface of his right arm and on the dorsum of his left foot (0.5x0.5 cm). Fig 1

On palpation underlying tissue was hard. Patient was on antibiotics for presumed soft tissue infection. X-ray of the extremities revealed soft tissue calcifications.
Results

Further inquiry revealed a history of calcium administration via peripheral intravenous lines at the sites of lesions. His calcium, phosphorus levels were normal, but vitamin D level was low, and parathormone was high. The calcifications were attributed to iatrogenesis due to previously extravasated calcium gluconate infusions, and antibiotics were discontinued.

Conclusions

Although rare, iatrogenic calcinosis should be in the differential diagnosis of ulcerated erythematous cutaneous lesions in young infants. The diagnosis can be made based on the hard consistency with evidence of calcification. The medical team should be aware of this rare clinical entity.
Aims & Objectives:

The study of children with cancer who are given intensive care is not still enough as compared with the adult patients. The objective of this study is to investigate children with cancer admitted to ICU and to clarify their characteristic and problems.

Methods

We retrospectively reviewed clinical records of children with cancer admitted to our hospital and required intensive care between April 1999 and March 2012.

Results

The total number of patients with cancer was 238. We obtained the data of 21 of cases. The breakdown of the disease was: 7 cases of acute myeloblastic leukemia, 4 of acute lymphoblastic leukemia, 2 of myelodysplastic syndrome, 3 of malignant lymphoma, 2 of osteosarcoma, 2 of hepatoblastoma, and 1 of cerebellar medulloblastoma. The major reasons for ICU transference were respiratory distress and circulatory failure. Most of the cases (90%) were given mechanical ventilation or continuous hemodiafiltration. More than half of the cases had infectious complications. There was a discrepancy between the median of pediatric index of mortality 2 (20%) and the observed ICU mortality (62%). Respiratory or cardiovascular disorder based on pediatric logistic organ dysfunction score was the major organ dysfunction. Twelve cases had 3 or more organ disorders.

Conclusions

Children with cancer required intensive care had more severe condition and high mortality as compared with the predicted mortality. We need to develop an appropriate prognostic score for this population to promptly intervene before worsening their general condition.
A STUDY OF 8 CHILDREN WITH HEMOLYTIC UREMIC SYNDROME GIVEN CONTINUOUS HEMODIALFILTRATION

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Aims & Objectives:

Hemolytic uremic syndrome (HUS) is a serious complication of infectious enterocolitis due to enterohemorrhagic Escherichia coli. Patients with acute kidney failure (ARF) due to HUS are provided blood or peritoneal dialysis. We usually conduct continuous hemodiafiltration (CHDF) as blood purification for HUS. The objective of this study is to clarify benefit or problems of CHDF in HUS.

Methods

We reviewed clinical records of children with HUS admitted to our hospital past 11 years.

Results

Among 23 patients with HUS, 8 patients (6 males) were given CHDF. The median age was 2.5 (range; 2-7). Prognostic score for the severity of HUS was higher in patients with CHDF than those without CHDF. The main reason for CHDF induction was anuria. The median duration from the onset of enterocolitis to initiation of CHDF was 6 days (range; 4-9). The median duration of CHDF was 20 days (range; 3-33). No patients developed chronic kidney failure. Three cases of catheter-related bloodstream infection (CRBSI) and 1 of intracranial hemorrhage occurred during CHDF.

Conclusions

All HUS patients with CHDF recovered renal function. We can expect the patients to recover from ARF in several weeks. However, we should pay close attention to CRBSI during CHDF.
Aims & Objectives:

Underfeeding is quite common in PICU. Inaccurate assessment of nutritional requirements could contribute to inadequate delivery of energy. Still there is no consensus on the optimal amount of energy to deliver for critically ill paediatric patients. Previous studies suggested that the provision of full requirements improves the clinical outcomes while other studies failed to detect such relationship. The aim of this study is to compare the patient’s caloric intake with their energy requirements as indicated by schofield-equation, and relate this to the clinical outcomes of PICU patients. Also we will compare different methods of estimating energy requirements.

Methods

We retrospectively reviewed our patients. Data was obtained from the hospital electronic system. The caloric requirements were calculated using schofield-equation and indirect-calorimetry. Hospital prescription was based on (the scientific advisory committee on nutrition) recommendations. Weight for age Zscores were calculated using WHO-anthro software.

Results

A total of 42 patients aged between 0-16 years were reviewed. About 41% of our sample received < 25% of their goal calories, 22% received < 50% of their requirements and only 30% of the patients received their recommended caloric intake, while 7% received more than the recommended daily calories. No correlation was observed between the length of hospital stay and the amount of calories delivered (r=0.070) and Zscores (r=0.077). A weak positive linear relationship was detected between hours of ventilation and caloric intake (r=0.4). There was no significant differences between the energy estimated by indirect-calorimetry and schofield-equation (pvalue=0.9), though a significant difference (pvalue=0.002) between the caloric requirements estimated by indirect-calorimetry and hospital recommendations was recorded.
Conclusions

Multiple factors contribute to inadequate delivery of energy in PICU. Hence most PICU patients do not receive their caloric needs during the early phase of critical illness. Professionals caring for PICU patients must carefully estimate the nutritional requirements to avoid morbidities associated with under and overfeeding.
Aims & Objectives:

Leukemia with lactic acidosis has been described on literature. Hypothesis for this association are anaerobic metabolism (hyperleukocytosis), tumor production, hepatic involvement reducing use of lactate and Glucose-6-phosphatase enzyme deficiency. Sillos et al reviewed issues and found one case with lymphoma and seven with leukemia in children, lactate just decreases with disease control, hemodialysis did not decrease mortality and all of them died.

Methods

We reported a 13-year-old boy with history of general malaise, lipothyrm and pallor started two weeks before admitted on emergency ward. His laboratorial finds showed severe anemia, thrombocytopenia and leukocytosis. He started corticotherapy despite undefined myelogram. He was referred to PICU of Instituto de Tratamento do Câncer Infantil (ITACI).

Results

On admission, he was lethargic, with facial paralysis and hepatosplenomegaly, showing no fever. We took out corticosteroid and repeated myelogram. Laboratory values were normal, except uric acid, 10mg/dL, serum lactate, 87mg/dL and some hypoglycemia episodes (despite use intravenous glucose). He received rasburicase and aggressive hydration. Although his myelogram had 90% of blast, surface and genetic markers were undefined. The skull CT and MRI were normal, but X-ray of long bones showed lytic lesions. During hospitalization, serum lactate increased until 150mg/dL and he had clinical worsening. After 11 days from admission, he received corticosteroid and Vincristine. He evolved with renal failure but he died before renal replacement therapy. Postmortem findings showed lymphocytic leukemic infiltrates in most organs.
Figure 1 – Facial paralysis, petechiae and hematomas

Figure 2 - Liver: atypical lymphoid cells in the portal tract and hepatic sinusoids. HE, 200x
Conclusions

This case was a severe form of leukemia presentation, probably previous use of corticosteroid therapy difficult the diagnosis. Patients with high lactate levels need earlier diagnosis and treatment although have poor prognosis.
Aims & Objectives:

The pediatric intensive care unit (PICU) quality initiative sought to reduce the rate of unplanned extubations (UEs), reduce duration of mechanical ventilation, decrease length of stay (LOS) and healthcare cost, and increase clinical staff's confidence level with securing endotracheal tubes. The initiative evaluated the effects of implementing practice standards for securing endotracheal tubes (ETTs) in intubated pediatric patients, and determined if these practice standards impacted clinical outcomes, and the confidence level of staff.

Methods

The initiative included a retrospective and a concurrent chart review. Data was analyzed for pediatric patients who experienced an UE during two study periods (January through May 2014 and January through May 2015). Interventions included interactive educational training, pre- and post-education confidence level scoring by staff, implementation of clinical practice standards for ETT management, review of UE events, and auditing to evaluate ETT management compliance.

Results

Pediatric UE rate was reduced, along with a reduction in LOS and healthcare cost. Analysis showed no significant difference in duration of mechanical ventilation. Difference in patient characteristics between the retrospective and concurrent groups was not to statistically significant. Confidence levels of clinical staff in securing ETTs was increased after education was implemented. The differences in pre- and post-confidence scores were compared using the Wilcoxon-signed rate test for medians. There was noted compliance related to the standard method of securing ETTs and with secretion management.

Conclusions
The use of clinical practice standards for ETT management positively impacted (a) the confidence level of clinical staff in securing pediatric ETTs; (b) the rate of UEs; (c) PICU length of stay; and (d) healthcare cost. The project proposes that the use of standardized ETT management increases the confidence of staff in securing ETTs which ultimately contributes to high compliance with the method for securing ETTs, and therefore reduces UEs, LOS and healthcare cost.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0031
MULTICENTER ANALYSIS OF PARENTS OF NEUROBLASTOMA PATIENTS IN SAUDI ARABIA
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Aims & Objectives:

To explore the characteristic features of parents of neuroblastoma in Saudi Arabia (SA) and link it to the mortality rate.

Methods

The study interviewed 48 parents of neuroblastoma children from three referral centers in SA. The interview was done either through phone or at hospital meeting. Demographic data, place of residence, consanguinity marriage, family income, past medical history, pregnancy history, siblings rank and presence of other cases of neuroblastoma or other inherited/genetic diseases were collected. Finally, the data was analyzed to assess mortality risk among neuroblastoma patients.

Results

From the study, the majority of parents were from the middle region of SA (30%). Most of the parents were of Saudi nationality, 84%. The average family income per month was $2,158. That was below the average $3,624/month. While, 58% were relative marriage, 56% of the parents had chronic medical illnesses, and 4% of the families had another child with an inherited/genetic disease. One family had another case diagnosed with neuroblastoma. 8% of the mothers have had complicated pregnancy including premature deliveries. The neuroblastoma children were usually, the first child in the family or the third (20% and 18% respectively). Of the total neuroblastoma children, 66.7% were alive, and 30.3% dead. Consanguinity marriage, parents suffering from chronic medical illnesses, experienced a complicated pregnancy, and presence of other siblings with inherited/ genetic diseases was not linked with neuroblastoma mortality p>0.05 value.

Conclusions

Parents features might affect the health outcome of their children. Our study revealed no difference between present and absent of abnormality in parents’ features.
Aims & Objectives:

The aim of this study; To identify the indications of mechanical ventilation as a life saving, complication and in addition to identify which factors will influence the outcomes.

Methods

Medical records of children (who were aged between one month and 15 years) and who required Invasive Mechanical Ventilation (IMV) during the period between 01/01/2010 to 31/05/2015 were analyzed retrospectively by using questioners; regarding admitted diagnosis, age, gender, duration of IMV, additional data that were characterize the study population, ventilation complications and outcomes. Data were analyzed by SPSS Statistics.

Results

During the study period they were 898 patients admitted to the PICU of those 173 (19%) required IMV, (71%) were infants, male child formed the majority (56%). The maximum duration of IMV was 15 days and less than 2 days. Indications of IMV were; respiratory disorders (33%), neurological disorder (24%), and severe sepsis (10%). Seventy-one patients (41%) died; The variables that were found to be risk factors for death were pediatric risk mortality score, organ failure score on first 24 hours from admission, use of vassopressor drugs, severity of hypoxic score, critical pulmonary shunt and ventilator complications (pneumothorax) p <0.0001.

Conclusions

This study is the first Libyan epidemiology data on risk factors and outcomes in children who were treated by IMV, which cast light on factors related to survival.
Aims & Objectives:

Background: SATI-Q is a voluntary program, sponsored by the Argentine Society of Intensive Care. Its aim is to collect data related to quality benchmarking in Argentinian PICUs.

Objective: to describe the demographic profile and evolution of patients admitted to the PICU members of the SATI-Q program.

Methods


Setting: 8-25 PICU located in public or private setting, in general or pediatric hospitals.

Patients: Children from 1 to 191 months admitted to the participating PICUs, between 1/1/2010 to 31/12/2014.

Results

A total of 11637 patients were admitted to the participating PICUs; 59.7% were males (6948/11637). Their median age was 25 months [interquartile range (IQR): 7-90] and 37% were younger than 13 months. Chronic complex conditions were present in 27.34% (3181/11637) of admissions.

The main admission reason was respiratory disease (30.1%) followed by postoperative admissions (25.8%). 5766/11637 (45.66%) patients required mechanical ventilation (MV). Median length of MV was 6 days (IQR: 2-13). 5% of children required >45 days of MV.

Median length of stay was 4 days (IQR: 2-11).

Nosocomial infection rate was 9.8‰ patient days, being ventilator associated pneumonia the most frequent one (7.3‰ MV days)
A total of 987 patients died in PICU (8.48%) whereas mortality predicted by PIM2 was 7.25%. Standardized mortality ratio was 1.17 (95% CI: 1.1-1.24).

Conclusions

Most children admitted to argentine PICUs are younger than 13 months. Respiratory illness is the main admission reason. Mortality is higher than expected. Rates of nosocomial infections constitute a problem.
Aims & Objectives:

In children with traumatic brain injury (TBI), 1) to describe the hospital discharge functional outcome and change from baseline function using the Functional Status Scale (FSS) and 2) to determine any associations between discharge FSS and neurologic exam and other predictors of outcome.

Methods

Design: Prospective observational cohort study, May 2013 to November 2015

Setting: Two U.S. level 1 Pediatric Trauma Centers

Patients: Children < 18 years old admitted to an intensive care unit (ICU) with acute TBI and either a surgical or critical care intervention within the first 24 hours or inhospital mortality.

Results

The primary outcome was hospital discharge FSS. Nearly all (195/196) of the cohort had normal or near-normal (≤ 7) pre-injury FSS. Most, 133/196 (68%), had severe TBI (admission GCS 3-8). Overall hospital mortality was 14%; 20% among those with severe TBI. More than one-third, 23/62 (37%), of survivors had new morbidity at hospital discharge (increase in FSS ≥ 3). Among children with severe TBI, 21/41 (51%) of survivors had new morbidity at hospital discharge. The mean change in FSS from baseline to hospital discharge was 3.9 ± 4.9 overall and 5.2 ± 5.4 in children with severe TBI. Hospital discharge FSS had an inverse relationship with GCS: for each
increase in admission GCS by 1, the discharge FSS decreased by 0.5 (95% CI: 0.7 to 0.3).

Conclusions

Hospital discharge FSS, change from baseline FSS, and new morbidity acquisition will be useful outcome measures for quality improvement initiatives and interventional studies.
Aims & Objectives:

Introduction: The Pediatric Intensive Care Unit (PICU) improves the survival of critically ill children but consumes most of the hospital resources, for this reason the efficiency of the bed use is very important. The length of stay (LOS) is an indirect measure of the PICU's financial and care resources. The advantage in knowing the LOS consists in adequate control of the patients flow, inside and outside of the PICU. Objectives: to identify the LOS related factors of the patients admitted in the PICU and to verify the association between these factors and LOS.

Methods

Method: the 1815 admissions' data were collected in electronic spreadsheets and analyzed in simple and multiple models.

Results

Results: The LOS was categorized in long (3 to 4 days) and very long (more than 4 days) stay. The age group is not shown as an associated factor to long and very long stay. The PELOD score is associated to the rise of LOS, mainly for very long stay patients and increases progressively in 13% the chance for this stay. We observed that the source of admission, Pediatric and Bone Marrow transplantation units, were significant for the LOS of 3 to 4 days and longer than 4 days. The readmissions within 48 hours are not associated to long and very long LOS.

Conclusions

Conclusion: knowing the factors that influence the LOS can help for the management of PICU beds and to provide subsidies to the search of a LOS predicted model.
Aims & Objectives:

The objective of this qualitative sub-study is to determine what outcomes are considered important by patients and families, and compare these to outcomes deemed important by researchers.

Methods

A purposive sample of participants and families enrolled in the Functional Recovery in Critically Ill Children, the “Weecover” Multicenter Study (Clinicaltrials.gov NCT02148081) were approached to participate in a face-to-face, semi-structured audiotaped interview, 3-6 months after Pediatric Intensive Care Unit (PICU) discharge. Transcribed interviews were independently analyzed using an interpretive-descriptive approach. The selected endpoints measured in the Weecover Study were coded using the same standardized approach, to determine the extent to which these overlap with the outcomes indicated by parents as priorities in their child’s recovery.

Results

We conducted a total of 20 interviews. Most of the priorities identified by caregivers were covered by the primary outcome measures selected for the Weecover study. While survival is of primary importance early during the PICU admission, functional recovery is a priority after the likelihood of survival becomes clearer. Caregivers reported many strains on their own functioning that influenced their availability to support their children while in the PICU (e.g. sleep disturbance, mental health concerns, understanding of their role as parents, finances). Following discharge,
caregivers identified a need for psychological and social support while adjusting to changes in their child, particularly if recovery to baseline functioning had not yet occurred. Ongoing analyses will examine if and when a shift in parental priorities occurs, and how this relates to their child’s pre-morbid condition.

**Conclusions**

Caregiver priorities appear to be covered by the primary outcomes selected by researchers in the Weecover study. However, there additional outcomes important to parents that may influence their child’s recovery. These are potential areas to improve on the delivery of care throughout the course of a child’s critical illness.
Aims & Objectives:

Prospective evidence on comprehensive long-term functional and health outcomes in the general critically ill pediatric population is limited. The objectives of this study are: 1) To measure functional recovery and predictors of poor functional recovery in children following a critical illness, using quantitative methods. 2) To determine the extent to which we are measuring recovery from a patient oriented perspective, using qualitative methods.

Methods

Prospective Observational Mixed Methods Longitudinal Cohort Study. Eligible participants were children aged over 12 months to 17 years, with at least one organ dysfunction and a minimum Pediatric Intensive Care Units (PICUs) length of stay of 48 hours. The primary outcome is functional status at PICU discharge, 3 and 6 months post-PICU discharge, which we measured using the World Health Organization (WHO) International Classification of Functioning, Disability and Health (ICF) definition. This includes measures of function, participation, parental stress and quality of life. Qualitative interviews were conducted to determine important outcomes as defined by patients’ families, and how these overlap with the selected study endpoints. Secondary outcomes were PICU related morbidities, length of stay and mortality.

Results

We enrolled 180 patients, between August 2014 to January 2016. The mean age was 9 years (SD 5.5) and 54% were males. To date, the 3 and 6 month follow-up rates are 87% and 90% respectively. On admission, 68% had a pre-existing chronic
condition, and 51% had some baseline functional limitation. Follow-up will be completed over the next 6 months, following which, functional recovery can then be analyzed.

**Conclusions**

Ongoing analyses will review functional recovery in the first 6 months following PICU discharge, and predictors of poor recovery. What defines functional recovery will be supported by qualitative data.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0655
WHAT DOES A HIGH BURNOUT SCORE ACTUALLY MEAN?
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Aims & Objectives:
Recent studies have shown high rates of burnout in intensive care staff, but there is little consensus on scoring, even when researchers use the same instrument. In this study we compared burnout data with scores on psychiatric screeners in order a) to establish which method of scoring burnout picked up the greatest proportion of participants at risk of developing a psychiatric disorder and b) to determine the overlap between burnout and other forms of distress.

Methods
The sample comprised 228 health professionals working on five intensive care units. Participants completed the abbreviated Maslach Burnout Inventory (MBI), the Hospital Anxiety and Depression Scale and the Trauma Screening Questionnaire

Results
The proportion classified as ‘burned out’ varied from n=9 (5%) scoring at risk on all three dimensions of burnout to n=134 (59%) using the least conservative method of scoring at risk on at least one dimension. A high risk score on the burnout dimension of emotional exhaustion identified the highest proportion of those with significant psychiatric symptoms (sensitivity 69%, specificity 84%).

Across the eight different scoring methods examined, the overlap between burnout and significant psychiatric symptoms was similar, with half of those classified as having burnout also meeting criteria on at least one psychiatric questionnaire (see Fig 1).
Conclusions

In this sample, whilst there was an overlap between burnout symptoms and psychiatric symptoms, the former were reported twice as frequently. There is a need to achieve greater consensus on the scoring method used in relation to assessing burnout using the MBI.
Aims & Objectives:

Background: Vigorous application of standard concentrations for continuous medication infusions using dose error reduction software (DERS) for infusion devices to improve medication safety has been standard practice in our paediatric intensive care unit (PICU) since 2008. In 2015 DERS was expanded to include short infusions.

Aim: To review compliance with the DERS, and to evaluate the impact on standard outcomes in paediatric intensive care.

Methods

Method: A prospective audit of patients admitted to our tertiary level PICU over a 6-month period was conducted. The audit tool collated information on patient’s weight, diagnosis, medication infusions, whether standard concentrations selected, daily fluid balance, target fluid balance, renal support and/or diuretics.

Results

Results: 80% of patients weighed less than 5kg. On average, there were 9 medication infusions per patient, in 95% standard concentrations and almost 100% in short infusions were adopted. In 5%, staff opted not to use the DERS, or selected non-standard concentration, and several patient’s had no label on syringe. 90% of patients had a minimal positive balance of 0.5mL/kg/hr averaged over 24 hours; patients receiving renal support or in the first 24 hours post cardiac surgery recorded a negative fluid balance. Standard concentrations did not have a significant impact on ventilation requirements, approximately 50% of patients received oral diuretics.
Conclusions

Conclusions The use of standard concentrations and short infusions in PICU using DERS is feasible as demonstrated by high compliance, and does not have a negative impact on patient outcome
Aims & Objectives:

Children receiving mechanical ventilation and pharmalogical sedation may experience many stressful factors such as agitation, fear, discomfort, confusion, communication problems, anxiety and altered mental state. Literature suggests that passive music therapy is an effective non-pharmalogical method of reducing stress factors\(^1\).

Methods

Music therapy is promoted by staff on the unit. Some informal teaching sessions are held to instruct nursing staff. Ventilated patients are played music, selected by their families, through headphones for periods between 30-60 minutes. Parents are encouraged to select slow tempo music familiar to the child to promote relaxation. Interventions are avoided where possible during this time. Patients are informally observed by nursing staff during this period.

Results

Passive music therapy leads to a reduction in heart rate, blood pressure and respiratory rate in ventilated patients. Literature suggests that music therapy is as effective as allocated “Quiet time” on an intensive care unit\(^2\). Parents are encouraged to lead this activity which allows them to feel more involved in their child’s care. Lack of nurse’s knowledge on the subject was found to be a barrier to effective implementation.

Conclusions

Music therapy when applied appropriately has many benefits including reducing physiological signs of stress and anxiety. Few negative side effects are evident. Involving the patient’s family can allow them some input into the care of their child in an environment where so much choice has been taken away from them. Better nurse education and further research is needed in order to implement music therapy effectively.

\(^1\) Hatem et al. Jornal de Pediatria 2006. 82(3):186-192

Aims & Objectives:

Introduction: The participation of a multidisciplinary team in caring for children and their families is essential to face the disease process, hospitalization and treatment. When it comes to pediatric patients, guidance for parents plays a fundamental role in providing information, taking into account the importance and the reasons why they should follow the regimen proposed.

Objective: The present study aimed to verify if the parents and/or guardians of pediatric patients undergoing liver transplantation received by the multidisciplinary team, the main guidelines about the complications of the procedure and the postoperative period as well as if these orientations were assimilated.

Methods

Methods: Descriptive study of exploratory nature. The sample consisted of 14 subjects, who answered to an 30 questions interview tool during the period from March to December 2015.

Results

Results: Among the participants, 68.8 ± 21.6% answered that they had received the orientations and 31.2 ± 21.5% denied it. Moreover, the majority of responses, on average 36.9 ± 20.4%, were classified as "partially adequate" and the minority (12.4 ± 11.4%) were considered fully adequate.

Conclusions

Conclusion: It was possible to observe that health care professionals transmitted the orientations to parents or guardians, although the assimilation was probably compromised by the moment family members were interviewed or due to communication barriers. As a proposal, there were created two booklets of guidelines to enhance the effective communication between health care professionals and family members.
Aims & Objectives:

Dramatic advances in critical care have created a new generation of children with chronic medical complexity (CMC) who experience frequent rehospitalisation in the pediatric intensive care unit (PICU). As parents of these children typically become highly proficient in dealing with the medical, technological, and physical care needs at home, their position as experts in their child’s care makes them unique. There remains, however, a paucity of knowledge concerning nurses’ perceptions of caring for these parents. The goal of this study was to explore nurses’ perceptions of caring for parents of critically ill children with CMC in the PICU.

Methods

An interpretive descriptive design was used with purposive sampling to capture the diversity among PICU nurses’ perceptions of caring for parents of children with CMC. Semi-structured interviews were conducted with ten nurses. Interview data were collected and analyzed using qualitative inductive content analysis.

Results

Five themes were identified in the data that captured PICU nurses’ experiences. These included: (i) “Thrown to the wolves”: learning to partner with parents; (ii) recognizing and respecting parents’ expertise; (iii) negotiating parental involvement in the child’s care; (iv) cultivating the collaborative nurse-parent relationship; and (v) experiencing moral distress.

Conclusions

Findings shed new light on nurses’ perceptions of caring for and partnering with parents of children with CMC in the PICU. Results will be used to develop strategies to enhance nurse-parent partnerships, with the ultimate goal of supporting parents and staff in their caregiving roles.
Aims & Objectives:

Critical care units are stressful environments in which interpersonal relationships between staff are placed under enormous pressure. We aim to describe the perceptions of doctor-nurse relationships within a large general critical care unit and identify aspects that may be improved.

Methods

Anonymous survey of medical and nursing staff within the PICU and NICU between May and October 2015.

Results

Of 238 surveys 44.1% were completed; doctors 39/68 (57.4%) and nurses 66/170 (38.8%). On a nine-point scale, 73/105 (69.5%) respondents rated doctor-nurse interactions positively with 92/105 (87.6%) noting at least one positive interaction per day. Skills including; Respect (81/103 78.6%), Communication (77/104 74%) and Listening (69/105 65.7%) were rated as absolutely critical. Unit-specific factors such as the consultant (24/104 23.1%), nurse-in-charge (32/105 30.5%) and patient load (26/104 25%) were not thought of as critical.

Respondents reported feeling joint ownership of the patient (95/105 90.5%), the patient’s information (94/105 89.5%) and the unit (79/105 75.2%). Only 44.8% of respondents thought doctors and nurses shared in decision-making.

Negative interactions were thought to occur at least weekly, by 47/105 respondents (44.8%).

Existing unit strategies to improve working relationships were known to 39.1% of respondents including first-name use (91.4%) and nurse-led rounds (81%). Respondents indicated that beneficial strategies could include first-name use (95.2%), joint teaching (90.5%) and out-of-work social functions (90.5%).

Conclusions
This survey indicated predominantly positive interactions between doctors and nurses in the unit. Results from the survey may be used to guide interventions to improve relationships as well as benchmark their effect for future surveys.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0617
EXPLORING MORAL RESILIENCY IN PEDIATRIC CRITICAL CARE PROVIDERS
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Aims & Objectives:

Moral distress (MD) is widely recognized as impacting critical care provider satisfaction, attrition from the profession, personal health, and the quality of care. Currently little is understood about how bedside providers manage MD over time. We explored the how pediatric critical care bedside staff manage MD in order to inform interventions that support a resilient community of practice.

Methods

Audio recorded focus group (n=1, 7 participants) and semi-structure interviews (n=10) were held with a convenience sample of inter-professional bedside staff with > 10 years of experience. Audio records were transcribed and descriptive qualitative analysis was carried out.

Results

Three distinct categories of strategies to reduce prevalence and severity of moral distress emerged: 1] active strategies described participant efforts to gather information or directly address the source of their distress, 2] perspective making involved reflection and directing thoughts and focus such that the negative impacts of moral distress were mitigated, 3] formal resources described the value and use of established supports (experts, peers, debriefing) to address distressing situations. Participants acknowledged an evolution of their approaches to moral distress over time and factors influencing decisions to stay or leave critical care were identified.

Conclusions

Providers with longer careers in pediatric critical care acknowledge and actively seek to mitigate impacts of ongoing exposure to moral distress. These individual strategies can be articulated and utilized for team level support. The scope of the strategies and differences between participants suggest that an integrated multi-modal program of support would optimize access, flexibility and fit for individual providers.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0790
INTENSIVE CARE UNIT CAPACITY STRAIN AND MORTALITY: A SYSTEMATIC REVIEW
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Aims & Objectives:

To examine the association between intensive care unit (ICU) capacity strain and mortality in children and adults.

Methods

The study protocol was based on PRISMA-P and registered with PROSPERO. We searched MEDLINE, CINAHL, the Cochrane Library, and reference lists for English-language studies (1999-2015) describing the association between capacity strain (high census, acuity, turnover, or an indirect measure of strain such as delayed ICU admission) on mortality for children and adults hospitalized in ICUs in highly developed countries. Two reviewers assessed study eligibility, abstracted data using a standardized form, and assessed risk of bias. We qualitatively synthesized data; there was insufficient study homogeneity to perform meta-analyses.

Results

Of 7,389 potentially relevant studies, 10 studies analyzed the effect of ICU capacity strain on mortality in a total of over 700,000 patients. Most studies used high patient census at the time of patient admission to define capacity strain; several of these studies used measures of patient turnover and/or acuity in addition to census. Indirect measures of capacity strain were delayed patient admission to ICU from the Emergency Department and refusal of admission to ICU. Eight of ten included studies found significantly increased mortality during times of capacity strain. The only study including children described a 9% increase in odds of mortality for each 10% increase in percentage occupancy.

Conclusions

In highly developed countries, ICU capacity strain is associated with mortality. Solutions to improve outcomes during times of capacity strain are needed.
Aims & Objectives:

The well known management consultant Peter Drucker, coined the phrase “culture eats strategy for breakfast” (Kotter, 2008). Without a positive workplace culture, change strategies are resisted, no matter how well planned they are. Moreover, culture affects staff retention, public perception and financial performance. While nurse staffing and skill mix influence patient safety and outcomes, the overall work environment of nurses is recognized as having a much larger influence on these measures (Press Ganey, 2015). In 2010, the nursing leadership team in our 15-bed Medical-Surgical Pediatric Intensive Care Unit (PICU) established a vision for a healthy and positive workplace culture; a culture where nurses would want to come to work and stay to work.

Methods

Using the American Association for Critical Care Nurses healthy work environment assessment tool, we have measured the health of our nursing work environment and benchmarked our results against other critical care units in the United States. This led to our ability to target specific areas for improvement and measure progress over time.

Results

Currently, the Alberta Children’s Hospital PICU enjoys one of the highest nursing retention rates across Alberta, and when compared to similar PICUs across North America, some of the best patient outcomes (ACH PICU VPS Annual Clinical Program Performance Report, 2014).

Conclusions

This poster details initiatives such as formal nursing leadership development, strategic incorporation of advanced practice nurses, implementation of timely Critical Incidence Stress Management, and staff recognition and engagement measures.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0819
RURAL VS URBAN AREAS ENVIRONMENTAL POLLUTION INFLUENCES ON ANTIOXIDANT PARAMETERS IN PLACENTAL TISSUE COLLECTED AT TERM

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Aims & Objectives:

Environmental pollution can generate increased oxidative stress. Rural and urban pollution sources are quite different and their influence on oxidative stress parameters should also be different. Placental tissue concentrations of oxidative stress markers and antioxidant defence systems may be an useful indicator of maternal and also fetal exposure to environmental pollution. Our objectives were to evaluate the influence of urban and rural pollution on placental antioxidant systems.

Methods

200 pregnant women in Bucharest (urban) and Giurgiu (rural areas) - 100 for each region. On placental tissue collected after on term birth we have evaluated the activities of glutathione transferase (GST), glutathione reductase (GRed), superoxide dismutase (SOD), catalase (CAT) and the concentrations of total and non-protein thiol groups (SH tot and SH nonpr).

Results

Total and non-protein thiol groups were significantly higher in rural area (Giurgiu) while the activities of GST and GRed were significantly higher in urban area (Bucharest). No significant differences were noted between the activities of SOD and CAT.

Conclusions

Our results show differences between the two areas in terms of antioxidant systems activated and may be explained by the differences in pollution related oxidative stress systems activation.
PICC-0395
CORRELATION AND AGREEMENT BETWEEN NAS, TISS-28 ANS NEMS
SCORES TO ESTIMATE THE NURSING WORKLOAD IN PEDIATRIC INTENSIVE
CARE
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Aims & Objectives:
estimate nursing workload using Nursing Activities Score (NAS), Therapeutic
Intervention Scoring System-28 (TISS-28) and Nine Equivalents of Nursing
Manpower Use Score (NEMS) and verify the correlation and agreement between the
estimated hours of work by the scores in a Pediatric Intensive Care Unit (PICU).

Methods
A prospective cohort study was conducted in the PICU of an University Hospital over
a period of one year with a sample of 490 patients. A total of 4617 observations were
obtained for each of the scores. Data were collected daily. The association between
the scores was calculated by Pearson correlation and the agreement by Bland &
Altman model.

Results
Workloads by NAS, TISS-28 and NEMS were respectively 17.6 ± 2.3; 15.6 ± 5.0 and
17.3 ± 5.5 hours. The correlation between NAS and TISS-28, NAS and NEMS, and
TISS-28 and NEMS were respectively r = 0.753; r = 0.698 r = 0.862. When the
difference in hours between the scores was compared, it was found that NAS and
TISS-28 had a difference of 2 ± 3.6 hours, NAS and NEMS 0.4 ± 4.2 hours and
NEMS and TISS-28 1.6 ± 2.8 hours.

Conclusions
As result of our work the scores have presented a strong correlation. It was found a
good correlation between the scores, with statistical significance in the measurement
of nursing workload.
Aims & Objectives:

The decision to perform tracheostomy for life prolongation in children can be controversial. To ensure that all relevant services are consulted prior to performing a non-urgent tracheostomy and to ensure that families are making informed decisions, a tracheostomy committee (TC) was created. We describe the composition, processes, and the preliminary results of the TC work at our tertiary pediatric centre.

Methods

A review of the tracheostomy cases performed during the period of 06/2012-01/2016 was undertaken utilizing data from the “Tracheostomy clinic” and Otolaryngology Department. The TC files were reviewed and its members were consulted. Demographics, diagnoses, meetings’ report, mechanical ventilation use (MV) and outcomes were collected.

Results

The TC became operational in June 2012, with the following services: Respirology, Otolaryngology, Palliative care, Ethics, Home care, Nursing, Intensive Care and Pediatrics. The TC mandate excludes indication related to isolated congenital airway obstruction and urgent airway instability. The TC has no decisional power, but makes recommendations following member’s input.

From June 2012- Jan 2016, 57 patients were considered for discussion; 74% (42/57) underwent the TC consultation; 78% (45/57) had tracheostomies performed. The TC met formally to discuss 26% (11/42) patients; for the remaining 31 consensus was achieved without face-to-face discussion. For the 12 patients not tracheostomized, 9 underwent our TC consultation process. Ten patients have died, 5 of them underwent TC process; 2 were lost to follow-up; 51% (13/45) have been decannulated; 20% (9/45) had MV.
Conclusions

A TC can be a useful facilitator in decision-making for families and health care professionals in controversial situations with potential for tracheostomy to prolong of survival. In the majority of cases consensus can be reached without multidisciplinary formal meetings, with the TC serving as facilitator for information gathering. Further research is needed to evaluate the medical staff and families’ opinion about the value of the committee.
Aims & Objectives:

Gaps between theoretical concepts of Family-Centered Care (FCC) and clinical practice has been reported both in pediatric and neonatal settings. Parent involvement in care and treatment in the Neonatal Intensive Care Unit (NICU) is increasingly acknowledged. Therefore, staff attitudes towards FCC should be encouraged.

Aims:

To describe the perceptions of Italian NICUs staff of FCC and to explore their views on translating the FCC principles into daily practice.

Methods

Cross-sectional multicenter study among healthcare professionals working in 32 Italian NICUs. The “Family-Centered Care Questionnaire - Revised” developed by Bruce and Ritchie (1997) was translated and adapted. The questionnaire used a 5-point Likert scale. The 45 items were divided in nine subscales. Every item was rates on ‘current practice’ and necessary practice’. The Bambino Gesù Children’s Hospital Ethical Board provided ethical approval.
Results

Data from 29 NICUs were analyzed. Totally, 1005 NICU staff responded. More than 90% worked in NICU and/or Neonatal High Care Unit. Cronbach’s α of the nine subscales ranged between 0.60-0.85. Significant differences were observed between the overall mean score of current practice and necessary practice FCC (mean 27.4 vs 36.7; p<0.001). On subscale level, significant differences occurred in all of them between current practice and necessary practice, ranging from: ‘Family is the Constant Factor’ (mean 3.1 vs 3.9; P<0.001) to the subscale ‘Design of Health Care system’ (mean 2.8 vs 4.1; P<0.001).

Conclusions

Although the elements of FCC are recognized as fundamental, there are still shortcomings in delivering FCC care in many Italian NICUs.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0788
SELF ASSESSMENT OF FAMILY CENTERED CARE IN 46 ITALIAN NEONATAL INTENSIVE CARE UNITS, PRELIMINARY RESULTS (BY THE FCC ITALIAN NICUS STUDY GROUP)


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Aims & Objectives:

Family-Centered Care (FCC) in Neonatal Intensive Care Units (NICU) is both related to staff culture and to the organization of the unit.

Aim: To explore the organization of Italian NICUs relating to policy and services to provide family-centered care.

Methods

The Italian version of the "FCC in the NICUs: A Self-Assessment Inventory", developed by the Institute for Patient and Family Centered Care was sent to nurse managers of 105 NICUs in Italy. The questionnaire contained 10 domains with totally 98 items (some items included more questions), five open questions and a descriptive section of the unit. The questions measure "status" (5-point Likert scale) and "priority for change" (3-point scale).

Results

Forty-six (44%) NICUs replied. The NICU characteristics were: number of beds, mean 20; discharged newborns per year, mean 331, of which VLBWI, mean 68. The total mean score was 2.6 for the “status” and 2.3 for “priority for change”. The domain Leadership received the highest mean score (3.4) for the “status” measure while the domain Families as Advisors and Leaders (FAL) received the lowest mean (1.7). Regarding “priority for change”, the highest mean score (2.5) was observed for the domain Quality Improvement and the lowest mean (2.1) was for the FAL domain.
Conclusions

The results provide evidence to improve FCC practices in the Italian NICUs. Enabling parents to become more involved in the governance and care planning in NICU might contribute to implement new directive FCC interventions.
PICC-0436
LONG-TERM MORTALITY AND HEALTHCARE UTILIZATION FOLLOWING ACUTE KIDNEY INJURY IN THE PEDIATRIC INTENSIVE CARE UNIT

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Aims & Objectives:
Acute kidney injury (AKI) is common in the pediatric intensive care unit (PICU). The late illness burden of child AKI is unknown. We will evaluate if AKI in the PICU is associated with increased mortality and health care service use 5 years after discharge.

Methods
Retrospective cohort study of children admitted to two Montreal, Canada PICUs, 2003-2005 (N=2500). Exclusions: no health number, deceased in PICU. Clinical chart data was merged with provincial administrative health data. AKI (main exposure): by Kidney Disease Improving Global Outcomes serum creatinine (SCr) definition (if no PICU-SCr drawn, non-AKI was assumed). 5-year outcomes: all-cause mortality; healthcare utilization (HCU), defined as the number of hospitalizations, ER, and physician visits per 100 person years. AKI-outcome relation evaluated with multivariate logistic (mortality) and linear regression (HCU), adjusting for gender, age, cardiac surgery, PRISM (mortality) score, vasopressors and infection.

Results
Of 2407 children (mean±SD age=6.0±5.7yrs; PRISM (mortality) score= 8.2±5.9); 56% male; 448 (18.6%) developed AKI. AKI (yes/no) was associated with mortality in univariate (p<0.05) but not multivariate analysis. Stage 2 AKI or worse was associated with 5-year mortality (adjusted[adj]OR=1.9, 95% CI= 1.1-3.2). AKI (yes/no) was associated with increased 5-year hospitalizations (adj p<0.05) and physician visits (adj p<0.001), but not ER visits (adj p=0.8). There was a graded increase in 5-year HCU with higher AKI severity [figure1].
Figure 1: Association of increasing AKI severity with number of hospitalizations, ER visits and physician visits in the long-term. Box plots. Middle line = median; Upper and lower edges = 75% and 25%, respectively; Bars = 1.5 x IQR (Interquartile range).

Conclusions
PICU-AKI is associated with long-term increased mortality risk and HCU. Research should evaluate cost-effective interventions to improve child AKI treatment and evaluate effects on late outcomes.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0484
LONG-TERM DEVELOPMENT OF HYPERTENSION FOLLOWING ACUTE KIDNEY INJURY IN THE PEDIATRIC INTENSIVE CARE UNIT

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Aims & Objectives:

Acute kidney injury (AKI) in the pediatric intensive care unit (PICU) is common and associated with poor hospital outcomes. Long-term renal effects of PICU-AKI, like microalbuminuria and hypertension, are not well understood. We will determine the prevalence of microalbuminuria and hypertension in a cohort of children admitted to the PICU between 2005-2010 and evaluate the feasibility of performing gold standard blood pressure testing.

Methods

Design: Ongoing longitudinal follow-up study. Population: Children admitted to the Montreal Children’s Hospital PICU between 2005-2010. Patients in the neonatal intensive care unit or patients with pre-PICU renal disease were excluded. Study visit: Perform visits 5-10 years after index PICU admission. At the visit we collect detailed medical histories, anthropometric measures, three office blood pressure (BP) measures, first morning urine for microalbuminuria determination, and perform 24-hour ambulatory BP monitoring (ABPM) for hypertension determination. The prevalence of the main outcomes (hypertension, microalbuminuria) was calculated and ABPM hypertension phenotypes were detailed.

Results

Study visits have been performed on 81 patients (female 52%, mean age ± SD = 11.6 ± 5.0 years). 40.5% (30/74) had past PICU-AKI (n=7 with no AKI data). 72/81 (89%) successfully performed the 24-hour ABPM. Of these, 7 (9.7%) had hypertension (6 masked hypertension, 1 severe ambulatory hypertension), 6 (8.3%) had prehypertension, 1 (1.4%) had white coat hypertension, and 33 (45.8%) had inadequate nighttime BP dipping. Microalbuminuria was present in 4/70 (5.7%) patients with urine samples analyzed.

Conclusions

Hypertension and non-BP dipping prevalence are high in children with past PICU admission. Future work must elucidate the risk factors for hypertension, in particular AKI, to provide an evidence base for post-PICU follow-up guidelines.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0378
THE ROLE OF STAFF SUPPORT PRACTITIONER IN STAFF RETENTION, HEALTH AND WELL-BEING
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Aims & Objectives:
Retention of staff is crucial to our workforce plan. In 2013 staff retention became a significant problem and improvement plan was initiated. A new role; Staff Support Practitioner (SSP) was introduced.

Methods
- in depth exit interviews, by a manager over a two year period
- a retrospective time and motion analysis over one week, of pastoral care provision from managers
- initiation of a new role of SSP

Results
In 2013-14, 67 exit interviews were conducted. Nurses wanted a better work life balance and jobs which they perceived would be less stressful than PICU. One third of manager time was spent providing pastoral staff care.

Conclusions
The SSP delivers qualified counselling, Cognitive Behaviour Therapy, debrief and resilience sessions for staff. In ten months, 54 (20%) staff have had confidential support; reasons ranging from personal bereavement, depression and stress at work or home. Referrals are made by managers or staff self-refer. New recruits have an introductory appointment. Staff have reported difficulty attending appointments during work time and some report an associated stigma. Critical incident debrief and reliance sessions have also been open to all staff.

Since the SSP role introduction, retention has improved from 9.5% to 3.7% over one year. Sickness has improved by 1.5% per month (currently 3.5%). The high service usage, improvement in retention and reduction in sickness, suggests this role has been successful and has contributed to workforce retention and staff health and well-being.
Aims & Objectives:
To determine blood biomarkers used in typical clinical settings to predict the outcome for pediatric post-cardiac arrest syndrome (PCAS).

Methods
We retrospectively examined all the patients who required chest compression for cardiac arrest or symptomatic bradycardia, and who were admitted to the National Center for Child Health and Development, a tertiary pediatric center in Tokyo, Japan, between January 2009 and May 2015. We excluded the patients who died within 24 hours after cardiac arrest, required extracorporeal life support, or had unrepaired congenital heart disease. We examined the blood biomarkers that can predict poor neurological outcome (Pediatric Cerebral Performance Category (PCPC) ≥3) at discharge.

Results
There were 178 patients who required chest compression, and 62 were included in this study. Thirty-five patients had good outcome (PCPC ≤2) while 27 had poor outcome. Between the two groups, there were significant difference in bystander-CPR, initial cardiac rhythm, and time to return of spontaneous circulation (ROSC), but there were no significant difference in age, sex, and baseline PCPC. Blood sugar, serum lactate, and serum sodium were significantly different in several time points after ROSC between the two groups. Blood sugar and serum lactate within six hours after ROSC and serum sodium after six hours after ROSC showed higher predictive
Conclusions

Blood sugar, serum lactate, and serum sodium can serve as prognostic factors for pediatric PCAS. We will further investigate the prognostic value of the combination of clinical examination, electrophysiology, and a head computed tomography.
Aims & Objectives:

The aim of the present study was to study the epidemiological and clinical profile of patients attending an exclusive pediatric Emergency Department (ED).

Methods

This is a descriptive study reporting the profile of patients visiting the ED for 1 year. Data was retrieved from records of the patients seen over a 1-year period from January 2015 to December 2016. Descriptive analysis was done to define demographic and clinical details, monthly admission rates and diagnoses.

Results

The total number of patients visiting the hospital was 19,618, with a monthly average of 1634 patients. Infants represented the largest age group (36%) while adolescents were only 1.2% of all patients. The triage categorized patients into resuscitation, emergent, urgent, and less urgent and non-urgent. 24% patients required resuscitation, emergent and urgent care while 76% patients required either less urgent or non-urgent care. 16.3% patients required hospital admission while 2.4% of all patients attending pediatric emergency were shifted to pediatric critical care unit for intensive monitoring and ventilation. The common reasons for attending the emergency department were respiratory illnesses (20%), infectious diseases (19%), neurological emergencies (16%), renal problems (10%), gastrointestinal (7%), cardiovascular (5%), and hematological illnesses (5%). Poisonings were seen in 2.3% of patients. The overall mortality rate in pediatric emergency was 0.07%.

Conclusions

Appropriate and ongoing data collection and analysis could guide more efficient utilization of pediatric emergency services to achieve better outcomes.
Aims & Objectives:

Hyperlactatemia (HL) i.e. serum lactic acid (LA) ≥4 mmol/l is associated with high mortality in Pediatrics Intensive Care Unit (PICU). Limited data is available on the frequency and outcomes of HL in PICU in Pakistan. Our objective was to assess the frequency of HL in children admitted to PICU and their outcomes.

Methods

Methods

Retrospective chart review of all children, (1 month - 16 years), admitted in PICU from January 2012 to December 2014 with serum lactate levels obtained was done. Data collected included demographic data, serum lactate levels, and clinical outcomes (length of stay and survival) on a structured proforma. Results are presented as mean ± standard deviation (SD) and frequency and percentage. Chi square test was applied and a p-value of 0.05 was considered significant.

Results

Total 202 patients had their serum LA levels checked. 68 (33%) patients had HL. 130 (64%) were male. Median age was 4 years (IQR 7). 188(93%) were admitted from Emergency Room, 5(2%) from ward and 9(4.5%) from Operation Room. 40(20%) had CNS disease, 45(22%) had cardiac /shock, 28(14%) infections, 31(15%) respiratory disease, 15(7%) post-surgical, 12(6%) trauma and 14(7%) had gastrointestinal disease. Multi-organ dysfunction syndrome was present in 74(36%) patients.

Overall, 91(45%) patients had metabolic acidosis, and 162(80%) of these had positive anion gap. Base line lactate level 2.5(IQR 3.5).

Among 77(38%) patients who expired 35(45%) had HL (OR 0.44, 95% CI 0.247 – 0.815, p-value 0.008). and 45(58%) of these had increasing trend of LA levels (p-value <0.05, OR 3.76, 95% CI 2.06-6.86). LA levels were more than 10 in 15(19%) patients and less than 10 in 62(80%) among 77 expired patients. (p-value <0.05, OR for >10 = 4.8, 95% CI 1.8 – 12.86).

Conclusions
Conclusions

Hyperlactatemia occurred in one third of patients and was associated with high morbidity and mortality rate.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0456
GASTROINTESTINAL (GI) COMPLICATIONS IN CHILDREN ADMITTED IN A PEDIATRIC INTENSIVE CARE UNIT (PICU)

M.T. Jamil¹, Q. Abbas¹, A. Haque¹, H. Jurair²
¹Aga Khan University & Hospital Karachi Pakistan, Pediatrics & Child Health, Karachi, Pakistan

Aims & Objectives:

Gastrointestinal dysfunction has been found to be a common problem in critically ill patient and associated with adverse outcome. There is scarcity of data on occurrence of different types of GI complications in children admitted in pediatric intensive care unit. Objective is to determine the frequency and types of GI complications in children admitted in PICU.

Methods

All the children (1 mo – 16 years) admitted in PICU (multidisciplinary) for at least 48 hours were enrolled prospectively after informed consent. All patients admitted in our PICU are started feeding within 4 hours of admission or after resolution of shock. All patients were observed for bowel sounds, abdominal distension, vomiting, high gastric residual volume (GRV), constipation, GI bleed and intra-abdominal hypertension (IAH) for at least 10 days. Data was collected on a structured Performa including basic demographics, PRISM III score, PICU therapies provided and GI complications observed. Results are presented as frequency and percentages and mean ± standard deviation (SD).

Results

Total 73 patients were enrolled, 68% were males and mean age was 47±50 months. Mean PRISM III score was 11±6.25 and mean length of PICU stay was 4.6±4.2 days. 56% patients developed multi-organ dysfunction, 76% needed mechanical ventilation, 78% needed inotropic support and 8% patients expired. Constipation was observed in 34% patients, high GRV in 23%, vomiting in 14%, abdominal distension in 11%, diarrhea in 5.5% while GI bleed and IAH were observed in 2.7% of patients.

Conclusions

Constipation, high GRV, vomiting and abdominal distension were the most commonly observed GI complications in our cohort.

P.S This study is ongoing.
HIGH FREQUENCY OSCILLATORY VENTILATION IN POSTOPERATIVE PEDIATRIC CARDIAC PATIENTS: AN EXPERIENCE FROM A TERTIARY CARE CENTRE IN MUMBAI, INDIA

Aims & Objectives:
Experience with High frequency oscillatory ventilation (HFOV) in postoperative cardiac surgery is limited due to concerns regarding safety, feasibility and lack of specialized training. It has so far not been used in postoperative cardiac care in India. This study aims to describe experience of our unit with HFOV in the management of the postoperative cardiac surgery patient with respiratory failure as a rescue modality.

Methods
In our unit, HFOV was used as a rescue therapy in 16 postoperative cardiac surgical patients who failed conventional ventilation between June 2013 and June 2015. Indication for HFOV was severe lung disease [acute onset, with Oxygenation index (OI) > 15, PaO$_2$/FiO$_2$ (PF) ratio <200, CXR with bilateral infiltrates]. Data was collected with regards to demographics, diagnosis, surgery performed, preoperative lung disease or sepsis, pre and post HFOV settings and indices. Short term outcomes were compared.

Results
On evaluation, it was observed that, in all patients Pre-HFOV OI was > 15 as per inclusion criteria and they improved within 24 hrs in 81.25 % (13) patients. PF ratios improved in 15/16 patients. None of the patients had any hemodynamic disturbances. 1 patient had a pneumothorax. Out of 16 patients, six (37.5%) patients died and the remaining were discharged.

Conclusions
In a select group of postoperative cardiac patients, the transition from conventional ventilation to HFOV as a rescue mode resulted in significant changes in oxygenation and ventilation without hemodynamic compromise. HFOV is a safe, feasible and effective therapy in postoperative cardiac surgery.
Aims & Objectives:

Children in critical care units put an immense psychological burden on the family members of the child hence assessing the family needs is very important to up-scale the perceived quality of care. This study was designed to explore the needs of family member of children admitted to an Intensive Care Unit and rank the needs and compare with the perspectives of multiple other stakeholders - doctors, nurses and administrators.

Methods

This is an exploratory comparative study done prospectively using a modified version of the Critical Care Family Needs Inventory (CCFNI) to measure, rank and compare the needs and the Needs Met Inventory (NMI). The study was done in a private sector pediatric ICU in south India. Responses of 35 consecutive family members, 30 Pediatric acute care Nurses, 30 pediatricians involved in intensive care and 30 administrators responsible for ICU decisions were recorded.

Results

The responses were compared between the care seekers' and care providers. The needs ranked highest by domain were “Assurance” by families, doctors and “information” by the nurses. The items those were included to the questionnaire concerning developing country situations were ranked high in importance.

Conclusions

The CCFNI with minor modifications can be used in developing countries for assessing multiple stakeholders’ perspectives on Pediatric Critical Care Family Needs. Making sure the parent feels assured about the care given to the child should be the area of prime focus and timely information regarding the child’s condition should be given the utmost importance in alleviating family anxiety. Repeated such
measurements and incorporating the care seekers unmet needs in the care delivery system would help to up-scale the perceived quality of care.
PICC-0193
CHARACTERISTICS OF RECURRENT ADMISSIONS TO PICU
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¹Birmingham Children’s Hospital, PICU, Birmingham, United Kingdom

Aims & Objectives:

Children with recurrent admissions to paediatric intensive care units (PICU) may have a worse outcome than general PICU cohort. We studied the characteristics of children with recurrent PICU admissions and describe the magnitude of PICU bed utilisation and their outcomes.

Methods

We performed a retrospective analysis of prospectively collected data of all admissions over 12 years (2004 – 2015) in our PICU. Recurrent admission was defined as readmission to PICU between 7 days and 2 years of discharge after index episode. Readmissions in the first 7 days after index discharge were excluded as they may be related to hospital processes rather than patient issues. Logistic regression was used to identify significant factors associated with recurrent admissions.

Results

9820 patients had a total of 14619 admissions. Of these 1897 (19%) patients had 3335 recurrent admissions with median (IQR) of 1(1-2) recurrent admission per child. The recurrent admission cohort occupied 52% (49,900 / 95135) of all PICU bed-days. 59% were boys and median age (IQR) at index admission was 4 (0.5-23) months. Observed in-PICU mortality per admission episode was lower (3.6%; p<0.001) in the recurrent admission group compared to the whole cohort (6.6%). However, children in the recurrent admissions cohort had a significantly longer length of stay per admission [median (IQR): 14 (8-28) days; p<0.001] compared to others [3 (2-6) days]. Significant factors associated with recurrent PIC admission are shown in Table 1. Younger, long-stay patients and those with a respiratory primary diagnostic category had significantly higher odds of recurrent
Conclusions

Children with recurrent PICU admissions had significantly longer length of stay per admission episode but without increased mortality risk. Several factors such as age, length of stay of index admission and diagnostic category are associated with odds of recurrent admissions to PICU.

Table 1: Logistic regression analysis of variables associated with recurrent PICU admissions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>95% Confidence intervals</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>0.91</td>
<td>0.90 - 0.92</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Length of stay (days)</td>
<td>1.02</td>
<td>1.02 - 1.03</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Diagnostic Categories</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Reference=Cardiovascular]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory</td>
<td>1.27</td>
<td>1.15 - 1.41</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Trauma</td>
<td>0.07</td>
<td>0.03 - 0.14</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Infection</td>
<td>0.65</td>
<td>0.52 - 0.81</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Multisystem</td>
<td>0.21</td>
<td>0.06 - 0.51</td>
<td>0.003</td>
</tr>
<tr>
<td>Endocrine/metabolic</td>
<td>0.80</td>
<td>0.58 - 1.08</td>
<td>0.15</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>1.05</td>
<td>0.90 - 1.21</td>
<td>0.54</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>1.34</td>
<td>0.97 - 1.84</td>
<td>0.07</td>
</tr>
<tr>
<td>Blood/lymph</td>
<td>0.88</td>
<td>0.54 - 1.36</td>
<td>0.57</td>
</tr>
<tr>
<td>Neurological</td>
<td>1.03</td>
<td>0.88 - 1.20</td>
<td>0.70</td>
</tr>
<tr>
<td>Oncology</td>
<td>1.09</td>
<td>0.84 - 1.40</td>
<td>0.51</td>
</tr>
<tr>
<td>Other</td>
<td>1.03</td>
<td>0.87 - 1.21</td>
<td>0.76</td>
</tr>
<tr>
<td><strong>Female sex</strong></td>
<td>1.02</td>
<td>0.94 - 1.10</td>
<td>0.65</td>
</tr>
<tr>
<td>[Reference=Male]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PIM score</strong></td>
<td>0.71</td>
<td>0.50 - 1.01</td>
<td>0.06</td>
</tr>
</tbody>
</table>
Aims & Objectives:

Organ dysfunction scores, based on physiological parameters, have been created to describe organ failure, not to predict mortality. In a general Pediatric Intensive Care Unit (PICU) population, the PEdiatric Logistic Organ Dysfunction-2 (PELOD-2) score had both a good discrimination and calibration, allowing to describe the clinical outcome of critically ill children throughout their stay. Our objective was to assess the performance of the PELOD-2 score in a subpopulation of critically ill children requiring plasma transfusions.

Methods

Ancillary study of a prospective observational study on plasma transfusions over a 6-week period. Critically ill children who received at least one plasma transfusion during the observation period were included (101 PICUs in 21 countries).

PELOD-2 scores were measured on days 1, 2, 5, 8 and 12 after plasma transfusion. Performance of the score was assessed by the determination of the discrimination (Area Under the ROC Curve: AUC), the calibration (Hosmer-Lemeshow test). Percentage of patients with New and Progressive Multiple Organ Dysfunction Score (MODS) was calculated.

Results

443 patients were enrolled in the study (median age and weight: 1 year and 9.1 kg, respectively). Observed mortality rate was 26.9 % (119/443). For PELOD-2 on day 1, the AUC was 0.76 (95%CI 0.71;0.81) and the Hosmer-Lemeshow test was p = 0.76. The serial evaluation of the changes in the daily PELOD-2 scores from day 1, demonstrated a significant association with death. In all, 209 patients (47.2%)
presented a New or Progressive MODS.

Conclusions

In a subpopulation of critically ill children requiring plasma transfusion, the PELOD-2 score has a lower but still acceptable discrimination than in an entire population and a good calibration. This score should therefore be used cautiously in specific subpopulations. The PELOD-2 score appropriately describes organ failure and allows for the computing of New or Progressive MODS.
PICC-0404
RESPIRATORY COMPLICATION AS POST INTENSIVE CARE SYNDROME IN A PEADIATRIC POPULATION

D.C.B.C. Moore¹, F. Lima-Setta¹, D.M.L. Caixeta¹, L.F. Martins-Toledo¹, G.A. Vivas¹, I.B. Brandão¹, R.S. Martins¹, F.V.M. Franco¹, M.R.C. Alvim¹, Z.M.A.A. Azevedo¹
¹Instituto Fernandes Figueira - Fundação Oswaldo Cruz - FIOCRUZ, Pediatric Intensive Care Unit, Rio de Janeiro, Brazil

Aims & Objectives:

The term post intensive care syndrome describes new or worsening impairments in physical, cognitive or mental health status arising after critical illness and persisting beyond acute care hospitalization. The mechanical ventilation and severe lung infection can be predisposing factors to bronchial hyperresponsiveness and higher rates of pneumonia after discharge.

This study aims to describe the presence of hyperresponsiveness and pneumonia after discharge of the paediatric intensive care unit.

Methods

Secondary data analysis, prospectively collected in the period of 10 years between 2005 and 2015 of patients admitted to the pediatric intensive care unit which were followed after discharge at the follow-up clinic. The respiratory outcomes evaluated were: pneumonia after discharge and bronchial hyperresponsiveness. All analyses were performed using the R software (R Core Team, 2015).

Results

A total of 170 children were included in the study with 64.7% presenting a respiratory cause of admission. The median time of follow up was 13.2 months with a median number of 4 visits. The bronchial hyperresponsiveness was seen in 64.1% and pneumonia after discharge in 31.7% of the patients. We found association between the respiratory cause of admission and risk of pneumonia after discharge ($X^2=3.89$ $p=0.04$) and bronchial hyperresponsiveness ($X^2=12.4$ $p=0.0004$). We did not find association between acute respiratory distress syndrome and pneumonia after discharge or bronchial hyperresponsiveness.

Conclusions
A respiratory diagnosis in the pediatric intensive care unit admission can be considered a risk factor for the development of bronchial hyperresponsiveness and occurrence of pneumonia after discharge.
Aims & Objectives:

To study the association of fluid overload with mortality, oxygenation index, organ dysfunction (PELOD score), duration of mechanical ventilation and PICU stay in mechanically ventilated critically ill children admitted in PICU.

Methods

Children less than 15 years of age requiring mechanical ventilation for a minimum of 24 hours were enrolled. Fluid overload percentage (FO%) was defined as: (Total fluid input in ml in 24 hours – total fluid output in ml in 24 hours) × 100/ weight in gm at admission]. Cumulative maximum fluid balance of 15% or more was considered to be significant fluid overload. We also collected information on key clinical outcomes on a daily basis. Statistical Analysis was performed using Stata 11.2.

Results

One hundred eighteen children (58.5% boys) were enrolled. Incidence of cumulative maximum FO% of 15% or more was 62.7% (n=74). The median (IQR) cumulative FO during the study period was 19.6% (10.5, 30.8). There was no association of cumulative fluid overload with mortality(p= 0.11) or oxygenation index (p = 0.379). However, cumulative peak fluid overload 15% or more was associated with higher PELOD score (p = 0.023), longer duration of mechanical ventilation (p=0.001) and PICU stay (p= 0.0001) on multivariate analysis.

Conclusions

Fluid overload was associated with poor organ function, longer duration of mechanical ventilation and PICU stay in mechanically ventilated critically ill children. However, there was no statistically significant association of cumulative fluid overload with mortality or oxygenation index in our study population.
Aims & Objectives:

Noise pollution, stress, discomfort and alarm fatigue are major consequences of false alarms. Nurses spend hours responding to false alarms. Following a previous observational study monitoring false alarms, a validation study was carried out. This is part of a large wireless monitoring study (RAPID), aiming to develop smart alarms.

Methods

Using a specially devised data collection tool, we gathered information regarding cause and response time of alarms, from four bed spaces, over a 24-hour period. Using set criteria, every alarm was categorised into valid, false or technical. Parents were given verbal and written information about the study. Consent was not required. These observations were carried out in April and then again in August to validate the results on the 2 wards (4 bed spaces on each ward).

Results

<table>
<thead>
<tr>
<th></th>
<th>All Alarms in 24 Hrs</th>
<th>Valid Alarms</th>
<th>False</th>
<th>Technical</th>
</tr>
</thead>
<tbody>
<tr>
<td>APRIL 2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WARD 1 (0-year)</td>
<td>363</td>
<td>94(26%)</td>
<td>206(57%)</td>
<td>61(17%)</td>
</tr>
<tr>
<td>WARD 2 (1-16years)</td>
<td>92</td>
<td>31(34%)</td>
<td>42(42%)</td>
<td>19(21%)</td>
</tr>
<tr>
<td>AUGUST 2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WARD 1 (0-year)</td>
<td>408</td>
<td>109(27%)</td>
<td>228(56%)</td>
<td>71(17%)</td>
</tr>
<tr>
<td>WARD 2 (1-16years)</td>
<td>183</td>
<td>65(35%)</td>
<td>56(31%)</td>
<td>62(34%)</td>
</tr>
</tbody>
</table>
Conclusions

The repeat study validates the previous results obtained on ward 1. However the ward 2 data does differ slightly and may require further observation. Both wards continued to have a high incidence of non-actionable and false alarms.

Better alarm management and development of smart, accurate, adaptive, individual alarm limits for each patient could reduce avoidable stress, discomfort for the patients, their families and the bedside team.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0399
PREDICTORS OF ADVERSE EVENTS DURING BRONCHOSCOPIC REMOVAL OF AIRWAY FOREIGN BODIES IN CHILDREN- A PROSPECTIVE OBSERVATIONAL STUDY

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²Postgraduate Institute of Medical Education and Research- Chandigarh, Anaesthesia and Intensive Care, Chandigarh, India
³Postgraduate Institute of Medical Education and Research, Paediatric Surgery, Chandigarh, India

Aims & Objectives:

To describe the peri-procedure adverse events and outcomes in children undergoing rigid bronchoscopic removal of inhaled FB under general anaesthesia.

Methods

A prospective observational study was conducted over one year, in all children (0-12 years) undergoing rigid bronchoscopy for documented/ suspected foreign body inhalation. Bronchoscopies done in children who did not have an airway foreign body were excluded from analysis. The details of anaesthetic management viz., intra-operative ventilation strategy, drugs used, peri-operative adverse events, and outcome were recorded.

Results

Data was collected from 89 children who underwent 90 bronchoscopies during the study period. FB was present in 71 children who underwent 72 bronchoscopies. Out of 19 bronchoscopies performed based on clinical presentation to rule out FB, a FB was actually found in 9 instances (47%). The incidence was high during winter months, in children < 3 years of age and the most common foreign body retrieved was peanut. All the patients were ventilated with a ventilating bronchoscope with the use of muscle relaxant for the procedure.

Intra-operative adverse events were similar in children irrespective of the duration of aspiration- <24 hours vs >24 hours after aspiration, nature of foreign body- vegetative vs non-vegetative and the anaesthetic agent used for induction- inhalational vs intravenous. However, we found significantly higher incidence of desaturation in children maintained on a combination of intravenous and inhalational anaesthetic agents (34%) as compared to inhalational anaesthetic agents alone (8%), p=0.04, (Table). Three children were intubated prior to the procedure due to severe cardio-
respiratory compromise of which one child had post-procedure mortality.

<table>
<thead>
<tr>
<th>Intra-operative complication</th>
<th>Total (n=72)</th>
<th>Inhalational agents only (n=24)</th>
<th>Intravenous agent only (n=10)</th>
<th>Inhalational + intravenous agents (n=38)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desaturation</td>
<td>18 (25.0%)</td>
<td>2 (8.4%)</td>
<td>3 (30.0%)</td>
<td>13 (34.2%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Airway mucosal bleeding</td>
<td>14 (19.4%)</td>
<td>4 (16.7%)</td>
<td>1 (10%)</td>
<td>9 (23.7%)</td>
<td>0.77</td>
</tr>
<tr>
<td>Movement during procedure</td>
<td>8 (11.1%)</td>
<td>1 (4.2%)</td>
<td>2 (20%)</td>
<td>5 (13.2%)</td>
<td>0.27</td>
</tr>
<tr>
<td>Airway oedema</td>
<td>6 (8.3%)</td>
<td>3 (12.5%)</td>
<td>1 (10%)</td>
<td>2 (5.3%)</td>
<td>0.50</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>2 (2.8%)</td>
<td>1 (4.2%)</td>
<td>0</td>
<td>1 (2.6%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Bronchospasm</td>
<td>2 (2.8%)</td>
<td>1 (4.2%)</td>
<td>0</td>
<td>1 (2.6%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Laryngospasm</td>
<td>1 (1.4%)</td>
<td>0</td>
<td>0</td>
<td>1 (2.6%)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Conclusions**

Maintenance of anesthesia with a combination of intravenous and inhalational agents results in higher incidence of desaturation during bronchoscopic removal of airway foreign body as compared to use of inhalational agents alone.
Aims & Objectives:

Methods

A male infant was delivered at term after a pregnancy complicated by polyhydramnios and absent stomach on antenatal ultrasound. Postnatal contrast study showed a hiatus hernia and gastro-oesophageal reflux with aspiration. An orojejunal feeding tube was passed and a replogle tube placed with the tip in the gastric fundus. Microlaryngoscopy/bronchoscopy on day 6, performed because of CPAP dependency and aphony cry, showed a type IVb laryngotracehoesophageal cleft (LTOC). At 13 weeks, surgical repair was undertaken on ECMO. Two weeks later, irreparable distal dehiscence was noted and care was withdrawn.

Results

Prior to surgery, he was maintained on nasal CPAP with periods off support as tolerated. He received regular chest physiotherapy. He was fed via orojejunal tube. A replogle tube was maintained on constant suction (5kPa), with the tip in the distal oesophagus. An orogastric tube was kept on free drainage with regular
aspiration (Figure 1).

Portable replogle suction was achieved with a Laerdal suction unit on the lowest setting (80mmHg/10.7kPa) which allowed him to leave PICU for short periods (Figure
Conclusions

Discussion
Double lumen “replogle” tubes were developed for management of oesophageal atresia\textsuperscript{2}. Use in LTOC has not previously been described. The combination of CPAP, replogle suction, jejunal feeding and gastric drainage facilitated high quality supportive care in PICU. This maintained stability while decisions regarding surgical options were made, permitted international air transfer and enabled the family to spend quality time with him and make invaluable memories.

1. Leboulanger, Orphanet J Rare Dis 2011

2. Replogle, Surgery 1963
Aims & Objectives:

Measure the difference in mechanical ventilation patterns and strategies related with the outcome in children admitted to Pediatric Intensive Care Unit in Public Hospital in Guatemala City.

Methods

A study was performed between June and December 2015 in Pediatric Intensive Care Unit in Hospital General San Juan de Dios in Guatemala City. All patients were admitted to mechanical ventilation, The Pediatric Risk of Mortality Score – PRISM III score were performed as amount. Nutritional status as biochemical, anthropometric and clinical assessment were performed at admittance.

Results

85 patients were admitted. Mortality is related with Higher PRISM III score, Higher FiO2 %, and lower pH (p< 0.003), (p<0.031) and (p<0.025) respectively at admittance. In the monitoring of variables to keep the management of medical guidelines for treatment the data between 6 – 72 hours related with mortality are: Higher PRISM III score 12 – 24 hours, Higher FiO2, Higher Tidal Volume, Higher PaO2, and Higher Peak Inspiratory Pressure. (p<0.01), (p<0.044), (p<0.033), (p<0.010), (p<0.042). Complications associated such as pneumotorax is related with higher mortality.

Conclusions

Higher mortality is related to higher mechanical ventilation settings since the admittance, 6- 72 hours and 1 week follow up. Pneumotorax is following complication and increase the mortality risk. Is mandatory to define strategies such as “open lung “ or similar to have a objective pathway of treatment in pediatrics residents.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0125
TECHNICAL PERFORMANCE SCORE AND ITS IMPACT ON ICU LENGTH OF STAY AFTER CONGENITAL HEART SURGERY
M. Nathan¹, R. Thiagarajan², L. Hua¹, P. del Nido¹, F. Pigula¹, J. LaRovere²
¹Boston Children's Hospital, Cardiac Surgery, Boston, USA
²Boston Children's Hospital, Cardiology, Boston, USA

Aims & Objectives:

Technical Performance Score (TPS) is associated with early and midterm outcomes after congenital heart surgery (CHS). We wished to assess the impact of TPS on intensive care unit (ICU) length of stay in CHS patient with ICU length of stay of >28 days.

Methods

Consecutive cardiac surgical patients <18 years of age with ICU length of stay > 28 days between 1/1/2005-12/31/2012 were included. We assigned TPS as Class 1 (no residua), Class 2 (minor residua), Class 3 (major residua/unplanned in hospital reintervention for major residua) based on clinical and echocardiographic characteristics. Other predictors included age, gender, prematurity, noncardiac anomalies, RACHS-1 mortality categories. Cox, Linear and Logistic regression models were used to test the adjusted association between mortality, hospital costs and post discharge reintervention and TPS.

Results

Among 302 subjects, 185(62%) were male, 135(45%) were neonates, 98 (33%) infants, 109(36%) in High risk RACHS-1 category4-6, 191(63%) had noncardiac anomalies. TPS distribution was: Class 1= 41(14%), Class 2 =51(16.9%), class 3=(56%). There were 138 deaths (45.7%) with 88 in hospital deaths; median hospital charge was $835,564 (IQR $548,725-$1,217,779). There were 70 (23.2%) post discharge reintervention among hospital survivors. We demonstrated that Class 3 TPS was associated with greater (1) Postoperative mortality- Coefficient 2.32 [CI 1.19, 4.52, p=0.01], (2) Hospital charge- coefficient 1.39 [CI 1.10, 1.76, p=0.005] and (3) Post-discharge reinterventions- Odds Ratio 2.25[CI 1.12, 4.53, p=0.02] after adjusting for important preoperative predictors (Table).

Conclusions

Among subjects with protracted ICU stay after CHS, TPS is an important predictor of outcomes and the only predictor of post discharge reinterventions in our model. Data from a larger multicenter study can guide development of predictive models for prolonged ICU stay after CHS.
| Postoperative Mortality (includes in-hospital and post discharge mortality) |
|---|---|---|---|
| **Cox Regression** | Coefficient | 95% CI | P value |
| **Age (categories)** | | | |
| Neonates | 2.26 | 1.12, 4.14 | 0.02 |
| Infants | 1.83 | 0.97, 3.45 | 0.06 |
| Children | Ref | - | - |
| **RACHS-1 risk categories** | | | |
| RACHS-1 category 2,3 | Ref | - | - |
| RACHS-1 category 4-6 | 0.57 | 0.99, 2.5 | 0.66 |
| RACHS-1 category non classifiable | 2.67 | 0.92, 3.01 | 0.09 |
| Chromosomal or noncardiac anomaly | 1.36 | 0.94, 1.97 | 0.1 |
| Prematurity | 1.42 | 0.94, 2.18 | 0.1 |
| **Technical Performance Score** | | | |
| Class 1 | Ref | - | - |
| Class 2 | 0.06 | 0.36, 2.01 | 0.73 |
| Class 3 | 2.32 | 1.19, 4.32 | 0.01 |
| TPS non classifiable | 2.09 | 0.64, 6.19 | 0.11 |

**Post Discharge Reintervention (early deaths n=777 excluded)**

<table>
<thead>
<tr>
<th>Logistic Regression</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P value</th>
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<tr>
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</tr>
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<tr>
<td><strong>RACHS-1 risk categories</strong></td>
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<td>0.95, 2.88</td>
<td>0.07</td>
</tr>
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<td>RACHS-1 category non classifiable</td>
<td>1.50</td>
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<td>Prematurity</td>
<td>1.04</td>
<td>0.62, 1.76</td>
<td>0.88</td>
</tr>
<tr>
<td><strong>Technical Performance Score</strong></td>
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<tr>
<td>Class 1</td>
<td>Ref</td>
<td>-</td>
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</tr>
<tr>
<td>Class 2</td>
<td>1.47</td>
<td>0.67, 3.25</td>
<td>0.34</td>
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<tr>
<td>Class 3</td>
<td>2.25</td>
<td>1.12, 4.53</td>
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<tr>
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<td>0.04, 0.924</td>
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<th>Hospital Cost, Linear Regression</th>
<th>Coefficient</th>
<th>95% CI</th>
<th>P value</th>
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<tr>
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<td>Ref</td>
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<tr>
<td>RACHS-1 category 4-6</td>
<td>0.99</td>
<td>0.81, 1.22</td>
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<td>1.42</td>
<td>1.13, 1.78</td>
<td>0.003</td>
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<td>1.05</td>
<td>0.90, 1.23</td>
<td>0.52</td>
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<tr>
<td>Class 1</td>
<td>Ref</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Class 2</td>
<td>0.97</td>
<td>0.73, 1.28</td>
<td>0.81</td>
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<td>Class 3</td>
<td>1.39</td>
<td>1.10, 1.76</td>
<td>0.005</td>
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<tr>
<td>TPS non classifiable</td>
<td>1.41</td>
<td>1.02, 1.95</td>
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CI: confidence interval, RACHS-1: risk adjustment in congenital heart surgery, Ref: reference group.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0128
ASSOCIATION BETWEEN TECHNICAL PERFORMANCE SCORE AND IN-HOSPITAL OUTCOMES AFTER NEONATAL CONGENITAL CARDIAC SURGERY

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¹Boston Children's Hospital, Cardiac Surgery, Boston, USA
²Boston Children’s Hospital, Cardiology, Boston, USA

Aims & Objectives:

The Technical Performance Score (TPS), a novel tool for assessing residual lesions after congenital heart surgery has been shown to be associated with in-hospital and midterm outcomes. This study validates the association between TPS and outcomes after neonatal congenital cardiac repairs.

Methods

Included were all neonates who underwent repair of a congenital cardiac defect between 1/1/2010-6/30/2012. We assigned TPS based on based on clinical and echocardiographic characteristics as Class 1 (no residua), Class 2 (minor residua), Class 3 (major residua / unplanned reintervention for major residua prior to hospital discharge). Linear and logistic regression adjusting for preoperative predictors (age, prematurity, extracardiac anomalies, preoperative risk factors, RACHS-1 risk category) was used to model the association between TPS and postoperative hospital length (PHLOS) of stay and a composite outcome of mortality/need for ECMO.

Results

Among 351 neonates, median age was 6.5 days (IQR 3.9, 10.9), 211(60%) were male, 280 (80%) had surgery on cardiopulmonary bypass, 51 (15%) were premature, 139(405) had important preoperative risk factors, and 204 (58%) were in the high RACHS-1 risk category of 4 to 6. The TPS distribution was: Class 1 =186 (53%), Class 2= 89(25%), Class 3 = 61 (17%). Median PHLOS was 15.9 (IQR: 10.1, 28) with 41 (12%) composite events. Multivariable modeling showed that Class 3 TPS had a higher (1) PHLOS (Coefficient 1.80, CI 1.50,2.16, P<0.001, R² for model 0.34) (2)Composite Mortality/ECMO (Odds Ratio 19.3, CI 7.5,49.4, p<0.001, C statistic for model 0.831) (Table)

Conclusions

We demonstrated a strong association between TPS and in hospital outcomes in neonates after congenital cardiac surgery after adjusting for important well known preoperative risk factors. A larger sample from a multi-institutional study will allow generalizability of our findings and development of a predictive model.
### Postoperative Mortality (includes in-hospital and post-discharge mortality)

#### Cox Regression

<table>
<thead>
<tr>
<th>Age (categories)</th>
<th>Coefficient</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
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<tr>
<td>Neonates</td>
<td>2.16</td>
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<td>Infants</td>
<td>1.83</td>
<td>0.97, 3.45</td>
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<tr>
<td>RACHS-1 category 4-6</td>
<td>1.57</td>
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<td>0.92, 3.01</td>
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<th>95% CI</th>
<th>P value</th>
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<tbody>
<tr>
<td></td>
<td>1.38</td>
<td>0.94, 1.97</td>
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</tbody>
</table>

| Prematurity                    | 1.43        | 0.94, 2.18 | 0.1     |

#### Technical Performance Score

| Class 1                        | Ref         | -          | -       |
| Class 2                        | 0.88        | 0.35, 2.01 | 0.73    |
| Class 3                        | 2.32        | 1.19, 4.52 | 0.01    |
| TPS non classifiable           | 2.09        | 0.84, 5.19 | 0.11    |

#### Post Discharge Reintervention (early deaths n=177 excluded)

#### Logistic Regression

<table>
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<th>Age (categories)</th>
<th>Odds Ratio</th>
<th>95% CI</th>
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<tr>
<td>Neonates</td>
<td>1.47</td>
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<tr>
<td></td>
<td>0.87</td>
<td>0.55, 1.38</td>
<td>0.56</td>
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</tbody>
</table>

| Prematurity                    | 1.04        | 0.62, 1.76 | 0.88    |

#### Technical Performance Score

| Class 1                        | Ref         | -          | -       |
| Class 2                        | 1.47        | 0.67, 3.25 | 0.34    |
| Class 3                        | 2.25        | 1.12, 4.53 | 0.02    |
| TPS non classifiable           | 0.19        | 0.04, 0.34 | 0.04    |

#### Hospital Cost, Linear Regression

<table>
<thead>
<tr>
<th>Age (categories)</th>
<th>Coefficient</th>
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<th>P value</th>
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<td>0.85</td>
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<tr>
<td>Infants</td>
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<td>0.74, 1.14</td>
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<tbody>
<tr>
<td></td>
<td>1.05</td>
<td>0.90, 1.23</td>
<td>0.52</td>
</tr>
</tbody>
</table>

| Prematurity                    | 0.89        | 0.74, 1.07 | 0.22    |

#### Technical Performance Score

| Class 1                        | Ref         | -          | -       |
| Class 2                        | 0.97        | 0.73, 1.28 | 0.61    |
| Class 3                        | 1.39        | 1.10, 1.76 | 0.005   |
| TPS non classifiable           | 1.41        | 1.02, 1.95 | 0.04    |

*CI: confidence interval, RACHS-1: risk adjustment in congenital heart surgery, Ref: reference group*
Aims & Objectives:

The severe congenital tracheal stenosis (CTS) is a rare, but potentially life-threatening tracheal disease. Despite the development of slide tracheoplasty as a surgical tracheal reconstruction of severe CTS, the perioperative management has been still challenging and the precise critical care is crucial for the better outcome. The objectives of this study is to describe the impact of the involvement of pediatric intensivists in the perioperative management of the severe CTS.

Methods

A retrospective observational study was conducted in patients who underwent the slide-tracheoplasty in two different periods. Twenty-one patients who underwent the slide-tracheoplasty between Jan. 1998 and Feb. 2010 were perioperatively managed by surgical team (Group1) and twenty-two patients who underwent the slide tracheoplasty between Mar. 2010 and Dec. 2015 were managed by PICU physicians with multidisciplinary team approach (Group2). PICU team was also involved in long distance transport for the patients from the referring hospital.

Results

The mean age and body weight were similar between both group (9mo vs 6mo and 5.4kg vs 5.9kg respectively). All of the patients in both group had long-segment tracheal stenosis (>50%). 80% of patients in both group had congenital cardiovascular anomalies including PA sling (17/21 vs 18/22). Half of the patients in Group2 (11/22) was transported by helicopter or ambulance. The mean duration of ventilator support was similar in both groups (11 days vs 16 days). Four patients in Group1 received ECMO management with one case of successful weaning, whereas six patients in Group2 needed ECMO management with successful weaning rate of 83%. Survival rate in Group1 was 76% (16/21) compared with 95% (21/22) in Group2.
Conclusions

Our PICU team contributed to centralize the severe CTS patients by involving the long distance transport and also dedicated aggressive perioperative critical care management with multidisciplinary team approach, resulting in good outcome.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0322
REDUCING REPEAT ADMISSIONS FOR ASPIRATION PNEUMONIA IN CHILDREN WITH SEVERE NEUROLOGICAL DYSFUNCTION THROUGH POSITIONING TECHNIQUES - A CASE SERIES REPORT

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1BC Children’s Hospital, Physiotherapy, Vancouver, Canada
2Royal Alexander Children’s Hospital, Respirology, Brighton, United Kingdom
3BC Children’s Hospital, Pediatrics, Vancouver, Canada

Aims & Objectives:

Swallowing dysfunction and gastroesophageal reflux are recognised risk factors for aspiration pneumonia in the neurologically impaired population. Despite undergoing invasive procedures including inserting feeding tubes and fundoplication, many children continue to present to hospital with respiratory distress attributed to aspiration, some requiring multiple admissions each year [1].

Our upper airway drainage [UAD] positioning protocol, used during sleep and symptomatically during the day, may effectively minimize respiratory exacerbation due to aspiration in children with poor secretion control. It involves the child sleeping in ¾-prone and adjusting feeding tubes to minimize gastric filling.

Methods

Three children had UAD initiated during their hospital stay, with families taught to continue the plan at home. All children had a gastronomy tube (G tube) to straight drainage with gastrojejunostomy (GJ) feeds. During follow up visits, all families reported using UAD positioning at home. A retrospective review of these three charts was conducted for a quality improvement project.

Results

Results show a drastic reduction in chest imaging (CXR) and admissions. In the 12 months prior to initiation, there were 62 CXRs and 23 admissions, with 145 days in hospital. In the 12 months following, there were six CXRs and a single one-day admission for respiratory exacerbation.

Conclusions

Our results suggest that these minimally invasive measures may lead to reduced admission rates, lessening the burden of respiratory disease in certain neurologically impaired children. Further comparative studies of UAD positioning are needed to assess outcomes associated with this intervention and to clarify the target group.
Aims & Objectives:

Attitudes to spinal muscular atrophy (SMA) have historically been pessimistic because of limited life expectancy. Provision of mechanical ventilation (MV) has been questioned on the grounds that the burdens imposed outweigh the benefits as the child cannot enjoy the same quality of life as other children. We report a case series where children with SMA have been successfully mechanically ventilated and have enjoyed a very good quality of life.

Methods

A retrospective descriptive case-series from a single institution was performed. Data were collected on duration of ventilation, therapies provided and outcome.

Results

Between 2012-16, seven children with SMA received MV on our unit. All were from the Middle East. All had a tracheostomy in-situ or inserted after admission. One had received long-term salbutamol to improve muscle strength. The median (range) age was 6 months (3-36m) and median duration of ventilation was 6 months (1-18m). All seven children remain alive, 4 have returned home, 3 continue as in-patients. All had an active therapy program; one has learnt to communicate using eye-tracking technology. All have retained the ability to smile and respond to parents and hospital staff, who report positively about their child’s quality of life.

Conclusions

We report a series of children with SMA and a new attitude and approach to this diagnosis. In our experience children with SMA have a good quality of life on MV. With advances in technology a policy decision to refuse MV in SMA on the grounds of unbearable burden may no longer have an ethical basis.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0278
LATE PICU READMISSION’S: A MARKER OF QUALITY CARE OR FOR COMPLEX DISEASES?
J. Piva¹, P. Carvalho¹, T. Rocha¹, A.P. Zeni¹, C. Andreolio¹, E. Baldasso¹, M.A. Soledade¹, K. Serena¹
¹Hospital de Clínicas de Porto Alegre, Pediatric emergency and Intensive Care Department, Porto Alegre, Brazil

Aims & Objectives:

Readmission to the PICU has been considered as a quality marker. In referral hospitals for complex diseases this index might suffer other influences and have another meanings. The aim of this study was evaluate the rate of readmissions and associated factors in a PICU located in a referral Brazilian Hospital.

Methods

Prospective observation study, enrolling all patients admitted between march2015 and march2016 to the PICU - Hospital de Clinicas de Porto Alegre (Brazil). This is a referral Brazilian hospital for complex diseases (e.g.: tumors, transplant programs, genetic syndromes). The EpiMed® software was used to evaluate the readmission rate and the related clinical variables. The local Ethical and Research Committee approved the study.

Results

296 PICU admissions occurred in the first 8 months (March-Nov) of the study with 87 (24.4%) late readmissions (>48hs after PICU discharge), without any early PICU readmission. Comparing the two groups (readmission and not readmission) we observe no differences regarding age, PIM2 and length of PICU stay. The readmission group presented higher death rate (29.9% vs. 12.9%; p<0.01) and higher length of hospital stay (109 vs. 33.6 days; p<0.01). Post major surgery and respiratory failure (37% and 31.5%) were the main diagnoses in the readmission group, without differences when compared to the all group.

Conclusions

In referral hospitals, there are patients that demand multiple PICU admissions, resources consume and high mortality rate. Specific policies to better care these patients should to be developed.
Aims & Objectives:

Despite of the medical advances, onco-hematologic tumors (OHT) remain as important cause of PICU admission (~10%) and mortality. The aim of the study was to identify the associated factors with OHT mortality in a referral Brazilian PICU.

Methods

Retrospective observational study including all children admitted to the PICU at Hospital de Clínicas de Porto Alegre (Brazil) between January 2011 and December 2012 with the diagnostic of OHT and/or any complications related to these diseases. Demographic data, the main cause for PICU admission, PIM2 at entrance, presence of sepsis and other clinical data as well as the outcome were evaluated. The local Ethics and Research Committee approved the study.

Results

Were identified 1058 PICU admissions, 96 (9.1%) being related to OHT [62% male, median age of 6.5 years (2.3-12.9)]. There were 53 solid tumors and 43 hematologic tumors. Post surgery (40.6%) and hemodynamic instability (21.8%) were the main causes for PICU admission. The overall PICU mortality was 8.3% while the OHT mortality was 16.7%, not predicted by PIM2 (8.8%; p<0.05). Sepsis was present in 61.4% of patients. Death risk was associated with sepsis (OR 12.3; 1.5-97.4), hematologic malignancy [OR 7.6; 2.0-28.9], mechanical ventilation (OR 2.1; 1.5-3.1), and vasoactive drugs infusion (OR 1.7; 1.3-2.2).

Conclusions

Compared to the general population, OHT group presents high PICU mortality and not predicted by PIM2. Sepsis and hematologic malignancy are risk factors associated with elevated mortality in this group of patients.
Aims & Objectives:
There is not a precise indication or specific guideline for tracheostomy in children. We speculate that this procedure might be postponed in the PICU. The study aims to identify the frequency, the profile and the outcome of children submitted to tracheostomy in a referral Brazilian PICU over a period of 13 years.

Methods
Retrospective observational study including all children admitted to the PICU at Hospital de Clinicas de Porto Alegre (Brazil) between January 2002 and December 2014 being submitted to tracheostomy. Demographic data, the main cause for PICU admission, PIM2, cause for tracheostomy and other clinical data as well as the outcome were evaluated. The median and IQ25-75% were used for data without normal distribution. The local Ethics and Research Committee approved the study.

Results
Were identified 8,024 PICU admissions being 82 (1%) submitted to tracheostomy (57% female, median age of 7.7 [2.6-47.4] months). The main causes indicating tracheostomy were neurologic diseases (47%), respiratory diseases (32%) and cardiovascular diseases (21%). Mechanical Ventilation (MV) previously to the tracheostomy was not provided to 12%. The median length of MV pre and post tracheostomy was 17 (2-43) and 1(0-5) days, respectively (p<0.05). The median length of PICU stay was 69(25-132) days and just 3.5(2-20) days after tracheostomy (p<0.01). The mortality rate was 18%; higher than the average PICU mortality (7-10%) in the same period (p<0.01).

Conclusions
Compared to the general PICU population, children requiring tracheostomy presents elevated length of PICU stay and high PICU mortality. Specific policies to improve care in these patients should be developed.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0511
CHANGES IN HOME PARTICIPATION, SUPPORTS, AND BARRIERS FOR CRITICALLY ILL CHILDREN FOLLOWING PICU ADMISSION

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Aims & Objectives:

Function, health, Health Related Quality of Life (HRQoL) and what defines recovery are complex. A comprehensive assessment of health and functioning as defined by the World Health Organization International Classification of Functioning, Disability and Health includes a measurement of one’s participation in their environment. This measurement has not been conducted in children who have survived a critical illness. The objective of this sub-study was to evaluate the feasibility of measuring participation, as part of our measurement of functional recovery, in critically-ill children.

Methods

This sub-study was conducted as part of the “Weecover” Pilot study (Clinicaltrials.gov # NCT01724593). We enrolled 33 children, aged 12 months to 17 years, with at least one organ dysfunction and a minimum 48-hour Pediatric Intensive Care Unit (PICU) stay, at McMaster Children’s Hospital, Hamilton, Canada. Participation was measured using the Participation and Environment Measure (PEM) questionnaire at baseline (pre-morbid), three and six months following discharge. PEM is a parent-report questionnaire that assesses participation restriction and perceived environmental supports and barriers in home and school settings. The results were analyzed descriptively.

Results

Children who survive critical illness experience deterioration in their home-based participation (Figure 1). Parents’ perceptions of their child’s participation at home appeared to improve over time. Those with pre-existing functional disability appear to participate less in home-based activities post-discharge compared to previously healthy children. Non-discretionary activities participation levels (i.e. personal care, household chores) appear to recover more slowly than discretionary activities (i.e. indoor play, hobbies).
Conclusions

It’s feasible to apply this framework for functional assessment that is recommended in rehabilitation medicine, to critically ill children. PEM identifies barriers and facilitators to a child’s participation in their home and school environment. Future study will determine how a child’s participation in their environment, can be used to explain observed patterns of barriers and facilitators of functional recovery following critical illness.
Aims & Objectives:

We are challenged in the National Health Service, to provide more efficient care without compromising quality. In a clinician/manager partnership we looked at how this could be achieved with surgical cardiac admissions to our institution.

We investigated whether length of stay could be safely reduced for patients admitted for the Glenn procedure, thereby improving the patient experience and simultaneously increasing efficiency.

Methods

We performed a retrospective review of data detailing the admissions of children admitted for the Glenn procedure over the preceding 12 months. The data was analysed and then used to develop a standardised “Glenn pathway”.

Results

The average length of stay was 7 days (3 days on intensive care, 4 days on the ward). Streamlining the routine steps in the post operative care of these children, into a defined Glenn pathway, could safely reduce the average length of stay by 2 days (5 days total: 2 days on intensive care, 3 days on the ward). This equated to a saving of 40 bed days per annum.

Conclusions

Our data supports the safety of the proposed Glenn pathway. Reducing hospital admission by 2 days would be beneficial for the patient and family experience. In addition, this could reduce annual bed days, reduce waiting lists, and open up further potential within the department. For example, the additional capacity could allow for 14 additional atrial septal defect repairs per annum, generating £318k of additional income.

We are currently piloting our new Glenn pathway, and await results for analysis later this year. Of note, other cardiac surgical procedures may also be amenable to a pathway.
Aims & Objectives:

Paediatric intensive care unit (PICU) mortality in the U.K. is less than 4% and continues to slowly decline. To date, mortality has been used as the primary outcome measure in PICU performance indicators and research. We hypothesise while mortality levels are decreasing, the length of stay is increasing: this may need greater consideration when evaluating PICU outcomes.

Methods

Times series analysis using monthly admission, length of stay and outcome data from a single general (non-cardiac) PICU between 2004 and 2014.

Results

Over the 11-year period, the annual admission rate has increased, a reflection in the increase in unit capacity (total admissions =10,395). Mortality has decreased, as has the mean Paediatric Index of Mortality score, which is calibrated to reflect changing mortality. Both the mean and median length of stay has increased (figure), along with a recent increase in the difference between the mean and the median (a measure of outliers). Despite this, the odds of death in children staying more than 7 days on
PICU is increasing.

Figure: A decomposed time series of median length of stay for all admissions to PICU over 11 years (n=10395). The second panel shows the increasing trend in the median length of stay, with the median stay going from 2.5 days in 2004 to 4 days in 2014.

Conclusions
Despite a decrease in mortality levels, lengths of stay have increased. While some of this can be attributed to a baseline increase in stay, it also reflects a larger number of children with prolonged admissions. The increasing odds of death for children staying for more than 7 days in PICU suggest a changing threshold for the continuation and escalation of intensive care. Formal health economic analyses are required to understand the cost of this evolution in practice.
Aims & Objectives:

Our primary objectives were to estimate 1) the prevalence of vitamin D deficiency, defined as serum 25 (OH) D ≤ 20 ng/mL and 2) the association between vitamin D deficiency and length of ICU stay.

Methods

We prospectively enrolled children aged 1 month to 17 years admitted to the ICU over a period of 8 months (n=101). The sample size calculated was 97. As our primary objective was to study the association between vitamin D deficiency and length of stay we performed multivariable regression analysis with length of stay as the dependent variable after adjusting for important baseline and outcome variables. Data were entered into Microsoft Excel 2007 and analyzed using Stata 11.2 (Stata Corp, College Station, TX).

Results

The prevalence of vitamin D deficiency was 74% (95% CI: 65 to 88). The median (IQR) duration of ICU stay was significantly longer in ‘vitamin D deficient’ children (7 days; 2 to 12) than in those with ‘no vitamin D deficiency’ (3 days; 2 to 5; p=0.006). On multivariable analysis, the association between length of ICU stay and vitamin D deficiency remained significant, even after adjusting for key baseline variables, diagnosis, Pediatric Index of Mortality - 2, Pediatric Logistic Organ Dysfunction score, and need for fluid boluses, ventilation, inotropes and mortality (adjusted mean difference [95% CI]: 3.5 days [0.50 to 6.53]; p=0.024).

Conclusions

We observed a high prevalence of vitamin D deficiency in critically ill children in our study population. The length of ICU stay was prolonged in these children as compared to others.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0427
OUTCOMES FOR CHILDREN WITH HEMATOPOIETIC STEM CELL TRANSPLANT UNDERGOING RENAL REPLACEMENT THERAPY IN THE PEDIATRIC INTENSIVE CARE UNIT
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Aims & Objectives:

Hematopoietic stem cell transplantation (HSCT) is a widely pursued therapeutic option for the management of malignant and nonmalignant disorders in children. Admission to a Pediatric intensive care unit (PICU) is often necessary due to HSCT-related complications. We investigated differences in patient characteristics and outcomes for HSCT patients undergoing renal replacement therapy (RRT) in the PICU.

Methods

A retrospective cohort study of 37 pediatric hospitals using data from the Pediatric Health Information System (PHIS) for years 2008 through 2014 was performed. Patients 1-18 years of age who underwent a Bone Marrow Transplant (All Patients Refined Diagnosis-Related Groups code=3) with an ICU admission were analyzed. Demographics and clinical outcomes were compared based on whether patients received hemodialysis/hemofiltration or peritoneal dialysis (ICD-9 codes 39.95 and 54.98, respectively).

Results

2174 HSCT patient admissions to the PICU were included in this study and 313 patients were put on RRT. RRT patients were older than those not receiving RRT (mean=94 months and 126 months, respectively) (p<0.0001). Children placed on RRT had greater severity of illness and, consequently, were significantly more likely to receive invasive mechanical ventilation (p<0.0001). Despite greater utilization of ICU therapies, RRT patients were significantly more likely to have graft-versus-host disease (p<0.0001) and sepsis (p<0.0001). Overall, hospital LOS was significantly greater for RRT patients (69 days and 91 days, respectively) (p<0.0001) as was ICU LOS (21 days and 34 days, respectively) (p<0.0001). Percent mortality was greater for RRT patients (67% v. 16%) (p<0.0001). RRT patients incurred significantly more charges than patients not put on RRT (average=$2130283 and $1107718, respectively) (p<0.0001).

Conclusions

Outcomes for children with HSCT admitted to the PICU were significantly worse if they required RRT despite greater resource utilization. Further analysis should
explore the association between RRT, other ICU therapies, and risk of mortality in a multivariate fashion.
Aims & Objectives:

To assess the prevalence and factors associated with Burnout Syndrome (BOS) among pediatric intensive care physicians in the United States (US).

Methods

Online survey of Pediatric intensive care physicians in the US in 2015. The survey gathered information on socio-demographic factors and practice characteristics. We used Maslach Burnout Inventory to assess BOS and the Revised Dyadic Adjustment Scale (RDAS) to assess relationship quality among married/cohabiting participants. About 275 physicians participated (40% response rate) and complete data on BOS is available from 220 participants.

Results

About half of the participants (n=110) reported high levels of burnout in at least one of the three domains of Maslach Burnout Inventory (MBI). The three domains are depersonalization (20%; 95% CI: 15-25%), emotional exhaustion (33%; 95%CI: 28-40%) and low personal accomplishment (21% 95% CI. 16-27%). Female physicians were about two times more likely to report burnout (OR 2.2 95%CI 1.3-3.9) while the risk showed a decreasing trend with increase in age. Practice characteristics that we examined didn’t independently predict the risk for burnout. Regular exercise was associated with lower risk (OR 0.53 95CI: 0.28-0.96) for burnout. Approximately 32% of married/cohabiting physicians reported distressed relationship and BOS was independently associated with distressed relationship (OR 2.8 95%CI 1.4-5.5).

Conclusions

This study describes high prevalence of burnout among Pediatric intensive care physicians in the US and its association with professional and personal factors.
Aims & Objectives:

Purpose:

Audit of the PICU admissions of patients of RPAC with an assessment of variables involved in admission and follow-up.

Background:

The Regional Paediatric Asthma Clinic (RPAC) is a large multidisciplinary, referral only, clinic serving North Simcoe Muskoka LHIN in Ontario, Canada.

In a 2015 RPAC study asthma severity was assessed as more severe at the asthma clinic than it was at referral by primary care physicians (concordance rate 39%).

Methods

Methods:

A retrospective chart audit of all RPAC patients who were admitted to a PICU over a 7 year period was undertaken.

Results

RESULTS:
The average time from PICU admit to referral to RPAC was 4.5 months (1-15 months).

Factors affecting optimal asthma control were noted:

- Smoking: 4/8 had smokers in the household
- Drug Benefits: 8/8
- Influenza Vaccination after RPAC visit: 6/8
- Non-compliance with medications: 6/8
- Failure to attend follow-up appointments: range 0-4 appointments missed
- Pets in family: 7/8
DISCUSSION:

Time to referral from the tertiary center to the regional paediatric asthma center averaged 4.5 months. This is a prolonged interval before local resources were brought to bear on this chronic disease.

Those patients who ultimately ended up in the PICU were poorly controlled prior to their admission.

Although lack of drug benefits in Canada has been a major impediment to the purchase of expensive asthma medications none of these patients were without drug benefits.

Smoking and pets have been recognized as preventable triggers for children with high risk asthma, despite an admission to a PICU and significant counseling through RPAC these variables were not positively influenced in these families.

One might expect that children in this high risk group would have a high compliance rate with medication and would have a high attendance rate at RPAC, unfortunately neither was the case. This major disconnect requires further study.
Aims & Objectives:

Critical illness and admission to the Pediatric Intensive Care Unit (PICU) commonly disrupts a child's circadian rhythm (CR). Pilot-test the feasibility of conducting a parent interview about their child's usual pre-hospitalization daily routine as a first step in building an individualized chronotherapeutic intervention.

Methods

Parents were invited to complete the Child's Daily Routine and Sleep Survey within 24 to 48 hours of PICU Admission. The data collection instrument was sparsely populated simply presenting two empty columns for time and activity. Parents were asked: "What is your child's usual daily routine?" then prompted to include timing of meals, naps, play, and wake-up/night-time activities. Parents were also asked to rate the level of burden in completing the tool on a scale of 0-10. Interviews were conducted by four undergraduate nursing students facilitated by two clinical nurse specialists.

Results

We interviewed 15 parents (71% mothers, 29% fathers) of children 4 years of age (median; IQR: 6.9 years). Parents identified wake times as 5:30-8:30am and bedtimes as 6:30-9:30pm. Activities were clustered into the following categories: eating, sleeping, medical treatments, school/play/TV, and hygiene. Interviews were conducted in less than 5 minutes (median; range: 3-15 minutes). Most participants (87%) rated the level of burden as <2 (0: median). One parent declined participation and one was not approached due to their child's criticality.

Conclusions
Parents can easily recant their child's daily routine within 24 to 48 hours of their child's admission. We are now re-piloting a revised survey that adds time elements and "pick list" of clustered activities to facilitate consistent data acquisition.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0810
RESOURCE USE IN CHILDREN WITH SEPSIS ADMITTED TO PEDIATRIC INTENSIVE CARE UNITS IN SOUTH AMERICA

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³Hospital Israelita Albert Einstein, PICU, Sao Paulo, Brazil

Aims & Objectives:

To report the variability in resource use in children with sepsis admitted to 20 PICU in South America.

Methods

A subset analysis of the Latin American Pediatric Sepsis Study - LAPSES (unpublished data). We analyzed the variability in resource use across 20 PICU participating in the LAPSES study. The amount of resources used per surviving patient in each PICU was estimated by the standardized, severity-adjusted resource use(SRU) and represents the average amount of resources used to “produce” one sepsis survivor. The higher the SRU, more resources are needed for each surviving patient. The PICU length of stay(PICU-LOS) was used as surrogate for resource use. The SRU for each PICU was calculated dividing the PICU-LOS (in days) in a specific PICU by the PICU-LOS (in days) observed for the whole sample (SRU=S LOS-PICUobserved / S LOS-PICUexpected). Severity was determined according to the PRISM score.

Results

Table 1 presents the expected PICU LOS for each PRISM severity class for the whole sample. Figure 1 shows the observed SRU for each participating PICU. Mean observed SRU was 1.06 days, ranging from 0.55 to 2.44 days. These data suggest
a wide variability in resource use for children with sepsis in South America.

Table 1: PICU LOS per surviving sepsis child for each PRISM severity class

<table>
<thead>
<tr>
<th>PRISM class</th>
<th>PRISM points (range)</th>
<th>PRISM points (mean)</th>
<th>Children with sepsis (n)</th>
<th>Surviving children with sepsis (n)</th>
<th>Total LOS-PICU (days)</th>
<th>LOS-PICU per survivor (days)</th>
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<tr>
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<td>3.1</td>
<td>101</td>
<td>99</td>
<td>789</td>
<td>7.97</td>
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<tr>
<td>2</td>
<td>6 - 10</td>
<td>7.8</td>
<td>120</td>
<td>114</td>
<td>1028</td>
<td>9.02</td>
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<tr>
<td>3</td>
<td>11 - 15</td>
<td>13.0</td>
<td>77</td>
<td>65</td>
<td>1041</td>
<td>16.02</td>
</tr>
<tr>
<td>4</td>
<td>16 - 25</td>
<td>19.1</td>
<td>80</td>
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<td>1367</td>
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<td>5</td>
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<td>30.2</td>
<td>38</td>
<td>22</td>
<td>881</td>
<td>30.95</td>
</tr>
</tbody>
</table>

Conclusions

There is a wide variability in the amount of resources used for treatment of sepsis children in this sample of 20 PICU in South America. Further studies are necessary to elucidate the factors associated with such variability and to determine the optimal resource in sepsis children in South America.

Figure 1: SRU for each participating PICU
Aims & Objectives:

The daily multi-disciplinary PICU ward round is vital for patient safety. Generally they are consultant led, unstandardised and highly variable. Goals are set which may not be achieved. Erik Hollnagel’s ‘work imagined vs work done’ and Otto Scharmer’s ‘Theory of U’ prompted our Lead Consultant to undertake a supervised PICU nursing shift in October 2015 to understand the actual pressures for front line staff in real time.

Methods

A junior nursing preceptor was identified who supervised the delivery of all routine patient cares throughout the course of a 12 hour shift.

Results

This was a valuable opportunity for senior medical staff to actually participate in the daily hands on management of a patient: patient examination, participation in the ward rounds, updating parents, routine cares, covering breaks, bed space cleaning, calling for medical assistance, preparing drugs and completion of all documentation. It highlighted the unseen excellent care delivered round the clock at the bedside and the many externally driven pressures and constraints imposed on nurses that could potentially create unnecessary stress and hinder good care.

Conclusions

The bedside nursing workload is constant, challenging and often under-appreciated. Many routine goals are safely completed and unrecognised whilst others are created, not achieved and scrutinised. Allowing people at the front line to excel requires a different kind of thinking. Leaders need to challenge their preconceptions and walk in the shoes of others to ensure everybody can contribute and be valued. In healthcare, it is imperative to provide a supportive, predictable environment that allows nurses to be adaptable, spontaneous and resilient to minor changes in order to maximise patient safety.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0334
CHANGES IN MODE OF RESPIRATORY SUPPORT AND INTENSIVE CARE UNIT ADMISSION RATES IN INFANTS WITH BRONCHIOLITIS IN AUSTRALIA AND NEW ZEALAND

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\textsuperscript{5}The Royal Children’s Hospital, Paediatric Intensive Care Unit, Melbourne, Australia
\textsuperscript{6}Royal Children’s Hospital Brisbane, Australian and New Zealand Paediatric Intensive Care Registry- CORE, Brisbane, Australia
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\textsuperscript{8}University of Queensland, School of Pharmacy, Brisbane, Australia
\textsuperscript{9}University of Adelaide, Paediatrics & Reproductive Health, Adelaide, Australia
\textsuperscript{10}Women’s and Children’s Hospital, Paediatric Intensive Care Unit, Adelaide, Australia
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Aims & Objectives:

Bronchiolitis is among the top causes for non-elective admission to paediatric intensive care units (ICU). We assessed incidence, respiratory support therapy, outcomes, and costs of severe bronchiolitis in pediatric intensive care units over the past decade.

Methods

Observational multicenter study of 9 PICUs and 21 general ICUs in Australia and New Zealand 2002-2014. Infants <24 months with bronchiolitis requiring ICU were included.

Results

Bronchiolitis was responsible for 9628 (27.6%) of 34829 non-elective admissions. The estimated population-based ICU admission rate due to bronchiolitis increased by 11.76/100,000 (95%-CI 8.11 to 15.41). The proportion of infants getting intubated decreased from 36.8% in 2002 to 10.8% in 2014 (adjusted OR 0.35; 0.27-0.46), while
a dramatic increase in High-Flow Nasal Cannulae (HFNC) use was observed (p<0.001). In an adjusted mixed effects model, 60.9% of the variation in ventilation was not explained by case mix or temporal trends, likely reflecting underlying differences in unit practice. Annual direct hospitalization costs due to severe bronchiolitis increased from AU$11.4 million in 2002 to $44.3 million in 2014.

Conclusions

Severe bronchiolitis remains responsible for a huge burden of disease. We observed a major change in practice in the management of severe bronchiolitis from invasive to non-invasive support with early use of HFNC. Our data suggest that thresholds to admit bronchiolitis patients to ICU have changed over the past decade with a major impact on healthcare-related costs and resource utilization in ICUs. International trials addressing the risk stratification and safe management of bronchiolitis outside ICUs are urgently warranted.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0765
PARENTS AND CARER’S EXPERIENCES OF TRANSITION AND AFTERCARE FOLLOWING THEIR CHILD’S DISCHARGE FROM THE PAEDIATRIC INTENSIVE CARE UNIT: A QUALITATIVE SYSTEMATIC REVIEW
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¹University of Nottingham, School of Health Sciences, Nottingham, United Kingdom

Aims & Objectives:

In the western world survival from childhood critical illness is common with the majority of PICU patients being discharged alive. Transitioning from the PICU can be a challenging experience for families with a multitude of physical, emotional and social adversities identified. However, a comprehensive understanding of parents and carers experiences during this period is unclear.

Therefore we aimed to conduct a qualitative systematic review to explore and synthesise the experiences of parents and carers during and after transition from PICU.

Methods

CINAHL, MEDLINE, EMBASE, PsychINFO, ASSIA, JBI Library, and Dissertation and Theses Databases were searched. Studies were selected using four predetermined criteria and methodological quality was assessed using a standardized checklist. The Joanna Briggs Institute synthesis approach was used to extract, code and synthesise data.

Results

From the 491 studies identified, four met the inclusion criteria that included a total of 95 parental participants. Forty-nine finding units were extracted. Through an iterative process four overarching categories were developed: (1) dynamic emotional responses; (2) disempowered parental role; (3) changes in care delivery provoking uncertainty and; (4) transitioning as a physical, emotional and social balancing act.

Conclusions

Transitioning from PICU can be a challenging time for parents and carers. Evolving and newly manifesting adversities leave parents with mixed emotions, uncertain roles and navigating multiple demands. In order to address these issues, parents and carers require to be informed, receive effective communication and holistic, family centered care.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0345
CRITICAL CARE NURSING: A COMPLEX SYSTEM
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²Hospital for Sick Children, PICU, Toronto, Canada

Aims & Objectives:

Complex adaptive systems (CAS) are characterized as a group of interconnected individual components, each of which interact through interconnected feedback loops. These systems are dynamic and self-organizing. They adapt to environmental triggers. Changes in one system affect and shape the other connected systems. These changes can be nonlinear, where small changes have the potential to have large effects on the CAS or inversely, large changes may only create small effects.

Methods

Using a complexity science framework, this presentation examines the nursing component of the nurse-patient feedback loop.

Results

As a CAS, the critical care unit is a dynamic environment that consists of patient, health care providers, medical technology and communication systems, which evolve over time. The nurse-patient feedback loop is the primary unit of care in the critical care unit. Multiple variables impact the nurse-patient feedback loop that monitors the patient, analyzes the data and then intervenes with appropriate treatment. Impediments or enhancements to the nurse-patient interaction have implications for effective nursing care and patient outcome.

Conclusions

The examination of nursing as a CAS leads to better understanding of nursing work and its impact on patient outcome.
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Aims & Objectives:

To analyze the performance of severity and organ dysfunction scores in predicting death in children with septic shock

Methods

Post-hoc analysis of a randomized control trial of 120 children with septic shock from 02/2008-07/2013. We compared the mean Pediatric Risk of Mortality (PRISM), the mean daily Pediatric Logistic Organ Dysfunction (PELOD) on the first five PICU days between survivors and non-survivors

Results

There were 120 children being 58.3% male, median age of 28 months, mortality was 14.2% and the standard mortality ratio was 0.64. The mean PRISM score was lower among survivors (13.3±7.41 x 26.5±15.7, p=0.006), a criterion of 20 was able to predict death with a sensitivity of 70.6%, specificity of 83.7% and an AUC=0.781. The mean PELOD score on the first PICU day was lower in survivors (12,[IQR25-75=11-14] x 23,[IQR25-75=13-33], p=0.0002), a criterion of 22 was able to predict death with a sensitivity of 52.9%, specificity of 91.2% and an AUC=0.78. The mean PELOD score on the second PICU day was lower in survivors (2,[IQR25-75=1-11] x 27,[IQR25-75=23-33], p<0.001), a criterion of 14 was able to predict death with a sensitivity of 85.7%, specificity of 92.2% with an AUC=0.963. The mean PELOD score on the third PICU day was lower in survivors (2,[IQR25-75=1-3] x 27,[IQR 25-75=23-33], p<0.001), a criterion of 13 was able to predict death with a sensitivity of 100%, specificity of 96.1% with an AUC=0.993. The mean PELOD score on fourth PICU day was lower in survivors (1,[IQR25-75=1-2] x 23,[IQR 25-75=21.7-35.5], p<0.001). A criterion of 13 was able to predict death with a sensitivity of 100%, specificity of 99% with an AUC=0.997. The mean PELOD score on fifth PICU day was lower in survivors (1,[IQR25-75=0-1.5] x 23,[IQR 25-75=21.3-31.8], p<0.001). A criterion of 12 was able to predict death with a sensitivity of 100%, specificity of 99% with an AUC=0.997.

Conclusions
we observed that unresolving multiple organ dysfunction assessed by the PELOD score was able to reliably predict an unfavorable outcome in pediatric septic shock
Aims & Objectives:

The mortality rate in the pediatric intensive care patients (PICU) has decreased in the last decennia to around 3% in the Netherlands. Mortality prediction models show a low risk of mortality for the majority of the population. Evaluation of death within the low-risk sub-population might reflect avoidable mortality and thus substandard quality of care. It is unknown whether there are differences between low-risk PICU non-survivors and survivors. The aim of the present study is to identify factors associated with mortality in PICU patients with low risk of mortality.

Methods

Retrospective cohort study. Patients were selected from a national database including all admissions in Dutch PICUs between 2006 and 2012. Patients between 0-18 years admitted to the PICU with a predicted mortality risk <1% according to either the Pediatric Risk of Mortality (PRISM) or the Paediatric Index of Mortality 2 (PIM2) recalibrated risk score were included.

Results

In total, 16,924 low-risk admissions were included of which 83 (0.5%) patients died.

Non-survivors had more complex chronic conditions compared with survivors (79.5% versus 58.6%, p<0.001), needed more mechanically ventilation (87.5% versus 35.2%, p<0.001), and had longer lengths of stay (median 11[IQR 5-32] days versus median 3 [IQR2-5] days; p<0.001). Non-survivors had more cardiovascular and respiratory diagnoses and fewer trauma and post-procedure diagnoses than survivors.

The strongest factors that were associated with mortality were complex chronic conditions and unplanned admissions (Table 1).
Table 1. Variables associated with mortality in low risk group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>1.03</td>
<td>0.99 – 1.07</td>
</tr>
<tr>
<td>Complex chronic condition</td>
<td>4.05</td>
<td>2.34 – 7.00</td>
</tr>
<tr>
<td>Admission out of office hours</td>
<td>0.88</td>
<td>0.55 – 1.42</td>
</tr>
<tr>
<td>Unplanned admission</td>
<td>5.81</td>
<td>3.35 – 10.08</td>
</tr>
<tr>
<td>Specialised transport upon admission</td>
<td>2.04</td>
<td>1.07 – 3.90</td>
</tr>
<tr>
<td>Admission between April and September</td>
<td>1.57</td>
<td>1.01 – 2.45</td>
</tr>
<tr>
<td>Readmission within 48 hours</td>
<td>2.22</td>
<td>0.68 – 7.23</td>
</tr>
</tbody>
</table>

Conclusions

Children dying in the PICU while having a low predicted mortality have more complex chronic conditions and/or emergency admissions.
**Aims & Objectives:**

In a 23 bed tertiary general/cardiac PICU, senior medical and nursing teams aim to avoid patient discharge outside daytime working hours. That is not always possible due to demand and availability of beds. This audit aimed to explore the factors contributing to out-of-hours discharge from PICU and whether patients suffered adverse events.

**Methods**

Prospective observational audit of all PICU discharges that occurred between 17:00 and 08:00.

**Results**

From March to November 2015, there were 471 live PICU discharges, 103 occurred out-of-hours (21.8%). 45% of patients were discharged to high dependency areas. The biggest reason for patients being discharged out-of-hours was that ward beds were not available in the daytime hours. Conversely 19% of patients were not clinically ready for discharge earlier in the day. All of the patients were deemed fit for PICU discharge by the PICU nursing co-ordinator. 33% of discharges occurred when the PICU was completely full but 12% were discharged when there were four or more beds available. 1% of patients were readmitted to PICU within 48 hours of discharge. The largest diagnostic group were cardiology (29%), general medical and general surgical. 25% of patients required Optiflow/Airvo support while 37% required no
enhanced support⁴.
Conclusions

Out-of-hours discharge were largely due to paucity of ward beds available during daytime hours. It was safe to discharge patients out-of-hours, although pragmatically it makes sense to try to do this in daytime hours when their supervising medical team are present on-site.
Aims & Objectives:

Background: Previous studies have shown an increase in pediatric domiciliary long-term mechanical ventilation. But children who after tracheotomy go back home for long-term mechanical ventilation is new in China, and the follow-up for this children is lacking.

Objective: To investigate the quality of life and condition change of the children who after tracheotomy, and improve the children’s quality of life.

Results

Result: From 2013 to 2014 the study recruited 22 children aged from 1 to 14 (median age 4.95 ± 4.348 years) with severe pneumonia (8, 36.4%), viral encephalitis (6, 27.3%), congenital subglottic stenosis (3, 13.6%), hand-foot-and-mouth disease (2, 9.1%) and neuromuscular disease (2, 9.1%); tracheotomy mechanical ventilation (2, 9.1%), tracheotomy oxygen inhalation (10, 45.5%), recovered 6 and 4 died; all the parents had airway nursing training before hospital discharge, except the emergency rescue training and physiological knowledge of tracheotomy training; the number of clinic visit per year was 3.18 ± 2.50; the number for emergency visit was 9 (40.9%); the scores of PedsQL4.0 were lower than the normal children.

Conclusions

The follow-up system for children with tracheotomy has to consummate gradually in China, and ensure the best practice for these children as well as their family.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0222
LACTATE AND NON-LACTATE COMPONENTS OF BASE EXCESS IMPROVE THE DISCRIMINATION OF THE PAEDIATRIC INDEX OF MORTALITY (PIM2) MODEL
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Aims & Objectives:

Absolute base excess (BE), one of 10 variables in the PIM2 score, measures metabolic acid-base status, including effects of lactate and other strong anions. We aimed to test if separating base excess into lactate and non-lactate components, that is, lactate and (lactate + base excess) improved PIM2 performance in a single Paediatric Intensive Care Unit.

Methods

Standard PIM2 variables including absolute BE (allowing venous samples), lactate and absolute (BE + lactate) were analyzed in custom models, using SAS v14.1, to determine their association with mortality. Univariate and multivariate analyses were performed. P values and 95% confidence intervals were calculated. Receiver operator characteristic (ROC) curves were constructed to analyze the discriminative performance of the variables when applied to these models.

Results

All admissions (n=11,233) were included in analysis from January 2006 to June 2015. All 10 PIM2 variables were significant in univariate analysis (p<0.0001) but recovery and cardiopulmonary bypass lost significance in this multivariate custom model. Lactate and absolute (BE + lactate) were also significant. Allowing venous BE values increased the area under the ROC curve (AUC) from 0.9038 (CI 0.8864, 0.9212) to 0.9098 (CI 0.8924, 0.9272). Replacing absolute BE by lactate and then adding its non-lactate components increased the ROC area further to 0.9109 (CI 0.8942, 0.9276) and then 0.9147 (CI 0.8982, 0.9313) respectively.

Conclusions

Replacing BE with lactate and absolute (BE + lactate) improves discrimination further in this custom model. A prospective multicenter study is required to establish whether these variables should be included in the PIM2 and later PIM models.
OUTCOMES / ECONOMIC EVALUATION / STAFF HEALTH / PATIENT AND FAMILY OUTCOMES

PICC-0601
A COMBINATION OF SERUM BIOMARKERS AND PRE-INJURY COGNITION ARE ASSOCIATED WITH ATTENTION AND EXECUTIVE FUNCTIONING FOLLOWING PAEDIATRIC TRAUMATIC BRAIN INJURY

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⁴The Hospital for Sick Children, Critical Care Medicine, Toronto, Canada

Aims & Objectives:

Background: Children with traumatic brain injury (TBI) are frequently at risk for long-term cognitive impairments but these problems have been difficult to accurately predict.

Hypothesis: A combination of serum biomarkers will be more strongly associated with long-term cognitive outcome than other child (e.g., age) or injury (e.g., severity) related variables, which are inconsistently related to outcome in past studies.

Methods

Methods: A variety of patient variables, along with six brain-injury and inflammatory serum biomarkers measured acutely post-injury, were evaluated as predictors of long-term (mean time since injury = 3.1 years) cognitive outcome following paediatric TBI in 23 patients. Outcome was assessed via parent-rated questionnaires of attention and executive function, using the Conners 3rd Edition Rating Scales (Conners-3) and Behaviour Rating Inventory of Executive Function (BRIEF), respectively. Partial least squares analyses were performed to identify the factors measured at the time of injury that were most indicative of outcome on (1) the Conners-3 and (2) the Behavioural Regulation Index (BRI) and (3) Metacognition Index (MI) of the BRIEF.

Results

Results: Higher levels of neuron specific enolase (NSE) and lower levels of soluble neuron cell adhesion molecule (sNCAM) were associated with higher scores on the inattention, hyperactivity/impulsivity and executive function scales of the Conners-3, as well as working memory and initiate scales of the BRIEF MI. Higher levels of NSE only were associated with higher scores on the inhibit scale of the BRIEF BRI.

Conclusions

Conclusion: NSE and sNCAM show promise as reliable, early predictors of long-term attention-related and executive function problems following paediatric TBI.
PALLIATIVE CARE / END OF LIFE CARE / ORGAN DONATION / ETHICS

PICC-0759
IMPACT OF FAMILY PRESENCE DURING RESUSCITATION ON PARENT BEREAVEMENT PROCESSES - AN INTEGRATIVE REVIEW WITH NURSING IMPLICATIONS
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Aims & Objectives:

Objective: To review the literature to determine how parent presence during pediatric resuscitation impacts a parent’s bereavement process.

Background: Increasingly, parents remain at their child’s bedside during cardiopulmonary resuscitation events. While we know that parents want the option to be present and that their presence does not interfere with the conduct of the procedure, little is known about the impact of parent presence during resuscitation on a parent’s grieving process.

Methods

Methods: A systematic review of the literature published between 1998 and 2015. Key themes about parent perspectives were identified and analyzed in the context of bereavement.

Results

Findings: Nine articles were analyzed, including 1 randomized controlled trial, 3 parent interview studies, and 5 systematic reviews. Thematic analysis revealed four themes about bereaved parents’ perceptions of being present during resuscitation: they felt assured that every effort was made to save their child, experienced an increased sense of comfort for themselves and their child, began coping with the event, and were allowed to say goodbye to their child. Factors that affect parental grieving include the circumstances surrounding the death, parent’s perception of the preventability of death, amount of parental anticipatory grief, and the degree to which the family members were involved with the child at their end of life. Each of these factors may be influenced by family presence during resuscitation, as it allows families to gain a sense of clarity about the care delivered at the end of their child’s life.

Conclusions

Conclusions: Based on the literature, parent-witnessed resuscitation may have a positive impact on parents’ grieving process. However, few studies sought to determine if witnessing their child’s resuscitation helped a parent’s grieving process.
Aims & Objectives:

Caring for families and children at the end of life forms an integral part of paediatric critical care, and can have significant and lasting impacts on the family experience of their child’s death. However, at present there is little known about bereaved parents’ expectations and perceptions of healthcare providers (HCP) during this time.

Methods

This study utilised a grounded theory approach to explore bereaved parents’ experiences of the death of a child in Australian PICUs, with a particular focus on their interactions with HCPs during this time. Data were analysed using the constant comparative coding methods, alongside theoretical memos.

Results

One early finding, “Defining Excellence”, is presented here. This concept explores the ways in which bereaved parents defined the quality of the various HCP’s they interacted with during and after the time their child was dying. Qualities such as ‘Provides practical assistance’, ‘Facilitates family involvement’, and ‘Accepts and accommodates family response’ emerged at various points along a continuum as parents’ descriptions moved from ‘good’ to ‘fantastic’. In contrast, the concept of ‘bad’ HCP actions was fixed, with parents identifying aspects such as ‘Provision of false hope’ and ‘Adopting a clinical demeanour’.

Conclusions

These results suggest that for bereaved parents, the concept of ‘good’ HCP behaviour is strikingly different to what is considered ‘bad’ or ‘fantastic’. These definitions provide landmarks for the delivery of care to families experiencing the end of a child’s life in PICU, ensuring their interactions with HCPs leaves a positive lasting impression during the worst moments of their lives.
Aims & Objectives:

The aims of this study are to better understand parental perception when making end-of-life care decisions in the local population, especially in the PICU setting, and elucidate possible barriers and factors that influence these decisions.

Methods

Our study population comprises parents of children who were previously well and admitted to a tertiary hospital for acute illnesses or who were being followed up in general paediatric clinics after discharge from hospital or emergency department.

Our pilot study included 10 participants who completed a questionnaire based on 4 different case scenarios about end-of-life issues. The questionnaires were carried out by trained interviewers after written consent was obtained. All responses were anonymous. For this pilot study, we obtained feedback after the questionnaire was completed to look for barriers and limitations of our questionnaire and case scenarios. This study was approved by our institutional research ethics board.

Results

In this pilot study data, there was no difference between parents with differing emotional levels when deciding for active withdrawal of care. Parents with higher educational qualifications were more likely to maintain life support measures in case scenarios describing futility of care. Interestingly, this group of parents rated quality of life of their child as the most important factor when considering end of life decisions. Parents with a religious background were generally uncomfortable to terminally extubate or stop inotropes. Our case scenarios were deemed adequate and realistic by the parents. They reported being not emotionally affected after the completion of the questionnaire. More than half were interested to find out more about palliative medicine.

Conclusions

End-of-life care issues are complex and making decisions about withdrawal of care is challenging for parents. A larger study population will allow us to better understand...
these challenges, and improve our communication with real parents of critically ill children facing these issues.
Aims & Objectives:

Screening tools in the pediatric population for palliative care (PC) needs are limited. Recently Bergstraesser et al. published the first pediatric PC screening scale called PaPaS. This tool is very comprehensive and has the potential to become worldwide used if validated. Thus the purpose of our study is to apply the PaPaS scale in pediatric patients from the Intensive Care Unit (PICU) and determine its utility and validity.

Methods

A total of 465 patients who were admitted to the PICU in Hospital de los Valles, Quito, Ecuador from January 2010- October 2015 were included. The Ethics Committee of Universidad San Francisco de Quito approved the study. The PaPaS scale was applied retrospectively to each patient and a score derived by two reviewers (100% concordance). Statistical analysis was performed and p-values < 0.05 were considered significant.

Results

Mean age was 5.3 ± 4.8 years, and 51% were male. The most common diagnosis for admission to the PICU were central nervous system disorders (i.e. tumors) in 20%, pulmonary manifestations (i.e. pneumonia) in 19%, congenital disorders (i.e. scoliosis) in 19%, trauma in 14%, cardiac syndromes in 7%, sepsis in 5% and other causes in 16%. Mortality was 5.6%. We obtained a mean PaPaS scale of 23.4 ± 3 (range 18-31) out of 35 possible points. A score of >15 signifies that the team needs to prepare to start PC, and all patients fall under this group. Those patients who were younger and hospitalised longer had higher PaPaS (p-value 0.0001).

Conclusions

Using the WHO definition of PC, the employment of PC is not limited to end of life, and the early implementation by the PICU team itself and/or the PC team is associated with good outcomes. The PaPaS scale is a useful tool to determine PC needs, and could be implemented in PICU’s worldwide.
Aims & Objectives:

This presentation will review the challenge of caring for children with complex life limiting illnesses followed by a palliative care team in the PICU.

Methods

Although seemingly conflictual, some families and children will chose to continue to receive high-level life-saving therapies in the PICU but will also want to limit the escalation of these or the initiation of other such therapies.

A series of cases will be reviewed to help illustrate this concept. Using these situations, a discussion of the potential benefit for the patient and the family will be discussed.

Results

In large PICU teams where every member is not involved in discussions with the family and child, this may lead to misunderstandings of the goal of treatment. Healthcare providers involved in caring for these children on a day to day basis may find it difficult to understand the requests of families. It may seem unethical to provide intensive care treatment for children and at the same time to limit such treatment in light of an irreversible life-limiting health condition. The use of family centered care while striving to bridge resuscitative critical care with quality of life oriented palliative care models, can help ensure that the family and health care team work together to achieve their goal of providing high level care and comfort care.

Conclusions

Healthcare workers working in PICU may be faced with situations where palliative and active PICU care can be provided simultaneously. Developing knowledge about family centered care as well as a model for decision-making will help them to integrate these two apparently opposite approaches to children and families.
OXYGEN SATURATION AND HAEMODYNAMIC CHANGES PRIOR TO DEATH: IMPLICATIONS FOR TRANSPLANTATION AND RESUSCITATION

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²Nottingham University Hospitals NHS Trust, Adult Intensive Care, Nottingham, United Kingdom

Aims & Objectives:

The progression of physiological changes around death is unknown. This has important implications in organ donation and resuscitation. Donated organs have a maximal warm ischaemic threshold. In hypoxic cardiac arrest, an understanding of pre cardiac arrest physiology is important in prognosticating, and may allow earlier identification of terminal states. We aimed to describe the progression of oxygen saturations, heart rate, and blood pressure observations prior to death.

Methods

Data was examined for all regional patients over a two year period offering organ donation after circulatory death. Frequent observations were taken contemporaneously by the organ donation nurse at the time of, and after withdrawal of intensive care.

Results

82 case notes were examined of patients aged 0 to 76 (median 52, 4 <18 years). From withdrawal of intensive care to death took a mean of 28.5 minutes (range 4 to 185). At 14 minutes prior to death, a terminal decline in oxygen saturations commenced, followed by a blood pressure decline 8 minutes prior, and a heart rate decline at 4 minutes. 2 patients had a warm ischaemic time of greater than 30 minutes, and 3 greater than 20 minutes. 70/82 patients had saturations of less than 40% for more than 3 minutes prior to cardiac arrest, and 74/82 for more than 2
Conclusions

There is a perimortem sequence of hypoxia, then hypotension, and then bradycardia. The heart appears extremely resistant to hypoxia. A warm ischaemic time of over 30 minutes is rare.
Aims & Objectives:

The objective of this study was to describe patient demographics and the events leading to death over a 6-year period in a paediatric medical-surgical PICU, and to assess the quality of end-of-life care for the patients that died.

Methods

Retrospective analysis of all PICU deaths occurring from January 2010 to December 2015. Quality of end-of-life care was benchmarked off national standards[1].

Results

Of the 94,330 hospital admissions, 2,937 were admitted to PICU. Data collection was complete on all but 3 patients. There were 137 (4.7%) PICU deaths of which 49 (35.8%) occurred in neonates, 24 (17.5%) in infants, 52 (37.9%) in children >1 year, <12 years and 12 (8.8%) in children over 12 years. 106 (77.4%) of the 137 deaths occurred in patients transferred-in from other institutions. 80 (59.7%) deaths occurred within 72 hours of admission to PICU. Median length-of-stay prior to death was 46.5 hours. Mode of death was failed cardiopulmonary resuscitation in 17 (12.7%), brain death in 15 (11.2%) and limitation or withdrawal of life-sustaining therapy occurred in 102 (76.1%).

Multidisciplinary discussions with the family occurred in 100% of cases where life-sustaining therapy was limited or withdrawn. Clear, timely and sensitive communication, accurate information, care setting in a single room, pain and symptom control, was provided to families by senior doctors and nurses. The patient was never involved in discussion, likely due to immaturity.

Conclusions

Most deaths in PICU occur after life-sustaining therapy has been limited or withdrawn with most patients referred-in from regional centres. National standards regarding quality of end-of-life care were met where this was possible.

PALLIATIVE CARE / END OF LIFE CARE / ORGAN DONATION / ETHICS

PICC-0369
PREDICTORS OF PLACE OF DEATH IN CHILDREN WHO DIED AFTER DISCHARGE FROM PAEDIATRIC INTENSIVE CARE UNITS IN ENGLAND AND WALES
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Aims & Objectives:

To identify characteristics of children who died in the community rather than hospital after discharge from PICU.

Methods

All children admitted to a PICU in England or Wales (1st Jan 2004 and 1st March 2011) were identified in the PICANet dataset. Death certificate data was available from the Office for National Statistics for all children who died up to the end of 2014. Place of death was categorised as hospital or community (hospice, home or other) for multivariable logistic modelling.

Results

The cohort consisted of 74032 individuals. 5311 deaths occurred in PICU (excluded from analyses) and 3036 deaths occurred outside PICU. Overall 60.2% of these deaths occurred in hospital, 26.5% at home, 12.5% in hospice and 0.8% elsewhere. Deaths in hospital decreased from more than 80% in 2006 to 58% in 2014. 621 (0.6%) of children were discharged to palliative care.

Children discharged to palliative care were 6.5 times more likely to die in the community (OR 6.51 95%CI (4.47-9.50)). Children who died <28 days post discharge from PICU were significantly less likely to die outside the hospital. Children in all older age groups were significantly more likely to die outside hospital than the under 1s (1-4 years OR 1.88 95%CI (1.48-2.40)).

Children from a South Asian background (OR 0.44 95%CI (0.34-0.57)) and those living in the most deprived categories (most deprived OR 0.61 95%CI (0.45-0.81)) were significantly less likely to die outside the hospital.

Conclusions

A large proportion of children dying after discharge from PICU continue to die in hospital. More involvement of palliative care at the point of discharge has the potential to offer choice around place of care and death for these children and families.
Aims & Objectives:

Objective:

To identify children with a Life-Limiting Condition (LLC) who have had an admission to a Paediatric Intensive Care Unit (PICU) in England and their outcomes.

Methods

Data for all children who had had a PICU admission (2004 -2015) were identified from the PICANet dataset.

Linkage to inpatient Hospital Episode Statistics (HES) data was undertaken by the NHS Health and Social Care Information Centre for all children who had been resident in England.

A previously developed ICD10 coding framework was used to identify individuals with a LLC codes in the HES dataset.

Results

Data on 103,734 individuals (155,983 admissions) who were resident in England during the time period were sent for linkage. Successful linkage occurred in 102,722 individuals (99.4%). Individuals who could not be linked were excluded from the analysis.

51.0% of these children had a LLC and these children accounted for 62.7% of the PICU admissions.

The crude PICU death rate in the children with a LLC was 5.0% (n=4826) compared to 3.1% (n=1786) in those without a LLC. The adjusted OR of death for children with a LLC was 2.11 (95%CI 1.97-2.27).

Conclusions
Children with a LLC account for a large proportion of all PICU admissions in England. Although only one in twenty of these children die in PICU, as death may be expected in this population of children more integration of specialist palliative care with PICU services may allow more choice for children and families.
PALLIATIVE CARE / END OF LIFE CARE / ORGAN DONATION / ETHICS

PICC-0541
POTENTIAL MISSED OPPORTUNITIES FOR PEDIATRIC ORGAN DONATION AFTER CARDIO-CIRCULATORY DEATH IN ONTARIO, CANADA
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2Janeway Children’s Health and Rehabilitation Centre, Pediatrics, St. John's, Canada
3Trillium Gift of Life Network, Provincial Resource Centre, Toronto, Canada
4Nova Scotia Health Authority, Critical Care Organ Donation Program, Halifax, Canada
5University of Ottawa, Pediatrics, Ottawa, Canada
6Children’s Hospital of Eastern Ontario, Pediatrics, Ottawa, Canada

Aims & Objectives:

Recent literature suggests that over two-thirds of pediatric deaths in the intensive care unit occur after planned withdrawal of life-sustaining therapy, providing an opportunity for families to participate in controlled donation after cardio-circulatory death when neurologic determination of death is not possible. Our objective was to determine the potential to increase pediatric organ donation rates after cardiocirculatory death at pediatric hospitals in Ontario.

Methods

We conducted a retrospective cohort study of deaths following planned withdrawal of life-sustaining therapy in children (age 3 months to 17 years inclusive) at the four pediatric hospitals in the province of Ontario between April 1, 2013 and March 31, 2015 using the administrative database maintained by Trillium Gift of Life Network. We examined rates of referral before withdrawal of life-sustaining therapy, medical suitability, consent and actual donation, as well as time from withdrawal of life-sustaining therapy to first declaration of death.

Results

Of the 35 patients identified, 62.9% died within 2 hours of withdrawal of life-sustaining therapy and were medically suitable for organ donation. However, nearly half (45.5%) of potential donors did not have next of kin approached regarding organ donation because referral was made after withdrawal of life-sustaining therapy. Consent rates for approached cases were 30%, with an overall donation conversion rate of 9.1%.

Conclusions

The greatest loss of potential for donation after cardio-circulatory death was due to no approach for consent because referral occurred after withdrawal of life-sustaining therapy. Earlier referral would yield a 2-fold increase in potential cases for pediatric donation after cardio-circulatory death.
Aims & Objectives:

Objective: To analyze the perception of parents regarding the return to the hospital where their children died to participate in a conversation with doctors and to analyze the feelings of parents about their participation in a study evaluating the care provided in the moments leading up to the death of children.

Methods

Methods: A descriptive exploratory qualitative study. The study sites were the Pediatric Intensive Care Units of the Hospital São Lucas and Hospital de Clínicas de Porto Alegre. Fifteen parents of children who died in the PICUs studied participated in the study. Data collection occurred in 2015 and was conducted through semi-structured interviews. Data were analyzed using thematic content analysis. The research was approved by the Research Ethics Committees of both hospitals.

Results

Results: The ability to return to the hospital and talk to medical assistants was considered by parents as a positive and enlightening opportunity. Parents who participated in the study understood this moment as an opportunity to be heard and demonstrated the intention to contribute with their experiences in order to improve care in the hospitals studied.

Conclusions

Conclusion: We conclude that there is a need to implement measures to provide palliative care to parents after the death of their children. It is necessary to consider the possibility of providing families follow-up meetings with the multidisciplinary team after the death of children.
PALLIATIVE CARE / END OF LIFE CARE / ORGAN DONATION / ETHICS

PICC-0573
PRELIMINARY REPORT OF THE INTEGRATION OF A PALLIATIVE CARE TEAM INTO A PEDIATRIC INTENSIVE CARE UNIT IN SOUTHERN BRAZIL

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³Hospital de Clinicas de Porto Alegre, Palliative Care, Porto Alegre, Brazil

Aims & Objectives:

In Brazil, a large number of children die in PICU despite having serious diseases, with no chance of cure. Palliative care is still very incipient.

This observational study aimed to analyze the first children accompanied by the palliative care team (PCT) as a consultant in PICU of a university hospital.

Methods

Prospective observational study that included all patients admitted to the PICU that have been assessed by PCT before death from March to December 2015 (palliative care program started). Collected demographic data, trigger to call the team and outcome after the evaluation.

Results

During this period there were 440 admissions with 33 deaths (7.5%). 14 were accompanied by the PCT (42.2%). The median age of children in follow-up was 12m (1-96) with no difference from non-assessed. Most were boys (70%). All children died in the PICU. The reasons that led the evaluation were genetic disease (42.8%), neurological (28.6%), respiratory (14.4%), terminal cancer (7.1%) and failure of more than 3 organs (7.1 %). The outcomes were: withdrawal 42.8% (remove inotropic support-5, Mechanical Ventilator-1) withhold 50% (Mechanical ventilation-4, inotropic support-3), DNR 7.2%. Only 1 patient was maintained all treatment due to parents' request. In all patients, analgesia has been optimized. The average assessment time to death was 3 days. All parents participated in the end of life plan. All assessments were recorded.

Conclusions

The data are still preliminary, but comparing the findings with published studies on end of life in Brazil, suggest an improvement over the assistance provided to children who die in PICU.
MORAL DISTRESS IN PAEDIATRIC AND NEONATAL INTENSIVE CARE PRACTITIONERS - A CROSS SECTIONAL EVALUATION

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Aims & Objectives:

Moral distress in pediatric and neonatal intensive care unit (ICU) staff is not well understood. We hypothesized that moral distress existed in ICU staff, and was related to both burnout and clinical uncertainty.

Methods

A cross-sectional survey was conducted over a two-week period in a large pediatric hospital among NICU and PICU health professionals with at least 3 months of ICU experience. The main outcome was Moral Distress measured with the Revised Moral Distress Scale (MDS-R). Secondary outcomes were burnout measured with the Maslach Burnout Inventory and uncertainty measured with questions adapted from Mishel’s Parent Perception of Uncertainty Scale. Linear regression models were used to examine associations between participant characteristics and the measures of moral distress, burnout and uncertainty.

Results

206 analyzable surveys were returned. 57.6% reported work-related moral distress. Moral distress was similar in NICU and PICU (MDS-R 101.7 vs 102.0). MDS-R questions with the highest scores involved controversial end of life care, and were similar between physicians, nurses and respiratory therapists. Nurses reported feeling more disturbed by situations than physicians (MDS-R subscores 57.3 vs 44.7, p=0.002). Moral distress was inversely associated with perceived hospital supportiveness, and positively associated with burnout ($r^2=.27$, $p<0.001$). In nurses only, moral distress was positively associated with increasing years of ICU experience and certainty about a child’s prognosis ($r^2=.03$, $p=0.03$) but inversely associated with uncertainty about whether their care was of benefit ($r^2=.11$, $p<0.001$).

Conclusions

In this single-centre cross-sectional study, we found that moral distress is present in PICU and NICU health professionals, and is correlated with burnout, uncertainty and feeling unsupported. We cannot determine cause and effect. The impact of time in ICU questions about the value of care provided and apparent differences between nurse and physician responses warrant further evaluation in a larger sample.
MORAL DISTRESS AND ACUITY OF ILLNESS IN THE PEDIATRIC ICU

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²Massachusetts General Hospital, Nursing, Boston, USA
³Johns Hopkins Hospital, Nursing, Baltimore, USA
⁴Johns Hopkins University, School of Nursing, Baltimore, USA

Aims & Objectives:

To investigate the patterns of moral distress in the PICU

To identify the individual and system-related antecedents that contribute to moral distress in the PICU

Methods

We employed a mixed-methods approach to analyze five patients that have been the subjects of moral distress from 2012-present.

We interviewed providers who cared for these patients. Informants were identified using purposeful sampling technique. A standardized interview guide was used to interview seven physicians, three nurse practitioners, ten nurses and four respiratory therapists. Interviews were audiotaped and transcribed.

We performed retrospective chart reviews of these patients and identified phases of the medical course such as improvement, decompensation and stability. Using a scale we developed to numerically rank the patient’s acuity, we created a trend chart for each patient.

Using interview transcripts, we charted informant-reported instances of moral distress alongside the child’s medical course. We assessed the level of moral distress present based on frequency, plotted alongside the child’s acuity.

Results

A child’s lack of forward progress medically is a key trigger of moral distress

All members of the medical team experience moral distress

There is no direct correlation between acuity of the patient’s condition and moral distress

As length of stay in the PICU increases, so does the likelihood of the team experiencing moral distress
The team's level of moral distress rises as the dissonance between the parents and the staff's perception of the child's quality of life increases.

An example of one patient's acuity plotted against informant-reported moral distress is below.

**Conclusions**

Moral distress is a pervasive phenomenon in the PICU that affects all members of the clinical team. Our findings suggest that there may be characteristics surrounding the patient and their stay that trigger moral distress that can be leveraged to build early warning systems and early intervention. Moral distress was associated with stagnation of the medical course rather than worsening.
MEDICAL CLOWNING IN PEDIATRIC INTENSIVE CARE UNITS

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Aims & Objectives:

The purpose of this article is (I) to describe the challenges that hospital clowns face, (ii) to offer an established model of intervention and (iii) to suggest standards of practice for clowning in Pediatric Intensive Care Units (PICUs).

Methods

In this work we showed several specificities of the clown’s work in a PICU given the complexity of the technical environment, the severity of a patient’s illness and the stress-level of the parents. Despite all these difficulties, our experience and our collaboration with the French hospital clown organization “Le Rire Medecin” revealed that the clowns’ intervention appears to be a viable practice under certain conditions.

Results

The distraction the clowns offer could appear as an alternative method to sedative medications in order to reduce anxiety. Moreover, integrating a family-centered approach to care in an ICU is strongly encouraged by critical care organizations. Parents also have to be supported and clowns have the skills to distract and even entertain worried parents. Finally, for most caregivers, the clown’s interventions could be a benefit, offering them a break, with a few moments of laughter and transgression in the day.

Meeting with health care professionals is one of the 2 prerequisites to welcome clowns in a PICU and to prepare them for their interventions. On going and site specific training is the second prerequisite before the clowns’ intervention and hopefully, recent efforts have been made to ensure that a level of professionalism and clinical standards exist among hospital clown organization.

Conclusions

Despite specificities, we suggest that a professional clown activity is possible, probably safe, and that it can offer benefits to the child, his parents and to medical personnel. However, before working in a PICU, the performers must be finely trained professionals, experienced, abide by a code of ethics and be fully accepted by the health care team.
Aims & Objectives:

Introduction.

Paediatric organ donation (OD) represents 3% of total donations in Australia. Approximately 10% of deaths in our Paediatric Intensive Care Unit (PICU) proceed to OD. The circumstances in those who do not proceed to OD may be evident from the medical record. We sought to identify the rates of documentation by medical staff of OD.

Methods

Methods.

A retrospective study evaluating the documentation of OD was conducted in the PICU between January 2013 and October 2015. We reviewed the medical record of patients who were intubated prior to death. We recorded the documentation of end of life discussions, medical suitability, absolute contraindications, family conversations, consent, prediction of timeframes to death and communication with the organ procurement organisation (OPO).

Results

Results.

There were 127 episodes in this time period of which 100 were analysed. There were 10/100 (10%) donations of which 3/10 (30%) were brain dead. The median weight was 9.34kg [IQR; 3.5, 22.5] and 50/100 (50%) were female. Documentation of OD occurred in 43/100 (43%) episodes. Documentation regarding medical suitability and consent occurred in 21/43 (48.8%) and 21/43 (48.8%) respectively. No documentation occurred in 57/100 (57%) episodes. In 6/57 (10%) there were no clear barriers to OD. In 10/57 (17.5%) there was an absolute contraindication and 20/57 (35%) were under 3 months and/or 5kg. Documentation of communication with the OPO occurred in 15/100 (15%).

Conclusions

Conclusion.
Documentation surrounding OD in the medical record is low identifying a discrepancy between consideration of OD and documentation. This makes it difficult to ascertain the full potential of OD within our PICU.
PALLIATIVE CARE / END OF LIFE CARE / ORGAN DONATION / ETHICS

PICC-0009
PEDIATRIC ETHICS AND COMMUNICATION EXCELLENCE: HOW FOCUSED DISCUSSIONS ABOUT GOALS OF CARE IN PROTRATED STAY PICU PATIENTS IMPACT PATIENT CARE AND MEDICAL TEAM MORAL DISTRESS

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Aims & Objectives:

Importance  Caring for critically ill pediatric patients with protracted hospitalizations involves discussions about goals of care and expected outcomes, which may include death or significant disability. Clinician moral distress is heightened in these circumstances, and necessitates further evaluation.

Objective  Evaluate impact of weekly team meetings (PEACE rounds) on 1. Outcomes for protracted stay PICU patients and 2. Clinician moral distress.

Methods

Design  Mixed methods prospective observational study with retrospective historical control evaluating patient outcomes and clinician moral distress before and after implementing PEACE rounds.

Setting  Pediatric ICU of a Tertiary care Children’s Hospital

Participants  1) PICU patients with LOS ≥10 days. Historical control patients from previous year. 2) Clinicians caring for PICU patients.

Intervention  Weekly PEACE rounds to discuss challenging medical and ethical issues, and establish realistic goals of care for identified patients.

Results

Main Outcomes  Primary outcome of specified patient outcomes. Secondary outcome of clinician moral distress.

Results  Historical (66) and intervention (60) patient groups admission characteristics were similar. PEACE was associated with a decrease in PRISM indexed PICU LOS (p<.02), increase in code status change and in-hospital death, and no change in
patient 30 or 365 day mortality MDS-R scores were lower for respondents in all categories, and statistically significant for nurses (p<.05).

Conclusions

Conclusions and Relevance  PEACE can shorten ICU length of stay for protracted stay patients. PEACE improved aspects of clinician moral distress and merits integration into clinical practice.
PICC-0426
PEDIATRIC SUDDEN UNEXPECTED DEATH AND END-OF-LIFE PRACTICES IN A PEDIATRIC INTENSIVE CARE UNIT
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Aims & Objectives:

Unintentional injury is leading cause of death among U.S. children. Although unexpected pediatric death is more common than death from chronic disease, data on end-of-life care in this population is scarce. This study aims to describe end-of-life practices in children who die in the pediatric intensive care unit (PICU) as a result of sudden, unexpected causes.

Methods

We performed a chart review of all deaths occurring from January 1, 2008 to December 31, 2014 in a large PICU. Subjects were classified as experiencing sudden unexpected death (SUD) or death related to a known, potentially life-limiting condition (LLC). Descriptive statistics were used to characterize the SUD cohort. Wilcoxon test and Fisher's Exact test were used to compare continuous and categorical variables respectively between the two groups.

Results

Preliminary analysis revealed 108 deaths in 2008 and 2009 (22% SUD). There were no significant differences in age, gender, or ethnicity between the SUD and LLC cohorts. Length of ICU stay was shorter in the SUD cohort (median 3 days, range 1-28 days for SUD; median 11 days, range 1-247 days for LLC; P=0.0043). Differences in mode of death (brain death, withdrawal or withholding of life-sustaining therapy, or failed resuscitation) were not significant. Palliative care service consultation was significantly less frequent (p=0.01) in the SUD group (4.2%) versus the LLC group (28.6%).

Conclusions

While SUDs are the leading cause of pediatric death in the United States, they comprise only 22% of deaths in a large tertiary care center's PICU. This is not surprising as many of these deaths occur either in the field or in community hospitals. The ICU length of stay is significantly shorter for children with SUD, and consultation with the palliative care service is significantly less frequent. Future studies should assess parental satisfaction with end-of-life care in the PICU for children who die unexpectedly.
Aims & Objectives:

Organs transplantation improves life expectancy and quality of life in children with end stage organ failure. However, the demand for transplantation still exceeds the number of organs available. Our aim was to describe the evolution of brain death (BD) diagnosis and organ donation (OD) experience in a reference general hospital PICU in two periods.

Methods

Retrospective observational study including all children admitted to a referral PICU at Hospital de Clínicas de Porto Alegre (Brazil), in two periods: P1 (2002 to 2006) and P2 (2007 to 2012), with the diagnosis of BD. Patient care was unchanged in the two periods, however there was a pro-active intervention of the intra-hospital organ procurement organization (IHOPO) in second period. The periods were compared regarding demographic data, cause of BD, organ donation, medical contraindications for OD. The local Ethical and Research Committee approved the study.

Results

Over the first period (P1), there were 2,492 admissions to the PICU with 251 (10%) deaths and 7.9% of them were BD; in the second period (P2), 2,950 admissions, 283 deaths (9.5%) being 11.6% of them BD (p>0.05). The causes of BD were predominantly neurosurgical and hypoxic-ischemic in both periods. The OD rate (20% vs. 21%), medical contraindications for OD (51.5% vs. 60%) and the familiar consent for OD (50% vs. 43.75%) were similar in the two periods.

Conclusions

Our data indicate that the pro-active work of the IHOPO did not make relevant influence on the diagnosis of BD neither on the OD rate in our PICU.
HEALTH PROFESSIONALS' PERSPECTIVES ON MORAL DISTRESS - A VIRTUE WORTH KEEPING?

Aims & Objectives:

Theoretical constructs of moral distress largely portray a negative phenomenon that leads to physiological and emotional burnout, poor retention rates and ultimately poor patient care. We explored how clinical experiences and perceptions of moral distress within two neonatal intensive care units (NICUs) compared with theoretical constructs of moral distress.

Methods

All medical and nursing professionals at two tertiary level NICUs – one surgical, one perinatal – were invited to participate by undertaking a brief questionnaire on their perceptions and experience of moral distress.

Results

326 providers from two NICUs participated: 272 nurses (74% response rate) and 54 medical professionals (92% responses rate). Moral distress (variably defined by the respondents) was experienced by more than 70% of medical and nursing professionals at least once a month. Overwhelmingly (97% of respondents) moral distress was viewed as a normal component of the NICU environment, reflecting the challenging nature of caring for very sick neonates amidst uncertainty and diverse viewpoints. More support was desired during distressing periods. Yet despite the traditional negative connotations surrounding moral distress, few (9% of medical and 21% of nursing professionals) thought we should aim to remove all moral distress. Moral distress was not only viewed as inevitable but also as a necessity to promote discussion, advocacy and a progressive medical environment. Even more positively, moral distress was viewed as a marker of compassion and professionalism.

Conclusions
Health professionals’ perspectives of moral distress challenge traditional literature and suggest it has a virtuous role to play in progressive thought and practice within NICUs.
Aims & Objectives:

Best interests should underpin clinical decision making, especially when decisions have substantial implications for life, quality of life, quality of death, and justification for actions may be sought. However best interests is a problematic concept, permitting a range of reasonable outcomes. The difficulty within the context of paediatric intensive care is that diverse interpretations of best interests exist within the complex network of lay and professional stakeholders.

Aim of the Study: To explore how best interests is constructed and enacted when making difficult decisions to persevere with, withhold or withdraw life sustaining medical treatment in children.

Methods
A qualitative methodology involving an extended 18 month case study of a single Paediatric Intensive Care Unit (PICU) was used. Ethnographic methods provided a unique insight into family and clinicians’ perspectives and the processes of making difficult decisions about treatment and withdrawal of treatment. Data were analysed using thematic analysis.

Results

Findings reflect the complexity in clinical processes, being grounded within the context of events, procedures, practices, and relationships. This paper focuses on two themes:

1) The renegotiation of best interests within context of managing uncertain situations;

2) Mediating between different professional and social worlds.

Conclusions

Best interests is depicted as a concept that can be identified, managed and used to guide difficult decision making. Yet it emerges as an elusive, ever-evolving construct generated within the uniqueness of each individual case. It is frequently used as a mechanism to validate and justify the reasoning process according to diverse and mutable perspectives.
Aims & Objectives:

Spinal muscular atrophy type 1 (SMA-1) is a progressive and fatal disease. Ethical attitudes of professionals in charge may influence their care.

Our objective was to know the ethical options of Pediatric Intensive Care Units (PICU) pediatricians from Spain in case of a child with SMA-1 and respiratory failure.

Methods

Transversal descriptive study by means of an anonymous questionnaire sent to the PICU in Spain.

Results

One hundred twenty four responses (70% women, 51% younger than 40 years, 69% with prior experience and 53% with religious beliefs) were analyzed. In the last cared patient, most of paediatricians opted by non-invasive mechanical ventilation (NIV) and limitation of therapeutic effort (LET) in case of NIV failure, while they recalled that nurses were more divided in their options and a third of families were in favour of permanent total support. In face of a future hypothetic case, half of paediatricians would opt by the same plan (NIV + LET) and 74% would support the family’s decision. Age, experience and sex were not related to the preferred options. People with religious beliefs were less in favour of initial LET. 63% scored the quality of life of a child with AME-1 and invasive mechanical ventilation as 3 points in a scale from 0 to 10.

Conclusions

In front of a child with AME-1 and respiratory failure, most of paediatricians are in favour of initiating NIV and perform LET when such support will be insufficient. They would accept the family’s decision even in case of disagreement.
Aims & Objectives:

All graduating physicians require general palliative care skills. In Canada, there is currently no standardized curriculum for teaching palliative care to subspecialty trainees.

Our objective is to develop an evidence-based palliative care curriculum that provides pediatric, neurology, anesthesia and ICU residents with general palliative care skills.

Methods

A needs assessment was performed. Pediatric residents completed an online questionnaire on breaking bad news (BBN). In neurology, focus groups were held with physicians, allied health care and senior residents; semi-structured interviews were held with patients and their caregivers. Data was analysed using qualitative thematic analysis. A systematic search of the literature was performed. Curricular design will consider results of the Kolb learning style inventory amongst residents.

Results

Less than 10 percent of pediatric residents strongly agreed with the statement “I feel confident in my ability to break bad news.” Ninety percent agreed additional BBN training to be beneficial. Neurology residents face 3 main challenges in palliative care: 1) uncertainty regarding disease trajectory and timing for palliative care discussions; 2) cohesiveness of the health care team regarding end of life issues; 3) the role of the resident in initiating palliative care. Principals identified for inclusion were: symptom management, communication, psychosocial aspects of care, care coordination and access, and myths and pitfalls in palliative care.

Conclusions

This project will identify the current best evidence and expert opinion in palliative care for pediatrics, neurology, anesthesia and intensive care. The data will be used to develop a novel cross-discipline Canadian palliative care curriculum with subspecialty specific modules.
PALLIATIVE CARE / END OF LIFE CARE / ORGAN DONATION / ETHICS

PICC-0612
PARENTAL EXPERIENCES OF END-OF-LIFE DECISION MAKING AND ADVANCED CARE PLANNING IN THE PAEDIATRIC INTENSIVE CARE UNIT (PICU): A LITERATURE REVIEW
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Aims & Objectives:

The evidence base for Advanced Care Planning (ACP) in PICU is scarce. A key source of intelligence to inform ACP is the parental experience of end of life (EOL) decision-making. We conducted a literature review to address the research question: “What is the published evidence base describing parental experience of EOL decision-making and ACP on PICU?”

Methods

Systematic search of Medline, Embase, and Cinahl (January 1995 – June 2015). Search terms derived using the SPICE model:

<table>
<thead>
<tr>
<th>ICU</th>
<th>EMBASE</th>
<th>CINAHL</th>
<th>MEDLINE</th>
<th>SPICE</th>
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<tbody>
<tr>
<td>PICU</td>
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Titles and abstracts were screened for relevance. All study types considered. Articles were excluded for non-relevance.

Results

Initial searches revealed 155 articles; 15 described parental experiences of EOL decision-making in PICU. No studies pertained to ACP in PICU. The following themes arose relating to parental EOL decision-making:

- Information needs to be clear, complete and understandable
- Professionals should be available, experienced, compassionate, kind and honest
- Parents desire time, choices, respect, to be listened to and not judged
- Children and young people should be considered. Quality of life, pain, discomfort and suffering, diagnosis, chances of getting better/surviving and neurological prognosis impact on decision making
- Faith and hope; specifically, the complex balance of maintaining hope against providing false hope, and the role of faith

Conclusions

The common themes in these studies can inform communication around end of life decision-making in PICU. There is a need for new research to inform practice regarding ACP in PICU.
Aims & Objectives:

In the last three decades the University Hospitals acquired a substantial amount of experience in the field of transplantation in adults and more recently in children. We focused on donor identification, donation and subsequent transplantation.

Methods

All potential donors within the University Hospitals transplantation network are registered in a database. We searched for potential donors from January 2000 till December 2015 in children under 16.

Results

74 children were potential donors. The most frequent cause of death is isolated craniocerebral trauma (30%), followed by trauma (20%), intra cranial hemorrhage (16%) en hypoxia (12%). 50 (68%) children became donors, 24 (32%) patients were refused for organ donation for different reasons: family refusal (63%); medical reason (33%) and 1 (4%) because of legal issues.

Of the 50 children 45 (90%) were braindead, 5 (10%) became donor after cardiac death. There is a high percentage of organ donation: 97% donated both kidneys, 94% liver donor, 66% heart donor, 26 % lungs, 18% pancreas and 8% small bowel. Those procedures resulted in 211 organs which were allocated to patients in need of a new organ. During those 16 years, 15 patients received a combined organ transplantation.

Conclusions

The death of a child has a huge impact on the family and this might be the reason for the high rate of refusal, but organ donation from children are helping a lot of patients in need of a new organ.
Aims & Objectives:

Improvement efforts in pediatric organ donation are challenged by the small number of potential donors in individual hospitals. We hypothesized that a multidisciplinary organ donation council (ODC) with physicians, nurses, social workers, clergy and OPO representatives would collaborate to maximize the likelihood that bereaved parents of eligible patients are given a timely, informed choice about organ donation.

Methods

We evaluated referral and consent statistics during 26-month periods before and after our ODC started in November 2013.

Results

Before the ODC, 128 (44%) of 288 deaths at BCH were referred to the NEOB prior to death, while afterward 197 (69%) of 285 deaths were referred before death. The percentage of these heart-beating referrals that were deemed medically suitable for donation remained similar (13%) before (17/128) and after (26/197) the ODC. Of the medically suitable referrals, 6 of 17 before the ODC were donation after circulatory determination of death (DCDD) candidates (35%) while 13 of 26 after were DCDD candidates (50%). None of the DCDD candidates consented before the ODC initiative (0%), while 3 of 13 DCDD candidates consented for donation after the ODC started (23%). The donation after brain death (DBD) conversion rate increased from 45% (5/11) to 62% (8/13) after the ODC began.

Conclusions

The collaborative work of the ODC has impacted the number of OPO heart-beating referrals and the DCDD and DBD conversion rate at BCH. Hospitals should consider multidisciplinary programmatic efforts to provide every interested and eligible family of a dying child the maximal opportunity for organ and tissue donation.
PALLIATIVE CARE / END OF LIFE CARE / ORGAN DONATION / ETHICS

PICC-0633
CHOICE MATTERS: CREATING A STAND-ALONE PALLIATIVE TRANSPORT SERVICE
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Aims & Objectives:

End of Life care is a complex transition where choices within this phase can dramatically improve the family’s ability to cope¹. Choices are often diminished due to a lack of informed decision making and the complexity of moving these patients to their chosen destination.

Kids Intensive Care and Decision Support (KIDS) is a transport service which transports critically ill children to specialist hospitals and intensive care units. Anecdotally we are increasingly transporting more patients for palliation.

We aim to demonstrate the high demand for a stand-alone palliative transport service. This will improve quality, choices and empowerment for families and allow a smooth transition from hospital to hospice/home for patients and families.

Methods
A telephone survey was conducted amongst all stand-alone paediatric retrieval services within the UK (England, Wales, Scotland and Ireland) using a proforma.

Results
Response = 100%.

All transport teams move patients for palliation; however this tends to be on an adhoc and elective basis. Although there are no exclusion criterions amongst teams for refusing transfers, it often depends on the acuity of other referrals and availability of a team. The competency of the transport team required was dependent upon patient needs. Only one transport service has developed palliative care policies and has a lead palliative care consultant.

Conclusions

Recommendations:

- Retrospective review of data within the West Midlands
- Develop palliative care policies and core standards specifically for transport
- Pilot a nurse lead service
Future friends and family review

Reference:

Aims & Objectives:

When epinephrine is used as intravenous continuous infusions, it has long been thought that hemodynamically unstable patients experience potentially hazardous changes in vital signs related to the exchange of depleted syringes to full, fresh medication syringes. The purpose of this study was to determine if a signal correlation with heart rate is present during such events.

Methods

This is a retrospective analysis from a pediatric cardiovascular intensive care unit (CVICU) using beat to beat heart rates collected from bedside monitors and stored for all patients admitted to the CVICU from 1/1/2013 to 6/30/2015. Epinephrine syringe exchanges without dose change were compared with heart rate. Analysis of heart rate measurements included 1 hour pre and post syringe exchange. A signal correlation algorithm was applied to analyze the change in heart rate surrounding each event.

Results

There were 1042 syringe change events recorded, 755 of which met strict criteria for analysis including high resolution, uncorrupted data. A total of 114/755 (15.1%) exchanges had a significant heart rate change following the event. 75 events (9.93%) had an increase in heart rate from baseline (max +40 bpm, min +5 bpm). 9 events (1.19%) had decreased heart rate (max -35 bpm and min -5 bpm), and 30 (3.97%) had erratic heart rate changes with both increase and decrease in heart rate.
Conclusions
With the ability to compare beat by beat heart rate changes with a large series of syringe exchanges, a significant correlation with change in heart rate surrounding syringe exchange events is shown. Further investigation is required to define clinical correlation with this novel data collection and signal processing analysis.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0583
A DESCRIPTIVE ANALYSIS OF RISK FACTORS AND OUTCOME OF UNPLANNED EXTUBATIONS IN THE PAEDIATRIC INTENSIVE CARE UNIT AT THE HOSPITAL FOR SICK CHILDREN

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Aims & Objectives:

Unplanned extubation (UE) is a recognized life threatening and potentially preventable adverse event in the ICU. We described the incidence, characteristics and outcome of UE at our 36-bed medical/surgical and cardiac PICUs.

Methods

We performed a retrospective cohort study including intubated patients, less than 18 years admitted to ICU during 2004 to 2014. UE event descriptors were extracted. Primary outcome was intubation status at 24 hours after event. Secondary outcomes were complications within 12 hours.

Results

We confirmed 458 UE, an incidence of 0.7 per 100 intubation days and 3.7% of patient-admissions. The ICU patient census on event days was 31(28-35) and there were 20(17-23) intubated patients. Patients were 5.5(1-28) months old, were ventilated for respiratory (43.7%) or post-procedural (30.3%) indications, were in ICU for a total of 8(4-27) days. The mode of intubation was nasal in 232(51%); the ETT position at most recent CXR was above the thoracic inlet 84(18%), and in main-stem bronchus 12(4%); ETT adjustment was documented after the CXR in 48(11%); receiving sedatives 352(77%) and muscle relaxants 29(6%). UE events occurred during patient care 117(26%); during a procedure 17 (4%) and in the absence of documented handling in 198(43%). Complications were hypoxemia 188(41%); stridor 63(14%). Difficult re-intubation was described in 27(6%), and cardiorespiratory arrest in 9(2%). There were no associated deaths. At 24 hours after event 195(43%) remained extubated; 210(45.9%) were reintubated; and 37(8.1%) were receiving NIPPV.

Conclusions

We report the largest cohort of UE events in critically ill children to date. We found rates consistent with previous. Life-threatening sequelae provide a compelling rationale for UE prevention. Conversely, the absence of sequelae in more than one third patients questions the physiologic indication for intubation, the role of CXR as preventative measure, and the utility of UE as a measure patient harm. It also raises evaluation extubation readiness and sedation practices.
A SEPARATED INDWELLING CATHETER SURVEILLANCE ROUND IS AN EFFECTIVE OPTION TO REDUCE THE DURATION OF URINARY AND VENOUS CATHETERIZATION IN PEDIATRIC INTENSIVE CARE UNITS

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Aims & Objectives:

Indwelling catheters are frequently used in Pediatric Intensive Care Unit (PICU). Although these devices are sometimes essential for life support in critical care, they are associated with serious complications, specially healthcare-associated infections (HAI). In our PICU, in an emergent country, we have already implemented some evidence-based measures to reduce HAI, but we took account additional attitude for improvement by reducing the duration of urinary and venous catheterization.

Hypothesis: A separated clinical team with the special goal to remove all indwelling catheters as soon as possible would be able to reduce the number of catheterization days.

Methods

In a tertiary PICU with 18-bed, a surveillance round team composed of an attending physician and two fellows reviews all patients devices twice a week and order to remove clinically judged non-essential catheters in accordance with the attending team.

Results

In the 9 months after the implementation of the surveillance team (March to December 2015), 144 urinary and 184 venous catheters were compared to the 182 and 259 catheters respectively, used in the year before (February 2014 to February 2015). The mean duration of urinary catheterization reduced from 7,8 to 4,9 days (p=0.0002) and the median rate of use from 49% of patients to 23,5%. Venous catheterization reduced from 10,0 to 7,6 days (p=0.005) and the median rate of use from 84,5% to 55,5%.

Conclusions

A catheter surveillance team is an effective intervention to reduce the period of time and rate of use of indwelling devices in PICU with high rates of catheters use.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0880
Developing a culture of safety for children heart surgery in Argentina

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Aims & Objectives:

Introduction: The PCICU environment is a very complex system with great possibilities for medical error. We started a program to promote a safety culture for children with heart surgery.

Objective: Our goal was to reduce mortality and major complications for patients undergoing heart surgery.

Methods

We worked in three areas:

I) Effective communication: Monthly multidisciplinary meeting: morbidity & mortality global and adjusted results, infection rates analysis, and death cases discussion. Daily CICU Round: Presentation and status of patients, daily goals. Weekly case conferences: all cases are presented for diagnostic and surgical treatment discussion. Presentations of complex cases: The week before surgery diagnosis and treatment strategies are re-evaluated with surgeons, CICU cardiologists and physicians. Monthly simulation sessions for crisis management training for all team members.


III) Reducing Infection Program: We developed a package of measures: CICU trained nurse, specialized nurse in the OR, bundles, chlorhexidine 2% as antiseptic choice, hand hygiene permanent education, use of ports, quick removal of central line and urinary catheter, oral hygiene and position of the head 30° in ventilated patients.

Results

We increased hands hygiene adherence from 35% to 70%, decreased CLBSI rate from 11.9 to 5.45 rate, and surgical wound infection from 6.5 to 5.1 rate.

Conclusions

Creation and maintenance of a safety culture is essential to improve quality of care and decrease medical errors.
Aims & Objectives:

In an environment where evidence based nursing and medical care are paramount, information regarding current best practice must be easily accessible to ensure the continuation of high quality care. Implementing new guidelines and standards have been shown to improve outcomes, but how do clinical staff want this information introduced?

Methods

An online structured questionnaire was emailed to clinical staff (n=122) on a regional PICU asking how they best accessed new information and how useful they found the current methods in effect on the unit. Responses were collated and themes identified from the open ended questions.

Results

The response rate was 40% (n=49). Of those responses, 71% felt that changes to practice were only communicated effectively sometimes. 32% of respondents thought the most accessible way of disseminating information was via email, with 42% saying they checked their email every shift. A variety of suggestions were given as to how dissemination of information could be improved, ranging from teaching sessions to computer alerts. Most respondents, however, chose more than one method, suggesting that no one felt any method was 'best'.

Conclusions

The responses suggest there is room for improvement in the dissemination of information around changes to practice. No method stood out as significantly more popular than another, indicating that staff best access new information in a variety of ways. This evidence can be used to inform future decisions of how changes or updates in practice are communicated to clinical staff. Further research is required to audit the different methods' efficacy.
QUALITY AND SAFETY (ERROR/NOSOCOMIAL INFECTION/DATA MANAGEMENT)

PICC-0187
ADAPTING THE WORLD HEALTH ORGANISATION SURGICAL SAFETY CHECKLIST FOR SURGICAL PROCEDURES ON THE PAEDIATRIC CARDIAC INTENSIVE CARE UNIT (CICU): A QUALITY IMPROVEMENT INITIATIVE
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Aims & Objectives:

To introduce a safety measure to standardise the approach to and minimise identifiable risks from elective delayed chest closure on the Cardiac Intensive Care Unit (CICU) at Great Ormond Street Hospital (GOSH) for Children.

Methods

The first phase of this quality improvement initiative was to complete an online staff survey to gain views on the process of bedside chest closure in the CICU. Fifty four responses were received and free text comments grouped into themes including communication, role clarity, standardisation of process, situational awareness and teaching opportunity. Within these themes areas of improvement were identified.

Using the World Health Organisation surgical safety checklist as a template, the pertinent themes from the staff survey were incorporated to generate a checklist for completion at the bedside prior to the procedure. This was approved by the Quality Improvement and Clinical Leads for CICU and distributed to the multidisciplinary team. Laminated copies were placed around the unit for easy access as well as being available on the bedside computers.

The second phase of this project is currently ongoing. The use of the checklist will be audited after 3 months to evaluate adherence and staff perception reviewed.

Results

67% of the staff responding to the survey did not believe the GOSH surgical safety checklist was completed before every procedure prior to this intervention. The surgical safety checklist is not tailored to the needs of the CICU population, and we postulated that an adapted version would improve compliance. Figure 1 shows the
checklist produced which is currently in use.

Conclusions

The response to this quality improvement initiative appears positive because the multidisciplinary team values the incorporation of their views. The feedback process is ongoing. The surgical time out is an international standard and therefore completion of the audit cycle will be a crucial part of the evaluation process.
Aims & Objectives:

To review the effect of oral care implemented in line with oral health care guides developed specifically for children in intensive care to prevent mucositis formation.

Methods

This prospective, observational, and interventional study was performed in the pediatric intensive care unit of a university hospital in Istanbul between January and December 2014. Daily oral care was implemented to pediatric patients in the study group in line with an oral care guide developed by the researchers. Data were collected using the patient diagnosis form and oral mucositis assessment scale, which were published by the World Health Organization (WHO).

Results

The average age of the patients in the study group was 76.64 ±5.29 months (range, 1-204 months); 31.9% were hospitalized because of respiratory system disease; 38.3% had an additional disease; 92.2% could not feed orally; and 88.8% had oxygen therapy. It was determined that three of the patients with oral mucositis had grade 1 mucositis, and four patients had grade 2. Oral mucositis was observed to develop in three patients within their first 7 days of admission and in four patients 7 days after their admission. It was detected that the oral mucositis of five of the patients improved in intensive care before they were discharged; two patients were discharged with grade 1 oral mucositis.

Conclusions

The oral care implemented in line with the Oral Care Guide in this study decreased the development frequency of oral mucositis. It can be considered that oral care guide was effective in preventing oral mucositis.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0438
THE USE OF HUMAN FACTORS METHODS TO DETERMINE USE-SAFETY AND USER EXPERIENCE OF MECHANICAL VENTILATORS
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¹University Health Network, Healthcare Human Factors, Toronto, Canada
²University of Toronto, Institute of Health Policy-Management- and Evaluation, Toronto, Canada

Aims & Objectives:

Usability testing is one of the primary tools of user-centered design. This common human factors method allows for a comprehensive evaluation of users’ interactions with medical devices and their environments. Formal usability testing is now required as part of the Food and Drug Administration approval process for medical devices. Manufacturers conduct these tests, but they are purely qualitative in nature and the results are typically confidential.

Through comparative usability testing, it is possible to compare and identify medical devices that are safer, resulting in reduced risks and improved experience for the patients and users alike. Until now, existing methodologies for comparison were simplistic and not rigorous, resulting in data that is not generalizable and very limited in its applicability. Our goal is to share a rigorous methodology for comparative usability evaluations developed through the combination of usability testing tools with solid research methods.

Methods

In this submission, we present a case study of four acute care ventilators (Hamilton G5, Puritan Bennet 980, Maquet SERVO-U and Dräger Evita V500) that demonstrates rigorous methodology for the comparison of medical devices.

Results

Combining observational usability testing methods with quantitative measures, we developed a mixed-methods approach that provides greater rigour in determining dimensions of use-safety and user experience. We will describe the methodology including: experimental design, scenario design, pilot and full-scale studies, metrics selection, recruitment, data collection process and teams, and data analysis.

Conclusions

Our ultimate goal is to raise awareness of the importance of design in critical care. These findings will be of interest to those who study quality and safety, and to professionals who use, manage and procure medical devices.
Aims & Objectives:

Aim: To develop a method for sustaining a culture of patient safety and quality within a tertiary level PICU.

Introduction: Although many quality and safety initiatives have occurred in the PICU in the past, sustaining change and maintaining motivation has been problematic as the unit has grown. “The National Safety and Quality Health Care Standards” provide a governance framework for Australian hospitals; this gave the foundation to lead cultural change within Paediatric Intensive Care Unit (PICU).

Methods

Develop a strategic direction for safety and quality;
1. Redesign a multidisciplinary governance committee
2. Promote a just culture to enhance incident reporting and encourage staff participation in projects and initiative
3. Improve engagement with staff and consumers through the following initiatives;
   a. Highly visible electronic safety and quality board
   b. Quarterly newsletter
   c. Regular Audits
   d. Family advisory council

Results

1. The committee meets 4 weekly, the agenda is aligned with the health care standards, clinical incident data is trended and reported and all projects and initiatives are discussed
2. Increased clinician engagement, with a 10 fold increase in projects and initiatives
3. Electronic safety and quality board has been introduced and positively received by staff and families
4. Newsletter is provided to all staff with positive review
5. Planned initiation for the parent advisory council in early 2016

Conclusions

Developing a governance structure for safety and quality with PICU has allowed for a significant change in unit culture resulting in increase engagement in quality and safety projects and initiatives.
QUALITY AND SAFETY (ERROR/NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0517
INTERRUPTIONS TO MEDICAL TRAINEES’ TASKS IN PAEDIATRIC INTENSIVE CARE
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¹, Edinburgh, United Kingdom
²Royal Hospital For Sick Children, PICU, Edinburgh, United Kingdom

Aims & Objectives:

Interruption or distractions to task requiring focus and completion by medical staff may affect patient outcomes, but it is unclear how often these happen within our clinical setting.

This study aims to determine the frequency and characteristics of interruptions to medical trainees’ tasks within a paediatric intensive care unit (PICU).

Methods

A prospective observational study was conducted in a single PICU. A single medical student observer shadowed the dayshift registrar, for 8.5 hours a day for a 10 day period, and collected data on interruptions to the registrar’s activities using a predesigned proforma. Data recorded pertained to task interrupted, person(s)
interrupting and reason(s) for interrupting.

Results

Registrars were interrupted a total of 165 times, or a median of 16 times per observation-day. Interruptions were most commonly made during the ward round or a procedure (12.1% each, n=20), during prescribing (10.9%, n=18) or patient discharge (9.7%, n=16). Nurses were the most common source of interruption (45.5%, n=83), followed by PICU consultants (15.8%, n=29). Interruptions were most often made to
provide an update of patient condition (19.7%, n=40), request for a prescription to be made (9.9%, n=20) or analyse patient results (5.4%, n=11).
Conclusions
Interruptions to registrars’ tasks occurred frequently within our PICU and occurred during key tasks. Further studies are needed to assess the impact of these interruptions on patient safety, however our study has identified potential ways to reduce some of these e.g. protected prescribing time after the ward round.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0063
MULTICENTRIC SURVEY ABOUT THE KNOWLEDGE AMONG PEDIATRIC INTENSIVISTS REGARDING THE TREATMENT OF ANAPHYLAXIS

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²Children’s Institute- University of São Paulo, Pediatric ICU, São Paulo, Brazil

Aims & Objectives:
Due to the increased incidence of anaphylaxis in the general population, and more specifically in the pediatric population, a clinical survey was developed and applied to pediatric intensivists in five different intensive care units to assess the knowledge on the treatment of anaphylaxis

Methods
Clinical survey to be answered personally by pediatric intensivists of five different pediatric ICU. The answer was anonymous. The demographic characteristics and years of medical residency were evaluated. Three questions should be answered: a) If the physician had treated any cases of anaphylaxis; b) What is the medication of choice to treat anaphylaxis c) if has changed the therapeutic approach in the last three years

Results
Demographic data show that 100% had residency in pediatrics; 75.6% had residency in pediatric intensive care. Attended at least one case of anaphylaxis: 85.4% of the physicians. Of these, used epinephrine intramuscularly: 34.3%. Of those who did not attend any cases of anaphylaxis, would use epinephrine intramuscularly: 66.7%

Conclusions
Despite the consensus in the medical literature on the treatment of anaphylaxis (epinephrine intramuscularly), the survey results show the lack of knowledge of an important part of pediatric intensivists (60.1%) on the correct treatment
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0751
SAFETY AND NOSOCOMIAL INFECTION PREVENTION (SNIP) ROUNDS: A SOLUTION TO DECREASE DEVICE UTILIZATION AND DEVICE-ASSOCIATED INFECTION RATES
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Aims & Objectives:

Objective: To describe the implementation of a weekly, multidisciplinary rounds model designed to decrease device utilization and device related infection rates.

Methods

Methods: Safety and nosocomial infection prevention (SNIP) rounds were developed as a multidisciplinary process, independent from daily clinical rounding, in the Medical Intensive Care Unit (MICU) of a tertiary children’s hospital. A physician, infection prevention nurse, and quality improvement (QI) assistant rounded with each patient’s bedside nurse and discussed the continued need for central venous catheters (CVC) and indwelling urinary catheters (UC), and if not clearly clinically indicated, made a recommendation for device removal. In addition, the SNIP team provided education on device-related infection prevention. Each session was scheduled on a different day and time each week, and took less than 30 minutes to complete.

Results

Results: Post SNIP implementation, 205 patients had a CVC and a recommendation for removal occurred in 46. Eighteen (39%) had this recommendation followed within 48 hours. Twenty-seven patients had a UC and a recommendation for removal occurred in 12. All UCs were removed as recommended.

Table 1 - Device utilization and device-associated infections

<table>
<thead>
<tr>
<th></th>
<th>Pre-SNIP Period (April to March 2012)</th>
<th>Post-SNIP Period (April 2012 to June 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVC device days</td>
<td>2628</td>
<td>1796</td>
</tr>
<tr>
<td>CLABSI rates/1000 device days</td>
<td>1.14</td>
<td>0.6</td>
</tr>
<tr>
<td>UC device days</td>
<td>644</td>
<td>292</td>
</tr>
</tbody>
</table>
Conclusions

**Conclusion:** SNIP rounds identified opportunities for CVC and UC discontinuation, and resulted in an overall device removal of 58%, and had a significant impact on UC utilization. Both the CA-UTI and CLABSI rates decreased despite no other interventions being implemented during this time period. SNIP rounds have continued weekly since 2012; further analysis is needed to assess if these reductions were sustained.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0638
WHO TO INTERRUPT? COMPARING INTERRUPTIONS ON REGISTRAR-LED WARD ROUNDS VS CONSULTANT-LED WARD ROUNDS IN THE NORTHERN IRELAND TERTIARY NEONATAL INTENSIVE CARE UNIT
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Aims & Objectives:

Ward rounds facilitate the communication of essential information to inform clinicians of developments impacting on clinical care. It is important for unnecessary interruptions to the ward round to be avoided. This observational study aims to review the number of interruptions in registrar-led ward rounds in comparison to consultant-led rounds. The hypothesis for this study was that registrars are more likely to be interrupted than consultants.

Methods

In the Northern Ireland's tertiary neonatal intensive care there are up to three ward rounds per day. The ward rounds include a mixture of a consultant-led round in the morning and registrar-led rounds in the evening and or night. Over a period of five days the ward rounds were directly observed and a record was made of all interruptions including whether they were avoidable or not.

Results

In total ten ward rounds were directly observed. Sixty percent of the ward rounds were consultant led and forty percent were registrar led. There were nine interruptions in total with eight interruptions being deemed avoidable. Of the avoidable interruptions, sixty percent occurred during the registrar-led ward round in comparison with forty percent being made during consultant-led rounds. The most common interruption was to request the prescription of a non-urgent medication for another patient.

Conclusions

The results of the observation support our study hypothesis that registrar-led rounds are more likely to suffer from avoidable interruptions. A larger scale study may help assess the impact of interruptions on communication and patient safety. The results of this study have been relayed to senior nursing colleagues to facilitate education on the importance of clinical handover on patient safety.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0862
IS THERE HIGH PRESSURE IN NORTHERN IRELAND’S PAEDIATRIC INTENSIVE CARE UNIT? AN AUDIT ON THE USE OF CUFFED ENDOTRACHEAL TUBES.

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²Royal Belfast Hospital For Sick Children, Paediatric Intensive care Unit, Belfast, United Kingdom
³The Royal Belfast Hospital For Sick Children, Paediatric Intensive Care Unit, Belfast, United Kingdom

Aims & Objectives:

In the Northern Ireland Paediatric Intensive Care Unit (NIPICU) patients are intubated with a cuffed endotracheal tube (ETT) unless a specific contraindication exists. There are concerns regarding the risk of pressure necrosis from an inflated cuff which highlights the importance of measuring the cuff pressure. Adult capillary perfusion pressure is 27-40mmH2O and it is assumed that the paediatric capillary perfusion pressure is somewhat lower. The purpose of this audit is to check how often cuff pressures were measured on ventilated patients in the NIPICU. A secondary outcome was to review the pressure within the cuff for each patient.

Methods

Spot checks were performed on the fourth day of the week over a six week period on every ventilated patient within the PICU. All ventilated patients were included in the study. Charts were reviewed for documentation of the cuff pressure. The cuff pressure was then manually assessed with a bedside manometer.

Results

In total twelve patients were included in the audit. The number of patients who had a documented cuff pressure was zero. Manual assessment of the ETT cuff ranged from 0-20cmH2O with a mean of 5cmH2O.

Conclusions

This audit has highlighted although cuffed ETTs are used within the NIPICU, it is not standard practice to record and document cuff pressure. The evidence in the literature supports measuring cuff pressure and so this would be considered good practice. A guideline has now been written and submitted for approval outlining details in the assessment and management of cuff pressures. It was also noted during the course of this audit that the bedside manometers were cable-tied to the patient’s bed space so they would not go missing. This makes them unavailable for assessing cuff pressures. It is therefore recommended that these cable-ties be
removed. A repeat audit is planned following approval and implementation of the guideline.
Aims & Objectives:

Ventilator associated pneumonia (VAP) is considered the second most frequent infection in pediatric intensive care and there is agreement on its association with higher morbidity and increased healthcare costs. Our VAP prevention program began in March 2012 and its goal was to apply a prevention bundle in the Pediatric Intensive Care Unit of Hospital Italiano de Buenos Aires, aiming to reduce the baseline VAP rate by 25 percent every six months. The first two years’ results have been reported. Now we aim to report the evolution of the program over the course of more than three years.

Methods

The VAP prevention team meetings started in March 2012 and the bundle was implemented in November 2012 after it had been developed and made operational. The included population was all mechanically ventilated patients admitted between November 2012 and February 2016. The intervention consisted of the implementation of an evidence-based VAP prevention bundle adapted to our unit. The bundle consisted of four main components: head of the bed raised more than 30 degrees; oral hygiene with chlorhexidine; daily interruption of intravenous sedatives; and a clean and dry ventilator circuit.

Results

The baseline VAP rate for the two years before intervention was 6.3 episodes every 1000 mechanical ventilation days. The VAP rate evolution by semester was, respectively, 5.7, 3.2, 1.8, 0.0, 0.0 and 0.0 episodes every 1000 mechanical ventilation days. The last VAP episode registered was in March 2014.

Conclusions

The implementation over more than three years of a VAP prevention bundle specifically adapted to our unit was associated with a reduction in VAP rate of 25 percent every six months and a nil rate in the last three and a half semesters.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0723
INVESTIGATING BEHAVIOURAL FACTORS INFLUENCING COMPLIANCE WITH PERSONAL PROTECTIVE EQUIPMENT USE IN A PAEDIATRIC INTENSIVE CARE UNIT

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Aims & Objectives:

Personal protective equipment (PPE) is essential in the prevention of microorganism transfer between patients, staff and surrounding persons. Rosenstock (1962) developed a Health Benefits Model that looks at individual’s perception of variables which influence behaviour and the likelihood of measures being taken to prevent negative health outcomes. Behaviours and knowledge within a tertiary PICU were identified as suboptimal, with limited understanding of causation.

The aim of this project was to assess PPE use within a tertiary PICU and identify and eliminate the barriers of PPE use.

Methods

A bedside audit was completed over a two month period. Episodes of clinical patient interaction were observed and the use of PPE in accordance with hospital policy noted. An electronic survey was concurrently conducted related to staff knowledge, and perceptions influencing their use of PPE within the PICU.

Results

PPE compliance was suboptimal when compared to existing hospital policies. Protective eyewear was utilized in 30%, gloves in 52%, gowns in 11% and masks in 0% of clinical episodes. This lack of compliance correlates with the knowledge deficits identified in the survey. Themes extrapolated from the survey highlighted the influence peers had on staff perception of Rosenstock’s variables and therefore PPE compliance.

Conclusions

Poor compliance with PPE was noted through the audit. Staff survey provided insight into the causation of these behaviors. Education is being provided to change the perceptions of Rosenstock’s variables and improve attitude, culture and compliance with PPE use in the PICU.
Aims & Objectives:

Critically ill children receive many drugs, necessitating concurrent intravenous (IV) administration of infused and injected drugs and introducing risks associated with drug-drug incompatibility. Our objectives were to evaluate the frequency of concurrent administration, and describe the compatibilities of concurrently administered IV drugs.

Methods

A single center retrospective study was performed. Eligible patients were admitted to PICU for at least 6-hours and received at >1 IV drug administration. Main outcomes were the numbers of concurrent IV-drug administrations and the drug-drug compatibilities of concurrently administered drug-drug pairs. Concurrent administration of a drug-drug pair was defined as documented administration of both IV-injections within one hour, of injection during an infusion, and of concurrent infusions. Concurrent administrations were counted and the duration of concurrent IV-infusions was reported.

Compatibilities were classified as Incompatible, Compatible, requiring pharmacist consultation, or unknown.

Results
The 3493 patients were admitted to ICU for 459,386 hours, received 220,519 injections and 12,668 infusions for 459,386 infusion-hours. Each patient received a median(IQR) of 17(7-53) IV-administrations; 648(18.6%) patients received >5 infusions.

There were 629,634 concurrent administrations; 230,759(36.7%) were compatible, 53,323 (5.5%) were incompatible, 32,159 (5.1%) required pharmacist consultation, and 313,393 (49.8%) had ‘unknown’ compatibility. The 22,030 concurrently administered infusion-pairs included 3,287(14.9%) incompatible combinations administered for 188,367 patient-hours.

**Conclusions**

IV-drug administration and concurrent administration is frequent in critically ill children, and a sub-set of children receive many drugs. While incompatible co-administration occurs, the compatibilities of most drug-drug pairs was unknown - adding complexity to routine bedside management and identifying information gaps for future research.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0822
USE OF INOTROPES IN PEDIATRIC ICU: THE MORE THE BETTER?

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²Hospital de Clinicas- UFRGS, Dept Pediatra, Porto Alegre, Brazil

Aims & Objectives:

Hemodynamic support with inotropes in the Pediatric Intensive Care Unit (PICU) is based on consensus driven guidelines since there are few good quality studies. Epinephrine and Norepinephrine are the most commonly utilized drugs. We aim to describe the use of these inotropes in PICU, regardless of the baseline diagnosis.

Methods

Utilizing the unit’s bedside data-bases, PICIS® and PICUEs®, patients (cardiac and non-cardiac) who received inotropes from 01/2010 – 04/2014 were studied. Only the maximum recorded level of Epi&Norepi were analyzed, along with patient outcomes and the utilization of Extracorporeal Life Support (ECLS).

Results

There were 4140 PICU admissions during the study period; 3.7% (154/4140) died; There were 1254 (30%) patients who received Epi or/and Norepi; 8.6% (108/1254) died. A total of 122 patients were on ECLS, 9.7% of patients within the Epi and/or Norepi groups; 41% (50/122) of them for cardiac arrest; 69%(84/122) survived to hospital discharge. Epi was used in 1129 patients; 8.8 % (100/1129) died; a maximum dose < than 0.25 mcg/Kg/min was used in 86% (975/1129). When Epi was used above this threshold, mortality increased from 5,1% (50/975) to 32.5% (50/154). Norepi was used by 566 patients; 13.5% (76/566) died; a maximum dose < than 0.25 mcg/Kg/min was used in 88% (498/566). When Norepi was administered above this threshold, mortality increased from 9% (45/498) to 45.5% (31/68). Epi&Norepi combination was used in 405 patients; 13,8% (56/405) died; when Epi&Norepi were both used at >0.25 mcg/Kg/min, mortality increased from 10,8% (40/371) to 47,0% (16/34).

Conclusions

Inotropes are used in almost half of the PICU admissions. Epinephrine and Norepinephrine are used mostly in low doses in our PICU, with relatively low mortality rates. Further studies are needed to correlate inotropic dosing, mortality and utilization of ECLS, in order to help physicians counsel families about expectations of survival and need for ECLS.
A COMMERCIAL AVAILABLE ACUITY SCORE IS A PREDICTOR OF ACUTE CARE TO INTENSIVE CARE TRANSFER

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\textsuperscript{5}University of Pittsburgh School of Nursing, Nurse Anesthesia, Pittsburgh, USA

Aims & Objectives:

The Pediatric Rothman Index \textsuperscript{®} (pRI) is a commercially available acuity score that is embedded into the electronic medical record (EMR) and is composed of 26 clinical variables. As EMR data accumulates, the pRI is automatically refreshed, providing a visual trend of patient condition over time. This study examines the pRI as a point-of-care predictive tool for identifying patients requiring admission to the pediatric intensive care unit (PICU).

Methods

In this IRB-approved study, data were collected prospectively from April – July 2015. Patients on the acute care floor whose pRI fell below predefined thresholds were identified and characterized, as were all patients requiring transfer from the acute care floor to the PICU in the setting of medical deterioration. A control dataset consisted of inpatients not requiring admission to the PICU.

Results

Alerts triggered by pRI <50 and pRI <40 while on the acute care floor were associated with positive likelihood ratios for requiring transfer to the PICU of 8.0 and 15.6. The median times between an alert and transfer were 7.0 hours (pRI<50) and 6.0 hours (pRI<40). For non-surgical patients, the receiver operating characteristics area under the curve for the pRI 12 hours and 4 hours prior to transfer were 0.71 and 0.72, respectively.

Conclusions

Results to-date suggest that utilizing pRI thresholds can improve timeliness of patient care and matching of hospital resources with patient acuity. An interventional phase is underway to determine whether staff deployment to patients triggering thresholds impacts therapeutic interventions, expedites PICU transfer, and improves quality metrics.
IS THERE MORE MIXING OF IV MEDICINES IN THE PAEDIATRIC OR ADULT ICU?

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²Midlands Critical Care and Trauma Network, Pharmacist Group, Birmingham, United Kingdom

Aims & Objectives:

Mixing of parenteral medicines at the terminal y-site is established practice in intensive care units (ICU). Reasons for mixing drugs include avoiding insertion of extra iv access to allow timely administration or prevent need for central lines. Mixing presents hazards including incompatibility or lack of compatibility seen in ICU due to varying concentration of infusions, especially in paediatrics. This small study compares frequency of mixing IV drugs in adult and paediatric ICU setting.

Methods

The IV access type, IV prescription and which drugs combinations were mixed at the terminal y-site was collected as a single snap shot across AICU and PICU.

Results

Thirty AICU and 18 PICU patients were included, with 212 and 119 IV continuous or intermittent infusion prescriptions respectively.

AICU 71/122 (58%) continuous infusions were mixed and 37/60 (61%) in PICU. PICU patients had less IV access per patient than AICU (1 : 1.35), as shown in table below.

<table>
<thead>
<tr>
<th>Type of IV access</th>
<th>Peripheral</th>
<th>Single central</th>
<th>Double central</th>
<th>Triple central</th>
<th>Quad central</th>
<th>Quin central</th>
<th>No central</th>
</tr>
</thead>
<tbody>
<tr>
<td>AICU</td>
<td>58</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>16</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>PICU</td>
<td>36</td>
<td>6*</td>
<td>1*</td>
<td>9*</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

*4 PICU patients had more than 1 central line insitu

In PICU, 1 in 2.15 prescriptions were mixed, compared with 1 in 2.5 prescriptions. Rate of mixing per line was 1 line in 1.29 in PICU with 1 in 1.93 lines needing to be used to mix drugs in the adult setting.
Three or more drugs were mixed via single IV access on 7/55 (12.7%) occasions in PICU compared to 1/83 (1.2%) in AICU.

Conclusions

Mixing of IV medicines is more common in PICU, with more drugs being mixed via same IV access in children.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0095
RESEARCH WITHOUT PRIOR CONSENT IN PAEDIATRIC INTENSIVE CARE - A QUALITATIVE EXPLORATION OF NURSES’ PERCEPTIONS

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²University of Manchester, School of Nursing- Midwifery and Social Work, Manchester, United Kingdom

Aims & Objectives:

Recruitment to paediatric intensive care research is known to be difficult due to the small therapeutic window for treatment and high levels of parental anxiety. To overcome barriers to recruitment UK legislation made provision for research without prior consent (RWPC), (The Medicines for Human Use (Clinical Trials) and Blood Safety and Quality (Amendment) Regulations (2008). RWPC is used for enrolling participants to trials, although its use remains controversial (Neuman et al. 2015). Understanding nurses’ and research nurses’ opinions is important as they play a crucial role in RWPC. The aim of this study was to explore nurses’ views of RWPC in the intensive care unit of a paediatric hospital.

Methods

Using a grounded theory approach, 10 participants, including intensive care bedside nurses and research nurses were recruited and participated in either a focus group or semi-structured interview between April-June 2015.

Results

Five themes emerged including, the importance of research, ambivalence about RWPC, considering potential implications, defining acceptable contexts and strategies. Although nurses felt paediatric intensive care research was fundamental and recognised benefits of RWPC, they were ambivalent about RWPC. Nurses felt particularly anxious and fearful when parents were present at the time of enrolment and when trials involved blood sampling or perceived higher risk interventions. Nurses identified strategies such as communicating well, deflecting responsibility and avoidance, to cope with their involvement in RWPC.

Conclusions

Staff involved in RWPC need to receive adequate support and further training about RWPC.
QUALITY AND SAFETY (ERROR/NOSOCOMIAL INFECTION/DATA MANAGEMENT)

PICC-0049
EXPLORING MEDICATION ERRORS AND DOCTORS’ AND NURSES’ PERCEPTIONS OF THEM IN THE PAEDIATRIC INTENSIVE CARE UNIT (PICU)

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²School of Health- University of Central Lancashire- UK, Children’s Nursing Research Unit- Alder Hey Children’s Foundation Trust- UK, Liverpool, United Kingdom

Aims & Objectives:

Background: Despite the introduction of numerous strategies to reduce medication errors, error rates over the last 5 years in our PICU had not reduced and the same errors were being repeated, suggesting inadequate learning from errors.

The aim of this study was to gain an understanding of medication error (ME) occurrence in one Paediatric Intensive Care Unit and explore the paediatric intensive care team’s perceptions of MEs and how they perceive they learn from them.

Methods

Mixed methods study involving 2 focus groups, 6 interviews, content analysis of 39 reflective learning tools and observations of nurses administering medication on the PICU.

Results

The focus groups and interviews generated three overlapping core categories, which were linked by a meta-category: ‘The reality of practice’, which provided a means of synthesising the range of participants’ perceptions and practices. The three core categories were: perceived culture of blame on PICU; factors affecting ME reporting; and learning from MEs. Interruptions and distractions were observed to increase violations of protocol. Three MEs were observed out of 59 medication administration episodes; none of these errors were reported formally.

Analysis of the reflective learning tool highlighted a lack of detailed, self-analysis and reflection following an error and poor demonstrating of learning.

Conclusions

A perception of blame culture still exists at times on the PICU, which inhibits reporting and thus learning from errors. Interruptions during both prescribing and administration were common and should not be accepted or tolerated as normal. Varied definitions of what constitutes a ‘medication error’ impacted on error reporting rates.
Aims & Objectives:

An intensive care ward round involves the communication of large amounts of clinically important information amongst a large number of personnel in limited time. There are significant challenges which can jeopardise the effectiveness of a ward round. We describe how a ward round was restructured and a ‘footprint for discussion’ implemented to enhance quality and safety (figure 1). The footprint included a description of where key personnel should stand, and in what order information should be discussed. A novel teaching programme was also integrated into the ward round structure.
Methods

A pre and post intervention observational study in a 14 bed PICU (Paediatric intensive care unit).

Results

Surveys of staff before and after the intervention showed the new ward round format was well received. The rounds felt more inclusive and were easier to understand (figure 2), and improvements were shown across a number of quality indicators (figure 3). The ‘plan concordance’ (where the lead clinician felt the ward round documentation was accurate) increased from 74% to 93% (p<0.01). The proportion of patient contact episodes where the prescription chart was reviewed increased from 30.5% to 91.7% (p<0.01); and the proportion of patient contact episodes which terminated with the completion of the unit safety checklist increased from 84.3% to
95.6% (p<0.01). The teaching programme was considered valuable by 83% of trainees.

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre</th>
<th>Post</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team members who felt valued on the round (%)</td>
<td>46.4</td>
<td>80</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Team members who had difficulty hearing the discussion (%)</td>
<td>82.8</td>
<td>58</td>
<td>0.02</td>
</tr>
<tr>
<td>Team members who felt they had a good understanding (%)</td>
<td>53.6</td>
<td>85.7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Team members who felt the ward round was too crowded (%)</td>
<td>82.8</td>
<td>69.4</td>
<td>0.16</td>
</tr>
<tr>
<td>Team members who felt they had opportunity to speak (%)</td>
<td>20.7</td>
<td>76</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Team members who felt the round was a good learning experience (%)</td>
<td>14.8</td>
<td>61.2</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

**Figure 2. Staff satisfaction with the ward round pre and post intervention**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Pre</th>
<th>Post</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean bedside ward round duration (mins)</td>
<td>37</td>
<td>62</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Mean time per patient (mins)</td>
<td>2.9</td>
<td>5.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Consultant contributed to ward round (%)</td>
<td>95.9</td>
<td>97.2</td>
<td>0.49</td>
</tr>
<tr>
<td>Fellow contributed to ward round (%)</td>
<td>87.3</td>
<td>95.6</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Bedside nurse contributed (%)</td>
<td>97.5</td>
<td>98.3</td>
<td>0.38</td>
</tr>
<tr>
<td>Blood tests discussed (%)</td>
<td>13.7</td>
<td>43.6</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Drug chart reviewed (%)</td>
<td>30.5</td>
<td>91.7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Plan clearly stated (%)</td>
<td>95.4</td>
<td>86.7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>DEFAULT stated (%)</td>
<td>84.3</td>
<td>95.6</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

**Figure 3. Key ward round metrics pre and post intervention**

**Conclusions**

Restructuring of the ward round and the implementation of a ‘footprint for discussion’ led to improvement in ward round quality indicators, with potential benefits for patient care and safety, and greater staff satisfaction.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0188
EARLY UNPLANNED READMISSIONS TO PICU: DOES DAY OR TIME OF DISCHARGE MATTER?
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¹Birmingham Children’s Hospital, PICU, Birmingham, United Kingdom

Aims & Objectives:

Early unplanned readmission to paediatric intensive care unit (PICU) is widely acknowledged as a quality marker. We analysed the effect of out-of-hours discharge on the odds of 48-hour unplanned readmissions to PICU.

Methods

We performed a retrospective analysis of prospectively collected data of all patients admitted during a 12 year period (2004-2015). Day and time of index discharge were analysed along with other key explanatory variables related to 48 hour unplanned readmissions to PICU in a logistic regression model. Time of discharge was categorised as in-hour discharges (06:00-17:59); early (18:00-23:59) and late out-of-hour (00:00-05:59) discharges.

Results

9,820 patients had 14,619 admissions. There were 394 unplanned readmissions within 48 hours of index discharge. 75% of all discharges occurred in-hours with only 4.4% late out-of-hour discharges. Unplanned readmissions occurred in 2.4% of all in-hour discharges compared to 3% of late and 3.5% of early out-of-hour discharges. Unplanned readmission rates based on day of index discharge varied between 2.3% (Tuesday) and 3.1% (Wednesday). Logistic regression analysis (Table 1) revealed
that early out-of-hours discharges were associated with higher odds of unplanned readmission.

**Table 1: Logistic regression analysis of variables associated with 48 hour unplanned readmission to PICU**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>95% Confidence Intervals</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>0.98</td>
<td>0.98 – 1.00</td>
<td>0.13</td>
</tr>
<tr>
<td>Length of stay (days)</td>
<td>1.01</td>
<td>1.00 – 1.01</td>
<td>0.03</td>
</tr>
<tr>
<td>Admission diagnostic category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Ref=Cardiovascular]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory</td>
<td>1.06</td>
<td>1.02 – 2.19</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Infection</td>
<td>2.05</td>
<td>1.31 – 3.09</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Endocrine/metabolic</td>
<td>2.37</td>
<td>1.29 – 4.05</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Oncology</td>
<td>2.10</td>
<td>1.21 – 3.45</td>
<td>0.01</td>
</tr>
<tr>
<td>Other</td>
<td>1.96</td>
<td>1.34 – 2.82</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Trauma</td>
<td>0.49</td>
<td>0.17 – 1.09</td>
<td>0.12</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>1.02</td>
<td>0.86 – 1.54</td>
<td>0.61</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>1.13</td>
<td>0.44 – 2.41</td>
<td>0.77</td>
</tr>
<tr>
<td>Blood/lymph</td>
<td>1.71</td>
<td>0.80 – 3.89</td>
<td>0.25</td>
</tr>
<tr>
<td>Neurological</td>
<td>1.42</td>
<td>0.96 – 2.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Multisystem</td>
<td>0.54</td>
<td>0.03 – 2.48</td>
<td>0.54</td>
</tr>
<tr>
<td>Female sex [Ref=Male]</td>
<td>0.99</td>
<td>0.79 – 1.21</td>
<td>0.73</td>
</tr>
<tr>
<td>PIN score</td>
<td>0.54</td>
<td>0.19 – 1.34</td>
<td>0.22</td>
</tr>
<tr>
<td>Day of discharge [Ref=Friday]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monday</td>
<td>0.94</td>
<td>0.54 – 1.68</td>
<td>0.77</td>
</tr>
<tr>
<td>Tuesday</td>
<td>0.88</td>
<td>0.59 – 1.12</td>
<td>0.42</td>
</tr>
<tr>
<td>Wednesday</td>
<td>1.17</td>
<td>0.83 – 1.65</td>
<td>0.38</td>
</tr>
<tr>
<td>Thursday</td>
<td>1.02</td>
<td>0.71 – 1.45</td>
<td>0.83</td>
</tr>
<tr>
<td>Saturday</td>
<td>0.90</td>
<td>0.61 – 1.32</td>
<td>0.58</td>
</tr>
<tr>
<td>Sunday</td>
<td>1.02</td>
<td>0.59 – 1.51</td>
<td>0.91</td>
</tr>
<tr>
<td>Discharge time [Ref=in-hours (06.00 – 17.59)]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late out-of-hours (00.00 – 05.59)</td>
<td>1.22</td>
<td>0.74 – 1.90</td>
<td>0.12</td>
</tr>
<tr>
<td>Early out-of-hours (18.00 – 23.59)</td>
<td>1.38</td>
<td>1.09 – 1.73</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**Conclusions**

Discharges between 18:00-23:59 hours were associated with higher odds of 48-hour unplanned readmissions to PICU. More detailed exploration of this data for modifiable (or) preventable factors associated with such readmissions is planned.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0450
RADIATION EXPOSURE IN PICU PATIENTS: HOW MUCH IS TOO MUCH?
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2St. John Hospital and Medical Center, Department of Radiology, Detroit, USA
3St. John Hospital and Medical Center, Director of Research, Detroit, USA
4St. John Hospital and Medical Center, Department of Pediatrics, Detroit, USA

Aims & Objectives:
Introduction: Critically ill patients tend to receive numerous radiologic studies, which are important for management. Children are more susceptible to adverse effects of radiation. No single study has assessed exposure and risk factors in all pediatric ICU patients, although prior studies have studied specific pediatric subgroups.

Objectives: To determine 1) Median cumulative radiation exposure in all PICU admissions; 2) Percentage of PICU patients with hospital radiation exposure above the US background level; 3) Demographic and clinical risk factors for increased radiation exposure.

Methods
This was a retrospective chart review of all patients admitted to the PICU at St. John Hospital and Medical Center from January 1, 2013 to December 31, 2014 (n=624). The average annual background radiation per person in the US, 6.2 millisieverts (mSv), was used as the baseline exposure. The radiation safety officer calculated radiation exposure in mSv for each radiologic study ordered per patient during the hospitalization. Exposures were classified ≤ or > 6.2 mSv. Data were analyzed using Student’s t-test, the χ² test and logistic regression.

Results
Median radiation exposure of PICU patients was 0.2 mSv (IQR 2.1). Out of 624, 11.7% patients received >6.2 mSv. Predictive risk factors for high radiation exposure included admission for trauma or surgery (OR=4.9), number of CT scans (OR=4.2), age (OR=1.3), and PICU length of stay (OR=1.2) (all p<0.0001).

Conclusions
Radiation exposure exceeded US annual background levels in 1 out of 9 PICU patients. Current practices of ordering radiologic tests, weighing risks and benefits, particularly in trauma and surgery patients should be evaluated critically. There is strong need for following radiation exposures for PICU patients especially those with longer stay.
QUALITY AND SAFETY (ERROR/NOSOCOMIAL INFECTION/DATA MANAGEMENT)

PICC-0830
THE ROLE OF THE UNIT SKIN CHAMPION IN THE PREVENTION OF PRESSURE ULCERS IN A PEDIATRIC CARDIAC INTENSIVE CARE UNIT
S. Keller¹, N. Gereau¹
¹Children's Hospital of Wisconsin, Cardiac ICU, Milwaukee, USA

Aims & Objectives:

Objective/Aim: The aim is to reduce the number of significant pressure ulcers (Stage III, IV, or unstageable) by 25% through the use of five interventions identified by the Solutions for Patient Safety Collaborative (SPS). Staff nurses in the Pediatric Cardiac Intensive Care Unit, serving as Skin Champions, support and educate nursing staff on the use of the five interventions.

Background: Pressure Ulcers remain a risk for complex hospitalized children. The SPS team identified methods to decrease the risk of pressure ulcers, including: skin assessment, device rotation, reposition, moisture management, and appropriate bed surface documentation. However, adherence to and documentation of these interventions by nursing staff proved challenging to unit nurses.

Methods

Quality Improvement Methods: Unit skin champions identified barriers to nurse compliance with interventions and documentation through weekly rounding with staff. They round weekly on every patient in the unit, review nurse documentation, perform skin assessments of patients, and give recommendations on prevention of pressure ulcers and treatment of Stage I and Stage II ulcers.

Results

Results: Compliance with all five interventions of the SPS recommended bundle increased from 18% in January 2015 to 62% in December 2015. Compliance of each individual intervention increased as well. Skin assessment from 61% to 94%; device rotation from 82% to 99%; reposition documentation from 47% to 73%; moisture management from 92% to 94%; and bed surface documentation from 65% to 89%. In 2014, the unit had 5 serious pressure ulcers, with a total of 2 in 2015, reflecting a 60% decrease in the total number of significant pressure ulcers; well above the goal of a 25% reduction.

Conclusions

Conclusion: The role of the Unit Skin Champion has been instrumental in increasing the compliance rate and decreasing the incidence of serious pressure ulcers for patients in the Pediatric Cardiac Intensive Care Unit.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0533
DEVELOPMENT, DISSEMINATION AND IMPLEMENTATION OF PREPRINTED PHYSICIAN ORDERS IN A PEDIATRIC INTENSIVE CARE UNIT TO PROMOTE BEST PRACTICE AND SAFETY
S.A. Marsh1,2, B. Churchill3, S. Strangemore2, O.J. Barter1,2, S. Waheed1,2, K. Krmpotic1,2
1Memorial University of Newfoundland, Pediatrics, St. John’s, Canada
2Janeway Children’s Health and Rehabilitation Centre, Pediatrics, St. John’s, Canada
3Janeway Children’s Health and Rehabilitation Centre, Pharmacy, St. John’s, Canada

Aims & Objectives:
The use of standardized physician order sets has been demonstrated to improve patient care by reducing the potential for medical error and promoting adherence to best practice guidelines, without negatively impacting medical resident or medical undergraduate education.

Methods
As part of a quality improvement initiative, we performed a retrospective audit to identify the most common diagnoses of children admitted to the Pediatric Intensive Care Unit at our institution. We identified five common diagnoses: diabetic ketoacidosis, respiratory insufficiency, seizures / status epilepticus, sepsis, and severe traumatic brain injury. We conducted a review of the literature to determine best practice guidelines for management of each of these conditions to guide development of the preprinted orders.

Results
We formed a multidisciplinary group to develop the preprinted orders which underwent review by hospital committees prior to dissemination and implementation. Knowledge translation activities included presentation at institutional Grand Rounds, mandatory education days for Pediatric Intensive Care nurses, and self-directed educational modules for resident physicians. In total, five standardized, preprinted physician order sets were simultaneously released for use in our Pediatric Intensive Care Unit.

Conclusions
Use of a rigorous and evidence-based development process combined with knowledge translation activities allows for the successful dissemination and implementation of standardized, preprinted physician orders that promote best practice and patient safety in the Pediatric Intensive Care Unit.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0460
EDUCATION PROGRAM IMPACT IN THE VENTILATOR-ASSOCIATED PNEUMONIA PREVENTION (VAP)
A.L. Capelari Lahoz¹, A. Figueiredo Delgado¹, R.C. Turola Passos Juliání¹, W. Brunow de Carvalho¹, E. Juan Troster²
¹Instituto da Criança do Hospital das Clínicas da FMUSP, Pediatria, São Paulo, Brazil

Aims & Objectives:

Background: Patients with VAP are at substantially higher risk for mortality and morbidity across pediatric intensive care units (PICU). Educational Programs (EP) can be effective to prevent this condition. Objectives: To evaluate the incidence of VAP and the impact of EP.

Methods

A prospective study was conducted in the PICU through continuing education with 49 non-medical professionals, and it was developed in three phases: 1. Epidemiologic profile of infections (October, 2013 - March, 2014); 2. Educational intervention for measures in preventing VAP (April - September, 2014) and 3. The effect of education intervention in the VAP density incidence (October, 2014 - March, 2015). Demographic data were described in terms of percentages. To compare the quantitative and qualitative variables between pre and post interventions we used the Kruskal-Wallis test and the chi-square test, respectively. VAP density incidence and mechanical ventilation (MV) utilization rate for pre and post intervention were calculated and compared using the chi-square test.

Results

The trained professionals had an average of 3 years of experience in ICU. Comparing the pre and post training periods, the epidemiological profile of patients was homogeneous, there was a decrease in VAP incidence (p = 0.001), despite an increase in the rate of dysfunction of multiple organs and systems in the last period (p = 0.013). The incidence of VAP decreased from 12.95/1000 days of MV in phase pre training to 3.43/1000 days of MV in phase post training. There was predominance of Gram- negative pathogens in the two phases.

Conclusions

The decrease in VAP provides a promising example of the potential of educational intervention and bundle implementation in PICU.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0422
WHAT IS "NORMAL"? RESETTING CVICU VITAL SIGN REFERENCE RANGES IN THE MODERN ERA
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L. Shekerdemian¹
¹Baylor College of Medicine- Texas Children’s Hospital,
Department of Pediatrics- Section of Critical Care Medicine, Houston, USA
²Baylor College of Medicine- Texas Children’s Hospital,
Department of Pediatrics- Section of Cardiology, Houston, USA

Aims & Objectives:

The current era of physiologic vital sign (VS) monitoring has expanded our capacity for data management. Using novel software, we sought to create vital sign percentile curves for cardiovascular intensive care unit (CVICU) patients to aid in recognition of early clinical decompensation (ECD) while comparing vital sign distributions to previously published percentile curves from hospitalized non-ICU patients (Bonafide et al.) as well as PALS reference ranges.

Methods

Cross-sectional database analysis of CVICU patients utilizing time-stamped VSs (heart rate [HR]; respiratory rate [RR]) downloaded continuously throughout admission from bedside monitors for patients < 18 years of age requiring cardiac surgery over 2 years (2013-2014). VS histograms were translated into age-specific percentile curves and reference ranges were compared to determine overlap and deviation.

Results

Utilizing data from 1,616 patient encounters (1,734 admissions), we analyzed between 782 million (RR) to 1.1 billion (HR) seconds of VS recordings. Graphical comparison across VSs revealed broader HR and RR percentile variation for similar age groups when compared to non-ICU children. PALS criteria limits for HR revealed similar lower limits. However, PALS upper limits demonstrated broader variation throughout the age spectrum. RR upper and lower limits were significantly broader when compared to PALS limits.
Conclusions

High-fidelity VS data can provide CVICU physicians with empiric reference ranges that extend beyond existing reference ranges. These percentile curves can be used to modify existing bedside monitor alarms, early warning score systems, and electronic health record VS alert systems to improve recognition of ECDs in the CVICU.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0167
IMPROVEMENT IN ENDOTRACHEAL INTUBATION SUCCESS RATES AND REDUCTION IN COMPLICATIONS IN A PEDIATRIC INTENSIVE CARE UNIT THROUGH IMPLEMENTATION OF VIDEO LARYNGOSCOPY AND AN INTUBATION CHECKLIST
L. Lee¹, S. Parsons¹, S. Llibey¹
¹Alberta Children’s Hospital, Pediatric Intensive Care Unit, Calgary, Canada

Aims & Objectives:

Endotracheal intubation has been shown to be a high risk procedure with significant morbidity and mortality in critically ill children. The complication rates for children undergoing endotracheal intubation has been shown to be up to 20%, with 6.5% being severe, and a 0.5-6% mortality rate.¹²³ Also reported consistently is a high failure rate of achieving intubation on the first attempt.³⁴⁵⁶ In order to reduce these risks to our patients during this usually life saving procedure, we implemented the use of video laryngoscopy and an intubation checklist. The purpose of this study was to determine our complication rate and whether the implementation of the above had any positive effect.

Methods

Data on all intubations occurring in the PICU was collected prospectively on our CIS (Metavision). We retrospectively reconciled the data with the full medical record for all intubations occurring between April 2014 and November 2015. Tube exchanges were excluded. Complications were defined based on the definitions provided by Near4Kids.³⁶

Results

119 Intubations were documented. Intubation was successful on first attempt in 98 (83%), on second attempt in 17 (14%), and on third attempt in 4 (3%) of all intubations. The total complication rate (excluding desaturation) was 8/119 (6.7%), with 3 (2.5%) being minor and 5 (4.2%) being major. Videolaryngoscopy was used in 96/103 (93%) of intubations. Over time the first attempt intubation rate increased from 20/26 (77%) to 25/28 (89%), and the first attempt and no complication rate increased from 19/26 (73%) to 24/26 (86%). Both trends were significant on Mann-Kendall testing.
Conclusions

Implementation of videolaryngoscopy and an intubation checklist correlated with lower than reported complication rates and continued improvement in 1st attempt and 1st attempt without complication over time. There are likely other site factors associated with the study results that need to be further explored.
References


QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0352
INTUBATION SUCCESS AND COMPLICATION RATE BY DISCIPLINE: IS A TEAM APPROACH BEST?
L. Lee¹, S. Parsons¹, S. Libbey¹
¹Alberta Children’s Hospital, Pediatric Intensive Care Unit, Calgary, Canada

Aims & Objectives:

Endotracheal intubation is a high risk procedure with significant morbidity and mortality in critically ill children. Complication rates can be to be up to 20%. Also reported is a high first attempt failure rate and a greater complication rate with more frequent attempts. Sander et al. looked at the level of trainee and found that inexperienced laryngoscopists have a high intubation failure and complication rate. The purpose of this study was to determine the 1st attempt success and complication rate for the various disciplines in our PICU.

Methods

Data on all intubations occurring in the PICU was collected prospectively on our CIS (Metavision). It was retrospectively reconciled the medical record for all intubations occurring between April 2014 and November 2015. Tube exchanges were excluded. Complications were defined based on the definitions provided by Near4Kids.

Results

119 intubations were documented, with the intubator documented for 107/119 (90%). Intubations were performed by an Anesthesiologist 1/107 (1%), Clinical Assistant 8/107 (7.5%), Pediatric Intensivist 45/107 (42%), Nurse Practitioner 13/107 (12%), Resident 20/107 (18.6%), and a Respiratory Therapist 19/107 (17.8%). All non-intensivist intubations were supervised or attended by an intensivist. The NP/CA group was found to have a higher first attempt rate and a lower complication rate vs both the intensivist group and all other groups combined. Both of these were statistically significant by Chi-Squared testing (P<0.05)
### Number of Intubation Attempts by Designation

<table>
<thead>
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<th>Designation</th>
<th>1 Attempt</th>
<th>2 Attempts</th>
<th>3 Attempts</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP</td>
<td>13/13 (100%)</td>
<td>0/0 (0%)</td>
<td>0/0 (0%)</td>
</tr>
<tr>
<td>CA</td>
<td>0/0 (0%)</td>
<td>0/0 (0%)</td>
<td>0/0 (0%)</td>
</tr>
<tr>
<td>Intensivist</td>
<td>35/45 (78%)</td>
<td>8/45 (18%)</td>
<td>2/45 (4%)</td>
</tr>
<tr>
<td>Resident</td>
<td>16/20 (80%)</td>
<td>4/20 (20%)</td>
<td>0/0 (0%)</td>
</tr>
<tr>
<td>RT</td>
<td>16/19 (84%)</td>
<td>3/19 (16%)</td>
<td>0/0 (0%)</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>0/1 (0%)</td>
<td>0/1 (0%)</td>
<td>1/1 (100%)</td>
</tr>
</tbody>
</table>

Legend:
- Blue: 1 attempt
- Red: 2 attempts
- Green: 3 attempts
Conclusions

The NP/CA group with a Pediatric Intensivist in attendance had significantly higher 1st attempt intubation and lower complication rates than all others. More variables, including severity of illness, markers of oxygenation and heart failure, need to be explored to determine the validity of these results. However, they may suggest that the combination of an experienced intubator (NP/CA) managing the airway while the Pediatric Intensivist manages all other patient care provides the best outcome for the patient.
References


A review of reported medication errors in a 23 bed PICU related to the delivery of medication via continuous or intermittent intravenous infusions. The review identified that errors were related to human factors involved with programing the delivery device.

The implementation of a Drug Library with integrated guardrail software had potential to significantly reduce the probability for programing errors caused by human factors.

Methods

A nursing, medical and pharmacy project team developed a drug library with default settings for; rate, upper and lower dose limits and bolus settings of the 180 medications delivered via intravenous infusion. The data was edited by the device company to meet software programming and display requirements. Final drug library sign off occurred, following independent keystroke testing by the multidisciplinary team.

Results

Through a two day structured roll out the drug library and guard rail package was successfully implemented to all continuous infusion delivery devices. Device champions provided educational support on rotating shifts, 24 hours a day, during the implementation. Twelve months post introduction the programming errors have reduced to zero.

Conclusions

100% of nursing staff are proficient in the use of the Drug Library and Guard rail software. Evaluation of the implementation process was positive, the transition was smooth and had minimal disruption to bedside patient care and has resulted in a significant reduction in medication errors related to continuous intravenous medication delivery.
Aims & Objectives:

Risks to patients, providers and other occupants during transport still do exist, though identifying independent non industry sponsored technically sound and safe design innovation is difficult and challenging.

The Innovation Design Module (INDEMO) 1.0 project was developed as an independent non industry driven interdisciplinary social good open source project to address this issue and to provide the clinicians with a science driven design module to guide their vehicle specs. Its goal to be a mobile, open sourced mobile demonstration environment, that is interactive, full size and accessible – both hands on and virtually (via telepresence robotics) - and to be disseminated and accessible throughout the patient transport community.

Methods

INDEMO 1.0 was designed by a team of interdisciplinary technical experts and operational providers. All existing technical transportation resources in engineering and medical literature were researched, a design platform was developed to address safety and operational efficiency based on sound technical engineering and operational science. INDEMO 1.0 design is also configurable to meet diverse transport needs and circumstances. To facilitate access to the design module, an interactive drivable mobile telepresence robot was selected to be utilized to explore the design module from any site globally, with a smartphone, tablet or laptop.

Results

The INDEMO 1.0 project was launched in 2013 and deployed at national and regional conferences, and onsite workshops. INDEMO has interacted with > 450 personnel, including transport providers, clinicians, EMS providers, and ambulance manufacturers with hands on inspections and also virtual tours via the telepresence robot. Feedback has been very positive from the majority of those interacting with INDEMO.

Conclusions

Use of an interdisciplinary design team to build a mobile full-size patient transport environment based on technical engineering science is achievable. Such a tool is
regarded as valuable and very accessible, both hands on and virtually, by transport providers and their services.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0439
PEDIATRIC CRITICALLY ILL PATIENTS ADMITTED TO A BRAZILIAN PEDIATRIC INTENSIVE CARE UNIT: AN EPIDEMIOLOGICAL PROFILE
F. Lima-Setta¹, D.M.L. Caixeta¹, D.C.B.C. Moore¹, Z.M.A. Azevedo¹
¹Instituto Fernandes Figueira - Fundação Oswaldo Cruz - FIOCRUZ, Pediatric Intensive Care Unit, Rio de Janeiro, Brazil

Aims & Objectives:

Demographic and clinical data from pediatric intensive care units in latin-america are still rare in current literature. The aim of this study is to describe a cohort of pediatric critically ill patients admitted to a 6-beds public brazilian pediatric intensive care unit (PICU) in Rio de Janeiro, during 19 months.

Methods

Secondary data analysis from electronic database prospectively collected from hospitalized patients in the period from March 1st 2014 to October 30th 2015.

Results

During the study period 192 patients were hospitalized, from whom 73 (38%) were female; 116 infants, 44 toddler, 16 scholars e 16 adolescents. The median and the mean age of the patients were 11 (5-44.3) and 34.5 (0-179) months, respectively. There were 49 non-SIRS/non-sepsis patients, 29 SIRS, 62 sepsis, 10 severe sepsis and 41 septic shock. The mean PIM2 was 5.0 (0.1-77) and the mean PRISM was 4.5 (0.2-89.9). Nine patients presented more than four organ dysfunctions and seven patients died (3.6%). The PIM standardized mortality rate was 0.72, while PRISM standardized mortality rate was 0.8.93 patients (48.4%) required invasive mechanical ventilation and 52 (27%) non-invasive mechanical ventilation with a median of 8 days (2-6.2) in mechanical ventilation. From the 93 ventilated-patients, 53 (57.0%) developed acute lung injury and 23 (24.7%) developed ARDS. All ARDS-patients were treated with protective mechanical ventilation, 13 (56.5%) were submitted to prone position, 7 (30.4%) to pulmonary recruitment, 6 (26.1%) to oscillatory high frequency ventilation, 17 (73.9%) to inhaled nitric oxide therapy and 6 (26.1%) to surfactant instillation as they were refractory to conventional treatment. The mean and the median PICU length-of-stay were 9.2 (0-104) and 4 (2-11), respectively.

Conclusions

During the study period, the demographic and clinical data from this low-income country pediatric critical care unit was similar to current medical literature from developed countries.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0521
PREDICTORS AND OUTCOME IN PEDIATRIC CRITICALLY ILL PATIENTS IN BRAZIL: A MULTICENTER STUDY
A.P. Barbosa¹, F. Lima-Setta¹, A.J.L.A. Cunha¹, C.E. Raymundo¹, J.R. Robaina¹, M.C.B. Barbosa¹
¹Instituto D’Or de Pesquisa e Ensino IDOR, Pediatric Research Department, Rio de Janeiro, Brazil

Aims & Objectives:

The attempt to identify possible risk factors for death in critically ill children is extremely relevant to clinical practice.

To identify possible risk factors associated with death in pediatric critically ill patients.

Methods

Data from patients admitted to six pediatric critical care units (PICU) in Rio de Janeiro, Brazil, from August 1st 2011 to July 31st 2015 was retrospectively analyzed. Categorical variables were compared with chi-square tests, and medians with Mann-Whitney tests. Logistic regression was performed to generate odds ratios. P ≤ 0.05 and 95% CI were considered in the analysis.

Results

From 6572 included/6575 eligible patients, 3598 (53.3%) were male and the median age was 30 months (10-84). Death occurred in 109 patients (1.6%) patients. The median PIM and PRISM score were higher in patients who died (PIM 0.86 x 5.81, p<0.001; PRISM 2 x 11, p<0.001). Gender and age were not associated with death in this population, while readmission in 24 hours, use of vasoactive drugs, invasive mechanical ventilation, parenteral nutrition, blood transfusion, renal support and cardiac arrest prior to admission were (p<0.001). The risk of death increased 1% for each day of PICU stay (OR 1.01; 95% CI 1.01-1.02), but not for duration of mechanical ventilation.
Table 1 - Characteristics of study population

<table>
<thead>
<tr>
<th></th>
<th>n (%)</th>
<th>Median (P25-P75)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total patients</td>
<td>6752 (100)</td>
<td>30 (10 - 84)</td>
</tr>
<tr>
<td>Age months</td>
<td></td>
<td>3 (2 - 5)</td>
</tr>
<tr>
<td>Length of stay in ICU (days)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>3041 (45)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3598 (53.3)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>113 (1.7)</td>
<td></td>
</tr>
<tr>
<td>Use of mechanical ventilation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>6209 (92)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>543 (8)</td>
<td></td>
</tr>
<tr>
<td>Use of vasoactive drugs-N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>6316 (93.5)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>336 (5)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>100 (1.5)</td>
<td></td>
</tr>
<tr>
<td>Deaths</td>
<td>109 (1.6)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 – Comparison between patients who died and survivors

<table>
<thead>
<tr>
<th>Variable</th>
<th>General Median (P25-P75)</th>
<th>Survivors Median (P25-P75)</th>
<th>Death Median (P25-P75)</th>
<th>p-value</th>
<th>OR (95% CI) add 1 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>30 (10-84)</td>
<td>30 (10-84)</td>
<td>31 (12-105)</td>
<td>0.294*</td>
<td></td>
</tr>
<tr>
<td>PRISM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score</td>
<td>2 (0-5)</td>
<td>2 (0-5)</td>
<td>11 (0-5)</td>
<td>&lt;0.001*</td>
<td></td>
</tr>
<tr>
<td>Death Probability</td>
<td>0.54 (0.46 - 1.22)</td>
<td>0.54 (0.46 - 1.19)</td>
<td>4.53 (1.07 - 17.52)</td>
<td>&lt;0.001*</td>
<td></td>
</tr>
<tr>
<td>PIM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score</td>
<td>0.87 (0.38 - 1.4)</td>
<td>0.86 (0.37 - 1.36)</td>
<td>5.81 (2.78 - 19.69)</td>
<td>&lt;0.001*</td>
<td></td>
</tr>
<tr>
<td>Duration of Mechanical Ventilation</td>
<td>3 (1-9)</td>
<td>3 (1-8)</td>
<td>5 (1-10.25)</td>
<td>0.824*</td>
<td>0.68** 0.99 (0.96-1.03)</td>
</tr>
<tr>
<td>PICU length of stay</td>
<td>3 (2-5)</td>
<td>3 (2-5)</td>
<td>5 (1-14)</td>
<td>&lt;0.001*</td>
<td>1.01 (1.01-1.02)</td>
</tr>
</tbody>
</table>

*Mann-Whitney test
**Wald test
Table 3 - Risk factors for death

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survivors N (%)</th>
<th>Death N (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>2991 (45)</td>
<td>48 (44)</td>
<td>0.954**</td>
</tr>
<tr>
<td>M</td>
<td>3538 (53.3)</td>
<td>60 (55)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>112 (1.7)</td>
<td>1 (0.9)</td>
<td></td>
</tr>
<tr>
<td>Age (months)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1</td>
<td>362 (5.5)</td>
<td>5 (4.6)</td>
<td>0.224*</td>
</tr>
<tr>
<td>2-11</td>
<td>1518 (22.9)</td>
<td>20 (18.3)</td>
<td></td>
</tr>
<tr>
<td>12-47</td>
<td>2203 (33.2)</td>
<td>43 (39.4)</td>
<td></td>
</tr>
<tr>
<td>48-143</td>
<td>1776 (26.7)</td>
<td>23 (21.1)</td>
<td></td>
</tr>
<tr>
<td>≥144</td>
<td>782 (11.8)</td>
<td>18 (16.5)</td>
<td></td>
</tr>
<tr>
<td>Readmission in 24h</td>
<td></td>
<td></td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>No</td>
<td>6271 (94.4)</td>
<td>93 (85.3)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>370 (5.6)</td>
<td>16 (14.7)</td>
<td></td>
</tr>
<tr>
<td>Use of vasoactive drugs</td>
<td></td>
<td></td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>No</td>
<td>6285 (96.1)</td>
<td>31 (28.4)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>256 (3.9)</td>
<td>78 (71.6)</td>
<td></td>
</tr>
<tr>
<td>Mechanical Ventilation</td>
<td></td>
<td></td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>No</td>
<td>6194 (93.3)</td>
<td>14 (12.8)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>447 (6.7)</td>
<td>95 (87.2)</td>
<td></td>
</tr>
<tr>
<td>Parenteral nutrition</td>
<td></td>
<td></td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>No</td>
<td>6479 (99.1)</td>
<td>84 (77.1)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>62 (0.9)</td>
<td>25 (22.9)</td>
<td></td>
</tr>
<tr>
<td>Blood Transfusion</td>
<td></td>
<td></td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>No</td>
<td>6177 (94.4)</td>
<td>44 (40.4)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>364 (5.6)</td>
<td>65 (59.6)</td>
<td></td>
</tr>
<tr>
<td>Renal support</td>
<td></td>
<td></td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>No</td>
<td>6518 (99.6)</td>
<td>83 (76.1)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>23 (0.4)</td>
<td>26 (23.9)</td>
<td></td>
</tr>
<tr>
<td>Cardiac Arrest</td>
<td></td>
<td></td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>No</td>
<td>6569 (99.8)</td>
<td>101 (93.5)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13 (0.2)</td>
<td>7 (6.5)</td>
<td></td>
</tr>
</tbody>
</table>

* Chi-squared Test  
** Fisher's Exact Test

Conclusions

Although death is uncommon in PICU, we have identified that PICU length of stay, readmission in 24 hours, cardiac arrest prior to admission and use of some common PICU procedures were associated with death. A better understanding of these risk factors could help developing strategies to reduce mortality in PICU.
IATROGENIC SALT POISONING IN THE COMMUNITY: A CASE REPORT OF LIFE THREATENING MULTI-ORGAN FAILURE FROM SEVERE HYPERNATRAEMIA FOLLOWING PREVENTABLE DRUG ERRORS

M. Lister¹, U. Khan¹, J. McFadzean¹

¹Royal Hospital for Sick Children, Paediatric Intensive Care Unit, Edinburgh, United Kingdom

Aims & Objectives:

We aim to describe a clinical case report of a patient surviving life threatening multi-organ failure from severe hypernatremia which was caused by preventable community acquired drug errors.

Methods

An 11 year-old boy with lissencephaly associated with severe developmental disability presented to the ED in a coma and multi-organ failure including severe circulatory shock after a 4-day diarrhoeal illness. He was intubated and ventilated, received fluid resuscitation (40ml/kg in total) and high-dose adrenaline infusion (maximum 0.5mcg/kg/min). He was treated for presumed sepsis. His initial biochemistry (table 1) revealed severe hypernatremia (serum sodium >200 mmol/l), hyperchloraemia, thrombocytopenia, and coagulopathy. Further history revealed he had received an enteral sodium supplement solution that was five-times more concentrated than the prescribed solution for 6 days. The sodium supplement solutions were dispensed by community pharmacists and both concentrations (1 mmol/ml and 5 mmol/ml) had identical packaging (figure 1). Severe salt poisoning with dehydration was the revised diagnosis.

Table 1: Biochemistry (at presentation)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>&gt;200mmol/l</td>
</tr>
<tr>
<td>Chloride</td>
<td>&gt;150mmol/l</td>
</tr>
<tr>
<td>Potassium</td>
<td>1.9mmol/l</td>
</tr>
<tr>
<td>Phosphate</td>
<td>0.26mmol/l</td>
</tr>
<tr>
<td>Urea</td>
<td>12.6mmol/l</td>
</tr>
<tr>
<td>Creatinine</td>
<td>53µmol/l</td>
</tr>
<tr>
<td>Plasma osmolality</td>
<td>424mosm/kg (normal 275-295)</td>
</tr>
<tr>
<td>Urinary osmolality</td>
<td>831mosm/kg</td>
</tr>
<tr>
<td>Urinary sodium</td>
<td>291mmol/l (normal 0-250mmol/l)</td>
</tr>
</tbody>
</table>

Figure 1:
Results

Hypernatraemia was corrected slowly over 4 days with isotonic fluid. Life-threatening arrhythmia resolved with hypokalemia treatments. Sepsis was excluded by microbiological, viral and fungal cultures. His organ functions recovered (thrombocytopenia and coagulopathy corrected, off inotropic support, and extubated successfully on days 4, 5, and 19 respectively). His neurological recovery was slow but returned to pre-morbid level by week 6.

Independent enquiry confirmed preventable drug errors occurred at 3 levels: packaging, medication delivery to the community pharmacy, and medicine dispensing by pharmacists.

Conclusions

Preventable multi-level drug errors in the community may cause life-threatening problems, in this case severe hypernatremia. Such errors need to be reported through a robust governance system to improve patient safety.
RELATIONSHIPS BETWEEN TOTAL AMOUNT OF SEDATION GIVEN IN PICU AND THE RISK OF DEVELOPING VENTILATOR ASSOCIATED PNEUMONIA (VAP)

K. Jack¹, J. McCormick¹, C. Burney¹, R. Park¹, J. Wilson¹, T.Y.M. Lo¹
¹Royal Hospital for Sick Children, Paediatric Intensive Care, Edinburgh, United Kingdom

Aims & Objectives:

Ventilator associated pneumonia (VAP) is a serious acquired infection in intensive care, potentially increasing morbidity and mortality. Sedation is required for ventilated patients to maintain patient comfort and safety of endotracheal tubes but over-sedation may potentially increase the risk of developing VAP. It is unclear if patients with VAP have received more IV sedation in our unit. We aim to determine if larger total amount of sedation during PICU stay increases patients’ risk of developing VAP.

Methods

46 consecutive patients were included in a prospective observational study in a single PICU. A pre-designed proforma was used to collect data which included total amount of sedation (IV morphine and midazolam) given in PICU, physiological data, durations of PICU stay and mechanical ventilation, and evidence of VAP. Non-parametric tests were employed to determine statistical significance. LREC waived the need for informed consent.

Results

11 of the 46 patients studied fulfilled the diagnostic criteria for VAP. Patients with VAP had significantly longer duration of mechanical ventilation and PICU stay (p < 0.05, Mann Whitney U test). Median total amount of morphine given were 1.6 and 2.6 mg/kg respectively in patients with and without VAP (p = NS). Median total amount of midazolam given were 15.1 and 14.5 mg/kg in patients with or without VAP p=NS).

Conclusions

VAP causes prolonged duration of mechanical ventilation and PICU stay, but the total amount of IV sedation given in PICU did not differ between patients with or without evidence of VAP. A larger study is required to validate this finding.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0500
IMPROVING EFFECTIVENESS IN MANAGING HIGH-RESOLUTION CLINICAL DATA FOR BOTH CLINICAL AND RESEARCH USE: A SCOTTISH PICU'S PROSPECTIVE

K. Jack¹, J. McCormick¹, C. Burney¹, L. Reekie¹, J. Richardson¹, J. Wilson¹, R. Park¹, J. McCormack², T.Y.M. Lo¹

¹Royal Hospital for Sick Children, Paediatric Intensive Care, Edinburgh, United Kingdom

Aims & Objectives:

Electronic clinical-information-system (CIS) collects accurate physiological and clinical data to guide clinical management and provides a valuable high-resolution data source for quality assurance and clinical research. If research and clinical data management teams work independently, prospective research data collection and retrospective analyses of the high-resolution clinical data for research and quality assurance can be time consuming. We aim to demonstrate the effectiveness in managing high-resolution clinical data for research and quality assurance through close collaboration between our research and clinical data management teams.

Methods

Our research team predefined their data requirement (e.g. the total amount of boluses of intravenous sedation given in each patient) and discussed this requirement with the clinical data management team which consists of a data manager, a senior charge nurse and a senior critical-care physician (consultant/staff physician level). The data management team then developed a real-time data collection algorithm drawing the relevant automated data within the CIS. The research team then checked the data generated fulfilled their requirement prior to using the custom-design data collection tool in their projects.

Results

Custom-designed data collection algorithm for quantifying total IV sedation boluses was successfully developed offline from data of 10 patients in our PICU. The algorithm was then validated online in 10 consecutive patients by the research team before using it live in research projects.

Conclusions

Close collaboration between research and clinical data management teams enables custom design of real-time prospective research data collection and time-efficient retrospective analyses of clinical data for research and quality assurance.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0505
EFFECTIVENESS OF INTENSIVE TARGET TRAINING ON THE QUALITY OF SEDATION BOLUSES DOCUMENTATION IN PICU
C. Burney¹, J. McCormick¹, K. Jack¹, J. Wilson¹, R. Park¹, T.Y.M. Lo¹
¹Royal Hospital for Sick Children, Paediatric Intensive Care, Edinburgh, United Kingdom

Aims & Objectives:

Sedation boluses are given to achieve optimal sedation, comfort, and safety in paediatric ventilated patients. We demonstrated poor documentation of sedation boluses given in our unit in another study potentially affecting adequacy of sedation level in ventilated patients. We aim to determine the impact of using standardised teaching materials on sedation bolus documentation delivered during intensive target training weeks on the quality of sedation bolus documentation.

Methods

A pre-designed electronic proforma on the clinical information system (CIS) was used to collect data on the total amount of sedation boluses delivered per patient and whether the sedation boluses were documented during a two week period randomly selected by our nursing audit/research team. Teaching materials on how to check and sign for sedation boluses including standardised guidelines were delivered to all nursing staff on PICU during the intensive target training weeks. The audit was repeated 1 month after the completion of intensive target training using the same pre-designed electronic proforma to assess its effectiveness in improving documentation.

Results

In the initial audit, 80% of all sedation boluses delivered was not documented on the CIS during the 2-week audit period. Intensive target training weeks were delivered to all nursing staff on PICU. Re-audit post-intensive target training demonstrated a significant improvement on sedation boluses with only 30% of all sedation boluses delivered having no documentation on the CIS.

Conclusions

Intensive target training with teaching materials tailored to the need of our unit was highly successful in improving sedation boluses documentation, thereby enhancing patient safety.
Aims & Objectives:

In paediatric ventilated patients, in addition to continuous IV sedation, boluses of sedation are required to achieve optimal comfort, and safety. The accuracy and quality of sedation boluses documentation in our unit was unknown. We aim to determine the accuracy of sedation boluses documentation in our PICU, and to assess staff’s knowledge and the usefulness of existing guidelines on sedation boluses documentation.

Methods

A pre-designed electronic proforma on the clinical information system (CIS) was used to collect data which included the total amount of sedation boluses delivered per patient and whether the sedation boluses were documented during a two week period randomly selected by our nursing audit/research team. All nursing staff in PICU was also surveyed to determine their knowledge on sedation boluses documentation. Existing guidelines on drug administration and IV sedation were examined to determine if there was specific guidance on sedation boluses documentation.

Results

80% of all sedation boluses delivered was not documented on the CIS during the audit period. The existing guidelines on drug administration and IV sedation did not have guidance on documentation of sedation boluses. Majority (79%) of the junior staff did not know how to document sedation boluses on CIS. Drug administration guideline was updated to include guidance on sedation boluses documentation.

Conclusions

Poor documentation of sedation boluses delivered in PICU is caused by lack of clear guidance and training on documentation procedures. Updating drug administration guideline and a tailor-made intensive training programme may improve documentation and warrants further investigations.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0381
THE IMPACT OF A HOSPITAL MERGE ON VASCULAR ACCESS QUALITY AND SAFETY AND RESEARCH PROGRAMS IN PICU
D. Long¹ ², T. Baveas³, L. Scaini³, T. Williams¹, L. Schlabach¹ ⁴, S. Mayfield⁴ ⁵
¹Lady Cilento Children's Hospital, Paediatric Critical Care Research Group, Brisbane, Australia
²Menzies Health Institute Queensland- Griffith University, NHMRC Centre of Research Excellence in Nursing Interventions in Hospitalised Patients, Brisbane, Australia
³Lady Cilento Children's Hospital, Paediatric Intensive Care Unit, Brisbane, Australia
⁴University of Queensland, School of Medicine, Brisbane, Australia
⁵Lady Cilento Children's Hospital, Patient Safety and Quality Service, Brisbane, Australia

Aims & Objectives:

The upheaval accompanying merger efforts can have a negative impact on staff. The effects on patients and processes of care, however, have been more difficult to understand. Central Venous Access Devices (CVADs) play an important role in the management of PICU patients, and their infection rates have been a KPI for some time. We underwent the merger of two paediatric tertiary facilities and experienced unexpected high rates of CVAD failure following this merge and aim to describe the challenges experienced in a hospital merger on vascular access research and quality outcomes in PICU.

Methods

Exponentially weighted moving average (EWMA) control charts were used to monitor infection rates. A case study design was employed to identify challenges in conducting clinical research during a period of transition.

Results

Both PICUs had a low infection rate prior to the merge and utilised evidence based bundles. In the first 8 months post merge, infection rates increased to 1.7 per 1000 catheter days (EWMA). The main research challenges identified included: new staff, services and patient cohorts; multiple availability of products; and, integrating research with standard clinical practice. Strategies for managing these challenges included: engaging the interest of clinical staff in study products; widening the cohort
Conclusions

We experienced unexpected increases in CVAD infections following a merge but were able to employ multiple strategies to decrease these rates. Whilst the potential cause of the increased infection rates was probably multifactorial, these strategies are readily applicable to other CVAD related Research, and Quality and Safety projects. The knowledge gained during this transition period provided essential information on the feasibility of conducting larger CVAD RCTs and helped to further build our Quality and Safety program. This knowledge can also assist other organisations about to, or undergoing, transition to a new facility.
Aims & Objectives:

This study reviews demographic information, primary disease, indication for tracheostomy, need of gastrostomy and complications of twenty paediatric patients who had undergone tracheostomy between 2013 and 2015 and were admitted in our paediatric intensive care unit.

Methods

A retrospective study with review of medical records of patients who underwent tracheostomy at a tertiary surgical hospital during the period of May 2013 and December 2015 was made, assessing the desired data.

Results

45% were male and 55% were female and the median age at time of procedure was 40.8 months (5 months – 19 years). The median time of endotracheal tube was 28.5 days (0-422 days). Most children had neurological disorders as primary disease (55%), followed by neuromuscular diseases (6%) and heart diseases (6%). Nine patients (45%) had pulmonary diseases associated with the primary ones. The primary indication for tracheostomy was long term ventilation (45%), followed closely by airway obstruction (40%). Two patients were successfully decannulated, three patients suffered accidental decannulation and pneumothorax, with one death. Just one patient had undergone an emergency tracheostomy, due to difficult airway. There is a high incidence of disphagia and gastroesophageal reflux in our sampling, with 80% needing gastrostomy.

Conclusions

We conclude that, in our study, tracheostomy is most common in patients with some sort of neurological disease, that can or cannot be associated with pneumopathies. Long term ventilation was the most common indication of tracheostomy and accidental decannulation was the only seen complication, although severe.
Tracheostomy in children requires a multidisciplinary team for its indication and follow up, since it is normally associated with children with complex diseases and countless needs.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0509
SICK TRACH SCORE: SAFE INPATIENT CARE FOR PEDIATRIC TRACHEOSTOMIZED PATIENTS

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Aims & Objectives:

In pediatric centers across Canada, there is significant variation in the care of in-hospital patients with tracheostomies. The level of supervision varies from intensive care units, to units with a technological dependent focus, and to wards. In the context of limited resources and with the goal of delivering standardized, safe care, it is important to identify patient’s needs. Our objective was to develop an airway score to categorize the intensity of care required for tracheostomised pediatric patients based on their dependence on the artificial airway.

Methods

The score was developed as a result of an extensive literature review and a working group comprised of airway experts at the Montreal Children's Hospital. The working group consisted of general pediatricians, respirologists, otolaryngologists, nurses, respiratory therapists, pediatric intensivists, and neonatalogists caring for pediatric tracheostomised patients.

Results

The 8 criteria evaluated in the score are; age, secretion quantity, airway abnormality (supraglottic and subglottic), ease of artificial airway placement, other medical concerns (neurological, respiratory and cardiac), ability to call for help and tolerance to decannulation and obstruction of tracheostomy. The patients in the higher score category require greater supervision. The levels of supervision from highest to lowest are as follows: pediatric or neonatal intensive care, non-intensive care direct observation with trained personnel (multiple patients in one observation unit or private rooms in a cohorted specialized airway hallway), indirect observation with trained personnel on hospital ward and intermittent monitoring with trained personnel on hospital ward.

Conclusions
We present an airway scoring system for pediatric tracheostomised patients that determines appropriate level of in-hospital supervision. This system will require validation in pediatric centers across Canada.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0560
MYVOICE: THE DEVELOPMENT AND USE OF A TABLET-BASED PATIENT AND FAMILY SAFETY REPORTING SYSTEM IN A PEDIATRIC CCU
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¹The Hospital for Sick Children, Quality and Risk Management, Toronto, Canada
²The Hospital for Sick Children, CCU, Toronto, Canada
³The Hospital for Sick Children, Optimizing the Clinical Experience OCE, Toronto, Canada

Aims & Objectives:

Healthcare providers under-report adverse events[1]. Families/patients are interested in reporting safety issues and reliably report valid concerns[2]. Soliciting family/patient safety reports may reveal unknown risks. Our aim was to develop a tablet-based survey that would allow families and patients to report safety problems in the CCU.

Methods

Using QI methodology, a validated survey from BC’s PSLS was tested in SickKids’ CCU. Data collection was initially by paper-based interview with families/patients. Hospital staff and a family advisor developed an innovative tablet-based survey to collect family/patient safety reports using TickiT® by Shift Health, Ltd. Families/patients were approached by CCU staff (in-person) or used a self-serve kiosk. All problems identified were reviewed for validity and follow-up occurred with staff and families/patients when possible.

Results

In-person administration resulted in an 84% response rate vs. 33% by kiosk. In 66 surveys 43 safety problems were identified; 6/43 (14%) overlapped with reports in the staff safety reporting system. Most safety problems identified by families concerned communication (51%); others were classified as concerning care (37%) or medication (12%).

Conclusions

This work provided proof of concept that families/patients want to be engaged in reporting safety issues and that they report valid safety problems. Future work includes assessing the impact of reported problems on families/patients and evaluating methods to reduce communication problems.

QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0775
FLORENCE IS STILL INFLUENCING QUALITY MEASUREMENT

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³ Boston Children's Hospital, Nursing Research, Boston, USA
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Aims & Objectives:

Aim : Over a century ago, Florence Nightingale noted that “What nursing has to do… is to put the patient in the best condition for nature to act upon him.”

Objectives: To develop an evolving set of nursing quality metrics for a tertiary-level multidisciplinary pediatric ICU based on Nightingale’s philosophy of nursing.

Methods

Thrice-yearly audits are aligned to how nurses create safe environments for patient/families and how nurses manage activities that optimize patient and family healing. Data are either extracted from the electronic medical record, manually collected through direct observation, or by bedside nurse interview. All patients with a length of ICU stay greater than 24 hours are audited.

Results

The Nightingale Metrics were initiated in March 2003 and throughout the years have been modified to capture the evolving work of nursing and unique patient needs. Items include comfort scoring (pain, agitation and iatrogenic withdrawal syndrome); assessment of immobility and device-related pressure ulcer risk (Braden Q); oral hygiene in intubated patient; implementing strategies to reduce venous thromboembolism risk in immobile patients; and time to critical intervention on abnormal laboratory values. We also compute a continuity of nursing care Index and stratify reporting by patient length of stay. Reflecting important changes in the field, we recently added the extent to which patients receive and participate in a physical therapy plan. Results are shared and solutions to improve care are generated by bedside nurses. Results are also benchmarked with other ICUs within the institution to facilitate cross-system learning.

Conclusions

Developing a unit-based quality monitoring program, based on Nightingale’s work, helps to focus quality monitoring on what staff nurses do that makes a difference for patients and families.
Aims & Objectives:

In the Paediatric intensive care unit (PICU) is the risk of a medication error often greater than in other clinical areas because of the complexity of the necessary dose calculations. At the PICU, which is part of the Department for Paediatric Surgery and Intensive Care, Division of Surgery, University Medical Centre Ljubljana, is the complexity even more intense. This is a unique, multidisciplinary unit, with 500 admissions per year that accepts all surgical and non-surgical patients from 0 to 18 years of age. Together with dedicated and experienced physicians, nurses and pharmacists, Marand engineers develop a user-friendly, intuitive, comprehensive clinical information system (CIS) tailored to real-time patient care and medication management coupled with decision support (allergy checking, drug interactions, and dose calculations). System can be used to support medication process (prescribing, ordering, administration and monitoring), real time warnings and key information regarding medications and patient status. Due to barcode identification and management of medication lists nurses can avoid errors by administering of drugs in single doses and continuous infusion.

Methods

The proposed article is based on our clinical experiences with the CIS and OpenEP medication management. Over 110 medical devices – infusion pumps in the PICU were connected to the system to import data.

Results

The hospital was able to remove several paper charts and forms in each step of the care process – from administration forms, paper order, vital signs observations charts, fluid balance sheets and since Marand’s medication management system covers not just basic but even advanced ePrescribing scenarios the hospital was able to completely omit the paper based medication charts as well.

Conclusions
Presented solution help improve the safety of medicines use, help reduce the current and unacceptable levels of adverse drug events and can significantly improve quality and effectiveness of the health care, increasing patient safety and time saving.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0496
UTILIZATION OF PATIENT CENSUS WHITEBOARD FOR DISPLAYING REAL-TIME CONTACT INFORMATION OF DIFFERENT TEAMS TO IMPROVE MULTIDISCIPLINARY COMMUNICATION IN THE INPATIENT UNIT OF A COMMUNITY HOSPITAL

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Aims & Objectives:

Effective and timely multidisciplinary communication is essential for quality patient care. Multidisciplinary communication is enhanced by easy access to up-to-date contact information and using the names of different team members. The patient census “whiteboard”, usually populated by the front desk staff, is easily accessible to all staff. In most units, the real-time display of name and contact information of the different teams on the whiteboard would be a continuous process, as the staff of the different teams switch at variable times. We describe the development and implementation of displaying the real-time contact information of different teams on the white board in a 28-bed combined Pediatric (Ward and PICU) unit.

Methods

The staff members of the different teams were given the responsibility of updating their names and contact information at the start of their shift on the white board or at any time they assumed care of a particular patient. Their involvement on the team was made visible on the board. The process flow chart describes the development, implementation and evaluation of displaying the real-time contact information on the white board (See Figure).
Results

Several cycles of the process flow chart revealed the teams whose information was missing from the white board (See Figure). The time required to achieve 80-100% compliance by different teams ranged from 3 weeks to 14 weeks.

Conclusions

In most units, the front desk staff is responsible for populating the information on the patient census whiteboard. However, the process in which the staff update their names and contact information themselves transforms the whiteboard to a relevant real-time information tool to support multidisciplinary communication while simultaneously empowering each discipline’s role on the team.
Development and Testing of Pediatric Sepsis Quality Measures

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Aims & Objectives:

To describe the development and testing of quality measures for the in-hospital care of children with sepsis syndrome, including sepsis, severe sepsis and septic shock.

Methods

Study Design: Seven measures of quality of care for children hospitalized with sepsis syndrome were developed using an iterative process including literature review, development of concepts and candidate measures, and selection of measures for feasibility and validity by a panel of content and feasibility experts. The measures were tested for reliability and validity among hospitalized children 0-18 years of age with sepsis syndrome from January 1, 2012 through June 30, 2013. The diagnoses of sepsis, severe sepsis, and septic shock were ascertained using ICD-9-CM diagnosis codes.

Results

Measure 1: 27 of 50 hospitals responded. Among these, 16 (59%) had no protocol for the identification and treatment of pediatric sepsis. Measure 3: Blood culture was performed in 191 of 274 (70%) cases of pediatric sepsis syndrome. Measure 4: Antibiotics were administered within the first hour of diagnosis in 18 of 26 (69%) cases of severe sepsis or septic shock. Measure 5: Timely fluid resuscitation was performed in 15 of 30 (50%) cases of severe sepsis or septic shock. Measure 6: Documentation of heart rate for children during fluid resuscitation of children with severe sepsis or septic shock was observed in 3 of 17 (18%) cases. Measures 2 and 7 could not be rigorously tested for validity and reliability given the rarity of cases of septic shock transferred to an ICU during the study period.

Conclusions

This multisite study to develop and validate measures of the quality of hospital care of children with sepsis syndrome highlights the existence of important gaps in the delivery of care. Future work will need to identify acceptable thresholds of achievement for hospital quality measures for pediatric sepsis syndrome and assess associated patient-level outcomes.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0722
QUALITY IMPROVEMENT INITIATIVE IN THE PICU: A TRANSITION TO CLOSED-SYSTEM PRESSURE MONITORING AND THE USE OF SYRINGE DRIVER DELIVERY FOR INFANTS
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Aims & Objectives:

A closed-system pressure monitoring with syringe driver delivery device was implemented to improve potential fluid overload, minimise adverse events, and reduce staff exposure to blood.

Methods

Multidisciplinary inter-departmental discussions occurred. The Biomedical Engineering Department assisted in identifying the accuracy of current fluid volume delivery via the flush bag system.

Closed system sets were trialled and incidences of adverse events were monitored for comparison purposes.

Education, training and feedback were gained from staff regarding the effectiveness of the set.

Results

Volume delivery via the flush bag system measured 3ml/hr/lumen varying with the amount of pressure in the bag. In the presence of fluid restriction, often with 4 lumens being transduced, fluid overload occurred. Due to large volumes, syringe driver delivery was implemented for infants in less than 5kg at 0.6ml/hr. This figure was found to maintain adequate line patency.

Less adverse events were documented during the trial period.

Positive feedback regarding ease of use and less incidence of breaking the line to obtain a blood sample was reported. The staff reported a preference for the closed system in decreasing the infection risk potential.

Conclusions

The implementation of closed-system pressure monitoring decreases infection risk and improves safety measures for patients and staff. Syringe driver delivery allows
for increased accuracy of fluid delivery, reducing the risk of fluid overload in infants. Further quality projects have been generated incorporating fluid overload reduction.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0796
ENGAGEMENT AND QUALITY IMPROVEMENT THROUGH SOCIAL GAMIFICATION: REDUCING CENTRAL LINE ASSOCIATED BLOODSTREAM INFECTIONS
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²UCSF, Information Services Unit, San Francisco, USA

Aims & Objectives:
Healthcare-associated infections (HAI), including central line-associated bloodstream infections (CLABSI), are preventable causes of morbidity and mortality. Targeting HAI prevention best-practice bundles has successfully led to reductions in HAI. We applied game mechanics to a social networking platform—social gamification—to engage nurses with central line maintenance practices and thereby decrease CLABSI.

Methods
We reconfigured an existing nursing central line maintenance practice audit tool as a digital self-assessment (SA) application at a university children’s hospital. In a one-year prospective controlled study for quality improvement during 2014-2015 (study-period), we implemented the CLABSI SA application in three nursing units (critical care, bone marrow transplant, hematology-oncology); all other inpatient units served as controls. We promoted voluntary participation through intermittent team-based contests between units. CLABSI rate was the primary outcome and was compared to the preceding year.

Results
673 SAs were completed during the study-period with 105 unique participants over 9886 line-days in the intervention group, and 7670 line-days in the control. The total combined line-days in the preceding year was 18864. Individual bundle element compliance rates were similar to those reported in observer-performed hospital audits. SAs were performed on weekday (32%), weeknight (40%), and weekend shifts (28%), whereas observer audits covered only weekday shifts. Contest months had more SAs than non-contest months (178 vs 15 per month, p=0.01). The intervention group CLABSI rate decreased by 48% from the preceding year to the study-period (3.31 to 1.72 per 1000 line-days, p=0.04). In the control group there was no significant change. Comparing relative change over time between intervention and control, there was a significantly greater decrease in the intervention group (p<0.01).

Conclusions
A digital social gamification-based approach promoting self-assessment can foster nursing engagement in CLABSI prevention practices and thereby reduce CLABSI. This model has been scaled to other units in our institution and is being extended to other HAI.
Aims & Objectives:

To red blood cells (RBC) infusion in critically ill children several supplies are available allowing administration on high or low infusion rates. In clinical practice we questioned possible influence of the infusion rate on RBC integrity. Nursing protocols to RBC transfusion must be grounded on evidence based interventions to promote patient safety. The objective of this study was to analyze the effect of the infusion rate on RBC during administration by gravity-driven infusion sets.

Methods

Experimental study carried out in controlled conditions in the Laboratory of Nursing Experiments, Federal University of São Paulo, Brazil. A sample of 20 packed RBC and 48 gravity-driven infusion sets were randomly studied at the rates of 10ml/h and 100 ml/h. RBC samples were collected before and after infusion to the analysis of free hemoglobin (mg/dl), potassium (mmol/L), hematocrit (%), lactic dehydrogenase (U/L), haptoglobin (g/L) and hemolysis ratio (%). Data were analyzed using average(±SD), Student t and Mann-Whitney tests (p≤0.05).

Results

The studied RBC had an average of 16.08 (±7.19) days of storage. A total of 576 analyzes were performed and relative differences in the hemolysis ratio (p=0.013) were observed between 10ml/hr (0.31±0.21) and 100 ml/h (0.17±0.22). The relative differences in the analyzed markers of RBC hemolysis according to the studied rates demonstrated that at 10ml/h the RBC presented a decrease of total hemoglobin (-0.07±0.09; p=0.060), an increase of free hemoglobin (0.25±0.21; p=0.070) and a significant increase of hemolysis ratio (0.31±0.21;p=0.013). The studied rates did not influence significantly other analyzed hemolysis biomarkers.

Conclusions
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0288
PERFORMANCE OF SYRINGE INFUSION PUMPS ACCORDING TO INFUSION RATE AND MODE OF INTRAVENOUS SYSTEM FILLING
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²Universidade Federal de São Paulo, Department of Pediatric Nursing - Escola Paulista de Enfermagem, Sao Paulo, Brazil
³Universidade Federal de São Paulo, Master in Nursing Graduation Program, Sao Paulo, Brazil

Aims & Objectives:

To verify the performance of syringe infusion pumps (SIP) according to flow rate and mode of intravenous system fill in with saline solution.

Methods

Experimental study accomplished in the Laboratory of Nursing Experiments of the Federal University of São Paulo, Brazil. Two SIP (A and B) were studied in triplicate. The six pumps were randomly assigned to the studied flow rates of 0.3ml/h, 0.5ml/h and 20.0ml/h, and two types of fill in the intravenous system with saline solution before the start of the infusion were studied, the prefilled intravenous system or the intravenous system filled by the bolus function of the SIP. Performance was studied as occurrence of startup delay and accuracy during the first hour of infusion, measured by an analytical balance (Shimadzu®-AUY220, Japan). To the statistical analyzes were applied mean, standard deviation and t test (p≤0.05).

Results

The time interval to the start of the infusion was different and longer as the lowest were the infusion rates in SIPA using the prefilled intravenous system (p<0.0001) and bolus (p<0.0001), and in SIPB in prefilled (p<0.0001) and bolus (p=0.0013). The bolus mode promoted a significant shorter startup delay in all flow rates studied in SIPB and at 0.3ml/h (p=0.0107) and 0.5ml/h (p=0.0027) in the SIPA. Filling the intravenous system with the SIP bolus increased the volume infused at 0.3ml/h (SIPA p=0.0001; SIPB p=0.0001) and at 0.5ml/h (SIPA p=0.0002; SIPB p=0.0006). At the flow rate of 20.0ml/h the equipment were accurate and the mode of intravenous system fill did not influenced the SIP performance (SIPA p=0.2748; SIPB p=0.4825).

Conclusions

The lowest infusion rates lead to longer startup delay. The SIP were accurate only at 20.0ml/h. The bolus mode promoted shorter startup delay in low infusion rates with no influence at 20.0ml/h.
Aims & Objectives:

The occurrence of RBC hemolysis during transfusion processes has been correlated to high shear stresses exerted by the infusion systems and intravenous catheters as well as to prolonged time of exposure to these stresses in lengthy and small caliber catheters, such as PICC. The objective is to analyze hemolytic markers during RBC’s transfusion in nonvalved PICC, according to the catheter’s caliber.

Methods

Experimental study developed in Laboratory of Nursing Experiments of the Federal University of São Paulo, under controlled environmental conditions. We used RBC blood type A+, storage for 17 days in CPDA-1. PICC were nonvalved, made of silicone, with 3 and 4 French (Fr). Blood samples were collected in two moments: from the RBC bag (control) and after infusion through the PICC (catheter). Free hemoglobin (FHB), lactate dehydrogenase (LDH) and potassium were the hemolytic markers evaluated in this study. The results were analyzed through mean, standard deviation and ANOVA test (p ≤ 0.05). The study was approved by the Ethics Committee of the institution (number 56518).

Results

Twenty-four samples were analyzed. In the PICC of 3Fr caliber, there was a 29.5% increase of FHB, 3% of LDH and 5.1% of potassium. In the 4Fr caliber, it was noted an increase of 30.5% in FHB (p=0.03), 74% of LDH and 1.45% of potassium. The potassium values remained similar for both. It can be inferred that the occurrence of
major changes in hemolytic markers was observed in 4 Fr catheters. It should be related to higher rates of infusion obtained from this catheter, causing a turbulent flow that contributes to collision between the red blood cells.

Table 1: Hemolytic markers change according to the catheter’s caliber. São Paulo, SP, 2016.

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Catheter</th>
<th>Mean difference vs. Control Catheter (IC 95%)**</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 Fr</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium (mol/L)</td>
<td>38.03 ±4.03</td>
<td>39.96±5.06</td>
<td>1.93 (-2.09 a 5.96)</td>
<td>0.20</td>
</tr>
<tr>
<td>FHB (g/dl)</td>
<td>0.115 ±0.10</td>
<td>0.149±0.11</td>
<td>-0.03 (0.00 a 0.06)</td>
<td>0.07</td>
</tr>
<tr>
<td>LDH (U/L)</td>
<td>756.4±421.8</td>
<td>779.8±414.9</td>
<td>23.3 (-212.8 a 259.6)</td>
<td>0.81</td>
</tr>
<tr>
<td><strong>4 Fr</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium (mol/L)</td>
<td>41.25 ±5.74</td>
<td>41.85±5.78</td>
<td>0.59 (-0.10 a 1.29)</td>
<td>0.10</td>
</tr>
<tr>
<td>FHB (g/dl)</td>
<td>0.177 ±0.21</td>
<td>0.231±0.26</td>
<td>0.05 (-0.03 a 0.14)</td>
<td>0.03</td>
</tr>
<tr>
<td>LDH (U/L)</td>
<td>1019.9±374.4</td>
<td>1774.6±1561</td>
<td>754.6 (-1239.8 a 2749.1)</td>
<td>0.23</td>
</tr>
</tbody>
</table>

* ANOVA repeated measures

Conclusions

No statistical influence was observed by 3Fr catheter caliber in hemolytic markers. In catheters with 4Fr there was a greater variation in FHB and mainly in LDH levels.

Aims & Objectives:

Objectives: The study was performed to evaluate the correlation between lactate sampling from artery and central vein in pediatric shock patients while they are in a state of shock and when they are hemodynamically stable.

Methods

Design: Prospective cross-sectional study.
Setting: Twelve-bed PICU in a tertiary university hospital.
Patients: Children with shock who had central venous catheter and or arterial catheter in place or arterial puncture done.
Measurements: Arterial lactate and central venous lactate were obtained simultaneously during the shock state and the stable hemodynamic state.

Results

Main Results: A total of 64 blood paired samples were collected from 48 patients. The overall correlation between central venous lactate and arterial lactate results were $r = 0.962$ ($P < 0.0001$). There was a similar correlation between central venous lactate and arterial lactate during the state of shock and the stable hemodynamic state which were $r = 0.971$ ($P < 0.0001$) and $r = 0.953$ ($P < 0.0001$), respectively. In the whole data set, the mean difference between central venous lactate and arterial lactate was $0.20 \pm 0.48$ mmol/l and the limits of agreement were -0.73 to 1.13 mmol/l.

Conclusions

Conclusions: Central venous lactate can substitute for arterial lactate with decent correlation and agreement in children with shock and being hemodynamically stable.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0246
NEAR MISSES AND 'NEVER EVENTS' IN A COMBINED NEONATAL/PAEDIATRIC TRANSPORT SERVICE: RETROSPECTIVE AUDIT: 2010-2015
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Embrace- Yorkshire and Humber Infant and Children's Transport Service, Dodworth, United Kingdom
²Sheffield University, School of Medicine, Sheffield, United Kingdom

Aims & Objectives:

Incident reports (IRs) are an essential part of a Safety Management System (SMS). Embrace, Yorkshire & Humber Infant & Children’s Transport Service (Embrace) transfers over 2000 patients/year. In January 2015 Embrace became the first UK transport service to report to the Ground and Air Medical qUality Transport (GAMUT) database, a free resource to track, report and analyse performance based on key transport specific quality metrics and allow comparison with other teams. The rate of Serious Reportable Events (SRE) is a key GAMUT quality metric supported by a US definition list, while in the UK we have statuary reporting to an NHS ‘Never Event’ definition list.

Review and categorise all IRs across two audit periods. Compile a transport specific ‘Never Event’ list based on UK and US definitions.

Methods

Retrospective review of IRs from June 2013-June 2015, with categorisation into documentation, equipment, transport, communication, clinical, medication, and other. Compare to previous audit period (Jan 2010-May 2013).

Results

There was an incident reported in 11.3% of all transfers over the combined audit period (5.5 years) with an increase in reporting in the second audit period (12.7%) compared to the first (10.3%). A trend to lower grade incidents over time was observed (table 1). Reporting has increased in ‘transport’ and ‘clinical’ categories and decreased in ‘communication’ and ‘equipment’ categories (table 2). Two incidents were identified as ‘Never Events’; both related to running out of medical gas supply.
<table>
<thead>
<tr>
<th>Severity Classification</th>
<th>Jan 2010</th>
<th>May 2013</th>
<th>June 2015</th>
<th>June 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>66%</td>
<td>84%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>20%</td>
<td>13%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>3.5%</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extreme</td>
<td>0.3%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonclassified</td>
<td>4%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Comparison of Incident Categories between the two audit periods

<table>
<thead>
<tr>
<th>Category</th>
<th>Jan 2010-May 2013</th>
<th>June 2013- June 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport (helicopters landings sites, vehicle breakdowns, attendance at road traffic collisions (RTC) and difficult access to hospitals)</td>
<td>16.3%</td>
<td>23.8%</td>
</tr>
<tr>
<td>Equipment</td>
<td>29.3%</td>
<td>26.9%</td>
</tr>
<tr>
<td>Communication (incident occurred as a direct or indirect result of poor communication and communication issues during referral)</td>
<td>21.7%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Clinical (human error or clinical misjudgment involving the patient)</td>
<td>17.4%</td>
<td>20.4%</td>
</tr>
<tr>
<td>Documentation (incorrect or inappropriate referrals, missing or incorrect notes, confidential paperwork lost or found)</td>
<td>-</td>
<td>4.3%</td>
</tr>
<tr>
<td>Medication</td>
<td>7.6%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Other</td>
<td>7.6%</td>
<td>5.4%</td>
</tr>
</tbody>
</table>

Conclusions

Incident reporting as part of a SMS helps make organisations safer when embedded in a just culture. The trend is to an increased reporting of incidents with an inverse trend to reduced severity grading. This may indicate an improvement in culture and safer operations. We hope development of a transport specific list of SRE or ‘Never Events’, in conjunction with reporting to GAMUT will help continue this improvement.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0804
TRANSLATION, UTILITY AND FEASIBILITY OF THE “BRADEN Q” SCALE FOR THE ASSESSMENT OF PRESSURE ULCER RISK IN INFANTS

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³Institute of Higher Education and Research in Healthcare, Faculty of biology and medecine UNIL and CHUV, Lausanne, Switzerland

Aims & Objectives:

Pressure ulcers are indicators of quality of care. Infants are at risk of developing pressure ulcers, especially those who are premature. This is a significant problem in this population and cause short and long-term complications. No valid tool to measure pressure ulcer risk in infants are available. The objective of this study was to translate and test the utility and feasibility of the Braden Q scale in infants.

Methods

The Braden Q scale was translated in French using a standardised method of translation. Following approval from the local ethics committee, infants were recruited from the Neonatology Department of A tertiary referral hospital in Western Switzerland between October 2015 and January 2016.

Following parental consent, infants were observed within the first 48 hours, up to 10 days. Four trained clinicians evaluated the pressure ulcer risk daily, using the Braden Q. Simultaneously and independently, the bedside nurse evaluated the presence of pressure ulcers using the Skin Assessment Tool (gold standard). Pressure ulcers were classified according to NPUAP graduation. Observations ceased the day a pressure ulcer appeared or when the patient was discharged from the department. Sensitivity, specificity and positive predictive value for ulcer appearance within the 24 hours following each observation will be calculated.

Results

Forward and back translation was performed by two independent professional translators. Consensus was reached for each item and clarification of item definitions were discussed with the author of the Braden Q scale. Currently, 80 patients have been included in the study, 10 of whom (12.5%) developed a pressure ulcer. Sensitivity and specificity analyses are in progress.

Conclusions
The Braden Q can be used in infants, but certain items needed clarification for appropriate scoring. Because the Baden Q scale is widely used in benchmarking studies, it was essential to determine its utility for infants, especially for those who are premature.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0716
THE PROSPECTIVE AUDIT OF PICU DRUG ERRORS WITH ONGOING INTERVENTION
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²Alder Hey Children’s Hospital, Pharmacy, Liverpool, United Kingdom

Aims & Objectives:

To assess drug errors frequency and severity in relation to daily PICU handover review of all drug errors.

Methods

Prospectively daily collected drug error data on all PICU admissions for 7 months (5/2015-12/2015). National Council for Medication Error Reporting and Prevention (NCC MERP) Index criteria were used in the audit to categorize medication errors. Data has been collected and put on database daily by pharmacist attending PICU reviewing all the drug charts. All reported errors have been anonymously discussed on following day PICU doctor’s handover. The study was approved by the Clinical Audit Department – a division of the Directorate of Research and Clinical Development at Alder Hey Children’s Hospital.

Results

579 drug errors have been reported. The audit hasn’t shown any decrease in number of drug errors occurrence or severity over the given period.

Conclusions

Our PICU handover intervention didn’t lead to drug errors occurrence or severity reduction. All the drug error issue is much more complex and different perhaps more targeted intervention is needed.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0019
RISK FACTORS FOR CATHETER-ASSOCIATED URINARY TRACT INFECTIONS IN CRITICALLY ILL CHILDREN

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2Penn State Milton S. Hershey Medical Center, Department of Medicine, Hershey- Pennsylvania, USA
3Penn State Hershey Children's Hospital, Division of Critical Care Medicine- Department of Pediatrics, Hershey- Pennsylvania, USA
4Pennsylvania State University College of Medicine, Division of Biostatistics and Bioinformatics- Department of Public Health Sciences, Hershey- Pennsylvania, USA
5National Institute of Child Health and Human Development, Pediatric Trauma and Critical Illness Branch, Bethesda- Maryland, USA

Aims & Objectives:

Catheter-associated urinary tract infections (CAUTIs) prolong hospital and ICU stay and increase mortality in adults. Despite a paucity of pediatric data, reduction of CAUTIs is utilized as a quality measure in children's hospitals, leading to widespread practice of early catheter removal. It is unclear if the benefit of preventing CAUTI outweighs the benefit of catheterization for accurate urinary output monitoring in critically ill children.

Methods

This was a retrospective case-control study of critically ill children admitted to a tertiary pediatric intensive care unit (PICU) in the United States. Patients with CAUTIs (n = 19) from 2008 to 2013 were matched by age, gender, and hospital admission date within 12 months with two controls (n = 38). Variables assessed included admitting service, diagnosis, PRISM-III score, location of urinary catheter insertion, use of vasoactive medications, use of steroids, use of antibiotics, presence of central venous catheter, total days of catheterization, hospital length of stay, cumulative PICU length of stay, and mortality.

Results

CAUTIs occurred on hospital day 11.7 +/- 9.7. The factors significantly associated with CAUTI were hospital length of stay (OR 1.10 (95% CI 1.03-1.17), p = 0.004), cumulative PICU length of stay (OR 1.18 (1.06-1.32), p = 0.003), total days of catheterization (OR 1.13 (1.01-1.25), p = 0.03), and use of vasoactive medications (OR 13.00 (1.64-102.76), p = 0.02). No other factor was significantly associated with
CAUTI, including mortality (OR 0.67 (0.07-6.41), p = 0.73). The most commonly cultured organism from cases was *Escherichia coli* (37%).

**Conclusions**

These data suggest that lengths of PICU and hospital stay in children are associated with CAUTIs, which is consistent with findings in adults. However, the data are insufficient to establish the causal relationship in this association. Further study is needed to best inform the appropriate use and infectious risk of this monitoring tool.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0166
DECREASING THE TIME TO RECOGNITION AND ADMINISTRATION OF FLUID BOLUS IN CHILDREN WITH SEPTIC SHOCK- A QUALITY IMPROVEMENT INITIATIVE
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¹All India Institute of Medical Sciences, Pediatrics, South delhi, India

Aims & Objectives:

Our aims were to 1) identify children with shock within 10 minutes of their arrival to the pediatric casualty and 2) intervention within 10 minutes of recognition of shock in the form of fluid bolus administration.

Methods

The project was carried out in three phases. In the first phase we identified process barriers to timely recognition by collecting baseline data over 1 week. The important process barriers identified were lack of space, personnel and monitoring. We used the PDSA (Plan, Do, Study, Act) model of improvement through all the three phases. The elements of PDSA comprised of creating triage tool, using preprinted forms for shock protocol and recording outcomes. In the second phase we implemented the project over the next 4 weeks. Finally, we once again recorded the variables over 4 weeks to see if the changes were sustained.

Results

The median time to shock recognition and administration of first fluid bolus were significantly reduced from 20 to 5 minutes and 25 to 10 minutes respectively (P=0.002 for both)
Although the values for both objectives continued to be lower than baseline in the post-implementation phase, there was a slight increase in the median time to recognition of shock and administration of bolus to 10 and 14 minutes respectively as compared to the implementation phase.

Conclusions

Use of a triage tool and shock protocol resulted in reduction in the time to recognition of shock to 5 minutes and in administration of fluid bolus to 10 minutes from the time of recognition of shock.
Aims & Objectives:

To compare the rate of ventilator associated pneumonia (VAP) and the expense of ventilator circuit between children using disposable and non-disposable ventilator circuits.

Methods

A prospective randomized controlled trial was conducted at pediatric intensive care unit (PICU), Queen Sirikit National Institute of Child Health from 2011 to 2012. Children aged between 1 month and 18 years who were ventilated more than 48 hours were enrolled. The patients were randomly assigned to one of two groups using disposable or non-disposable ventilator circuit.

Results

There were 98 patients enrolled, of which 48 using disposable and 50 using non-disposable ventilator circuits. The total VAP rate was 13.68/1,000 ventilator days. There was no significant difference of VAP rate between the disposable and non-disposable circuit groups (8.80/1,000 and 17.95/1,000 ventilator days, respectively) (p = 0.93). The mortality rate in the disposable group (2.1%) was significantly lower than the non-disposable circuit group (12%) (p =0.04). No significant difference of VAP risk factors (PICU length of stay, ventilator day, use of sedatives, antimicrobial, H2-blocker, or nasogastric tube insertion) between both circuit groups was found. The total ventilator circuit expenses of the disposable and non-disposable groups were not different (p = 0.58).

Conclusions

There was no significant difference in VAP rate and the ventilator circuit expense between patients using disposable and non-disposable ventilator circuits.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0152
CHANGE IN ANTIMICROBIAL PRESCRIPTION BEHAVIOUR IN A TERTIARY LEVEL PICU/NICU: A QUALITY IMPROVEMENT PROJECT
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¹ROYAL MANCHESTER CHILDREN'S HOSPITAL, Critical Care Services, Manchester, United Kingdom
²Great Ormond Street Hospital, Critical Care Services, London, United Kingdom
³Great Ormond Street Hospital For Children, Critical Care Services, London, United Kingdom

Aims & Objectives:

To ensure that a complete prescription for anti-microbials is written for all our Intensive care patients as per NICE and Department of Health guidelines (clearly mention indication to start, the plan and duration of therapy) as a part of the antibiotic stewardship programme.

Methods

We reviewed all antibiotic prescriptions twice a day for compliance. Interventions were done over a period of 4 weeks (every Monday). Interventions in order of application included; Visual aids and reminders, Email to all registrars, senior fellow and consultant reminders, Consultant and Pharmacist reminders. Data was measured prior to every intervention and then midweek and continued for a period of 6 months as follow up. SPC charts were run.

Results

An improvement in prescription behaviour from <10% complete prescriptions to >80% complete prescriptions was seen over time and was well sustained over a 6 month period. NICU lagged behind PICU with only 50% complete prescriptions at the end of 3 months of study. This could be secondary to absence of daily pharmacist and consultant reminders in NICU. NICU however caught up by the end of the 6th month with >75% complete prescriptions once there was consultant and pharmacist engagement in the project. Overall dips in the SPC runs were mainly observed during week-ends (no pharmacist cover).

Conclusions

By selecting target behaviour, prescribing can change. These changes are better implemented and then sustained when there is engagement from all tiers of staff and a cultural change in the team.
Aims & Objectives:

The role of our Neonatal Intensive Care Level II and III nurses is to facilitate change that leads to improved patient care, yet few nurses were participating in quality improvement (QI) activities. The aim of this project was to provide an opportunity for staff to participate in a quality improvement activity.

Methods

The Nursing Director dedicated a portion of scheduled staff meetings to engage staff in QI activities. Working in 7 small groups, the staff identified opportunities to improve patient care. With guidance and support from the unit-based nurse scientist, each group developed evidence based problem summaries and plans prior to carrying out their projects.

Results

Of the 49 Level II and III nurses, 86% (n = 42) participated in the QI projects. Outcomes included the following: improvements to the health benefits coordinator consultation system, streamlined processes for obtaining lab work and reducing the numbers of cancelled labs, increasing pediatric palliative care consultations, standardization of patient care handover, and implementing a “Distraction Free Zone” during nursing clinical hand-off. Of the projects brought to fruition, staff disseminated their findings via 1 national podium presentation, 5 national poster presentations, and 5 local poster presentations.

Conclusions
Nurse Directors are uniquely positioned to engage their staff in QI activities. Participating in QI allowed staff to improve the care they deliver to patients, and to develop confidence and skills that can be applied to future projects.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0475
NURSING WORKLOAD AND ITS RELATIONSHIP TO PATIENT CARE ERROR IN THE PAEDIATRIC CRITICAL CARE SETTING: AN OBSERVATIONAL STUDY
R. Trinier¹
¹, Toronto, Canada

Aims & Objectives:

Patient care error, a leading cause of death and disability in the critical care setting, contributes to suffering of the patient and family; can precipitate an emotional crisis for health care staff; and creates an increased financial burden to the health care system. Increased nursing workload may contribute to negative patient outcomes.

The objective of this study was to examine the relationship between nursing workload and the delivery of best-practice care in the paediatric critical care setting.

Methods

A prospective observational study was performed, nested within a larger study using direct observation strategies of critically ill patients admitted to a critical care unit over a period of 5 months. The main outcome was the occurrence of 13 complications of care. For each patient-day, nursing workload scores, which quantified physical and emotional care of the patient including underlying cognitive activities and indirect care, were determined for each patient using data entered directly by the patient’s nurse. Using a correlational design, the presence or absence of complications was compared to the workload score for the nurse(s) over a 24 hour period.

Results

Data for 2,117 total patient days representing 3,845 nursing shifts over the 5 months of the study identified 665 complications that occurred on 497 (23%) patient days. A statistically significant (p < .001) association between nursing workload and patient care error was identified. Although the relationship was small (rho (2117) = .11), the odds of error increased as the nursing workload increased. Further findings indicated that a large number of patients in the study required nursing care in excess of what was suggested that one nurse could provide.

Conclusions

An association between nursing workload hours and patient care error was identified. The difference in mean workload hours between those entries with an error and those without was 1.77 hours over 24.
Aims & Objectives:

The prevalence study aimed to investigate central venous access devices (CVADs) in Australian paediatric facilities by:

1. Identifying the prevalence of CVADs, and associated complications;
2. Identifying the current practice in CVAD management; and
3. Compare each of these practices to current evidence, to identify areas in need of improvement.

Methods

A prospective, observational, point prevalence survey of CVAD practices was conducted throughout tertiary paediatric facilities in Australia between September and November 2015 using a validated data collection tool.

Results

Across the six sites, 1,027 patients were screened with an overall CVAD prevalence of 27.6% (n=284) and a critical care prevalence of 49.1% (n=57). Overall 262 CVADs were audited, with 18.7% (n=49) in critical care settings.

Severe CVAD-associated complications were evident in 9.5% of CVADs (n=27) with the most frequent complications being catheter blockage (5.7% CVAD, n=15) and CVAD-associated bloodstream infection (1.9% CVAD, n=5). Local site complications were evident in 10.4% of CVAD (n=27) with the most frequent local complications being bruising (5.0% CVAD, n=13), >1cm of redness (1.9% CVAD, n=5) and itch or rash under dressing (1.5% CVAD, n=4).

CVAD dressings did not meet the basic criteria of clean, dry and intact for 13.4% of CVADs (n=35), and non-sterile dressing products were used to reinforce 26.3% of CVAD (n=69). Chlorhexidine-impregnated dressing products were only used in 14.3% of CVADs admitted to a critical care units (n=7). Almost half of CVADs audited (47%; n=124) had no documentation on the bedside chart regarding site assessment in the previous 4 hours, including 8.7% in critical care areas (n=4).

Conclusions
Complications associated with CVADs are a substantial and significant problem. Areas of improvement were the use of chlorhexidine-impregnated dressing products in critical care areas, documentation and assessment of CVAD sites and the review of current dressing products to improve dressing integrity and sterility.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0821
THE CHALLENGES AND BENEFITS OF INCLUDING PAEDIATRIC POPULATION INTO TRIAL RESEARCH WITHIN A COLLABORATIVE MODEL

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²Children's Health Queensland, Vascular Access, Brisbane, Australia
³Children's Health Queensland, Paediatric Intensive Care, Brisbane, Australia

Aims & Objectives:

Insertion and maintenance of vascular access devices (VADs) is a common invasive procedure in modern healthcare. Nonetheless, it is a significant episode of care for paediatric patients and their families. The onus is on the paediatric healthcare team to minimise pain, distress, and risks of complications through skillful insertion and expert maintenance practices. Paediatric patients are especially vulnerable to the potential complications associated with vascular access devices, due to their immature anatomy and immune response. To date there is limited quality evidence to inform VAD insertion and care, both in general and specific to paediatrics.

The aim of this presentation is to outline the development of a collaborative partnership between clinicians and university researchers to establish an effective program of VAD research in the paediatric population. To describe the unique processes, challenges and benefits of including paediatric patients in randomised control trials (RCT) related to VAD research

Methods

A case study analysis of recent pilot trials that included paediatric patients, that studies VAD flushing practice, dressing and securement methods, and administration sets.

Results

Results identified challenges associated with (1) recruitment, (2) clinical challenges with some interventions in the paediatric setting, and (3) integrating trial process into standard practice. Strategies for managing these challenges included (1) extending timeline for recruitment, (2) modifying intervention arms as appropriate, and (3) engaging local staff from the study inception and as research assistants.

Conclusions

It is important for research groups to consider inclusion of paediatric population in trial studies. There are many common clinical questions that require collaborative investigation. However, paediatric patients and practice also have unique features, which must be taken into consideration when developing research protocols.
QUALITY AND SAFETY (ERROR /NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0465
DRUG-PRESCRIPTION IN PICU: SAFETY AND QUALITY IMPROVEMENT

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²University Hospitals Leuven, Pharmacy, Leuven, Belgium
³University Hospitals Leuven, IT, Leuven, Belgium
⁴University Hospitals Leuven, hospital hygienist, Leuven, Belgium

Aims & Objectives:

Drug-policy is a crucial element in the care of children in PICU. To minimize the risk of prescription error and to standardize drug-delivery, the electronic prescription module was improved.

Methods

A multidisciplinary taskforce comprising nurses, physicians, pharmacist, hospital hygienist and IT, reviewed dosage, solutions and mode of delivery of frequently used medication in a goal to standardize prescription and delivery.

Results

After implementation of a standardized electronic pediatric drug-prescription module, bedside nurses were more comfortable in preparing and administrating intravenous drugs to their patients and had less concern regarding the prescription.

Conclusions

A thorough revision led to uniformity in drug prescription and reduced the risk of fluid overload, the risk of prescription errors, thereby improving patient safety.
QUALITY AND SAFETY (ERROR / NOSOCOMIAL INFECTION / DATA MANAGEMENT)

PICC-0473
PREVENTION OF SERIOUS DECUBITUS ON PICU: IMPACT OF ALTERNATING MATTRESSES
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²University Hospitals Leuven, Student Nurse, Leuven, Belgium
³University Hospitals Leuven, Teacher, Leuven, Belgium

Aims & Objectives:
Critically ill children have a high risk of developing decubitus, particular when ventilated for more than 4 days and on ECMO. We introduced pediatric alternating mattresses in our PICU since 2011 trying to reduce the incidence of serious decubitus events (category 4).

Methods
Using the PDMS-database we searched for the incidence of decubitus in patients younger than 16 years. Decubitus is registered in 4 categories, according to the severity. We correlated the incidence of serious decubitus events with the use of alternating mattresses.

Results

<table>
<thead>
<tr>
<th>Patients admitted on PICU (n)</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with decubitus events (%)</td>
<td>5,0%</td>
<td>5,0%</td>
<td>4,7%</td>
<td>6,4%</td>
</tr>
<tr>
<td>Patients with decubitus category 4 (%)</td>
<td>2,3%</td>
<td>1,2%</td>
<td>1,4%</td>
<td>0,9%</td>
</tr>
<tr>
<td>Patients on alternating mattresses (%)</td>
<td>4%</td>
<td>10%</td>
<td>10%</td>
<td>15%</td>
</tr>
</tbody>
</table>

Over the past 4 years, the incidence of patients experiencing any form of decubitus did not decrease. However, the severity of the decubitus wounds decreased significantly. The use of alternating systems increased in the same period. Implementation of alternating mattresses in children at risk for developing serious decubitus, can help to reduce the incidence of this feared and avoidable complication.

Conclusions
Critically ill children in PICU have an increased risk of developing decubitus. The incidence of serious decubitus can be reduced by using alternating mattresses.
IMPLEMENTATION OF A RENAL EXTRACORPOREAL QUALITY IMPROVEMENT TEAM IMPROVES NUTRITION DELIVERY IN CRITICALLY ILL PEDIATRIC PATIENTS RECEIVING CONTINUOUS RENAL REPLACEMENT THERAPY (CRRT)

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¹Baylor College of Medicine/Texas Children's Hospital, Renal, Houston, USA
²Baylor College of Medicine/Texas Children's Hospital, Critical Care, Houston, USA

Aims & Objectives:

Nutrition provision for pediatric critical care patients receiving CRRT is suboptimal with protein (PRO) prescription and delivery goals being frequently unmet. An interprofessional continuous quality Improvement (CQI) team identified optimization of nutrition as a priority metric. Ongoing interventions have emerged as a result of data collected.

Methods

Data was collected daily on all CRRT patients to identify appropriateness of nutrition prescription. Thrice-weekly bedside-rounding was performed to review safety and quality indicators including nutritional adequacy. Plan-Do-Study-Act (PDSA) cycles were initiated. An early PDSA included adding the PRO prescription to the daily nephrologist progress note. Subsequent PDSA included targeted education to intensivists. Recommendations were made if nutrition prescriptions were suboptimal. Two patient cohorts were compared after both PDSA cycles/interventions.

Results

Group 1: 11 patients, 63% malnourished, mean age 9.4 years, 72% male; Group 2: 12 patients, 25% malnourished, mean age 4.8 years, 33% male. Group 2 median PRO delivery was 2.01 (IQR 1.46-2.76) versus 1.98 g/kg/d (IQR 0.95-1.98) in group 1. Group 1 met PRO goals only 24% CRRT days, increasing to 38% CRRT days in Group 2 (p<0.05). Caloric delivery was unchanged in both groups with goals unmet on 67% CRRT days.

Conclusions

Nutrition delivery to CRRT patients remains suboptimal. Implementation of an interprofessional CQI team has significantly decreased number of CRRT days with unmet PRO goals and improved PRO delivery in these patients.
Aims & Objectives:

We describe the results and outcomes of a new PICU in Quito – Ecuador.

Methods

Data were prospectively collected using SATI-Q software was provided to validate the PIM-2 score in Latin America.

Results

We analyzed the period 6/1/ 2013 – 12/3/2015. 572 patients were admitted (56.3% males), age 66.1 ± 59.9 months (IQR 12 – 118 months). Admission were from the OR (42.8%), other hospital (26.5%), and the ER (14.6%). Reasons for admission were postoperative (45%), respiratory (18.7%), trauma (15.8%), and neurologic (13.7%). Admission was related to a chronic complex condition (CCC) in 25.2% of the cases, especially cancer, cardiovascular, and neuromuscular. 31/572 patients were admitted after a cardiac arrest.

Mean PICU-LOS was 8.4 ± 25.2 days (IQR 2 – 129 days). MV was used in 42% with LOS on MV of 7.7 ± 13.3 days. Tracheostomy was performed in 1.75%. We used a CVC in 36.8%, Foley catheter (48%), and NG tube (28.5%). ECMO was used in one child and RECR in 11 patients (91% peritoneal dialysis). 5.2% of the patients developed a nosocomial infection.

In comparison with admission, at discharge 92% did not show brain impairing, and 90.4% global impairing. Mortality was 6.64%; the probability of dying according PIM2 was 8.37 ± 18.8% (IQR 0.41 – 5.32). Mortality was associated with PIM2 (z=-6.395), CCC (p<0.0001, RR 2.01 [1.4 – 2.9]), MV (p<0.0001, RR 2.2 [1.9 – 2.6]), cardiovascular disease(p:0.028, RR 6.02 [1.62 – 22.36]) and respiratory disease (p:0.027, RR 1.8 [1.1 - 3]). Postoperative admissions were not associated with mortality (p:0.009; RR 0.52 [0.29 – 0.93]).
Conclusions

Our PICU admitted children for postoperative care or respiratory, traumatic and neurologic causes. Most of the children did not show any brain or global impairment at discharge. Mortality was 6.6% and showed association with CCC, MV, cardiovascular, and respiratory diseases.
Aims & Objectives:

Metformin is a biguanide used to treat DM Type 2. MALA is a widely recognized rare side effect in adults. It is even less reported in the pediatric age group, none of which were associated with therapeutic doses of metformin. We report a case of a three year old girl on therapeutic regimen of metformin with MALA.

Methods

A three year old girl with repaired congenital cardiac disease presented with infected PE resulting in cardiopulmonary arrest, severe HIE and dystonia. She received metformin in preparation for stem cell therapy. Three weeks after metformin initiation, she acutely developed hyperkalemic ECG changes, poor perfusion and venous blood gas showing severe lactic acidosis and hyperkalemia; pH 6.96, PaCO2 57mmHg, PaO2 65mmHg, HCO3 12mmol/L, Lactate 12mmol/L, K= 9.5mmol/L, Glucose 9mmol/L, Creatinine 60umol/L, BUN 15mmol/L. She was managed for hyperkalemia with calcium, insulin/dextrose, bicarbonate and furosemide. She became hypotensive requiring volume, vasopressors and higher ventilator support. She improved within three hours but had a recurring episode 12 hours later. Both events occurred 60-120 minutes after metformin administration. It was noted that her creatinine had doubled with concurrent increment in metformin dose 6days prior to the event. She did not have further episodes after discontinuation of metformin.

Results


Conclusions

The few reported pediatric cases of MALA are seen with drug overdose, acute on chronic metformin toxicity, ESRD, hypoxemia, hypoperfusion and liver disease. Reported mortality is 50%. Symptoms of metformin toxicity include nausea, emesis, hypoglycemia, lethargy, abdominal pain, hypothermia, respiratory failure, hypotension, and cardiac dysrhythmias. Metformin levels peak at 1-2hours, is renal excreted with half-life 1.5-4.9hours. Despite not attaining metformin levels, the constellation of biochemical findings and the correlation with time of drug ingestion
was suggestive of cause and effect relationship. Therefore, in a patient receiving metformin with acute severe metabolic acidosis, MALA should be considered as a possible cause.
Aims & Objectives:

Considerable attention has been given to early movement (EM) of patients in adult intensive care units where progressive mobilization plans have shown a reduction in morbidities and length of stay (LOS). Standardized movement protocols do not exist for the critically ill child even though they develop similar physical, psychological and neuro-cognitive sequelae. The objective of this project was to test the feasibility of implementing an interprofessional EM program (EMP) in a quaternary PICU.

Methods

The EMP was developed using Plan-Do-Study-Act methodology (Figure 1). Movement plan templates (based on five levels of movement) were customized for each child. Each plan contained guidelines for positioning, limb movements, sitting/transferring, weight-bearing and functional movements. A child’s baseline movement level, daily movement level, length of time to first move out of bed (OOB), and factors associated with movement plan adherence were collected. A post-implementation feedback survey was also given to front-line providers.
Results

A total of 375 patient movement assessments were conducted over 5 weeks. EM rounds took 15-25 minutes for an average census of 17. Readiness to move OOB is demonstrated in Figure 2 and time to first move OOB is demonstrated in Figure 3. Factors associated with movement plan adherence included medically not ready (28%), equipment (19%), procedures (18%), and inadequate personnel (7%). According to frontline providers, EM rounds were perceived as an additive, efficient strategy by the interprofessional team in movement planning for their patient(s).
Figure 2: Readiness to Move OOB

Percentage of Patient Movement Assessments:

- Not ready to move OOB
- Required maximum assistance
- Required minimum to moderate assistance

Readiness to Move Out of Bed
Conclusions

It is feasible to implement an interprofessional EM program in a quaternary-level PICU and leads to more consistent EM of critically ill children.

References

SEDATION AND ANALGESIA / PHARMACOLOGY / MOBILITY / DELIRIUM

PICC-0353
WEANING OF OPIOIDS AND BENZODIAZEPINES IN CRITICALLY ILL CHILDREN: A QUALITY IMPROVEMENT INITIATIVE
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2University of Toronto, Department of Paediatrics, Toronto, Canada
3The Hospital for Sick Children, Pharmacy Department, Toronto, Canada

Aims & Objectives:
Critically ill children often require high doses of analgesics and sedatives to tolerate invasive treatment. There is limited information on the best methods to wean these drugs in children to prevent drug withdrawal. Our aim was to determine incidence and risk factors for drug withdrawal in critically ill children after the implementation of guidelines for weaning of opioids and benzodiazepines.

Methods
Inclusion criteria were exposure to opioids and benzodiazepines for greater than 5 days and age under 18 years. Data collected include age, weight, burden of sedation, weaning strategy, withdrawal scores, withdrawal episodes and treatment. Descriptive statistics were used. Median and interquartile ranges are reported.

Results
47 patients meet criteria between March and June 2013. Median age was 4.3 months (IQR 0.7-17.5). Median Weight was 4.3kg (IQR 3.2-8.6). Morphine was the most commonly used opioid (96%) with median duration of use prior to wean of 10 days (IQR 7-16). Most commonly used benzodiazepine was Lorazepam (93%) with median duration of use prior to wean of 6 days (Range 1-30days). 25 patients required a wean of opioids only and 22 patients required a wean of both opioids and benzodiazepines. There were 21 patients who developed at least one episode of withdrawal during their wean. This represents an incidence of withdrawal of 45%. 13 patients had more than one episode of withdrawal. Withdrawal occurred more frequently in younger patients and in children with lower weights.

Conclusions
Drug withdrawal in critically ill children is relatively common. Younger children and children with lower weights were more at risk. This evidence is being used to develop new guidelines for weaning of analgesics and sedatives demonstrating a dynamic and adaptive way to make clinical guidelines current and relevant.
USE OF SUGAMMADEX TO REVERSE INDUCED-NEUROMUSCULAR BLOCKADE IN THE NEONATAL AND INFANT POPULATION. A CASE SERIES

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Aims & Objectives:

Sugammadex is used to reverse induced neuromuscular blockade at a recommended dose of 2mg/kg in children >2yr. Limited experience in less than 2yr has led to a lack of recommendations regarding its usage in the neonatal/infant population. Carlos et al. reported two cases and Alonso et al. 23 cases. Both reports in neonates have demonstrated a good safety profile and onset of action.

We present 8 cases admitted to the NICU/PICU for management of critical illness who all received Sugammadex to reverse induced-neuromuscular blockade.

Methods

A retrospective review was undertaken of patients on our unit between October 2012 and January 2016 who received Sugammadex. Demographic, clinical and treatment details were collected. Dosage, frequency and outcomes were also noted.

Results

8 patients (4 male) received Sugammadex following cessation of Vecuronium infusion. Median age (range) and weight were 19 days (range 4-116days) and 2.35kg (range1.5-4kg) respectively. 7 received 2mg/kg and 1 received 4mg/kg of Sugammadex per dose. Of the 8 patients, 3 required only one dose to fully recover from their paralysis. 5 required subsequent dosing (max 6). The total maximum dose given in this group was 24mg/kg over a 144hr period. Prior to Sugammadex dosing 5 patients displayed mild-moderate renal impairment, with only one having an increased creatinine level post dose.

Conclusions

Our experience has reassured us that Sugammadex is safe for use in neonates/infants, even with mild renal impairment. We have used up to 4mg/kg in repeated doses with no adverse effects.
SEDATION AND ANALGESIA / PHARMACOLOGY / MOBILITY / DELIRIUM

PICC-0191
PREVALENCE AND RISK FACTORS FOR DELIRIUM IN CRITICALLY ILL CHILDREN
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Aims & Objectives:

Recognition of delirium in the pediatric intensive care unit (PICU) is challenging and its impact is under recognized. The study aim was to assess prevalence of delirium and risk factors in critically ill children admitted to PICU.

Methods

Prospective study of children admitted to PICU (3/15-9/15). Richmond Agitation-Sedation scale (RASS) and Cornell Assessment Method for the Intensive Care Unit (CAP-D) were obtained after admission. Patients were assessed for delirium if RASS score was > -3.

Results

Forty-four children (M/F: 29/15), age 9.5 (2-48) months (median, IQR), with PICU Length of stay (LOS) and duration of mechanical ventilation (MV) of 8.5 (5-15), 7.5 (4-11.5), and 6 (1-9) days respectively; PRISM risk of mortality of 5 % (2-9) were enrolled. The prevalence of delirium for day 1, 2, and 3 was 66%, 52%, and 53%, respectively; 57% of children received at least 2 medications for sedation purposes.

<table>
<thead>
<tr>
<th></th>
<th>Delirium Day 1</th>
<th>Delirium Day 2</th>
<th>Delirium Day 3</th>
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<tbody>
<tr>
<td><strong>Age</strong></td>
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<tr>
<td></td>
<td>0.98 (0.97-1.00)</td>
<td>0.98 (0.97-1.00)</td>
<td>0.98 (0.96-1.03)</td>
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<tr>
<td>PRISM III</td>
<td>1.04 (0.94-1.15)</td>
<td>1.05 (0.96-1.12)</td>
<td>1.02 (0.92-1.15)</td>
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<tr>
<td>PICU LOS &gt; 7 D</td>
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<tr>
<td></td>
<td>7.6 (1.7-33)*</td>
<td>5.7 (1.6-21)*</td>
<td>14.7 (2.9-73)*</td>
</tr>
<tr>
<td>Infused Drugs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>&gt;2</td>
<td>7.2 (1.7-29)*</td>
<td>11.8 (2.8-49)*</td>
<td>11.3 (2.3-54)*</td>
</tr>
</tbody>
</table>
Values are Odds ratio (95% CI); * p < 0.05

A multivariate logistic regression model showed PICU LOS > 7 days as independent predictor of delirium for day 1 (OR 7.3, 95%CI: 1.08-50, p= 0.041), day 2 (OR 5.3, 95%CI: 0.87-33, p= 0.070), and day 3 (OR 38.6, 95%CI: 3.02-49, p=0.004), adjusted for age, PRISM III, use of > 2 drugs, and use of inotropic support.

Conclusions

Delirium is highly prevalent in critically ill children. Higher risk of mortality, use of more than two medications, and prolonged PICU stay were associated with delirium.
SEDATION AND ANALGESIA / PHARMACOLOGY / MOBILITY / DELIRIUM

PICC-0565
VALIDATING THE WITHDRAWAL ASSESSMENT TOOL (WAT-1) IN HOSPITALIZED PATIENTS FROM BIRTH TO 18 YEARS OF AGE: AN INTERIM ANALYSIS OF DATA

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⁵McGill University, School of Nursing, Montréal, Canada

Aims & Objectives:

This research project aims to establish the validity of the WAT-1 scale in PICU and NICU from birth to 18 years of age, that have received continuous infusion of opioids or benzodiazepines for analgesia and/or sedation for at least 72 hours, regardless of admitting diagnosis. Validity of the tool will also be assessed outside of the intensive care environment when possible once the patient has been transferred to the general medical or surgical unit. Validity of the WAT-1 will be established by comparing WAT-1 scores with nurses’ clinical judgment of whether or not a patient is in withdrawal.

Methods

A prospective cross-sectional validity study will be conducted, wherein each subject’s WAT-1 score will be compared to bedside nurses’ clinical judgment of the presence or absence of withdrawal syndrome.

Results

One hundred and ten (110) patients have been recruited over a 24-month period in the PICU and the NICU. Preliminary data analysis of the first 58 subjects shows an average age of 38.3 months with a median of 1.9 month. Main diagnoses are cardiovascular surgery and disease (33%), respiratory disease (20%). Average length of sedation pre-weaning was 7.6 day, median 6 (range 3-18days). WAT-1 and nursing judgement were compared and overall the WAT-1 demonstrated good validity for all patients of varying age and diagnosis in this interim analysis.

Conclusions

The WAT-1 score appears to demonstrate good validity in a varied population of pediatric and neonatal intensive care patient. Continued data gathering and complete analysis will need to be completed to validate appropriately the WAT-1 score.
**Aims & Objectives:**

Plasma-Lyte 148 is a balanced, crystalloid intravenous fluid used for both maintenance and bolus therapy. There is increasingly strong evidence of benefit compared to saline. There is no pharmacostability information available for mixtures with common therapeutic agents. To investigate the pharmacostability of Plasma-Lyte 148, and Plasma-Lyte 148+5% glucose, with eight commonly used therapeutic agents when compared with 5% glucose and 0.9% saline as diluents.

**Methods**

Morphine, Midazolam, Ketamine, Fentanyl, Salbutamol, Aminophylline, Furosemide, and Clonidine were mixed with Plasma-Lyte 148, Plasma-Lyte 148+ 5% glucose, 0.9% saline, and 5% glucose. Physical stability, pH, and drug concentration were measured at 0, 2, and 24 hours by visual inspection, pH monitor, and High Performance Liquid Chromatography. For HPLC, six repeats were performed with each combination. Stability was defined as <10% concentration variation.

**Results**

No precipitate formed in any of the samples. All Plasma-Lyte solutions were stable compared to saline and glucose solutions at 2 and 24 hours. Relative to starting concentration, all drugs except Midazolam were stable to +/- 3%. Midazolam showed similar variation in concentration with all four fluids. All Plasma-Lyte combinations remained in a safe peripheral administration pH range of 5-9. Plasma-Lyte 148 admixtures were found have a pH closest to that of the blood.

**Conclusions**

Compared to standard diluents, the above tested therapeutic agents are chemically and physically stable for 24 hours at the concentrations measured, and are all stable at Y site dilutions, when diluted with Plasma-Lyte 148 and Plasma-Lyte 148+5% dextrose. All are pH stable and all are suitable for peripheral administration.
Aims & Objectives:

Sedation is required in critically ill children to reduce anxiety, pain, and enable synchronization during mechanical ventilation. A combination of opioids and benzodiazepines is mainly used. Prolonged exposure to these agents is associated with tolerance and withdrawal. Sedation regimens incorporating α2-agonists may offer benefits. We aim to report our experience with clonidine used as an adjunctive sedative agent.

Methods

Medical records of patients who received clonidine between November 2013 and April 2015 were retrospectively reviewed. Demographic data, sedation agents, clonidine indications and doses, side-effects, and withdrawal symptoms were recorded. We hypothesized an opioid- and benzodiazepine-sparing effect of clonidine, and we analysed morphine and midazolam consumption during two time periods: 18 months before and 18 months after the introduction of clonidine.

Results

57 patients were enrolled. Mean age was 2.3 years. Reason for intensive care admission was mainly respiratory failure (50%). Main indications for clonidine were: increasing morphine and midazolam requirements (64%), difficulties in achieving optimal sedation (38%), and withdrawal syndrome (7.7%). During clonidine infusion 4 patients (10.2%) experienced bradycardia, 3 (7.7%) hypotension and 5 (12.8%) both. Fifty-eight per cent of patients who showed haemodynamic instability were less than one year old. These effects did not result in increased demand for intravenous fluids or catecholamines. We observed a significant lower consumption of morphine and midazolam after clonidine was introduced. Compared with the 18 months pre-study period, the consumption decreased by 9.3% for morphine and by 47.1% for midazolam (calculated as mg/months/hospitalized patients).

Conclusions

Intravenous clonidine for analgesia and sedation in critically ill children is safe and effective. Clonidine decreases opioids and benzodiazepines requirements, and can be beneficial to reduce complications associated with prolonged exposure to these agents.
SEDATION AND ANALGESIA / PHARMACOLOGY / MOBILITY / DELIRIUM

PICC-0351
SEDATION REQUIREMENTS IN CRITICALLY ILL INUIT CHILDREN
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²Children's Hospital of Eastern Ontario, Pediatric Critical Care, Ottawa, Canada

Aims & Objectives:

Several Canadian PICUs report that Inuit infants require higher than average doses of sedation to tolerate mechanical ventilation (MV). There are currently no studies evaluating their dose requirements and the underlying mechanism if this impression is true.

Objective: To describe the doses of sedative drugs administered to Inuit infants requiring MV for medical indications compared with non-Inuit controls.

Methods

With Research Ethics Board approval a retrospective case-controlled chart review was performed at Montreal Children's Hospital (MCH) and Children's Hospital of Eastern Ontario 2004-2008. Inclusion criteria were a medical diagnosis and need for >4 days MV. Exclusions included age >3 years, neurologic or painful conditions. Cases and controls were matched by age and diagnosis. Details of daily infusion rates (IR) and bolus doses of opioids and benzodiazepines, adjunct medications and duration of ventilation were collected. Sedation was managed according to local practice without routine sedation scoring. Analysis was by longitudinal mixed (fixed and random) effects model adjusted for day and pairing clusters.

Results

At MCH there were 9 cases and 5 controls and at CHEO 17 cases and controls. Analysis showed the Inuit cases to have higher IR and daily doses of opioids than controls on each of 4 days of data collection. On day 4 mean daily IR of fentanyl was 2.5 vs 1.04 mcg/kg/hr for cases vs controls (p=0.021). The groups did not differ in benzodiazepines IR or total doses.

Conclusions

This is a retrospective study with small numbers but seems to confirm the higher dosing for Inuit vs non-Inuit infants. There is evidence of differing dosage requirements for opioids in genetically distinct populations in Columbia but the Canadian Inuit population have never been studied in this context. To further investigate these observations and obtain better information to guide dosing in this population we propose a pharmacokinetic/pharmacodynamic study with a pharmacogenetic component.
SEDATION AND ANALGESIA / PHARMACOLOGY / MOBILITY / DELIRIUM

PICC-0787
PROPYLENE GLYCOL TOXICITY IN CRITICALLY ILL CHILDREN RECEIVING INTRAVENOUS PENTOBARBITAL INFUSION

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Aims & Objectives:

Propylene glycol (PG) is a solvent used in intravenous pentobarbital, which when used over prolonged periods, or at high doses, leads to risk of PG toxicity. The clinical and biochemical features of PG toxicity are altered mental state, seizures, cardiac dysrhythmia; and elevated serum osmolal gap (OG), anion gap (AG), and lactate levels.

Methods

Retrospective study of patients in our intensive care unit treated with pentobarbital infusion for at least 18 hours. Chart review to identify patients with laboratory or clinical evidence of PG toxicity. Data presented as non-parametric with median (interquartile range).

Results

Sixteen patients aged 33 (16-102) months were identified. Of these, 7 patients (44% [95% confidence interval 20%-70%]) had laboratory evidence of PG toxicity (raised AG acidosis, increased lactate and/or increased OG). The maximum dose of pentobarbital used in the whole cohort was 6 (3.9-8.8) mg/kg/hr. The total cumulative exposure to pentobarbital in the entire cohort was 338 (139-1265) mg/kg over 113 (70-325) hours. On univariate and multivariate testing there were no associations between PG toxicity and dosing of pentobarbital.

Conclusions

Pediatric patients treated with pentobarbital infusion for prolonged periods are at significant risk of developing PG toxicity; we estimate that the percentage is between 20% and 70%. We could not identify risk factors from the type of exposure (age, maximum dosing, duration of infusion) that were associated with PG toxicity, which means that clinicians should have a high index of suspicion for toxicity and utilize appropriate biochemical monitoring.
Aims & Objectives:

Pain is a common symptom of hospitalized children. Nevertheless, treatment of pediatric pain is insufficiently addressed in Ethiopia and faces cultural and resource challenges. In Ethiopia there are currently no models for pediatric procedural sedation and procedures are commonly performed without guidelines for safe use of sedation and analgesia. Our objective was to develop a safe and effective procedural sedation clinic as part of a quality improvement project.

Methods

We analyzed barriers and challenges for providing safe and effective analgesia and sedation during procedures by using the fish bone approach to quality improvement. We sought the involvement of all stakeholders at TASH. The infrastructure for procedural sedation was created by obtaining physical space, equipment, monitors and medications. Education and training of a multidisciplinary team was performed using a modified version of the Society for Pediatric Sedation (SPS) Provider Course. A Pain and Sedation Booklet with clear guidelines was created.

Results

The sedation clinic at TASH was opened in July 2015. The clinic is a collaborative effort between the Departments of Pediatrics and Anesthesia. A total of 284 patients have undergone procedural sedation in the first 6 months. The most common procedure performed was bone marrow aspiration and biopsy. All levels of sedation were used (minimal, moderate and deep). Medications used include ketamine and propofol. No major complications have been reported.

Conclusions

Development of safe and effective procedural sedation is possible in resource limited settings with proper training, equipment, guidelines and the support of hospital leadership.

Acknowledgements: This quality improvement project is possible through the generous support of the American people with funding from the US President's
Emergency Plan for AIDS Relief (PEPFAR), The U.S. Center for Disease Control and Prevention (CDC Ethiopia), American International Health Alliance, Society for Pediatric Sedation, and the Department of Pediatrics at TASH
SEDATION AND ANALGESIA / PHARMACOLOGY / MOBILITY / DELIRIUM

PICC-0200
EXPLORING THE IMPLEMENTATION AND EFFECTIVENESS OF THE SOPHIA OBSERVATION WITHDRAWAL SYMPTOMS SCALE (SOPHIA SCORE) FOR BENZODIAZEPINE AND OPIOID WITHDRAWAL IN THE PAEDIATRIC INTENSIVE CARE UNIT
B. Hansen¹
¹, Cambridge, United Kingdom

Aims & Objectives:

Administration of benzodiazepines and opioids in paediatric intensive care units (PICU) is common practice¹. Treatment of pain and safe management of ventilated patients in PICU is essential². However, extended exposure to sedatives and analgesic drugs often creates physiological dependency, prolonging their PICU stay and hospital admission¹. The Sophia score serves as a tool to recognise withdrawal symptoms. This project focuses on the use of the Sophia Observation Withdrawal Symptoms Scale (Sophia score) in the PICU, exploring its potential effectiveness in reducing withdrawal symptoms from benzodiazepines and opioids.

Methods

Eighteen patients who received continuous morphine and/or midazolam infusions for ≥five days were randomly selected. The total number of times each patient was Sophia scored, the score awarded and overall length of admission were included in the study for analysis. A Sophia score of four or above indicates that the patient is withdrawing and requires a medical review to manage symptoms.

Results

Patients on continuous infusions of midazolam and/or morphine for ≥five days all scored ≥four at least once, presenting with signs of withdrawal. However, patients were not regularly Sophia scored each shift, making the consistency of scores difficult to interpret.

Conclusions

The Sophia score may be effective in recognising withdrawal symptoms, yet without a weaning protocol it is redundant in its ability to limit symptoms from arising and merely recognises withdrawal. Developing an effective weaning programme in conjunction with the Sophia score could potentially minimise withdrawal symptoms in patients and shorten overall hospital stay.

¹ (Cunliffe et al/2004).
2 (Berde et al 2002).
Aims & Objectives:

Opioids are the first choice of analgesic treatment after major surgery in infants. In a previous RCT we showed that paracetamol IV as primary analgesic reduced morphine requirements by 66% with comparable pain scores. Now we aimed to study if these results could be confirmed in routine daily practice.

Methods

In a prospective study, from February 2014 to December 2015, we included infants up to the age of 1 year, after major non-cardiac thoracic or abdominal surgery. As part of the revised clinical protocol, they received a loading dose IV paracetamol after arrival in the PICU, followed by q4h IV paracetamol. When pain was suspected (COMFORT-B ≥17 and NRS≥4), a morphine rescue bolus was administered with dose adjusted for postnatal age (10 mcg/kg if ≤10 days vs. 15 mcg/kg if >10 days) which could be repeated twice within one hour. If pain persisted, continuous morphine was to be started. Protocol adherence and morphine consumption were documented. These findings were compared to the original results of our RCT.

Results

We included 77 patients; 64 were ≤10days of age (83%). Seventy-five (97.4%) received IV paracetamol of whom 42 (56%) did not need rescue morphine. The two other patients received rectal paracetamol. 35 infants (46.7%) needed rescue morphine, with a median of 2 boluses (IQR 1-4), 27 also needed continuous morphine infusion with median dosage of 7.9 mcg/kg/u (IQR 5-10). After implementation, the median cumulative morphine consumption across the first 48 hours postoperatively [111 mcg/kg (IQR 0-279)] was not different from that in the RCT paracetamol group [121 mcg/kg (IQR 99-264)] (p>0.05).

Conclusions

The results of our study confirm that IV paracetamol as first-choice analgesic after major surgery works well in daily practice. Adherence to IV paracetamol was high, while continuous morphine was started sooner and higher than the revised clinical protocol dictated.
Early exercise and rehabilitation improves long-term functional outcome in adult intensive care unit (ICU) survivors, but has not been evaluated in children. The objective of this pilot trials is to evaluate the feasibility of conducting a multi-centre randomized controlled trial (RCT), evaluating the efficacy of early in-bed cycling in addition to usual care physiotherapy, compared to usual care physiotherapy alone, on functional recovery in critically ill children.

Methods

Children aged 3 to 18 years admitted to the PICU at McMaster Children’s Hospital who were limited to bed-rest/bed mobility, not at their baseline function, were haemodynamically stable and had no contraindication to mobilization, were randomized in a 2:1 ratio to early in-bed cycling (within 24 hours of enrolment) vs. usual care physiotherapy. In-bed cycling is applied for 30 minutes daily during weekdays, for a maximum of 7 days, or till baseline functional mobility was achieved for 2 consecutive days. Primary outcomes were feasibility and protocol adherence. Target sample size is 30, over 12 months. Secondary outcomes are functional outcome at 1 month and PICU related morbidities.

Results

A total of 11 patients were enrolled between September 2015 to January 2016; 7 to the cycling arm and 4 to usual care. To date, our consent rate and 1 month follow-up rate is 100%. The median time to intervention after consent is 11.5 hrs (minimum 1, maximum 19.5). Seventeen cycling sessions have been applied; median 2 (min 2, maximum 4) per patient. There were no adverse events attributed to cycling intervention during study period.

Conclusions

To date, consenting and applying an early mobilization protocol in critically ill children appears feasible. We anticipate completion of enrolment in 8 months. These results will inform the design and appropriate outcomes for a planned multi-centre RCT.
Aims & Objectives:

Unrelieved pain can have lasting physiological and psychological effects for children and their families. Most available studies conclude the best pain assessment is self reported pain, however the majority of patients in the paediatric intensive care unit (PICU) are unable to verbally communicate their pain. Therefore, it is essential that nurses ensure that they perform and document regular and accurate pain assessment scores for each of their patients.

Methods

A literature search was performed around the value of pain assessment tools in PICU’s. Two audits were conducted two years apart looking at the nursing compliance of documenting pain assessment scores in a single PICU. A nursing survey was also conducted to establish how important nurses feel parent/carer involvement in their child’s pain assessment is.

Results

There is limited paediatric evidence available around this topic, many studies highlighted pain assessment in PICU as an area requiring further exploration. Compliance with pain assessment scoring was initially very poor in the chosen centre, although improved more recently; there are many possible reasons for this. Most of the nurses working on PIC saw the families’ participation in pain assessment as important. However, they also thought that their clinical assessment and available pain assessment tools were a more accurate measure of their patients’ pain.

Conclusions

It is very clear that further research into pain assessment in PIC is required to ensure best practice is standardised across all centres. The reason’s for uncompleted nursing pain scores still need to be established so more nurse education can be delivered to improve current nursing practice.
Aims & Objectives:

To determine the safety and feasibility of an early rehabilitation and progressive mobilization program in a pediatric intensive care unit.

Methods

This quality improvement project in the PICU involved a ‘usual care’ baseline phase, followed by a quality improvement phase that incorporated interventions to promote the early rehabilitation and progressive mobilization of critically ill children.

Results

A pre-post retrospective design was used for this QI project that focused on evaluating an early mobilization program (PICU Up!) as it became routine care for the children hospitalized in the PICU. Data was collected and analyzed from July to August 2014 (pre-implementation phase) and July to August 2015 (post-implementation). Program implementation was completed in April to May 2015. Data was analyzed from 200 children aged 1 day through 17 years admitted to the PICU with a length of stay of at least three days. PICU Up! implementation led to an increase in occupational therapy consultations on PICU day 3 (44% vs 59% p = 0.034), with a significant increase in children with physical therapy consultation in place by the day prior to discharge (53% vs. 82%; p=0.017). More children engaged in mobilization activities after the PICU Up! intervention on PICU day 3, including transition from sit to stand (p=0.002) and ambulation (p=0.016). No adverse events, including unplanned extubations, occurred as a result of early mobilization activities. The program was positively received by PICU staff overall, and areas for ongoing improvement were identified.

Conclusions
Implementation of a structured and stratified early mobilization program in the PICU is safe and feasible. PICU Up! increased PT and OT involvement in critically ill children's care and resulted in increased patient mobilization activities including ambulation. A bundled intervention to create a healing environment in the PICU with structured activity may have benefits for short and long-term outcomes of critically ill children.
DAY-NIGHT ACTIVITY RHYTHMS ARE DISRUPTED IN CHILDREN ADMITTED TO THE PEDIATRIC ICU AFTER MAJOR SURGERY
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²Children’s National Medical Center, Pediatrics, Baltimore, USA
³Johns Hopkins Bloomberg School of Public Health, Biostatistics, Baltimore, USA
⁴Johns Hopkins School of Medicine, Medicine & Epidemiology, Baltimore, USA

Aims & Objectives:

Sleep is a basic human need. Children in the hospital are exposed to multiple risk factors for sleep disruption during a time when healing and recovery are the goals. Accelerometry can provide a longitudinal, quantitative measurement of raw activity levels as a measure of circadian rhythm in critically ill children. The overall objective of this study is to characterize activity levels and sleep-wake cycles in critically ill children admitted to the ICU. We hypothesized that exposure to the ICU environment would result in an increase in nighttime activity and severe disruption of the circadian rhythm.

Methods

In this prospective, observational study, accelerometry was initiated with an actigraphy watch on post-operative day 1 in children after major cardiac, orthopedic or urologic surgery. The watch was maintained on the subject until the day of hospital discharge. Primary outcome measure was the percentage of total activity during the nighttime period.

Results

One hundred fifty-six subjects between the ages of 0-18 were enrolled, with a mean age of 7 years. Males comprised 58% of all subjects. The largest cohort was cardiac surgical patients (n=109), followed by orthopedic surgery (n=35) and urologic surgery (n=12). Differences in daytime and nighttime activity were completely indistinguishable in 37.5% of all subjects. The pediatric ICU setting was associated with increased disruption of circadian rhythmicity when compared to the floor setting.
Conclusions

This study concludes that children admitted to the PICU experience significant changes in circadian rhythm that persist through hospitalization and may have important implications for outcomes.
Aims & Objectives:

Several authors have reported the use of sugammadex and rocuronium in infants, but there have been few reports of its use for laparoscopic pyloromyotomy. The aim of this study was to investigate the anesthesia management for laparoscopic pyloromyotomy in infants with hypertrophic pyloric stenosis.

Methods

This study was approved by the institutional review board. The data was collected retrospectively from 18 consecutive laparoscopic pyloromyotomy procedures in infants with hypertrophic pyloric stenosis between May 2011 and November 2014.

Results

At the time of surgery, the median age was 41 days (range 15-100) and the weight was 3.7 kg (2.9-5.1). The median duration of surgery was 30.5 minutes (23-98). The median doses of fentanyl, rocuronium and sugammadex were 0.8 (0-2.9), 0.8 (0.5-2.1) and 2.4 mg/kg (1.7-11.3), respectively. The time to extubation after administration of sugammadex (T1) was 13.5 minutes (2-60) and the time to anesthesia end after surgery (T2) was 21.5 minutes (7-67). Greater doses of fentanyl, rocuronium and sugammadex were associated with longer T1 (p=0.025, r2=0.28; p=0.001, r2=0.51; p=0.003, r2=0.44) and longer T2 (p=0.009, r2=0.36; p=0.001, r2=0.53; p=0.002, r2=0.47), respectively. Greater doses of sugammadex were directly associated with greater doses of rocuronium (p<0.001, r2=0.66). Lower weight and greater dose of rocuronium were associated with prolonged anesthesia (defined as both longer T1 and longer T2 than the third quantile) by single variable logistic analysis (unit OR=0.049, 95%CI 0.0005-0.82; unit OR=51.7, 95%CI 1.06-3558599).

Conclusions

Lower weight and greater doses of rocuronium may be risk factors of prolonged anesthesia.
Aims & Objectives:

The measured glomerular filtration rate (mGFR) has been used to assess augmented renal clearance (ARC). However, in critically ill patients, there are several disadvantages, especially the delay in obtaining mGFR. Therefore, we evaluated the correlation between estimated GFR (eGFR) and vancomycin trough level in order to predict whether the patient has ARC upon drug prescription without the time delay.

Methods

This study was carried out at a PICU within a tertiary university children’s hospital. Patients admitted at the PICU who underwent therapeutic drug monitoring (TDM) of vancomycin between July 1, 2009 and June 30, 2014 were included, and their vancomycin trough level, daily dose of vancomycin administered, dosing interval, and serum creatinine concentration were all included in the analysis.

Results

Vancomycin trough levels of 87 (86.1%) patients were below 15 mg/L. The vancomycin trough level was associated with age (p=0.006), daily dose (p=0.041) and dosing interval (p=0.006) of vancomycin, and eGFR (p<0.001). In a multivariate analysis using the modified drug clearance model showing the relationship between eGFR and vancomycin trough level, the adjusted R2 and p value were 0.812 and <0.001, respectively. Age (odds ratio, 0.987; 95% confidence interval, 0.976–0.999; p=0.039), daily dose of vancomycin (0.991; 0.985–0.996; p=0.002), and eGFR (1.002; 1.001–1.003; p=0.001) were risk factors for a subtherapeutic level of vancomycin. The cutoff eGFR for a subtherapeutic level was 110.51 mL/min/1.73m2 (area under the curve, 0.795).

Conclusions

Estimated GFR had relevant associations with vancomycin trough levels, and the cutoff value for a subtherapeutic level had good predictability. For patients that are predicted to have subtherapeutic drug levels, the prompt decision to increase dosages and measures taken to maintain therapeutic levels is crucial in critical children. Hence, eGFR is a reliable and convenient alternative to mGFR in predicting ARC.
Aims & Objectives:

Management of pain and sedation in postoperative cardiac intensive care patients is challenging. What may be more difficult is weaning these patients from the analgesics and sedatives used. Since February 2015, we have used Cardiac RESTORE (cRESTORE) to guide pain and sedation management of all postoperative cardiac surgery patients. cRESTORE is a nurse-implemented goal-directed algorithm that includes CICU multidisciplinary team discussion and agreement of the anticipated duration of intubation and patient illness trajectory, assignment of a patient goal SBS based on illness trajectory, and active titration of pain and sedation medications. Here we describe the impact of implementing cRESTORE on the quality of sedation management in post-operative cardiac surgical patients.

Methods

Once 90% of the RN staff and providers were trained, we phased-in cRESTORE over 4 weeks. Three month pre and post measurements were completed, including comfort measures, opioid/sedation exposure, length of stay, and adverse events, comparing patients prior to the use of cRESTORE to patients managed on cRESTORE.

Results

We found no significant demographic differences between the two groups. We found no change in pain assessment and reduction, however there was an increase in SBS assessment and agitation reduction. Methadone exposure was decreased overall. This was noted both at PCICU transfer, pre cRESTORE 19% and post cRESTORE 2%, and also the day prior to hospital discharge, pre cRESTORE 12% and post cRESTORE 1%. Benzodiazepine exposure was also decreased by day prior to hospital discharge, pre cRESTORE 17% and post cRESTORE 3%. With risk adjustment, total hospital length of stay was reduced in the cRESTORE group. Reported adverse events were similar between the two groups.

Conclusions
In total, the quality of sedation management improved post $c$RESTORE. We are currently comparing 6-month pre-post data, embedding $c$RESTORE in our standing order sets, and are expanding $c$RESTORE to include all PCICU patients.
Aims & Objectives:

Delirium in adult ICU patients is increasingly recognised as an important symptom that has potential long term issues. Adult studies have demonstrated that delirium duration in the ICU is associated with white matter disruption, smaller brain volumes and long-term cognitive impairment. To date no paediatric MRI studies have been reported. Paediatric neuroradiology is in its infancy and the degree to which these results apply to the paediatric critical care population has yet to be fully demonstrated. We aim to describe preliminary MRI findings obtained to investigate a cause of delirium.

Methods

This case series includes 6 PICU patients who underwent MRI for delirium as a result of a clinical diagnosis of delirium. We describe the cases and the degree to which MRI imaging added value to the care of the acutely delirious paediatric critical care patient. PCPC and POPC were also collected.

Results
Standard MRI sequences did not add to the clinical picture other than to demonstrate cortical atrophy and a number of minor non-specific changes.

Conclusions

MRI findings did not alter the immediate treatment course. Standard images did not elucidate any unanticipated findings as a cause of delirium. Future research is warranted to define the role of current and newer MRI techniques and software in assessing and managing delirious PICU patients, and to examine relationships between MRI findings and short and long-term neurological outcomes.
Aims & Objectives:
To analyze the effectiveness of inhaled sevoflurane in critically ill children with difficult sedation.

Methods
Prospective observational study performed in two pediatric intensive care units (PICU) over a 6 years period. Children treated with inhaled sevoflurane due to difficult sedation were included. Sevoflurane was administered via Anaconda® device with a Servo-i ventilator. Demographic and clinical data, oral and intravenous sedatives, sedation and analgesic clinical scores and BIS monitoring were registered.

Results
19 administrations in 18 patients (10 male) with a median age of 6 months were studied. 55% of patients after cardiac surgery and 31% had respiratory disease. The most frequently used sedoanalgesic drugs before sevoflurane were midazolam (63%) and fentanyl (53%). 6 patients (32%) also received muscle relaxants. The median concentration of exhaled sevoflurane was 0.7% (IQR: 0.7-0.8), with an infusion rate of 7 ml/h (5.8-8.7). After 48 hours of treatment, some sedative drugs were discontinued in 14 patients (74%) and the dose was decreased in 16 patients (84%). Median BIS prior to sevoflurane was 56 (IQR: 45-61), decreasing to 42 (RIQ: 41-46) after 6 hours of treatment (p< 0.05). Sevoflurane was administered for a median of 5 days (IQR: 2.7-8.5). 4 patients (21%), all of which received sevoflurane for over 6 days, presented withdrawal syndrome after discontinuing sevoflurane.

Conclusions
Inhaled sevoflurane is an effective method of sedation in critically ill children. It can be administered easily and safely in the PICU with conventional ventilators via Anaconda® device. Withdrawal syndrome may occur with prolonged treatment.
Aims & Objectives:

Although delirium is of great importance in adult intensive care, pediatric data is scarce. We present the first prospective study on risk factors for post-operative delirium in critically ill children.

Methods

We investigated 93 PICU patients (0-17 years) after elective surgery. After awakening (RASS > -3), the Cornell Assessment of Pediatric Delirium was done twice daily over a period of 5 days. Based on these scores, patients were classified as having either no, mild, or severe delirium.

Results

A total of 61 patients (66%) were delirious, of which 30 (32%) showed a mild, and 31 (33%) a severe delirium. Sex ratio was equal in all groups. Younger children developed delirium more frequently, and the symptoms were more pronounced. The number of preceding operations or a positive history of delirium did not influence the risk of delirium. Total intravenous anaesthesia had a lower risk than balanced anaesthesia (p<0.05). Duration of anaesthesia was similar in all groups. Patients with delirium had a longer duration of mechanical ventilation in the PICU (p<0.001). Significant differences in cumulative doses of various medications (e.g. sedatives, analgesics, anticholinergics) were noted between groups. Foreign bodies (p<0.01) and infections (p<0.001) increased risk of delirium. Delirious children had significantly higher demand of care and longer stays in the PICU and hospital.

Conclusions

A high incidence of delirium was noted in the PICU, and several risk factors were identified. Our data may be a base for development of strategies to prevent and treat postoperative delirium in children.
INTRANASAL MIDAZOLAM VERSUS KETAMINE TO SEDATE NEWBORNS FOR INTUBATION IN DELIVERY ROOM; A MULTICENTER RANDOMIZED CONTROLLED TRIAL

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Aims & Objectives:

Newborns in the delivery room (DR) were intubated without anesthesia in 80% of French maternity, mostly because of the lack of intravenous line. We hypothesized that intra-nasal ketamine sedation was as effective and better tolerated hemodynamically.

Objectives: The primary objective was to compare the efficacy of intra-nasal midazolam sedation (0.2 mg / kg, group M) and ketamine (2mg / kg, group K) during intubation in DR. The secondary objectives were to compare the hemodynamic tolerance and the intubation quality evaluated on film.

Methods

Randomized, prospective, multicenter (4 centers), double-blind, study. Newborns requiring surfactant instillation in DR were eligible. The exclusion criteria were: urgent intubation and mother under general anesthesia. Failure was defined by the need of more than 2 doses to achieve the necessary level of sedation.

Results

62 newborns [28 (3)weeks of gestation and 1100 (350) g] were included over a period of 2 years. Sedation with midazolam was more effective than ketamine: lower failure rate (7% vs 38%, p = 0.04) and shorter delay for surfactant administration [27 (9) vs. 37 (26) min, p = 0.05]. The hemodynamic tolerance was comparable in the two groups, respectively in the M and K groups: minimum BP: 26 (9) vs 28 (8) mmHg (p = 0.6) and hemodynamic treatment prevalence : 46% vs 35% (p = 0.44 ). The intubation quality was comparable with the 2 molecules (pain score, number of attempts, glottis exposure duration). No difference was observed in invasive
Conclusions

In delivery room during newborn’s intubation, 0.2mg/k of intra-nasal midazolam sedation is effective and more efficient than 2mg/kg of intra-nasal Ketamine. Its hemodynamic tolerance is comparable to ketamine sedation.
Aims & Objectives:

Measure the difference in total amount of infusion sedation drugs based on clinical and hemodynamic impact in mechanical ventilation patients admitted in Pediatric Intensive Care Unit. A Bispectral Index monitor (Medtronic Covidien®) was used to measure the brain activity and response to sedation dose.

Methods

A study was performed between January and December 2014 in Pediatric Intensive Care Unit in Hospital General San Juan de Dios in Guatemala City. All patients were admitted to mechanical ventilation, if case seizures or status epilepticus was descarted. All patients start with following protocol and guidelines of sedation as part of treatment; even traumatic brain injury. The Comfort and/or Ramsay scale was primary the asessment were Pediatric Intensive Care Fellow defines the rate of sedation drugs. The Bispectral Index monitor was used to measure the brain range activity related with sedation and level of sedation between Anxyolisis, Moderate Sedation and Deep Sedation; based in BIS range guidelines response the infusion rate of sedation drug was trititated.

Results

60 patients (34 male) were admitted. The mean age was 46.93 months (± 4.24). The mean values of Midazolam, Fentanyl and Thiopental (8.5 mg/kg/min ±1.65), (0.88 mcg/kg/hour ± 2.63) and (0.63 mg/kg/hour ± 0.49) infusion rate were lower than infusion drug rates based on clinical and experience and operator decision such as the scales are. (<0.05) The recurrence of hemodynamic disturbances were lower too in this group and the vasoactive drugs requirements as the same.

Conclusions

Quantitative value could make more adjusted and trititated sedation drug infusion with lower incidence of cardiovascular complications and vasoactives drugs rate. The BIS monitor is useful tool in PICU in developing country PICU were the morbility, mortality, nurse:patient ratio, doctor: patient ratio and budget claims better performance and workload.
SEDITION AND ANALGESIA / PHARMACOLOGY / MOBILITY / DELIRIUM

PICC-0220
OVERCOMING THE BARRIERS TO RECOGNISING DELIRIUM IN A PEDIATRIC INTENSIVE CARE SETTING: A CASE SERIES
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Aims & Objectives:

Delirium is an acute brain dysfunction common in Paediatric Intensive Care Units (PICU), and associated with increased mortality and morbidity. Evaluation conducted by a psychologist or psychiatrist using the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-V) is the diagnostic gold standard. However, limitations accessing a psychologist or psychiatrist necessitates bedside screening tools. We aim to highlight the barriers to the accurate and early detection of delirium in PICU by describing a delirium case series, and to discuss the value of psychology in diagnosing delirium.

Methods

Retrospective analysis was conducted on 5 cases of delirium in patients (aged 2-15 years, 40% male) admitted to the Lady Cilento Children’s Hospital PICU for respiratory infection, toxic epidermal necrolysis, hiatus hernia, and veno-occlusive disease.

Results

These 5 cases showcase the difficulties assessing and managing delirium in PICU. Due to heterogeneous diagnoses, the aetiology and presentation of delirium symptoms varied between each patient. However, all 5 cases were prescribed polypharmacological treatment for medical treatment and additional delirium management, and were frequently described as difficult to sedate and/or wean prior to and during their episodes of delirium. Clinicians additionally reported difficulty differentiating patients’ neurocognitive symptoms from delirium and acute brain insult, withdrawal or developmental regression.

Conclusions

Accurate and early detection of delirium is important. Screening tools are essential for diagnosing delirium but may be limited by the heterogeneous aetiology and symptom manifestation. In conjunction with screening tools, psychologists informed
by the DSM-V criteria may be beneficial in aiding with training, education and diagnostic consultation.
Aims & Objectives:
To analyze the role of Dexmedetomodine (DXT) in providing safe and effective procedural sedation in children.

Methods
A descriptive analysis of 29 consecutive cases who underwent procedural sedation using DXT during the study period of June 2015 to May 2016 – a one year period, done in tertiary level multi-disciplinary hospital at Chennai, Tamil Nadu, India.

Results
A total of 29 patients (N=29) underwent procedural sedation. Male: female ratio was 14:15. Average age in the sample population was 5.43yrs (0.15-16yr). Eleven children (37.94%) had painful procedures done, 18 children (62.06%) underwent painless procedures.

In children with painless procedures, 3 children (1.03%) had premedication with Trichlofos. Twelve children (41.3%) received DXT as bolus doses only, 4 children (13.9%) received DXT as bolus followed by infusion, 2 children (6.89%) received as infusion only. Average bolus dose was 1.09mcg/kg (Range: 0.75 - 3). Average infusion rate was 0.11mcg/kg/hr (Range: 0-0.5mcg/kg/hr). Seven children (24.13%) received other sedatives also. All children who had painful procedures done (11 children), received DXT along with analgesic medications. Seven episodes of adverse events (desaturations requiring only positioning) was noted (4 in painful and 3 in painless group). Six children had hiccups which resolved spontaneously. No child had hemodynamic instability. All children were observed till they were awake.

The clinical features in both the group is given in table .No.1

Conclusions
DXT is a safe drug for procedural sedation in children, both for painful and painless procedures.

Fall in the heart rate was a significant adverse event noted in this study group which did not warrant any intervention.
Aims & Objectives:

Dexmedetomidine, approximately equivalent to midazolam and provided more effective sedation without significant adverse effects. We sought to compare the efficacy of midazolam versus dexmedetomidine for sedation during mechanical ventilation in PICU.

Methods

**Design:** A prospective observational study. **Setting:** Level III PICU of a tertiary care hospital. **Period:** February-August 2015. **Participants:** 115, children aged ≤12 year’s ventilated for >24 hours divided into Midazolam-group (Midz) (n=63) and Dexmedetomidine-group (Dexm) (n=52). **Intervention:** Continuous infusion of either midazolam (1-10 microgram/kg/h) or dexmedetomidine (0.20-1.2 microgram/kg/h) with intermittent fentanyl/morphine, as needed and as decided by treating team. Sedation assessment performed with Ramsey sedation scale (RSS, target=3or4/6), PICU sedation score and Tracheal suctioning score. **Outcome measures:** Percentage of time with target sedation, length of mechanical ventilation, rescues fentanyl/morphine requirements and complications.

Results

Median of age was 19 vs 10.5 months (p=0.010) and PRISM-III was 10 vs 11 (p=0.384) in Midz-group and Dexm-group respectively. Mean (±SD) percentage of duration of proper sedation was not significant different in Midz-group (81.4±17) and Dexm-group (83.4±15.6) (p=0.510). Median cumulative dose (microgram/kg) requirement was significantly higher in Midz-group (12.2, 9.8-17) as compared to Dexm-group (9.6, 5-15.3) (P=0.019). Median duration of ventilation (1.9, 1.3-2.6 vs 2, 1.5-3 days, p=0.193) and requirement of rescue sedation (1, 0-2 vs 1, 0-2, p=0.799) was not significant, but PICU-stay was significantly lower in Midz-group (2.5, 1-4.6) as compared to Dexm-group (4.5, 3.3-5.7) days (p=<0.001). Complications were similar in both groups 19% vs 7.7% (bradycardia 9.5% vs1.9%, hypotension 9.5%vs5.8%) (p=0.079).

Conclusions

Dexmedetomidine was equally efficacious as midazolam in providing sedation in ventilated children without significant side effects in pediatric intensive care unit.
Aims & Objectives:

To determine whether dexamethasone administration prior to extubation is effective to prevent post-extubation respiratory difficulty due to upper airway obstruction.

Methods

A double-blind randomized trial was carried out including patients from 5 different centers. Patients intubated longer than 48h were randomized to receive placebo or 0.25 mg/kg/6h dexamethasone (4 doses) starting 6-12 hours before extubation. Demographical, clinical and postextubation treatment variables were compared between groups.

Results

72 patients were included: 38 received placebo (PL) and 34 dexamethasone (DMX). There were no differences prior to extubation between groups.

Reintubation due to upper airway obstruction was necessary in 10.5% patients of the PL group and in 5.9% of the DMX group (p=0.677). Stridor was present in 50% of PL patients and in 31.2% of DMX patients (p=0.113). There were no differences in maximum Taussig Score: PL group had a mean of 4.6 (SD 3.7) vs. 3.4 (SD3.3) in the DMX group (p=0.195).
Treatment with nebulized adrenaline was more frequent in the PL (44.7%) than in the DMX group (18.8%) (p=0.021). There were no statistically significant differences in the use of other treatments: heliox (15.8% with PL vs. 6.2% with DMX; p=0.211), i.v. steroids (23.7% vs 15.6%; p= 0.401), nebulized budesonide (15.8% vs 3.1%; p=0.116) and non invasive ventilation (63.2% vs 47.1%; p=0.170). There were no adverse events related to treatment.

Conclusions

There is not enough evidence to recommend use of dexamethasone prior to extubation in critically ill children. Preliminary results might indicate a reduction in the need of other treatments for upper airway obstruction.
Aims & Objectives:

Background: Fentanyl and Morphine are commonly used postoperative analgesics following cardiac surgery; morphine is safe and effective, fentanyl has a rapid onset and short duration of action with minimal side effects. In recent years, research on postoperative pain management in pediatrics has gained momentum, as it plays a major role in patient’s postoperative recovery. However, there is no comparative evidence or consensus as to which treatment is more effective in pediatric postoperative pain management.

Objective: The study's objective is to compare Fentanyl and Morphine analgesia effectiveness in pediatric postoperative cardiac patients admitted to the pediatric intensive care unit (PICU) at the American University of Beirut Medical Centre (AUBMC).

Methods

The study is a prospective randomized single-blinded clinical trial. Postoperative pediatric cardiac patients between the ages 1 month to 18 years admitted to the PICU are randomized to two groups; the Fentanyl group and the Morphine group. Patients with severe comorbid conditions and/or requiring paralytic agents are excluded. Postoperative pain scores are documented using the COMFORT scale for every 5 minutes in the first hour then every hour for the first 24 hours. Patient scores are assessed in relation to patients' length of stay in the PICU, ventilator days, PaCO2 levels, adjuvant analgesics use and postoperative complications.

Results

As this is an ongoing study, preliminary correlation and regression analyses of pilot results show no significant association between treatment and pain scores ($p=0.747$).

Conclusions

As the study proceeds, we hypothesize that Fentanyl may demonstrate better results due to its rapid action and minimal hemodynamic side effects.
A NON-INTERVENTIONAL PROSPECTIVE CLINICAL STUDY IN CRITICAL CARE PEDIATRIC PATIENTS FROM 1 MONTH TO 16 YEARS REQUIRING FENTANYL FOR ANALGESIA/SEDATION

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Aims & Objectives:

Fentanyl is commonly used off-label in pediatric intensive care units (PICU), although a safe and efficacious dosing regimen has not been properly defined. The aim of our study was to characterize fentanyl pharmacokinetics (PK) and its relation with pharmacodynamic (PD) markers of analgesia and sedation in critically ill children.

Methods

A prospective non-interventional study was performed in critically ill children requiring fentanyl. An adaptive design was proposed with interim analyses using modeling and simulation tools in small groups of patients. Blood sampling scheme was accommodated within routine extractions and scheduled via simulation using an ontogeny-based predictive PK-PD model developed for fentanyl. Clinical and monitoring variables were recorded at the time of blood samples. The predictive capacity of the model was assessed by means of Visual Predictive Checks, testing whether the initial predictions were consistent with the actual PK observations, considering a 20% acceptance criterion.

Results

The first interim analysis was performed with 12 children (<2 years, n=8; ≥ 2 years, n=4). As displayed as an example in figure 1, the initial predictions were consistent with the actual PK observations, fulfilling the acceptance criterion, thus demonstrating an adequate predictive capacity of the model and supporting the suitability of the study design. Based on these results, a sample size of N=40 was determined for the second interim analysis.
Conclusions

The development of model-based adaptive designs for the characterization of fentanyl PK and its link with PD markers of analgesia and sedation could guide individualized dosing regimens of fentanyl in PICU.
PEDICULOSIS / PHARMACOLOGY / MOBILITY / DELIRIUM

PICC-0645
RECOGNIZING DELIRIUM AFTER PEDIATRIC CARDIAC SURGERY- RESULTS FROM AN INTERNATIONAL SURVEY

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Aims & Objectives:

Delirium is an acutely developing and fluctuating syndrome that encompasses a number of neuropsychiatric symptoms such as disturbance in consciousness, attention, cognition, or perceptual disturbance. Timely recognition and management of delirium is important. The objectives of this study were to characterize pediatric cardiac intensive care unit (PCICU) clinician satisfaction with delirium management, their exposure to delirium education, and use of delirium screening.

Methods

Members of the Pediatric Cardiac Intensive Care Society and other PCICU clinicians were invited to participate in an international electronic survey. A survey link was available on the PCICS website and participants were sent electronic survey links via email from mid November to December 2015.

Results

142 respondents from 60 institutions in 10 countries completed the survey. 128 respondents (90%) were from North America. 79 (56%) respondents were nurses and 57 (40%) were physicians. Only 16% (23/142) of respondents were satisfied with delirium management, 35% (50/142) indicated they had attended at least one delirium lecture, and 27% (38/142) reported that their unit routinely screened for delirium. We found no significant differences between respondents from North America and other countries in terms of satisfaction with delirium practices (Fisher Exact test, p= 0.45), attending a delirium class ($X^2(1) =0.79$, p= 0.38), and screening practices (Wilcoxon Rank Sum test S=1042.5, p= 0.41).

Conclusions

Our results show clinician dissatisfaction with postoperative delirium management strategies in PCICUs and highlight the need for more education, routine screening of postoperative pediatric cardiac surgery patients, and improved training for PCICU clinicians.
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Aims & Objectives:

Objective: To determine the costs associated with delirium in critically ill children.

Methods

Methods: This was a prospective observational study, conducted in an urban, academic, tertiary-care pediatric intensive care unit (PICU) in New York City. Four-hundred and sixty-four consecutive PICU admissions between 9/2/2014 and 12/19/2014 were included. All children were assessed for delirium daily throughout their PICU stay. Hospital costs were analyzed using cost-to-charge ratios, in 2014 dollars.

Results

Results: Median total PICU costs were higher in patients with delirium than in patients who were never delirious ($18,832 vs. $4,803, p<0.0001). Costs increased incrementally with number of days spent delirious (median cost of $9,173 for 1 day with delirium, $19,682 for 2-3 days with delirium, and $75,833 for >3 days with delirium, p<0.0001); this remained highly significant even after adjusting for PICU length of stay (p<0.0001). After controlling for age, gender, severity of illness, and PICU length of stay, delirium was associated with an 85% increase in PICU costs (p<0.0001).

Conclusions

Conclusions: Pediatric delirium is associated with a major increase in PICU costs. Further research directed at prevention and treatment of pediatric delirium is essential to improve outcomes in this population, and could lead to substantial healthcare savings.
THE INFLUENCE OF PARENTS’ VOICE ON THE CONSUMPTION OF SEDATIVES IN CHILDREN

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Aims & Objectives:

In pediatric patients invasive procedures such as the insertion of a central venous catheter or gastroscopy require deep sedation. It is unknown whether parental presence or at least listening to their voice during deep sedation in pediatric patients can reduce sedative doses. Aim of this prospective study was to determine the effect of listening to one parent’s voice during deep sedation on consumption of sedatives in children.

Methods

Fifty children aged 2-14 years undergoing central line placement or gastroscopy under deep sedation with propofol were randomly assigned to two groups: (A) listening or (B) not listening their parents’ recorded voice reading a standardized text by the use of earphones. Depth of sedation was clinically monitored and by Bispectral Index.

Results

Median sedative dose of propofol in both groups was equal (A 0.26 mg/kg/min; B 0.29 mg/kg/min; p=0.11). Furthermore, no difference neither for complication rate (p=1.0) nor for recovery time (A 14.5 min; B 15 min; p=0.60) was noted.

Conclusions

Listening to parental voice during deep sedation does not result in a reduction of sedative dose in children undergoing small medical procedures. It remains unknown whether parental presence or listening to a different acoustic stimulus such as music could be advantageous regarding the required sedative dose.
Aims & Objectives:

Iatrogenic withdrawal syndrome (IWS) and pediatric delirium (PD) in critically ill children are unwanted. Both can be assessed with the Sophia Observation withdrawal Symptoms-Pediatric Delirium (SOS-PD) scale. We estimated the incidence of IWS and PD in our PICU and analyzed if the SOS-PD scale could distinguish between the two.

Methods

All discharge letters for 2014-2015 were searched with relevant keywords and the incidence of IWS and PD was estimated from prescriptions of haloperidol and risperidone. SOS-PD results for patients admitted for at least 48 hours were retrieved from the digital patient management system. Percentage of high SOS-PD scores per patient (SOS-PD scores of 4 and higher) were compared among patients diagnosed with IWS or PD.

Results

Of a total of 51, 20 patients had been diagnosed with IWS, 20 with PD, and 7 with both; 4 had been diagnosed as prodromal delirium. During the study period 992/2377 children had been admitted for 48 hours or more. Thus 2.7% (27/992) patients were diagnosed with delirium and 2.0% with withdrawal syndrome only. A median of 45 SOS-PD assessments (IQR 33 to 92) had been performed in the 51 diagnosed patients. The median percentage of scores of 4 and higher was 20% (IQR 9 to 32%) in the PD group vs. 4% (IQR 0 to 7%) in the IWS group (p<0.001).

Conclusions

Although symptoms of PD and IWS overlap, the SOS-PD scale was able to distinguish the two to some extent.
Aims & Objectives:

There are limited pediatric studies assessing the safety profile of Propofol/Ketamine/Midazolam versus Propofol/Fentanyl/Midazolam in combination used in a pediatric sedation program. The purpose of the study is to compare the effectiveness and the frequency of adverse events between these two groups in order to determine the combination with the safest profile for pediatric sedation.

Methods

Data was abstracted from Meditech and Patient charts for patients who received the combination of propofol, ketamine, midazolam for procedural and/or diagnostic sedation. The incidence of adverse effects and overall sedation effectiveness, consisting of time to onset of sedation, duration of sedation, recovery and any failures to sedate was collected. Vital signs (blood pressure, heart rate, respiratory rate and oxygen saturation) were identified at 5 minutes interval prior to, during and following sedation.

Results

A total of 450 patients were evaluated with 110 patients receiving the combination fentanyl, midazolam and propofol and 340 patients receiving ketamine, midazolam, and propofol. Baseline characteristics are similar in both groups. Both systolic and diastolic blood pressures were significantly lower with fentanyl, midazolam and propofol group versus the ketamine, midazolam and propofol group (p value for systolic blood pressure = 0.027; P value for diastolic blood pressure = 0.007). Values for both groups were at baseline prior to discharge. The propofol dose used was significantly higher in ketamine group versus the fentanyl group (P value = 0.027). There was no significant differences in respiratory rate and oxygen saturation between both groups. No serious side effects were identified.

Conclusions

According to the results, Fentanyl and Ketamine there are no significant difference in respiratory rate and oxygen saturation. The combination of ketamine, midazolam and propofol significantly reduces the risk of hypotension during procedural and/or diagnostic sedation compared to fentanyl, midazolam and propofol. Further prospective trials are needed to confirm our findings.
Aims & Objectives:

With the advent of dexmedetomidine, sedation in pediatrics has been given a supposedly safer option in respect to avoidance of the typical adverse effects including respiratory depression or paradoxical hyperactivity. This drug may have other unanticipated adverse effects including hypotension and bradycardia.

Methods

We present a case series of five patients selected from our facility, ages two to nineteen, who presented for outpatient procedural sedation from a time period of January 22, 2010 to May 11, 2010. This was a retrospective chart review with IRB approval at the facility.

Results

All five patients qualified for a severity index of “life-threatening” per FDA categorization, and qualify for a “Probable” classification per WHO guidelines for causality. All patients selected had baseline vital signs within normal limits for their age, and none had any previously known adverse reactions to drugs. Monitoring hemodynamics parameters was carried out by hand-charting. Capnography was not utilized during sedation. A total of 5.5 to 6 mcg/kg of dexmedetomidine was given via buccal route during each respective procedure. Of the five patients, all had a 25% to 39% decrease in systolic blood pressure at some point during the sedation. Each also had a substantial drop in baseline heart rate between 42% and 76%, with one patient experiencing a complete asystole event for nine seconds, before returning to spontaneous sinus rhythm. All patients were discharged home later the same day with a return to their respective baseline vital signs, and no apparent residual effects of medication.

Conclusions

Dexmedetomidine is not a completely innocuous drug in the pediatric population. The provider must be diligent in monitoring hemodynamic parameters during sedation, and be prepared for intervention in cases of spontaneous bradycardia and hypotension. A proposed mechanism for these incidents may have been introduction of cold substances creating a vagal response after administration of dexmedetomidine.
Aims & Objectives:

We aim to describe the sedoanalgesia protocol used on our unit, statistics, and collateral effects.

Methods

Chart review and literature search.

Results

We reviewed 196 patients, during 2014. The mean age was 69 months. The LOS in the PICU was 6 days. 78 patients (39.8%) needed some form of mechanical ventilatory support with 4.6% needing VAFO. The mean duration of mechanical ventilation was 6.3 days; the mean duration of VAFO was 7.8 days.

Children in mechanical ventilation needed a mean dose of midazolam of 3.5 mcg/kg/min; 60.3% of the patients required a dose higher to 3 mcg/kg/min.

The mean required dose of fentanyl during of mechanical ventilation was 3.2 mcg/kg/hour; one third of the patients required a dose higher than 5 mcg/kg/hour. VAFO required higher doses of midazolam and fentanyl in comparison with conventional mechanical ventilation.

10% of children needed dexmedetomidine as a sedoanalgesia or as a coadjuvant in abstinence syndrome. All the patients in VAFO required some form of inotropic or vasoactive support while 70% of children in conventional ventilatory support needed it.

Abstinence syndrome developed in 11% of the patients. Children with deprivation received a mean dose of 5.3 mcg/kg/min during a mean of 9.6 days. The mean dose of fentanyl that patients who developed abstinence syndrome was 5.5 mcg/kg/hour during a mean of 11.4 days (versus 1.4 mcg/kg/hour and 1.4 days in patients who did not, respectively). Patients in VAFO were especially susceptible to develop abstinence syndrome.

Conclusions
All the children on mechanical ventilation received a combination of midazolam and fentanyl. The need of VAFO required higher doses of sedoanalgesia. Doses of sedoanalgesia and the developing of abstinence syndrome were not formally evaluated with appropriate scales. The higher the dose and duration of sedoanalgesia, the higher the need of inotropic/vasoactive support or the incidence of abstinence syndrome.
Aims & Objectives:

Postoperative follow up is critical after successful repair of coarctation of the aorta as - among other complications, paradoxical hypertension can be observed. Dexmedetomidine is an alpha-2 agonist agent with sedative and analgesic properties. The control of hypertension after coarctation repair is a novel area of usage which will be pointed out.

Methods

Eleven weeks old male child was referred because of the recurrence of hypertension after balloon dilatation of the coarctation of aorta. Surgical repair of the recoarctation was undertaken and hypertension recurred after the operation. Lower doses of midazolam and fentanyl infusions were continued after extubation for sedation and analgesia. Doses of amlodipine, enalapril and propranolol were increased gradually until the maximum doses were reached. As the hypertension persisted, intravenous antihypertensive therapy needed to be utilised. At this stage, dexmedetomidine infusion was started at 0.2 mcg/kg/h.

Results

Blood pressure started to decrease and it was under 95th percentile when the dose was increased up to 0.5 mcg/kg/h. Intravenous infusion of dexmedetomidine was continued for 48 hours and during this time it was tapered gradually as long as the blood pressure was steady. We were able to discharge the patient on 12th day after the operation with a single antihypertensive therapy of amlodipine.

Conclusions

Since dexmedetomidine doesn’t cause respiratory depression, it is often used in pediatric intensive care units for sedated extubation and sometimes to prevent symptoms of deprivation of other sedatives. Persistent hypertension after repair of coarctation is a risk factor for the new anastomosis and it is conventionally treated with sodium nitroprusside or nitroglycerine. Dexmedetomidine, with its sympatholytic effects along with sedation and analgesia, can be the choice of drug for intravenous infusion in order to avoid excessive hypotension or side effects of these drugs like cyanide toxicity.
Aims & Objectives:

The objective of this qualitative sub-study is to understand the opinions of caregivers and healthcare providers on in-bed cycling as a method of early mobilization in critically ill children.

Methods

Primary caregivers and healthcare providers (HCP) of children who were randomized to the in-bed cycling arm of the wEECYCLE Pilot trial, were approached to participate in a face-to-face, semi-structured, audiotaped interview, after completion of the cycling intervention period. The interviews were transcribed verbatim and anonymized. Data collection will continue until data saturation, which is anticipated to be reached at approximately 10-15 interviews per group. Interviews are being iteratively analyzed and coded by the research team.

Results

Enrolment for this study began in September 2015, and is expected to be completed in 12 months. To date, we have conducted 8 interviews (4 caregiver, 3 HCP, 1 patient). Emerging themes include, that while the concept is novel to parents (“I thought it was a little bit nuts”), they are willing to defer to the medical team (“I just thought that you weren’t going to put it on if you think this isn’t appropriate right?”). Some parents expressed psychological and emotional benefit of in-bed cycling during their child’s critical illness (“you knew there was some physical benefit, but for her, it was something to look forward to”; “…it was entertainment, something new, something different”; “…because it (cycling) made me aware that he’s not dying, it seems like he’s going to live”; “…emotionally we don’t get much around here, so psychologically yeah, it was so beneficial”.

Conclusions

Additional qualitative interviews and analyses will enable us to better understand both family and clinicians’ perspectives on in-bed cycling in critically ill children, as well as the perceived barriers and facilitators to its implementation.
THE BRAIN

PICC-0606
THERAPEUTIC STRATEGIES FOR SEVERE TRAUMATIC BRAIN INJURY IN CHILDREN AND INDICATION OF DECOMPRESSIVE CRANIECTOMY -A SINGLE CENTER EXPERIENCE-
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Aims & Objectives:
To describe the usual practice for various intracranial pressure (ICP)-targetted medical therapies and indication of decompressive craniectomy (DC) for children with severe traumatic brain injury (TBI).

Methods
A retrospective chart review of data was performed using a database to pediatric patients (<16 years old) with TBI between January 2002 and December 2009.

Results
122 pediatric TBI patients studied and fifty patients were severe TBI (GCS<8). Patients were categorized into two group, with medically treated (n=39; group M) and surgically treated (n=11; group S). ICP monitoring was used in 78% (39/50) of children with severe TBI, 79.5% (31/39) of them showed ICP decrease with ICP-targetted medical therapies, such as hyperosmolar diuretics (17/39: 57%), mild hyperventilation (10/39: 30%), the use of sedatives (9/39: 30%). DC was performed in 38% (19/50) of children and the ICP sensor insertion (OR 9.17, 95%CI 1.07-78.50), the intracranial hemorrhagic lesion (OR 47.33, 95%CI 6/16-363.44) were found to have strong correlation with DC. The group S had a pupillary abnormality (8 vs 5, p<0.01), had a higher the Injury Severity Scale score (32.8±10.2 vs 9.4±8.6, p<0.01), hypotension (6 vs 2, p<0.01) compared to the group M. At the most recent follow-up examination, favorable outcome were seen on 76.5% (29/39) children of group M and 78.9% (15/19) children of group S.

Conclusions
Reducing ICP is crucial factor in patients’ survival with severe TBI in children. DC might be beneficial in the management of refractory intracranial hypertension. Long-term follow-up is important to determine neurological sequelae associated with TBI.
Aims & Objectives:

The vein of Galen malformation (VOGM) is a rare congenital anomaly that results in significant aneurysmal dilation of this vein. Although endovascular embolization has decreased mortality from nearly 100% to 10-16%, it still remains around 52% among newborns. Urgent embolization is needed when the newborn presents with intractable heart failure, but the ideal period is between 3 and 6 months of age. Our aim is to provide more data on successfully diagnosing and treating VOGM, thus optimizing the care of newborns affected by this condition.

Methods

Chart review for case report.

Results

We report a case of a full term male newborn with an uneventful gestational history, who presented to the Emergency Department with a history of respiratory distress and cyanosis during breastfeeding, subsequently needing respiratory and inotropic support for high output heart failure. Echocardiogram showed ostium secundum atrial septal defect, moderate pulmonary hypertension and patent ductus arteriosus. A pulsating posterior fontanelle and a murmur on auscultation of this site were also observed. Cranial ultrasonography and computed tomography showed a large VOGM. Endovascular embolization was performed at 28 days of age through the femoral artery, using n-butyl cyanoacrylate and microcoils, successfully occluding a total of 5 abnormal vessels (approximately 50% of the mural type malformation). Following embolization, the infant was successfully weaned off respiratory and inotropic support.
Chest X-Ray showing signs of Congestive Heart Failure

CT scan showing a large Vein of Galen malformation
Sagital CT scan showing a large Vein of Galen malformation

**Conclusions**

VOGM in newborns with severe heart failure still has a high mortality rate, requiring early diagnosis, proper clinical management and urgent skilled intervention.
Acute disseminated encephalomyelitis (ADEM) is an immune-mediated inflammatory and demyelinating disorder of the central nervous system, which is commonly preceded by an infection or vaccination. In many cases, the etiology cannot be determined. Human herpesvirus family is commonly associated with acute viral encephalitis, but rarely causes ADEM. Our objective is to describe a case of ADEM after human herpesvirus 6 (HHV-6) infection, which might contribute to further understanding of this complex disease.

Methods

Chart review for case report.

Results

A 14-month-old female patient presented to the Emergency Department with a 2-day-history of persistent fever, vomiting, lethargy and seizures. Lumbar puncture revealed a high cerebrospinal fluid protein level and a positive polymerase chain reaction test for HHV-6. On cranial magnetic resonance imaging, hyperintense pathological signs were observed in the periventricular white matter, thalamus and brainstem on T2-weighted sequences. Then, she was diagnosed with ADEM following HHV-6 infection. Over the next 5 days, she had progressively high intracranial pressure refractory to standard measures and underwent decompressive craniectomy. Ganciclovir, intravenous immunoglobulin and pulse methylprednisolone therapy (30mg/kg/d for 3 days) were administered. Ultimately, the patient survived and shows progressive recovery.
MRI images showing diffuse compromise of white matter, thalamus and brain stem

Conclusions

Many active HHV-6 infections are asymptomatic or benign in infancy. Infrequently, primary infection is associated with a more severe disease and neurological complications. To our knowledge, HHV-6 has rarely been associated with ADEM.
THE BRAIN

PICC-0696
BRAIN-SPECIFIC BIOMARKERS TO SCREEN FOR POTENTIAL NEUROLOGICAL MORBIDITY ACROSS DIAGNOSES IN THE PEDIATRIC INTENSIVE CARE UNIT
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Aims & Objectives:
The incidence of neurological morbidity in pediatric intensive care units (PICUs) worldwide continues to increase and is often difficult to detect acutely. Brain-specific serum biomarkers represent one promising tool for detection of neurological injury. We sought to determine whether neuron specific enolase (NSE), myelin basic protein (MBP), and S100B, specific for neurons, oligodendrocytes, and glia, respectively, were predictive of neurological morbidity in critically ill children.

Methods
Serum was prospectively collected on days 1-7 from children with all diagnoses admitted to the PICU (n=103) with an indwelling intravascular catheter in this IRB-approved study. Unfavorable neurological outcome at PICU discharge was defined as Pediatric Cerebral Performance Category (PCPC) of 3-6 with a deterioration from baseline. NSE, MBP and S100B levels were measured by ELISA.

Results
Peak biomarker levels were higher in patients with unfavorable vs. favorable neurological outcome (NSE 39.4±44.1 vs. 12.2±22.9 ng/ml (P=0.005), MBP 9.1±11.5 vs 0.6±1.3 ng/ml (P=0.003), S100B 0.130±0.232 vs. 0.034±0.070 ng/ml (P=0.038), respectively; mean±SD). Peak levels were each independently associated with unfavorable neurological outcome when controlling for presence of primary neurologic admission diagnosis (NSE, p=0.027; MBP, p=0.010; S100B, p=0.037; logistic regression). Area under the curve (AUC) and 95% confidence intervals for prediction of unfavorable neurological outcome: NSE 0.75 (0.56,0.94), MBP 0.76 (0.60,0.93), and S100B 0.68 (0.53,0.84).

Conclusions
Brain-specific biomarkers are associated with unfavorable neurological outcome in critically ill children. Development of predictive models that include combinations of brain-specific biomarkers and clinical data is underway, to determine if early detection reduces neurological morbidity and mortality in the PICU.
THE BRAIN

PICC-0066
A MEETING OF THE MINDS- ENHANCING THE NEUROCRITICAL CARE KNOWLEDGE OF THE BEDSIDE NURSE THROUGH INTERDISCIPLINARY NEUROLOGY CASE CONFERENCES
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Aims & Objectives:

Enhancing the knowledge of nurses caring for the complex neurocritical care patients by fostering an environment of learning from today practice and exploring practice lapses.

• Create a robust knowledge base for caring for neurologically complex patients

• Facilitate sharing his or her knowledge with peers

• Nursing focused verse physician driven lectures thus increasing presentation comfort level

• Physician facilitator gaining insight of the nurses knowledge level and needed resources

Methods

Nursing focus groups were used to develop neurology case conferences. Physician lead lectures transitioned to nursing presenting patient cases from their point of view with physician facilitating and furthering any knowledge gap.

Results

With an average of seven nurses attending each conference and over fifty conferences completed, the neurology case conference helps disseminate neurocritical knowledge broadly throughout the unit. Neurology case conferences facilitate the sharing of information between the physician and the bedside nurse. They help the nurse develop a more nuanced understanding of neurological conditions by discussing in-depth cases that they themselves wanted to learn more about. This also provides a way for the physician to see any gaps in the knowledge base of the bedside nurse and helps shrink those gaps. Thereby promotes better bedside care.
Conclusions

Starting as a physician led lecture series to provide nurses with more information on caring for the neuro-critically impaired patient population, the neurology case conferences morphed into patient presentations by nurses on diagnosis and topics they were interested in. This philosophy allows for a greater participation by the nursing staff, primarily driven by them while facilitated by physician specialist. While gaining insight and education, nursing and physician staff are able to identify consistent themes throughout the care of this specific patient population leading to revision of policies and effect positive changes to delivery of care.
Aims & Objectives:

In infants Subdural and retinal haemorrhages (SD/RH) are overwhelmingly considered to be due to Nonaccidental Head Injury (NAHI). Some state that SD/RH could be due to medical causes. In this case, the number of care givers present at collapse would be random. Child protection research suffers from evidential circularity. Gold standard for “proof of abuse” is court judgements, normally based on medical opinions, reflecting court judgements. Are retinal haemorrhages (SD/RH) an entity caused by a caregiver, or a medical diagnosis not associated with the caregiver?

Methods

SD/RH without identified medical cause are all referred to the police. All referred cases over a 5 year period were examined. The number of care givers at the time of collapse was identified. The time spent in the care of one or more than one caregiver was documented using police interviews.

Results

Of 20 cases, the mean time spent definitely with more than one caregiver was 5.6 hours/day. All time points which were indetermined were classed as being single care. Adjusted for variations of care by time of day, 4.39/20 collapses should have occurred in the presence of more than one caregiver. Although in 9 cases there was another adult in the house, in all 20 cases only one caregiver was attending at collapse. This is statistically significant with p=0.018.
Conclusions

In some way, caregivers are central to the finding of SD/RH. Any internal medical condition in these children contradicts biological plausibility. Our study is without evidential circularity and is consistent with causation of SD/RH by NAHI.
Aims & Objectives:

Diabetic ketoacidosis (DKA) and traumatic brain injury (TBI) in children are associated with vasogenic cerebral edema, possibly due to the release of destructive polymorphonuclear neutrophil (PMN) azurophilic enzymes. Our objectives were to measure plasma azurophilic enzymes in children with DKA and TBI and to determine if azurophilic enzymes disrupt the human blood-brain barrier in vitro.

Methods

Blood plasma, obtained from children admitted to the critical care unit with DKA or TBI, was assayed for PMN azurophilic enzymes: human leukocyte elastase (HLE), proteinase-3 (PR-3), cathepsin-G (CTSG) and myeloperoxidase (MPO). Degradation of primary human brain microvascular endothelial cell (hBMEC) junctional proteins by azurophilic enzymes was assessed in vitro.

Results

DKA and severe TBI in children were associated with elevated circulating PMNs and plasma azurophilic enzymes. Of the azurophilic enzymes elevated, only PR-3 applied to hBMEC degraded both the tight junction protein occludin and the adherens junction protein VE-cadherin. Permeability of hBMEC monolayers was increased by recombinant PR-3 application.

Conclusions

DKA and TBI are associated with systemic PMN elevation, activation and degranulation. Of all the PMN azurophilic enzymes examined, only PR-3 degraded hBMEC protein junctions in vitro. PR-3 might mediate vasogenic cerebral edema during DKA and TBI. Selective PR-3 antagonists may offer future vascular and neuro-protection.

Reference

Disclosure

Aims & Objectives:

compare the ferritin levels in the cerebrospinal fluid (CSF) of children with clinical suspicion of meningitis and its ability to discriminate among bacterial meningitis, viral and non-meningitis cases.

Methods

A cohort, historical and contemporary study was conducted in two tertiaries hospitals in the southern Brazil. All children included were between 28 days and 12 years old with suspected acute meningitis. Ferritin levels in the CSF were measured in the period between 2005 and 2015 and were compared among patients with bacterial meningitis, viral meningitis and non-meningitis. Kruskal-Wallis test was performed to compare the groups, with Dunn variable for the pairs.

Results

Overall, 81 patients were included. The median age was 24 (IQR 8-69) months. It was identified 32 patients with viral meningitis (39%), 23 with bacterial (28%) and 26 as non-meningitis (32%). Demographic and clinical characteristics at admission were similar between groups. The median CSF ferritin was 52.8 (IQR30,7-103,0) for the bacterial meningitis group, 4.1 (IQR3,0-6,7) for the viral group and 4.0 (IQR2,0-2,3) for the non-meningitis group (p<0,001). When compared in pairs, bacterial meningitis was distinguished from viral meningitis (p <0.001) and non-meningitis (p <0.001). However, ferritin levels failed to distinguish viral meningitis from non-meningitis. The CSF ferritin, with a cut-off value of 16 ng/ml, had 100% sensitivity and 98.3% specificity for bacterial meningitis.

Conclusions
CSF ferritin was shown to be an excellent marker for identifying and discriminating bacterial meningitis in children with clinical symptoms of this disease.
THE BRAIN

PICC-0016
CENTRAL NEUROGENIC HYPERVENTILATION WITH ACUTE RESPIRATORY ALKALOSIS, TRANSIENT LACTIC ACIDOSIS AND TACHYCARDIA FOLLOWING ENDOSCOPIC THIRD VENTRICULO STOMY IN A CHILD
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Aims & Objectives:
Endoscopic third ventriculostomy (ETV) is a common minimal-invasive neurosurgical procedure with well-documented complications. We report the case of a 6-year old female child who underwent ETV, external ventricular drainage catheter insertion and biopsy for a tumour arising from the pineal gland causing obstructive hydrocephalus and raised intracranial pressure (ICP).

Methods
Case Report

Results
Vital signs were stable pre-operatively and anaesthesia was maintained using propofol infusion. The operative bed was irrigated with normal saline under pressure after ETV, which immediately resulted in sinus tachycardia intra-operatively and central neurogenic hyperventilation (CNH) with respiratory alkalosis and transient lactic acidosis an hour after the surgery. Only few case reports have been reported in adults with CNH and respiratory alkalosis. Hyperventilation resulting in lactic acidosis is a well-known entity but lactic acidosis following CNH due to transient hypothalamic dysfunction after endoscopic third ventriculostomy has not been reported previously. Our patient was managed with with benzodiazepines and oxygen delivered by a rebreathing mask, which resulted in complete recovery within 12 hours. This case highlights the importance of ICP measurement and monitoring and assessment of the type, volume and pressure of fluid used for brain irrigation during ETV, to prevent complications.
Conclusions

ETV may cause intra-operative hemodynamic disturbances such as tachycardia, hypertension and hyperthermia followed by post-operative transient hypothalamic dysfunction and CSF acidosis leading to sequelae of CNH with acute respiratory alkalosis and transient lactic acidosis. We emphasize the importance of ICP monitoring during neuroendoscopic procedures, as an inadvertant rise in ICP appears to be the central factor leading to the various ill effects encountered both intra and post operatively. Moreover, normal saline has been the irrigation fluid of choice for neurosurgeons, although a multitude of laboratory studies suggest it is less ideal and it might be prudent to look into alternatives, namely artificial CSF and Ringer’s Lactate.

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THE BRAIN

PICC-0675
CRANIOPHARYNGIOMA WITH BIDIRECTIONAL CAVOPULMONARY CONNECTION WHO DEVELOPED SODIUM AND WATER IMBALANCE POSTOPERATIVELY: A CASE REPORT
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Aims & Objectives:

Patients with bidirectional cavopulmonary connection (BCPC) are tend to have low cardiac reserve, low oxygen delivery and high superior vena cava (SVC) pressure. This is the first case report of patients with BCPC, who developed sodium and water imbalance due to Diabetes insipidus (DI) and cerebral salt wasting syndrome (CSWS) after surgical treatment of craniopharyngioma.

Methods

3-year-11-month old boy, who underwent BCPC procedure at the age of 1-year-2-month, was scheduled surgical resection of craniopharyngioma. In the middle of surgery, he developed DI and treated with hypo-osmotic solution and continuous injection of vasopressin. He was admitted to pediatric intensive care unit (PICU) after surgery.

Results

We continued to use vasopressin to treat DI. On postoperative day (POD) 4, his urinary output began to decline and vasopressin was stopped on POD 5. Serum sodium concentration continued to decrease, we suspect CSWS and used hypertonic saline. Patients with BCPC are prone to head and neck congestion, volume overload should be avoided. To increase urine output and elevate serum sodium concentration, we used tolvaptan on POD 7, but he developed DI again and continuous injection of vasopressin was restarted. We converted continuous injection of vasopressin to oral desmopressin on POD16. He left PICU on POD 22.

Conclusions

DI after pituitary surgery often takes triphasic course of temporary DI, SIADH and permanent DI, and may be complicated with CSWS. Correct differential diagnosis of SIADH and CSWS and accurate judgment of water balance in accordance with the change of clinical course are important especially in patients with BCPC.
THE BRAIN

PICC-0229
MULTIPLE CEREBRAL SINUS THROMBOSES COMPLICATING PNEUMOCOCCAL MENINGITIS: A PEDIATRIC CASE REPORT

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Aims & Objectives:

To describe a rare complication of pneumococcal meningitis in an infant: Multiple cerebral sinus thromboses

Methods

Case report

Results

Pneumococcal meningitis in childhood is a life-threatening disease determining a high incidence of neurological sequelae in survivors. We present a rare case of pneumococcal meningitis complicated by cerebral sinus venous thrombosis (CSVT).

Case presentation

We describe a case of 35 days old male infant who presented with short history of fever, poor feeding and generalized tonic seizure. Lumbar puncture confirmed the diagnosis of pneumococcal meningitis by gram stain and latex agglutination. He was treated with cefotaxime for 14 days. Admission CECT brain showed 1 cm×1 cm abscess in right frontal lobe. No active neurosurgical intervention was required. On day-12, he had seizure and worsening sensorium. CEMRI brain showed no evidence of abscess and MRV revealed superior sagittal, right transverse and left cortical vein thrombosis (Figure 1) Anticoagulation therapy was started. The patient was discharged on subcutaneous low molecular weight heparin on day-18 of PICU stay. At 3-months follow-up he was neurologically intact with normal MRI brain. Pro coagulant work up was normal. The anticoagulant therapy was discontinued.

Conclusions

The clinical manifestations of CSVT are nonspecific and may be subtle. Clinician requires high index of suspicion for earlier detection and making therapeutic strategy. High index of suspicion led to earlier diagnosis and prompt management enabled a good neurodevelopmental outcome.
THE BRAIN

PICC-0626
PLATEAU WAVES OF INTRACRANIAL PRESSURE AFTER PAEDIATRIC TRAUMATIC BRAIN INJURY
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Aims & Objectives:

Introduction: After traumatic brain injury (TBI), dynamic fluctuations of intracranial pressure (ICP) are often seen in adults. One such fluctuation, Plateau Wave (PW), characterized by steep ICP rise to 35-100 mm Hg lasting over 5 minutes up to 30 minutes, could indicate greatly reduced brain compliance. Less is known about PW in children. We studied the effect of PW on cerebrovascular reactivity and autonomic system using intracranial and systemic variables in children with TBI.

Methods

Arterial blood pressure (ABP) and ICP recordings from 36 paediatric TBI patients (mean 12, range 1-16) used for analysis. Intracranial variables (mean ICP, amplitude of ICP - AMP, pressure reactivity - PRx) and systemic variables (baroreceptor sensitivity - BRS and heart rate variability - HRV) averaged 5 minutes prior to and during a plateau wave.

Results

Results: 41 PW were observed in 9 TBI patients. Mean (sd) ICP, AMP, and PRx all significantly increased from before to during PW [ICP 21(7) to 47(11) mm Hg, p < 0.0001; AMP 2.7(1.7) to 8.7(5.2) mm Hg, p < 0.001; PRx -0.22(0.34) to 0.26(0.46), p < 0.0001]. The ratio of HRV in the low compared to high frequency range (LF:HF) and BRS increased [LF:HF HRV 0.56(0.50) to 1.08(0.84), p = 0.04; BRS 6(5.0) to 11(8.4) ms/mm Hg, p < 0.0001]. High frequency HRV did not change from before to during PW.

Conclusions

Conclusions: In children, rapid rises in ICP after TBI cause disturbed cerebrovascular pressure reactivity. Increases in baroreceptor sensitivity and LF:HF heart rate variability indicates PW associated with autonomic activation
Aims & Objectives:

Pediatric stroke is rare with estimated incidence of 2.3-13 pediatric strokes per 100,000 children. Pediatric ischemic-type stroke confers considerable morbidity and mortality. While alteplase (tPA) and neuro-interventional (IR) procedures are not FDA-approved in children, our objective is to describe a ischemic stroke where both were successfully utilized.

Methods

We present the case of a 9-year-old previously healthy male who presents to Emergency Department with witnessed symptoms that began 76 minutes prior to arrival. Upon arrival, NIHSS was 11 notably with left hemiparesis and left facial droop. Stroke team was activated and emergent magnetic resonance imaging (MRI) revealed right middle cerebral artery (MCA) thrombus with occlusion at the M1/M2 junction.

Results

TPA bolus followed by an infusion was started at 202 minutes after symptom onset. With tPA infusing, IR performed cerebral angiogram with successful thrombectomy of an occluded supraclinoid carotid. At discharge he had 2/5 strength in LUE and 3/5 strength in LLE. The etiology of his stroke remains uncertain since had negative cardiac and hypercoaguable workup.

Conclusions

Stroke is in the top five causes of adult mortality, leading to an increasing number of hospitals being designated stroke centers. While pediatric stroke is highly variable in presentation and may be missed by medical providers, it confers significant mortality and morbidity that is alarming and should be in the differential of any patient presenting with acute onset of neurological symptoms.
THE BRAIN

PICC-0700
CEREBRAL MICROEMBOLI DURING PEDIATRIC CARDIAC CATHETERIZATION: A PILOT STUDY USING TRANSCRANIAL DOPPLER ULTRASONOGRAPHY
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²Stanford University Medical Center, Department of Cardiothoracic Surgery, Stanford- CA, USA
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Aims & Objectives:

Cerebral embolism is one cause of acute stroke in children undergoing cardiac catheterization. We sought to determine the frequency and circumstances of cerebral microembolic signals (MES) during pediatric cardiac catheterization.

Methods

Transcranial Doppler (TCD) ultrasonography of the right middle cerebral artery via the temporal window was used for emboli detection during cardiac catheterization in 5 children. MES, counted off-line, were defined as unidirectional high intensity transient signals associated with an audible sound and sinusoidal correlation, suggesting a traveling embolus. MES were grouped as single, >10 MES per 3-5 cardiac cycles (“cluster”), or MES “with curtain effect” per 3-5 cardiac cycles (Figure 1). Cerebral blood flow velocities (CBFV) and pulsatility indices (PI) were recorded after anesthetic induction (baseline) and with MES. Events during catheterization were noted.

Figure 1. MES during pediatric cardiac catheterization: single (top left); “cluster” (top
Results

Clinical and catheterization procedure data (Table 1), and MES counts and TCD parameters (Table 2) are presented. MES were detected in all patients. Total MES count in the cohort was 1697, with 907 (53%) occurring in 44 clusters/curtains. Events associated with clusters/curtains included: left ventricular angiography (39%; 17/44), right ventricular angiography (16%; 7/44), device placement (16%; 7/44), heparin bolus (9%; 4/44), pulmonary artery angiography (9%; 4/44), venous access (5%; 2/44), right atrial angiography (2%; 1/44), arterial access (2%; 1/44), and hemodynamic measurements (2%; 1/44).

Table 1. Clinical and procedure data for children undergoing cardiac catheterization
Table 2. MES with CBFVs and PIs within the sample volume for each child during cardiac catheterization (bottom table).

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age (mos)</th>
<th>Diagnosis</th>
<th>Septal Defect</th>
<th>Diagnostic (D) Interventional (I)</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>46</td>
<td>Septum primum defect, aortopulmonary collateral from descending aorta to right lung</td>
<td>No</td>
<td>I</td>
<td>Right and left heart catheterization (retrograde) with aortic angiography and coil occlusion of aortopulmonary collateral from descending aorta to right lower lobe of lung.</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
<td>Multiple ventricular septal defects, patent foramen ovale</td>
<td>Yes</td>
<td>I</td>
<td>Right and left heart catheterization with placement of 2 devices to close the ventricular septal defects.</td>
</tr>
<tr>
<td>3</td>
<td>86</td>
<td>Williams Syndrome with supravalvar aortic stenosis and pulmonary stenosis, patent foramen ovale</td>
<td>No</td>
<td>D</td>
<td>Right and left heart catheterization with coronary artery and aortic angiography, Brockenbrough atrial septal puncture to access left heart.</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>Left congenital diaphragmatic hernia and ventricular septal defect</td>
<td>Yes</td>
<td>D</td>
<td>Right and left heart catheterization with Brockenbrough atrial septal puncture to access left heart.</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>Repaired truncus arteriosus with right pulmonary artery stenosis</td>
<td>No</td>
<td>I</td>
<td>Right heart catheterization with aortic and pulmonary angiography and balloon angioplasty right pulmonary artery.</td>
</tr>
</tbody>
</table>
### Conclusions

MES detected by TCD are common during pediatric cardiac catheterization. Cerebral blood flow velocity/PI changes with MES may suggest risk for impaired distal perfusion. Whether curtains/clusters are worse than single large or multiple MES is unknown. Research is ongoing to further characterize these findings.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Baseline after induction</th>
<th>Single MES, cm/sec, mean (SD)</th>
<th>VES cluster, cm/sec, mean (SD)</th>
<th>VES with curtain, cm/sec, mean (SD)</th>
<th>Monitoring Period (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>61 97 87 1.54</td>
<td>78 73.85 136.56 40.86 1.141 0.10</td>
<td>51 64.15 324.9 32.5 1.39 ± 0.35</td>
<td>6 60.12 101.4 30 ± 5.3 0.51 ± 0.02</td>
<td>105</td>
</tr>
<tr>
<td>2</td>
<td>55 89 74 1.39</td>
<td>73 63.9 215.2 20 14.7 1.22 ± 0.18</td>
<td>58 63.11 131.17 38 ± 9 5.6 ± 0.43</td>
<td>35 48.31 105.34 34 ± 9 3.6 ± 0.53</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>50 70 32 0.74</td>
<td>79 50.5 34 ± 2 31 ± 4 1.11 ± 0.17</td>
<td>63 58.15 132 ± 2 52 ± 4 3.11 ± 0.15</td>
<td>54 63.15 97 ± 4 32 ± 4 1.15 ± 0.13</td>
<td>94</td>
</tr>
<tr>
<td>4</td>
<td>63 320 35 1.59</td>
<td>47 64.7 140 ± 3 20 ± 2 1.6 ± 0.09</td>
<td>0 NA NA NA NA</td>
<td>62 62 ± 3 200 ± 4 23 ± 7 1.89 ± 0.28</td>
<td>71</td>
</tr>
<tr>
<td>5</td>
<td>41 51 18 1.77</td>
<td>7 476.9 156 ± 64 10 ± 2 2.43 ± 0.77</td>
<td>0 NA NA NA NA</td>
<td>0 NA NA NA NA</td>
<td>64</td>
</tr>
</tbody>
</table>
Aims & Objectives:

In 2013 the “PROSAFE” ICU network embarked on the CREACTIVE project to study moderate-to-severe TBI patients in 7 countries, over 5 years, as part of InTBIR (International initiative for TBI research). Acute admission injury-related and treatment related information is collected prospectively and added to impairment, disability and quality of life assessment measured at six months post injury. We present the descriptive PICU results of the first two years (2014-15) of CREATKids, CREATIVE’s pediatric sub-study.

Methods

All TBI-Common Data Elements endorsed by InTBIR are collected, along with items required to develop a sensitive prognostic model, using specialized computerized system.

Results

Of the 97 CREACTIVE participating ICUs, 49 have recruited at least one child (total 213 patients) over two years, in Italy, Hungary, Slovenia, Cyprus and Israel. Mean age was 7.9 years; 67.6% were male. Almost 83.8% came from the emergency room. 39% had GCS of 8 or less. 83.5% were close-head injury; 9.9% from crushing blows; majority were caused by traffic accident. 64% of cases had focal and 12% had diffuse injury; the remaining cases had isolated traumatic subarachnoid haemorrhage or skull fracture. 18% had intracranial hypertension, 7% anisocoria, 7% had cerebral edema. Overall ICU mortality was 5.6% and average length of PICU stay was 4.4 days.
Conclusions

CREACTKids results provide a unique opportunity to describe moderate to severe TBI patients PICU course. An association will be sought between patient's injury and PICU course to their long term outcome.
A NEW COMPREHENSIVE TOOL FOR ASSESSMENT OF CHILDREN OUTCOME AFTER MODERATE TO SEVERE TRAUMATIC BRAIN INJURY (ON BEHALF OF THE CREACTIVE CONSORTIUM)

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Aims & Objectives:

TBI is one of the leading causes of pediatric morbidity and mortality. TBI was endorsed by all major scientific organizations under the acronym InTBIR. The CREACTIVE consortium is an EU funded group studying adults and children suffering from moderate to severe TBI admitted into over 250 ICU’s. CREATKIDS is the pediatric sub-study.

Methods

An international expert group (developmental psychologists, pediatric sleep, psychiatric trauma, neurosurgeons, intensivists, rehabilitation, epidemiologists) led by PICU specialists, built a follow-up inventory to be delivered by a lay person and filling time takes less than one hour. The basic concept was to assess patient’s outcome compared to premorbid condition (as described by the parents during the first hours of PICU admission). All assessment-tools are validated, age-specific and multilingual, using both parent report questionnaires and computer tasks for cognitive-behavioral assessments. The assessment tools were computerized on a web based platform for easy distribution, delivery to the patients and online centralized data collection, storage and outcome analysis.

Results

Patient’s assessment occurs at three time points: Time 0 – shortly after PICU admission; T 5 months – phone interview; T 6 months – face to face meeting. Assessment includes child’s temperament; behavioral dysfunction; sleep quality; PTSD symptoms and four main cognitive function domains: attention, memory, numerical cognition and inhibition. Our tool has been trialed in a single center pilot study and being currently used in the CREATKIDS study.
Conclusions

We present our TBI outcome assessment tool and offer to share it with any interested pediatric TBI study group.
Aims & Objectives:

To investigate the effect of Human Nerve Growth Factor (HNGF) treatment bilirubin encephalopathy

Methods

there are 22 babies with severe hyperbilirubinemia at August 2014 to May 2015 in our hospital inpatients, with exchange transfusion, the BIND score >3, Multi-frequency steady-state evoked potentials no induce the response wave, remove the central nervous system infection, multiple organ failure, hearing loss caused by other reasons. Among them, 8 cases whose parents do' t agree with HNGF treatment as control group, the rest 14 patients as the observation group. All patients admitted to giving routine treatment, the observation group additional HNGF by Intrathecal injection after exchange transfusion. Collecting clinical data, BIND score. Follow-up 6 months. Compare hearing recovery and mental developmental situation.

Results

The differences were not statistically significant at gestational age, birth weight, age, the park serum bilirubin level. All patients in observation group were not adverse effects associated HNGF treatment (infection, fever, hemorrhage, etc). Convulsion cases 4/14, 1/8, central respiratory failure 9/14, 6/8, moderately/severe bilirubin encephalopathy cases of 8/14 and 1/8 respectively, the difference was not statistically significant (p>0.05). Follow-up to 6 months, audition recover to normal cases is 8/14, 2/8, the difference was statistically significant (P<0.05). According to CDCC examination ,mental development were divided into normal, critical state and obviously lagged, that cases of observation group is 8/4/2 and control group is 2/4/2, the difference is statistically significant, P < 0.05).

Conclusions

There may be the therapeutic effect HNGF treatment to bilirubin encephalopathy in hearing loss and mental developing
Aims & Objectives:

Introduction: Emerging evidence suggests extra-thoracic trauma may alter the lungs' responses to infection, increasing the risk of developing pneumonia. It remains unclear if brain trauma increases the risk of pneumonia in children.

Aim: To determine the incidence of pneumonia in children with isolated brain trauma requiring intensive care.

Methods

Methods: A retrospective study was conducted in a single paediatric intensive care unit (PICU) over a 3 year period (01/04/2011 to 31/03/2014). A pre-designed proforma was used to collect clinical data which included Glasgow Coma Scale (GCS), durations of PICU stay and ventilation, brain CT scan findings, requirement for invasive intracranial pressure (ICP) monitoring and evidence of seizure activity. Evidence of pneumonia and its timing in relation to the brain injury were determined.

Results

Results: 26 patients with isolated brain trauma were included in the study and 13 had evidence of pneumonia. 11 of the 15 children with ICP monitoring developed pneumonia (p<0.05, Fisher's Exact Test). Median age was 6 years (range: 18 days – 14 years 7 months). Median length of stay was 6.5 days (range: 2 – 16 days). All of the patients with evidence of pneumonia had stayed in the PICU more than 3 days (p<0.05, Fisher’s exact test).

Conclusions

Conclusion: Significantly more brain trauma patients who stayed over 3 days in the PICU or had ICP monitoring developed pneumonia. Further study is required to determine the reasons why these patients are more prone to developing pneumonia.
Aims & Objectives:

To assess the application and prognostic value of amplitude-integrated electroencephalogram (aEEG) in coma patients in pediatric intensive care unit (PICU).

Methods

A retrospective analysis was performed for coma patients who were admitted to PICU of Children’s Hospital of Fudan University and were applied continuous electroencephalogram monitoring. The results of aEEG was divided into continuous voltage, discontinuous voltage, epileptic discharge, status epilepticus, suppression-burst, continuous low voltage and flat. The patients were divided into five groups according to Glasgow Outcome Score (GOS): 1 death; 2 persistent vegetative state; 3 severe disability; 4 moderate disability; 5 low disability. To assess the prognostic value of aEEG by analyzing the results of aEEG of 5 groups.

Results

115 patients were included in this study. There were 14 patients (12.17%) in group 1, 11 (78.57%) of them were flat aEEG, 3 (21.43%) were continuous low voltage; There were 16 patients (13.91%) in group 2, 8 (50%) of them were continuous low voltage, 6 (37.5%) were status epilepticus, 2 (12.5%) were suppression-burst; There were 28 patients (24.35%) in group 3, 13 (46.43%) of them were status epilepticus, 12 (42.86%) were continuous low voltage, 3 (10.71%) were suppression-burst; There were 30 patients (26.09%) in group 4, 13 (43.33%) were discontinuous voltage, 9 (30%) were continuous voltage, 6 (20%) were epileptic discharge, 1 (3.33%) was status epilepticus, 1 (3.33%) was continuous low voltage; There were 27 patients (23.48%) in group 5, 17 (62.96%) of them were continuous voltage, 8 (29.63%) were discontinuous voltage, 1 (3.7%) was status epilepticus, 1 (3.7%) was continuous low voltage.

Conclusions
aEEG is more convenient and easier to be recognized in PICU. It has prognostic value for coma patients. Patients with flat/continuous low voltage/status epilepticus/suppression-burst usually have bad outcomes
Aims & Objectives:

Introduction: Physiological monitoring in minute-resolution is the routine standard in pediatric traumatic brain injury (TBI) intensive-care management, but many pediatric intensive care units (PICU) only use lower resolution data (e.g. end-of-hour summary) for quality assurance and research purposes. This discards vital information, reduces data fidelity, and potentially compromises patient safety, clinical management, and outcome. We, therefore, aim to establish a new multi-centre pediatric brain monitoring and information technology group (KidsBrainIT) to use high-resolution physiology data and information technology (IT) innovations to improve pediatric TBI patient care and safety.

Methods

Methods: KidsBrainIT is modelled upon the successful adult BrainIT group (www.brainit.org). Phase-1 is a proof-of-concept stage on the feasibility of linking 7 PICU to export anonymised prospectively-collected high-resolution physiological, clinical, and 6 month global outcome data to a central repository where abnormal physiology is quantified, using state of the art analytics such as intracranial pressure (ICP) dose-response, and its relationship to outcome determined.

Results

Results: Minute-resolution physiological data of 89 TBI children were successfully exported from 2 contributing PICU within KidsBrainIT to-date. Using colour-coded dose-response plots, children with ICP above 20 mmHg for longer than 8 minutes were associated with worsened outcome. Furthermore, in a multivariate model, the cumulative ICP-time burden is independently associated with mortality.
Conclusions

**Conclusion:** KidsBrainIT brings together clinician and scientists from multi-centres to use high-resolution physiological data and IT innovations to improve TBI patient care and safety. Further studies are required to determine its long-term impact on TBI patient care and outcome.
Aims & Objectives:

Febrile infection–related epilepsy syndrome (FIRES) is an epileptic encephalopathy with unknown etiology characterized by an acute onset of recurrent seizures that evolve to refractory status epilepticus in previously healthy school-aged children.

Results

Previously healthy 3 year old male was brought to the hospital in status epilepticus on day 5 of amoxicillin due to a febrile upper airway infection. He received endovenous diazepam, phenytoin, phenobarbital, topiramate, midazolam and sodium thiopental drips. He would have mouth movements or the EEG would show status epilepticus. He persisted febrile for two weeks despite empirical treatment: broad-spectrum antibiotics, oseltamivir, acyclovir, immunoglobulin, high dose methyl-prednisolone. On day 20 the drips started to be weaned off and were suspended on day 35. On day 64 he was started on a 4:1 ketogenic diet and the targeted ketonuria was reached on day 83. He then showed a partial neurologic recovery gain, going back to oral feeds. The investigation turned out inconclusive (blood and CSF cultures, herpes PCR, respiratory viruses, bartonella and mycoplasma serologies, CSF and serum auto antibodies, brain CT scan, ammonia, lactate, bicarbonate, serum glucose and coagulogram repeatedly normal, magnetic resonance: mild demyelination) thus the diagnose was FIRES

Conclusions

Several treatment regimens have been used such as antiepileptic drugs and immunosuppressive therapies but all with limited success. The ketogenic diet is an
alternative treatment which has been shown promising not only controlling the seizures but also improving cognitive outcome.
THE BRAIN

PICC-0107
DESCRIPTION AND CONTRIBUTION OF BRAIN MAGNETIC RESONANCE IMAGING IN NON TRAUMATIC CRITICALLY ILL CHILDREN

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2 Necker hospital, Neurology unit, Paris, France
3 Necker hospital, Biostatistics, Paris, France
4 Necker hospital, Radiology, Paris, France
5 Necker hospital, Pediatric intensive care unit, Paris, France

Aims & Objectives:

We aimed to collect all brain Magnetic Resonance Imaging (MRI) performed in critically ill children in our medical Pediatric Intensive Care unit (PICU) over a 2-year period (2012-2013) in order to (i) describe the findings and (ii) assess the contribution of this procedure on practical patient care.

Methods

This is a single-center and retrospective study. All children without traumatic brain injury who underwent a brain MRI during PICU stays were included. To assess the exam’s contribution, the patient’s medical condition at the time of the MRI exam was blindly and separately exposed to a pediatric neurologist and a pediatric intensivist.

Results

During the study period, 87 patients (7.5%) underwent a brain MRI. Median age was 4 months and 13 children (14.9%) died in PICU. The most common final diagnosis was post-anoxic encephalopathy. Brain MRI was abnormal in 68 patients (78.2%). No serious adverse event occurred during the transport. The neurologist and the intensivist considered brain MRI as indicated during PICU stay in 65 (74.7%) and 68 patients (78.2%). They deemed that brain MRI had a diagnostic contribution in 76 (87.4%) and 60 (69.0%) patients, respectively. A therapeutic change consecutive to MRI findings occurred in 19 patients (21.8%) and MRI results were associated with a decision to withdraw life-sustaining treatment in 21 patients (24.1%).

Conclusions

Brain MRI is one component of neuromonitoring and our study suggests a substantial diagnostic contribution, although its therapeutic impact appears limited to specific diagnoses.
THE BRAIN

PICC-0527
IMPACT OF MEDICAL MANAGEMENT DELAYS IN TRAUMATIC BRAIN INJURY IN PATIENTS ADMITTED TO UNIVERSITY PUBLIC HOSPITALS IN GUATEMALA

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¹Universidad de San Carlos de Guatemala,
Unidad de Terapia Intensiva Pediatrica / Hospital General San. Juan de Dios,
Guatemala, Guatemala

Aims & Objectives:

OBJECTIVE: Determine the risk factors and medical management delays related with outcome of pediatric patients admitted with head trauma in university public hospital in Guatemala City.

Methods

A study was performed between July 2013 and June 2014 in Hospital General San Juan de Dios in Guatemala City. 44 patients admitted in this hospital were related the outcome with the objectives of head trauma management based in Guidelines for the Acute Medical Management of Severe Traumatic Brain Injury in Infants, Children, and Adolescents-Second Edition Pediatr Crit Care Med 2012 Vol. 13, No. 1 (Suppl.).

Results

44 patients were admitted, 25 deaths. Clinical, hemodynamic and laboratory data were obtained and compared related with the outcome. Medical management comparison were made to determine impact of the differences in accurate care and delays detected over the time sensitive approach. Male gender, pre hospital transport more than 60 minutes, more than 150 kilometers distance between primary and tertiary care (93.2 miles), lack of spinal immobilization, first attention performed by non trained provider had difference between survivors and non survivors. Is more related survival if the transport were performed earlier in car or non equiped ambulance instead later in equiped ambulance. In the hospital management if the record of Peak Inspiratory Pressure –PIP > 24 cmH2O, Positive End Expiration Pressure -PEEP > 7 cm H2O, Oxygen Inspired Fraction- FiO2 > 70 %, Mean Arterial Pressure < 70 mmHg, sodium measurement < 130 mEq/Lt, > 1 vasoactive drugs, neurosurgical procedure, unrelated complications and > 11 points PRISM III score were related with fatal outcome.

Conclusions

Developing countries must define a continuum care in traumatic brain injury. First attention starting with improve advanced life support and the physiological stability to reduce secondary damage.
Aims & Objectives:

The CREACTIVE consortium follows pediatric TBI patients as part of the InTBIR initiative, focusing on outcome and quality of life in children post TBI. A comprehensive follow-up package was developed by a team of pediatric developmental psychologists, psychiatrists, sleep experts and coordinated by PICU specialists. Our aim was to assess the feasibility of the package.

Methods

Clinical data was collected prospectively using our computerized system (PROSAFE). Validated age matched questionnaires and computerized tasks were used to assess: temperament; behavioral dysfunction; sleep quality; PTSD; cognitive function domains (attention, memory, numerical cognition and inhibition); rehabilitation. Patients underwent a three-stage evaluation: pre-morbid condition (filled during PICU admission), phone call evaluation and late clinical assessment.

Results

29 patients were approached. 22 (75%) completed follow-up. Median age was 6.5 years, 64% males. Median PICU and hospital length of stay (LOS) were 3 and 8.5 days, respectively. 27% had poor outcome (GOS≥6), three required rehabilitation. PICU LOS was positively associated with behavioral dysfunction and patient's stress (SDQ), (P<0.002) (Fig. 1). Total hospital LOS was associated with decreased quality of life (PEDIQL) (p<0.0003) (Fig. 2).
Conclusions
We present our pilot results of a PICU global outcome assessment tool. PICU admission negatively affects the child's global outcome and may influence the child's temperament, sleep quality, social and cognitive functions in comparison to pre admission status. Our research package is comprehensive, well accepted by patients and their families, and serves as a good tool to study pediatric outcome after PICU admission.
Decompressive craniectomy (DC) is considered a life-saving procedure for patients with traumatic brain injury (TBI), when the medical management fails to control raised intracranial pressure (ICP), with, however, equivocal results regarding the neurological outcome. Our aim was to evaluate the efficacy of DC in pediatric patients with severe TBI.

Methods

The records of patients<14 years with TBI, admitted in the PICU of ‘Aghia Sophia’ Children’s Hospital, Athens, Greece, during 2009–2015, were retrospectively reviewed. Patients with severe TBI (GCS ≤8), continuous ICP monitoring and refractory ICP (≥20mmHg for ≥15min, despite standard treatment), were included in the analysis.

Results

Out of 100 admissions, 53 patients suffered from severe TBI. Of those, 15 patients underwent DC and required ICP monitoring (1 excluded) and 14 didn’t underwent DC, although presented refractory ICP (23 excluded as didn’t require ICP monitoring or didn’t present refractory ICP) (fig1).

No differences were recorded between the two groups regarding the demographic characteristics, PRISM–III score, GCS, pupils, CT findings and Rotterdam score on admission (table 1). Children underwent DC presented higher values of ICP_{max} compared to no–DC group (67.4±37 vs 42.5±8, p=0.022). DC procedure lead to significant decrease of the ICP_{max} (67.4±37 vs 49.8±37, p=0.007), however, no significant difference between the DC and no–DC group was noted regarding the neurological outcome or the mortality (table 2).

Conclusions

In children with severe TBI, DC can be effective in reducing refractory ICP, with questionable impact, however, on the mortality or the neurological outcome.
Figure 1. Study population

TBI: Traumatic Brain Injury, DC: Decompressive Craniectomy, ICP: Intracranial pressure
Table 1. Demographic and clinical characteristics of Decompressive Cranectomy and no Decompressive Cranectomy group (n=29)

<table>
<thead>
<tr>
<th></th>
<th>No Decompressive Cranectomy (n=14)</th>
<th>Decompressive Cranectomy (n=15)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>8.8±4.3</td>
<td>8±5</td>
<td>0.649</td>
</tr>
<tr>
<td>Gender, male</td>
<td>10 (71)</td>
<td>6 (40)</td>
<td>0.139</td>
</tr>
<tr>
<td>Weight, Kg</td>
<td>34.6±18</td>
<td>28.6±15.1</td>
<td>0.343</td>
</tr>
<tr>
<td>Mechanism of injury</td>
<td></td>
<td></td>
<td><strong>0.033</strong></td>
</tr>
<tr>
<td>Road Traffic Accident</td>
<td>11 (70)</td>
<td>5 (33)</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>3 (21)</td>
<td>9 (60)</td>
<td></td>
</tr>
<tr>
<td>Compression</td>
<td>0</td>
<td>1 (7)</td>
<td></td>
</tr>
<tr>
<td>Intubated on admission</td>
<td>10 (71)</td>
<td>11 (73)</td>
<td>1.000</td>
</tr>
<tr>
<td>PRISM III</td>
<td>13.7±6.5</td>
<td>16.4±9.1</td>
<td>0.525</td>
</tr>
<tr>
<td>Glasgow Coma Scale on admission</td>
<td>5.8±1.9 (6.5, 4)</td>
<td>5.7±1.9 (6.4)</td>
<td>0.847</td>
</tr>
<tr>
<td>Pupils on admission</td>
<td></td>
<td></td>
<td>0.692</td>
</tr>
<tr>
<td>Equal</td>
<td>6 (43)</td>
<td>6 (40)</td>
<td></td>
</tr>
<tr>
<td>Unequal</td>
<td>6 (43)</td>
<td>5 (33)</td>
<td></td>
</tr>
<tr>
<td>Dilated</td>
<td>2 (14)</td>
<td>4 (27)</td>
<td></td>
</tr>
<tr>
<td>Computed Tomography findings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skull fracture</td>
<td>11 (77)</td>
<td>11 (73)</td>
<td>1.000</td>
</tr>
<tr>
<td>Brain damage</td>
<td>11 (77)</td>
<td>11 (73)</td>
<td>1.000</td>
</tr>
<tr>
<td>Epidural hematoma</td>
<td>2 (14)</td>
<td>6 (40)</td>
<td>0.215</td>
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<tr>
<td>Subdural hematoma</td>
<td>2 (14)</td>
<td>9 (60)</td>
<td>0.021</td>
</tr>
<tr>
<td>Subarachnoid Hemorrhage</td>
<td>8 (57)</td>
<td>4 (33)</td>
<td>0.272</td>
</tr>
<tr>
<td>Intracerebral hemorrhage</td>
<td>2 (14)</td>
<td>6 (40)</td>
<td>0.213</td>
</tr>
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<td>Axonal injuries</td>
<td>4 (29)</td>
<td>2 (13)</td>
<td>0.390</td>
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<tr>
<td>Oedema</td>
<td>3 (21)</td>
<td>14 (93)</td>
<td><strong>&lt;0.001</strong></td>
</tr>
<tr>
<td>Midline shift</td>
<td>0</td>
<td>3 (20)</td>
<td>0.224</td>
</tr>
<tr>
<td>Rotterdam score</td>
<td>2.6±0.8 (2.5, 1)</td>
<td>3±0.8 (3, 1)</td>
<td>0.172</td>
</tr>
<tr>
<td>Sedation duration, days</td>
<td>6.6±4.8 (5.5, 6)</td>
<td>10.3±5.9 (9, 9)</td>
<td>0.070</td>
</tr>
<tr>
<td>Intensive Care Unit stay duration, days</td>
<td>12.1±10.7 (9.5, 11)</td>
<td>26.1±35.6 (19, 23)</td>
<td>0.070</td>
</tr>
<tr>
<td>Ventilation duration, days</td>
<td>7.4±6.3 (6, 6)</td>
<td>23.2±37 (16, 11)</td>
<td><strong>0.012</strong></td>
</tr>
<tr>
<td>Mannitol</td>
<td>8 (57)</td>
<td>10 (67)</td>
<td>0.710</td>
</tr>
<tr>
<td>Hypertonic Saline</td>
<td>10 (71)</td>
<td>15 (100)</td>
<td><strong>0.042</strong></td>
</tr>
<tr>
<td>Barbiturate Cemota</td>
<td>0</td>
<td>8 (53)</td>
<td><strong>0.002</strong></td>
</tr>
</tbody>
</table>

* values expressed as mean±SD, p-values of student’s t-test, ** values expressed as mean±SD (median, IQR), p-values of Mann-Whitney test § values expressed as n (%), p-values of x² test
Table 2. Effect of Decompressive Craniectomy on ICP and CPP and complications and outcome of patients of the two groups

<table>
<thead>
<tr>
<th></th>
<th>No (n=14)</th>
<th>DC (n=15)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decompressive Craniectomy day</td>
<td>-</td>
<td>2.6±2 (1,3)</td>
<td>-</td>
</tr>
<tr>
<td>ICPmax before Decompressive Craniectomy</td>
<td>42.5±8</td>
<td>67.4±37</td>
<td>0.022</td>
</tr>
<tr>
<td>ICPmax after Decompressive Craniectomy</td>
<td>42.5±8</td>
<td>49.8±37</td>
<td>0.471</td>
</tr>
<tr>
<td>ICPmax difference</td>
<td>-</td>
<td>-17.5±21 (-5, 34)</td>
<td>0.007</td>
</tr>
<tr>
<td>CPPmin before Decompressive Craniectomy</td>
<td>23.8±13</td>
<td>23.2±12</td>
<td>0.900</td>
</tr>
<tr>
<td>CPPmin after Decompressive Craniectomy</td>
<td>23.8±13</td>
<td>35.7±12</td>
<td>0.028</td>
</tr>
<tr>
<td>CPPmin difference</td>
<td>-</td>
<td>12.5±12</td>
<td>0.002</td>
</tr>
<tr>
<td>Acute Respiratory Distress Syndrome</td>
<td>0</td>
<td>2 (13)</td>
<td>0.483</td>
</tr>
<tr>
<td>Infarction</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Pontine myelinolisis</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Liver failure</td>
<td>3 (21)</td>
<td>4 (27)</td>
<td>1.000</td>
</tr>
<tr>
<td>Acute Kidney Injure</td>
<td>0</td>
<td>1 (7)</td>
<td>1.000</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>1 (7)</td>
<td>0</td>
<td>1.000</td>
</tr>
<tr>
<td>Glasgow Outcome Score Extended 6 months</td>
<td>5 (37)</td>
<td>2 (13)</td>
<td>0.389</td>
</tr>
<tr>
<td>Improvement</td>
<td>5 (37)</td>
<td>2 (13)</td>
<td></td>
</tr>
<tr>
<td>Improvement, minor deficit</td>
<td>3 (21)</td>
<td>2 (13)</td>
<td></td>
</tr>
<tr>
<td>Impairment</td>
<td>3 (21)</td>
<td>6 (40)</td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td>3 (21)</td>
<td>5 (34)</td>
<td></td>
</tr>
<tr>
<td>Survival</td>
<td>11 (79)</td>
<td>10 (66)</td>
<td>0.682</td>
</tr>
</tbody>
</table>

* values expressed as mean±SD, p-values of student’s t-test, ** values expressed as mean±SD (median, IQR), p-values of Mann-Whitney test § values expressed as n (%), p-values of x² test, # p-values of repeated measures t-test

ICP: Intracranial pressure, CPP: Cerebral perfusion pressure
THE BRAIN

PICC-0263
HYPERTONIC SALINE 7.5% FOR THE TREATMENT OF INCREASED INTRACRANIAL PRESSURE IN PEDIATRIC SEVERE TRAUMATIC BRAIN INJURY

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²Panagiotis and Aglaia Kyriakou Children’s Hospital, Paediatric Intensive Care Unit, Athens, Greece
³Papageorgiou General Hospital- Aristotle University of Thessaloniki, 2nd NICU and Neonatal Unit, Thessaloniki, Greece

Aims & Objectives:

Patients with traumatic brain injury (TBI) suffer by increased intracranial pressure (ICP), associated with poor neurological outcome and increased mortality. Hypertonic saline (HTS) and/or mannitol have been used for controlling increased ICP. The aim of this study was to compare the effect of HTS 7.5% versus mannitol in pediatric patients with severe TBI.

Methods

The records of patients<14 years with severe TBI (GCS ≤8), admitted in the PICU of ‘Aghia Sophia’ Children’s Hospital, Athens, Greece, during 2009–2015, were retrospectively reviewed. Patients with continuous ICP monitoring and refractory ICP (≥20mmHg for ≥15min) were included in the analysis. The initial treatment of all patients included mannitol. In the case where ICP remained elevated despite mannitol administration, a bolus of 5ml/kg HTS 7.5% was given, and thereafter repeated if required. ICP and cerebral perfusion pressure (CPP), before and after each agent, and at 60 and 120 minutes were recorded and further analyzed.

Results

Totally 29 patients included in the study with an overall 155 doses (136 doses of HTS 7.5% and 19 doses of mannitol). The demographic and clinical data are presented in table 1. There was significant difference in the efficacy of HTS 7.5% versus mannitol in decreasing ICP (-13.4±9.6 vs -3.3±5.6, p<0.001) and increasing CPP (10.5±14.6 vs 3.11±5.7, p=0.041). Moreover, ICP sustained lower at 60 and 120 minutes (p=0.003) and CPP higher accordingly (p<0.001), after HTS boluses (table 2).

Conclusions

HTS 7.5% given as bolus is more effective than mannitol in controlling increased ICP and decreased CPP in children with TBI.
Table 1. Demographic and clinical data of study group

<table>
<thead>
<tr>
<th></th>
<th>Severe Traumatic Brain Injury (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years**</td>
<td>8.4 ± 4.6 (9, 15.4)</td>
</tr>
<tr>
<td>Gender, male§</td>
<td>16 (55)</td>
</tr>
<tr>
<td>Weight, Kg*</td>
<td>31.1 ± 16.5 (28, 31.5)</td>
</tr>
<tr>
<td>Mechanism of injury§</td>
<td></td>
</tr>
<tr>
<td>Road Traffic Injury</td>
<td>16 (55)</td>
</tr>
<tr>
<td>Fall</td>
<td>12 (41)</td>
</tr>
<tr>
<td>Compression</td>
<td>1 (4)</td>
</tr>
<tr>
<td>PRISM III*</td>
<td>15.1 ± 8</td>
</tr>
<tr>
<td>Intubated on admission§</td>
<td>21 (72)</td>
</tr>
<tr>
<td>GCS on admission**</td>
<td>5.7 ± 1.9 (6, 4)</td>
</tr>
<tr>
<td>Pupils on admission§</td>
<td></td>
</tr>
<tr>
<td>Equal</td>
<td>12 (41)</td>
</tr>
<tr>
<td>Unequal</td>
<td>11 (38)</td>
</tr>
<tr>
<td>Dilated</td>
<td>6 (21)</td>
</tr>
<tr>
<td>CT findings on admission§</td>
<td></td>
</tr>
<tr>
<td>Skull fracture</td>
<td>22 (76)</td>
</tr>
<tr>
<td>Brain damage</td>
<td>22 (76)</td>
</tr>
<tr>
<td>Epidural hematoma</td>
<td>8 (28)</td>
</tr>
<tr>
<td>Subdural hematoma</td>
<td>11 (38)</td>
</tr>
<tr>
<td>Subarachnoid Hemorrhage</td>
<td>13 (45)</td>
</tr>
<tr>
<td>Intracerebral hemorrage</td>
<td>8 (28)</td>
</tr>
<tr>
<td>Axonal injuries</td>
<td>6 (21)</td>
</tr>
<tr>
<td>Oedema</td>
<td>17 (50)</td>
</tr>
<tr>
<td>Midline shift</td>
<td>3 (10)</td>
</tr>
<tr>
<td>Rotterdam score**</td>
<td>2.8 ± 0.8 (3, 1)</td>
</tr>
<tr>
<td>Sedation duration, days**</td>
<td>8.5 ± 5.6 (9, 8)</td>
</tr>
<tr>
<td>Ventilation duration, days**</td>
<td>15.6 ± 27.7 (9, 12)</td>
</tr>
<tr>
<td>Intensive Care Unit stay duration, days**</td>
<td>19.4 ± 27.1 (13, 16)</td>
</tr>
<tr>
<td>Barbiturate Coma§</td>
<td>8 (28)</td>
</tr>
<tr>
<td>Decompressive Cranietomy§</td>
<td>15 (52)</td>
</tr>
<tr>
<td>Inotropes§</td>
<td>14 (48)</td>
</tr>
<tr>
<td>Antiepileptics§</td>
<td>19 (66)</td>
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<tr>
<td>Acute Respiratory Distress Syndrome§</td>
<td>2 (7)</td>
</tr>
<tr>
<td>Infarction§</td>
<td>0</td>
</tr>
<tr>
<td>Pontic myelinolysis§</td>
<td>0</td>
</tr>
<tr>
<td>Liver failure§</td>
<td>7 (24)</td>
</tr>
<tr>
<td>Acute Kidney Injury§</td>
<td>1 (4)</td>
</tr>
<tr>
<td>Neutropenia§</td>
<td>1 (4)</td>
</tr>
<tr>
<td>Glasgow Outcome Score Extended 6 months§</td>
<td></td>
</tr>
<tr>
<td>Improvement</td>
<td>7 (24)</td>
</tr>
<tr>
<td>Improvement, minor deficit</td>
<td>5 (17)</td>
</tr>
<tr>
<td>Impairment</td>
<td>9 (31)</td>
</tr>
<tr>
<td>Death</td>
<td>8 (28)</td>
</tr>
<tr>
<td>Survival§</td>
<td>21 (72)</td>
</tr>
</tbody>
</table>

* mean ± SD,  ** mean ± SD (median, IQR), § n (%)
Table 2. Comparison of HTS 7.5% versus mannitol administration

<table>
<thead>
<tr>
<th></th>
<th>HTS 7.5% (n=136)</th>
<th>Mannitol (n=19)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume/kg, ml/kg**</td>
<td>39 ± 2.2 (3.4, 2.9)</td>
<td>2.3 ± 2.5 (2.5, 0.4)</td>
<td>0.002</td>
</tr>
<tr>
<td>ICP before**</td>
<td>31.4 ± 9.2 (29, 9)</td>
<td>26.5 ± 11.2 (25, 4)</td>
<td>0.061</td>
</tr>
<tr>
<td>ICP after**</td>
<td>18 ± 7.7 (18, 7)</td>
<td>23.2 ± 11.8 (21, 5.4)</td>
<td>0.006</td>
</tr>
<tr>
<td>ICP difference**</td>
<td>-13.4 ± 9.6 (-12, 12)</td>
<td>-3.3 ± 5.6 (-1.5, 5)</td>
<td>0.000</td>
</tr>
<tr>
<td>ICP 60min**</td>
<td>17.2 ± 8.6 (17, 11)</td>
<td>25.2 ± 13.8 (22, 12)</td>
<td>0.003</td>
</tr>
<tr>
<td>ICP 120min**</td>
<td>18.6 ± 8.8 (18, 10)</td>
<td>26.1 ± 13 (23, 10)</td>
<td>0.003</td>
</tr>
<tr>
<td>CPP before**</td>
<td>48.8 ± 14 (50, 14)</td>
<td>41.7 ± 10 (44, 5, 15)</td>
<td>0.018</td>
</tr>
<tr>
<td>CPP after**</td>
<td>50.3 ± 14.3 (57, 16)</td>
<td>44.8 ± 10.2 (47, 5, 15)</td>
<td>0.000</td>
</tr>
<tr>
<td>CPP difference**</td>
<td>10.5 ± 14.6 (6, 18)</td>
<td>3.11 ± 5.7 (1.5, 8)</td>
<td>0.041</td>
</tr>
<tr>
<td>CPP 60min**</td>
<td>50.4 ± 14.5 (58, 18)</td>
<td>45.3 ± 14.2 (46, 14)</td>
<td>0.000</td>
</tr>
<tr>
<td>CPP 120min**</td>
<td>50.2 ± 15 (58, 18)</td>
<td>44.3 ± 14.1 (46, 13)</td>
<td>0.000</td>
</tr>
<tr>
<td>Sodium before**</td>
<td>144 ± 6.1 (142, 11)</td>
<td>142 ± 6.8 (140, 11)</td>
<td>0.081</td>
</tr>
<tr>
<td>Sodium after**</td>
<td>151 ± 10.3 (149, 15)</td>
<td>144 ± 6.9 (143, 14)</td>
<td>0.003</td>
</tr>
<tr>
<td>Sodium alteration**</td>
<td>7.12 ± 8.2 (6, 11)</td>
<td>1.84 ± 3.4 (1, 4)</td>
<td>0.003</td>
</tr>
<tr>
<td>Osmolality before**</td>
<td>300 ± 11.6 (296, 23)</td>
<td>298 ± 15.8 (292, 32)</td>
<td>0.211</td>
</tr>
<tr>
<td>Osmolality after**</td>
<td>313 ± 21.2 (308, 31)</td>
<td>309 ± 27.3 (306, 86)</td>
<td>0.355</td>
</tr>
<tr>
<td>Osmolality alteration**</td>
<td>13.7 ± 17.2 (10.1, 27)</td>
<td>9.5 ± 16.2 (6.6, 20)</td>
<td>0.407</td>
</tr>
</tbody>
</table>

** mean ± SD (median, IQR)
ICP: Intracranial pressure, CPP: Cerebral perfusion pressure
Aims & Objectives:

The presence of light is constant in neonatal units, that can be in a disturbing element of sleep, which is essential for the brain development and recovery of premature newborns. **Objective:** To investigate the correlation of total sleep time, sleep stages and wakefulness of preterm infants with the illuminance level inside the incubators.

Methods

**Method:** observational correlation study performed in a neonatal unit of São Paulo Hospital, Brazil. The sample consisted of 10 preterm infants. The variables related to sleep were measured by polysomnography, and illuminance levels by the lightmeter, both on 24 hours uninterrupted. Data analysis was used descriptive statistics and applied the Pearson’s correlation test.

Results

**Results:** The preterm infants studied had 32.2 ± 4.2 weeks of gestational age and 1606.0 ± 317.8 grams. Total sleep time was 14.9 hours, which 4.6 were in active sleep stage, 5.8 and 4.5 hours of sleep were quiet and indeterminate, respectively. Wakefulness was 9.1 hours. Positive correlation was found (r=0.65 and p=0.041)
just between the maximum levels of illuminance and the occurrence of wakefulness.

**Graph 1.** Correlation between illuminance levels and total sleep time, active sleep, quiet sleep, indeterminate sleep and wakefulness of premature infants, in minutes, within 24 hours.

**Conclusions**

**Conclusion:** the higher illuminance level inside the incubators, the greater was wakefullness time of preterm infants. **Practice Implications:** the nursing staff must provide light/dark cycles to promote sleep of preterm infants and consequently promote the development of the circadian rhythm. Although the literature is controversial to the presence of the circadian rhythm in preterm infants, the light is described as the environmental factor which most influences this rhythm synchronization.
Aims & Objectives:

Near infrared resonance spectroscopy (NIRS) monitoring is commonly used to screen for deficient end organ oxygen delivery. Although tissue oxygen tension (tPO2) is the gold standard measure of adequate end organ perfusion, the correlation of the regional NIRS index (rSO2) with cerebral tPO2 is poorly described. The primary aim of this study is to determine the correlation of cerebral NIRS with measured tPO2 (in a juxtaposed location), mixed venous saturation (SvO2), and cardiac output.

Methods

Yorkshire swine (n=3, 29-31 kg) were anesthetized, intubated, and paralyzed. Cerebral rSO2 of the right cerebral hemisphere was measured using a NIRS device (Somanetics Corporation), and tPO2 of the left hemisphere was measured using an implantable Clark electrode (Licox, Integra LifeScience). SvO2 was measured by co-oximetry (Radiometer ABL80), and cardiac output was measured using a transit time flow probe (Transonic, Inc) on the aortic root. No injuries were performed, and FiO2 was varied between 0.21 and 0.8. Data were compared between contemporaneous variables by linear regression analysis.

Results

In the setting of hyperoxia with low-normal cardiac output, rSO2 correlated poorly with tPO2 ($r^2=0.0005$) (Figure 1A), SvO2 ($r^2 = 0.0017$) (1B) and cardiac index ($r^2 = 0.0715$) (1C). In fact, rSO2 was inversely correlated with CI (slope = -3.244).
Conclusions

In swine with near-normal cardiac output, rSO2 correlates poorly with tPO2, SvO2 and CI. Further investigation into these correlations in shock states is warranted.
Aims & Objectives:

Differentiation between oculocardiac and cushing reflex as the etiology of acute bradycardia in a patient with concomitant ocular and head injuries.

Methods

Patient studied is a 13-year-old boy who presented with gun-shot pellet wounds to the head, resulting in traumatic brain injury with pellets embedded in both left frontal and parietal lobes, causing hemorrhage and midline shift. Facial damage included bilateral penetrating open globe injuries and fragmented frontal skull fractures. The patient underwent emergent intervention with decompressive craniectomy, external ventricular drain placement and bilateral repair of open globes. During his PICU course, he became severely bradycardic on multiple occasions. One episode necessitated brief cardiopulmonary resuscitation. Episodes were associated with position change when the head of the bed was lowered from 30 degrees to supine without measured increases in intracranial or intraocular pressure. Significant position changes subsequently were pretreated with atropine.

Results
Conclusions

This patient's case was unique in terms of etiology and events inciting the bradycardia. Given normal measured intracranial pressures and heart rate increase with atropine, the oculocardiac reflex seems to have played a dominant role with his profound positional bradycardia. Positional changes could also be considered to help differentiate the two etiologies in patients with ocular and CNS trauma. In addition, regardless of the etiology, it is important to closely monitor patients with extensive head and ocular trauma in order to recognize and prevent a life threatening arrhythmia.

<table>
<thead>
<tr>
<th>Bed Position</th>
<th>EVD</th>
<th>ICP&lt;sup&gt;a&lt;/sup&gt; (mmHg)</th>
<th>IOP&lt;sup&gt;b&lt;/sup&gt; (mmHg)</th>
<th>HR&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td>Closed</td>
<td>5-14</td>
<td>10 OD 13 OS</td>
<td>30</td>
</tr>
<tr>
<td>Flat</td>
<td>Closed</td>
<td>5-8</td>
<td>10 OD 13 OS</td>
<td>20-60</td>
</tr>
</tbody>
</table>

<sup>a</sup> Intracranial Pressures taken on day of bradycardic event
<sup>b</sup> Intraocular Pressure taken on day of bradycardic event
<sup>c</sup> EVD status, bed position, and heart rate at the time of bradycardic event
Aims & Objectives:

In Indonesia every year 45,000 babies born with congenital heart disease (CHD), and 25% of them needed surgical intervention. Neurological injury after pediatric heart surgery still cannot be avoided.
To evaluate the role of S100B, sTNFR-1, lactate, saturation of superior vena cava and cerebral saturation (NIRS) as predictors of neurological deficiency incidence on correction of CHD.

Methods

This is a prospective cohort study. Inclusion criteria are child patient with CHD aged 1 month-6 years old that undergo corrective operation. In analysis, subjects will be divided into 2 groups; group 1 with neurological deficit and group 2 with no neurological deficit. All subjects are observed closely while they were in ICU, until they are released from hospital. Blood examination is done in 3 times observing: before surgery, after cardio pulmonary bypass(CPB), and 4 hours after CPB.

Results

During March-September 2015, there were 51 patients observed. There are significant difference of S100B, sTNFR-1, lactate, and AUC 20% baseline of cerebral saturation concentrations observed post CPB between group with and without neurological deficit. In addition, other parameters such as core temperature at CPB and CPB time are related with neurological deficit after congenital heart surgery. The neurological deficit event regression model was obtained as

\[ S(t) = [S_0(t)] \exp(2.54 \times S100B + 1.98 \times sTNF + 1.76 \times Lakat + 0.61 \times \text{core temperature} + 0.04 \times \text{CPB time}) \]

Conclusions

In CHD patients who undergo corrective surgery, S100B value, sTNFR-1, lactate, and AUC 20% baseline of cerebral saturation can be used as predictors of neurologic deficit incidence after CPB.
Aims & Objectives:

Background: Fever is associated with poor outcomes in brain injury. Whilst therapeutic hypothermia has not proved to be beneficial in large randomised controlled trials, normothermia may be beneficial. We hypothesise that children with brain injury develop a fever early during their paediatric intensive care unit (PICU) admission and should be treated pro-actively.

Methods

Methods: We conducted a single-centre retrospective observational study over a 4 year period (2012-2016) of all children who underwent intra-cranial pressure (ICP) monitoring (traumatic or vascular injury). Temperature profiles of children in the first 24 hours of admission were analysed. Fever was defined as a central or axillary temperature >=38°C (100.4°F). We also evaluated the association between temperature on maximum ICP throughout stay and lengths of ICP monitoring, muscle
relaxation and ventilation as surrogate markers for severity of injury.

Results

Results: Fifty four children were admitted with traumatic or vascular injury to PICU, requiring ICP monitoring. Twenty six (48.1%) children had a temperature $>38^\circ C$ in the first 24 hours, with over half within the first 3 hours of admission (figure). Two children died prior to discharge from PICU. There was no association between the maximum
temperature in the first 24 hours and maximum ICP, length of ICP monitoring, muscle-relaxation or ventilation in this cohort.

Conclusions

Conclusion: Almost half the children with brain injury in our cohort had a fever in the first 24 hours of admission. This was not associated with short term outcomes. Nevertheless, given adult evidence, we argue fever should be pro-actively controlled early in the context of brain injury in PICU.
THE BRAIN

PICC-0470
THE ACCURACY OF OPHTHALMIC ULTRASOUND TO DETECT RETINAL PATHOLOGY IN CHILDREN SUFFERING FROM ACCIDENTAL AND ABUSIVE HEAD TRAUMA

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Aims & Objectives:

Abusive head trauma (AHT) includes any non-accidental injury inflicted to a child’s head and body. AHT has a mortality rate of 30%, and 80% of survivors suffer permanent neurological damage. Dilated fundus exams identify retinal manifestations of AHT in 80% of victims. In a child with head trauma and retinal hemorrhages, the probability of AHT is 91%. At least one-third of AHT cases are not identified upon initial presentation to the emergency department. We propose that ophthalmic ultrasonography can rapidly and accurately identify retinal pathology associated with AHT, thus decreasing the number of missed cases and triggering interventions that may prevent more serious and repeated injuries to the child and their siblings.

Methods

Retinal pathology was evaluated by dilated fundus exams in all patients. A GE LOGIQ E® ultrasound machine with a high frequency linear array 10-22 MHz probe was used to obtain ophthalmic ultrasounds in all patients.

Results

Thirty nine patients, 28 males and 11 females, 5 days to 5 years of age with an average age of 10 months (±15 months) were enrolled in this IRB approved prospective observational cohort. AHT was diagnosed in 29 patients and accidental trauma in 10 patients. According to retinal exams (gold standard), 23 patients had significant bilateral retinal hemorrhages, 2 had unilateral retinal hemorrhages, and 14 patients had no retinal pathology. Relative to hospital admission time, ophthalmic ultrasounds were obtained within 3.3 hours (±2) and dilated fundus exams within 71.6 hours (±61 hours). Compared with retinal exams, the sensitivity and specificity for detecting retinal pathology for ophthalmic ultrasound was 96.2% (95% CI: 80.4-99.9) and 100% (95% CI: 76.8-100) respectively.

Conclusions

Ophthalmic ultrasound is a rapid, radiation-free, and accurate bedside imaging tool that can be used to identify retinal pathology in children with suspected AHT.
Aims & Objectives:

Outcomes after severe traumatic brain injury (TBI) in children are influenced by poorly understood complex secondary mechanisms. Brain microdialysis is an advanced technique that has clinical and research potential that is largely unexplored in children. In this study we aimed to examine our experience with microdialysis in children.

Methods

We examined data from children with severe TBI who underwent microdialysis monitoring. We had complete bedside metabolite data in 22 patients; 19 also had offline analysis of brain extracellular fluid for inflammatory mediators using Luminex multiplex array analysis, and 14 had full proteomics analysis using mass spectrometry.

Results

There were no complications associated with microdialysis monitoring. Elevated lactate/pyruvate ratio (LPR) was associated with poor clinical outcome and showed individual associations with intracranial pressure and brain oxygenation. Glycerol increased with contusions and demonstrated dynamic trends consistent with cellular injury. Brain glucose and serum glucose were correlated but there were differences in individual patients. Commonly elevated inflammatory mediators were interleukin (IL)-6, monocyte chemoattractant protein-1, IL-1 receptor agonist. Pro-inflammatory mediators peaked early and decreased over time while anti-inflammatory mediators increased over time. Proteomics captured 1208 proteins, of which the dominant groups included apoptosis markers, blood markers, and markers of tissue injury and remodelling.

Conclusions

Microdialysis is a potentially useful method for research and clinical purposes that can be safely applied to children. Bedside metabolite data provide insight into
dynamic biochemical changes for therapeutic purposes while offline analysis enables unique opportunities for brain extracellular fluid analysis across a wide range of possibilities.
THE BRAIN

PICC-0669
CEREBRAL FUNCTION MONITORING (CFM) FOR SEIZURE DETECTION IN
PAEDIATRIC INTENSIVE CARE (PIC)
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Aims & Objectives:

Children with hypoxic-ischaemic or traumatic brain injury are at risk of seizures, with incidence rates reported between 18-45%. CFM using continuous amplitude-integrated EEG may detect electrographic seizures (ES) in children requiring neuromuscular blockade, as well as subclinical seizures. This study aimed to evaluate the accuracy and rapidity of ES detection at the bedside, by non-expert users (medical/nurse members in PIC).

Methods

Prospective, cohort study of PIC patients monitored using CFM between April 2013 and April 2014. We studied incidence, time to detection and detection delays of ES. Sensitivity and false positive rates of ES detection by non-expert users were calculated using expert neurophysiologists as the gold-standard. Several demographic and process variables were analysed for association with delays or inaccuracies.

Results

101 of 1470 PIC patients had CFM. Cardiovascular and neurological (34/101 each) were the commonest admission diagnostic categories. Commonest indications for CFM were detection/confirmation of seizures (62%) and post-cardiac arrest protocol (24%). 12 (12%) of patients with CFM had ES. Factors associated with ES included younger age (p<0.001) and abnormal background EEG (p<0.001). All ES were detected within 48 hours, with the first ES occurring at a median of 1.6 (0.4-10.5) hours. Non-expert users identified all ES accurately (100% sensitivity). There was a detection delay of >1 hour in 5 patients, and 11 patients (11%) had a false-positive diagnosis. 91% (10 /11) of false-positive events occurred out-of-hours, 4 of which had burst-suppression. There were no statistically significant factors associated with ES detection delays or false positive diagnoses. The small sample size limits interpretation.

Conclusions

Non-expert users identified seizures accurately and rapidly using CFM. Although less frequent than previously reported, ES were relatively common in this cohort. Larger
sample size is needed to analyse factors associated with delays and false positive diagnoses.
THE BRAIN

PICC-0647
CHANGING ETIOLOGY OF ACUTE CNS INFECTIONS IN NORTH INDIAN CHILDREN: A PROSPECTIVE OBSERVATIONAL STUDY

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Aims & Objectives:

This study was conducted to identify etiologic profile of acute CNS infections after introduction of Hib and pneumococcal vaccines in the community and to evaluate diagnostic role of multiplex PCR

Methods

In a prospective study conducted in Pediatric-emergency and intensive care units of a teaching hospital of North India between July2013 to July2015, we enrolled consecutive children, aged 3 months and 14 years, with clinical and CSF features consistent with acute CNS infection. CSF samples were subjected to cell-count, biochemistry, ELISA for scrub typhus, culture and multiplex PCR for select bacteria (meningococcus, pneumococcus, H.influenzae) and viruses [Japanese encephalitis (JE), Herpes simplex (HSV)-1 and 2, varicella-zoster (VZV), Epstein-Barr (EBV), CMV, HHV-6, HHV-7, adeno- and B19 virus.

Results

326 children (median age 36 months, 68% boys) with clinical and CSF features consistent with acute CNS infection were enrolled. 103(31.6%) children had acute bacterial meningitis and 223(68.4%) acute encephalitis Conventional diagnostic tools identified etiologic agent in 103 (31.5%) patients. Multiplex PCR (done in 310) identified an etiological agent in an additional 119 (38.3%) patients. Common etiologic agents of acute bacterial meningitis were scrub typhus (n-26,8.3%), Strept. pneumoniae (17.5.4%), H. influenzae (12.3.8%), S.aureus (7.2.2%) and gram negative organisms (11,3.6%) The common viruses identified in CSF were EBV (44,14.2%), B19 virus (28,9%), JE (27,8.7%), adenovirus (27,8.7%), HSV-1 (12,3..8%) and CMV (11,3.5%).

Conclusions

We found EB virus (in acute encephalitis) and Scrub typhus (in acute meningitis) as significant, hitherto under-recognized etiology of acute CNS infections in North Indian children. Use of Multiplex PCR doubled the diagnostic yield
THE BRAIN

PICC-0587

CLINICAL EFFECTIVENESS OF LEVETIRACETAM COMPARED TO FOSPHENYTOIN IN THE TREATMENT OF BENZODIAZEPINE REFRACTORY CONVULSIVE STATUS EPILEPTICUS IN PEDIATRIC POPULATION - OPEN LABEL RANDOMIZED PILOT TRIAL

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Aims & Objectives:

To study the clinical effectiveness of Levetiracetam compared to fosphenytoin in treatment of benzodiazepine refractory status epilepticus in children aged 3 months to 18 years attending pediatric emergency room

Methods

All consecutive children admitted in status epilepticus (SE) and remained refractory to first dose benzodiazepine (BRSE) were randomized further to two groups of treatment protocol. Group A received Fosphenytoin and Group B received Levetiracetam. Time to seizure cessation (response latency) was documented in both groups. The test drug was administered over 10 minutes and if seizure remained refractory after 20 minutes of test drug administration, the next appropriate antiepileptic drug was chosen as per pediatrician’s discretion. Response latency, recurrence in next 60 minutes, in 24 hours, rate of intubation, hypotension episode, cardiac arrhythmia, number of antiepileptic drugs used, antiepileptic agents at discharge, duration of PICU stay and duration of hospital stay were compared between the two therapeutic groups

Results

Of 61 children enrolled over one year study period, 32 (52.5%) were randomized to group A and 29 (47.5%) were in Group B. Age and sex distribution were comparable in both groups. 57.4% (35/61) of study population had received some form of prehospital benzodiazepine administration prior to reaching our emergency room. Among these, 75.4% (n=26) had first episode seizure presenting as SE and remaining (n=15) 24.6% had past history of seizures. Of 61 children, n=58 (98%) required PICU admission and n=5 (8.2%) required mechanical ventilation. Duration of PICU stay and hospital stay were comparable. The response latency and seizure
recurrence were not significantly different between the groups and the seizure recurrence in 24 hours was also comparable.

Conclusions

Levetiracetam observed to be equally effective in clinical cessation of seizure activity in children with BRSE when comparing to Fosphenytoin. Seizure recurrence in 24 hours and readmission in 30 days also remained comparable in both groups.
THE BRAIN

PICC-0797
DIGITAL MEASUREMENT OF GREY-WHITE MATTER DENSITY AND FUNCTIONAL OUTCOME AFTER PEDIATRIC TRAUMATIC BRAIN INJURY

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Aims & Objectives:

Traumatic brain injury (TBI) is the leading cause of morbidity and mortality in North American children. Computed tomography (CT) scanning is widely available and used in early pediatric TBI. This study explores the use of digital measurement of injury severity on admission cerebral CT scans in children after TBI. Hounsfield units (HU) are values that quantify tissue density on CT scans. HU change in regions including the caudate nuclei, thalami, and putamen is hypothesized to be associated with poor functional outcome in children.

Methods

This project was a retrospective cohort study combining two cohorts of Canadian children (n = 118) 0 to 17 years of age (median = 4.0 year, IQR = 8.8) with TBI. Eighty-two age-similar and contemporaneous imaging subjects acted as controls. Functional outcome was measured at hospital discharge or three months after injury using the Pediatric Cerebral Performance Categorical (PCPC) score.

Admission CT scans were analyzed using Medical Image Processing Analysis and Visualization software. Odds proportional logistic regression was used to determine the models with regions of interest associated with poor functional outcome in children.

Results

Bivariate analysis showed quantifiable HU value differences in the caudate nuclei and grey-white matter ratio of children after moderate to severe TBI compared to controls. The best model (area-under-curve = 0.868) showed that caudate nuclei, thalami, and grey-white matter ratio were predictive of poorer functional outcomes after TBI in children.
Conclusions

Findings suggest quantification of CT scans may help determine early pediatric head injury severity.
THE BRAIN

PICC-0379
MULTIPLE CEREBRAL INFARCTS IN A YOUNG PATIENT ASSOCIATED WITH MARIJUANA ABUSE

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Aims & Objectives:

Marijuana, or cannabis, is one of the most commonly used illicit drugs worldwide. Evidence accumulated over the last decades supports a link between cannabis and stroke in adults, but central nervous system infarction related to marijuana use is not well described in children. Cannabis might produce stroke through direct effects on the cerebral circulation, orthostatic hypotension, vasculitis, vasospasm, and atrial fibrillation. Long-term use of marijuana in young people may cause serious damage to the cerebrovascular system.

Methods

Chart review for case report.

Results

A 14 year-old girl, long-term heavy cannabis user, presented with generalized tonic-clonic seizure and decreased level of consciousness. Few hours earlier, she had used marijuana and alcohol. On examination, she was comatose and in shock. At the Emergency Department, she received antiepileptic drugs, respiratory and hemodynamic support. Toxicological screening was positive for cannabis and alcohol. Magnetic resonance imaging showed multiple ischemic infarcts in frontal lobe, basal ganglia, and corpus callosum, which had both chronic and acute characteristics. After treatment, she was not fully recovered and was discharged home for rehabilitation. Six months later, she remained with dysphonia, dysphagia, facial paralysis and tracheostomy.

Conclusions

The absence of other vascular risk factors, the temporal relation of symptom onset to cannabis exposure and the association between long-term use and chronic infarct suggest a causal role of cannabis in this case of stroke. Toxicology screening should be done in young patients with stroke with no obvious cause, or if suggested by history or examination.
THE BRAIN

PICC-0780
PATTERNS OF CEREBRAL HAEMORRHAGE AND INFARCTION COMPLICATING PAEDIATRIC ECMO

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Aims & Objectives:

Children with cerebral haemorrhage and infarction during extracorporeal membrane oxygenation (ECMO) have reduced survival and worse neurologic outcomes. We classified patterns of acute brain injury detected on portable head CT during ECMO, and assessed some clinical factors associated with these patterns.

Methods

Demographic, clinical, electrophysiologic, laboratory, and radiologic data were assessed from the medical records of 179 children treated with ECMO for respiratory or cardiac disease or as an aid to cardiopulmonary resuscitation (January 2010 to July 2013). Intracranial abnormalities on portable head CT during ECMO were classified into patterns of cerebral haemorrhage and infarction.

Results

78/179 patients (44%) had portable head CT scans, of which 51/78 (65%) showed acute pathology. Intracranial haemorrhage occurred in 28/51 cases, and infarction in 29/50 cases.

Stroke patterns are shown in Figure 1. The arterial territories affected and electrophysiology patterns in those with abnormal imaging are shown (Figures 2 and 3). Arteries involved were the middle cerebral artery (13/15 cases), posterior cerebral artery (8 cases), and anterior cerebral artery (5 cases). Suppression pattern and seizures on electroencephalogram occurred more often in those with infarction (p=0.003). Peak lactates on day of cannulation were significantly greater in those with abnormal imaging (p = 0.0002).

Figure Legends:

**Figure 1.** Infarction patterns on portable head CT during paediatric ECMO.
**Figure 2.** Arterial vascular territories involved in multifocal (≥2 arteries, top figure) and focal (1 artery, bottom figure) ischaemic stroke.
**Figure 3.** Electrophysiologic patterns during paediatric ECMO.
Patterns of acute brain injury during ECMO include global and focal infarction in addition to intracranial haemorrhage. Focal infarction is MCA predominant. Surveillance for seizures may be important for those with ischaemic lesions complicating ECMO. Peak lactate may be predictive of risk of acute brain injury during ECMO or suggest the need for earlier intervention. Prospective studies are needed to clarify these issues.
THE BRAIN

PICC-0172
NEUROLOGIC COMPLICATIONS AMONG CHILDREN HOSPITALIZED WITH HEMOLYTIC UREMIC SYNDROME

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Aims & Objectives:

Neurologic complications in children with Hemolytic Uremic Syndrome (HUS) often require critical care management for seizures, altered consciousness, and stroke. Previous reports of neurologic complications in HUS are decades old or limited to small case series in single institutions or outbreaks. We aimed to determine incidence and risk factors for neurologic complications in HUS among children hospitalized in the United States.

Methods

The 2012 Kids Inpatient Database was used to: 1) Identify children hospitalized with HUS, exclusive of atypical disease; 2) Produce national disease estimates of neurologic complications in non-atypical HUS.

Results

Among 913 children hospitalized with non-atypical HUS in 2012, 140 (15%) had neurologic complications, which included seizures (61%), stroke (19%), and altered consciousness/coma (15%). Risk factors for neurologic complications included African American versus Caucasian race [Relative Risk (RR) 2.3, 95% Confidence Interval (CI) 1.6-3.3], emergency admission (RR 1.5, 95% CI 1.1-2.0), and hospitalization in Midwestern states (RR 1.7, 95% CI 1.2-2.4); no difference was found with age or gender. Neurologic complications were associated with more critical care interventions and multi-system disease involvement (Table 1), and also with higher mortality (8% versus 1%, p<.001), higher average hospital charges ($280,000 versus $129,000; p<.001), and ongoing nursing care after discharge (27% versus 15%, p<.001).
Conclusions

Neurologic complications in non-atypical HUS are common and associated with increased critical care interventions, higher hospital charges, higher morbidity, and increased mortality. Risk factors include African American race, Midwestern location, emergency admission, and multi-system disease.
THE BRAIN

PICC-0256
EARLY TRACHEOSTOMY IN CHILDREN WITH HIGH SPINAL CORD INJURY
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Aims & Objectives:

High spinal-cord injuries in children are rare but can result in significant physical and psychological morbidity. We report three children with high spinal-cord injuries supported with tracheostomy ventilation.

Methods

The children where aged 5, 6 and 14 years with no significant past medical history. Two boys (6 and 14 year old) where involved in high speed road traffic accident and the 5 year old boy suffered extensive non-accidental injury. A retrospective patient case note review was performed.

Results

Patient 1 (6 years) had spinal cord injury at C4/C5 due to a spinal haematoma, tracheal transection and right clavicular fracture. Tracheostomy was performed at presentation.

Patient 2 (14 years) suffered C4/C5 cervical fractures, bilateral pneumothoraces, sternal fractures, a splenic laceration and a right humeral fracture. Tracheostomy was inserted day 11 post injury.

Patient 3 (5 years) had spinal cord haematoma from C2-C5, intracranial abscess and significant bruising all over his body. Tracheostomy was placed 18 days after ICU admission following failed attempts at extubation.

Ventilation through tracheostomy facilitated early commencement of neuro-rehabilitation measures and improved psychological wellbeing. Children were weaned to nocturnal only ventilation by 84 days (mean) after tracheostomy. At last follow-up all three have been successfully weaned off respiratory support.

Patient 2 required debridement of tracheal granuloma 5 months post-tracheostomy. He has been decannulated 7 months post-tracheostomy. Patient 1 and 3 are anticipated to be decannulated in the coming months. No other complications related to tracheostomy have been reported.

Conclusions
Tracheostomy ventilation promoted effective rehabilitation in our cohort of children with high spinal-cord injuries.
THE BRAIN

PICC-0660
REASONABLE TREATMENT AND PROGNOSIS OF FEVER INDUCED REFRACTORY EPILEPTIC ENCEPHALOPATHY IN CHILDREN
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Aims & Objectives:

OBJECTIVES: To investigate the reasonable treatment as well as prognosis of fever-induced refractory epileptic encephalopathy in children.

Methods

Methods: We retrospective analyzed the clinical manifestations and rescue measures in three cases of children’s fever-induced refractory epileptic encephalopathy. Their outcomes were also analyzed.

Results

Results: All three cases with normal clinical history, acute onset, high fever, convulsions and unconsciousness in early disease, normal Head CT scan, normal cerebrospinal fluid, EEG slow wave increased, no remission treated as viral encephalitis, negative results of common pathogenic detection. Maintained the stabilization of life symptoms and control convulsion in acute stage mainly. All three patients with stable vital signs after the rescue, but one case with obvious neurological sequelae, such as cognitive dysfunction, language communication difficulties, facial muscle spasms and salivation.

Conclusions

Conclusion: It is possible to reduce the neurological sequelae in children, by early diagnosis for children with fever-induced refractory epileptic encephalopathy in acute stage, along with given antiepileptic drugs as well as combined therapy composed primarily of anticonvulsants and protecting the brain promptly when the children were in epileptic state.
Aims & Objectives:

Background: Human echinococcosis (hydatid disease) is a rare zoonotic infection caused by a tapeworm. Liver and lungs are the most effected organs. Primary cerebral involvement is extremely rare, and potentially fatal if not treated carefully. We aimed to report a pediatric case of primary cerebral multicystic hydatid disease.

Methods

Case: A 9 year old male with poor medical follow up, presented with a history of difficulty with walking since 1 year and headaches over a month. He had received antibiotics for presumed sinusitis. Due to headache and evolving facial asymmetry he was evaluated in our university based hospital. His physical examination was significant for left sided central facial palsy and decreased motor strength (3/5) of right upper and (4/5) of right lower extremity. His routine laboratory tests were within normal limits, including eosinophilia. Brain MRI revealed six cysts of various sizes with variable mass affect (Figure 1).

Hemaglutination test was negative. Echinococcus IgG was positive. Chest and bone x-rays, abdominal ultrasonography and echocardiography were normal. Five cysts were excised in toto, one ruptured during surgery (Figure 2).
Results

There was no anaphylactic reaction. The pathology confirmed the diagnosis. Albendazol treatment was started. His facial palsy and motor weakness resolved post surgery.

Conclusions

Discussion: Since symptoms are nonspecific, insidious and related to localized mass effect and infection of the cysts, the possibility of hydatic infestation should be in the differential diagnosis, especially in children from endemic regions of the world. Careful dissection of the cysts by an experienced surgeon is the key for success.
FLUDROCORTISONE IN CEREBRAL SALT WASTING SYNDROME: TWO CASE REPORTS

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Aims & Objectives:

Cerebral salt wasting (CSW) syndrome is seen in acute neurological conditions. Sodium and fluid replacement are main stage of treatment. We report the use of fludrocortisone, which is an effective and safe treatment in treating two cases of CSW refractory to replacement therapy.

Methods

Case 1

An 11-year-old boy had congenital heart disease with right to left shunting, presented with multiple brain abscesses and warm shock. He developed inappropriate natriuresis leading to significant polyuria (5L/day), refractory to replacement therapy (sodium supplement 30mmol/kg/day). Inotropic support could not be weaned off resulting in life threatening tachyarrhythmia. Oral fludrocortisone 150 micrograms (mcg) twice daily have successfully reduced the natriuresis and all inotropic support was taken off within 3 days.

Results

Case 2

A 10-year-old boy had pineal gland germ cell tumor operation complicating by intracranial bleeding. He had polyuria (6L/day) and hyponatraemia (sodium supplement 18mmol/kg/day) since day 8 after operation. Biochemical profiles confirmed CSW without diabetic insipidus. In view of practical difficulty in replacing fluid, fludrocortisone (100mcg twice daily, step up to 200mcg twice daily over 1 week) had successfully treated his CSW.

Except mild hypokalemia, no hypertension was noted in both cases. Fludrocortisone was gradually weaned off after 6 and 4 weeks respectively.

Conclusions

There is no standardized protocol on the timing and dose in fludrocortisone treatment in CSW. It is advice to start at 50-100mcg twice daily and step up according to clinical effect with no more than 200mcg twice daily. From our experience, twice daily dose resulted in more effective control in natriuresis. Close monitoring of fluid status at the
beginning is recommended to avoid fluid overload. Clinical effect is usually seen after 3-5 days of treatment. Hypertension and hypokalemia are reported to be the side effect of fludrocortisone. Gradual weaning with close monitoring of sodium level and fluid status is advised.
THE HEART

PICC-0431
REPEAT KIDNEY INJURY IN SINGLE VENTRICLE PATIENTS
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Aims & Objectives:

Despite growing evidence demonstrating the morbidity and mortality associated with acute kidney injury (AKI) following complex cardiac surgery, there is little data on the kidney function of single ventricle patients undergoing the entire staged surgical palliation pathway. Our hypothesis is that repeated episodes of AKI during single ventricle palliation will have cumulative negative effects on renal function.

Methods

A retrospective chart review was performed on patients with single ventricle disease at Texas Children’s Hospital from 2009-2014 who underwent at least one stage of the three staged pathway. Demographics and other clinical data were collected, including the preoperative creatinine and the highest post-operative creatinine the week following surgery. AKI was defined by KDIGO guidelines.

Results

A total of 138 single ventricle patients were included that met criteria. When examined per stage: 46.3%(64/138) of patients who underwent stage 1 had AKI following surgery, 12.7%(15/118) after stage 2, and 23.1%(9/39) after stage 3. Cumulative data was available for 39 patients who survived to complete all three surgeries during the study period; 10/39 (25.6%) did not have any incidence of AKI following any staged surgery. 21/39 (53.8%) had one episode of AKI, most of which occurred following stage 1. 7/39 (17.9%) had two episodes of AKI, and 1/39 (2.6%) had AKI following each procedure. Additionally, of the 30 interstage mortalities following stage 1 and 2, 19/30 (63.3%) were found to have AKI immediately following surgery.

Conclusions
In the single ventricle population, AKI during the staged repair pathway is common. Impact on long term outcomes requires further investigation.
Aims & Objectives:

To determine the changes on tricuspid valve after surgery using echocardiogram (ECHO).

Methods

From 1999 – 2012, we reviewed twelve patients underwent tricuspid valve surgery at King Abdulaziz Medical City, Riyadh, Kingdom of Saudi Arabia. Patients demographic data, underline health status, and peri-operative ECHO were collected. Change on tricuspid valve analyzed by paired difference test.

Results

7 males and 5 females were included. The mean age is 18.67 (±SD 4.4) years old. 7 patients were underweight (BMI < 18.5). The mean BMI was 19.3 (±SD 5.2). While 4 patients were diagnosed with a septal defect, 10 patients have mitral valve disease (stenosis or regurgitation). 7 patients are known case of rheumatic heart disease, and 3 of them were pulmonary diseased. The mean follow-up time was 4.8 years (±SD 4.7). ECHO studies were reviewed for all patients; before the operation, after the operation, prior discharge home, and last ECHO. Friedman’s test showed statistically significant (p=< 0.05) for improvement tricuspid regurgitation grade across time and Wilk’s multivariate test reveal significant improvement of valve diameter (p=< 0.05).

Conclusions

Significant improvement in tricuspid valve was noticed by ECHO studies.
Aims & Objectives:

B-type natriuretic peptide (BNP) concentrations are positively correlated with the magnitude of left-to-right shunting and the end-diastolic volume in cardiac defects with LV volume overload and (Holmgren, 2005, 25: 263-9). In preterm infants, BNP correlate with the magnitude of shunting through a PDA, and is a useful guide for management (Flynn, 2005, 147: 38-42). In the present study we hypothesized that BNP concentrations could identify pulmonary overcirculation in patients undergoing a modified Blalock-Taussig shunt (MBTS).

Methods

This retrospective observational study included data collected within the first week from patients undergoing surgery for MBTS between Jan-1-2013 and Dec-31-2015 at our tertiary paediatric cardiac referral centre. BNP concentrations were measured at the physician's discretion. The analysis of the relationship between BNP concentrations and postoperative parameters used mixed models adjusted for age. The ROC methodology was used to identify the BNP concentration threshold which could identify patients with pulmonary overcirculation (i.e. pulmonary blood flow ≥ 2.5x systemic blood flow), as assessed by an arterial oxygen saturation above 88%.

Results

Overall 22 patients were included and 92 BNP measurements were analysed. The median age at surgery was 26.5 days, IQR[7-91], the mean haemoglobin concentration was 14.4±1.4g/dL and the mean fraction of inspired oxygen was 45.5±23.2%. The median duration of mechanical ventilation was 3 days, IQR [2-6.2] and the median ICU length of stay was 6.5 days, IQR[5-14.7]. One patient died in-hospital. The median BNP concentration was 933.2pg/mL, IQR[488.8–1461.2]. A significant association was found postoperatively between BNP concentrations, the arterial oxygen saturation (p=0.04), lactacidemia (p<0.01) and serum creatinine concentrations (p<0.01). A BNP concentration above 726.1pg/mL identified pulmonary overcirculation with a 0.71 sensitivity and 0.69 specificity.

Conclusions
The present results suggest that the postoperative BNP concentration monitoring can provide useful information for the assessment of the magnitude of the shunting through modified Blalock-Taussig anastomoses.
Aims & Objectives:

Methylene blue is increasingly used in paediatric patients as a salvage therapy for profound vasoplegia in the post cardiopulmonary bypass population. There are a few case reports of its use in the paediatric intensive care unit in patients with severe hypotension unresponsive to conventional therapies. Although extracorporeal life support is available as rescue therapy in patients with severe shock, it is challenging to use in this population as it often contributes to the ongoing vasoplegia and capillary leak.

Methods

We describe a successful case of methylene blue use in a 9 month old boy, history of pulmonary atresia and an intact ventricular septum palliated with a bidirectional Glenn, who presented in severe vasoplegic shock likely secondary to a profound systemic inflammatory syndrome. A transthoracic echocardiogram confirmed a hyperdynamic left ventricle with good systolic function and a patent Glenn. Despite escalation of epinepherine, norepinepherine, and vasopressin infusions, ongoing administration of hydrocortisone, and broad spectrum antibiotics, he continued to need multiple fluid boluses. He was challenged with a bolus of IV methylene blue (1 mg/kg) followed by an infusion of 0.25 mg/kg/hr for 12 hours.

Results

Over the next 24 hours, he was aggressively weaned off vasopressin and epinepherine, and maintained on a low norepinepherine infusion to facilitate diuresis and sedation. Following his hemodynamic stabilization, he developed hypoxemia secondary to newly diagnosed veno-venous collaterals. An interventional catheterization confirmed high Glenn pressures, two accessible collaterals which were coiled, and he returned to the unit for a wean to extubation.

Conclusions

This case further adds to the literature regarding the use of methylene blue as a rescue therapy in vasoplegic shock. It provides further confidence in using it across all paediatric intensive care populations. Our experience highlights a commonly associated side effect of increased pulmonary vascular resistance that can occur following administration.
THE HEART

PICC-0820
CHARACTERISTICS AND OUTCOMES OF CHILDREN WITH DIAPHRAGMATIC PARESIS AFTER SURGERY FOR CONGENITAL HEART DISEASE: A MULTI-INSTITUTIONAL ANALYSIS

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Aims & Objectives:

The incidence of diaphragm plication among pediatric patients post-surgical repair of congenital heart disease is unknown. The objective of this study was to determine the incidence of and risk factors associated with diaphragm plication in children undergoing cardiac surgery.

Methods

A retrospective review of the Pediatric Health Information System (PHIS) database was conducted from 2004-2014. Patients (pts) < 18 years of age who underwent cardiac surgery were included. Risk Adjustment for Congenital Heart Surgery (RACHS-1) was utilized to determine procedure complexity.

Results

A total of 112,110 patients were included in the analysis. The overall incidence of diaphragm paresis was 2.3% (n=2649). Of these, 22.9% (609 pts) underwent diaphragm plication. Higher complexity cardiac surgery (RACHS 5-6) and age less than four weeks were associated with a higher likelihood of diaphragm plication (p-value <0.01). Diaphragmatic plication was associated with increased hospital length of stay (p-value <0.01).

Conclusions

Diaphragm paresis and subsequent plication after surgery for congenital heart disease are associated with a longer hospital length of stay. The likelihood of plication increases with younger age and higher procedure complexity. Methods to improve early recognition and treatment of diaphragm paresis should be developed.
Aims & Objectives:

A 9-month-old boy was diagnosed having MAS with involvement of the distal thoracic aorta and uncontrollable hypertension. Echocardiography showed left ventricular hypertrophy with preserved function. Renal function was not impaired. The weight of 7.7 kg and the small abdominal aorta let us choose a catheterinterventional approach. We aimed to increase the flow to the abdomen by transcarotid stenting and angioplasty of the most stenotic area.

Methods

Angiography (Fig. 1a) showed a diffuse hypoplasia of the distal thoracic and abdominal aorta. Vascular access was achieved via a 6F sheath in the left carotid artery. The minimal diameter of the distal thoracic aorta was 1.8 mm. A 7x24 stent was implanted across the stenosis with 10 atm. The remaining waist in the stent was dilated with a 5 mm balloon at 14 and a 4 mm balloon at 20 atm. After this procedure 107/51 mmHg were recorded proximal and 63/50 mmHg distal to the stent.

Results
After the intervention the patient was treated with labetolol, salicylate and clopidogrel. Blood pressure stabilized around 130/77 mm Hg. At a weight of 11.3 kg a reintervention was planned to improve blood pressure control. Again the lesion was approached via the left carotid. First the diameter of the stent was increased by angioplasty. Because of a residual gradient of 30 mmHg distal to the stent a second 7x24 stent was implanted distally (Fig. 2). After this procedure 107/47 mmHg were recorded proximal and 94/77 mmHg distal to both stents. Two years after the first intervention blood pressure is still under control with labetolol 2x4 mg/d.

Fig. 2

Conclusions

Successive transcarotid stenting and angioplasty is a safe and effective in infants with thoracic involvement of MAS. The first procedure enabled us to start antihypertensive treatment. The second procedure alleviated residual gradients and achieved blood pressure control.
THE HEART

PICC-0736
BIOMARKER UTILITY TO ASSESS MYOCARDIAL DYSFUNCTION AFTER PAEDIATRIC CARDIAC SURGERY
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Aims & Objectives:

Introduction

The study was a prospective observational cohort study of paediatric patients undergoing cardiac surgery to determine if the measurement of biomarkers was useful in the assessment of myocardial dysfunction. Research studies have assessed the utility of a variety of biomarkers however no study has assessed a wide subset of biomarkers in a large cohort of children. Biomarkers such as CK, troponin, Free T3, C reactive protein, and procalcitonin were measured. In addition mitugumin-53 (MG53) was measured - which is a muscle membrane protein.

Aim

The aim of the study was to identify if there was a useful biomarker to determine myocardial injury and predict myocardial dysfunction in the post-operative period.

Methods

Methods

A pilot study of 10 patients was conducted to determine the feasibility of a larger study. Serum biomarkers were measured preoperatively and in the post-operative period and compared to existing clinical and diagnostic markers.

Results

Biomarkers were within normal limits in the preoperative period, Troponin and CK levels increased in all patients in the immediate post-operative period.

C-reactive protein and procalcitonin levels varied with time, increases were observed 12-24 hours post operatively.
MG53 showed promise in animal work, however its expression in human serum was uncertain in this pilot cohort

Conclusions

Trends were seen in conventional biomarkers in a small sample of patients. A larger cohort of patients will be required to determine statistical and clinical significance. The pilot study has indicated the feasibility of continuing the study to a larger cohort.
Aims & Objectives:

Fulminant myocarditis is an infrequent presentation of systemic lupus erythematosus (SLE). Catastrophic antiphospholipid syndrome (CAPS), a rare complication of lupus causing thrombotic storms, has cardiac involvement in approximately 50 percent of individuals. These patients can rapidly deteriorate with cardiovascular collapse requiring urgent mechanical circulatory support (MCS).

Methods

We present a 17-year old obese male with a history of metabolic syndrome, deep venous thrombus and renal insufficiency without cardiac risk factors who presents with acute chest pain, dyspnea and hypoxemia. Chest x-ray showed patchy alveolar disease, EKG with a wide QRS without ST abnormality and a normal CT angiogram. He progressed to hypoxemic respiratory failure, cardiac arrest with ventricular fibrillation and cardiogenic shock requiring renal replacement therapy for acute on chronic renal insufficiency.

Results

Echocardiogram showed severe biventricular systolic dysfunction, mitral valve regurgitation, and pulmonary hypertension. He had elevated cardiac enzymes, pro-brain natriuretic peptide, and Lactate. With the severe systolic and diastolic left ventricular (LV) dysfunction, bundle branch block and episodes of non-sustained ventricular tachycardia, he required urgent Impella (Abiomed, Danvers, MA) placement and was supported for 7 days, with resultant improvement in LV ejection fraction, arrhythmias and increased urine output.

Conclusions

Impella support in pediatric patients is emerging and evolving. The ability to urgently place it in acute cardiogenic shock, as a temporary ventricular assist device, supports its use in more emergent settings. Its safe profile and percutaneous insertion allow consideration of its use as an emergent temporary mechanical support device to recovery or bridge to chronic support.
THE HEART

PICC-0770
HEMODYNAMIC CHANGES MEASURED BY TRANSPULMONARY
ULTRASOUND DILUTION DURING BIVENTRICULAR PACING
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Aims & Objectives:

To determine the feasibility of using the COstatus System (Transonic Systems Inc., Ithaca, NY) to measure hemodynamic changes associated with different cardiac pacing modes.

Methods

A 43 kg patient with CAVC and permanent epicardial biventricular pacing (Consulta, Medtronic), was evaluated using transpulmonary ultrasound dilution method (COstatus). A disposable AV loop, primed with heparinized saline, was connected between the radial and central venous catheters. A pump circulated blood (12 mL/min) from the artery to the vein over 22 minutes. Measurements involved injections of body temperature isotonic saline 0.5-1 mL/kg into the AV loop. We performed 1 to 3 cardiac output measurements during each pacing mode.

Modes of Pacing*:

1: DDD_{LV+RV} (Left (lateral wall) and right ventricles, VV interval: 0.04 msec).
2: VVI (Right ventricle only).
3: DDD_{RV} (Right ventricle; conventional pacing).
4: DDD_{LV} (Left ventricle only).

*AV interval was 130 msec (Modes 1, 3, 4).

Results

Changes in pacing modes modified cardiac index, stroke volume index, central blood volume index (CBVI), total end diastolic volume index (TEDVI), and active central volume index (ACVI). The dynamic trend seen with CI and SVI were also seen by CBVI, TEDVI, and ACVI. With the increase in CI and SVI, more blood was brought
into the central circulation to support the increased volume ejected.
Conclusions

COstatus can be used to detect small variations in cardiac output and related blood volumes during optimization of cardiac resynchronization.
INTRODUCTION: Critical congenital heart disease is associated with high morbidity and mortality. Early diagnosis and intervention can be achieved with prenatal diagnosis and pulse oximetry screening. The factors associated with increased neonatal morbidity and mortality include prematurity ≤ 35 weeks, low birth weight, major extracardiac and genetic malformations, neonatal sepsis and meconium aspiration, hypoplastic left heart syndrome and complex cardiac anatomy.

To review clinical cases and outcomes of critical congenital heart disease seen in a Southern African Tertiary Institution with limited resources.

Methods

A retrospective review of cases presenting to the Division of Paediatric Cardiology at the Chris Hani Baragwanath Academic Hospital and admitted in the Neonatal ICU and High Care between 2005 and 2015. There are no onsite cardiothoracic surgical and pulse oximetry screening services. Data related to demographics, clinical presentation, prenatal and postnatal diagnosis, treatment, surgery, mortality and follow up was collected.

Results

One hundred and twenty patients (males, 62.7%) were diagnosed. Mean age at presentation = 2.1±2.8 days (1-18 days). Median age at diagnosis = 2 days (1-78 days, IQR=1-5). Twenty three cases (19.2%) were premature ≤ 35 weeks of gestation. Fifty two cases (43%) had low birth weight, mean birth weight = 1.91±0.39 kg (0.97-2.49 kg). Prenatal diagnosis was made in nine patients (7.5%). Most common presentation was respiratory distress, cyanosis and shock with metabolic acidosis. Common cardiac lesions were hypoplastic left heart syndrome, transposition of the great vessels and pulmonary atresia with or without ventricular septal defect. Majority required invasive positive pressure ventilation (IPPV) and sixty nine patients (57.5%) received PGE2 infusion. Extracardiac and genetic malformations were diagnosed in sixteen patients (13.3%). Catheter interventions were done in eighteen patients (15%). Surgery either palliative or corrective was achieved in twenty two patients (18.3%). Forty five patients (37.5%) were deemed inoperable. Overall preoperative mortality was 71.7%. Preoperative mortality without the patients deemed inoperable was 34.2%.
Conclusions

Mortality is high in patients with critical congenital heart disease. Prematurity, low birth weight, extracardiac anomalies, lack of pulse oximetry screening program, inadequate prenatal screening and resources may have contributed to the mortality.
Aims & Objectives:

The aim of this study is to investigate the changes in the sympathoparasympathetic balance with the presence of MODS and mortality in critically ill children.

Methods

A total of 111 patients who were admitted to the PICU of Akdeniz University Hospital between September 2011- August 2012 were studied. Patients were classified according to presence of MODS and also 28-day mortality in groups of survivors and non-survivors.

Results

Table 1 and 2 represent the first day heart rate variability (HRV) indices of the patients with and without multiple organ dysfunction syndrome (MODS) during their admissions and the outcomes of 28 day-mortality among the survivors and non-survivors respectively. Time domain parameters of the HRV were found to be associated with the presence of MODS and 28 day-mortality (p<0.01). Time domain analysis of the first day admissions, the MODS group had statistically significant lower values for SDNN, SDANN, SDANNi, RMSSD, NN50, pNN50 (p<0.001) (Table 1). In the current study, non-survival group had a significant lower levels for SDNN, SDANN, SDNNi, RMSSD, NN50 and pNN50 than the survival group (p<0.003) (Table 2).
Conclusions

HRV allows the quantitative evaluation of the autonomic nervous system. HRV indices are associated with MODS and mortality in critically ill children.
Aims & Objectives:

To examine the influence of mechanical ventilation strategy on hemodynamic changes using ultrasound cardiac output monitoring (USCOM).

Methods

This prospective observational study was conducted with 56 children on protective mechanical ventilation for pulmonary (36 children) and non-pulmonary (20 children) pathology. Circulatory parameters (e.g., cardiac index and systemic vascular resistance index) were evaluated after initiation of mechanical ventilation and at 6, 12 and 48-hour intervals. The circulatory support therapy was indicated based on USCOM measurement results. Fluid balance was monitored.

Results

No significant differences between the groups' hemodynamic profiles were found. Children ventilated for pulmonary pathology tended to require more frequent combined inotropic and vasopressor circulatory support than did the children ventilated for non-pulmonary pathology. Both groups required a similar amount of fluid during the study. Children ventilated for pulmonary pathology required significantly higher inspiratory pressures.

Conclusions

The protective strategy of mechanical ventilation for critically ill children was not associated with significant differences in hemodynamic profiles between those with pulmonary and non-pulmonary pathologies. Although not statistically significant, a trend was observed toward a more frequent requirement for inotropic and combined inotropic/vasopressor therapy in children ventilated for pulmonary pathology, compared to those ventilated for non-pulmonary pathology.
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Aims & Objectives:

BACKGROUND- Sepsis is a major cause of morbidity and mortality in infants post-cardiac surgery. Hypogammaglobulinemia has been reported after cardiac surgery, probably resulting from capillary leak. Role of immunoglobulin therapy for sepsis in infants after cardiac surgery has not been specifically investigated.

AIM- To evaluate effect of pentaglobin (IgM enriched immunoglobulin) treatment on clinical and laboratory parameters and survival in infants post cardiac surgery with nosocomial sepsis.

Methods

Retrospective case series of 16 infants in PCICU in a tertiary referral centre. Infants after congenital heart surgery who developed culture positive sepsis and received pentaglobin were included in study. Pentaglobin was initiated when no response in clinical/ laboratory parameters was observed after 72 hours of sensitive antimicrobial therapy; 250 mg/kg per day of pentaglobin was infused over 8-hour period on 5 consecutive days. Clinical and laboratory data before and after pentaglobin treatment was collected and compared.

Results

Of the total, 10 (62%) were males and 8 (38%) females. Following 72 hours of pentaglobin therapy, the immature-to-total neutrophil ratio and C-reactive protein levels were significantly decreased, and the platelet count was significantly increased (p < 0.05). The axillary temperature, hemoglobin, and total leukocyte values did not significantly differ before and after treatment (p > 0.05). Klebsiella pneumoniae (n = 6; 37.5%), Acinetobacter baumanii (n = 4; 25%), Pseudomonas aeruginosa (n = 3; 18.7%) and Ralstonia (n=3; 18.7%) were identified in blood cultures. Mortality of 3 infants was observed, with 1 attributed to residual cardiac defect and 2 related to progression of sepsis to MODS. No adverse effects were observed during the therapy.

Conclusions

IgM enriched immunoglobulin has a role in improving outcome in infants with multidrug resistant sepsis after cardiac surgery.
THE HEART

PICC-0865
THE EFFECTS OF MAGNESIUM SUPPLEMENTATION ON THE INCIDENCE OF CARDIAC COMPLICATION AFTER PEDIATRIC CARDIAC SURGERY
B. haghighiaski

Aims & Objectives:
The present study aimed to assess the role of magnesium sulfate (MgSO4) supplementation after cardiac surgery in pediatric patients, evaluating the incidence of cardiac complications, such as arrhythmia.

Methods
In this study, 105 children scheduled for elective cardiac surgery were randomly divided into 3 groups. The first group, as the placebo group, received saline. Groups 2 and 3, on the other hand, respectively received 25 mg/kg and 50 mg/kg MgSO4 during the recovery phase of cardiac surgery.

Results
The results showed no significant difference among the study groups regarding the levels of Mg, Ca, and K at the time of admission to the Cardiac Intensive Care Unit (CICU). However, the patients receiving 50 mg/kg MgSO4 (group 3) had a significantly lesser occurrence of arrhythmia compared to the control group (group 1). Furthermore, the patients in groups 2 and 3 had a lesser length of CICU stay after surgery in comparison to group 1. No association was found between MgSO4 consumption and the types of arrhythmia and the time of mechanical ventilation.

Conclusions
Supplementation with MgSO4 after cardiac surgery seems to reduce the incidence of arrhythmia and length of CICU stay in pediatric patients. This effect on the incidence of arrhythmia seems to be dose related.
THE HEART

PICC-0629
BEDSIDE ULTRASONOGRAPHY SCREENING FOR CONGENITAL RENAL ANOMALIES IN CHILDREN WITH CONGENITAL HEART DISEASES UNDERGOING CARDIAC REPAIR

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Aims & Objectives:

Ultrasound (US) assessment of renal anomalies in children requiring pediatric cardiac surgery is not a standard practice. This study is highlighting the role of bedside US performed by intensivist to detect occult renal anomalies associated with congenital heart disease (CHD)

Methods

A cross sectional study for 100 consecutive children with CHD admitted to PCICU in 2015. US of kidneys screening was performed by trained pediatric cardiac intensivists to ascertain the presence of both kidneys in renal fossae without gross anomalies and to investigate if early detection of occult kidney anomaly would have any impact on outcome.

Results

After renal US screening of 100 consecutive children with CHD, we identified in 94 cases (94%) normal right and left kidney in the standard sonographer shape in the renal fossae. In 6 cases further investigation revealed ectopic kidney in 3 patients (50%), solitary functional kidney in 2 patients (33.4%) and bilateral grade IV hydronephrosis in one patient (16.6%). Urinary tract infection developed peri-operatively in 66% of the cases with kidney anomalies with statistical significance compared to patients with normal renal US (P: 0.0024). No significant renal impairment was noted in these patients post-surgery. We observed no specific association between the type of renal anomaly and specific CHD

Conclusions

Routine renal US in children with CHD demonstrated prevalence of associated congenital renal anomalies in 6% of children undergoing cardiac surgery. The presence of occult renal anomalies increased the risk of urosepsis. Performing renal US as a standard practice in all children with CHD is justifiable
THE HEART

PICC-0834
OXIDATIVE DAMAGE IN CHILDREN UNDERGOING CARDIOPULMONARY BYPASS SURGERY: A PILOT STUDY
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Aims & Objectives:

Data are scarce on oxidative damage in children undergoing cardiopulmonary bypass (CPB) for treatment of congenital heart disease (CHD). We aim to describe the temporal profile of F₂-isoprostanes (biomarkers of oxidative damage) in these children.

Methods

Plasma levels of F₂-isoprostanes (after adjusting for arachidonate) were measured in two groups: (1) patients undergoing cardiac surgery with CPB and (2) controls (patients undergoing cardiac surgery without CPB and elective non-cardiac surgery). We excluded those whose gestational age is <37 weeks and those with known genetic syndromes. Our primary end-points were plasma level of F₂-isoprostanes (adjusted for arachidonate). Demographic and clinical information was collected. F₂-isoprostanes and arachidonate were measured in plasma using a gas-chromatography mass spectrometry, before and immediately after CPB (30 minutes, day 1 and at discharge).

Results

A total of 22 patients (n=11 in each group) of median age 13.2 (interquartile range (IQR):4.1 – 76.0) months were included. Groups were comparable in terms of age, weight and height. Seven (70%) patients who underwent cardiac surgery with CPB had cyanotic CHD, whereas none in the control group had cyanotic CHD. For the CPB group, median duration of surgery, CPB and aortic cross clamp times were 270 (IQR:224 – 337), 163 (IQR:118 – 203), and 95 (IQR:70 – 115) minutes respectively. Despite comparable baseline levels, median plasma F₂-isoprostanes (adjusted for arachidonate) were significantly higher at completion of CPB [7.24 (IQR:4.86 – 11.00) vs. 2.81 (IQR:1.79 – 3.88) ng/mg, p=0.013]. Increase in plasma F₂-isoprostanes was sustained on first post-operative day (median 4.64 (IQR:2.79 – 8.28) vs 2.81(IQR:1.79 – 3.88) ng/mg, p=0.008) before normalizing on discharge.

Conclusions
CPB increases the burden of oxidative damage in patients with CHD. Future studies should examine the prognostic implications of $F_2$-isoprostanes and evaluate the roles of antioxidants to ameliorate the burden of oxidative damage in patients undergoing surgical repair for CHD.
Aims & Objectives:

Preoperative anemia is an important risk factor for postoperative morbidity and mortality, and increases likelihood of blood transfusion. The study was performed to determine the prevalence of anemia in children with congenital heart disease (CHD) referred for cardiac surgery.

Methods

We performed a retrospective analysis of patients admitted for surgery to Pediatric Cardiac Center in Bratislava between January 2014 and December 2015. Cyanotic patients and newborns were excluded. The patients were divided into 3 age groups; Group 1: patients between 1 month and 5 years (n=200), Group 2: patients between 5 and 12 years (n=34), and Group 3: patients above 12 years of age (n=21). According to WHO guidelines, anemia was defined as hemoglobin level less than 110g/L, 115g/L and 120g/L in the Group 1, 2 and 3, respectively.

Results

Median hemoglobin levels were 120 (74-182), 129 (110-151), 145 (98-194) g/L in Group 1, 2 and 3 with age-specific prevalence of anemia 29%, 5.9%, and 4.5%, respectively. The overall prevalence of anemia was 23%. Eighty-nine percent of cases were microcytic (MCV less than 84 fl) anemia.

Conclusions

Anemia, mostly microcytic is common in children with non-cyanotic CHD referred to cardiac surgery who are younger than 5 years of age. Preoperative management should be focused on patient blood management such as assessment of iron status and nutritional deficiencies to decrease prevalence of preoperative anemia in children with CHD.
THE HEART

INCIDENCE AND RISK FACTORS FOR ARRHYTHMIAS IN POSTOPERATIVE CARDIAC PATIENTS: AN OBSERVATIONAL STUDY IN A SIXTY BEDEDPEDIATRIC CARDIAC ICU

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Aims & Objectives:

To study the incidence of post-operative cardiac arrhythmias in children and to evaluate the risk factors

Methods

Design: Retrospective observational study

Setting: Cardiac ICU of a tertiary cardiac center.

Patients: Patients below 18 years undergone cardiac surgery between April - July 2014.

Results

536 children were included. Arrhythmia developed in 17.4% (n=93) children. Commonest arrhythmia was complete heart block (30%) followed by Junctional Ectopic Tachycardia (20.4%), 1° and 2° Atrio-Ventricular block (15%), Junctional rhythm (13.9%), Ectopic beats (11.8%) and Supraventricular tachycardia (8.6%). In univariate analysis age <1 year (p=0.019), RACHS category 4 (p=0.016), procedure requiring Cardiopulmonary bypass (CPB) (0.020), use of Dobutamine >5µg/kg/min (p=0.050), Adrenaline >0.05µg/kg/min (p=0.017), Isoprenaline (p=0.001), higher mean CPB time (p=0.001), Aortic cross clamp (AXC) time (p=0.001) and higher 24 hours mean Vasoactive Ionotrope score (VIS) (p=0.004) were found to be significant. In the multivariate logistic regression analysis age < 1 year (p=0.021), CPB > 75 minutes (p=0.035), AXC > 60 minutes (p=0.043) and Isoprenaline (p=0.001) was found to be independent risk factors. JET occurred in 3.5% of total population. It was more common in infants (p=0.001), patients on Dopamine (p=0.002), Dobutamine >5 µg/kg/min (p=0.016) and Isoprenaline (p=0.00) and those with higher mean CPB and AXC time (p=0.001). In multivariate logistic regression analysis age < 1 year (p=0.006), temperature > 98.6°F (p=0.00), CPB > 75 minutes (p=0.045), AXC > 60 minutes (p=0.005) and Isoprenaline (p=0.001) were found to be significant.

Conclusions

Hemodynamically significant arrhythmias remain a frequent complication in post cardiac surgery patients. Younger age, complex surgery, surgeries involving
manipulation of conduction pathway, longer CPB and AXC time and use of Isoprenaline are the risk factors. Additional risk factors in JET were higher temperature (> 98.6 F) and LV dysfunction.
Stroke Caused by Undiagnosed Non-Compaction Cardiomyopathy in a Patient with 1p36 Deletion

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Aims & Objectives:

Background: Left ventricular non-compaction cardiomyopathy (LVNC) is a genetic cardiomyopathy characterized by prominent left ventricular trabeculae and is a reflection of an interruption of the normal fetal process of myocardial structural compaction in the first trimester. LVNC is more recently identified as a common cause of left ventricular dysfunction, reported in up to 9% of childhood cardiomyopathies. Despite its recognition as a more common cause of LV dysfunction, LVNC can remain undiagnosed even in older children thereby becoming the cause of life threatening and fatal conditions including sudden death, stroke, pulmonary embolism, mesenteric infarct and arrhythmias. Children with 1p36 deletion syndrome among other heterogeneous etiologies, are at high risk of developing LVNC and subsequent complications.

Case Presentation: 13 year old Caucasian female with the past medical history of 1p36 deletion syndrome and neuromuscular scoliosis admitted to the pediatric ICU post-operative day (POD) 0, s/p elective T3-L4 spinal fusion. The same post-operative day, the patient was noted to have persistent hypertension and tachycardia. On POD#2, due to persistent abnormal vital signs and altered mental status with concern for posterior reversible encephalopathy syndrome, a CT scan of the brain was obtained. CT scan revealed a large infarct of the left middle cerebral artery distribution. Transesophageal echocardiogram demonstrated decreased LV systolic function, ejection fraction of 33% and a heavily trabeculated LV.

Methods

N/A

Results

N/A

Conclusions

Conclusions: Although LVNC is an uncommon diagnosis with a variable prognosis due to the heterogeneity of etiologies, the risk of sudden death remains high due to high risk of ventricular arrhythmias. These co-morbidities are also compounded by
the common underlying disorders of children with LVNC which includes 1p36 deletion, Turner syndrome, DiGeorge syndrome and LEOPARD syndrome. Established criteria and awareness by the vigilant pediatrician and cardiologist are crucial to preventing morbidity and mortality in patients at high risk of LVNC.
THE HEART

PICC-0571
MILRINONE INFUSION IMPROVES ICU MORTALITY AFTER NORWOOD PROCEDURE

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Aims & Objectives:

Introduction

It was reported milrinone infusion may improve ICU mortality in adult cardiac surgery. However, it is not reported in pediatric cardiac surgery. We changed inotropic support protocol from routine epinephrine use to isolated milrinone infusion after June 2011 for children who received Norwood procedure. The aim of this study is to investigate whether milrinone infusion improves ICU mortality in patients underwent Norwood procedure.

Methods

Method

The patients who received Norwood procedure during Jan 2008 to Dec 2014 were separated before and after Jan 2011 that we changed the inotropic support protocol from routine epinephrine use (Group E) to isolated milrinone infusion (Group M). The primary outcome was ICU mortality. The data collection of age (day), weight, preoperative mechanical ventilation, preoperative inotropic support, RACHS-1, the duration of CPB, the lowest temperature during CPB, patient who received bilateral pulmonary artery banding before Norwood procedure or not, risk of mortality by PIM2 score were compared between the two groups.

Results

Result

Forty-five children received Norwood procedure during study period. Group E had 23 patients and Group M was 22 patients. The age of group E was significantly lower than that of Group M (Group E 3.5 (2.75, 4.5) vs Group M 7 (3, 64), p=0.02). However, bilateral pulmonary arterial banding before Norwood procedure had no significant difference between Group E and Group M (13.4% vs 34.8% p= 0.1). Other
data did not have statistically difference between the two groups. ICU mortality of Group M was significantly lower than Group E (4.3% vs 27.3%, p=0.03).

**Conclusions**

Conclusion

Isolated milrinone infusion may reduce ICU mortality for children who received Norwood procedure.
Aims & Objectives:

Arrhythmias after cardiac surgery can be a therapeutic challenge, since antiarrhythmics may be ineffective and associated with adverse effects. This study evaluates dexmedetomidine as a first line therapy for management of postoperative arrhythmias in pediatric cardiac patients.

Methods

Retrospective study evaluated 33 patients who received dexmedetomidine as a primary drug for postoperative arrhythmias. The restoration of sinus rhythm or slowing of tachycardia to rate that allowed atrial or atrioventricular sequential pacing was considered as efficacy of therapy.

Results

Thirty-three patients with median age of 1.8 months (3 days – 16 years) received dexmedetomidine for junctional ectopic tachycardia (n=18), junctional accelerated rhythm (n=4), supraventricular reentry tachycardia (n=3), ventricular tachycardia (n=1), supraventricular (n=5) or ventricular (n=2) premature beats. Sixteen (48.4%) patients received an initial loading dose of 1 (0.5-1.2) mcg/kg. A continuous infusion with a maximum dose of 1 (0.5-2) mcg/kg/h was administered in all patients. Duration of infusion was 36 (3-199) hours. Dexmedetomidine was successful in 19 (57.5%) patients. The escalation therapy to amiodarone (n=11), sotalol (n=1), adenosine (n=1) and amiodarone with subsequent extracorporeal membrane oxygenation (n=1) was required in 14 (42.5%) patients. Transient hypotension related to dexmedetomidine was seen in 4 patients. Patient age and weight, and maximum heart rate in patients with tachycardia were not risk factors for dexmedetomidine failure.

Conclusions

The study suggests that dexmedetomidine as a first line antiarrhythmic drug has a therapeutic role in the treatment of postoperative arrhythmias after pediatric cardiac surgery.
Aims & Objectives:

To describe a case of intentional flecainide overdose with acute haemodynamic instability and cardiac arrest treated with intralipids® and TTVP, emphasizing importance of effective and prolonged CPR for good neurological outcome in cases of drug overdose.

Methods

A 13 year old, 60Kg boy presented after deliberate mixed overdose of flecainide (10mg/Kg), citalopram (2.5mg/Kg), propranolol (1.2mg/Kg) and paracetamol (unknown). On admission, he was conscious with normal cardiovascular examination and stable haemodynamics albeit with prolongation of the QTc and QRS duration. Initial bloods (FBC, U&E, LFT, Coagulation, Bone profile and blood gas) were normal. He received 2 doses of sodium bicarbonate, 2g of magnesium sulphate & toxicology advice was not to give intralipid® at this stage unless there was a clinical deterioration. Two hours later he had a generalized tonic-clonic seizure followed by ventricular fibrillation (VF) leading to cardiac arrest. CPR was commenced immediately, DC shocks were administered and 100ml of intralipid 20% was given in addition to multiple doses of adrenaline, three further doses of sodium bicarbonate, 2 doses each of magnesium sulphate and potassium chloride. ECMO team was called in but fortunately after 30 minutes of CPR there was a sustained return of spontaneous circulation(ROSC) but with broad complex bradycardia needing transcutaneous pacing. Continuous infusion of intralipid was given for further 4 hours. After stabilisation, TTVP was inserted under ECMO back-up.

Results

The patient steadily improved, rhythm stabilized with narrowing of the QRS, although the QTc remained prolonged. The patient was completely neurologically intact and the pacemaker was removed the next day. The patient was assessed by the psychiatric team and discharged to his local hospital.

Conclusions

This case highlights the use of intralipids in cases of flecainide overdose with haemodynamic instability in children. It also emphasise the importance of good
quality and prolonged CPR in cases of poisoning for favourable neurological outcome.
THE HEART

PICC-0570
CARDIAC OUTPUT MEASUREMENT BY VOLUMETRIC CAPNOGRAPHY IN CHILDREN: A PROOF OF CONCEPT
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²The Hospital for Sick Children, Department of Anaesthesia.Division of Cardiac Anaesthesia., Toronto, Canada
³The Hospital for Sick Children, Department of Anaesthesia. Division of Cardiac Anaesthesia., Toronto, Canada
⁴The Hospital for Sick Children, Department of Paediatrics. Division of Cardiology., Toronto, Canada

Aims & Objectives:

The gold standards for Cardiac Output (CO) measurements are Direct Fick (DF), Thermodilution, and Cardiac Magnetic Resonance. Volumetric Capnography (VCO₂) measurements are incorporated and standard on modern anaesthesia machines and mechanical ventilators. Theoretically, Oxygen (O₂) and Carbon dioxide (CO₂) can be used as indicators for flow measurements. Therefore, we tested the use of VCO₂ to measure CO in Children.

Methods

Under research ethics board approval, 20 children with Congenital Heart Disease were studied. VCO₂ was measured by Respiratory Mass Spectrometry and Argon gas dilution method (AMIS 2000, Innovision®, Denmark). CO₂ and O₂ blood contents were measured by direct Pulmonary Arterial (PA) and Pulmonary Vein (PV) sampling for co-oximetry. CO by VCO₂ was derived by VCO₂/δ(PA-PV)CO₂ and compared with DF-O₂ calculations. Statistical analysis used a paired t test, a Pearson correlation coefficient, and a Tukey HSD test. All values are indexed, and expressed as means, standard deviation, and standard error.

Results

CO-VCO₂ was 3.095 L/min/m² (SD: 1.465, SE: 0.3278) and CO-DF-O₂ was 2.784 L/min/m² (SD: 1.124, SE: 0.2514) with a t-test p value of 0.0899, a correlation coefficient r value of 0.8512, and a Tukey HSD p value of 0.4554. There was good correlation and agreement and no significant difference between both methods.

Conclusions

This proof of concept study demonstrates the feasibility and accuracy of Cardiac Output measurement by Volumetric Capnography in Children. It allows the use modern anaesthesia machines and mechanical ventilators to calculate Cardiac Output in children worldwide. To our knowledge, this is the first report that compares
the use of VCO₂ and Direct Fick in a paediatric population. Further studies are required for external validation. Thank you.
Aims & Objectives:

In Indonesia, children with congenital heart disease (CHD) usually present late for corrective surgery and are prone for euthyroid sick syndrome (ESS) and low cardiac output syndrome (LCOS) after open heart surgery. The objective of the study was to provide evidence that oral T3 prophylaxis could prevent ESS and subsequently reduce the incidence of LCOS.

Methods

The study was a single center, randomized, double blind, and placebo controlled clinical trial in children with CHD less than 3 years of age undergoing open-heart surgery. Oral T3 or placebo was administered every 6 hours for 60 hours. Serum FT3 and TSH levels were measured. The incidence of LCOS and some factors that affected LCOS (i.e age, Aristotle score, malnourishment, cardiopulmonary bypass time, cross clamp time, inotropic score, and T3 supplementation) were also assessed.

Results

A total of 209 patients were allocated to the placebo and treatment group. LCOS within 6 hours post cross clamp removal was significantly higher in the placebo group [38% vs. 20%, respectively, p=0.003; Odds Ratio (OR) (95% CI) 2.55 (1.35–4.81)]. Multivariate analysis showed that T3 supplementation significantly determined LCOS within 6 hours post cross clamp removal with an adjusted OR 2.45 (1.25–4.77), p=0.009. No significant adverse events were noted, although sepsis occurred significantly less in the treatment group.

Conclusions
Oral T3 prophylaxis was safe and effective to prevent ESS and reduce LCOS. This treatment option seems extremely helpful especially for children in Indonesia and perhaps other developing countries where patients tend to present later and in more severe clinical conditions.
THE HEART

PICC-0253
IMPACT OF PERIOPERATIVE VIRAL RESPIRATORY PATHOGENS ON OUTCOMES IN PAEDIATRIC CARDIAC SURGICAL PATIENTS
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4Mater Health Services, Mater Pathology, Brisbane, Australia
5University of Queensland, School of Medicine, Brisbane, Australia
6Lady Cilento Children's Hospital, Infection Management and Prevention Service, Brisbane, Australia
7University of Queensland, Faculty of Paediatrics, Brisbane, Australia

Aims & Objectives:
Viral respiratory infections are commonly considered a contraindication to elective cardiac surgery, however there is a paucity of data describing the impact on children in this setting. We reviewed outcomes of paediatric cardiac surgical patients testing positive for viral respiratory pathogens in the early perioperative period.

Methods
Retrospective cohort-study within a Paediatric Intensive Care Unit (PICU) providing state-wide cardiac surgical services in Queensland, Australia. Children admitted for cardiac surgery between 01.01.2008 and 31.12.2013 were included. Positive nasopharyngeal aspirate polymerised chain reaction (NPA PCR) results from 72 hours prior to 48 hours after PICU admission were identified. PICU length of stay and duration of ventilation were defined as primary outcomes. Patients with multiple viruses were separately analysed.

Results
Of 1610 admissions, 69 (4.3%) tested positive for a virus. Organisms identified included Rhino/enteroviruses (38 [47.5%]), Adenovirus (25 [31%]), Parainfluenza 3 (9 [11%]) and Respiratory Syncytial Virus (3 [4%]) in 299 NPA specimens tested. Eleven patients had multiple viruses detected. NPA positive patients were younger (p<0.001) and had higher PIM2 scores (p=0.027). The virus positive cohort required a median 9 hours longer invasive ventilation (p<0.001), more Extracorporeal Life Support (ECLS) (OR 2.6, 95%CI 1.1-5.8 p=0.02) and a median 2.7 days greater PICU stay (p<0.001), while mortality was similar (see table). Following adjustment for age and PIM2 score, intubation duration and length of stay remained significantly increased in NPA positive patients undergoing cardiac surgery (p<0.001). Patients positive for multiple viruses had an increased risk for ECLS (adjusted OR 6.7, 95%CI 1.4-32.0
Conclusions

Viral infections in the early perioperative period increase PICU morbidity and prolong recovery for paediatric cardiac surgical patients. Further prospective studies are required to define risk stratification and to guide decision making with respect to optimal surgical timing.

### Table: Comparison of Casemix and Outcomes: Nasopharyngeal Aspirate (NPA) positive and negative cohorts

<table>
<thead>
<tr>
<th></th>
<th>Univariate analysis</th>
<th>Adjusted analysis&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPA Positive n=69</td>
<td>NPA negative n=1541</td>
</tr>
<tr>
<td>Age, Median months (IQR)</td>
<td>4.9 (2.5-14.6)</td>
<td>11.4 (2.3-56.4)</td>
</tr>
<tr>
<td>PIM2, Median score, (IQR)</td>
<td>0.65 (0.50-1.11)</td>
<td>0.55 (0.45-0.77)</td>
</tr>
<tr>
<td>Invasive Ventilation duration, Median hours (IQR)</td>
<td>27.5 (18.3-118.8)</td>
<td>18.5 (4.8-46.1)</td>
</tr>
<tr>
<td>PICU Length of stay, Median days, (IQR)</td>
<td>4.7 (2.0-7.9)</td>
<td>2.0 (1.0-4.0)</td>
</tr>
<tr>
<td>Retrieved; n (%)</td>
<td>11 (16%)</td>
<td>81 (5.3%)</td>
</tr>
<tr>
<td>Extracorporeal Life Support, n (%)</td>
<td>7 (10.1%)</td>
<td>65 (4.2%)</td>
</tr>
<tr>
<td>Inhaled Nitric Oxide; n (%)</td>
<td>9 (13.0%)</td>
<td>106 (6.9%)</td>
</tr>
<tr>
<td>PICU Mortality; n (%)</td>
<td>3 (4.3%)</td>
<td>30 (1.9%)</td>
</tr>
</tbody>
</table>

<sup>a</sup> Linear/Logistic regression adjusted for PIM2 Score and age  <br>
<sup>b</sup> p value obtained using Mann Whitney U test  <br>
<sup>c</sup> Odds ratio calculated by Chi square test and 95% CI demonstrated for significant results
Aims & Objectives:

Introduction:

Transfusion of blood during and after pediatric cardiac operation is common practice. The main purpose of blood transfusion is to improve oxygen carrying capacity and enhance oxygen transportation. This study will investigate the relationship between blood transfusion and tissue oxygen extraction ratio.

Methods

We conducted a prospective study on children who underwent cardiac surgery and received blood transfusion in Prince Sultan Cardiac Center Qassim from 2013-2015. Demographic, hemodynamic and laboratory data were collected including heart rate, Systolic blood pressure, Mean blood pressure, and Central Venous Pressure lactate level before transfusion and 1, 6 hours post. Bleeding cases were excluded from study.

Oxygen extraction ratio (O₂ER) pre and post transfusion was calculated after collecting all data. Patients were divided into two groups impaired O₂ extraction group (O₂ER≥40%) and non-impaired O₂ extraction group (O₂ER<40%). Effects of blood transfusion on O₂ER, hemodynamic data and markers of tissue perfusion were analyzed and compared.

Results

We enrolled 103 post-operative pediatric cardiac patients who received blood transfusion post-surgery during study period. Both group had no statistic difference in age, weight or RACHS score. Vasoactive score, Both group received same amount of PRBC and had same Hemoglobin level 9+0.11 which lead to increase hemoglobin concentration by 2.8+0.03.
there was 28 patients in impaired \( O_2 \)ER group and 75 patients in non impaired \( O_2 \)ER group with mean extraction ratio of 46+0.9 and 25+1.1 in each group respectively. Impaired group showed significant statistic improvement in \( O_2 \) extraction in who increased their ScvO2 saturation and ExO2 significantly post transfusion.

**Conclusions**

In post-operative cardiac children with hemoglobin \( \leq 9 \) and increased \( O_2 \)ER > 40, blood transfusion improves \( O_2 \)ER and ScvO2. Together with other clinical and hemodynamic indicators \( O_2 \)ER and ScvO2 may be considered as additional markers that can be used for blood transfusion trigger indications in post-operative cardiac children.
Aims & Objectives:

Primary objective is to determine the incidence of septal malalignment in patients with ASD secundum compare with normal children. Secondary objectives are to evaluate baseline characteristics, associated anomalies, type of treatments and follow up result of patients with ASD secundum.

Methods

A retrospective study of 200 patients with ASD secundum and normal 200 children. Hospital record, chest X-ray, electrocardiogram were reviewed for baseline characteristics. Septal alignment was assessed from the latest echocardiographic record of each patient. Percentage and odd ratio were used for comparison of septal malalignment between ASD patients and normal children.

Results

There were 200 patients with ASD secundum. One hundred and sixteen cases were female (58%). Mean age at diagnosis was 3 years and 10 months. The mean of ASD diameter was 11.4 mm. Septal alignment was identified in 97 patients (48.5%) with the odd ratio of 7.62 (95% CI 4.52-12.85) compare with the normal children. Sixty percent of the ASD patients have been following up regularly with the mean follow up time of 1 year and 7months. Spontaneous closure was found in 9% whereas 20.5% was closed by surgery and 10% by percutaneous treatment. For those ASD treated with catheter intervention, septal malalignment was identified in 45%. There was no mortality, no erosion or cardiac perforation during follow up. One patient developed atrial fibrillation after surgery.

Conclusions

Children with ASD secundum have a higher incidence of septal malalignment than normal children 7.6 times. However, due to limited number of cases and follow up time, relationship of this septal abnormality and cardiac erosion cannot be elucidated.
A NOVEL ECG PRESENTATION OF RYR2 GENE MUTATION
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²*A. & P. Kyriakou”Children’s Hospital, Cardiology Department, Athens, Greece

Aims & Objectives:

Mutations in the gene RYR2 have been linked with malignant episodes of catecholaminergic polymorphic ventricular tachycardia (CPVT). The gene product - Ryanodine receptor is an ion channel that is responsible for the release of Calcium ions from the sarcoplasmic reticulum during cardiac cells contraction.

Methods

We report a 20 months male toddler who admitted to our hospital after two episodes of loss of consciousness. His initial clinical and lab evaluation was normal. At rest, his ECG and cardiac echo was normal. Overnight, he had an episode of cardiac arrest. He was resuscitated for almost 30 minutes and was transfered to PICU. He was hemodynamically unstable with episodes of sustained ventricular tachycardia (SVT) followed by episodes of non-sustained ventricular tachycardia (NSVT). His VT episodes were gradually controlled by propanolone, amiodarone and mexiletine. His ECG pattern was always of monomorphic ventricular tachycardia. This finding was validated by repeated 24h ECG tests.

Results

An extensive diagnostic work up was done. The only pathologic result was a novel mutation in the gene RYR2 (p.Leu1686Phe). Neither an ectopic center nor a mutation in a gene that cause monomorphic ventricular tachycardia were found.

Conclusions

Catecholaminergic polymorphic ventricular tachycardia is a rare cardiac arrhythmia. It is triggered during emotional or physical stress in structurally normal heart. Mutations in RYR2 are inherited by autosomal dominant pattern. Also, mutations in RYR2 have been linked with cardiac failure, Long QT, brugada syndrome and cardiomyopathies but not monomorphic ventricular tachycardia. So, we suggest a possible link between this mutation and monomorphic ventricular tachycardia.
MYOPERICARDITIS WITH VERY HIGH TROPONIN-I LEVELS AND FAVORABLE OUTCOME

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Aims & Objectives:

Myopericarditis in previously healthy children is rare, with a wide range of etiologies such as infectious, toxic, and autoimmune. Three teenagers boys with myopericarditis were admitted to our PICU. All three of them were without history of cardiac disease. They all had mild viral symptoms before admission followed by chest pain, and general malaise.

Methods

All three boys (age 12, 14, 16) had similar clinical and laboratory findings. They were hemodynamically stable with normal blood pressure but were all tachycardic with an average heart rate of 120 bpm. They all had feverish illness with low grade fever and common viral symptoms like rhinitis, malaise and sore throat. One of them (Pt2) had diarrhea. All had chest pain which was present less than 24 hours before admission. Their electrocardiograms were abnormal (elevation of the ST segment), while their echo cardiogram showed minimal fluid in the pericardium without to compromise their cardiac function. Their blood count was normal and also their blood biochemical profile was normal. Their CK-MB and troponin I levels were elevated. Troponin levels on admission were Pt1: 5.2 ng/ml, Pt2: 4.1 ng/ml, Pt3: 5.7 ng/ml.

Results

All laboratory values as well as electrocardiogram and echo cardiogram improved in the next 48 hours. Their clinical status improved the first 24 hours and they were symptoms free after 36 hours in the PICU. Their troponin-I levels raised to levels over 20 ng/ml (Pt1: 25.2, Pt2: 22.1, Pt3: 21.7) the first 24 hours and then rapidly declined.

Conclusions

All patients had a good outcome while no specific cause was determined. They all had to undergo cardiac magnetic resonance imaging to assess affected cardiac tissue. Although rare in children, myopericarditis remains challenging. Although all of them had very high levels of troponin I, they had a favorable outcome.
Aims & Objectives:

The classical Fick principle (Fick\textsubscript{O2}) is frequently used to estimate cardiac output (CO) in patients with congenital heart disease and critical illness. These data are used to guide patient management and to estimate vascular resistance. Fick\textsubscript{O2} has been shown to systematically overestimate CO, particularly during hyperoxia. The substitution of oxygen with carbon dioxide in the Fick principle (Fick\textsubscript{CO2}) may obviate this problem. The objective of this research is to describe the accuracy of Fick\textsubscript{CO2} and Fick\textsubscript{O2} estimates of CO at varied FiO\textsubscript{2} under normal physiological conditions compared with a gold standard.

Methods

Yorkshire swine (n=7, 29-31 kg) were anesthetized, intubated, and paralyzed. Instrumentation included a femoral arterial line, pulmonary artery oximetric catheter (Edwards Lifesciences), myocardial tissue PO\textsubscript{2} probe (Oxford Optronix), and a transit time-based flow probe (Transonic, Inc) on the aortic root. Indexed oxygen consumption (VO\textsubscript{2}) and carbon dioxide production (VCO\textsubscript{2}) were continuously measured (GE Healthcare). FiO\textsubscript{2} was varied between 0.21 and 0.8. Fick\textsubscript{O2} was calculated using aortic (SaO\textsubscript{2}) and pulmonary artery (SvO\textsubscript{2}) oxyhemoglobin saturations, hemoglobin and corresponding oxygen tensions. Fick\textsubscript{CO2} was calculated using PaCO\textsubscript{2}, PvCO\textsubscript{2}, pH and temperature. Data were compared between groups using Wilcoxon matched-pairs signed rank tests.

Results

PaO\textsubscript{2} increased with FiO2 as expected. VO\textsubscript{2} and VCO\textsubscript{2} did not significantly vary with FiO\textsubscript{2}. Tissue oxygen tension and SvO\textsubscript{2} varied significantly with FiO\textsubscript{2} (p<0.001), although CO remained constant during hyperoxia. Thus, Fick\textsubscript{O2} consistently over-estimated CO as compared to flow probe-based measurements (A), primarily due to changes in SvO\textsubscript{2}. At FiO\textsubscript{2} 0.8, Fick\textsubscript{CO2} closely approximates gold standard measures (B), significantly reducing the error present in Fick\textsubscript{O2} (C).
Conclusions

Fick\textsubscript{CO2} is an accurate, clinically feasible alternative to Fick\textsubscript{O2}. Further work to determine whether this phenomenon remains true under variable PCO\textsubscript{2} tensions and under other physiologic states (e.g. shock and supraphysiologic cardiac output) is warranted.
Aims & Objectives:

The adequacy of tissue oxygen delivery is a critically important parameter in caring for critically ill patients. Current methods utilizing venous saturations or markers of tissue injury are insensitive and delayed indicators of inadequate tissue perfusion. The aim of this study is to describe the relationship between the local mitochondrial redox state with clinically important markers of myocardial function.

Methods

Sprague Dawley rats (n=20) were anesthetized, intubated, ventilated and the chest opened. Myocardial tissue oxygen tension (Clark electrode), contractility (conductance catheter), and arterial blood pressure were compared with the fraction of reduced mitochondrial proteins (Mito\textsubscript{red}) in real time (A). Mito\textsubscript{red} was measured in real time directly from the myocardium by comparing the spectrum of inelastically scattered light (441 nm, Resonance Raman Spectrometer, Pendar Technologies, Cambridge, MA) to that of isolated mitochondria in the oxidized (healthy) and reduced (oxygen deprived) state. Measures were made during baseline (FiO\textsubscript{2} 1.0) and severe hypoxic ventilation (FiO\textsubscript{2} 0.05-0.08).

Results

Hypoxic ventilation resulted in arterial hypoxemia (SaO\textsubscript{2} 40±7%), and a decrease in myocardial tissue PO\textsubscript{2} over time (B, black). In ~50% of animals, this was well tolerated, and neither Mito\textsubscript{red} or contractility changed. In others, Mito\textsubscript{red} increased significantly over time (B, red), and was temporally associated with a decrease in contractility (B, blue; data = means, error = SEM). In animals in whom Mito\textsubscript{red} exceeded a threshold of 25 AU (possible critical threshold; C, red, n=7), the incidence and time to cardiac arrest were significantly higher than in those not experiencing an increase in Mito\textsubscript{red} (C, black, n=13; P=0.0013, log rank test).
Conclusions

When used on the myocardium, Mitochondria Red is a sensitive marker of hypoxia-related impairments in contractility and impending cardiac arrest.
The Heart

Picc-0126
Tertiary Center Experience of Ventricular Assist Devices as a Safe Bridge to Pediatric Heart Transplant
J. Philip¹, D. Lopez-Colon¹, R.S. Samraj¹, W.I. Stein¹, B.A. Pietra¹, F.J. Fricker¹, M.S. Bleiweis¹
¹University of Florida, Department of Pediatrics, Gainesville, USA

Aims & Objectives:

We compared our center’s experience with national outcomes for ventricular assist devices (VAD) as a bridge to pediatric heart transplant.

Methods

Retrospective study of patients 0-21 years supported with a VAD from 1996 to 2015. Single Ventricle patients were excluded. Patient’s diagnosis included dilated cardiomyopathy (DCM) (n= 21), congenital heart disease (CHD) (n=7), and other (n=3). Prior to 2007, Thoratec was the preferred device and EXCOR Berlin Heart since then. Risk factor ratios for mortality were estimated within the framework of a proportional hazards survival regression model. Risk factors were only considered univariately within individual models (small sample size).

Results

A total of 31 patients were identified (8 Thoratec® VAD and 23 EXCOR Berlin Heart®). BiVADs were used in 86% (18/21) of DCM, 100% (7/7) of CHD, and 100% (3/3) of other patients. Mean age and body surface area were 8.1±6.7 years [0.1-21 years] and 0.99 ± 0.66m² [0.23-2.58m²], respectively. An 81% (25/31) survival to discharge post-transplant was observed (22/28, 79% BiVAD and 3/3, 100% LVAD). There was 100% survival in the DCM subset. Major bleeding was observed in 12 patients (38%). The source of infections was bloodstream (8/31; 25.8%), driveline exit site (3/31; 9.6%), sternal wound (2/31; 6.5%) and pleural fluid (1/31; 3.2%). Neurologic events noted in 25% (8/31), with predominant event being strokes (6/31; 19%). Two patients had cerebral hemorrhage. ECMO prior to implant and persistent renal failure 2 weeks after implant increased risk of mortality.

Conclusions

Our protocol for circulatory support of severely depressed RV function with BiVAD allowed early extubation and early discontinuation of inotropes. Our survival and rate of complications is comparable to national outcomes. Need for dialysis at 14days was associated with increased mortality. This could be an indicator of severity of multi-organ insult prior to VAD placement and/or inadequate support post device placement.
THE HEART

PICC-0127
TERTIARY CENTER EXPERIENCE WITH EXCOR BERLIN HEART® IN INFANTS AND CHILDREN WITH HYPOPLASTIC LEFT HEART SYNDROME
J. Philip¹, D. Lopez-Colon¹, R.S. Samraj¹, W.I. Stein¹, B.A. Pietra¹, F.J. Fricker¹, M.S. Bleiweis¹
¹University of Florida, Department of Pediatrics, Gainesville, USA

Aims & Objectives:

There is limited experience with the use of EXCOR Berlin Heart® in hypoplastic left heart (HLHS) patients, with only few centers implanting them in 5 or more patients. We described our center’s experience in the support and management of HLHS patients with Berlin Heart®.

Methods

Retrospective study of HLHS patients 0-21 years of age supported with the EXCOR Berlin Heart® at our institution from 2005 to 2015. Clinical data was collected from EMR.

Results

Five patients were identified. Mean age and body surface area were 26.0±25.1 months [0-67 months] and 0.48±0.20m² [0.22-0.76m²], respectively. Two patients were post first-stage palliation, one following a Norwood Sano and the other following the Hybrid procedure. Among the other three, one presented a year after the Bidirectional Glenn procedure and two were post Fontan palliation (one fenestrated). Both Fontan patients were referred to us for transplant evaluation. All patients received a single VAD. Survival was 60%; 100% survival in Fontan palliation (2/2), 50% survival following stage one palliation (1/2). Mean VAD support was 63.8±93.7 days (8–226 days). Atrial cannulation was the preferred technique (4/5, 80%). All non-survivors had CPR pre-implantation with none of the survivors needing CPR. Two patients required ECMO pre-VAD (40%), 1 survivor and 1 non-survivors. Renal failure (RIFLE category F,L) at 14 days was present in 3 patients (50%), one survivor and 2 non-survivors. Three (60%) patients returned from implantation with an open chest, 1 survivor and 2 non-survivors.

Conclusions

Our data suggests that early use of mechanical assist in marginal HLHS patients may correlate with improved survival. The need for CPR, persistent renal failure and open chest post device lead to poor outcomes. Our cohort suggests the feasibility of timely supporting of critically ill patients with HLHS at any stage of palliation.
Levosimendan is a drug which increase the sensitivity of the heart to calcium and opens potassium channels resulting in inotropic and inodilation. Clinical trial have demonstrated that it improve hemodynamics without increasing intra-cellular calcium or oxygen consumption. However, there is no consistent evidence of mortality reduction. We described the clinical and hemodynamic improvement after levosimendan administration.

Methods

We described a series of cases of three neutropenic female adolescents, with cancer, previously submitted to a cardiotoxic chemotherapy with anthracyclines. They were admitted to the Oncologic Pediatric Intensive Care Unit with refractory septic shock associated to acute heart failure submitted a therapeutic with Levosimendan.

Results

An echocardiogram showed reduced left ventricular ejection fraction (34% in case one, 38% in case two and 35% in case three) and all patients were tachycardic (heart rate 187-144bpm). In case one, B-type natriuretic peptide (BNP) reached 3961pg/ml. Initial management with epinephrine and milrinone were unsuccessful. A levosimendan infusion at 0.2mcg/Kg/min for 48 hours associated with low dose of norepinephrine resulted in clinical, laboratory and echocardiographic improvement, without major side effects. Furthermore, hemodynamic improvement was already noticeable at 48 hours and was sustained after discontinuation of the infusion. In case one, the left ventricular ejection went to 59%, 48% in case two and 65% in case three. A loading bolus was not given in any of the three cases. All patients were discharged from the unit using caverdilol and spironolactone.
Levosimendan can be an effective therapeutic option in septic shock associated to acute heart failure, especially in patients submitted to cardiotoxic chemotherapy.
Aims & Objectives:

Myocardial dysfunction in children with septic shock leads to decreased Left ventricular (LV) ejection fraction (EF) and cardiac output. We present a case series of 6 children with septic shock at admission who underwent detailed echocardiographic assessment showing normal LV EF with LV diastolic dysfunction and coexisting right ventricular (RV) dysfunction.

Methods

Based on the surviving sepsis campaign 2014 a diagnosis of septic shock was made in these patients and emergent care with oxygen, crystalloids and vasoactive medications were initiated as per protocol. Within the first hour after admission, a pediatric intensivist certified in transthoracic echocardiography performed a detailed assessment of the following parameters: IVC diameter, LV EF by modified Simpsons method, LV Diastolic function by mitral inflow E/A ratio, Medial mitral annulus E’ by tissue Doppler imaging (TDI) and RV function by TDI of lateral tricuspid annulus S’ (normal > 9.5).

Results

The echocardiographic examination findings are shown in table 1. These patients admitted with septic shock had normal LV systolic function with impaired LV diastolic and RV systolic function based on echocardiogram. There was one mortality among
the six patients, who had severe grade III diastolic dysfunction with RV dysfunction.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Age</th>
<th>Sex</th>
<th>BP EF (%)</th>
<th>Mitral E (m/s)</th>
<th>Mitral E Dec T (ms)</th>
<th>Mitral A (m/s)</th>
<th>Mitral E/A</th>
<th>Mitral E' TDI (cm/s)</th>
<th>Mitral E/E'</th>
<th>RV Tricuspid S' TDI (cm/s)</th>
<th>LV Diastolic Dysfunction</th>
<th>RV Dysfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 mo</td>
<td>M</td>
<td>64</td>
<td>0.54</td>
<td>109</td>
<td>0.77</td>
<td>0.7</td>
<td>0.06</td>
<td>9</td>
<td>8</td>
<td>Abnormal Relaxation (Grade I)</td>
<td>Present</td>
</tr>
<tr>
<td>2</td>
<td>2 y</td>
<td>M</td>
<td>60</td>
<td>0.75</td>
<td>102</td>
<td>0.79</td>
<td>0.95</td>
<td>0.08</td>
<td>9.37</td>
<td>7</td>
<td>Abnormal Relaxation (Grade I)</td>
<td>Present</td>
</tr>
<tr>
<td>3</td>
<td>3 mo</td>
<td>F</td>
<td>63</td>
<td>0.95</td>
<td>76</td>
<td>0.66</td>
<td>1.47</td>
<td>0.07</td>
<td>13.87</td>
<td>8</td>
<td>Pseudo – normal (Grade II)</td>
<td>Present</td>
</tr>
<tr>
<td>4</td>
<td>1.5 y</td>
<td>M</td>
<td>60</td>
<td>1.16</td>
<td>130</td>
<td>0.56</td>
<td>1.94</td>
<td>0.08</td>
<td>14.2</td>
<td>8</td>
<td>Restrictive physiology (Grade III)</td>
<td>Present</td>
</tr>
<tr>
<td>5</td>
<td>8 y</td>
<td>F</td>
<td>58</td>
<td>0.89</td>
<td>130</td>
<td>0.93</td>
<td>0.95</td>
<td>0.13</td>
<td>7.36</td>
<td>6</td>
<td>Abnormal Relaxation (Grade I)</td>
<td>Present</td>
</tr>
<tr>
<td>6</td>
<td>3 y</td>
<td>F</td>
<td>60</td>
<td>0.71</td>
<td>102</td>
<td>0.57</td>
<td>1.24</td>
<td>0.05</td>
<td>13.57</td>
<td>9</td>
<td>Pseudo – normal (Grade II)</td>
<td>Present</td>
</tr>
</tbody>
</table>

BP EF – Biplane Ejection Fraction (Normal > 51%); E, E Dec T, A – Mitral inflow Pulse wave doppler

Conclusions

A detailed systematized echocardiographic assessment helps identify an increased coexistence of LV diastolic dysfunction and RV dysfunction among patients admitted with septic shock. Assessment of the echocardiograph parameters listed above can improve septic shock management by (1) Timely initiation of Lusitroic agents such as milrinone, (2) Fluid restriction and (3) Early initiation of renal replacement therapy to prevent fluid overload.
Aims & Objectives:

To study the occurrence of biventricular dysfunction and the severity of myocardial involvement by performing detailed systematized echocardiography (DSE) among children with scorpion envenomation and its correlation with cardiac troponin I level.

Methods

Prospective descriptive study of consecutive Pediatric Intensive care unit admissions aged less than 12 years with Scorpion Envenomation Grade II or more over the period of 3 months from October 2015 to December 2015.

DSE of children with scorpion envenomation was performed within 1 hour of admission. Transthoracic echocardiography was performed by a trained and validated pediatric intensivist. DSE of the following parameters were done: Left ventricle (LV) ejection fraction (EF) by modified Simpsons method, LV Diastolic function by mitral inflow E/A ratio, Medial mitral annulus E’ by tissue Doppler imaging (TDI) and right ventricle (RV) function by TDI of lateral tricuspid annulus S’ (normal > 9.5). Troponin I levels were measured for 9 out of children at 0 hours and 6 hours of admission to hospital. The echocardiographic examination findings are shown in the table.

Results

Median age was 4.2 years (IQR 1.8 – 8.5). LV systolic dysfunction was present among 40% children, out of which one child had severe LV diastolic dysfunction with tricuspid regurgitation and other child had moderate diastolic dysfunction with mitral regurgitation. RV dysfunction was present in 30% children who had normal LV systolic function, out of which one child had isolated RV dysfunction. Two children had coexisting LV diastolic dysfunction (20%) also. There was no mortality in our cohort. Out of 10 children, 4 had LV diastolic dysfunction. The Troponin I levels also
Conclusions

There is an increased occurrence of LV diastolic dysfunction and RV dysfunction along with LV systolic dysfunction, which remains undiagnosed due to lack of DSE assessment of myocardial functions by pediatric intensivists.
THE HEART

PICC-0124

COMPARISON OF NONINVASIVE OSCILLOMETRIC AND INTRA-ARTERIAL BLOOD PRESSURE MEASUREMENTS IN CHILDREN ADMITTED TO PEDIATRIC ICU OF DEVELOPING COUNTRY

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Aims & Objectives:

Direct intra-arterial readings are considered to be the gold standard for BP measurement in critically ill children. Arterial cannulation is associated with risks, non-invasive blood pressure measurements are routinely used. Study was carried out to find difference, limits of agreement and correlation between simultaneously recorded invasive and oscilometric non-invasive BP measurement in critically ill children.

Methods

Prospective study in children (1 month-18 years) admitted to 10 bedded PICU. IABP readings were compared with simultaneously obtained non-invasive readings. NIBP monitor (oscillometric technique) was used for NIBP measurements. Agreement and correlation between methods was assessed using Bland-Altman analysis.

Results

Overall, 4,447 pairs of simultaneous recorded oscillometric and invasive blood pressure measurements were collected in 65 patients with a mean age of 6 years. IABP readings were obtained from peripheral arteries. Mean overall biases between invasive and non-invasive techniques (IBP-NIBP) were -3.6 ± 12.85, -4.7 ± 9.3 and -3.12 ± 9.30 mm Hg respectively for systolic, diastolic and mean arterial BP (p < 0.0001), with wide limits of agreement. 35.1% of the NIBP systolic readings were higher than IBP systolic readings by more than 10 mm Hg. Overestimation of blood pressure using the oscillometric method was more important in children less than one year, children on inotropic and ventilator support and overweight/obese children.

Conclusions

Oscillometric blood pressure measurements overestimated IABP readings. NIBP can be inaccurate among critically ill patients. Since in critically ill patients importance of BP readings is often crucial, noninvasive techniques cannot be regarded as reliable alternatives to direct measurements.
THE HEART

PICC-0593
INTRAVENOUS IMMUNOGLOBULIN IN CHILDREN WITH ACUTE MYOCARDITIS AND/OR DILATED CARDIOMYOPATHY

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Aims & Objectives:
This retrospective study was performed to evaluate the effect of intravenous immunoglobulin (IVIG) on the cardiac function and cardiac rhythm of children with acute myocarditis and/or early DCM.

Methods
This was a retrospective analysis of case records of children who presented with acute myocarditis and/or early DCM and admitted in pediatric critical care unit of our tertiary hospital between January 2013 and December 2014. Inclusion criteria were children (age <12 y), acute onset (duration <3 months) congestive heart failure and impaired left ventricular function (On echocardiography, either a left ventricular ejection fraction (LVEF) ≤0.45, left-ventricular end-diastolic volume (LVEDD) of >2 SD above the norm, or a shortening fraction (SF) >2 SD below the mean) following a recent viral illness. Patients with structural heart disease, Kawasaki disease and other specific causes of acute cardiomyopathy were excluded. The study was approved by the Ethics committee of the hospital. Data were collected through patient chart review. Searches were screened and data extracted independently by two reviewers. Quality was assessed by two reviewers using the Jadad scale.

Results
A total of 35 children were initially eligible for the study; however, 7 were excluded due to insufficient clinical data/non comparable factors. Twenty-eight children were ultimately included. Of these, 12 patients, (7 males) had received treatment with IVIG (1gm/kg per day) for two days, while the remaining 16 patients (9 males) had not received IVIG therapy. The LVEF of both groups had improved significantly at 6 months; however, children treated with IVIG had a significantly higher LVEF than those without IVIG. The episodes of ventricular tachycardia/fibrillation and atrioventricular block were reduced significantly in the IVIG group.

Conclusions
This study suggests that IVIG for the treatment of acute myocarditis and/or early dilated cardiomyopathy is associated with improved recovery of left ventricular function and reduction in episodes of fulminant arrhythmias.
Aims & Objectives:

Transesophageal Echocardiography (TEE) has been traditionally used perioperatively in paediatric cardiac surgeries in confirming the perioperative diagnosis, evaluation of surgical procedure and in monitoring the cardiac function. We reviewed our perioperative echo data of pediatric cardiac surgery patients analyze its effect on change in surgical decision.

Methods

All paediatric patients who underwent cardiac surgery from Jan 2015 and December 2015 were reviewed. The records of preoperative transthoracic echocardiogram (TTE), surgical procedure and intraoperative TEE were reviewed to determine new findings, change in surgical plan and residual/new lesions post bypass leading to second CPB.

Results

Total of 502 paediatric cardiac patients with mean age of 7 years underwent cardiac surgery out of which 454(90.4%) patients underwent intraoperative TEE. We identified variations between preoperative TTE and intraoperative TEE in 35 patients (7.7 %). Twenty three patients (5.06%) had minor variations maximum being persistent left SVC. Major variations (PAPVC 25%, OS ASD 15.6% etc) were detected in 12 (2.64%) patients leading to change in surgical plan in operating room, with the following primary diagnosis: 4 VSDs, 7VSD with pulmonary stenosis and/orVSD with aortic regurgitation, 2 DORV, 8 TOF, 6 ASD, 3 ASD+VSD, 3 TGA, 3valvular heart diseases. Six patients (1.3%) operated under CPB had residual/new lesions after coming off CPB thereby requiring surgical corrections under second CPB run.

Conclusions

Intraoperative TEE has a major role in modifying the course of paediatric cardiac surgery. Routine use of intraoperative TEE during and after intracardiac repair in children is recommended.
THE HEART

PICC-0909
Changing in Whole Blood Lactate Levels during Cardiopulmonary Bypass are Early Indicator of Outcome in Pediatric Cardiac Surgery
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²Division of Pediatric Intensive Care Medicine- Department of Child Health Faculty of Medicine University of Indonesia – Dr. Cipto Mangunkusumo Hospital- Jakarta, Division of Pediatric Intensive Care Medicine- Department of Child Health Faculty of Medicine University of Indonesia – Dr. Cipto Mangunkusumo Hospital- Jakarta, Jakarta, Indonesia
³Integrated Heart Service- Division of Pediatric Intensive Care Medicine, Integrated Heart Service- Division of Pediatric Intensive Care Medicine, Jakarta, Indonesia

Aims & Objectives:

In pediatric cardiac surgery, high blood lactate levels during cardiopulmonary bypass (CPB) are associated with tissue hypoperfusion and contribute to postoperative complications. Studies indicate that blood lactate level is proportional to tissue oxygen debt.

To evaluate the change in blood lactate levels and perioperative morbidity and mortality.

Methods

We conducted a retrospective analysis of 81 pediatric patients who had undergone cardiac surgery with continuous monitoring of serial measurement of blood lactate in Integrated Cardiac Service Unit Cipto Mangunkusumo Hospital, Jakarta. Arterial blood samples were taken before, during CPB, and on admission to the ICU and every 6 hours after. Duration of CPB, hemodynamic parameters, inotrope dosage and perioperative outcome were documented.

Results

The largest increment in lactate level occurred during CPB and decreased on admission to the ICU. Patients who had complications exhibited higher lactate levels at all time points. Lactate levels were higher in the group with complications at the end of surgery (4.4 vs 2.7 mmol/L; P = .000), immediately after ICU admission (2.9 vs 1.9 mmol/L; P = .000); 6 hours (1.9 vs 1.4 mmol/L; P < .003), and >12 hours after admission (4.6 vs 2.8 mmol/L; P = .000). Increased lactate concentration was reliably associated with patient length of ICU stay, liver function parameters, and anion gap. Logistic regression analysis revealed that peak blood lactate levels of 3.5 mmol/L or higher during CPB were strongly associated with postoperative mortality and morbidity.
Conclusions

Hyperlactatemia occurs during CPB may become an early indicator/ predictive index for postoperative morbidity and mortality in pediatric patients. This study generates the hypothesis that strategies aimed to preserve oxygen delivery during CPB may reduce the occurrence of elevated lactate levels.
THE HEART

PICC-0859
Congenital Heart Surgery in a developing country - a great Challenge
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Aims & Objectives:

Introduction:

The aim of this article is to review the local experience over the last 15 years (2000-2015) in providing surgical intervention for children with heart diseases in Bangladesh. Congenital heart disease (CHD) refers to the presence of a structural abnormality of the heart and/or great vessels that is present at birth and is of actual or potential functional significance. In recent decades, the management of congenital malformations of the heart has improved remarkably in the developed world such that even very complicated lesions are now amenable to treatment.

Methods

Methods:

We studied retrospectively all patients between 2000 and 2015, at the National Heart Foundation Hospital & Research. Collecting epidemiological, clinical, echocardiographic and surgical data from hospital files.

Results

Results:

We studied 3014 patients with median age at diagnosis of 4.5 years. 1614 were females (53.5%). Only 560 (18.57%) patients were diagnosed under the age of two years, and complications were present in 656 (21.76%) at time of diagnosis. Mean age of surgical intervention 6±5 years. The 30-days post-operative mortality was 7% in the beginning, now reduced to 2.3%.

Conclusions

Conclusion:

The practice of pediatric cardiac intensive care has evolved considerably over the last several years. These efforts are the result of a collaborative effort from all subspecialties involved in the care of pediatric patients with congenital heart disease. Advances in the diagnosis, surgical technique has impact on post-operative
management and make the field of pediatric cardiac intensive care an exciting, demanding, and evolving discipline, necessitating the ongoing commitment of various disciplines to pursue a greater understanding of disease processes
THE HEART

PICC-0385
CORONARY FISTULA WITH HEART FAILURE IN A NEWBORN
F. Rezende Caino de Oliveira¹, M.D. Barauna¹, C. Gonçalves Pio de Oliveira¹, R. Novais de Carvalho¹, C. De Holanda Carlos¹, N. Kraychete²
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²Santa Izabel Hospital, Cardiac Surgery, Salvador, Brazil

Aims & Objectives:

The coronary arterial fistulas (CAF)s were first described by Josef Hyrtl in 1851 (Friedman et al., 2007). Echocardiographic studies estimated the incidence of congenital CAFs in children at 0.06 to 0.2% (Hsieh et al., 2002). Major sites of origin are from the right coronary artery (40-60%), (Gupta-Malhotra, 2010). The coronary fistula predominantly drain into the right side of the heart (92%) (Levin et al., 1978). Clinically must be observed when there is the presence of a continuous murmur in precordium. May have chest pain or symptom of heart failure. This study aims to report a patient with coronary fistula cavity and underwent surgery with satisfactory results.

Methods

Report a case of a newborn with coronary fistula cavity and underwent surgery.

Results

TCD patient, 25-day life, came from another institution with congenital heart disease suggestive of fistula in the right coronary with limited ventilation weaning and dependent on milrinone. Performed catheterization on the day of admission, being surgically approached for correction the day after, evolved with insufficiency of systolic function of the right ventricle, and because major expansion of ventricular chambers only managed to close chest two weeks after corrective surgery procedure, attended this period in need of milrinone maintenance, being suspended such measurements one week after closing chest and digoxin association. Extubated 19 days after surgical procedure and remained in non-invasive ventilation until be discharged after 23 days of PICU had complications as junctional tachycardia and hospital infection, solved.

Conclusions

CAF's are rare complications that can cause a serious of complications as described before. In this case, that was reported, lead to heart failure just with few days of life, and need to go to surgical correction as soon as possible, different from literature that shows symptomatic patients are usually in infants and associated with cardiology comorbid pathology (Doksöz et all, 2014).
IS HAND-HELD ECHOCARDIOGRAPHY ACCURATE IN HYPOPLASTIC LEFT HEART SYNDROME?

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²Texas Children’s Hospital, Center for Research & EBP, Houston- TX, USA

Aims & Objectives:

Handheld echocardiography (HHE) can assess ventricular function in adults, but accuracy in pediatrics is unknown. In hypoplastic left heart syndrome (HLHS), detection of depressed right ventricular systolic function (RVSF) and higher grade tricuspid regurgitation (TR) identifies patients who have increased morbidity and mortality.

Methods

Children with HLHS after Stage I or II surgical palliation (Norwood or Glenn procedures) were prospectively enrolled. Subjects underwent HHE (GE Vscan) by a pediatric cardiologist the same day as standard echocardiography (echo). Using four point scales, HHE assessment of RVSF and TR were compared with blinded assessment of offline standard echo images. Weighted kappa coefficient (k) was used to evaluate agreement.

Results

Thirty-two HHE’s were performed on 15 subjects (Stage I - 17 and Stage II - 15) in the outpatient clinic (n=13), inpatient ward (n=7) and intensive care unit (n=12). Median age was 3.4 months (14 days - 4.2 years). Median weight was 5.9 kg (2.6 - 15.4 kg). Six standard echoes revealed depressed RVSF (mild - 1, moderate - 3 and severe - 2) and sixteen had hemodynamically significant (> mild) TR (moderate - 13 and severe - 3). HHE assessment of RVSF and TR had substantial agreement with standard echo (k=0.80, k=0.74, respectively; p<0.001). HHE sensitivity and specificity for depressed RVSF were 100% and 92%, respectively, and were 94% and 88% for hemodynamically significant TR, respectively. Average HHE scan time was 238 seconds.

Conclusions

This is the first study demonstrating HHE offers a rapid, bedside tool for pediatric cardiologists to detect RV systolic dysfunction and hemodynamically significant TR in HLHS.
THE HEART

PICC-0382
PAEDIATRIC CARDIAC CRITICAL CARE (PCCC) ADMISSIONS TO A
PAEDIATRIC INTENSIVE CARE UNIT (PICU) IN A DEVELOPING COUNTRY

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Division of Paediatric Critical Care and Children’s Heart Disease- Red Cross War Me
morial Children’s Hospital- School of Child and Adolescent Health, Cape Town,
South Africa

Aims & Objectives:

Knowledge is limited on PCCC in South Africa. This is the first study describing
PCCC admissions to a South African PICU.

Methods

A prospective review of consecutive patients admitted to Red Cross PICU with a
cardiac discharge diagnosis. Patients included from January 2015 to December
2015. Red Cross PICU is a 22-bed combined medical and surgical tertiary PICU.

Results

472 PICU admissions were included. 274 admissions followed elective cardiac
surgery, 35 followed elective general surgery and 163 were emergency admissions.

Indications for emergency admission included: shock (28%), need for respiratory
support (22%), severe cyanosis (20%), decompensated cardiac failure (18%), post
cardiac arrest (10%) and life threatening arrhythmias (0.3%).

The first diagnosis of a cardiac problem was made on PICU in 57 patients. Eighty five
theatre procedures (32 cardiac surgical) were undertaken from PICU. Eighty one
patients needed PICU readmissions and 19 needed redo cardiac operations during
this study period.

PCCC mortality was 6.3% versus predicted mortality (PIM2) of 9.5%. Twenty of the
emergency patients died in PICU versus five elective surgery patients.
## Conclusions

Overall 34.9% of all PICU admissions during 2015 were PCCC admissions. Emergency PCCC admissions have a higher morbidity and mortality in our setting.

<table>
<thead>
<tr>
<th>Median</th>
<th>Emergency admissions N=163</th>
<th>Elective post- surgery admissions N=309</th>
<th>P- value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of PICU stay (days)</td>
<td>9.9</td>
<td>4.4</td>
<td>0.0001</td>
</tr>
<tr>
<td>Length of ventilation (days)</td>
<td>3.9</td>
<td>2.0</td>
<td>0.0001</td>
</tr>
<tr>
<td>Length of inotrope use (days)</td>
<td>4.2</td>
<td>2.4</td>
<td>0.007</td>
</tr>
<tr>
<td>Maximum inotrope score</td>
<td>11.1</td>
<td>9.5</td>
<td>0.1093</td>
</tr>
<tr>
<td>Admission age (months)</td>
<td>19.9</td>
<td>42.5</td>
<td>0.0001</td>
</tr>
<tr>
<td>AKI</td>
<td>55</td>
<td>54</td>
<td>0.0001</td>
</tr>
<tr>
<td>1 dialysis</td>
<td></td>
<td>2 dialysis</td>
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</tr>
<tr>
<td>Neurological events</td>
<td>23</td>
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<td>iNo use</td>
<td>20</td>
<td>17</td>
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<tr>
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<td>24</td>
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</table>
THE HEART

PICC-0386
CHILDREN ADMITTED TO PICU WITH FULMINANT DILATED CARDIOMYOPATHY OR MYOCARDITIS IN A DEVELOPING COUNTRY
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Aims & Objectives:

To review the outcome of children with fulminant dilated cardiomyopathy (DCMO) or myocarditis in a setting where cardiac mechanical support and transplantation are limited and only medical support available to treat acute exacerbations.

Methods

A retrospective review of children with fulminant DCMO and myocarditis admitted to Red Cross PICU between January 2010 and July 2015.

Results

95 children with a median age of 27.8 months were included. All presented in Ross stage 4 cardiac failure (77% in cardiogenic shock). Admission median lactate was 6.5mmol/l. Admission left ventricular ejection fraction was < 30% in 79% of patients and 9 developed intra-cardiac clots.

Aetiology was presumed viral myocarditis in 87% and idiopathic DCMO in 13%. Adenovirus PCR was positive in 28, Parvovirus in 19 with multiple positive viral studies in 32.

The median number of ICU admissions per patient was 1.5 (range 1-5) and length of ICU stay was 14.9 days (1-69). 55% required ventilation for median of 8.1 days. 100% required inotropic support for a median of 8.2 days. 82% received Milrinone, 78% Dobutamine and 33% Adrenaline infusions. The median maximum inotrope score was 21.9.

Complications during ICU stay included acute kidney injury in 68% of which two patients needed dialysis, liver derangement in 43%, neurological events in 25% and 34% suffered a cardiac arrest episode. 33% had arrhythmias of which 27% needed electrical cardioversion and 57% drug treatment.
63 (66%) children survived to ICU discharge. The overall survival was 47%. Of the ICU survivors the median number of ward readmissions was 3.7 (range 1-19). Total median length of ward stay was 23.2 days (1-138).

Conclusions

In our setting DCMO and myocarditis is associated with significant duration of hospital stay, morbidity and mortality.
Aims & Objectives:

A single centre description of perioperative management and medium term outcome of children with ALCAPA in a developing country without mechanical cardiac support.

Methods

A retrospective longitudinal study describing 46 consecutive patients with ALCAPA presenting between July 2004 and August 2015 to PICU.

Results

Forty six patients where included of which 45% presented in cardiogenic shock requiring immediate ICU support. At presentation 67% had an ejection fraction (EF) < 45%. The median age at presentation was 5.2 months (range 0.5 to 24 months).

Forty three patients had coronary artery reimplantation surgery. The median length of PICU stay, post-operative inotropic support and ventilation was 9.9, 8.3, and 7 days. Perioperative morbidity included community acquired infection, nosocomial infection, arrhythmias, cardiac arrest and AKI needing dialysis in 27%, 40%, 24%, 13% and 6%.

Three patients died in PICU pre surgery, two died during surgery and two died in the early postoperative PICU period. Thirty nine patients survived to hospital discharge of which five died between 39 and 290 days after hospital discharge. Pim2 predicted 24% mortality and actual mortality was 26%. On multivariate analysis no predictors of mortality could be identified.

Fourteen patients needed PICU readmission (range 1-5). The median total PICU stay were 12.4 days. Six patients required cardiac re-intervention surgery. For the survivours the median time to EF recovery was 15.5 months.
Conclusions

Coronary reimplantation is successful procedure in our institution. Perioperative infection remains a major morbidity. Availability of mechanical cardiac support might have changed the outcome for seven children.
Aims & Objectives:

To assess the impact of echocardiographic assessments performed in PICU.

Methods

Prospective review of all echocardiographic assessments done in a combined 22-bed medical and surgical tertiary PICU between February 2015 to February 2016.

Results

Echocardiograms (n=379) were done on 211 PICU patients of which 88 patients were known with a cardiac diagnosis prior to PICU admission. During this study period 15% of the total PICU population received an echocardiogram. Sixty three percent (n=238) of the echocardiograms were done by the cardiology department and thirty seven percent (n=141) by ICU staff formally trained in echocardiography.

New congenital heart lesions were diagnosed in 47 PICU patients of which 12 were right ventricular outflow tract obstructions, 6 left ventricular outflow tract obstructions and 27 shunt lesions. Newly acquired heart lesions were diagnosed in 10 patients of which 5 were dilated cardiomyopathy and 5 infective endocarditis.

Normal hearts were confirmed in 14% (52/379) of the echocardiograms. In 39% (146/379) of the echocardiograms new anatomical or functional pathology were identified that contributed to change in PICU management while 26% (97/379) of the echocardiograms confirmed new pathology that did not require treatment change.
Indications for echocardiogram on PICU

- Post cardiac surgery: function assessment (118)
- Post cardiac surgery: pulmonary pressure assessment (21)
- Post cardiac surgery: anatomy assessment (146)
- Pulmonary pressure assessment (54)
- Anatomical assessment (19)
- Infective endocarditis concern (101)
- Pericardial effusion assessment (5)

N=379 Echocardiograms

243 (64%) New findings
- 146 (39%) Treatment change
- 97 (26%) No treatment change

136 (36%) No new findings
- 52 (14%) Normal heart
- 84 (42%) Continue current treatment
Conclusions

Echocardiographic assessment is a valuable diagnostic tool in PICU and will often contribute to treatment modification.
THE HEART

PICC-0666
HEMODYNAMIC PATTERNS DETERMINED BY NON-INVASIVE CW-DOPPLER ULTRASOUND CARDIAC MONITORING (USCOM) IN NEONATES DURING THERAPEUTIC HYPOTHERMIA

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²Regional Perinatal Centre, NICU, Kursk, Russia
³Kursk State Medical University, Department of Pediatrics, Kursk, Russia

Aims & Objectives:

Optimizing of therapeutic hypothermia (TH) for neonatal hypoxic ischemic encephalopathy (HIE) implies among other factors support of cerebral perfusion that might be affected by TH and heart ischemia. To determine the hemodynamic patterns in neonates with HIE/TH we used the USCOM-1A technology that is a bedside method of evaluation of cardiac output based on continuous-wave Doppler ultrasound effect.

Methods

Hemodynamic parameters were measured during 4 days in 20 healthy term neonates and 24 term neonates with HIE/TH with the first measurement before TH and the last – after competing of rewarming procedure.

Results

In day 1 HIE/TH neonates had lower cardiac index (CI) (2.6+0.7 vs 3.6+0.8 l/min/m², p=0.003), higher systemic vascular resistance index (SVRI) (1696+567 vs 1052+297 dyn s cm⁻⁵ m⁻², p=0.041) and higher potential energy to kinetic energy ratio (PKR) that assesses arterial impedance matching (70+45 vs 34+15, p=0.04). By the day 4 CI had increased in HIE/TH group (2.6+0.7 vs 4.2+1.8 l/min/m², p=0.002) but not in healthy neonates and became even higher than in healthy neonates (4.2+1.8 vs 3.1+0.9 l/min/m², p=0.012) that might be explained by the effect of inotropes. SVRI has increased in healthy patients (1052+2987 vs 1364+223 dyn s cm⁻⁵ m⁻², p=0.023) and fell non-significantly in neonates with HIE/TH (1696+567 vs 1276+325 dyn s cm⁻⁵ m⁻², p>0.05) that together with decrease of PKR (70+45 vs 38+12, p=0.05) may indicate to the improvement of their cardiac output.

Conclusions

Hypoxia-ischemia induces hypodynamic cardiovascular disorders that should be detected and properly corrected to prevent further hypoperfusion of the brain.
The heart

PICC-0712
Splanchnic near-infrared spectroscopy (NIRS) can predict necrotizing enterocolitis (NEC) in preoperative neonate with congenital heart disease

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Aims & Objectives:

It has been reported that neonates with congenital heart disease, especially patients with single ventricle, have a risk of developing NEC. In order to prevent NEC, keeping cardiac output and oxygen delivery are important. Regional oximetry (rSO2) measured by NIRS may detect the early phase of NEC and be able to determine the optimal timing for cardiac surgery.

Methods

From September to December 2015, 3 babies with high pulmonary flow circulation were enrolled. Their cerebral and splanchnic rSO2 were measured before cardiac surgery and the differences are analyzed.

Results

All patients suffered from pulmonary congestion. Moreover, they demonstrated the symptoms with bowel ischemia (blood stool, abdominal intestinal gas pattern on abdominal X-ray, etc.).

All of them showed abnormal NIRS pattern; splanchnic rSO2 (s-rSO2) < cerebral rSO2 (c-rSO2), despite of any therapy for decreasing pulmonary flow (intubation, deep sedation and N2 inhalation). There was more than 20% difference between s-rSO2 and c-rSO2. A patient diagnosed of NEC and the other who had symptoms with somatic low flow differed more than 40% between s-rSO2 and c-rSO2.

Only one patient diagnosed NEC by abdominal free air, and died without cardiac procedure. Although the other two had tendency of NEC and required closely observation, they were survived caused of early intervention using NIRS.

Conclusions

Splanchnic NIRS may be one of the predicted factor of NEC in preoperative neonatal congenital heart disease. Future studies are needed to accumulate more cases.
Aims & Objectives:

In infants with single ventricle physiology endotracheal suctioning poses greater risks due to the instability between pulmonary and systemic blood flow. We examined the impact of and adverse events with bedside nurses performance of endotracheal suctioning in the 1st 48 hours post-operatively in single ventricle infants.

Methods

Prospective observational study in a single PICU in England.

Results

One hundred and forty (140) episodes of bedside nurse endotracheal suctioning data were collected in 16 infants in the first 48 hours post-operatively after BT shunt, pulmonary artery band or Norwood Sano shunt. 62% of these suction episodes were classed (by the nurse) as 'unplanned and 38% 'planned'. Reasons cited for the unplanned suction interventions were: 50% for acute desaturation (yet only 21% (9/43) had Spo2 ≤70%), 16% for audible secretions on auscultations, 9% for increased Co2 level, 8% for patient coughing and 4 % for low minute volumes. Unit guidance specifies that an additional IV bolus of opiate (fentanyl) and Relaxant) are always administered pre-suction, yet opiate bolus only occurred in 54% of ‘planned’ suctions and 38% on ‘unplanned’ suctions. Of all the suction episodes only 53% had additional relaxant bolus. Most concerningly, a serious adverse event occurred in 8% (11/136) of these suction episodes (4 of these cardiac arrests (CA). 45% of these (5/11) were with ‘planned’ suction episodes. 82% of these adverse events occurred on the night shift.

Conclusions
Data collected by bedside nurses during their routine endotracheal suctioning, demonstrates significant haemodynamic instability and adverse events. It was notable that unit clinical guidelines were not always adhered to by bedside nurses.
Aims & Objectives:

Endotracheal suctioning is a high risk procedure in single ventricle infants, especially in the early post-operative period. We aimed to determine the effect of endotracheal suction in the first 24 hours after high risk infant heart surgery on the ICU and to compare open and closed suctioning techniques in these infants.

Methods

A randomised crossover study of open versus closed suctioning. Detailed physiological data and echocardiography (for flow velocity) were measured at baseline, during and 2 minutes after the procedure. Treatment means and standard errors at baseline, during and post procedure were computed using Excel and ANOVA used for measurement change during the procedure. A statistical analysis was undertaken using GenStat software.

Results

There were 14 infants with paired measurements for analysis: Five infants after Norwood-Sano, 4 modified Blalock-taussig shunt (MBTS) and 5 after Pulmonary Artery Banding (PAB). The median age 21 days (IQR 6 - 47) mean weight (3.1Kg SD 0.65). All infants were sedated and muscle-relaxed as per PICU protocol for measurements. There was no clinically significant change and no significant difference in flow velocity, heart rate, diastolic, systolic, mean blood pressure, cerebral NIRS or Spo2 during endotracheal suction between the two methods (Graphs 1 and 2).
Graph 1: Change in flow velocity (on echocardiography) during endotracheal suction

Changes in Spo2

Conclusions
There appears little clinically significant difference in physiological variables between open and closed suction method in the first 14 infants. These were highly controlled procedures however, and data collected by bedside nurses during their suctioning of these children over the same time period, demonstrated significantly more haemodynamic instability.
Aims & Objectives:

To determine perioperative factors in children undergoing cardiac surgery with cardiopulmonary bypass (CBP) to identify patients with high risk for developing low cardiac output syndrome (LCOS).

Methods

We performed a prospective study in a tertiary pediatric intensive care unit and included all consecutive patients admitted from June 2010 to May 2011. Pre-, intra- and postoperative factors were evaluated for association with LCOS through chi-square or fisher’s exact test and we considered statistical significance with p value < 0.05. In a second phase, we performed logistic regression models to identify factors with independent association.

Results

134 patients accomplished inclusion criteria and LCOS was present in 32.4%. Of all clinical factors considered, those significantly associated with LCOS were as follow, preoperative: age < 1 year, weight < 10 kg, cyanogen heart defect and emergency hospital admission; intraoperative: RASH-1 > 4, combined procedures, ventriculotomy, CBP time > 135 min, aortic clamp time > 80 min and hypothermia < 24°C; postoperative: arrhythmias, infection and profuse bleeding. When we included these factors in logistic regression models, just the following variables had significantly association: age < 1 year (OR 14.8), CBP time > 135 min (OR 7.2) and postsurgical arrhythmias (OR 3.8).

Conclusions

Independently of cardiac surgery’s complexity, we stated there are perioperative factors that highlight an increased probability to develop LCOS. We believe, this knowledge could help to identify those patients that require more aggressive management in order to prevent the presence of the syndrome at the early postoperative period.
Aims & Objectives:

Passive leg raising (PLR) test to assess fluid responsiveness (FR) has been validated extensively in adults. The preferred end-point varies, with researchers using cardiac index (CI), Stroke volume index (SVI) among others. Our objective was to assess whether PLR induced changes in CI (ΔCI) is as reliable as changes in SVI (ΔSVI) in predicting FR.

Methods

This is an ongoing prospective observational study conducted in Pediatric Intensive Care Unit of a tertiary care centre. Children with tachycardia plus one other sign of shock were included. Hemodynamic parameters including heart rate(HR), SVI and CI were assessed at baseline, after PLR and after fluid challenge(FC), using Ultrasonic-Cardiac-Output Monitor(USCOM). Fluid responders were those that had an increase in SVI ≥ 10% with FC.

Results
Of 32 patients, 15 (46.9%) were responders and 17 were non responders. On bivariate analysis, ΔSVI and ΔCI ≥ 10% after PLR were significant predictors of FR (Table 1). On plotting Receiver Operating Curve, ΔSVI of 9.8% predicted FR with a sensitivity of 80% and a specificity of 100%, AUC (mean±SE) =0.906±0.055 (95%CI 0.797–1.015); whereas ΔCI of 6.6% predicted fluid responsiveness with a sensitivity of 73.3% and a specificity of 88.2%, AUC (mean±SE) =0.875±0.061 (95%CI 0.756–0.993) (Figure 1). Regression plots showed that although both ΔSVI and ΔCI with PLR had linear correlation with ΔSVI after FC, correlation coefficient was higher for the former (0.42 vs. 0.34).

Conclusions
Our preliminary results indicate that HR is an unreliable end-point for PLR test. SVI appears superior to CI, as it is uninfluenced by HR.
Aims & Objectives:

Humidified High Flow Nasal cannula therapy (HHFNC) is an increasingly popular mode of respiratory support in pediatrics. While proposed to generate positive airway pressure, the amount of positive airway pressure delivered by newer HHFNC devices at increasing flow rates has not been adequately evaluated. The objectives of this study are to measure the airway pressure delivered during HHFNC, and evaluate the variables that may influence the delivery of positive airway pressure.

Methods

Prospective observational cohort study at McMaster Children`s Hospital, Pediatric Critical Care Unit (PCCU), Canada. Children under 18 years on HHFNC support (Optiflow Jr®) were eligible. Esophageal pressure (Poes) was measured in a standardized manner as a surrogate for airway pressure, at varying flow rates. Weight, size, disease severity, work of breathing, nasal cannula fit and nares diameter ratio, were measured in each patient.

Results

Twenty-five Poes measurements have been conducted in a total of 9 patients to date. Patients ranged from 12 days of age to 13 years, the median weight was 5.7 kg (3.2 - 89 Kg), and 78% (7) were males. The commonest diagnoses necessitating HHFNC in these patients were pneumonia and bronchiolitis. The range of HHFNC flow rates used was 5 – 30 L/min. There was a linear correlation between HHFNC flow rate and Poes (Figure 1), with Poes ranging from 2 to a maximum of 11.5 cm H2O. The measured Poes does not appear consistent amongst patients. Further analyses will examine
Conclusions

HHFNC does not consistently deliver a predictable positive airway pressure in all patients. Despite higher flow rates achieved with newer HHFNC devices, the maximum $P_{es}$ generated in the pediatric population may not be as high as anticipated.
To analyze the influence of the definition (Berlin or PALLIC) and the timing of severity stratification on the outcomes of PARDS.

Methods

A retrospective analysis of 30 PARDS patients who had been diagnosed according to the Berlin definition. Patients were classified according to the Berlin and PALLIC definitions on the first day of diagnosis (D1), 24 hours later (D2) and on the day of the worst oxygenation metrics (DW).

Results

The characteristics of the study population are shown in Table 1. Six of the 30 patients no longer met PARDS criteria at D2. We did not observe any difference in mortality across the severity categories according to the Berlin or PALLIC definitions at D1, D2 or DW. Significant differences in the VFD were observed at D2 for the Berlin and PALLIC definitions, and at DW for the PALLIC definition.

Conclusions

Both Berlin and PALLIC definitions could predict differences in VFD at D2, but failed to predict differences in mortality at any of the pre-determined timings.
THE LUNG

PICC-0231
NAVA REDUCE WORK OF BREATHING DURING NON INVASIVE VENTILATION FOR SEVERE BRONCHIOLITIS

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²CHU Sainte-Justine, Pediatrics, Montréal, Canada
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⁴St. Michael's Hospital, Keenan Research Center, Toronto, Canada
⁵CHU Sainte-Justine, Pediatric Intensive Care Unit, Montréal, Canada

Aims & Objectives:

Continuous Positive Airway Pressure (CPAP) is the primary mode for non-invasive ventilation (NIV) in children with severe bronchiolitis. Neurally adjusted ventilatory assist (NAVA) is a recent ventilatory mode, which improve synchronisation during NIV. NAVA may be an alternative to usual mode for NIV especially in small children. We aimed to evaluate work of breathing during NIV with NAVA in comparison with CPAP in children with severe bronchiolitis.

Methods

Children younger than 6 months with severe bronchiolitis were included after written informed consent. An oesophageal pressure probe was inserted orally (CTO-2 pressure transducer, Gaeltec, Scotland). All data (Electrical activity of the diaphragm (EDI), flow, oesophageal pressure, airway pressure) was recorded continuously with a data acquisition system (Neurovent Inc, Toronto, Canada) for at least 1 hour in CPAP and then switch in NAVA. Work of breathing was estimated using oesophageal pressure-time product (PTPes) and oesophageal swing during 25 breaths in CPAP just before change and then during 25 breaths in NAVA. Data were compared using Wilcoxon two-sample paired sign test. A p-value below 0.05 was considered significant.

Results

5 children (2 boys) were included with median age 63 days [30-63] with weight of 3625g [3600-4530]. In CPAP the PEEP was set at 7 cmH₂O [7-7]. In NAVA, the PEEP was set at 7 cmH₂O [5-7] and the NAVA level was set at 0.9 cmH₂O /μV [0.7-0.9] with resulting delta pressure of 10.11 cmH₂O [9.19-15.58]. Pressure–time product per minute was significantly lower in NAVA compared to CPAP (172 cmH₂O/min [161-278] vs. 425 cmH₂O/min [364-432], p=0.043). Results are presented in table 1.
Conclusions

NAVA reduce significantly work of breathing and inspiratory time/total respiratory cycle time (Ti/Ttot) during NIV in children with severe bronchiolitis compared to CPAP.

Table 1: Main breathing parameters in CPAP and in NAVA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>CPAP</th>
<th>NAVA</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Rate (/min)</td>
<td>76 [71-92]</td>
<td>80 [57-80]</td>
<td>0.22</td>
</tr>
<tr>
<td>Ti/Ttot (s)</td>
<td>0.48 [0.47-0.49]</td>
<td>0.40 [0.39-0.44]</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Mean Airway Pressure (cmH₂O)</td>
<td>6.96 [6.95-7.07]</td>
<td>10.62 [10.55-10.95]</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>EDI Max (µV)</td>
<td>29 [19-31]</td>
<td>13 [11-19]</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Swing Peso (cmH₂O)</td>
<td>16 [14-19]</td>
<td>9 [7-16]</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>PTPes/min (cmH₂O/min)</td>
<td>425 [364-432]</td>
<td>172 [161-278]</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

* Wilcoxon two-sample paired sign test
Aims & Objectives:

Extubation after surgery for congenital heart disease (CHD) can often be delayed, prolonging mechanical ventilation (MV). We aimed to identify risk factors for prolonged MV duration in children undergoing surgery for CHD.

Methods

We analyzed a database from the ASSIST initiative, with data from two tertiary-care centers in Sao Paulo state, Brazil, from September 2014 to December, 2015. Risk factors were modelled in a Cox proportional hazards model, with MV duration as the main outcome.

Results

Five hundred seventeen patients were included. The results are summarized in Table 1.

Table 1. Cox proportional hazards model for the probability of being extubated after surgery for congenital heart disease.

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>B</th>
<th>P-value</th>
<th>HR</th>
<th>Lower 95%CI</th>
<th>Upper 95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (kg)</td>
<td>0.014</td>
<td>&lt;0.001</td>
<td>1.014</td>
<td>1.009</td>
<td>1.018</td>
</tr>
<tr>
<td>Preterm birth</td>
<td>-</td>
<td>0.156</td>
<td>0.856</td>
<td>0.593</td>
<td>1.234</td>
</tr>
<tr>
<td>Previous ICU admission</td>
<td>-</td>
<td>0.403</td>
<td>0.856</td>
<td>0.593</td>
<td>1.234</td>
</tr>
<tr>
<td>CPB duration (minutes)</td>
<td>-</td>
<td>0.003</td>
<td>0.855</td>
<td>0.592</td>
<td>1.234</td>
</tr>
<tr>
<td>Emergency surgery</td>
<td>-</td>
<td>0.173</td>
<td>0.856</td>
<td>0.593</td>
<td>1.234</td>
</tr>
<tr>
<td>Risk factor</td>
<td>B</td>
<td>P-value</td>
<td>HR</td>
<td>Lower 95%CI</td>
<td>Upper 95%CI</td>
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<td>-------------</td>
</tr>
<tr>
<td>Lactate at ICU admission (mmol/dL)</td>
<td>-0.007</td>
<td>0.002</td>
<td>0.993</td>
<td>0.989</td>
<td>0.997</td>
</tr>
<tr>
<td>Infection</td>
<td>0.543</td>
<td>0.001</td>
<td>0.581</td>
<td>0.418</td>
<td>0.808</td>
</tr>
<tr>
<td>RACHS-1 category 2</td>
<td>-0.241</td>
<td>0.104</td>
<td>0.786</td>
<td>0.588</td>
<td>1.050</td>
</tr>
<tr>
<td>RACHS-1 categories 3-6</td>
<td>0.620</td>
<td>&lt;0.001</td>
<td>0.538</td>
<td>0.396</td>
<td>0.730</td>
</tr>
</tbody>
</table>

Legend: ICU, intensive care unit; CPB, cardiopulmonary bypass; RACHS-1, Risk Adjustment for Congenital Heart Surgery 1.

**Conclusions**

Lower birth weight, previous ICU admission, CPB duration, lactate at ICU admission, infection, and RACHS-1 of 3 or more negatively impact the probability of being extubated after surgery for CHD, leading to a prolonged MV duration and associated morbidity.
EXCESS LUNG INJURY IN JUVENILE INFLUENZA A VIRUS INFECTION IS ASSOCIATED WITH INCREASED INTERFERON PRODUCTION AND PULMONARY MONOCYTE RECRUITMENT

Aims & Objectives:

Influenza A virus (IAV) is a highly contagious respiratory virus that infects up to 40% of the pediatric population each year. Healthy children are much more likely to die from IAV infection than are healthy adults, but the mechanisms underlying this susceptibility to severe lung injury are unclear. An excess inflammatory response to IAV infection has been implicated in IAV-induced lung injury and death. Therefore we sought to compare the recruitment of inflammatory monocytes, the activation of the NLRP3 inflammasome, and the development of lung injury in juvenile and adult IAV infection.

Methods

Juvenile (4 week-old) and adult (10-12 week old) mice were intratracheally infected with IAV and evaluated for viral clearance and the development of acute lung injury. Antiviral interferon production (IFN-α/β) and NLRP3 inflammasome activation were assessed in bronchoalveolar lavage fluid (BALF). Monocyte chemoattractant protein 1 (MCP-1) was measured in serum. Immune cell populations in whole lung homogenates were analyzed and compared.

Results

Despite an equal rate of viral clearance in both age groups, juvenile mice had increased levels of IFN-α/β and increased activation of the NLRP3 inflammasome in BALF than adult mice. This was associated with elevated serum MCP-1 in juvenile mice and excessive recruitment of inflammatory monocytes into juvenile lungs. In addition, more severe lung injury was found in juvenile IAV-infected mice as evaluated by histology, respiratory mechanics, and alveolar protein leakage.

Conclusions

In spite of an equal ability to clear IAV, juvenile mice secrete more antiviral interferons, have increased activation of the NLRP3 inflammasome, and produce more MCP-1. This results in increased inflammatory monocyte recruitment and is associated with more severe lung injury in juvenile mice. Our data suggest that age is an important determinate of the innate immune response to IAV and that the inflammatory response is independent of viral titer.
Aims & Objectives:

Following pediatric cardiac surgery, ventilation with high airway pressures can be detrimental to right ventricular function and pulmonary blood flow. Neurally adjusted ventilatory assist (NAVA) improves patient-ventilator interactions, thus helping to maintain spontaneous ventilation. We hypothesized that using NAVA in this population is feasible and allows for lower ventilation pressures.

Methods

We retrospectively studied all children ventilated with NAVA (invasively or non-invasively) after undergoing cardiac surgery between January 2013 and May 2015 in the pediatric intensive care unit of CHU Sainte-Justine, Montreal. Baseline patient characteristics and duration of the different ventilation periods in each mode were described. For the first period of invasive NAVA in each patient, clinical data in the 4 hours before and after the start of NAVA were extracted from electronic patient charts.

Results

33 post-operative courses were included in 28 patients with a median [25th – 75th percentile] age of 3 [1–12] months. NAVA was used invasively in 27 post-operative courses over 49 episodes, for a total duration of 87 [15 - 334] hours per course. Peak inspiratory pressures (PIP) and mean airway pressures (MAP) decreased significantly after the start of NAVA (mean difference of 5.8 cmH₂O (95% CI, 4.1-7.5) for PIP and 2.0 cmH₂O (1.2–2.8) for MAP, p<0.0001 for both). There was no significant difference in vital signs or blood gas values. NAVA was used non-invasively in 14 patients, during 79 [25-137] hours.
Figure: Evolution of PIP and MAP in the 4 hours preceding and following the start of NAVA. Box plots illustrate median, interquartile range, and spread.

Conclusions

NAVA could be used in pediatric patients after cardiac surgery. The significant decrease in airway pressures observed after transition to NAVA could have a beneficial impact in this population. Prospective interventional trials are needed to assess the impact of NAVA on cardiac function and pulmonary vascular resistance in these patients.
THE LUNG

PICC-0303
GRANULOCYTE AND MONOCYTE CD64 EXPRESSION IN CRITICAL BRONCHIOLITIS: ASKING TO THE CIRCULATORY WHITE CELLS ABOUT THE RESPIRATORY ASSISTANCE NEEDED
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1HOSPITAL NIÑO JESÚS, Pediatric Critical Care Unit, Madrid, Spain
2Hospital Infantil Universitario Niño Jesús, Pediatric Hematology and Oncology-, Madrid, Spain

Aims & Objectives:
Flow-cytometry (FC) is an unknown technical tool for clinicians. The granulocyte CD64 expression (gCD64), constitutively expressed in monocytes (mCD64), could be a useful data in severe acute bronchiolitis (SBA). Its significance in order to predict respiratory assistance in SBA has not been studied.

Objectives: 1) To assess the gCD64 and mCD64 in children with SAB 2) To describe the gCD64 and mCD64 based on their maximal respiratory assistance and evolution 3) To compare gCD64 and mCD64 in each group in order to analyze its significance.

Methods
Prospective study of children admitted to the Pediatric Intensive Care Unit because of SAB. Clinical, analytical and management data were collected. A FC, using FACS Canto II, was done at PICU admission to obtain mCD64 and gCD64. After demonstrating normal distribution, parametric tests were applied in the statistical analysis.

Results
Thirty two patients were enrolled (median age 52,5±91,1 days and PICU stance 5±2,9 days). mCD64, gCD64, CD64+/CD45 granulocytes and mCD64/gCD64 in all children are described in figure 1; mean± standard deviations of each respiratory assistance group are in figure 2. There were no differences between groups or relation with antibiotherapy or days of PICU treatment. Finally the patients were matched in two groups: nassal cannula or high flow nassal cannula versus rest (Figure 3). No differences were observed.
<table>
<thead>
<tr>
<th></th>
<th>mCD64</th>
<th>gCD64</th>
<th>%CD64⁺/CD4⁻</th>
<th>mCD64/gCD64 ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Median</strong></td>
<td>11422,5000</td>
<td>4465,0000</td>
<td>54,7000</td>
<td>2,7632</td>
</tr>
<tr>
<td><strong>Standard deviation</strong></td>
<td>3791,85494</td>
<td>2492,20589</td>
<td>19,29083</td>
<td>2,26980</td>
</tr>
</tbody>
</table>

**Figure 1.** mCD64, gCD64, CD64⁺/CD4⁻ granulocytes and mCD64/gCD64 in children with SBA.
<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Minimal</th>
<th>Maximal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mCD64</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Nasal cannula</td>
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<td>11687.5000</td>
<td>491,43921</td>
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<td>12035.00</td>
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<tr>
<td>High-flow nasal cannula</td>
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<td>5668.00</td>
<td>17606.00</td>
</tr>
<tr>
<td>CPAPn</td>
<td>9</td>
<td>11422.4444</td>
<td>3083.75783</td>
<td>6405.00</td>
<td>14469.00</td>
</tr>
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<td>BiPAP</td>
<td>5</td>
<td>12070.2000</td>
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<td>8434.00</td>
<td>19898.00</td>
</tr>
<tr>
<td>VM</td>
<td>2</td>
<td>18409.0000</td>
<td>4658.41947</td>
<td>15115.00</td>
<td>21703.00</td>
</tr>
<tr>
<td>MV</td>
<td>32</td>
<td>11687.0625</td>
<td>3791.85494</td>
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<td>21703.00</td>
</tr>
<tr>
<td><strong>gCD64</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Gafas Nasales</td>
<td>2</td>
<td>2586.0000</td>
<td>45.2548</td>
<td>2554.00</td>
<td>2618.00</td>
</tr>
<tr>
<td>Alto flujo</td>
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<td>CPAPn</td>
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<td>BiPAP</td>
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<tr>
<td>MV</td>
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<td>4513.46258</td>
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<td>8315.00</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>4338.2812</td>
<td>2492.20589</td>
<td>655.00</td>
<td>12223.00</td>
</tr>
<tr>
<td><strong>%CD64+/CD45 granulocytes</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Gafas Nasales</td>
<td>2</td>
<td>81.3000</td>
<td>11.59655</td>
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<td>89.50</td>
</tr>
<tr>
<td>Alto flujo</td>
<td>14</td>
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<td>22.81729</td>
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<td>99.20</td>
</tr>
<tr>
<td>CPAPn</td>
<td>9</td>
<td>87.7444</td>
<td>16.08471</td>
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<td>98.60</td>
</tr>
<tr>
<td>BiPAP</td>
<td>5</td>
<td>88.3800</td>
<td>22.69002</td>
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<td>100.00</td>
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<tr>
<td>MV</td>
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<td>85.7500</td>
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<td>82.70</td>
<td>88.80</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>85.5719</td>
<td>19.02030</td>
<td>12.20</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>mCD64/gCD64 ratio</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gafas Nasales</td>
<td>2</td>
<td>4.5186</td>
<td>1.1096</td>
<td>4.44</td>
<td>4.60</td>
</tr>
<tr>
<td>Alto flujo</td>
<td>14</td>
<td>3.5109</td>
<td>2.52744</td>
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<td>11.85</td>
</tr>
<tr>
<td>CPAPn</td>
<td>9</td>
<td>2.6760</td>
<td>1.51741</td>
<td>0.00</td>
<td>5.77</td>
</tr>
<tr>
<td>BiPAP</td>
<td>5</td>
<td>3.1673</td>
<td>2.75605</td>
<td>1.63</td>
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</tr>
<tr>
<td>MV</td>
<td>2</td>
<td>5.2168</td>
<td>3.68643</td>
<td>2.61</td>
<td>7.82</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>3.3920</td>
<td>2.26580</td>
<td>0.00</td>
<td>11.85</td>
</tr>
</tbody>
</table>

CPAPn: nasal continuous positive pressure; BiPAP: bilevel positive pressure; MV: mechanical ventilation.

Figure 2. mCD64, gCD64, CD64+/CD45 granulocytes and mCD64/gCD64 in children with SBA basis on the maximal respiratory support received.
Conclusions

Granulocyte and monocyte CD64 expression did not offer new data or information about respiratory evolution in children with SBA. Larger clinical studies are necessary.
Aims & Objectives:

Background: High flow nasal cannula (HFNC) provide humidified oxygen at higher flow rates and FiO$_2$ than conventional delivery devices and is increasingly being used in pediatric critical care units (PICU). However, there is limited information on their use, results and safety.

Methods

Methods: We retrospectively reviewed the medical records of patients admitted to a 6-bed tertiary PICU in São Paulo, Brasil, who used HFNC during 2015 to collect information on age, diagnosis, Wood-Downes' score for assessing respiratory distress and outcomes. Failure was considered as the need for further respiratory support while HFNC or after 24 hours of stopping using HFNC.

Results

Results: 21 patients were included with a median age of 1.91 years. The most frequent (66%) diagnosis was respiratory disease. In 57% of all patients HFNC was used after extubation (69% success group, 37% failure group), and 61% used as a way of weaning noninvasive ventilation. 5 patients had complications due to HFNC: 2 skin injury, 2 nose bleeding and 1 pneumomediastinum. In 54% of all infants, the Wood-Downes' score was mild, 42% moderate and 4% severe. In the success group, 100% end the use of HFNC with mild respiratory distress, while in the failure group 62% was moderate and 25% severe.

Conclusions

Conclusion: In this sample, the success of HFNC was more evident when HFNC was used after extubation, showing a new useful tool to prevent reintubation. Patients on HFNC need careful monitoring for deterioration in their respiratory status since those who failed didn’t improve at all their respiratory distress score.
Aims & Objectives:

Fluid overload (FO) is associated with morbidity in pediatric ARDS. We designed this pilot study to assess safety and efficacy of a restrictive fluid protocol to prevent FO in children with ARDS.

Methods

two pediatric intensive care units. Inclusion criteria: children 1 to 24 months-old on invasive mechanical ventilation (MV) fulfilling ARDS criteria. Patients were prospectively enrolled in a restrictive fluid strategy (FS) and compared with subjects without that approach (conventional FS). Maintenance intravenous fluid (MIVF) at 50% of calculated requirements. **Restrictive FS:** Maintenance intravenous fluid (MIVF) at 50% of calculated requirements. Resuscitation fluids were guided by pulse pressure variation. **Conventional FS:** MIVF according to Holiday-Segar formula and resuscitation according to surviving sepsis campaign. Primary outcome: percentage of FO(%FO) at 24, 48 and 72h. Secondary outcomes were MV duration, length of stay (LOS) as well as hemodynamic interventions; safety was assessed by renal function test and glycemia.

Results

27 patients were included in Restrictive FS and 25 were reviewed for Conventional FS (table 1). Restrictive FS had less %FO at 24h, less fluid resuscitation and PRBC transfusions. Hypoglycemia was more frequent in Restrictive FS. Diuretics and their complications were more frequent in Conventional FS. Conventional FS was associated with longer MV duration and LOS. No significant differences were found on BUN and SCr. (Table 2)
Table 1. Demographics and clinical characteristics of patients in conventional and restrictive groups. (*p< 0.05)

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Restrictive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (%)</td>
<td>56%</td>
<td>59%</td>
</tr>
<tr>
<td>Age (mo)</td>
<td>2 (1,4)</td>
<td>7 (2,9)*</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>5.2(4.5,6.8)</td>
<td>7.1(5.1,8.9)*</td>
</tr>
<tr>
<td>MV (hr)</td>
<td>124(96,141)</td>
<td>63(45,72)*</td>
</tr>
<tr>
<td>LOS (days)</td>
<td>8 (7,9)</td>
<td>6(5,9)*</td>
</tr>
<tr>
<td>P/F ratio</td>
<td>171 (122,224)</td>
<td>154 (108,206)</td>
</tr>
<tr>
<td>VAD (days)</td>
<td>3 (0,4)</td>
<td>3(1,3)</td>
</tr>
<tr>
<td>(%)</td>
<td>60%</td>
<td>88%*</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>0%</td>
<td>14.8%*</td>
</tr>
<tr>
<td>Hypokalemia</td>
<td>68%</td>
<td>26%*</td>
</tr>
</tbody>
</table>

MV: duration of mechanical Ventilation; LOS: length of stay; VAD: vasoactive drug support.
Conclusions

Restrictive FS was associated with better outcomes, but it was associated to mild hypoglycemia. Future studies are needed to address this strategy, but careful adjustment of glucose infusion rate and hypoglycemia monitoring must be included.
THE LUNG

PICC-0425
PLEASE, DON’T CONSIDER A TRACHEOSTOMY FOR ME!
C. Gil Escobar¹, C. Abadesso¹, P. Nunes¹, M. Moniz¹, H. Loureiro¹
¹Hospital Prof. Doutor Fernando Fonseca, Pediatric Intensive Care Unit, Amadora, Portugal

Aims & Objectives:

Patients with neuromuscular disease (NMD) who undergo mechanical ventilation via endotracheal intubation (ETI) for respiratory failure (RF) often fail to pass spontaneous breathing trials (SBT) and consequently are at risk for extubation failure. Since there are no guidelines for extubating unweanable patients, these patients with NMD usually are considered for a tracheostomy.

Methods

Case report

Results

We present a 3 years old girl with Congenital Muscular Dystrophy Merosin-Negative, under nocturnal non-invasive ventilation (NIV) since first year of life. She was intubated in the context of pneumonia and RF that was non-responsive to NIV. During the weaning process, she had intermittent right lung atelectasis and after failing 2 SBT’s, a tracheostomy was considered. However, we decided to use an extubation protocol for unweanable NMD patients published for adults. While intubated, mechanically assisted coughing (MAC) was used at pressures of 40 to - 40 cmH2O, with exsufflation-timed abdominal thrusts and suctioning, to maintain SpO2>95% in ambient air. Moreover, sufficient ventilatory support was used to maintain normal CO2 and respiratory rate. After 1 month of ETI, all criteria were met and she was successfully extubated to continuous nasal NIV, maintaining intensive MAC when needed. After ten days she was discharged home under nocturnal NIV.

Conclusions

Unweanable intubated patients with NMD who satisfy specific criteria can be successfully extubated to full NIV and MAC. This new paradigm applied for non-weanable adult NMD patients should also be considered in children, to avoid unnecessary tracheostomies. More studies are needed to evaluate the extent of this protocol.
THE USE OF OPEN LUNG BIOPSY IN PAEDIATRIC INTENSIVE CARE: OUR EXPERIENCE OVER TEN YEARS

C. Goodman¹, B. Lakin¹, C. Halfhide²

¹Alder Hey Children’s NHS Foundation Trust, PICU, Liverpool, United Kingdom
²Alder Hey Children’s NHS Foundation Trust, Pulmonology, Liverpool, United Kingdom

Aims & Objectives:

Background

Open lung biopsy (OLB) is an invasive investigation which is performed infrequently due to its potential complications in a fragile patient population. Nevertheless, results obtained can significantly influence management decisions. In this review, our experience with patients in Paediatric Intensive Care (PIC) undergoing OLB over 10 years is described.

Aims/Objectives:

To evaluate our practice in carrying out open lung biopsies, its safety and its impact on management.

Methods

Retrospective notes review.

Results

A total of 11 patients were indentified with a median age of 8 months (range 13 days - 14 years) at the time of OLB.

Indications included: Presumed malignancy (n=1), recurrent pleural effusions (n=2), neonatal respiratory failure (n=2), failure to wean from mechanical ventilation (n=2) and chronic respiratory symptoms/oxygen requirement (n=4).

Complications included: Significant bleeding (n = 1), increases in ventilatory support (n=1), new requirement of invasive ventilation >24 hours (n=1) and clinically significant pneumothorax (n=2). There were no complications in the 2 patients undergoing OLB whilst on extracorporeal membrane oxygenation (ECMO).

The impact in management included: Commencing chemotherapy (n=1), modification of chylothorax management (n=1), palliation (n=2) and immunomodulation (n=5). There were 3 deaths within 28 days of OLB.
Conclusions

Open lung biopsy has been performed infrequently on our PICU but for a wide variety of indications. Significant changes in management were common following OLB but the exclusion of a significant diagnosis in the remaining patients may be equally as important. Complications were not uncommon but these were managed relatively easily. Therefore, a cautious approach in selecting patients for OLB seems justified.
THE LUNG

PICC-0192
MODIFIABLE RISK FACTORS FOR VENTILATOR ASSOCIATED EVENTS IN A PEDIATRIC INTENSIVE CARE UNIT

R. Guess¹, J. Vaewpanich¹, J. Coss Bu¹, C. Kennedy¹, J. Starke², J. Graf¹, S. Thammasitboon¹

¹Baylor College of Medicine, Pediatric Critical Care, Houston, USA
²Baylor College of Medicine, Pediatric Infectious Disease, Houston, USA

Aims & Objectives:

The CDC proposed new surveillance definitions for Ventilator Associated Events (VAE), including ventilator associated conditions (VAC), infection-related ventilator-associated complications (IVAC), and ventilator-associated pneumonias (VAP). Our systematic application of this new approach revealed VAC and IVAC predicted an increase in ICU days, hospital length of stay, ventilator days, and mortality. The existing evidence-based VAP prevention bundles are inadequate to prevent the broader spectrum of complications. This project aims to identify modifiable risk factors for VAC and IVAC.

Methods

Matched case control study. From 606 mechanically ventilated patients (3,787 ventilator days) who met inclusion criteria during 1-year period, 70 patients with VAC were matched 1:2 to controls based on age, immune status, and time-to-event. Variables analyzed include demographics, severity of illness scores, ventilator parameters, neuromuscular blockade (NMB) infusion, steroid exposure, estimated creatinine clearance (eCrCl), and fluid overload (FO) status. We compared cases and controls using descriptive statistics and examined associations between covariates and VAC and IVAC using logistic regression.

Results

Cases and controls were well matched on most baseline characteristics, but case patients had higher PIM 2 score (mean, -2.9 vs -3.5, p=0.02). Worsening renal function (% decrease in eCrCL), peak fluid accumulation, NMB infusion, steroid exposure, mean airway pressure, mean peak inspiratory pressure (PIP) were associated with VAC with odds ratios (95%CI) of 17.93(4.6-69.9), 3 (1.1-8.4), 3(1.7-5.8), 2.15(1.2-3.9), 1.12(1.03-1.23), 1.1(1.04-1.15) respectively. After adjusting for PIM 2 score, mean PIP was an independent predictor of VAC, whereas NMB infusion was an independent predictor of IVAC. Worsening renal function was a strong
predictor of both VAC and IVAC.

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ventilator-associated condition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease in eCrCl (%)</td>
<td>6.16</td>
<td>1.07-35.43</td>
</tr>
<tr>
<td>Mean PIP</td>
<td>1.12</td>
<td>1.02-1.22</td>
</tr>
<tr>
<td>PIM 2 score</td>
<td>1.25</td>
<td>1.013-1.54</td>
</tr>
<tr>
<td><strong>Infection-related ventilator-associated complication</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease in eCrCl (%)</td>
<td>12.02</td>
<td>1.27-113.5</td>
</tr>
<tr>
<td>NMB infusion</td>
<td>3.19</td>
<td>1.17-8.68</td>
</tr>
<tr>
<td>PIM 2 score</td>
<td>1.35</td>
<td>1.06-1.72</td>
</tr>
</tbody>
</table>

**Conclusions**

Higher mean PIP is a risk factor for VAC, whereas use of neuromuscular blockade infusion is a risk factor for IVAC. Worsening renal function increases risk for both VAC and IVAC. Future research and quality improvement should address these risk factors aimed at reducing rates for VAE.
THE LUNG

PICC-0180

PEDIATRIC PARAPNEUMONIC EFFUSION AND EMPYEMA- CRITERION TO PREDICT THE NEED FOR EARLY INTERVENTION

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2Hamad Medical Corporation, Pediatric Pulmonology, Doha, Qatar
3Hamad Medical Corporation, Radiology, Doha, Qatar
4Hamad Medical Corporation, Pediatric Neurology, Doha, Qatar
5Hamad Medical Corporation, Pediatrics, Doha, Qatar

Aims & Objectives:

To assess if stratification of patients based on clinical severity, laboratory markers and radiological findings at presentation would enable better prediction for the need for an early surgical intervention.

Methods

Single centre retrospective cohort study done in the in-patient pediatric wards of a tertiary care centre in the State of Qatar. 56 children (aged 6 months – 14 years) with empyema or parapneumonic effusion, from July 2009- June 2013. Patients were classified into mild and severe clinical presentation based on the 2011 British thoracic society pneumonia guidelines. Interventions were categorized as conservative (antibiotics only), non-conservative (antibiotic and surgical intervention). The values of C-reactive Protein (CRP), ESR, WBC count upon admission and follow up were assessed, along with pleural fluid markers such as LDH, glucose and PH. The chest xray and chest USG were also assessed for severity and loculations.

Results

Of the 56 patients included, 29 (52%) had severe and 27 (48%) had mild clinical presentation. 26 patients (46.4%) were managed conservatively, while 30 patients (53.6%) required intervention. Younger patients (3.8±3 years) tend to have increased risk for intervention, severe clinical presentation and loculations on USG. Age ≤ 5 years, severe clinical presentation, serum WBC count ≥20,000/mm³, ESR ≥80mm/hr, serum CRP≥100mg/dl, moderate to severe effusion on chest radiograph and presence of loculation on USG individually increased the likelihood for a surgical intervention in pediatric patients with parapneumonic effusion. Having ≥ 4 out of 7 criteria predicted a high risk for the need for surgical intervention (OR-6.93, 95%CI-1.2-37, p=0.023, sensitivity 72%, specificity 73%).
<table>
<thead>
<tr>
<th>Variable</th>
<th>Conservative Mean ± SD (N)</th>
<th>Non-Conservative Mean ± SD (N)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Stay</td>
<td>8.4 ± 3.5 (26)</td>
<td>16.4 ± 7.3 (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Age</td>
<td>5.8 ± 3.3 (26)</td>
<td>4.2 ± 3.0 (30)</td>
<td>0.064</td>
</tr>
<tr>
<td>Total Antibiotic duration (days)</td>
<td>16.4 ± 7.3 (26)</td>
<td>29.5 ± 11.4 (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Admission day when fever resolved</td>
<td>4.2 ± 2.7 (26)</td>
<td>10.4 ± 7.3 (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Admission day when O2 requirement decreased</td>
<td>2.6 ± 2.1 (26)</td>
<td>7.5 ± 6.1 (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Admission day when resp. distress improved</td>
<td>3.0 ± 2.0 (26)</td>
<td>8.0 ± 5.0 (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Admission day when appetite improved</td>
<td>4.5 ± 1.9 (26)</td>
<td>10.3 ± 6.6 (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Admission day when general health improved</td>
<td>4.9 ± 2.0 (26)</td>
<td>12.1 ± 8.0 (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ESR at presentation (mm/hr)</td>
<td>69.7 ± 26.3 (22)</td>
<td>89.3 ± 26.5 (20)</td>
<td>0.021</td>
</tr>
<tr>
<td>CRP at presentation</td>
<td>160.9 ± 114.6 (14)</td>
<td>187.2 ± 103.4 (24)</td>
<td>0.471</td>
</tr>
<tr>
<td>WBC count at presentation (x103 cells/μL)</td>
<td>12.7 ± 5.4 (24)</td>
<td>20.0 ± 10.3 (29)</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Table 2 - showing the outcome measures between the conservative and interventional groups.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Clinical Severity at Presentation</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild Mean ± SD (N)</td>
<td>Severe Mean ± SD (N)</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>11.9 ± 7.9 (27)</td>
<td>16.1 ± 8.3 (29)</td>
</tr>
<tr>
<td>Age</td>
<td>6.2 ± 3.4 (27)</td>
<td>3.8 ± 2.5 (29)</td>
</tr>
<tr>
<td>Total Antibiotic duration (days)</td>
<td>20.1 ± 11.3 (27)</td>
<td>26.5 ± 11.3 (29)</td>
</tr>
<tr>
<td>Admission day when fever resolved</td>
<td>5.3 ± 6.7 (27)</td>
<td>9.5 ± 5.5 (29)</td>
</tr>
<tr>
<td>Admission day when O2 requirement decreased</td>
<td>2.9 ± 3.6 (27)</td>
<td>7.4 ± 5.7 (29)</td>
</tr>
<tr>
<td>Admission day when resp. distress improved</td>
<td>3.6 ± 3.2 (27)</td>
<td>7.8 ± 4.8 (29)</td>
</tr>
<tr>
<td>Admission day when appetite improved</td>
<td>5.9 ± 6.3 (27)</td>
<td>9.1 ± 4.8 (29)</td>
</tr>
<tr>
<td>Admission day when general health improved</td>
<td>6.6 ± 6.8 (27)</td>
<td>10.7 ± 6.6 (29)</td>
</tr>
<tr>
<td>ESR at presentation (mm/hr)</td>
<td>75.6 ± 27.4 (21)</td>
<td>82.5 ± 28.6 (21)</td>
</tr>
<tr>
<td>CRP at presentation</td>
<td>125.4 ± 85.1 (15)</td>
<td>211.5 ± 107.5 (23)</td>
</tr>
<tr>
<td>WBC count at presentation (x103 cells/µL)</td>
<td>14.2 ± 7.4 (25)</td>
<td>18.8 ± 10.0 (28)</td>
</tr>
</tbody>
</table>
Conclusions

An objective criterion for pediatric empyema can reasonably predict patients requiring early intervention. Prospective trials are needed to see if early stratification and intervention in patients with parapneumonic effusion based on such a criterion would reduce the LOS and cost-burden on the healthcare system.
Aims & Objectives:

Introduction: The use of Ultrasound for assessment of diaphragmatic dysfunction after pediatric cardiac surgery may be underutilized. This study aims to evaluate the role of bedside Ultrasound performed by intensivist to diagnose diaphragmatic dysfunction and the need for plication after pediatric cardiac surgery.

Methods

Methods: Retrospective cohort study on prospectively collected data for post-operative children admitted to Pediatric Cardiac Intensive Care Unit (CICU) during 2013. Diaphragmatic dysfunction was suspected based on difficulties in weaning from positive pressure ventilation or Chest X-Ray findings. Ultrasound studies were performed by Pediatric CICU intensivist and confirmed by qualified radiologist.

Results

Results: Out of 344 post-operative patients, 32 needed diaphragm ultrasound for suspected dysfunction. Ultrasound confirmed diaphragmatic dysfunction in 17/32 (53%) patients with an average age and weight of (10.8±3.8) months and (6±1) Kg respectively. The incidence rate of diaphragmatic dysfunction was (4.9%) in relation to the whole population. Diaphragmatic plication was needed in 9/17 cases (53%), with rate of 2.6% in post-operative cardiac children. Mean plication day was (15.1±1.3) after surgery. All patients who underwent plication were under 4 months of age. Post plication they were discharged with mean Pediatric CICU and hospital stay of (19±3.5) and (42±8) days respectively. An ultrasound based algorithm for management of diaphragmatic dysfunction was established guided by these results.

Conclusions

Conclusions: Critical care ultrasound assessment of diaphragmatic movement is a useful and practical bedside tool that can be performed by a trained pediatric (CICU) intensivist. It may help in early detection and management of diaphragmatic dysfunction.
dysfunction post pediatric cardiac surgery through a decision-making algorithm that may have potential positive effect on morbidity and outcome.
Aims & Objectives:

PGD after lung transplantation (LTx) in adults has been reported to occur in 11% - 25% of patients with mortality rates as high as 50%. There is sparse literature on the prevalence of PGD in children undergoing LTx as well as its association with outcomes. We sought to identify the prevalence of severe PGD at our institution and identify its impact on early outcomes after LTx.

Methods

A retrospective, cohort study of all patients <18 years who underwent bilateral sequential LTx between 2003 – 2015. We collected demographic data, P_{a}O_{2}/FiO_{2} (P/F) ratios, and reviewed chest radiographs at 4 time points up to 72 hours. Severe PGD (Grade 3) was identified as per current ISHLT definition (P/F ratio <200 and positive chest radiograph). Primary outcomes were ventilation days, length of stay, and 90-day mortality.

Results

70 patients underwent LTx during the study period. The indications were: cystic fibrosis 67%, pulmonary hypertension (PH) 20%, and other 13%. Additional demographic data were: female 65.7%, median age 14 years, and average weight 37 kg. The prevalence of severe PGD at times 0, 24, 48, and 72 hours was 50%, 38.6%, 27.1%, and 15.7% respectively. Severe PGD at 48 hours was associated with a longer ventilation days compared to patients without severe PGD (5 days vs. 2 days, p<.001). Overall 90-day mortality was 4.4 %. Severe PGD at 48 hours was associated with 90-day mortality (0% vs. 16.7%, p=.016). Severe PGD was associated with PH as an indication for LTx (OR=4.3, 95% CI 1.2 - 15.8).

Conclusions

The prevalence of PGD in children undergoing LTx is similar to that seen in adults, and although the duration of mechanical ventilation was longer in patients with severe PGD, early mortality was low. Severe PGD at 48 hours was associated with early mortality, but with better survival than reported in adults.
Aims & Objectives:

Viral bronchiolitis leads to high morbidity in young children worldwide. Children with severe bronchiolitis often require PICU admission for mechanical ventilation. In critically ill patients, including those with acute respiratory failure, early fluid overload is common and is associated with adverse outcomes such as mortality, prolonged mechanical ventilation and serious oxygenation deficits. It is unclear if this also applies to young children with severe bronchiolitis. In this study, we aimed to investigate the association between cumulative fluid balance (CFB) and duration of mechanical ventilation and oxygenation in children with severe bronchiolitis.

Methods

We performed a retrospective study of children (age <2 years) admitted to the PICU between 2008-2014 admitted with bronchiolitis requiring mechanical ventilation. The primary outcome was duration of mechanical ventilation. Secondary outcome was oxygenation, determined by daily mean oxygen saturation index (OSI). These outcomes were compared against the CFB on day 3 of mechanical ventilation (CFB3), to assess early fluid status, using uni- and multivariable linear regression.

Results

A total of 135 children had a mean CFB3 (±SD) of +97.9 (±49.2) ml/kg. The CFB3 was significantly correlated with a longer duration of mechanical ventilation in multivariable linear regression (p<0.05). However, no association was found between the CFB3 and OSI during the period of mechanical ventilation.

Conclusions

Early fluid overload is an independent predictor of prolonged mechanical ventilation. However, oxygenation is not associated with early fluid overload. This study suggests that avoiding early fluid overload is a promising target for therapy to reduce disease burden in critically ill children with severe bronchiolitis. Prospective testing in a clinical trial is warranted.
THE LUNG

PICC-0831
CHARACTERIZATION IN THE USE OF NONINVASIVE VENTILATION AND ITS RELATIONSHIP WITH CONVENTIONAL CLINICAL INDICATORS IN PATIENTS OF PEDIATRIC INTENSIVE CRITICAL CARE UNIT (PICU)
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Aims & Objectives:

Abstract Background:

The use of non-invasive ventilation (VNI) system, as a respiratory support modality is increasing as an alternative to after invasive mechanical ventilation VMI. This suggests that VNI system may decrease the need for intubation.

Objectives: to determine safety, tolerability, and efficacy of early initiation of noninvasive ventilation systems in the management of children admitted a PICU with respiratory failure and/or high oxygen requirements.

Methods

We performed a retrospective, observational clinical study of patients treated with a non-invasive ventilation systems (high-flow nasal cannula (HFNC) and ventilacion with positive presion (VNI-PP). during 3 years. The following variables were analyzed: clinical severity score, respiratory rate, heart rate, clinical improvement, oxygen saturation, blood gases, complications, and the need for invasive ventilation after and before starting the treatment. Identifying predictive factors for NIV success would help define which patients will benefit from NIV treatment whilst avoiding delays in
Results

179 patients were studied (41.8% girls and 58.1% boys). With NIV therapy system (HFNC) 54.7%(98) patients; VPP 45.2%(81) patients. The duration of treatment was 5 days. NIV therapy systems was most frequently used in respiratory diseases. Mild complications (initial irritability and excessive humidity) were observed, but treatment interruption was not required. The success was observed 44.1%. A higher PaCO2
after NIV systems is a determinant of failure (OR:5.84(IC95%:1.507-22.674; p=<0,05).

Conclusions

we can say that NIV systems can be used with success in patients with respiratory failure mild, moderate and/or high oxygen requirements.
Aims & Objectives:

To study the diagnostic rate, safety, and clinical yield of flexible bronchoscopy via an intensivist led service in critically ill children

Methods

This was a retrospective study of all patients admitted in regional pediatric intensive care unit of tertiary care hospital in India. All consecutive patients who underwent flexible bronchoscopy (FB) were enrolled and data were collected from the hospital records.

Results

50 flexible bronchoscopies were performed by two intensivists on 47 patients that were admitted to the PICU over 9 month’s period from April 2015 to December 2015. Median age was 10 months (range- 2 months to 144 months). Male and female ratio was 3:2. Bronchoscopy was generally performed soon after PICU admission, at a median time of 2 days. The majority of the FBs were diagnostic (28 of 50). 8 of these were undertaken to detect etiology of upper airway obstruction, suspected foreign body and 20 to aid the diagnosis of pneumonia. Therapeutic procedures including resolution of lobar collapse were undertaken in 22 cases. 72% of the diagnostic FBs were reported to be abnormal. Positive microbiological results which altered or confirmed changes in patient management occurred in 34% children who had BAL specimens cultured. Organisms were gram negative bacilli (Pseudomonas, Klebsiella Acinetobacter) in 15 (30%), gram positive cocci (Staphylococcus) in 1 (2%) and fungi (Candida) in 1 (2%). Complications from the bronchoscopy occurred in 15% of the patients. The main complication was a decrease in oxygen saturation (SpO2) of during FOB, which occurred in 6 children (12%). There were no fatalities experienced at our center.

Conclusions

There is a high yield of positive findings from undertaking FB for both diagnostic and therapeutic purpose. Positive microbiological results in alteration or confirmation of changes in patient management. FB should be seen as a routine diagnostic and therapeutic tool in paediatric intensive care.
Aims & Objectives:

The aim of the study was to assess the antibiotic sensitivity pattern and microbiological isolates from the bronchoalveolar lavage samples in pediatric intensive care unit (PICU) of tertiary care hospital in south India.

Methods

This prospective study was done in the period from January 2015 to December 2015, enrolling patients undergoing mechanical ventilation for more than 48 hour. Bronchoalveolar lavage (BAL) was collected from patients with suspected ventilator associated pneumonia (VAP), and quantitative cultures were performed on all samples.

Results

Out of 50 flexible bronchoscopies performed over 1 year period, 17 BAL samples were positive for microorganisms. 9 (53 %) patients had monomicrobial infection and 8 (47%) had polymicrobial infection. Gram negative bacilli accounted for 92% of all the causative agents. The most common organisms were Pseudomonas aeruginosa (36%), followed by Acinetobacter baumannii (32%), Klebsiella pneumoniae (24%), Staphylococcus aureus (4%), candida (4%). Among the 9 isolates of Pseudomonas aeruginosa, 3 (3.70%) were resistant to all antibiotics. Resistance to amikacin was (56%), ceftazidime (44%), Ciprofloxacin (67%), and gentamicin (67%), meropenem (67%). Among the 8 isolates of Acinetobacter baumannii, 2 (13.3%) were resistant to all antibiotics tested in the study, including carbapenems while 4 (57%) isolates were resistant to ceftazidime, ciprofloxacin, amikacin and meropenem but sensitive to gentamicin. 1 (14%) isolates was sensitive to all antibiotics. Among the 6 isolates of Klebsiella pneumoniae, resistance to amikacin (16%), ceftazidime (83%), ciprofloxacin (100%) and gentamicin (100%), meropenem (16%) was found. 18 isolates (72%) were multidrug resistant (MDR) i.e. resistant to three or more class of antibiotics.

Conclusions

The bacteriological approach for the management of VAP helps the clinicians in choosing the appropriate antibiotics. Due to the rising incidence of multidrug-resistant
organisms in ICUs, prompt diagnosis of VAP is an urgent challenge for formulating appropriate therapies.
THE LUNG

PICC-0341
VIRAL AETIOLOGY OF UNDER 5 CHILDREN ADMITTED WITH ACUTE SEVERE RESPIRATORY INFECTION IN PICU - A PROSPECTIVE OBSERVATIONAL STUDY
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Aims & Objectives:

Acute respiratory infections (ARI) are one of the major causes of morbidity and mortality in young children. The epidemiology of acute respiratory infection is constantly changing in which both viral and bacterial causal agents play various roles. This study was done to identify viruses associated with primary acute respiratory tract infection among children less than 5 years admitted to PICU requiring respiratory support or oxygen therapy.

Methods

It is a prospective observational study. We enrolled children aged 1 to 60 months admitted to PICU with primary acute respiratory infection requiring minimum 12 hours of oxygen therapy between August 2014 and March 2015. Throat swabs were taken for all children enrolled and viruses isolated by RtpCR technique. We also performed a comparison between viral isolate positive and negative children with regards to surrogate diagnostic markers and outcome measures.

Results

Of 70 children who fulfilled the enrolment criteria, 35(50%) were found to have viral etiology. Rhino virus was found to be the most common isolate n=15 (42.85%) followed by RSV accounting for 14(40 %) children. Of 22 children requiring advanced invasive ventilator support, 9 children were found to have respiratory virus isolate. Commonly used surrogate diagnostic markers like CRP, ALC, and ANC were found to be not significantly different between the groups.

Conclusions

Viral pneumonia is one of the common causes of ARI in children necessitates intensive care unit admission and viral pneumonia need not always be mild and self-limiting in immunocompetent. In our observation, Human rhino virus and RSV were the two most common viral isolates and H1N1 was associated with severe disease.
THE LUNG

PICC-0346

DOES HIGHFLOW (HHFNC) OXYGEN THERAPY PERFORM AS 'EQUALLY EFFECTIVE RESPIRATORY SUPPORT' IN UNDER-5 CHILDREN WITH PNEUMONIA WHILE COMPARING THOSE WITH BRONCHIOLITIS? - RETROSPECTIVE OBSERVATIONAL STUDY

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Aims & Objectives:

To compare the clinical effectiveness of heated humidified high flow nasal cannula (HHHNFC) oxygen therapy in under five children with clinical diagnosis of severe pneumonia with those of bronchiolitis requiring oxygen therapy

Methods

We enrolled under five children who have received HHFNC with the clinical diagnosis of either bronchiolitis or severe pneumonia between January 2014 and December 2014 by retrospective case review. We performed an inter-group comparison of the proven surrogate outcome measures like duration of oxygen therapy, duration of HHFNC therapy, duration of PICU stay, duration of hospital stay. Incidence of intubation was also compared between the two groups

Results

Data retrieved from hospital electronic database and pediatric critical care case records by retrospective review. Of 113 children fulfilled the enrolment criteria, 50 had bronchiolitis and 63 had severe pneumonia by clinical criteria. Baseline characteristics like sex distribution and day of illness on which hospitalized was comparable among the study groups (p 0.95; p 0.12). Age distribution was significantly different (p 0.003) as anticipated because the severe pneumonia had significantly higher mean age. While comparing the surrogate outcome measures like duration of oxygen therapy, duration of HHFNC, duration of PICU stay, there was no significant difference observed between the groups. Number of intubation events was comparable in both groups, though the events were minimal in both groups.

Conclusions

HHFNC serves as an equally effective respiratory support therapy in children with severe pneumonia requiring oxygen therapy while comparing those with bronchiolitis. Complications such as empyema, progressive MODS, co-infections may worsen the
respiratory status to necessitate intubation in case of community acquired pneumonia.
THE LUNG

PICC-0441
THERAPEUTIC INDICATIONS AND CLINICAL OUTCOME OF UNDER-5 YEARS CHILDREN RECEIVED HIGH FLOW (HHFNC) OXYGEN RESPIRATORY SUPPORT THERAPY IN PICU - A PROSPECTIVE OBSERVATIONAL STUDY
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Aims & Objectives:
To study the indications of HHFNC in children requiring intensive care unit admission and their clinical outcome

Methods
It is a prospective observational study. We enrolled all under five children who have received HHFNC as respiratory support therapy in PICU from January 2015 to November 2015. Clinical outcome was measured using proven surrogate outcome measures like time to clinical and respiratory stability, duration of oxygen therapy, duration of HHFNC therapy and change in respiratory distress score.

Results
Of 100 children enrolled, 44 children had pneumonia, 19 had bronchiolitis, 18 had post extubation tachypnea while rest comprised of severe dengue, under 5 wheeze, acute laryngotracheobronchitis, severe anemia, peritonitis, laryngomalacia with gastroesophageal reflux, cardiomyopathy. The median time to clinical and respiratory stability in our study group was 45 minutes, median duration of HHFNC and oxygen therapy were 48 hours and 86.5 hours respectively. Heart rate, respiratory rate, oxygen saturation and RDS score analysed at 0, 1 and 2 hour of HHFNC therapy revealed that there was significant improvement in above mentioned parameters (p<0.05) after initiation of HHFNC. HHFNC failed in five children (5%) necessitating intubation and invasive ventilation. There were no incidence of air leak or any other adverse outcome observed in our study cohort.

Conclusions
HHFNC is an effective respiratory support therapy in children presenting with respiratory distress due to various etiology and clinical effectiveness is comparable to those with bronchiolitis. HHFNC significantly improves heart rate, respiratory rate and respiratory distress score in the study cohort within 2 hours of initiation of this respiratory support therapy.
Aims & Objectives:

Congenital central hypoventilation syndrome (CCHS) is characterized by ventilatory insensitivity to hypercapnia and hypoxemia during sleep and/or wakefulness. The management of CCHS is long-term ventilation. However, ventilation can be challenging given differences in the control of breathing during different sleep stages resulting in higher blood carbon dioxide (CO$_2$) levels during non-Rapid Eye Movement (NREM) sleep. Intelligent Volume-Assured Pressure Support (iVAPS) is a mode of Bi-level ventilation in which the pressure support is modulated to ensure a constant tidal volume.

The aim of this study was to determine if Bi-level ventilation with iVAPS mode is more effective at controlling hypercapnia than Bi-level ventilation with Spontaneous/ Timed (S/T) mode.

Methods

A retrospective chart review of CCHS patients who underwent both a titration polysomnogram (PSG) with standard Bi-level ventilation S/T mode and a follow up study with Bi-level ventilation iVAPS mode at SickKids, Toronto, Canada between January 1, 2013 and September 30, 2015 were included. Baseline characteristics and PSG data were reported as median (interquartile range (IQR)) for continuous variables and frequencies for categorical variables. Comparisons were made between S/T mode and iVAPS mode using non-parametric Wilcoxon pair signed-rank test. Statistical analysis was performed using Graph Pad Prism 6.

Results

Eight (4 male) CCHS children were included. They had PSG with Bi-level ventilation with S/T mode at median age of 9 (IQR 7-12) years. All children were managed exclusively with nocturnal noninvasive Bi-level ventilation. Three patients had 20/25 polyalanine repeat mutations (PARMS) and the remaining children had non-polyalanine repeat mutations. The NREM transcutaneous CO$_2$ (tcCO$_2$), median (IQR) for iVAPS was 43 (36-52) mmHg versus 46.5(43-56) mmHg for S/T mode, (p value=0.046). There were no other significant differences in PSG characteristics between the two modes (Table 1).
Conclusions

iVAPS significantly improved hypercapnia associated with CCHS during NREM sleep as compared to traditional S/T mode.
THE LUNG

PICC-0592
LONG-TERM NONINVASIVE VENTILATION FOR 32 INFANTS AT HOME

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Aims & Objectives:

Noninvasive ventilation (NIV) became popular in children, but in infants under one year, the indication of NIV, when to start NIV and the choice of mask are unclear.

Out of 73 children on NIV at home whom we experienced for 4 years, 32 patients were under 1 year.

Methods

Underlying diagnosis, NIV start age, ventilation mode, mask type, follow-up periods, outcome were chart-reviewed. Daily usage time was evaluated by build in SD card. Effectiveness of NIV was evaluated by overnight pulseoximetry at home.

Results

(1) Underlying diagnosis: 18/13 trisomy with congenital heart disease(18), cerebral palsy(5), craniofacial anomaly(4), congenital myopathy (3), chronic lung disease of premature infant(2)

(2) NIV start age: 4 month

(3) Mode of NIV: CPAP(13), Bilevel PAP(19)

(4) Mask: nasal(16), total face(9), oronasal(4), nasal cannula(3)

(5) Ventilator used: Respironics BiPAP A40/AVAPS etc.

(6) Average daily usage time: 10hr

(7) Overnight pulsoxymetry : duration of $\mathrm{SpO}_2 < 90$ was 2%

(7) Follow-up periods: 17 months

(8) Outcome: cardiac death without intubation(7), tracheostomy(1), withdrawal(4), still on NIV(20)

Conclusions
NIV for small infants is feasible if appropriate mask is selected, but oronasal / total face mask has a risk of vomiting / suffocation, and nasal cannula is not appropriate for pressure support ventilation because of large leak.

Smallest nasal mask available in Japan is made for infants >5kg. We need smaller nasal mask and shorter headgear which can be used for 2kg baby.
Aims & Objectives:

To determine whether HFNC therapy decreases intubation rate in ARI

Methods

All children aged 1 month-18 years admitted with ARI (defined as any acute respiratory illness requiring intensive care) from January 2007-October 2015 were included. Children with chronic lung disease, tracheostomy or primary CNS cause for ARI were excluded. Children were divided into two cohorts: Cohort 1 children admitted before November 2011 (pre-HFNC) and Cohort 2 children admitted from November 2011 (post HFNC). Children were further divided into four etiological groups: Bronchiolitis, Asthma, Pneumonia and ARDS. Intubation rates, duration of invasive ventilation, PICU LOS and mortality were analyzed. Need for intubation after starting HFNC was classified as HFNC failure

Results

937 children were included. Success rate of HFNC in bronchiolitis was 100%, asthma 93.3% and pneumonia 87.5%. Duration of invasive ventilation decreased in children with asthma and bronchiolitis. After introduction of HFNC, use of other modes of NIV decreased in children with pneumonia. There was no change in the PICU LOS and mortality after introduction of HFNC

Conclusions

HFNC decreases intubation rate in children with bronchiolitis. It also decreases duration of invasive ventilation in children with bronchiolitis and asthma. The success rate of HFNC in children with bronchiolitis, asthma and pneumonia is very high
THE LUNG

PICC-0435
THE EFFECT OF POSITIVE END EXPIRATORY PRESSURE ON PEAK INSPIRATORY:EXPIRATORY FLOW RATIOS DURING PAEDIATRIC MANUAL HYPERINFLATION
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Aims & Objectives:

Manual Hyperinflation (MHI) is widely used in paediatric intensive care physiotherapy treatments to aid secretion clearance (McCord et al 2013). It has been suggested that the critical value for two-phase gas-liquid flow (and therefore theoretical sputum clearance) to occur is at a ratio of 0.9 (Peak Inspiratory Flow/Peak Expiratory Flow (PIF/PEF)) (Kim et al 1986). While previous research has considered the effect of positive end expiratory pressure (PEEP) on PEF, the aim of this data analysis was to investigate whether a change in PEEP during MHI affected PIF/PEF ratios which might impact on sputum mobilisation.

Methods

MHI applied by sixteen physiotherapists with experience in intensive care to an infant mannequin. Data were captured using respiratory profile monitor. A statistical relationship between PEEP and PIF/PEF ratio was explored using a Pearson correlation coefficient.

Results

A total of 2,956 breaths were recorded. 2,017 (68%) had a PIF/PEF ratio <0.9. Statistical analysis showed a very weak correlation between PEEP and PIF/PEF ratio (r=0.17). When the breaths that reached a PIF/PEF ratio of <0.9 were sub-analysed, this correlation weakened further (r=0.09).

Recorded PEEP was 0-28.4cmH20. PIF/PEF ratio <0.9 was demonstrated to be achievable with a PEEP in excess of 15cmH20 (2.28% of breaths).

Conclusions

No significant correlation was found between PEEP and PIF/PEF ratio. This provides provisional data that PEEP during MHI may affect sputum mobilisation less with paediatric open-ended circuits in comparison to previous adult research. Critical air flow rates for sputum mobilisation were achieved at PEEP of 0 to >15cmH20. Research is required to investigate this further in a clinical cohort. This may impact on safeguarding patients from atelectrauma if PEEP can be applied throughout MHI without compromising sputum mobilisation.
Aims & Objectives:

Air leak syndrome can be a serious complication of necrotizing pneumonia whose handling may be challenging. Report in the literature describe the use of Heliox on invasive mechanical ventilation treatment of pneumothorax in animals. The aim of this study is to describe an alternative use of Heliox to treat patients with air leak syndrome refractory to conventional therapy.

Methods

Retrospective analysis of medical records and patient database.

Results

We describe an infant, RDRO, four months old, admitted to a Brazilian Pediatric Intensive Care Unit (PICU) diagnosed with necrotizing pneumonia and respiratory failure. The patient developed Acute Respiratory Distress Syndrome not responsive to conventional protective ventilation, neither to pulmonary-specific ancillary treatment such as alveolar recruitment maneuvers, inhaled nitric oxide, prone position and surfactant instillation. He presented bilateral pneumothoraces requiring chest tube drainage and subsequent continuous aspiration. High frequency oscillatory ventilation was initiated without success, and the patient developed refractory hypoxemia and needed elevated values of mean airway pressure (Paw), maintaining air leak syndrome. Computed tomography and chest X-ray showed parenchymal disease associated with an encysted pneumothorax. Laparoscopic thoracoscopy was performed without significant clinical improvement. Two extubations were unsuccessful due to respiratory failure, returning to conventional invasive mechanical ventilation. Due to conventional therapy response failure, mechanical ventilation with Heliox, a low density gas mixture of helium and oxygen (80:20 ratio), known to be nontoxic, noncarcinogenic, and have no lasting effects on any human organs, was attempted for three days. After this, a CT scan of the chest was repeated showing total reabsorption of air leak and pneumothorax absence. Two days later the patient was successfully extubated to non-invasive ventilation and was discharged of the PICU after a week.
Conclusions

Heliox is a safe therapy and could be an effective treatment to reduce pneumothorax in patients diagnosed with necrotizing pneumonia with air leak syndrome refractory to conventional therapy.
Aims & Objectives:

Pulmonary agenesis is a rare congenital malformation, with few cases reported in literature. It consists of the complete or partial absence of the pulmonary parenchyma, bronchi or lung vessels and is commonly associated with other congenital malformations involving the cardiovascular system, musculoskeletal, gastrointestinal and, less frequently, genitourinary and central nervous system.

The aim of this study is to describe a case of unilateral pulmonary agenesis in an critically ill infant.

Methods

Retrospective analysis of medical records and patient database in a private pediatric critical care unit (PICU), in Rio de Janeiro, Brazil.

Results

We report a four months old girl, admitted to a private hospital in September 2014 with fever, cough and runny nose, followed by respiratory distress. She had moderate tachydysepsia on physical examination at admission and pulmonary auscultation revealed breath sounds on both sides, with wheezing and rales on the left side. A chest X-ray performed at admission showed opacity of the right hemithorax. Because of respiratory distress, the patient was referred to PICU with the diagnosis of bacterial pneumonia and atelectasis of the right lung. On the second day of PICU, the clinical picture worsened and non-invasive ventilation was installed for the next 48 hours, without significant clinical improvement.

Due to the maintenance of pulmonary imaging in chest X-ray, a thoracic CT scan was performed and agenesis of the right lung was diagnosed. No other congenital anomaly was detected.

The infant evolved with progressive improvement of the breathing pattern and was discharged of the hospital a week later. Another five admissions were recorded after her diagnosis in a period of six months, all of them related to respiratory symptoms.
Conclusions

Despite of being a rare condition, pulmonar agenesis can be an isolated congenital malformation and should be remembered as a possible cause of respiratory distress in small children.
THE LUNG

PICC-0269
EVALUATION OF HUMIDIFIED HIGH FLOW NASAL CANNULA THERAPY (HFNC) IN PAEDIATRIC ACUTE CARE
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Aims & Objectives:

Current modalities for non-invasive respiratory support are hampered by their limited ability to deliver high gas flows, promote carbon dioxide clearance (standard nasal cannula therapy), and poor patient tolerance (CPAP). There has been increasing use of HFNC as non-invasive respiratory support. However, there has been limited published evidence of its use in the general paediatric patient population, specifically, in evaluating CO₂ clearance and comfort in children. Thus, we performed a pilot study, evaluating the clinical effects and tolerability of HFNC.

Methods

We recruited children admitted to the general paediatric ward with acute respiratory distress requiring supplemental oxygen. Following a period on standard nasal cannula therapy, patients were put on our HFNC machine, (TNI®20s Oxy, total flows of 10L/min) for 3 hours. Various clinical parameters were measured throughout, including pulse rate, respiratory rate, oxygen saturation, transcutaneous capnometry (Radiometer TOSCA 500), COMFORT score and modified Woods clinical asthma score. We compared observations at 0hr and 3hr using the Wilcoxon signed-rank test.

Results

A total of 10 patients were recruited (range: 4 months to 9 years) with various medical diagnoses, predominantly asthma and pneumonia. There were no statistically significant changes in any of the measured observations, although there was a trend towards a decrease in heart rate and COMFORT score on HFNC.
Conclusions

This pilot study suggests that treatment with HFNC is safe, and comfortable. Our small study provides the basis for a larger study investigating its effects on children with acute respiratory distress.
THE LUNG

PICC-0249
NON-INVASIVE VENTILATION AT THE PICU: DESCRIPTIVE STUDY AND MORTALITY RELATED FACTORS

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Aims & Objectives:

Non-invasive ventilation (NIV) is widely used in Pediatric Intensive Care Units (PICUs). This study shows the characteristics and results of NIV and preliminary results on mortality related factors in different PICUs in Spain and Turkey.

Methods

An observational, prospective, multicenter study was carried out. Patients who required NIV during hospitalization in 8 PICUs between December 2012 and October 2015 were included. Demographic, clinical and NIV related data were collected.

Results

909 patients (57.5% male) between 37.2 ± 3.6 months of age were studied. 51.6% had an underlying disease, most commonly congenital heart disease (19%). Half of the children admitted to the PICU suffered from lower respiratory airway diseases (asthma and bronchiolitis overall). The main indication for NIV was hypercapnia (61.3%). In 27.4% of patients NIV was used post-extubation, 60% of which were prophylactic. Bilevel positive airway pressure was the main initial ventilatory mode (76%). The most common interfaces at the beginning of NIV were oronasal (29%) and total face masks (27.4%). 10.2% of patients had complications, being erythema (6.5%) and pressure ulcers (2%) the most frequent. Mortality rate was 7%. Mortality risk factors in the univariate analysis are shown in the table.

<table>
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<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRISM III &gt; 5</td>
<td>2.83</td>
<td>1.60-5.00</td>
</tr>
<tr>
<td>Underlying disease (cerebral palsy)</td>
<td>3.92</td>
<td>1.71-8.98</td>
</tr>
</tbody>
</table>
Apnoea at admission 2.00 1.06-3.77
Pulmonary pathology at admission 2.43 1.39-4.22
Reason for NIV: hypercapnia 1.76 1.04-2.99
SatO\textsubscript{2}/FiO\textsubscript{2} < 250 after 1 hour of NIV 2.36 1.18-4.72
SatO\textsubscript{2} after 1 hour of NIV < 96% 1.84 1.06-3.19
RR after 12 hours of NIV > 35 breaths per minute 2.01 1.13-3.59

**Conclusions**

NIV is widely used at the PICU with a moderate rate of complications. Some mortality-related factors should be taken into account to improve the results.
Aims & Objectives:

Prone positioning is commonly used in patients with ALI/ARDS to improve oxygenation. Improved oxygenation is thought to occur due to recruitment of collapsed dorsal lung regions and improved ventilation homogeneity. This study aimed to determine the effect of prone turning on regional ventilation distribution and homogeneity in children with ALI/ARDS using electrical impedance tomography (EIT).

Methods

Thoracic electrical impedance tomography measurements were taken, in children with ALI/ARDS, in the supine position (baseline) and 5, 20 and 60 minutes after being turned into the prone position. Arterial blood gas measurements were obtained at baseline and after 60 minutes of being in the prone position. Repeated measures ANOVA was used to determine the difference in proportion of ventilation and ventilation homogeneity between responders and non-responders.

Results

Fourteen participants (9, 64% male) with a median (interquartile range) age of 20(11.6 - 26.2) months were studied. Seven (50%) participants showed an improved P_aO_2 of 2.1(1.5 - 3.3)kPa (“responders”), while seven showed a reduction of 1.1(0.5 - 1.8)kPa (“non-responders”) after 60 minutes in the prone position. Proportion of ventilation in the dorsal lung was no different between responders and non-responders (p=0.59). Responders showed significantly more variability in ventilation inhomogeneity at baseline compared to non-responders (p=0.005). After 60 minutes in the prone position, ventilation inhomogeneity was significantly less variable in the responders (p=0.02).

Conclusions

Prone positioning did not result in recruitment of the dorsal lung regions but rather more homogenous ventilation distribution. Children who responded to prone positioning had more variable ventilation inhomogeneity at baseline, compared to the non-responders.
THE LUNG

PICC-0121
THE EFFECT OF BODY POSITION ON REGIONAL DISTRIBUTION OF VENTILATION AND MUSCLE ACTIVITY IN MECHANICALLY VENTILATED INFANTS AND CHILDREN

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²University of Geneva, Division of Neonatology and Paediatric Intensive Care, Geneva, Switzerland

Aims & Objectives:

Recent studies have questioned the pattern of ventilation distribution (VD) in the paediatric population. There are no recent studies examining the effect of body position in older mechanically ventilated children without anaesthesia. In addition, there are few studies reporting muscle activity in relation to body position in this population. This study aimed to determine the effect of body positions on regional VD and respiratory muscle activity in mechanically ventilated children.

Methods

Thoracic electrical impedance tomography (EIT) and surface electromyography (sEMG) measurements were taken in left and right side lying, supine and prone positions in mechanically ventilated infants and children. Functional EIT images were produced and regional relative tidal impedance (ΔZ) in the left, right, ventral and dorsal lungs was calculated. Activity (µV) of the left, right, ventral and dorsal hemidiaphragms was examined in each position.

Results

Twenty-one children (11 (50%) male) aged six months to 6 years are presented. Majority (11, 53%) of children consistently showed greater ventilation in the right lung (11, 53%) in side lying and in the dorsal lung (6, 46%) in supine and prone positions. No significant differences in ΔZ, regional filling and diaphragm activity were found between left and right lungs in side lying. Regional filling was significantly greater in the dorsal lung in the prone position (p=0.007). Significantly greater activity was seen in the ventral hemidiaphragm in both supine and prone positions (p=0.04).

Conclusions

The paediatric pattern of ventilation is not predictable in mechanically ventilated infants and children, as previously described. Muscle activity is variably affected by body position.
Aims & Objectives:

This case report describes the multi-professional collaboration involved in planning the optimal management of a neonate with a complex type 4 laryngotracheoesophageal cleft.

Methods

A 2.5kg male neonate was admitted to PICU from the regional NNU for surgical investigation of respiratory distress, failure to feed and aphonic cry. He was born at 37 weeks gestation by C-section for poor growth and polyhydramnios. On admission he was spontaneously ventilating in air requiring intermittent CPAP support. Contrast study showed a hiatus hernia and gastro-oesophageal reflux with aspiration. On day five of life he had microlaryngobronchoscopy under intravenous general anaesthesia which demonstrated a type 4 laryngotracheoesophageal cleft, Figure 1.
Results

The patient returned to PICU for ongoing respiratory support whilst a multidisciplinary international collaboration between the local respiratory, otolaryngology and critical care teams and the tracheal reconstruction teams in London and Cincinnati aimed to determine the best treatment option for his condition. He was maintained on nasal CPAP with continuous suction of the distal oesophagus via a replogle tube. The patient subsequently underwent transatlantic aeromedical transfer by the unit’s critical care transport team on humidified non-invasive ventilation to Cincinnati Children's Hospital for definitive surgical treatment by transcervical repair.

Conclusions

This presentation will describe in detail the multi-faceted aspects of the clinical, logistical and social management of this patient’s complex case.

References
THE LUNG

PICC-0165
CHEST PHYSIOTHERAPY DOES NOT IMPROVE VENTILATORY OR PHYSIOLOGICAL PARAMETERS IN INVASIVELY VENTILATED CHILDREN

C. McDougall1, M. Wright1, A. Wood1
1Royal Hospital for Sick Children, Paediatric Intensive Care Unit, Edinburgh, United Kingdom

Aims & Objectives:

Mechanically ventilated children in intensive care cannot adequately clear airway mucus because of reduced or absent ability to cough. Mucus accumulation predisposes to airflow obstruction, discomfort and respiratory infection. Chest physiotherapy and suction are therefore often performed to prevent and resolve respiratory complications. However, evidence for efficacy of physiotherapy in this setting is lacking. We therefore sought to assess short-term effects of physiotherapy.

Methods

Data was collected prospectively for all physiotherapy episodes (routine and emergency), using standard manual techniques, in ventilated patients over a 5-month period. Ventilator and physiological data was exported from the PICU clinical information system.

Results

Data was collected on 238 consecutive episodes of physiotherapy in 46 patients. Primary diagnosis was respiratory in 123 (52%), post-operative in 36 (15%), cardiac in 11 (5%), neurological in 55 (23%) and sepsis in 13 (5%) episodes. Mucoactive drugs were used in 67 (28%) episodes. There were no differences in the studied parameters before and up to 60 minutes after physiotherapy other than relative tachycardia in the first 30 minutes and reduction in oxygen saturation and increase in measured PEEP, both of doubtful clinical significance (table). Subgroup analysis, considering different diagnoses and mucoactive drug use, did not show any changes following physiotherapy.
Conclusions

Routine chest physiotherapy does not result in immediate improvements in ventilatory or physiological parameters. Further work is needed to identify patients who may benefit from physiotherapy and to study longer-term effects of physiotherapy.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Baseline Mean (SD)</th>
<th>0-30 mins post-physio Mean (SD)</th>
<th>0-30 mins post-physio P value*</th>
<th>Mean % change (95% Cls)</th>
<th>30-60 mins post-physio Mean (SD)</th>
<th>30-60 mins post-physio P value*</th>
<th>Mean % change (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory rate (breaths/min)</td>
<td>27.0 (5.4)</td>
<td>27.1 (5.4)</td>
<td>0.67</td>
<td>0.6</td>
<td>26.7 (5.0)</td>
<td>0.05</td>
<td>-1.1</td>
</tr>
<tr>
<td>Heart rate (beats/min)</td>
<td>131.2 (26.1)</td>
<td>136.4 (27.0)</td>
<td>&lt;0.001</td>
<td>4.5</td>
<td>132.0 (26.0)</td>
<td>0.40</td>
<td>1.2</td>
</tr>
<tr>
<td>FiO₂ (%)</td>
<td>34.5 (10.5)</td>
<td>35.0 (10.5)</td>
<td>0.20</td>
<td>2.3</td>
<td>34.4 (10.3)</td>
<td>0.53</td>
<td>-0.2</td>
</tr>
<tr>
<td>SpO₂ (%)</td>
<td>95.9 (3.8)</td>
<td>95.6 (3.6)</td>
<td>0.02</td>
<td>-0.3</td>
<td>95.5 (3.6)</td>
<td>0.01</td>
<td>-0.4</td>
</tr>
<tr>
<td>Tidal volume (ml/kg)</td>
<td>6.8 (2.8)</td>
<td>6.9 (2.8)</td>
<td>0.13</td>
<td>3.7</td>
<td>6.8 (2.8)</td>
<td>0.67</td>
<td>2.5</td>
</tr>
<tr>
<td>End tidal CO₂ (kPa)</td>
<td>5.7 (1.6)</td>
<td>5.8 (1.7)</td>
<td>0.24</td>
<td>1.3</td>
<td>5.8 (1.7)</td>
<td>0.15</td>
<td>1.5</td>
</tr>
<tr>
<td>PIP (cmH₂O)</td>
<td>18.4 (4.7)</td>
<td>18.5 (4.6)</td>
<td>0.25</td>
<td>1.0</td>
<td>18.6 (4.4)</td>
<td>0.70</td>
<td>0.4</td>
</tr>
<tr>
<td>PEEP (cmH₂O)</td>
<td>6.0 (1.7)</td>
<td>6.0 (1.7)</td>
<td>0.06</td>
<td>1.7</td>
<td>6.1 (1.7)</td>
<td>0.02</td>
<td>1.9</td>
</tr>
</tbody>
</table>

*comparison to baseline by paired t-test
Aims & Objectives:

To analyze the effect of inhaled sevoflurane in the treatment of severe refractory bronchospasm in children.

Methods

A retrospective non-interventional clinical study was performed in children with severe bronchospasm and acute respiratory failure requiring mechanical ventilation and treated with sevoflurane in two paediatric intensive care units of tertiary general university hospitals in Spain. Inhaled sevoflurane therapy was initiated after failure of conventional medical management and mechanical ventilation. Sevoflurane was administered through ventilator equipped or with a vaporizer and via the Anaesthetic Conserving Device (AnaConDa) with a critical care ventilator.

Results

Ten patients were included in the study. The median age was 16 months (IQR 10-60 months). In all patients sevoflurane was initiated within the first 12 hours of mechanical ventilation. Sevoflurane was administered for a median of 36 hours (IQR 20-96). Median expired sevoflurane concentration was 0.75 % (IQR 0.6-1) and it was reached with a median infusion rate of 6.6 ml/h (IQR 4-9). Inhaled sevoflurane resulted in statistically significant decreases of PaCO₂ of 34.2 torr (IC 95% 8.3-60), peak inspiratory pressure of 14.3 cmH₂O (IC 95% 8.6-19.9) and improvement in pH of 0.17 (0.346-0.002) within 6 hours of administration. Only one patient presented hypotension responsive to volume administration at the beginning of the treatment. All patients could be extubated within a median time of 120 hours (IQR 46-216).

Conclusions

Inhaled sevoflurane therapy decreases the levels of PaCO₂ and peak inspiratory pressure values, and it may be a safe and effective treatment in patients with life-threatening bronchospasm refractory to conventional therapy.
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PICC-0931
A CASE SERIES ON NEURONAL VS. CONVENTIONAL PRESSURE CONTROL OF NON-INVASIVE VENTILATION IN BRONCHIOLITIS: A PILOT STUDY FOR THE FEASIBILITY OF A SUPERIORITY TRIAL
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¹Albert Einstein College of Medicine, Pediatrics, Bronx, USA

Aims & Objectives:

High-flow nasal cannula has significantly reduced intubation rates in bronchiolitis. 20-30% of ICU patients still require non-invasive ventilation (NIV) and about 7-9% still get intubated. We report a series of NIV use, directly controlled by the phrenic nerve neuronal output (NIV-N). This study aims to assess the feasibility of a comparative study between NIV-N vs. conventional pressure control ventilation (NIV-PC).

Methods

Retrospective cohort study investigating patients with bronchiolitis, admitted to a single center pediatric ICU over 14 months. Patients > 12 months or with significant co-morbidities were excluded. Data presented as mean ± SD, or median [IQR]. Groups were compared using Wilcoxon Rank sum test or Chi square test. A sample size calculation was performed for future studies.

Results

Of 1349 patients admitted, 139 received NIV and 16 patients received NIV-N. After applying inclusion/exclusion criteria, 11 patients received NIV-PC and 10 NIV-N for bronchiolitis. The ages (4.5±3.1 months vs. 4.2±3.1 months, respectively) and duration on NIV (4 days [2-8.5] vs. 3 days [2-3], respectively) were comparable. The total duration of respiratory support (NIV-PC: 8 days [4.25-12.75] vs. NIV-N: 6 days [5-9], p = 0.860) and the length of ICU stay (NIV-PC: 12 days [5.25-17.75] vs. NIV-N: 6.5 days [6-10], p = 0.549) showed a trend towards shorter times in the NIV-N group, but differences were not statistically significant. In the NIV-PC group, 2/11 infants were intubated (18.2%) and none in the NIV-N group (p = 0.500). Based on this data, a sample size of 88 and 100 would be needed to show differences in intubation and respiratory support outcomes, respectively.

Conclusions

Given the low number of required subjects and the availability of NIV-N in at least 16 institutions in the PALISI network, a prospective study to demonstrate superiority of neuronal control of NIV in bronchiolitis appears feasible.
Aims & Objectives:

Concerning the management of severe bronchiolitis, nCPAP is the gold standard. HFNC is increasingly used in this indication even if there are no randomized studies evaluating its efficacy and safety in this population. Our objective was to evaluate the failure rate of HFNC compared to the nCPAP during the initial management of severe bronchiolitis.

Methods

Methodology: Prospective, controlled, randomized, multicenter study. Infants from 0 to 6 months old, admitted in PICU for severe bronchiolitis (Modified Wood score > 3) were randomized into two groups: "HFNC" (2 l/kg/min) and "nCPAP" (6 cm H2O) during 24 hours. The primary endpoint was the percentage of failure in both arms during the first 24 hours. Failure was defined as an increase of (1) clinical score for respiratory distress (mWCAS) or (2) Respiratory rate (RR) or (3) discomfort (EDIN score) or (4) apnea. Results: [median (SD) and % (IC)]

Results

142 infants were included from November 2014 to March 2015; 71 were randomized in HFNC group and 71 in the nCPAP group. Their weight was 4100 (1200) g, they were 40 (35) days old the RR: 53 (13), FiO2: 30 (12), mWCAS: 4.3 (1), PCO2: 59 (14) mmHg, pH: 7.28 (0.1). There was no difference between the two groups (weight, age, HR, RR, FIO2, mWCAS, EDIN, PCO2). The failure rate was higher in the HFNC group 49 (39-62) vs 31 (20-42)%; OR: 0.49 (0.2-0.9) p = 0.018. We didn't find any predictive failure criteria. Failure occurred rapidly during the first 18 hours in the two groups. We didn't find any difference between the two groups concerning the length of stay (6.2 (6) vs 7.5 (13) d; p = 0.46), or the number of intubation (3/71 vs 5/71;
p=0.51).

![Graph showing the number of failures in nCPAP vs HFNC group during the first 24 hours.](image)

*: $p < 0.05$

**Conclusions**

During severe bronchiolitis management, the failure rate is higher with the high flow compared with nasal CPAP.
Aims & Objectives:

The aim of the present study was to describe the value of esophageal pressure (P_{ES}) measurements for determining the usefulness and optimal settings of Non Invasive Ventilation (NIV) in children with hypercapnic respiratory failure admitted to the PICU.

Methods

This is a single-center retrospective study. Patients < 1 year old admitted in the PICU for an acute or acute on chronic respiratory failure and supported by NIV, in whom P_{ES} and P_{GAS} measurements were performed, were analyzed. After the insertion of the esogastric catheter, the study started with a period of spontaneous breathing (SB) followed by a recording of a period with the clinical settings (NIV\textsubscript{clin}) and optimal NIV setting (NIV\textsubscript{phys}).

Results

Six patients were included with a mean baseline PvCO\textsubscript{2} of 72.7 ± 7.7 mmHg. The mean values of DP_{ES} and PTP_{ES}/min were 26.3 ± 24.6 cmH\textsubscript{2}O and 336 ± 104 cmH\textsubscript{2}O.s.min\textsuperscript{-1}, respectively. NIV was associated with a decrease in respiratory effort in 4 patients. In these patients reductions were observed with mean PTP_{ES}/min and PTP_{DI}/min decreasing from 360 ± 139 and 408 ± 81 cmH\textsubscript{2}O.s.min\textsuperscript{-1} during SB to 203 ± 101 and 198 ± 198 cmH\textsubscript{2}O.s.min\textsuperscript{-1} during NIV\textsubscript{clin}, and to 146 ± 105 (p=0.049) and 134 ± 108 cmH\textsubscript{2}O.s.min\textsuperscript{-1} (p=0.02) during NIV\textsubscript{phys}, respectively.

Conclusions

This study showed that a physiological approach, based on the P_{ES} measurements, may be useful to manage NIV, to indicate or not this method and to optimize its settings, especially in a heterogeneous population of critically ill children.
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PICC-0750
A COMPARATIVE STUDY OF HHHFNC AND NCPAP IN PREVENTING RE-INTUBATION IN EXTREME PRETERM INFANTS BORN AT LESS THAN 30 WEEKS GESTATION
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¹Rosie Hospital- Cambridge University Hospitals, Neonatal Medicine, Cambridge, United Kingdom
²Norfolk and Norwich University Hospital, Neonatal Medicine, Norwich, United Kingdom

Aims & Objectives:

Despite recent advances in respiratory support, the wide use of antenatal steroids and surfactant replacement therapy, respiratory problems continue to represent the leading cause of mortality in premature infants during the neonatal period.

In the last few years, HHHFNC has been widely adopted as a mode of non-invasive respiratory support for infants with respiratory difficulties. However, data of the safety and efficacy of HHHFNC use in extremely premature infants are scarce.

This study will aid in bridging the knowledge gap and sheds light on the efficacy and, more importantly, the safety of HHHFNC as non-invasive respiratory support for extremely premature infants.

Methods

This is a retrospective comparative study conducted at Neonatal Intensive Care Unit (NICU), Norfolk and Norwich University Hospital between 01/October/2010 and 31/December/2014.

Data were collected from the medical notes of the eligible patients. Participants' total number was 26, 9 patients in nCPAP group while HHHFNC group consisted of 17 patients.

The participants' gestational age was ranging between 24 to 29+9 weeks who were supported by either nCPAP or HHHFNC after first extubation. Primary outcome defined as the need for re-intubation within 72 hours post-extubation i.e. failure of non-invasive respiratory support.

Results

This study showed no statistically significant differences in either primary (nCPAP (9/2 [22%]), HHHFNC (17/2 [12%]; P = 0.59) or secondary outcomes (Constant need for O₂ in the first 4 weeks of life (P = 0.9), Pneumothorax (P = 1.0), nasal injury (P = 0.35)). P value for spontaneous bowel perforation was not computed as there was no affected patients.

Conclusions
The study demonstrate that HHHFNC is similarly safe and efficacious in comparison to nCPAP as non-invasive respiratory support for extremely premature infants post-extubation.
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PICC-0488
DIAPHRAGM ELECTRIC ACTIVITY (EADI) SIGNAL AND DIAPHRAGMATIC PARALYSES AFTER CARDIAC SURGERY IN NEONATES: A VALID DIAGNOSTIC AND CLINICAL TOOL?
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1ASST Papa Giovanni XXIII, Department of Anesthesia and Intensive Care- Paediatric Intensive Care Unit, Bergamo, Italy
2School of Medicine and Surgery-, Departmente of Health Science- University of Milan-Bicocca, Monza, Italy

Aims & Objectives:
Diaphragmatic paralyses (DP) due to phrenic nerve injury after congenital cardiac surgery is a severe complication. DP diagnosis could be suspected by an elevated hemidiaphragm on chest X-Ray, however definite diagnosis is confirmed with fluoroscopy (FS) or ultrasound (US) during spontaneous breathing. Since an EAdi Catheter may be employed to monitor the diaphragm activity (and possibly to deliver neurally adjusted ventilator assist (NAVA)), we aimed at evaluating the role of EAdi as a tool for an early identification of patients with DP.

Methods
EAdi Catheters were positioned in eight hypoxic neonates (11 ± 3 days old, 5 females, PaO2/FiO2 < 300) at risk of DP following correction of transposition of great arteries.

Results
Five children showed normal Eadi waveforms (Figure 1) and were effectively supported by NAVA ventilation. In four of them, DP was excluded by US after extubation, while one developed respiratory distress after extubation and a unilateral right-sided DP (without paradoxical movement - PM), was confirmed by US and FS. No surgical diaphragmatic plication was performed. Three infants showed a saw-tooth Eadi waveforms with low amplitude (Figure 2) and NAVA ventilation was not possible. Two unilateral left-sided DP (without PM), and 1 unilateral-left side DP (with PM) were confirmed by US and FS. All neonates with DP required a period of non invasive nasal CPAP after extubation to restore a normal respiratory function.

Conclusions
Although preliminary, these data suggest that Eadi signal might have a role for early suspicion of DP, however a normal Eadi waveform did not exclude the presence of a DP.
Aims & Objectives:

Respiratory distress contributes significantly to mortality and morbidity in neonates. It is a common indication for neonatal intensive care unit (NICU) admission. Primary aim is to describe the common etiologies for respiratory distress and evaluate the outcome in terms of mortality and NICU/hospital stay.

Methods

Retrospective observational study of neonates with respiratory distress admitted to a 6-bedded level III NICU from July 2014 to October 2015. Data was retrieved from case records and comprised of maternal and neonatal clinical characteristics, interventions and outcomes. Data is presented as median and interquartile range (IQR).

Results

Out of 306 neonates admitted during the study period 109 (35.6%) developed respiratory distress. 104 were included for further analysis (incomplete data in 5). Median gestational age was 35±6 weeks (34 - 37±5 weeks) and majority were late preterm and early term (69; 66.3%). Median birth weight was 2.40 kg (1.72 - 2.70 kg) and 65 (62.5%) were males. 10 (9.8%) were born after in-vitro fertilization. 82 (78.8%) neonates were born by caesarian section. The etiologies were transient tachypnea of newborn in 46 (44.2%), respiratory distress syndrome in 31 (29.8%), birth asphyxia in 10 (9.6%) and meconium aspiration syndrome in 7 (6.7%). Maximal respiratory support in NICU included free flow oxygen in 45 (43.3%) followed by nCPAP in 24 (23.1%). Overall, 9 (8.8%) neonates died. The median length of NICU stay was 4.7 days (IQR 2 to 13.7) and total hospital stay was 10 days (IQR 6 to 18.7).
<table>
<thead>
<tr>
<th>Variable</th>
<th>Results*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational age (weeks)</td>
<td>35(^{\pm}) 34 to 37(^{\pm})</td>
</tr>
<tr>
<td>Birth weight (kg)</td>
<td>2.40 (1.72 to 2.80)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>65 (62.8)</td>
</tr>
<tr>
<td>Female</td>
<td>39 (37.5)</td>
</tr>
<tr>
<td>Conception</td>
<td></td>
</tr>
<tr>
<td>Spontaneous</td>
<td>94 (90.4)</td>
</tr>
<tr>
<td>In vitro fertilization</td>
<td>10 (9.6)</td>
</tr>
<tr>
<td>Multiple gestation</td>
<td></td>
</tr>
<tr>
<td>Singleton</td>
<td>95 (91.3)</td>
</tr>
<tr>
<td>Twins</td>
<td>08 (7.7)</td>
</tr>
<tr>
<td>Triplets</td>
<td>01 (0.9)</td>
</tr>
<tr>
<td>Antenatal steroids</td>
<td>43 (41.3)</td>
</tr>
<tr>
<td>Maternal illness</td>
<td></td>
</tr>
<tr>
<td>Gestational Diabetes</td>
<td>25(24)</td>
</tr>
<tr>
<td>Cholestasis</td>
<td>16(15.4)</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>13(12.5)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>9 (8.7)</td>
</tr>
<tr>
<td>Duration of ventilation (hours)</td>
<td>34 (13 to 108.5)</td>
</tr>
<tr>
<td>Mortality</td>
<td>9 (8.7)</td>
</tr>
<tr>
<td>Duration of NICU stay (days)</td>
<td>4.7 (2 to 13.7)</td>
</tr>
<tr>
<td>Duration of hospital stay (days)</td>
<td>10 (6 to 18.7)</td>
</tr>
<tr>
<td>Bronchopulmonary dysplasia</td>
<td>4 (3.8%)</td>
</tr>
</tbody>
</table>

NICU- Neonatal intensive care unit
*Values are expressed in median with interquartile range or number (percentage) as applicable
Conclusions

Respiratory distress is a frequent indication for NICU admission and has significant morbidity and mortality.
Aims & Objectives:

Evaluate efficacy of RAM cannula in management of respiratory failure in children.

Introduction: Non-invasive positive pressure ventilation (NIPPV) is effective in managing respiratory failure in children. NIPPV avoids tracheal trauma, decreases sedation needs, ICU and hospital length of stay (LOS). The RAM cannula provides a novel interface for NIPPV.

Hypothesis: RAM cannula reduces need for invasive mechanical ventilation and decreases PICU LOS.

Methods


Statistics include counts and percentages for categorical data and means, medians and standard deviation, for continuous data. Fisher’s exact test compared categorical variables between patients intubated and not intubated. Independent sample t-test compared continuous data between groups. p-value < 0.05 was considered statistically significant.

Results

Analysis included RAM cannula experience in 50 children aged <24 months and <12 Kg. 11 patients (22%) progressed to intubation and 39 (78%) remained on RAM. Variables: Age, weight, ethnicity and etiology of respiratory failure

Age and weight were comparable between intubated and non-intubated groups. Median RAM [47 hours] was significantly higher in patients remaining on RAM compared to those requiring intubation [12 hours] (p=0.0009). 64% of males and 100% African-American children advanced to invasive ventilation.

Median PICU LOS of patients remaining on RAM cannula [80 hours] was significantly lower than patients requiring intubation [220 hours] (p<0.0001).
Conclusions

RAM cannula interface safely and effectively delivers NIPPV to children < 24 months, while reducing need for invasive ventilation and PICU length of stay.
THE EFFECTIVENESS OF HEATED HUMIDIFIED NASAL HIGH FLOW OXYGEN THERAPY IN PATIENTS WITH ACUTE RESPIRATORY FAILURE ADMITTED TO OUR PICU

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Aims & Objectives:

Heated Humidified Nasal High Flow Oxygen (HH-NHFO) therapy is being increasingly used in a variety of patients with different diseases. The aim of the study is to determine if the use of HH-NHFO support managed to reduce the need for endotracheal intubation in both infants with bronchiolitis and older children with acute respiratory failure admitted to our Pediatric Intensive Care Unit (PICU) during the last eight months.

Methods

All patients who had received HH-NHFO therapy in our PICU over the last year (December 2014 - December 2015) were included in this retrospective study.

Results

During this period, eleven patients with acute respiratory failure received HH-NHFO therapy. Six of them, were infants less than 2 months old with acute RSV bronchiolitis. The mean duration of HH-NHFO support was 2.5 days. Only one of these infants needed Non Mechanical Ventilation (NIV) for two days. The other five patients were older children with acute respiratory failure and suffered from an underlying chronic respiratory or neurological disease. The mean duration of HH-NHFO support to these children was 3.5 days. Only one of them was intubated after 24 hours of HH-NHFO support. No complication (pneumothorax, infection) was observed to any of our patients.

Conclusions

HH-NHFO therapy is generally well tolerated and accepted by young patients. It may improve clinical outcome of their respiratory failure and reduce the need for endotracheal intubation in PICU.
THE LUNG

PICC-0120
PULMONARY FUNCTION TESTS ON FOLLOW UP IN MECHANICALLY VENTILATED CHILDREN ABOVE 5 YEARS OF AGE IN DEVELOPING COUNTRY
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¹Dayanand Medical College and Hospital, Pediatrics, Ludhiana, India

Aims & Objectives:

Mechanical Ventilation is life saving, but can have long term consequences on pulmonary function. Study was done to determine pulmonary function tests in mechanically ventilated children at discharge and follow up.

Methods

Children more than five years of age, requiring mechanical ventilation were studied. PFT were measured using spirometry at discharge, 3 and 6 months after discharge and values were compared with normal values.

Results

32 met the eligibility criteria and 20 completed 6 month follow up. Male to female ratio was 3:1. Mean age was 9 years, 65% patients were rural, 35% were underweight. Reason for mechanical ventilation was neurological in 35% patients, respiratory in 45% and multisystem/ elective in 20%. 15% developed VAP. Mean duration of ventilation and PICU stay was 8.3 and 14.2 days. 75% patients had abnormal lung function mainly restrictive function at the end of 3 months and 65% at end of 6 months. No significant correlation of patient or ventilation characteristics with long term lung function was established, although patients with neurological causes, low PRISM scores, rural patients had better results while patients with longer duration of ventilation, complications of ventilation, high PIP and high fiO2 had worse outcome. Inspiratory Volume, Inspiratory Capacity, Vital Capacity, Forced Expiratory Volume (in first second) and Forced Vital Capacity showed greatest deficits.

Conclusions

This study highlights the long term effect of mechanical ventilation on pulmonary function and need for longer follow up in larger number of patients in future.
Aims & Objectives:

Acute viral bronchiolitis (AVB) is a major cause of lower airway infection and hospitalization in infants. Mechanical ventilation (MV) is often necessary in infants with severe AVB, predisposing them to fluid retention secondary to increased ADH and renin secretion in response to decreased venous return.

Recent trials on acute pulmonary injury have shown a correlation between fluid overload and longer duration of MV. The influence of fluid balance in infants mechanically ventilated for AVB, however, has not been elucidated yet.

Objectives: To analyze the correlation of positive fluid balance, as shown by acute weight gain, with the duration of MV, PICU length of stay (LOS) and use of diuretics in infants undergoing MV for AVB.

Methods

Retrospective analysis of clinical and demographic data of all infants admitted to the PICU from 2012-2015 who underwent MV for AVB. The patients were classified into two groups according to weight gain: ≤7.5% and >7.5% of the admission weight.

Results

Ninety-four patients were included. Median age was 2.5 [2-5] months; 60% were male. Patients with weight gain >7.5% received more fluid boluses on D1 of MV, had longer duration of MV, longer PICU and hospital and needed more diuretic doses. The characteristics and outcomes of the two groups are shown in Tables 1 and 2.
Table 1. Characteristics of the study population

<table>
<thead>
<tr>
<th></th>
<th>≤ 7.5%</th>
<th>&gt; 7.5%</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male gender, n (%)</td>
<td>30 (61.2)</td>
<td>27 (60)</td>
<td>0.98</td>
</tr>
<tr>
<td>Age, months*</td>
<td>4 [2-6]</td>
<td>2 [1.7-3.2]</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Initial weight, kg**</td>
<td>5.52 ± 1.78</td>
<td>5.28 ± 1.55</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>PIM II (%)*</td>
<td>1.1 [0.4-1.4]</td>
<td>1.1 [0.85-1.6]</td>
<td>0.30</td>
</tr>
<tr>
<td>PRISM II (%)*</td>
<td>2.8 [1.8-5]</td>
<td>3.4 [2.3-4.6]</td>
<td>0.52</td>
</tr>
<tr>
<td>FiO2, D1*</td>
<td>0.4 [0.33-0.46]</td>
<td>0.4 [0.35-0.45]</td>
<td>0.54</td>
</tr>
<tr>
<td>PaO₂/FiO₂ D1**</td>
<td>259 ± 90</td>
<td>251 ± 78</td>
<td>0.66</td>
</tr>
<tr>
<td>Peak Pressure, D1*</td>
<td>24 [22-26]</td>
<td>26 [24-29.2]</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>PEEP, D1*</td>
<td>7 [7-8]</td>
<td>7[7-8]</td>
<td>0.98</td>
</tr>
</tbody>
</table>

*Median and interquartile range. **Mean ± SD
Conclusions

Acute weight gain >7.5% of the admission weight, used as a surrogate of positive fluid balance, is associated with longer duration of MV and longer PICU LOS in patients with AVB. Increased weight gain was associated with bolus fluids on D1 of MV.

Table 2. Comparisons of outcomes according to weight gain

<table>
<thead>
<tr>
<th></th>
<th>≤ 7.5%</th>
<th>&gt; 7.5%</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n= 49</td>
<td>n= 45</td>
<td></td>
</tr>
<tr>
<td>PICU LOS, days*</td>
<td>7 [6-10]</td>
<td>10 [9-11]</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Hospital LOS, days*</td>
<td>12 [10.5-15.5]</td>
<td>16 [12.2-19.7]</td>
<td>0.01</td>
</tr>
<tr>
<td>Total fluid infusion in</td>
<td>110 ± 36.2</td>
<td>127 ± 42.9</td>
<td>0.03</td>
</tr>
<tr>
<td>day 1, ml/Kg**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid bolus D1, n</td>
<td>21</td>
<td>36</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Fluid bolus D1, ml/Kg*</td>
<td>0 [0-20]</td>
<td>28.8 [10-40.6]</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Daily fluids, ml/Kg*</td>
<td>99.7 [88.3-109.6]</td>
<td>101.5 [93-107]</td>
<td>0.34</td>
</tr>
<tr>
<td>MV, days*</td>
<td>3.1 [2.3-4.3]</td>
<td>5.6 [4.8-7.4]</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Furosemide, mg/Kg*</td>
<td>0 [0-0.4]</td>
<td>0.9 [0.5-1]</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

D1: First day of MV. *Median and interquartile range. **Mean ± SD
THE LUNG

PICC-0096
EXPERIENCE IN ISOLATION IS NOT ADEQUATE TO MODERATE THE
PRESSURES APPLIED BY PHYSIOTHERAPISTS DURING MANUAL
HYPERINFLATION OF A PAEDIATRIC MANNEQUIN
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²University of Hertfordshire, School of Health and Social Sciences, London, United Kingdom

Aims & Objectives:

To investigate the influence of experience and manometer use on positive pressures applied by physiotherapists during Manual Hyperinflation (MHI) of a paediatric mannequin using a 0.5l open-ended circuit.

Methods

Design: Quantitative, repeated measures experiment.

Setting: Paediatric, tertiary care hospital in the United Kingdom.

Participants: Sixteen physiotherapists with experience in paediatric intensive care.

Interventions: MHI performed on a paediatric mannequin; with and without a manometer, and with and without prescribed target pressures.

Outcome measures: Overall positive pressures applied, and accuracy of pressures when a target pressure was given.

Results

Increasing duration of experience correlated with improved accuracy of achieving the target Positive End Expiratory Pressure (PEEP) ($r_s=-0.544$, $p=0.001$) however it raised the mean Positive Inspiratory Pressure (PIP) applied ($r_s=0.475$, $p=0.006$).

Manometer use resulted in increased PEEP (4cmH₂O to 8cmH₂O; $p<0.0001$), lower peak PIP (63cmH₂O to 41cmH₂O) and reduced variability of applied PIP ($p=0.003$). Accuracy in achieving prescribed target pressures improved with a manometer, with the absolute PIP error reducing from 9.57 to 1.99cmH₂O ($p=0.001$). More experienced participants showed greater improvements in accuracy with a manometer than their inexperienced counterparts (PIP $r_s=-.649$, $p=0.007$; PEEP $r_s=-.630$, $p=0.009$).

Conclusions
Experience and manometer use offers the best combination to deliver appropriate, prescribed positive pressures and accuracy. Delivering appropriate levels of positive pressure reduces the potential risks of barotrauma during MHI, therefore routine use of a manometer is recommended for physiotherapists of all levels of experience.
Aims & Objectives:

Transcutaneous CO₂ (TcCO₂) is widely used in the pediatric intensive care unit (PICU). Numerous studies have found good correlations between partial pressure of arterial CO₂ (PaCO₂) and TcCO₂ but their agreement might be limited. The aim of this study was to evaluate the accuracy of trends in TcCO₂ by comparing changes of PaCO₂ to changes in TcCO₂ in children admitted to the PICU.

Methods

Patients with both an arterial catheter and a TcCO₂ probe (Sen-Tec Digital-Monitoring-System) were identified. Pairs of consecutive PaCO₂ and their related TcCO₂ values were retrieved and analyzed. Analysis included comparison of the differences between PaCO₂ and TcCO₂ for each PaCO₂-TcCO₂ pair.

Results

Thirty-one TcCO₂-PaCO₂ pairs were analyzed. The median PaCO₂ and TcCO₂ values were 52 (35,74) and 61mmHg (43,88) respectively. The median difference between TcCO₂ and PaCO₂ was 9.6mmHg (2.5,16.3). The median value of the differences between each two consecutive PaCO₂-TcCO₂ difference was 1.0mmHg (0,7). Fig. 1 shows that this difference was consistent in relation to the mean arterial CO₂ and relatively small indicating that the trend of change in PaCO₂ was very similar to the
trend of change in TcCO$_2$.

**Fig. 1-** Differences between two following PaCO$_2$-TcCO$_2$ values in relation to absolute PaCO$_2$.

![Graph showing differences between TcCO$_2$ and PaCO$_2$](image)

\[ y = -0.0195x + 3.2193 \]
\[ R^2 = 0.0057 \]

**Conclusions**

TcCO$_2$ trends have a good agreement with the trends of PaCO$_2$ over a wide range of PaCO$_2$ levels. Monitoring TcCO$_2$ trends is reliable and useful even when TcCO$_2$ significantly deviates from PaCO$_2$. This may further help decreasing invasive CO$_2$ measurements and reduce blood loss in patients admitted to the PICU.
THE LUNG

PICC-0075
CAN THE LUNG ECHOGRAPHY REPLACE CHEST X-RAY EXAMS TO EVALUATE CHRONIC LUNG DISEASE (CLD) IN PREMATURE BABIES DURING THE FOLLOW-UP PERIOD?
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¹Saitama Medical Center- Saitama Medical University, Department of Pediatrics, Kawagoe, Japan

Aims & Objectives:
During the long follow-up period, CLD in premature babies has been repeatedly evaluated by chest x-ray so far. However, we can't rule out the possibility that the prolonged exposure to radiation by repeated chest x-ray will affect the premature babies with CLD in the future. Then, we investigated in this study whether lung echography could be applied to the evaluation of CLD in premature babies or not instead of chest x-ray during the follow-up period.

Methods
We reviewed 27 premature babies with CLD (GA:26.8+2.7W, BW842+342g) who were admitted to our NICU since April in 2014 and underwent lung echography. Compared with those babies, we reviewed 10 neonates without lung diseases who underwent lung echography. The echography was done on 113 +53 days after birth.

Results
1) Based on CLD36, the number is 4 in mild CLD, 8 in moderated CLD, and 15 in severe CLD.

2) Twenty-three among 27 premature babies showed B-lines. All 23 babies demonstrated abnormal x-ray shadows. Three in 4 babies who didn't show B-line have the normal x-ray.

3) Ten neonates without lung diseases showed no B-lines and normal x-ray.

Conclusions
Lung echography could have high sensitivity and specificity to show the lung damage of CLD instead of x-ray. The repeated x-ray exams could have the potential danger of the prolonged exposure to radiation. Lung echography could replace chest x-ray to follow up the premature babies with CLD to a certain extent.
THE LUNG

PICC-0919
PROFILE OF TRACHEOSTOMY PATIENTS IN THE PICU – A RETROSPECTIVE STUDY

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²Sri Ramachandra Medical College and Research Institute, Pediatrics, Chennai, India

Aims & Objectives:

To study the profile of patients who had undergone tracheostomy in the PICU

Methods

It is a Retrospective observational study. The data of patients who had undergone tracheostomy in the PICU between 2010 and 2015 were studied.

Analysis done by SPSS (Version 17), results compiled and statistical significance calculated via Chi square test.

Results

• 49 patients underwent tracheostomy during the period

• Most patients were in 12 – 18 years (46.9%)

• 57.1% were intubated for low GCS

• The number of ventilated days prior to tracheostomy was between 1 week and 15 days in 34.7% of patients, while 8.2% for more than a month .(p 0.000)

• 77.6% of tracheostomy were done in PICU

• 44.9% had a tracheostomy for neurological problems, while 14.3% was for upper airway problem (p 0.00)

• All were elective tracheostomy

• Horizontal incision for tracheostomy was done in 93.9 %

• The level of tracheostomy was medium in 85.7%

• 1 patient had early complication with tracheostomy tube displacement

• Late complication was infection, common organism was Pseudomonas and Acinetobacter
- 65.3% of patients required ventilation for 1 week to 1 month after tracheostomy
- 22.4% had tracheostomy for 2 to 2.5 months
- 66.3% of patients were successfully decannulated while 36.7% were not decannulated as they either died or was tracheostomy dependant
- 24.5% of patients died due to underlying disease process
- None of the patients had any problems following decannulation

Conclusions

Head trauma and neurological diseases were the most common indication for tracheostomy

34.5% of patients had tracheostomy between 7 – 15 days

66.3% were successfully decannulated

None of the patients had any problems after decannulation
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PICC-0749
AIRWAY PRESSURE RELEASE VENTILATION (APRV) IN PEDIATRIC ACUTE RESPIRATORY DISTRESS SYNDROME (P-ARDS): AN OPEN-LABEL, PARALLEL-DESIGN, RANDOMIZED CONTROLLED TRIAL

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¹Postgraduate Institute of Medical Education and Research PGIMER, Pediatrics, Chandigarh, India
²M.M Institute of Medical Science and Research- Mullana- Ambala- India, Pediatrics, Ambala, India

Aims & Objectives:

To compare APRV and conventional low-tidal ventilation (LoTV) with respect to ventilator-free days (VFD) and all-cause mortality in P-ARDS.

Methods

Open-label trial conducted in 15-bedded PICU of a tertiary care, referral and teaching hospital in Northern India between Jan 2014 and Dec 2015. Children aged 1 month-12 years, satisfying modified-Berlin definition, were randomized to receive either APRV or LoTV using computer-generated, unstratified, variable-size block randomization. Children with air-leaks, raised intracranial pressure, high sedation requirement, >24 hours since diagnosis of ARDS or >72 hours of ventilation were excluded. Ventilator-free-days (VFDs) was primary outcome while all-cause mortality, organ failure-free days, treatment failure, adverse events were secondary outcomes. Assuming alpha of 5% and power of 80% with non-inferiority limit of 4 days (SD of VFDs being 8.2 days), sample size calculated was 104 (52 per group). Apriori interim analysis was planned at 50% enrolment.

Results

The trial was terminated after enrolment of 52 children (26 in each group), when interim analysis revealed statistically significant difference in mortality. Both groups were similar with respect to age {LoTV:65.5[12.8,127]; APRV:36[9.8, 84]months;p=0.12}, PRISM-III-24 score {LoTV:18[15,27]; APRV:20[17.5,25.3]; p=0.57} and oxygenation index {LoTV:9[5.2,16]; APRV:11.9[7.9,21.1]; p=0.07}. However, proportion of males was significantly higher in APRV group [(65.4%vs.34.6% in LoTV; p=0.03]. Median[IQR] VFDs were statistically similar in both [LoTV 20 [0.23] days and APRV 0 [0.22.8] days; p=0.23]. However, 28-day all-cause mortality was 53.8% in APRV as compared to 26.9% among controls (p =0.048).

Conclusions

APRV and conventional ventilation were comparable in terms of length of mechanical ventilation however all-cause mortality was significantly higher in the former.
THE LUNG

PICC-0752
BIOMARKERS IN PEDIATRIC ACUTE RESPIRATORY DISTRESS SYNDROME (P-ARDS): INFLUENCE OF MODE OF VENTILATION AND PREDICTION OF OUTCOMES
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¹Postgraduate Institute of Medical Education and Research PGIMER, Pediatrics, Chandigarh, India
²M.M Institute of Medical Sciences & Research- Mullana- Ambala- India, Pediatrics, Ambala, India
³Postgraduate Institute of Medical Education and Research PGIMER, Immunopathology, Chandigarh, India

Aims & Objectives:
To assess the influence of mode of mechanical ventilation on biomarker (IL-6, IL-8, Ang-2, sICAM-1) level in P-ARDS measured on day 1 and day 5 and their ability to predict clinically relevant outcomes.

Methods
This prospective observational study was conducted in a tertiary care, referral and teaching hospital in Northern India between Jan 2015 and Dec 2015. Thirty children aged 1 month-12 years, satisfying modified-Berlin definition of ARDS, were enrolled into the study after informed consent from parents. All enrolled children had serum tested on day 1 and day 5 for four biomarkers – Interleukin-6, Interleukin-8, Angiopoietin-2 and soluble-intercellular-adhesion molecule-1 (sICAM1). All decisions regarding mode of ventilation, PICU transfer and other aspects of supportive care were made by the treating team. Clinical data were collected on a pre-designed proforma. Wilcoxon-signed rank test was used to compare differences between day 1 and day 5 biomarker levels. Mann-Whitney U test and Kruskal Wallis tests were used to compare biomarker values across outcomes and modes of ventilation, respectively.

Results
The median (IQR) age was 33(12,87) months. Nearly 47% received conventional low-tidal volume ventilation, 7 (23.3%) received CPAP, 5 (16.7%) APRV and two children each received HFOV and manual ventilation respectively. Overall mortality in this cohort was 26.7%. Day-1 and day-5 levels of all four biomarkers were not associated with survival-to-discharge. Also there was no significant association between various modes of ventilation and levels of day 1 or day-5 of any of the biomarkers. None of the biomarkers could reliably predict length of hospital stay or ventilator-free-days.

Conclusions
Day-1 or day-5 levels of Interleukin-6, Interleukin-8, Angiopoietin-2 and sICAM-1 cannot reliably predict clinically relevant outcomes. There was no significant difference in the trends of these biomarkers between children on different modes of ventilation.
Aims & Objectives:

An increase in incidence of childhood empyema has been reported from several countries. We described the first pediatric series of intrapleural fibrinolysis in 1997\(^1\). Many large and studies followed. However, with the advance in surgical skills and technology we have switched to VATS as first option intermittently with intrapleural fibrinolysis since.

Objectives: To review our experience with VATS as primary treatment of complicated pleural effusions.

Methods

Clinical, laboratory, treatment and outcome data were prospectively collected for the last consecutive 42 children with complicated pleural effusions.

Results

Patients age was 2.9 (1-16) years (71% male). All children underwent insertion of chest tube and intravenous antibiotics. Primary treatment included: VATS in 29 children (on day 9 [5-30] of disease), intrapleural urokinase (UK) in 9 children, chest tube only in 2 cases. 5/11 children in the UK group failed treatment and further underwent VATS. Eighteen of 34 VATS cases (53%; only 1 in last 10 cases) received assisted ventilation (< 24 h). Except one case, complications were mild. Mean PICU stay was 2.6 days (2-7) and mean hospital stay was 9 days (6-19). One case had a severe complication – brain air emboli with neurologic complications that resolved after 3 months. Recovery was complete in all cases.

Conclusions

Although being a surgical procedure, VATS is an appropriate primary treatment in complicated pleural effusion since it is associated with less pain, shorter hospital stay, shorter recovery period and less treatment failure.

\(^1\)Treatment of loculated pleural effusion with intrapleural urokinase in children. Pediatr Surg 1997;32:1473
THE LUNG

PICC-0813
MECHANICALLY VENTILATED CHILDREN WITH UNEXPLAINED THORACIC PUMP FAILURE: USING DIAPHRAGMATIC ELECTRICAL ACTIVITY IN CLINICAL ASSESSMENT

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\textsuperscript{2}Harvard Medical School, Anesthesia, Boston, USA

Aims & Objectives:
Sensing electrical activity of the diaphragm (Edi) may provide an assessment of diaphragmatic function in patients with suspected thoracic pump failure. We describe Edi findings in this population and review potential clinical biomarkers.

Methods
Mechanically ventilated (MV) children with suspected thoracic pump failure (failure to wean, suspected diaphragmatic palsy/weakness) were monitored (using a NAVA catheter, Maquet Medical Systems USA, Wayne NJ). Mean (SD) Edi signal amplitude was summarized. Variability in Edi signal was computed as the coefficient of variation (CV) and time-series data were smoothed using a robust local-regression which incorporated local weighted linear-least-squares; periodicity and prominence of variation of the smoothed Edi CV was extracted. The cohort was divided into two groups: 1) high-variability, where Edi-CV prominence ≥15\% and 2) low-variability Edi-CV <15\%. Statistical analysis included Pearson correlation and independent samples T-test.

Results
In 12 subjects (aged 9.0±4.8 years, weight 31.2±14.8 kg), at assessment, MV peak and end-expiratory pressures were 19.8±4.3 and 6.7±2.0 cm H2O, respectively. The duration of MV was 26.8±20.6 days. Edi monitoring lasted, on average, 21 hours. Median Edi over this period was 1.5±0.6 uV. All cases had Edi<5uV, below expected. Cyclic changes in Edi had periodicity 2.7±0.9 hours (cycle duration 76±25 minutes).
An example of the analysis is shown in Figure 1. The duration of Edi-CV cycle was associated with length-of-stay (R\textsuperscript{2}=0.73, p=0.014); mean prominence of Edi-CV was associated with duration of MV (R\textsuperscript{2} = 0.5, p=0.032). The duration of MV was shorter in group 2 (16.5±9.0 versus 47.4±27.4 days, p=0.016).
Conclusions

In pediatric subjects with suspected thoracic pump failure we identified potential electrical activity biomarkers that may assist in clinical care and possibly the likelihood of MV weaning and length of stay. These include: 1) Edi amplitude over a ~24 period; 2) variation in Edi-CV signal; and 3) cyclical prominence, which may indicate REM-atonia.
THE LUNG

PICC-0365
THE EFFICACY AND LIMITATION OF NONINVASIVE POSITIVE PRESSURE VENTILATION FOR DIAPHRAGM PARALYSIS AFTER CARDIAC SURGERY FOR FUNCTIONAL SINGLE VENTRICLE
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2Hiroshima University, Emergency and Critical Care Medicine, hiroshima, Japan

Aims & Objectives:
To evaluate the efficacy and limitation of noninvasive positive pressure ventilation (NPPV) in patients with diaphragm paralysis after surgery for functional single ventricle.

Methods
This is a retrospective observational study in a pediatric intensive care unit in a university hospital. Twenty-three patients with diaphragm paralysis, diagnosed by fluoroscopy or echography, after cardiac surgery and performed NPPV between 2009 and 2015 were included.

Results
Twelve patients (52%) were weaned from NPPV without re-intubation and diaphragmatic plication. The duration of NPPV before weaning off, re-intubation or plication were 5, 1, and 25 days in median, respectively. Nine patients (39%) were required re-intubation due to respiratory failure. Ten patients (43%) were required diaphragmatic plication in order to be liberated (weaned off?) from NPPV. Patients = or > 1 year old were weaned from NPPV without diaphragm plication more frequently compared to the patients aged less than 1 year old, 9/11 (81%) and 3/12 (25%) respectively (p=0.012; Fisher’s exact test). Two patients with bilateral diaphragm paralysis failed to be weaned off from NPPV and required reintubation and long-term invasive ventilation followed by tracheostomy.

Conclusions
NPPV might become an option for rescue therapy avoiding re-intubation or diaphragm plication only in children aged = or > 1 year old suffering from diaphragm paralysis after surgery for functional single ventricle.
Aims & Objectives:

There is a dearth of paediatric specific data informing delivery of mechanical ventilation for critically ill children. To inform randomized clinical trials we need to understand current clinical practice in PICUs. **Aim**: To determine, in PICUs across Europe, the professional group with responsibility for key ventilation decisions; use of protocols, spontaneous breathing trials (SBTs), non-invasive ventilation (NIV), high flow nasal cannula (HFNC), and automated closed loop systems and nurse staffing.

Methods

Cross-sectional e-survey using a validated instrument contextually adapted for Europe sent to PICUS expressing interest in a concomitant observational study (VESPER).

Results

Response rate was 64% (65/102) representing 19 European countries; 97% were intensivist-led units, 80% mixed PICUs (42% including cardiac surgery), 14% mixed neonatal/paediatric units. Most (75%) units indicated selection of initial ventilator settings was a physician decision; other decisions were mostly based on collaborative discussion between physicians and nurses (Table 1). Availability of written guidelines/protocols for ventilation (31%), weaning (22%), and NIV (33%) was infrequent whereas sedation protocols (66%) and sedation assessment tools (76%) were common. Figure 1 shows approximately half the units used HFNC (53%) and NIV to avoid intubation (52%) >50% of the time; 44.5% used SBTs >50% of the time. Routine use of elective extubation to NIV and automated modes was infrequent. A nurse-to-patient ratio of 1:2 was most frequent for invasively (50%) and non-invasively (70%) ventilated patients.

Conclusions

Our data indicate substantial variability across European PICUs in nurse staffing, interprofessional team involvement in decision making, and adoption of tools/adjuncts to manage weaning.
THE LUNG

PICC-0310
THE UTILITY OF PROADRENOMEDULLIN IN SEVERE BRONCHIOLITIS
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Aims & Objectives:

Bronchiolitis is a potential life-threatening respiratory illness and the most common
lower respiratory infection in infants. We lack reliable biomarkers to predict severity
and to diagnose bacterial coinfection
Our aim is to investigate clinical usefulness of proadrenomedullin (proADM) as
biomarker in severe bronchiolitis admitted in Pediatric Intensive Care Unit (PICU).

Methods

We conducted an observational, descriptive and prospective study of 57 severe
bronchiolitis cases admitted in a tertiary care PICU (October 2012-February 2014).

Results

57 patients were included (55 had respiratory syncytial virus). The mean age was 115
days (range 9 days-20months) and the median length of PICU stay was 5 days
(range 1- 14days). Median proADM levels on admission were 0.658 nmol/l(range
0.308-1.467). No significantly differences were found between patients with and
without suspected bacterial infection (0.7568 and 0.6879 respectively). In our patients
proADM levels correlate with length of PICU stay (r 0.509 P = 0.004) and with the
hours of positive pressure respiratory support (CPAP or high flow nasal cannula) (r 0.325 P = 0.016). ProADM did not correlate with clinical severity. Procalcitonin (PCT)
and C- reactive protein (CRP) were also measured and its mean values were 0.365
ng/mL (range 0.07-23) and 1.9 mg/dL(0.1-19.5) respectively. PCT correlates with
length of PICU stay( r 0.408 P= 0.048) and hours of positive pressure respiratory
support (r 0.373 P=0.013) but CPR did not ( r 0.074 p>0.05 and r 0.164 p >0.05
respectively)

Conclusions

In our population proADM is a reliable prognostic biomarker but it is not useful
discriminating bacterial coinfection in severe bronchiolitis.
Aims & Objectives:
To describe the experience resulting from the use of a high-flow nasal cannula in patients presenting with respiratory distress who are admitted into a Pediatric Intensive Care Unit (PICU) in Bogota, Colombia.

Methods
A prospective study was conducted with patients admitted into the PICU of San Jose Hospital in Bogota (Colombia) over one year. Patients presented with respiratory distress. Noninvasive ventilatory support via high-flow nasal cannula was applied to the patients. Demographic and clinical variables were measured at admission and 1, 6, and 24 hours after starting with the cannula. Changes in measured parameters from abnormal values to normal values or, alternatively, changes in severity scale scores were determined as improvements.

Results
One hundred twenty-one patients admitted during the observation period were described. Fifty percent of cases were younger than 2 years old. Small airway obstruction was the most frequent (62.8%), followed by occupational alveolar diseases (21.4%). Fifty-five percent of patients showed improvement in respiratory rate, and 69% of patients had improved oxygen saturation. Only 35% of patients showed improvement in heart rate. The subgroup of small airway obstructions showed improvement in 43% of patients according to Wood's scale of severity. Mechanical ventilation was not required for 83% of patients; the mean ICU stay was 7±6.7 days. The nasal cannula flow rate was 1 L/kg/min. Only one patient presented epistaxis as an adverse effect.
Conclusions

According to the experience of this ICU staff, the use of a high-flow nasal cannula as a noninvasive ventilatory support is safe and effective. The high-flow nasal cannula is an alternative for patients with respiratory failure due to its success and advantages over other more invasive devices.
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PICC-0296
HEATED HUMIDIFIED HIGH-FLOW NASAL CANNULA (HHHFNC) THERAPY IN BRONCHIOLITIS IN PICU
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Aims & Objectives:

Heated humidified high-flow nasal cannula (HHHFNC) therapy is used widely in patients with bronchiolitis in many Paediatric Intensive Care Units (PICU). In Birmingham Children’s Hospital, HHHFNC was introduced in 2013 in PICU, and in 2014 in High Dependency Unit (HDU).

Aim: To describe and compare the type of respiratory support used for bronchiolitis patients in PICU before and after the introduction of HHHFNC therapy.

Methods

Prospective data collected on children less than two years old with bronchiolitis admitted between 1 November 2014 and 31 January 2015 to a single centre multidisciplinary PICU were analysed. This was compared with data from 2011-12 before the introduction of HHHFNC in PICU and HDU.

Results

During the study period, 31 patients were admitted to PICU from in-house wards/HDU (seven patients retrieved from other hospitals were excluded). 67.7% were males. Median age was 4.7 months (range: 12 days to 23.7 months). 6 (19.5%) patients received HHHFNC, 6 (19.5%) patients received continuous positive airway pressure (CPAP), and 2 (6.5%) patients had trial of both HHHFNC and CPAP before admission to PICU. The following table shows types of respiratory support used in PICU in 2011-12 and 2014-15. There was no significant difference in the rate of intubation (p=0.79) and length of PICU stay (p=0.20) between the two seasons.
Conclusions

HHHFNC therapy has become the common non-invasive mode of respiratory support for bronchiolitis in children admitted to PICU, displacing CPAP. However, its use has not been associated with a reduction in length of PICU stay or rate of intubation post PICU admission.

<table>
<thead>
<tr>
<th>Respiratory Support in PICU</th>
<th>2011-2012 (n = 30)</th>
<th>2014-2015 (n = 31)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bubble CPAP alone, n (%)</td>
<td>14 (46.7)</td>
<td>2 (6.5)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>HHHFNC alone, n (%)</td>
<td>0 (0)</td>
<td>5 (16.1)</td>
<td>-</td>
</tr>
<tr>
<td>HHHFNC at any time, n (%)</td>
<td>0 (0)</td>
<td>19 (61.3)</td>
<td>-</td>
</tr>
<tr>
<td>Intubation &amp; invasive ventilation, n (%)</td>
<td>16 (53.3)</td>
<td>18 (58.1)</td>
<td>0.79a</td>
</tr>
<tr>
<td>Length of PICU stay (median, range)</td>
<td>4 days, 0.76 to 33 days</td>
<td>5 days, 1 to 61 days</td>
<td>0.20b</td>
</tr>
</tbody>
</table>

*aFisher’s exact test. bMann-Whitney U test
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PICC-0241
TIME TREND IN MORTALITY IN PEDIATRIC ACUTE RESPIRATORY DISTRESS SYNDROME: A SYSTEMATIC REVIEW AND METAANALYSIS
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Aims & Objectives:

Epidemiological studies on pediatric acute respiratory distress syndrome (ARDS) report varied mortality rates. This variation is postulated to be due to differences between centres, patient case mix, time period, and study designs. The aim of this metaanalysis is to describe overall pooled mortality in pediatric ARDS and investigate whether this has changed over time.

Methods

Two authors independently carried out an online search in PubMed, EMBASE and Web of Science using keywords and MESH terms including acute respiratory distress syndrome, acute lung injury, pediatric intensive care unit and critically ill children. We included all prospective studies with more than 20 subjects that reported baseline demographics and survival outcomes on pediatric patients with ARDS. Only control arm patients were included for RCTs. Retrospective studies were excluded. Data was extracted from each study using standardized data collection forms. Statistical analysis was performed using RevMan v 5.0 and R v 3.1.2. Random effects models were used for all analysis.

Results

A total 32 studies (2875 patients) were included in this study (Figure 1). Overall pooled mortality was 0.24 [95% confidence interval (95% CI) 0.18, 0.33] (Figure 2). Mortality reported in observational studies were higher than in RCTs 0.28 (95%CI 0.20, 0.38) versus 0.12 (95%CI 0.07, 0.20) respectively. Mortality in studies published before year 2000, between 2000 to 2009 and 2010 onwards showed stepwise improvement; 0.39 (95%CI 0.18, 0.65), 0.28 (95%CI 0.19, 0.39) and 0.24 (95%CI 0.18, 0.33) respectively (Figure 3).

Conclusions
Our systematic review and metanalysis demonstrated that RCTs have lower mortality in pediatric ARDS compared to observational studies. Overall mortality from pediatric ARDS is improving over time.
Aims & Objectives:

The aim of this study was to determine the cases admitted to Emergency Department after foreign body aspiration. We evaluated the demographic features of the cases, such as age and gender, we reviewed seasonal distribution of the admissions, symptoms on admission, we studied the properties of the object extracted and the settlement distribution of the object got stuck. We compared our data with the literature.

Methods

The study is a retrospective sectional study. We got the information of patients diagnosed foreign body aspiration and followed by pediatric surgery.

Results

47 patients were included to the study. The age average was found 3.3±2.7 (min-max:1-16) years old. 61.7 % of the patients (n=29) were male. The most frequent admission of the patients were in May and September; respectively 19.1 % and 17% of the patients. Cough was about 19.6 times higher in patients 3 years of age (OR=19.636, 95% CI: 2.189 - 176.138). Bronchoscopies give us data that most common object in our cases was hazelnut (25.5%) and the most common settlement of the object was right main bronchus (12.8%).

Conclusions

Our main patient profile (a boy patient 3 years of age) with foreign body aspiration correlates with outgoing literature. This period corresponds to the oral stage of development psychology. Spring and autumn are the liveliest seasons for children; they spent plenty of time outdoors and are out of parents’ control. This probably leads to increase of aspiration cases.
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PICC-0442
DOES DIAPHRAGM ELECTRICAL ACTIVITY MONITORING PREDICT EXTUBATION SUCCESS?

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Aims & Objectives:

To investigate whether diaphragm electrical activity (Edi) monitoring could predict extubation success.

Methods

Prospective observational study with institutional grant (SAG-C-TUP-080415-0098). Patients (0-18 years) who required invasive mechanical ventilation due to respiratory failure over 48 hours were eligible. Vital signs, Edi values and blood gases were recorded before and after extubation for 24 hours. The average Edi max value was charted every hour during study.

Results

25 patients (female/male=1.5:1) were included. Median age was 18 months (IQR 10-96). 22 patients had significant comorbidities. Pneumonia (60%) and ARDS (28%) were major reasons for intubation. Eleven patients (44%) failed extubation. Females had more success in extubation (p=0.049). Median Edi levels increased from 11 to 20 after extubation in all patients (p=0.0001). Pre-extubation Edi levels did not differ between patients with extubation failure vs success (p=0.622). Median Edi increased by 150% after a successful extubation, whereas the increment was higher (250-300%) in patients who failed. This difference was not significant (p=0.063). Patients who failed had significantly lower pH (7.29±0.12; p=0.003), higher pCO₂ (59.6±21.42 mmHg; p=0.015) and lower SpO₂ (95±5.69; p=0.024) after extubation. Patients who had at least 4 fold increment of Edi value after the extubation failed. Median NVE (Vt/Edi) index was higher in successful patients compared to patients who failed extubation (p=0.807). In the subgroup of patients, who were supported with non-invasive ventilation after extubation, Edi max values had increased after extubation, although this did not reach statistical significance (p=0.063).

Conclusions

Although patients who failed extubation had higher Edi levels compared to their counterparts, numeric Edi levels were not reliable predictors in our small series of patients with significant comorbidities. Increments by 4 fold may potentially predict failure.
Aims & Objectives:

The aim of this study was to determine our experience about pediatric tracheostomy indications, timing and complications and review of the literature.

Methods

Retrospective analysis of 53 patients who underwent tracheostomy from January 2012 to October 2014 were evaluated. Data analyzed included age, gender, indications for tracheostomy, tracheostomy timing and complications.

Results

Twenty eight(52.8) female and 25(47.2) male total 53 patients were evaluated in this study. The median age was 36.88±44.58(2-191 months) months. Neurological diseases were the most common indications for tracheostomy (32 patients, 60.4). Another indications for tracheostomy were prolonged intubation (12 patients, 22.6), upper airway obstruction (6 patients, 11.3), vocal cord paralysis (2 patients, 3.8) and trauma (1 patient, 1.9) in our study. Mechanical ventilation duration times were 29.6±39.12 days before tracheostomy. There were perioperative complications at 14 patients (26%).

Conclusions

In our study, neurological diseases were the most common indications for tracheostomy. Tracheostomy has low mortality and morbidity rates when placed at pediatric intensive care units.
Aims & Objectives:

Bronchiolitis may require ventilatory support, which can be invasive with endotracheal intubation or non-invasive ventilation (NIV). One method is nCPAP. HFNC is an alternative, and its use is becoming more accepted and widespread in pediatric practice. To our knowledge, there aren't yet studies comparing HFNC and nCPAP. To determine whether HFNC is as effective as nCPAP in preventing intubation in infants < 24 months of age with acute respiratory failure (ARF) secondary to bronchiolitis.

Methods

Randomized, controlled, multicenter, non-inferiority study. Infants with ARF secondary to moderate bronchiolitis (Wood-Downes-Ferres ≥ 4 and/or $O_2 ≥ 2$ lts/min) were recruited from 4 centers: 2 PICUs in Chile, 1 in Argentine and 1 in Uruguay. They were randomized to nCPAP or HFCN. Primary outcome was need for intubation. 232 patients per group were needed to provide 80% power to test the hypothesis that HFCN is non-inferior to nCPAP with rate for intubation of 25% in both groups and a non-inferiority margin of 10%. An informed consent approved by ethics committee was granted.

Results

This is an interim analysis representing 14.4% of cohort. Demographic characteristics, severity of bronchiolitis at study entry, intubation need, insufficient treatment or complications were similar in both groups. (Table) Patients of HFNC
Conclusions

Preliminary data suggests that HFNC is similar to nCPAP in preventing the need for intubation in patients with moderate bronchiolitis and shortens length of stay. More patients need to be included to have definitive conclusions.
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PICC-0717
HIGH-FLOW OXYGEN SUPPORT IN ONCOLOGY PEDIATRIC PATIENTS WITH RESPIRATORY FAILURE: A EXPERIENCE IN A SINGLE-CENTER PEDIATRIC INTENSIVE CARE UNIT IN A DEVELOPING COUNTRY
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Aims & Objectives:

Several non-invasive ventilation (NIV) options are available to treat respiratory distress and it is able to reduce invasive ventilation and mortality rate. Use high-flow nasal therapy (HFNT) is rapidly growing as NIV support in children and adults. This ventilatory system utilizes warm and humidify breathing gas (0.5-60L/min) with some advantages: reduction of dead space (greater alveolar ventilation and CO2 elimination); inspiratory resistance reduction; conductance and pulmonary compliance improvement. Furthermore, nasopharyngeal high flow provides positive distending pressure for lung recruitment. For pediatric hemato-oncology patients or bone marrow transplantation recipients, acute respiratory failure is major cause of PICU admissions. Garcia-Salido et al (2015) showed that use HFNT was successful in 20 of 50 patients, with no requirement of a more complex respiratory care but one third of NIV patients needed invasive ventilation. Aim of this study was to show our experience using HFNT in hemato-oncological patients with acute respiratory failure.

Methods

We conducted a retrospective study in PICU of Instituto do Tratamento do Cancer Infantil of Instituto da Criança (Sao Paulo University), in the period of February/2014 (when we used HFNT for the first time) to December/2015 and analysed all children who used HFNT.

Results

HFNT was used in seven patients. Mean therapy duration was five days. In five patients, HFNT was placed because NIV was not well tolerated after extubation process. In all cases we observed improvement in breathing pattern and decreased need for sedation. Three patients had prior extubation failure due to laryngitis and post-extubation atelectasis. Two patients had to be re-intubated and extubation
Failure was related to septic shock and ARDS (Table 1).

**Table 1 – Patient’s characteristics**

<table>
<thead>
<tr>
<th>Patient</th>
<th>Gender</th>
<th>Age</th>
<th>Diagnosis</th>
<th>Mechanical Ventilation Previously</th>
<th>Succes in HFT</th>
<th>HFT’s Cause of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>11 yrs</td>
<td>Ewing Sarcoma, BMT recipient, Pneumonia</td>
<td>Yes</td>
<td>No</td>
<td>Septic shock and ARDS</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>2 yrs</td>
<td>Burkitt Lymphoma, Pneumonia, Pleural Effusion, Septic Shock, Extubation Failure (Atelectasis and laryngitis)</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>10 months</td>
<td>Paravertebral Neuroblastoma, Chylothorax, Subglottic Stenosis</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>9 yrs</td>
<td>Glioblastoma, Acute Alveolar crisis, Aspiration Pneumonia</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Female</td>
<td>7 yrs</td>
<td>Medulloblastoma, BMT recipient, Pneumonia</td>
<td>No</td>
<td>No</td>
<td>Septic shock</td>
</tr>
<tr>
<td>6</td>
<td>Male</td>
<td>4 yrs</td>
<td>Chronic tracheobronchitis, BMT recipient, GVHD, Acute Respiratory Failure</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Male</td>
<td>1 yr</td>
<td>Gliomatosis, CVA due Thrombosis, Extubation Failure (Laryngitis and Subglottic Stenosis)</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

BMT: Bone marrow transplantation; ARDS: Acute respiratory distress syndrome; GVHD: Graft-versus-host disease; IH: Intracranial Hypertension; CVA: Cerebrovascular accident.

**Conclusions**

In our service, when compared to NIV, HFNT demonstrated reduction in respiratory distress, extubation failure rates and need for sedation. We also observed that patients felt more comfortable using HFNT once speaking and eating were more feasible processes.