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ABSTRACTS

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Area: Medical

Topic ID	Topic	Abstract number(s)
2	Neonatal respiratory failure	1–18
3	Acute lung failure	19–36
4	Chronic lung disease	37–42
5	Non-invasive ventilation	43–52
7	Microcirculation/shock (non-septic)	53–60
8	Congenital heart disease and cardiac surgery	61–86
9	Ethics	87–97
10	Infection, systemic inflammation and sepsis	98–168
11	Neuro critical care	169–194
13	Metabolism and endocrinology	195–213
14	Nutrition	214–236
16	Resuscitation and emergency medicine	237–266
17	Pharmacology	267–275
19	General	276–277
20	Innovations	278–281
21	Parent care	282
24	Renal failure	283–292
25	Liver failure	293–295
26	Transplantation and organ donation	296–299
27	Education	300–307

Area: Nursing

Topic ID	Topic	Abstract number(s)
2	Neonatal respiratory failure	308–309
3	Acute lung failure	310
5	Non-invasive ventilation	311
8	Congenital heart disease and cardiac surgery	312
9	Ethics	313–314
10	Infection, systemic inflammation and sepsis	315
11	Neuro critical care	316
14	Nutrition	317–319
16	Resuscitation and emergency medicine	320–324
19	General	325–341
20	Innovations	342–345
21	Parent care	346–350
22	Nursing research	351–363
26	Transplantation and organ donation	364
27	Education	365–369

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Medical Topic 2 - Neonatal respiratory failure (1–18)

1 – POSTER PRESENTATION

PROLONGED NEURALLY ADJUSTED VENTILATORY ASSIST (NAVA) IN PRETERM INFANTS WITH ACUTE RESPIRATORY DISTRESS SYNDROME (RDS): SAFETY AND EFFECTIVENESS

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Objectives: NAVA is a unique approach to mechanical ventilation based on neural respiratory output. With NAVA the electrical activity of the diaphragm is captured, fed to the ventilator and used to assist the patient's breathing in synchrony and in proportion to the patient's own efforts. Recent clinical trials in adults and term infants showed the feasibility and efficacy of NAVA. Until now clinical data on NAVA in preterm infants are poor and insufficient. In this study we compared currently used ventilation methods to NAVA in preterm infants to evaluate effectiveness and safety of this new ventilation mode on premature babies.

Methods: 8 preterm babies with acute RDS needed mechanical ventilation were recruited. The ventilator used was Servo (Maquet Critical Care). At first babies were ventilated in synchronized intermittent mandatory ventilation (SIMV). After 12 h switched on NAVA mode maintained until extubation (15–102 h). At 1–6–12 h of each ventilation mode were analysed arterial blood gases data, expired minute and tidal volume, PIP, MAP, arterial oxygen tension to fraction of inspired oxygen ratio ($\text{PaO}_2/\text{FiO}_2$). Ventilator rate (RR mech), patient's spontaneous respiratory rate (RRneu) and, as synchrony index, RR mechanical to neural ratio ($\text{MNR} = \text{RRmech}/\text{RRneu}$) were calculated.

Results: In NAVA PIP levels and MNR resulted significantly reduced than in SIMV mode ($p < 0.05$). Also in NAVA we obtained $\text{PaO}_2/\text{FiO}_2$ higher than SIMV mode ($p = 0.059$).

Conclusions: From our preliminary data NAVA seems to be safe and effective to increase patient-ventilator synchrony and to decrease ventilatory assistance in preterm infants.

2 – POSTER PRESENTATION

SURFACTANT BRONCHIAL LAVAGE IN MECONIUM ASPIRATION SYNDROME: A COMPARATIVE STUDY

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Background and aim: Meconium aspiration syndrome produces natural surfactant inhibition with serious neonatal complications. A comparative study was carried out to evaluate surfactant bronchial lavage therapy efficacy in term infants with meconium aspiration syndrome.

Methods: By a random clinical essay we studied term newborns with meconium aspiration syndrome treated in a neonatal care intensive unit, divided in two groups. Group A received surfactant bronchial lavage, B isotonic saline bronchial lavage. Oxygenation index, unit stay days, days of mechanical ventilation, weight, gender and gestational age was study variables. Data analysis was non parametric.

Results: Sixteen patients were included, 8 for each group, 9 (56.25%) girls and 7 (43.75%) boys, with gestational age average of 40.62 weeks and 3.083 kg of weight. Statistical difference for best improvement was determined by surfactant bronchial lavage group in: ventilation days ($p = 0.007$), unit days stay ($p = 0.001$), oxygenation index at third ($p = 0.007$) and fourth day ($p = 0.028$), maximum ventilation pressure at fifth day ($p = 0.038$) and inspired oxygen fraction in fourth ($p = 0.028$) and fifth day ($p = 0.038$). Not differences exist in gender comparison.

Conclusions: Surfactant bronchial lavage is more effective for improve in minor time meconium aspiration syndrome patients conditions, and low stay medical costs.

3 – POSTER PRESENTATION

COMPARING OF THE INCIDENCE OF PULMONARY HEMORRHAGE IN THE PREMATURE NEWBORNS WITH RDS TREATED WITH EXOGENOUS SURFACTANT AND CONTROL GROUP

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Objective: The purpose of this study was to compare the rate of pulmonary hemorrhage in ventilated premature neonates with RDS treated with and without the exogenous surfactant.

Method: In this descriptive analytic study the rate of pulmonary hemorrhage in 40 patients with severe RDS who treated with intratracheal surfactant were compared with 40 patients of control group treated without surfactant. The control group was selected from patients who had severe RDS and received routine treatment except surfactant in the period that surfactant was not administered because of lack of neonatologist presence at the hospital. Surfactant was used as survanta during the first 24 h of life with dose of 4 mg per Kg through intratracheal tube.

Finding: Two groups were comparable in baseline parameters including birth weight sex and gestational age. The rate of pulmonary hemorrhage not increased in case group (survanta received) comparing with control group.

Conclusion: Administration of exogenous surfactant in neonates with severe RDS does not increase pulmonary hemorrhage.

4 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

DIFFERENT PHOSPHOLIPASES AND THEIR MODULATORS ARE INVOLVED IN HUMAN MECONIUM ASPIRATION SYNDROME AND CORRELATE WITH OXYGENATION IMPAIRMENT AND EPITHELIAL DAMAGE

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Background: Meconium aspiration syndrome (MAS) is a rare and life-threatening lung injury, which pathophysiology has been studied in animal models. It is known that pancreatic secretory phospholipase A2 (sPLA2-IB) and proinflammatory cytokines present in meconium challenge the lungs, catabolising surfactant and harming alveoli. Locally produced phospholipases could perpetuate the injury and influence clinical pictures. It is unknown whether pulmonary phospholipases A2 (sPLA2-IIA) and enzyme modulators play a role.

Methods: We measured distinct phospholipases A2 and their modulators in broncho-alveolar lavage fluids and in meconium, using specific ELISA/EIA kits. 5 neonates affected by MAS and 5 control neonates matched for gestational age and birth weight were enrolled. Results were corrected for serum-to-BAL urea ratio and dilution factors.

Results: MAS patients have a higher amount of pulmonary phospholipase (sPLA2-IIA; $p = 0.016$) and Clara Cell Secretory Protein (CCSP; $p = 0.032$). Local lung production of such proteins is confirmed by their low meconial levels and pulmonary production of sPLA2-IIA contributes to the higher total enzyme activity in MAS patients, as compared to controls ($p = 0.008$). Enzyme total activity and sPLA2-IIA concentrations are correlated with meconial TNF α ; increase in phospholipases and TNF α was associated with the release of CCSP in response. Phospholipases activity, sPLA2-IIA and TNF α concentrations in lavage fluids correlate with the degree of oxygenation impairment and of haemorrhagic lung oedema. Cytosolic phospholipase was undetectable both in meconium and in lavage fluids.

Conclusions: Pulmonary sPLA2 (and not only the pancreatic isotype) plays a role in the oxygenation impairment and epithelial damage during MAS. This represents an important target to address with sPLA2 inhibitors.

5 – POSTER PRESENTATION

STUDY OF PRESSURE VOLUME LOOP IN RELATION TO X RAY FINDINGS AMONG VENTILATED NEWBORN INFANTS

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Introduction: Pulmonary graphics monitoring of lung during ventilation have shown a reliable data among many ventilated newborn infants. Exposure of the newborn infants and NICU staff to frequent radiation from X-ray chest carries great risk.

Aim of work: The aim of this study is to correlate the chest X-ray changes to the pressure–volume loop findings.

Subjects and methods: Fifty-five ventilated infants were included in this study. They all subjected to medical evaluation and care according to the routine of our unit. The findings from X-ray were collected as well as the pressure volume loop monitoring data at the same time. The data were collected and analyzed using SPSS.

Results: The most common cause of admission was respiratory distress syndrome. Our results showed that a correlation between pressure volume loop abnormalities as there was narrow loop and slit like pattern when X-ray chest showed bilateral pacification and white out lung (60%), and increases inspiratory resistance with widening of

pulmonary loop when classic findings of radiological chronic lung diseases. The positive predictive value was 90.6 and sensitivity 100%. Also study of pressure volume loop can indicate faulty in air flow when showed a flow starvation pattern. Segmental radiological abnormalities did not correlate with pressure volume loop anomalies.

Conclusion: Pressure volume loop abnormal changes can correlate significantly with the generalized lung diseases.

6 – POSTER PRESENTATION

WEANING FROM MECHANICAL VENTILATION USING NEURALLY ADJUSTED VENTILATION ASSIST IN NEONATES WITH CONGENITAL DIAPHRAGMATIC HERNIA

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Background and aims: Weaning from mechanical ventilation in neonates with congenital diaphragmatic hernia (CDH) can be challenging. Neurally adjusted ventilatory assist (NAVA) provides pressure in proportion to the electrical activity of the diaphragm. Thus, NAVA should guide the clinician on the ability and efficiency of contraction of the diaphragm and should facilitate the weaning from mechanical ventilation in patients with CDH.

The aim of the study was to evaluate the feasibility, tolerance and efficacy of NAVA in the weaning from mechanical ventilation in neonates with CDH.

Methods: We conducted a prospective observational study from September 2010 to April 2011 in our paediatric intensive care unit. Neonates with surgically cured CDH were eligible.

Results: During the study period, 5 patients were eligible, 4 were included and 1 did not receive NAVA at all. NAVA was started at the ages of 29, 14, 4 and 7 days of life and lasted 7, 3, 2 and 3 days, respectively. All patients were successfully weaned from mechanical ventilation after the NAVA period. Two patients received non invasive ventilation driven by NAVA for 5 and 10 days. Enteral nutrition through the NAVA gastric tube was well tolerated. NAVA also helped the clinician to conduct the down titration of sedation/analgesia.

Conclusion: NAVA can be a helpful tool for the weaning from mechanical ventilation in neonates with CDH.

7 – POSTER PRESENTATION

OUTCOME TO DISCHARGE OF CONGENITAL DIAPHRAGMATIC HERNIA IN A LARGE ENGLISH TERTIARY NEONATAL UNIT

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Background and aims: Congenital diaphragmatic hernia (CDH) is a disease with high mortality. The aim of this study was to assess the outcome of infants with CDH managed at a large regional NICU in England from 2006 to 2011.

Methods: Data was collected retrospectively from electronic patient record systems. Data on Antenatal scans, delivery details, postnatal ventilatory management and mortality were collected. Standard statistical methods were used.

Results: Total of 35 pregnancies had antenatal diagnosis of CDH. Eight pregnancies were terminated. The outcome of 30 live born infants is shown in Figure 1. Fifteen (50%) of live born infants survived to discharge. The nonsurvivors had an earlier in utero diagnosis of CDH, lower lung-head ratio (LHR) on antenatal scans, lower birth weight and Apgars (Table 1). All the ventilatory parameters were significantly worse and the use of inotropes was higher in non-survivors.

Fig. 1 Survival to discharge

Table 1

	Non survivors (N = 15)	Survivors (N = 15)	P value
Gestations at diagnosis in weeks (median range)	20 (19-24)	29 (20-36)	0.01
LHR (Median)	1.1	1.9	0.007
Birthweight (Median)	2,777	3,170	0.05
Median Apgar 1 min	5.5	8	0.01
Median Apgar 5 min	6.5	9	0.02
Worst median OI in first 6 h	48	10.2	0.001
Inotrope use	87%	47%	0.05

Conclusions: CDH continues to have high mortality. Earlier antenatal diagnosis and lower LHR is associated with mortality.

8 – POSTER PRESENTATION

INCIDENCE, RISK FACTORS AND OUTCOME OF ACUTE LUNG INJURY IN TERM NEONATES

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Background and aim: Transient tachypnea of the newborn (TTN) is considered as a benign and self-limited respiratory disease. A small subset of these neonates progressively increases their oxygen requirement and requires mechanical ventilation for acute lung injury (ALI). The aim of this population-based case-control study was to identify factors associated with subsequent development of ALI among term neonates initially diagnosed with TTN.

Methods: Between 2003 and 2008, neonates born in Burgundy between 37 and 41 weeks' gestation and admitted to the neonatal care units within 48 h of life for respiratory distress were screened. Infants with bacterial infection, meconium aspiration syndrome, asphyxia and congenital malformations were excluded. ALI cases were defined as follows: mechanical ventilation >24 h; PaO₂/FiO₂ ratio <300; bilateral alveolar infiltration on chest radiograph and absence of left atrial hypertension. Each case was compared to two controls, randomly selected among neonates with TTN that did not progress to ALI.

Results: Sixty-four neonates met the criteria for ALI. Severe complications (pneumothorax, persistent pulmonary hypertension, hospital-acquired infection) were encountered in 35 infants. The mortality rate was zero. Three factors were associated with an increased risk for ALI: age at the onset of the disease ≥60 min; SpO₂/FiO₂ ratio at the time of admission to the neonatal care unit ≤250 and decrease in the SpO₂/FiO₂ ratio during the 5 h following the admission.

Conclusion: ALI was an infrequent but severe disease. The SpO₂/FiO₂ ratio allowed prompt identification of infants at high risk for ALI among neonates initially recognised as TTN.

9 – POSTER PRESENTATION

NEBULISATION OF SURFACTANT: HOW MUCH REACHES THE LUNGS?

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Background and aims: Surfactant has proven effect against RDS only when instilled endotracheally. It would be advantageous if it could instead be inhaled as aerosol, avoiding the need for tracheal intubation. We investigated lung deposition of surfactant, administered via the eFlow Neonatal nebuliser system (PARI Pharma, Germany).

Methods: One day old piglets, born full-term, weighing 1.6 (1.1-2.2) kg [median (range)], received 200 mg/kg of nebulised surfactant via mask, nasal prongs, or tracheal tube. The surfactant (Curosurf, Chiesi, Italy) was diluted with saline to 40 mg/ml and mixed with technetium-99-labelled nanocolloid. Undiluted Curosurf (80 mg/ml) was instilled tracheally in a fourth group of piglets. There were 8 subjects in each group. A gamma camera measured deposition of nanocolloid in percent of the nebulised or instilled dose. We assumed that the deposition figures for surfactant were the same.

Results: Lung deposition of nebulised surfactant was 5.1 (3.4-16)% via mask, 14 (2.4-40)% via prongs, and 45 (25-56)% via tube. It was 88 (71-96)% with instillation. In the mask and prongs groups, 15 (12-24)% and 20 (14-26)%, respectively, was deposited supraglottically; most of this in the nose. The gut contained 5 (4-11)% and 9 (0-18)%, respectively.

Conclusion: The observed lung deposition of nebulised surfactant might be compatible with an acceptable effect, and efficacy studies in surfactant deficient subjects are needed.

10 – POSTER PRESENTATION

PERSISTENT PULMONARY HYPERTENSION OF THE NEWBORN: REVIEW OF OUR MANAGEMENT

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Objectives: We reviewed our PPHN management over the last 12 years.

Methods: Case-based retrospective review of patients admitted to our intensive care unit from 1998 to 2010.

Results: Admission OI (30), mortality (10%) and length of stay have not changed. The number of patients requiring iNO has been consistently 85% over the years, however, the mode of delivery has changed from via a conventional ventilator to HFOV as a standard practise. The need for ECMO has stayed around 20%. However, the reason for initiating ECMO support is no longer a specific OI but rather the presence of air leak or cardiovascular instability. The mortality on ECMO has remained (20%).

Conclusion: Patient characteristics and outcomes for PPHN have not changed over the last 12 years. Despite advances in the management of PPHN including iNO there continues to be a proportion of patients that do not respond to conventional therapy and need ECMO support. This review supports the need for further research in understanding the pathogenesis of PPHN as well as the investigation of new medical therapies.

11 – POSTER PRESENTATION

SP-A ADDITION TO EXOGENOUS SURFACTANT FOR RESPIRATORY DISTRESS SYNDROME IN PRETERM RABBITS

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Objective: To evaluate the effects of SP-A addition to the exogenous surfactant, regarding to the pulmonary dynamic compliance (CD), the ventilatory pressure (VP), the maximum lung volume (V_{30}) and the homogeneity of alveolar expansion.

Methods: After c-section, 27 days preterm rabbits were ventilated using a ventilator plethysmograph-system. At 5 min ventilation animals were randomized into three study groups: Surfactant (surfactant 100 mg/kg—Butantan surfactant, Brazil, 25 mg lipids/ml), SP-A (surfactant 100 mg/kg with addition of 5% SP-A), and Control Group (no surfactant treatment). CD, VP and Vt were recorded each 5 min. After 20 min ventilation animals were deeply sedated with sodium pentobarbital (25 mg/kg, IP) and a quasi-static pressure–volume

curve was performed to determine maximum lung-volume at 30 cm H₂O (V_{30}). Following sacrificed, the lungs were reinflated at 30 cm H₂O, the pressure was reduced to 10 cm H₂O with tracheal ligation and lung was removed and fixed using 10% formalin. Lung slices were evaluated for mean alveolar size (Lm) and distortion index (DI). Statistical analysis was by ANOVA One Way with repeated measures, significance was set at $p = 0.05$.

Results:

Table 1

	Control (n = 9)	Surfactant (n = 8)	SP-A (n = 9)
Tidal-volume (ml/kg)	8.2 ± 0.3	8.0 ± 0.1	8.0 ± 0.2
DC (ml/kg · cm H ₂ O)	0.42 ± 0.06	0.64 ± 0.08	0.63 ± 0.08
Ventilatory pressure (cm H ₂ O)	19.4 ± 2.5	12.5 ± 1.6	12.6 ± 1.7
V_{30} (ml/kg)	23.7 ± 5.8	40.7 ± 2.8	44.8 ± 3.1
Lm (micron)	61.0 ± 4.7	63.3 ± 2.4	63.4 ± 10.0
Distortion index	6.5 ± 1.2	5.3 ± 2.4	6.2 ± 2.4

12 – POSTER PRESENTATION

THE USE OF AN ACCELEROMETER TO MEASURE RESPIRATORY ACTIVITY IN NEONATES

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Objectives: To pilot the use of a small accelerometer device to determine if it is sensitive enough to detect respiratory activity in neonates >26 weeks gestation.

Methods: The study took place in the Neonatal Intensive Care Unit at the RUH, Bath, Appropriate ethical approval was obtained. Infants born at >26 weeks gestation were eligible for recruitment. Informed consent was obtained from parent(s) and the accelerometer was placed adjacent to the baby's trunk by attaching it to the nappy. Three separate channels of digital signals (representing the x, y and z axis) were then recorded using wireless data transmission. The data were collected and stored on a remote computer. The data were analysed for different patterns of activity. This was corroborated using observations of the baby's respiratory activity using standard nursing observations and a cot side events diary.

Results: On analysis of this data it was possible to demonstrate that a distinctive sine wave is produced representing the respiratory movements of the baby. Apnea is also clearly recognised.

Conclusions: It is difficult to monitor respiratory activity in neonates reliably. Detection of apnoea is therefore also difficult. This technology allows for remote and unobtrusive monitoring of an infant's respiratory rate. It may also be possible to calibrate signals for effort of breathing. It gives a clear indication of apnoea. The possibilities for using such devices for remote monitoring both in NICUs and potentially in other environments deserve further evaluation.

13 – POSTER PRESENTATION

PIGTAIL CHEST DRAINS COMPARED WITH CONVENTIONAL CHEST DRAINS IN NEONATES

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Introduction: Pigtail catheters have been shown to be as effective and less invasive in adults than traditional chest tube thoracotomy (Liu CM et al., 2003, Am J Emerg Med). Pigtail catheters have been used in neonatal care but have not been directly compared to conventional chest drains (Jung AL et al., 1991, Clin Pediatr) for the management of pneumothorax.

Aim: We aimed to compare conventional and pigtail chest drains in the neonatal intensive care unit.

Methods: We studied 27 conventional chest drains and 17 pigtail drains from 18 neonates. Significantly increased conventional drain required repositioning and additional drains compared to pigtail drains. Post pigtail chest drain there was a significantly reduced FiO₂ and pCO₂.

Conclusion: Optimising management of acute pneumothorax would improve neonatal morbidity and mortality. The use of the smaller and more flexible pigtail thoracotomy may minimise lung injury during insertion and scarring at the site of insertion.

14 – POSTER PRESENTATION

PROPOFOL AS AN INDUCTION AGENT FOR ALL ELECTIVE INTUBATIONS IN NICU

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Background and aims: The purpose of this audit was to use propofol, a hypnotic agent, as a first line induction agent in place of morphine, atropine, and suxamethonium as an induction agent for all non-emergency neonatal endotracheal intubation. We hypothesized that propofol aids intubation by allowing the continuation of spontaneous breathing, as suggested by Ghanta et al.

Methods: We conducted a prospective audit at Oliver Fisher Neonatal Unit in a tertiary level neonatal unit (Medway Maritime Hospital, UK) of infants who required non-emergency endotracheal intubation. Primary outcome was successful intubation confirmed by chest auscultation and clinical examination of the infant.

Results:

Total number of babies recruited 30

- Minimum: 24 + 2/40
- Maximum: Term
- Median Gestation Age: 28/40 (23 + 6 – 34 + 6)
- Median age at use 6 days (1-99)
- Median attempts 1.5 (1-4)
- Median weight: 880 g (500-2,870 g)

Severe desaturation noted only in one out of 30, no evidence of hypotension noted in any babies.

Conclusions: Propofol is more effective or equally effective to the morphine, atropine, and suxamethonium regimen as an induction agent to facilitate neonatal nasal endotracheal intubation. Being only one drug to use there are potential less chances of drug errors. Importantly, hypoxemia was less severe, probably because of the maintenance of spontaneous breathing. The shorter duration of action would be advantageous in a compromised infant.

15 – POSTER PRESENTATION

AUTOMATED RESPIRATORY CYCLES SELECTION IMPROVES THE DISCRIMINATION BETWEEN RESPIRATORY MECHANICS PARAMETERS IN VENTILATED NEWBORNS

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Background: Ventilator respiratory mechanics (RM) monitoring remains rarely used in clinical practice to follow trends or to differentiate different respiratory status. The aim of this study is to evaluate the interest of new monitoring software selecting optimal breaths and its ability to improve the discrimination of RM parameters.

Methods: Ten minutes recordings from ten newborns ventilated in Assist/Control with variable diseases and gestational age were analysed. Ventilator provided RM data (Resistance, Compliance, Time constant, Tidal volume and C20/C) every 10 s (VRM, Ventilator RM). From pressure to flow continuous recordings, new computer software automatically determined assisted leak-free optimal respiratory cycles. RM values were calculated from optimal cycles (ARM, Automatic cycles' selection RM). To assess the discriminating power of each method, we compared each patient with the 9 others with Student t-tests. All 45 "t" values obtained for VRM and ARM were then compared with a paired t-test.

Results: "t" values means and SD's are summarised in the table for each parameter.

't' values from each RM method

	Rdyn	Cdyn	Time Cst	Tidal volume	C20/C
VRM	8 ± 8	6 ± 3	7 ± 8	7 ± 5	5 ± 4
ARM	20 ± 23	17 ± 17	21 ± 23	17 ± 20	11 ± 11

Differences in discriminating power between VRM and ARM are all significant (p < 0.001)

Conclusions: In our unselected patients, data provided by new software are 2-3 times more discriminating than averaged values provided by ventilator. Improving discriminating power of ventilator monitoring may help in assessing disease status and following trends. Application to clinical practice needs further study.

16 – POSTER PRESENTATION

SELECTING RESPIRATORY CYCLES TO CALCULATE RESPIRATORY MECHANICS PARAMETERS OF VENTILATED NEWBORNS IMPROVES THE ABILITY TO DISCRIMINATE BETWEEN PATIENTS

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Background: Ventilator respiratory mechanics (RM) monitoring, while widely available, remains rarely used in clinical practice to follow trends and to differentiate different respiratory status. The aim of this study is to evaluate a new approach to provide RM from selected optimal breaths and its ability to improve the discrimination of RM parameters between patients.

Methods: Ten minutes recordings from ten newborns ventilated in Assist/Control with variable diseases and gestational age were analysed. Ventilator provided RM data (Resistance, Compliance, Time constant, Tidal volume and C20/C) every 10 s (VRM, Ventilator RM). Continuous pressure and flow recordings were used to reconstruct respiratory waves and loops. Visual assessment determined assisted leak-free optimal respiratory cycles used to calculate RM values (SRM, selected respiratory cycles RM). To assess the discriminating power of each method, we compared each patient with the 9 others with Student t-tests. All 45 “t” values obtained for VRM and ARM were then compared by paired t-test.

Results: Table shows “t” values means and SD’s.

‘t’ values for each method

	Rdyn	Cdyn	Time Cst	Tidal Volume	C20/C
VRM	8 ± 8	6 ± 3	7 ± 8	7 ± 5	5 ± 4
SRM	23 ± 28	18 ± 17	24 ± 30	20 ± 20	13 ± 11

Differences in discriminating power are all significant (p < 0.0001)

Conclusions: In our unselected patients, data provided by selected breaths are 2 to 3 times more discriminating than averaged values provided by ventilator. Improving discriminating power of ventilator monitoring may help in assessing disease status and following trends. Application to clinical practice needs automation of such selection.

17 – POSTER PRESENTATION

AUTOMATED RESPIRATORY CYCLES SELECTION IMPROVES DISCRIMINATION BETWEEN RESPIRATORY MECHANICS PARAMETERS IN SIMV VENTILATED NEWBORNS

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Background: Ventilator respiratory mechanics (RM) monitoring remains rarely used to differentiate different respiratory status. The

study aim is to evaluate new monitoring software selecting optimal breaths and its ability to improve discrimination of RM parameters.

Methods: Ten minutes recordings from ten newborns with variable diseases ventilated in SIMV then Assist/Control were analysed. Ventilator provided RM data (Resistance, Compliance, Time constant, Tidal volume and C20/C) every 10 s (VRM, Ventilator RM). From pressure and flow continuous recordings, new computer software automatically determined assisted leak-free optimal respiratory cycles. RM values were calculated from those optimal cycles in both modes (ARM, Automatic cycles’ selection RM). To assess the discriminating power of both methods, each patient was compared with others by t-tests. All “t” values obtained were then compared by paired t-test.

Results: In two patients, selection in SIMV did not provided enough optimal cycles. For the remaining 8 patients, 28 values by RM parameter for each mode and method were analysed.

‘t’ values (mean ± SD)

	Rdyn	Cdyn	Time constant	Tidal volume	C20/C
ARM A/C	11 ± 12*	9 ± 7*	10 ± 8*	8 ± 6*	8 ± 7**
ARM SIMV	16 ± 19** ^a	9 ± 6*	13 ± 12*	7 ± 4*	15 ± 17** ^a
VRM A/C	6 ± 7	6 ± 3	6 ± 7	5 ± 2	5 ± 4
VRM SIMV	7 ± 8	5 ± 3	6 ± 5	3 ± 2	5 ± 5

^a p < 0.05 AC versus SIMV

* p < 0.01 ARM vs. VRM, ** p < 0.05

Conclusions: In our unselected patients, power to highlight differences between patient’s doubles with data provided by new software compared to ventilator values, either in A/C or in SIMV.

18 – ORAL PRESENTATION

LUNG ULTRASOUNDS FOR SURFACTANT ADMINISTRATION IN NEONATAL RESPIRATORY DISTRESS SYNDROME

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Objectives: Lung ultrasonography (LUS) is increasingly used for respiratory distress in NICUs. Recently the sonographic picture of respiratory distress syndrome (RDS) has been depicted (1). An ultrasound pattern of vertical, confluent artifacts called comet tails or B-lines (white lung) have been demonstrated to be a sign of RDS. The aim of this study was to correlate the need for surfactant with the finding of a white lung on LUS.

Methods: A retrospective analysis was accomplished on any newborn under 35 weeks of gestational age (GA) or newborns over 35 weeks of GA with respiratory distress who underwent LUS at birth. The presence of a LUS picture white lung versus non-white lung was correlated with the need for surfactant administration, i.e. fraction of inspiratory oxygen ≥ 0.4 for >30 min (2).

Results: LUS of 97 newborns with a median GA 33 weeks (range 26–40) were reviewed. LUS showed a white lung in 21 out of 22 patients treated with surfactant. Three out of 24 newborns with white lung on LUS did not need surfactant. Overall, accuracy of sonographic white lung for surfactant administration was: sensitivity 95%, specificity 96%, positive and negative likelihood ratios 23.9 and 0.05, respectively.

Conclusions: LUS was helpful in evaluation of newborns with respiratory distress who are at risk of RDS. The sonographic picture of a white lung (i.e. B-lines confluent and no lung spared areas) is strongly suggestive of need for surfactant administration.

References:

1. Copetti R et al (2008) *Neonatology* 94:52–59
2. CURPAP Study (2010) *Pediatrics* 125:e1402–e1409.

Medical Topic 3 - Acute lung failure (19–36)

19 – POSTER PRESENTATION

EXTRACORPOREAL MEMBRANE OXYGENATION FOR PEDIATRIC RESPIRATORY FAILURE: A SINGLE-CENTER EXPERIENCE IN MANNHEIM

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Objective: Extracorporeal membrane oxygenation (ECMO) has shown to be an effective treatment for severe respiratory failure (ARDS) in children. We aimed to examine outcomes of ECMO-therapy in pediatric patients and identify pre- and on-ECMO conditions that are associated with survival.

Design: Retrospective analysis of all pediatric ECMO (n = 92) between 1990 and 2009 in the referral center Mannheim.

Results: The overall survival was 61%, increasing from 48% in 1990–1994 to 76% in 2005–2009 ($p = 0.025$). The main reason for severity of disease requiring ECMO was the primary pulmonary ARDS (92%). Eighty-six percentages of all ECMO patients had a ventilator-associated lung injury with pulmonary-interstitial edema (PIE) or pneumothoraces before receiving ECMO. There was no statistically significant difference between pre-ECMO ventilator settings, ventilation duration, blood gas parameters, age and weight regarding survival. The mean ECMO-duration increased from 254 ± 188 h (1990–1994) to 339 ± 218 h (2005–2009), particularly in those patients who survived (from 123 ± 38 h up to 354 ± 214 h, respectively), and was associated with higher survival ($p = 0.007$).

Conclusions: ECMO serves as a rescue therapy for severe pediatric ARDS refractory to conventional management and can improve the outcome if performed in a referral experienced center. The combination of lung protective ventilation strategies, early transfer to a referral center and specific use of ECMO seem to improve survival. Further identification of factors associated with survival may help in the ongoing struggle about ECMO selection criteria in critically ill children.

20 – POSTER PRESENTATION

RELATIONSHIP BETWEEN TIDAL VOLUME AND MORTALITY IN MECHANICALLY VENTILATED CHILDREN: A SYSTEMATIC REVIEW AND META-ANALYSIS OF OBSERVATIONAL STUDIES

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Background and aims: Lung-protective ventilation (i.e. use low tidal volume—Vt) has been shown to reduce mortality in critically ill adults. Subsequently, the use of low Vt has been universally adopted in mechanically ventilated children. Yet, it remains undetermined whether there is a relation between Vt and mortality in critically ill children. We performed a systematic review of observational studies to assess this relationship.

Methods: MEDLINE, EMBASE and CINAHL were electronically searched (inception—May 2011) for studies reporting on the effects of Vt on mortality in mechanically ventilated children. Data about study design, ventilator characteristics and mortality were extracted. Data were pooled and analyzed using Review Manager.

Results: Seven studies were identified, comprising 1,604 patients. Five to them did not find a relation between Vt and mortality. Two studies yielded opposing results: in one high Vt was associated with increased mortality whereas in the other it was independently associated with reduced mortality. Of these 7 studies, 5 were eligible for meta-analysis. Pooled analysis (N = 5 studies) showed that $Vt \geq 8$ ml/kg was not associated with higher mortality rates than $Vt < 8$ ml/kg (OR 1.09, 95% CI 0.79, 1.51). However, significant heterogeneity was observed ($I^2 = 64\%$). Similar results (N = 4 studies) were found using 10 ml/kg as cut-off (OR 1.23, 95% CI 0.56, 2.70 $I^2 = 66\%$).

Conclusion: Current data could not confirm a relationship between Vt and mortality. However, significant heterogeneity was observed. Yet, our findings question the use of mortality as outcome for future trials.

21 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

NEURALLY-ADJUSTED VENTILATORY ASSIST (NAVA) VERSUS PRESSURE SUPPORT VENTILATION (PSV) FOR WEANING INFANTS RECOVERING FROM SEVERE ARDS: RETROSPECTIVE COHORT STUDY

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Background-objective: To study the efficacy of the neurally adjusted respiratory assist (NAVA) in the weaning of infants recovering from severe acute respiratory distress syndrome (ARDS).

Methods: Twelve consecutive infants with severe ARDS ventilated with high frequency oscillatory ventilation (HFOV) were considered: six were weaned using pressure support ventilation (PSV) and six with NAVA. Patients were matched for age, weight and gas-exchange impairment. After extubation, respiratory support was continued using non-invasive ventilation, with the same modality. Vital parameters and mechanical data were recorded during the weaning with endotracheal PSV or NAVA. Duration of weaning and subsequent non-invasive ventilation was also recorded.

Results: Significant differences exist between PS and NAVA in terms of heart rate change (+20 vs. +7.2%; $p = 0.003$), mean arterial pressure change (+23.3 vs. 6.3%; $p < 0.001$), $\text{PaO}_2/\text{FiO}_2$ ratio change (−18.6 vs. −8.7%; $p = 0.003$), rate/volume ratio (20.6 vs. 3.5 breaths $\times$ Kg/mL $\times$ min; $p = 0.02$) and minute ventilation (232 vs. 523 mL/Kg/min; $p = 0.04$). Pressure per rate product was almost significantly different (1,126 vs. 795 cmH₂O $\times$ breaths/min; $p = 0.057$). Weaning duration (77 vs. 29 h; $p = 0.049$) and time on non-invasive ventilation (176 vs. 33 h; $p = 0.04$) were lower for the NAVA group.

Conclusions: NAVA is safe and seems to achieve better ventilation and patient-ventilator synchrony, in infants recovering from severe ARDS. The use of NAVA may allow a shorter weaning time.

22 – POSTER PRESENTATION

ADDITIVE EFFECT OF PRONE POSITION AND HFOV: EVALUATION OF THE SEQUENCE OF BOTH METHODS ON AN EXPERIMENTAL MODEL ARDS

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Objectives: The aim of study was to determine the effect of prone position and HFOV in an experimental model of ARDS.

Methods: The study included 40 experimental piglets. After anaesthesia and instrumentation, the animals were ventilated PVC. Lung damage induced by repeated bilateral lung lavage with saline (38°C, 30 ml/kg) to achieve $\text{PaO}_2/\text{FiO}_2 < 200$ Hgmm. After induction of ARDS, the experimental animals were randomized into 5 groups—the control group (PCV in the supine position throughout the experiment), PP (PCV in the prone position and then in the supine position), HFOV (HFOV in the supine position throughout the experiment), HFOV + PP (HFOV in the supine position, after 6 h of prone position and then supine position), PP + HFOV (PCV in the prone position, after 6 h HFOV, further rotation of supine and prone positions, as the PP group. Monitored parameters pH, PaO_2 , PaCO_2 and oxygenation index.

Results: In terms of oxygenation (PaO_2) was not the difference between PP and HFOV, higher PaO_2 was achieved in PP + HFOV than in HFOV + PP. CO_2 elimination was better in HFOV + PP than in PP + HFOV, no difference between PP and HFOV. There was no significant difference in OI between PP and HFOV, HFOV + PP had a lower OI than HFOV + PP.

Conclusions: Between PP and HFOV were no differences in oxygenation and CO_2 elimination, the combination of HFOV + PP is more effective in terms of oxygenation.

Keywords: ARDS; Prone Position; High Frequency Oscillatory Ventilation; Oxygenation Index.

23 – POSTER PRESENTATION

CAN CHEST RADIOGRAPHS PREDICT OUTCOME IN ONCOLOGY PATIENTS ADMITTED TO PAEDIATRIC INTENSIVE CARE?

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Background and aims: Unplanned oncology admissions to PICU have a relatively high mortality. The effects of prePICU cardiopulmonary damage and respiratory infection are common causes. We aimed to see if chest radiographic (CXR) signs would predict PICU outcome.

Methods: In over 100 unplanned oncology PICU patients admitted 2004–2009 there were 11 deaths. These were matched for age and sex with 20 survivors from the same time period. The admission CXR was retrieved, anonymised, and reported by a PICU consultant. CXR appearances and patterns were correlated with outcome. Fischer's exact test was used to test for statistical significance.

Results: Survivors and non-survivors were of similar age and gender mix. The commonest primary malignancy (ALL) and reasons for admission was similar in both groups. There was an excess of bone marrow transplant patients in the non survivors (5/11 vs. 2/20). Enlarged heart and effusion did not predict death, but widespread consolidation and opacity at admission was strongly correlated with a poor outcome. (figure)

CXR appearances predicting outcome

Conclusions: Myocardial damage, evident in cardiomegaly and effusion can be successfully managed in this group. However, pulmonary changes, perhaps reflecting fibrosis or refractory infection are less treatable. Understanding who is likely to die can direct treatments and research, and aids clinical decision making.

24 – POSTER PRESENTATION

SYSTEMIC INFLAMMATORY REACTION AND MECHANICAL VENTILATION INDUCED HISTOLOGICAL CHANGES IN LUNG TISSUE IN PIGLETS. EXPERIMENTAL STUDY

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Prospective, randomised, experimental study included a total of 32 piglets divided into 2 groups (A Vt = 6 ml/kg, B Vt = 10 ml/kg) and mechanically ventilated (MV) in PCV mode for 12 h.

Aim of the study to develop a clinically relevant experimental model of MV and assess the influence of mechanical ventilation on lung function, morphology, systemic inflammatory reaction and biotrauma induction.

Blood samples were obtained after 1 and after 12 h of MV and levels of TNF- α , IL-6, IL-8, ICAM, VCAM were examined. The ventilatory indexes (AaDO₂, OI, VI, PaO₂/FiO₂, Cdyn, Rawe) were recorded. The lung tissue samples were obtained for histological and immunohistochemical analysis at the end of the study (caspase 3 a Ki-67). Piglets ventilated with small Vt maintained physiological oxemia, but developed respiratory acidosis.

Piglets ventilated with large Vt maintained normal oxemia and capnia with concomitant change of ventilatory indexes: AaDO₂, OI, PaO₂/FiO₂, Cdyn (p < 0.05).

IL-6 increased (p < 0.01) and TNF- α decreased in both groups (p < 0.05). The levels of IL 8, ICAM a VCAM did not change significantly.

The histological examination of lung tissue exposed to large Vt revealed inflammatory infiltration of the alveolar septa, bronchioles and vascular structures. Minor inflammatory septal infiltration was observed in small Vt group. Apoptotic and proliferative changes were observed in both groups.

In conclusion: MV with Vt = 6 ml/kg does not guarantee a preservation of physiological processes in the lung tissue. MV with Vt = 10 ml/kg does not fulfill the criteria for protective ventilation. Supported by grant: MSM 0021620819.

25 – POSTER PRESENTATION

TIDAL VOLUME IS NOT ASSOCIATED WITH ACUTE KIDNEY INJURY IN MECHANICALLY VENTILATED CHILDREN

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Background and aims: Lung-protective ventilation (i.e. low tidal volume—Vt) has been shown to reduce mortality and multiple organ system failure in critically ill adults. The relationship between Vt and acute kidney injury (AKI) in mechanically ventilated children has not been studied. We hypothesized that children ventilated with Vt <8 ml/kg during the first 48 h of mechanical ventilation (MV) had less AKI than with Vt $\geq$ 8 ml/kg.

Methods: Demographical and clinical data of children <18 years consecutively admitted to the pediatric intensive care unit (PICU) of the Beatrix Children's Hospital (June 2009–August 2010) were retrospectively collected. Primary measure of outcome was AKI as defined by the pRIFLE criteria. Patients were dichotomized in two groups according to mean Vt during the first 48 h of MV: group I (Vt <8 ml/kg during) and group II (Vt $\geq$ 8 ml/kg).

Results: Three-hundred patients were included: 106 (35.3%) in group I and 194 (64.7%) in group II. Baseline demographics and estimates of disease severity (PRISM II score) were comparable between the two groups. The occurrence of AKI was comparable between the two groups (12.3% vs. 14.4%, p = 0.60). There was also no correlation between the prevalence of AKI and amount of Vt (p = 0.83). Also, in children with impaired oxygenation (SpO₂/FiO₂ <315, N = 167) the prevalence of AKI was comparable between both groups (20.0% vs. 17.0%, p = 0.63).

Conclusion: Tidal volume was not associated with AKI in mechanically ventilated children.

26 – POSTER PRESENTATION

PULMONARY FUNCTION AFTER SURFACTANT NEBULISATION IN CHILDREN WITH RESPIRATORY FAILURE

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Background: Pulmonary function after surfactant therapy has not yet been investigated using Electrical Impedance Tomography (EIT). Objective was to investigate pulmonary function in children with respiratory failure treated with nebulisation of surfactant.

Methods: Three ventilated infants with respiratory failure received surfactant (60 mg/kg BW, diluted in 10 mL 0.9% NaCl) via an Aeroneb[®] nebulizer. Next to spirometry and hemodynamics, Δ relative impedance changes (RIC) by EIT as surrogate lung function parameters were recorded, reflecting regional distribution of V_T (amplitude of RIC) and changes in EELV (minima of RIC). Data was recorded before, 1, 6, and 12 h after surfactant application. Respirator settings were kept unchanged. RDS-score was assessed by chest x-ray before, 1 and 3 days after intervention.

Results: Improved gas exchange was detected after nebulisation of surfactant. Δ minima of RIC (EELV) increased significantly (p < 0.001), especially in the dorsal lung areas. After nebulisation, V_T shifted from ventral to middle towards dorsal lung areas. RDS score is displayed in Table 1.

Table 1

Patient	Before surfactant	Day 1 after	Day 3 after
I	4	3	1
II	5	4	3
III	5	3	3

Conclusions: These results implicate that nebulisation of surfactant induces an amelioration of surrogate parameters of lung function. These beneficial effects stayed present for at least 12 h. Nevertheless,

in a next step clinical relevance of nebulisation of surfactant has to be proven in comparison to bolus application.

27 – POSTER PRESENTATION

PREDICTIVE FACTORS OF OUTCOME IN CHILDREN WITH ACUTE LUNG INJURY

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Background and aims: Acute lung injury (ALI) is a life-threatening form of hypoxemic respiratory failure. ALI patients require intensive care with prolonged mechanical ventilation. Numerous studies have tried to find prognostic factors in these patients; however, the available data are heterogeneous. This study aimed to determine predictive factors of outcome in children with ALI.

Methods: In this observational cross-sectional study, 64 pediatric patients with ALI were recruited in a 22-month period of time in Tabriz Children teaching Hospital. The pediatric intensive care unit (PICU)-outcome was determined and accordingly, the patients allocated in two groups; survivors and deceased. Patients' characteristics including age and sex, past medical records, parameters of mechanical ventilations, arterial blood gasses, organ involvement, presence of acute respiratory distress syndrome (ARDS) and pediatric risk of mortality (PRISM) score were compared between the two groups.

Results: The PICU mortality rate was 51.6%. Independent predictive factors of mortality were higher (more negative) base excess (BE), higher positive end-expiratory pressure (PEEP) and peak inspiratory pressure (PIP), and higher on-admission PRISM score, as well as presence of other organ involvement and ARDS. Parameters such as age, sex, previous history, time gap between admission and hospitalization, duration of hospitalization, PaO₂ and PaCO₂ were not significantly different between the two groups. In multivariate study, however, high PRISM score was the only independent predictor of mortality (≥ 13.5 , sensitivity: 75.8%, specificity: 90.3%).

Conclusions: The PRISM score was the only reliable predictor of PICU-mortality in pediatric patients with ALI.

28 – POSTER PRESENTATION

DEMOGRAPH AND TEMPORAL TRENDS IN SEVERE RSV DISEASE

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Background and aims: To describe temporal and co-morbidity related trends in Respiratory Syncytial Virus (RSV) induced acute respiratory failure.

Methods: Retrospective single centre cohort study over 8 years (20 bed PICU). Significant co-morbidity included: ex-premature, cardiac disease, and major chromosomal/developmental anomalies. Trends and group differences were analysed via ANCOVA, with marginal mean estimates.

Results: 403 ventilated RSV infants were admitted over 8 years (winter seasons 2003–2010), mean (SD) age 3.2 (4.2) months, weight 4.4 (2.1) kg, 59% male. The proportion of co-morbidity did not change over time, being: none (55%), ex-premature (34%), cardiac (5.5%) chromosomal/developmental (5.5%), $p = 0.21$. Overall mean length of ventilation (4.1 ± 2.9) was constant over time ($p = 0.17$), but showed considerable differences between groups, ranging from 3.4 to 7.1 days ($p < 0.001$, figure).

LOV across years and co-morbidities

Conclusion: Length of ventilation has remained relatively constant for RSV disease over the last decade, but is influenced by co-morbidity. These data may provide useful for powering clinical trials in RSV disease.

29 – POSTER PRESENTATION

THE RELIABILITY OF SIDE-STREAM END-TIDAL CO₂ CAPNOGRAPHY FOR ESTIMATING ARTERIAL CARBON DIOXIDE TENSION IN MECHANICAL VENTILATED CHILDREN

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Objectives: Capnography is a tool for continuously measuring carbon dioxide concentration in expired gas (EtCO₂). The aim of the present study was to assess the correlation between EtCO₂ and arterial carbon dioxide concentration (PaCO₂) in a general population of mechanically ventilated critical ill children.

Methods: In this single-centre prospective observational study all patients were ventilated with a SERVOi ventilator (Maquet, Germany). EtCO₂ was measured by continuous side stream capnography (Philips MP 70 monitoring system). Blood gas samples were drawn from an intra-arterial catheter. Per patient a maximum of 10 consecutive paired samples of EtCO₂ and PaCO₂ levels were collected.

Results: We recorded a total of 365 paired samples in 50 children with a mean age of 3.2 (0.1–14) years and a mean weight of 14.4 (1.8–65) kg. Mean measured values were (range): PaCO₂ 4.5 (2.2–7.6) kPa, PEEP level 6.2 (3–14) cm H₂O, heart rate 134 (58–205) bpm, mean arterial pressure 65.5 (39–103) mmHg. Mean length of stay (range) was 12.1 (1–64) days and ventilator days were 9.3 (1–30) days. The correlation between EtCO₂ and PaCO₂ was poor with $r = 0.44$ (95% CI 0.36–0.52; $p < 0.0001$) (figure 1). The mean bias was 0.9 kPa with limits of agreement ($1.96 \times$ SD of bias) of 1.9 kPa.

Fig. 1

Conclusion: In this general PICU population EtCO₂ capnography did not reliably reflect PaCO₂.

30 – POSTER PRESENTATION

H1N1 PNEUMONIA: IS NON-INVASIVE VENTILATION AN OPTION?

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Aims: In 2009 emerged a novel H1N1 Influenza virus that may cause acute respiratory failure, with 1-10% of cases requiring intensive care unit (ICU) admission. Non-invasive ventilation (NIV) changed the management of different causes of acute respiratory failure. However, the role of NIV for hypoxemic respiratory failure is controversial and evens more in H1N1 virus infection. Concerns are related with the risk of respiratory pathogen transmission by droplet dispersion and the high rate of NIV failure reported in the treatment of these patients.

Patients: We describe three pediatric patients with H1N1 virus pneumonia, with hypoxemic respiratory failure (two with acute lung injury, the other with acute respiratory distress syndrome), successfully managed with NIV in a negative pressure room.

Conclusions: Non-invasive ventilation can have a role in treating acute respiratory associated with H1N1. In this context NIV should be applied with specific resources by experienced teams, in negative-pressure rooms, in selected patients with a rapid trial identifying those who fail without delaying intubation.

31 – POSTER PRESENTATION

INCIDENCE OF PNEUMOTHORAX IN NEONATAL INTENSIVE CARE UNIT: IS SURFACTANT ADMINISTRATION EFFECTIVE?

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Objectives: Pneumothorax (Px) is most commonly seen during the neonatal period. Our aim was to examine the incidence of pneumothorax among critically ill ventilated neonates admitted in the

Neonatal Intensive Care Unit and to evaluate the effect of artificial surfactant.

Methods: In a retrospective study, we reviewed the files of all neonates complicated with Px and admitted in the NICU. We used a checklist including demographic and clinical characteristics such as: sex, age of initiation of the disease, birth weight, gestational age, type of Px, underlying disease, duration of admission, type of ventilation, treatment and mortality.

Results: Among the 544 neonates admitted during the 27-month study, 64 (11.7%) neonates developed Px. Px was significantly more prevalent in neonates who had not received surfactant ($p < 0.05$). Pneumothorax was also more common among full term neonates (55%). The most common underlying disease was Respiratory Distress Syndrome (RDS) (38%), followed by congenital pneumonia and asphyxia, both 11%. Mortality rate was 72%. Birth weight didn't show any correlation with the incidence of Px ($p < 0.05$).

Conclusions: The incidence and mortality rate of Px was high. This was because of low supply of surfactant seen in our setting and therefore unlike other studies in which aspiration of meconium was the most common cause for Px, in our setting RDS was the most common. Therefore, in order to decrease the incidence of Px and consequently neonatal mortality rate, gentle suction, avoiding vigorous resuscitation and widely use of surfactant preparations is recommended.

32 – POSTER PRESENTATION

BRONCHIOLITIS INDUCED LYMPHOPENIA: IS THERE A VIRUS SPECIFIC RESPONSE?

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Background and aims: Bronchiolitis is the commonest reason for children under the age of 1 year to be admitted to hospital. Respiratory syncytial virus (RSV) is associated with profound immune changes involving Th1/Th2 lymphocytes and peripheral lymphopenia. In this study we compared lymphocyte changes in bronchiolitis with different viral infections.

Methods: A retrospective analysis of all children admitted to the Paediatric Intensive Care Unit (PICU) at Addenbrookes Hospital from March 2001 to April 2007. All ventilated children under 1 year of age with bronchiolitis were included. Exclusion criteria were bacterial sepsis, congenital heart disease, hematologic disease or immunodeficiency.

Results: 112 children were identified and 13 excluded. Of 99 subjects the median (interquartile range) age was 2.4 (1.38-4.22) months. 56 (56.6%) were boys and 89 (89.9%) had a virus identified. The most common pathogens identified were RSV (67/89), rhinovirus (25/89), and parainfluenza (9/89). Co-infection was present in 23, RSV with rhinovirus the most common association ($n = 20$). There were no differences in age, gender, or length of stay between RSV and other viruses. Only RSV was associated with lymphopenia at admission [2.80 (2.10-3.83) vs. 3.78 (2.58-4.83), $p < 0.01$] and throughout the PICU stay [2.30 (1.73-3.35) vs. 3.15 (2.31-4.26), $p = 0.01$]. There was an inverse correlation between lymphocyte count and PICU length of stay ($r = 0.28$, $p < 0.01$).

Conclusions: Children admitted to PICU with RSV bronchiolitis become lymphopenic compared with those infected with rhinovirus or parainfluenza. The intensity of lymphopenia correlated with PICU length of stay. Further studies are needed evaluate the underlying mechanism for these changes and possible long term effects.

33 – POSTER PRESENTATION

HIGH FREQUENCY OSCILLATORY VENTILATION: EIGHT YEARS OF EXPERIENCE

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Background: Ventilation of patients with respiratory failure can be a challenge. High Frequency Oscillatory Ventilation (HFOV) is an ideal way to ventilate with an open lung and avoid ventilator induced injury. **Aims:** Describe our experience with HFOV and evaluate if HFOV (Sensormedics 3100A®) allowed improvement in oxygenation and ventilation.

Methods: Retrospective cohort study of all children ventilated in HFOV (January 2002–December 2009). The following was recorded: demographic and clinical data; blood gases and ventilatory parameters at 0, 2, 6, 12, 24, 48 h after starting HFOV and complications.

Results: Included 73 children with a median age of 1.5 months (min: 0.3; max: 36). Fifty-three (72.6%) were ventilated due to pneumonia and 16 (21.9%) due to bronchiolitis. Sixty-three (96.9%) developed Acute Lung Injury. Conventional ventilation was performed in 62 (84.9%) patients prior to HFOV during a median time of 12 h (min: 1 h; max: 360 h). HFOV was started due to persistent hypercapnia in 52 (71.2%) and to refractory hypoxemia in 9 (12.3%) patients. Mean pCO₂ before HFOV was 89.9 ± 32.8 mmHg. HFOV was performed for a median time of 97.5 h (min: 12 h; max: 576 h). Inotropic support was needed in 44 (60.3%) patients. Six hours after initiation of HFOV a mean PCO₂ below 60 mmHg was reached (p < 0.001) together with a pH of 7.3 (p < 0.001) and a FiO₂ of 60%. During the first 48 h, a sustained increase in SatO₂/FiO₂ ratio (p < 0.001) was observed. No complications directly related to HFOV were described; overall survival rate was 82.7%.

Conclusions: HFOV enabled an improvement in hypercapnia and oxygenation. It is a valid and safe option for the treatment of ARDS and ALI.

Methods: All children requiring NMB were eligible for this prospective study. They were ventilated in a time-cycled, pressure limited mode with pre-set tidal volume. Respiratory system compliance (Cr_s) and resistance (R_{rs}), peak inspiratory pressure (PIP), mean airway pressure (MAP), and parameters for gas exchange (PaCO₂ and PaO₂) were recorded before and during administration of rocuronium 1 mg/kg i.v. Center of ventilation (CoV) was assessed using electrical impedance tomography (EIT). A CoV <50% indicates ventral ventilation. Data are expressed as mean ± standard error. Statistical analysis was done using the paired t-test.

Results: So far, six children were enrolled (mean weight 5.7 ± 1.1 kg). PIP (30.5 ± 3.9 vs. 25.5 ± 4.4 cm H₂O), Cr_s 2.6 ± 0.4 vs. 2.4 ± 0.4 mL/cm H₂O, R_{rs} 108.8 ± 14.9 vs. 107.7 ± 11.2 cm H₂O/L/sec and oxygenation index (15.9 ± 3.0 vs. 11.8 ± 2.1) were not significantly changed after NMB. The CoV was 49.0 ± 0.8 before and dropped to 45.2 ± 1.3% during the use of NMB (p = 0.06) indicating more ventilation towards to the non-dependent zones.

Conclusions: The use of NMB resulted in more ventilation towards non-dependent zones in children. A larger sample size is necessary to confirm these findings.

35 – ORAL PRESENTATION

IMBALANCE BETWEEN ACE AND ACE2 ACTIVITY MODULATES ACUTE RESPIRATORY DISTRESS SYNDROME; RESCUE BY ANGIOTENSIN-(1-7)

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Background and aims: Acute respiratory distress syndrome (ARDS) is a devastating clinical syndrome. Angiotensin-converting enzyme (ACE) and its effector peptide angiotensin (Ang) II have been implicated in the pathogenesis of ARDS. Recently a counter-regulatory enzyme of ACE, i.e. ACE2 that degrades Ang II to Ang-(1-7), was discovered offering a novel treatment modality for this syndrome. As the involvement of the ACE and ACE2 in ARDS is still far from clear, we addressed the role of the two enzymes in both human disease and an animal model of ARDS.

Methods: ACE and ACE2 activity was measured in bronchoalveolar lavage fluid (BALF) from children with or without ARDS following viral lower respiratory tract infection requiring ventilatory support. In rats, ARDS was induced by intratracheal administration of LPS followed by mechanical ventilation. During mechanical ventilation animals were treated with normal saline (placebo), Losartan (Ang II receptor antagonist) or with a protease-resistant, cyclic form of Ang-(1-7) (cAng-(1-7)).

Results: BALF ACE activity was enhanced, whereas ACE2 activity was reduced, both in human ARDS as well as in the experimental model. This was matched by enhanced BALF levels of Ang II and reduced levels of Ang-(1-7) in the experimental model. Therapeutic intervention with cAng-(1-7) attenuated the inflammatory mediator response, markedly decreased lung injury scores and improved lung function, as evidenced by increased oxygenation.

34 – POSTER PRESENTATION

GLOBAL DISTRIBUTION OF TIDAL VOLUME BEFORE AND DURING NEUROMUSCULAR BLOCKADE IN MECHANICALLY VENTILATED CHILDREN: A PILOT STUDY

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Background and aims: The use of neuromuscular blockade (NMB) negatively affects the distribution of ventilation in adults. It is unknown whether this also occurs in mechanically ventilated children. We tested the hypothesis that the use of NMB was associated with a decreased aeration of the lung dependent zones.

Conclusions: Our data indicate that ARDS develops due to reduced pulmonary levels of Ang-(1-7) and that suppletion of this peptide halts the development of ARDS.

36 – POSTER PRESENTATION

THE ESTIMATING OF THE INFLUENCE OF HELIOX AND SALBUTAMOL TREATMENTS HISTOPATHOLOGICALLY IN A RAT-MODEL ARDS

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Aim: To describe histopathological changes in the lungs of 10 rats with ARDS after using salbutamol and heliox.

Material and method: Rat-model ARDS was designed in 10 Wistar albino male rats by intratracheal instillation of physiological saline solution in respect of German and Hafner's study. Anesthetized and tracheotomized rats were pressure-controlled ventilated with 100% oxygen. Rat lung parenchyma lavage was done with 5×6 ml of physiological saline solution per animal every half an hour through 210 min. There were four groups: Control group ($n = 10$), salbutamol (Ventolin®) group ($n = 10$; 0.2 mg/kg/dose) heliox ($\text{He}:\text{O}_2 = 50:50$) group ($n = 7$) and salbutamol (Ventolin®) group ($n = 8$; 2.5 mg/dose). Third group received 50:50 heliox: O_2 for 1 h continuously.

Results: We found a significant difference statistically between heliox and the dosage of 0.2 mg/kg of salbutamol group according to hyaline membrane formation ($p = 0.008$). Mean grade of HM was recorded in heliox group as 1.78. That of second group was 2.90. The difference was significant statistically between second and fourth group in terms of hemorrhage ($p = 0.0001$). The mean grade of hemorrhage in second group was higher than that of fourth group. While the mean grade of HM was lower in heliox group, the grade of hemorrhage was high.

Conclusion: In our study is the first study to show the treatment effect of heliox: O_2 in ARDS. In our study, 2.5 mg/dose ventolin nebulas inhalation intratracheal in four cycles with 15 min breaks showed that it can be helpful to decrease the hemorrhage of lung parenchyma during the management of ARDS in practice.

Medical Topic 4 - Chronic lung disease (37–42)

37 – POSTER PRESENTATION

VITAMIN D AND RESPIRATORY MORBIDITY IN VERY LOW BIRTH WEIGHT INFANTS

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Background and Aim: Vitamin D deficiency (<50 nmol/l) is associated with negative effects on bone health and other chronic diseases. Vitamin D deficiency is associated with Tuberculosis, other

respiratory morbidities. We have previously reported a high incidence of low vitamin D in a cohort of preterm very low birth weight (VLBW) infants. We aimed to assess co-morbidities associated with Vitamin D deficiency in this population.

Methods: Serum 25-hydroxy-vitamin D (25-OH-D) levels were assessed in 100 preterm VLBW infants (B.wt <1.5 kg, <32 weeks gestation), admitted to a tertiary referral NICU prior to additional oral multivitamin supplements, although infants were supplemented in TPN since birth. Data on demographics and other biochemistry was also collected.

Results: 100 babies had a 25-OH-D level with $23 > 50$ nmol/l (mean $\pm$ SD: 65.6 ± 14.8 nmol/l) and 77 had levels <50 nmol/l (36.8 ± 7.4 nmol/l). Comparing those babies with 25-OH-D <50 nmol/l with those >50 nmol/l, there was no significant difference with regard to ethnicity; birth weight, gestation, gender, Apgar scores, antenatal steroids, requirement for resuscitation, intubation or surfactant, duration of IPPV. However, duration of NPCAP, Oxygen therapy, home oxygen requirement, and chronic lung disease were significantly increased in infants who were Vitamin d sufficient at the time they started oral supplements. However, these infants were significantly chronologically older at the time of sampling and exposed to greater TPN vitamin d.

Conclusions: Recognition of vitamin D deficiency is important due to potential long term effects. Vitamin D sampling of mothers and infants at birth, discharge is required to assess the impact of vitamin d deficiency on preterm outcomes.

38 – POSTER PRESENTATION

THE EFFECT OF ADDITIVE TREATMENT WITH EXTRACT CHLORELLA VULGARIS IN IMPROVEMENT OF COPD PATIENTS QUALITY OF LIFE

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Background: Common respiratory tract disorders can be categorized into two major groups: (1) obstructive disorders (reversible: Asthma, Irreversible: COPD). (2) Restrictive disorders which include pulmonary fibrosis and interstitial lung disease. The main causes of pulmonary obstructive disease are known to be the followings; Oxidative stress, free radicals, Allergens Inflammation provoking agents. The common medications prescribed for patients suffering from this disease, possess lots of side effects.

Methods and materials: In this study, we put the patients into 2 groups each of 40 patients. One group was only treated with standard therapies including: β_2 agonist, corticosteroids, and the second group received Extract of Chlorella Vulgaris (ECV: ALGOMED; Germany) as adjunctive therapy to the standard therapy as mentioned above. ECV (900 mg/day) was administered to these patients 3 times daily for 2 months. Different parameters indicative of patient's response to therapy were analyzed, including: patient's quality of life (QOL) based on St. George's respiratory questionnaire, Spirometry parameters (FEV_1 , FEV_1/FVC , $\text{FEF}_{25-75\%}$, FVC), blood tests (Oxidative stress related parameters including: Glutathione synthetase/peroxidase, super oxide Dismutase (SOD)). The above parameters were determinate both before the initiation of therapy and after treatment.

Results: The results indicated that ECV as additive therapy significantly improved patient's QOL ($p = 0.01$), improved spirometry indicas ($p = 0.01$), reduced oxidative stress related parameters ($p = 0.05$) and increased the antioxidative profile of these patients ($p = 0.05$).

In conclusion: The results of present study suggested that ECV additive treatment by induction of antioxidative properties in COPD patients can be used in clinical setups.

39 – POSTER PRESENTATION

AUDIT OF NATIONAL COMPLIANCE WITH BRITISH THORACIC SOCIETY GUIDELINES FOR LONG TERM OXYGEN THERAPY IN CHRONIC LUNG DISEASE

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The British Thoracic Society guidelines state that in infants with chronic lung disease (CLD), oxygen saturations below 90% are associated with an increased risk of apparent life threatening events (ALTE) and saturations below 92% may be associated with suboptimal growth. They recommend that, when assessing infants for the suitability of long term oxygen therapy (LTOT), pulse oximetry should be measured for 6–12 h and that oxygen saturations should be maintained at 93% or above. This audit aims to identify national compliance with the BTS guidelines for assessing suitability of LTOT in CLD.

Methods: Guidelines for assessment for suitability for LTOT were obtained via telephone survey.

Results: Sixty-five randomly selected English NICUs were contacted and 48 responded. 52% carry out pulse oximetry monitoring pre-discharge in infants with CLD to assess need for LTOT. Of these, target saturations were variable, 8% using 93%, 52% below and 40% above this. Although 43% monitored over the recommended time period, 48% monitored for over 12 and 2% for less than 6 h.

Conclusions: Only 4% of units contacted carry out pulse oximetry to assess suitability for LTOT as per BTS guidelines. This suggests that some infants requiring LTOT may not receive this, increasing the risk of ALTE and poor growth. Others may receive unnecessary LTOT, with the associated expense and inconvenience. Local review supports this. These results suggest the need for increasing the awareness of the BTS guidelines amongst English neonatal units.

Reference

1. Balfour-Lynn et al (2009) BTS guidelines for home oxygen in children thorax.

40 – POSTER PRESENTATION

PREVALENCE OF CHRONIC LUNG DISEASE IN PRETERM BABIES LESS THAN 31 WEEKS GESTATION: A NEONATAL NETWORK PERSPECTIVE

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Objectives: To obtain a neonatal network perspective of the prevalence of chronic lung disease (CLD) in preterm babies <31 + 0 weeks gestation.

Methods: The outcomes of all premature babies <31 + 0 weeks gestation with a diagnosis of CLD (oxygen requirement at 36 weeks

corrected gestational age) were studied using the Badger system. The review was over a 12 month period between 01/04/09 and 31/03/2010 in the Southern West Midlands Newborn Network (SWMNN).

Results: In the 12 month period there were 437 babies <31 + 0 weeks gestation who were admitted to the 7 neonatal units across the SWMNN. Of these babies, 72 were diagnosed with CLD. However, 8 babies did not clinically meet the criteria for CLD (i.e. Badger error) and were therefore excluded. 6 babies left the SWMN, thereby leaving a total of 58 babies with CLD in the SWMN. The median gestational age was 27 weeks and median birth weight was 867 grams. There were 39 males (67%) and 19 females (33%). 3 (5%) babies received postnatal steroids. 2 (3%) died after a diagnosis of chronic lung disease had been made. 15 (26%) babies were discharged on home oxygen. 41 (71%) babies were discharged home without oxygen.

Conclusions: Chronic lung disease poses significant morbidity in preterm babies less than 31 weeks gestation. There is a male predominance of this condition with few babies receiving post-natal steroids. 26% of babies with CLD in this age group are discharged home on oxygen in our neonatal network.

41 – POSTER PRESENTATION

“LIGHTING THE BLACK BOX”: INFLUENCING FACTORS ON THE DEVELOPMENT OF CHRONIC LUNG DISEASE IN PATIENTS WITH CONGENITAL DIAPHRAGMATIC HERNIA

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Background: Despite the prognostic value of intrauterine lung volume measurements, congenital diaphragmatic hernia (CDH) often remains a therapeutic “black box”. We quantified different factors in the postnatal management especially targeting early ventilator induced lung injury on the pulmonary outcome on day 56.

Methods: Retrospective matched pair's case-control study. 66 patients with CDH were included. Average gestational age was 36 ± 1.25 weeks, birth weight 2,771 ± 441 g. Pairs were matched according to lung-to-head ratio, gestational age and birth weight. Patients with other severe birth defects and perinatal asphyxia were excluded.

The following factors were noted; lung damage secondary to early ventilation, oxygen therapy for pulmonary hypertension, pulmonary infection, chylothorax and duration of ventilation.

Results: CDH patients without chronic lung disease (CLD) (n = 17, 25.7%) or mild disease (n = 16, 24.2%) were compared to those with moderate (n = 20, 30.3%) or severe CLD (n = 13, 19.7%). 33 (51%) 33 patients required ECMO-therapy—n = 4 (12.5%) had no or mild CLD and n = 29 (88%) had moderate or severe CLD.

Poorer pulmonary outcome was associated with infections (p < 0.0001), longer ventilation period (p < 0.0001), longer supplementation of oxygen (p = 0.009) and chylothorax (p = 0.047).

Conclusions: Many postnatal factors affect pulmonary outcome. Lung injury secondary to ventilation in the early postnatal period plays a key role. Measuring additional hemodynamic variables and individually tailored therapy could help reducing the incidence of CLD. With optimization of pulmonary and systemic perfusion (e.g. using ECMO) early surgical correction of diaphragmatic herniae and especially reduction of time on invasive ventilation should be main targets of the therapeutic approach.

42 – POSTER PRESENTATION

BRONCHOPULMONARY DYSPLASIA IN VERY LOW BIRTHWEIGHT INFANTS: FREQUENCY ACCORDING TO THE SEVERITY LEVEL AND MAIN RISK FACTORS

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Background: During the years, the definition of bronchopulmonary dysplasia (BPD) differs. That makes comparing the results difficult. **Aim:** To evaluate the frequency by birthweight and gestational age according to the new diagnostic criteria for BPD, and the main risk factors.

Methods: 563 very-low-birth-weight infants (<1,500 g) were admitted to NICU from 01.2008 to 06.2010. 485 survived more than 28 days and were included in this study. BPD was diagnosed if supplemental O₂ for the first 28 days was necessary. O₂-requirements at 36 gestational weeks (gw) determine the severity level.

Results: 26.8% from the infants developed BPD. 13.6% were with supplemental O₂ at 36 gw (the classical diagnostic criteria for BPD). 10.9% were with moderate BPD, 2.7%—with severe BPD. The BPD frequency reduced progressively: from 100% at 23 gw or birthweight <600 g to 0% at 33 gw and 7% at birthweight 1,401–1,500 g. Mild BPD was more likely if gestational age was >27 gw. The need for ventilator support increased from 1.5 (± 2.8) days (non-BPD group) to 50.2 (± 20.1) days (severe BPD), $p < 0.05$. Patient ductus arteriosus was diagnosed in 25.4%; pneumothorax in 3% of the BPD infants compared with 1.7% and 0.5% of non-BPD infants respectively, $p < 0.05$. Sepsis and pulmonary hemorrhage were found more frequently in the BPD group too.

Conclusion: According to the new diagnostic criteria, the frequency of BPD is about 2 times higher compared to the classical definition. The main risk factors are ELBW, ELGA, and duration of the assisted ventilation, patient ductus arteriosus and air leak syndrome.

Medical Topic 5 - Non-invasive ventilation (43–52)

43 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

NON-INVASIVE VENTILATION IS ASSOCIATED WITH A REDUCED NEED FOR VENTILATORY SUPPORT IN INFANTS WITH RESPIRATORY SYNCYTIAL VIRUS INDUCED RESPIRATORY FAILURE

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Background and aims: Non-invasive ventilation (NIV) might be a suitable alternative to conventional mechanical ventilation (CMV) for

infants with respiratory syncytial virus (RSV) infection. We tested the hypothesis that infants <6 months with RSV managed with NIV required a shorter duration of ventilatory support (DVS) than CMV. **Methods:** We performed a retrospective two-center study of infants <6 months consecutively admitted to a center primarily using NIV (Group I) or a center exclusively using CMV (Group II). Patients with upper airway disease, immunodeficiency, cystic fibrosis and neuromuscular disease were excluded. Primary outcome was DVS. Multivariate regression analysis was used to identify the independent contribution of ventilatory mode.

Results: Data of 229 (group I 179, group II 50) infants was studied. They were comparable with respect to age, gestational age, prematurity and weight; PRISM II score (5.2 ± 3.0 vs. 12.0 ± 5.8 , $p < 0.001$) and prevalence of BPD (37.4% vs. 2.0, $p < 0.001$) was significantly higher in group I. Hypoxia was more profound in group II (SpO_2 95.3 ± 7.2 vs. $80.5 \pm 11.8\%$, $p < 0.001$). DVS was significantly shorter in group I (7.5 ± 3.6 vs. 3.4 ± 2.6 days, $p < 0.001$). After adjusting for PCO₂, SpO₂, presence of BPD and PRISM II score, NIV remained independently associated with decreased DVS (Hazard Ratio 2.2, 95% CI 1.2–3.8, $p = 0.007$).

Conclusion: NIV was independently associated with a shorter duration of ventilatory support in infants <6 months with RSV LRTD.

44 – ORAL PRESENTATION

NONINVASIVE CONTINUOUS POSITIVE AIRWAY PRESSURE (NCPAP) BY HELMET VERSUS FACIAL MASK: A MULTICENTER RCT

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Background: A recent crossover RCT reported that nCPAP by helmet in infants was more feasible respect to facial mask (1).

Objective: To evaluate rate of successful treatment (ST) between CPAP by helmet versus facial mask.

Methods: Prospective RCT multicenter.

Patients: Thirty consecutive infants with ALI ($PaO_2/FiO_2 < 300$).

Measurements: Rate of ST, intubation, intolerance, sores, sedation between groups were analyzed. Blood gases value and physiological parameters were collected at baseline and at 1 h CPAP. Mann–Whitney/Fisher test were applied as indicated ($p < 0.05$).

Results: Seventeen enrolled pts were randomized to receive nCPAP by helmet; 13 by mask. Groups were homogeneous for age ($p = 0.4901$), weight ($p = 0.4049$) PIM2 ($p = 0.2619$), CPAP ($p = 0.7378$), FiO_2 ($p = 0.6543$) and CPAP application time ($p = 0.8867$). Bronchiolitis and pneumonia were the leading admission causes. ST rate was greater with helmet ($p = 0.0008$). Intolerance was leading cause of failure with mask respect to helmet ($p = 0.0008$); intubation rate, PICU length of stay and mortality were similar between groups. Less need of sedation and sores was reported with helmet versus mask ($p = 0.0002/p = 0.0003$). No differences in gastric distension and leaks were found. paO_2/FiO_2 increased in both groups respect to baseline ($p = 0.0040/p = 0.0310$ for helmet and mask).

Conclusions: CPAP delivered by helmet was associated with increased ST, less sedation and sores with similar improvement in oxygenation respect to facial mask.

Reference:

- Chidini G, Calderini E, Cesana BM, Gandini C, Prandi E, Pelosi P (2010) Noninvasive positive airway pressure in acute respiratory failure: helmet versus facial mask. *Pediatrics*. doi: [10.1542/peds.2009-3357](https://doi.org/10.1542/peds.2009-3357), published online Jul 26.

45 – POSTER PRESENTATION

WHAT HAPPENS WHEN THE INSURE (INTUBATION-SURFACTANT-EXTUBATION) PROCEDURE IN PRETERM INFANTS <32 WEEKS OF GESTATIONAL AGE FAILS?

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Background and aims: With the development of the INSURE procedure surfactant can be given during NCPAP treatment reducing the need for mechanical ventilation. The aim of this study is to determine whether a failed INSURE procedure involves consequences on respiratory outcome and other early morbidities.

Methods: Retrospective, case-control study. Cases: all failed INSURE procedures in preterm infants <32 weeks of GA between 2006 and 2010. Failure was defined as the need for mechanical ventilation (MV) within 48 h after surfactant. Controls: infants of the same GA and birth weight, during the same period, with respiratory distress syndrome who received surfactant followed by MV.

Results: Cases: 24; Controls: 48. There were no differences on antenatal corticoids or infection. Infants in both groups had a similar time of MV (56.1 h vs. 66.5 h, $p = 0.7$), age at removal of respiratory support (132 h vs. 214.8 h, $p = 0.7$), and rate of bronchopulmonary dysplasia (13.6% vs. 12.5%). Multiple doses of surfactant were administered more often in the INSURE group (87.5% vs. 31.3%, $p = 0.00$). No significant differences were found for retinopathy of prematurity, intraventricular hemorrhage, persistent ductus arteriosus and infections.

Conclusions: The INSURE procedure, although its failure associates multiple doses of surfactant, is a safe technique. Since this method has been found to reduce the need for MV and the duration of respiratory support, its safety in case of failure should encourage us to perform it in preterm infants.

46 – POSTER PRESENTATION

THE NUMBER OF FAILING ORGANS PREDICTS NON-INVASIVE VENTILATION FAILURE IN CHILDREN WITH ALI/ARDS

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Background and aims: Non-invasive ventilation is being increasingly used in pediatric critical care, albeit it is still debated for

acute lung injury (ALI) and acute respiratory distress syndrome (ARDS). No definite data are available for the prediction of NIV outcome in such selected population. We aimed at identifying which factors might affect NIV failure in pediatric ALI/ARDS patients.

Methods: A retrospective cohort study, using comprehensive predictivity analysis was performed. All children admitted to pediatric intensive care unit during 4 years for ALI/ARDS were reviewed. Basic, clinical, physiological parameters and their change after 1 h of NIV were considered and subjected to univariate analysis. Candidate prognostic variables were then subjected to multicollinearity scrutiny and logistic regression. Finally, variables significant at the logistic regression were subjected to predictivity analysis.

Results: The number of organ failure at the admission (NOF) is a strong predictor for NIV failure (odds ratio: 5.26; $p = 0.004$). In details, having only one organ failure provides a probability of NIV success of 85.7% (sensitivity 87%; specificity 49%). 1 NIV failure will be predicted and avoided for each 4 cases in which the presence of other organ failures will be incorporated into the clinical decision.

Conclusions: NOF significantly predicts the NIV failure. Children with no organ failures other than ALI/ARDS may safely be treated with NIV.

47 – POSTER PRESENTATION

EFFECT OF VARYING AMPLITUDE AND INSPIRATORY TIME IN A BENCH MODEL OF NON-INVASIVE HIGH FREQUENCY OSCILLATORY VENTILATION THROUGH NASAL PRONGS

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Background and objectives: Nasal high frequency oscillatory ventilation through nasal prongs (nHFOV) has been proposed to combine the advantages of oscillatory pressure waveform and of non-invasive interface. We aimed at studying the effect of oscillation amplitude and inspiratory time on the pressure transmission and stroke volume delivered through different nasal prongs.

Methods: A bench model of nHFOV was built connecting SM3100A oscillator tubing's to a neonatal lung model, via two differently sized nasal prongs. A standard circuit with no nasal prongs was used as control. Tidal volume (T_v), oscillatory pressure ratio ($\Delta P_{\text{dist}}/\Delta P_{\text{prox}}$) and ventilation (DCO_2) were measured across a range of amplitudes and with inspiratory time (IT) set at 33 and 50%. Measurements were performed with a low-dead space hot wire anemometer coupled with a pressure transducer, specifically validated for neonatal ventilation.

Results: Using both nasal prongs, T_v , $\Delta P_{\text{dist}}/\Delta P_{\text{prox}}$ and DCO_2 were 83, 40 and 71%, respectively, of the control circuit. No differences were noticed between small and large prongs. T_v and ΔP_{prox} were linked by a quadratic relationship and T_v plateaus for amplitude values $>65 \text{ cm H}_2\text{O}$. $\Delta P_{\text{dist}}/\Delta P_{\text{prox}}$ shows the same tendency. Same results were obtained with both prongs and with increasing IT. On the whole, mean T_v was higher with IT at 50% than at 33% (2.4 mL vs. 1.4 mL; $p < 0.001$).

Conclusions: Changing oscillation amplitude has a significant effect on ventilation during nHFOV through nasal prongs and this seems greater than that obtained by varying the frequency. 50% IT always provides an higher T_v delivery and ventilation.

48 – POSTER PRESENTATION

NON INVASIVE NEURALLY ADJUSTED VENTILATORY ASSIST IN YOUNG INFANTS WITH SEVERE BRONCHIOLITIS

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Background and aims: Non invasive ventilation (NIV) has been shown to improve acute respiratory failure in infants with severe bronchiolitis. But NIV is limited in young infants (high leakage interface; failure of pneumatic triggering). Neurally adjusted ventilatory assist (NAVA), as it uses the electrical activity of the diaphragm to control the timing and pressure of the ventilation delivered, should improved NIV in these cases.

The aim of this study was to evaluate the feasibility and tolerance of non invasive neurally adjusted ventilatory assist (NIV NAVA) in young infants with severe bronchiolitis.

Methods: We conducted a prospective non-controlled clinical study during winter 2010-2011 in the paediatric intensive care units of two university hospital. Infants presenting with severe bronchiolitis with NIV criteria were eligible.

Results: Eighteen patients were included in our study (mean age 41 days; mean weight 3.7 kg). NIV NAVA was achieved for all patients, and successful for 16 patients (89%). The median duration of NIV NAVA was 45 h. It was well tolerated with no need of analgesia or sedation. After 6 h of NIV NAVA, mean pH improved from 7.29 to 7.39 ($p < 0.001$), mean PCO₂ decreased from 61 to 51 mmHg ($p < 0.001$), and there was a significant reduction in respiratory distress signs measured by the RDAI score ($p < 0.05$).

Conclusions: NIV NAVA is feasible and well tolerated in young infants with severe bronchiolitis. In our study it successfully reduced the respiratory distress signs and improved gas exchange, even with high leakage interfaces.

49 – POSTER PRESENTATION

USE OF NON-INVASIVE VENTILATION (NIV) IN PAEDIATRIC CARDIAC PATIENTS

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Background and aims: The number of studies regarding the use of NIV in children is limited, especially those with congenital heart disease. We attempted to analyze the use of NIV in our department.

Methods: We prospectively collected data regarding the use of NIV in 10 children (age range 4 days-15 years) affected by congenital heart disease from January to May 2011. NIV was used postoperatively in all children. Exclusion criteria were: excessive secretions, thoracic trauma, absence of a cough reflex, neurologic disturbances, intolerance to the device, the presence of intubation criteria defined as pH < 7.25 and pCO₂ > 60 mmHg.

Results: All patients were intubated electively before cardiac surgery. Median intubation time was 24 h (range 24-672 h). After extubation patients were electively placed on NIV. We used as NIV interfaces: full face masks in 7 patients, a Helmet in 2 patients and an oral nasal mask in

1 patient. Five patients showed radiologically atelectasis that disappeared after NIV. In one child NIV caused an increase of SpO₂ values of approximately 20 points. One patient showed a reduction of pCO₂ from 77 to 39 mmHg. Three patients required reintubation, 1 patient due to upper airway obstruction, 1 for cardiac reasons and 1 patient affected by Duchenne muscular dystrophy required a tracheostomy. One patient had facial lesions after NIV. No other complications were reported.

Conclusions: NIV can be used successfully in selected paediatric cardiac patients, however it is important to establish guidelines that aid in the prediction of NIV success.

50 – POSTER PRESENTATION

PEDIATRIC TRACHEOSTOMIES: A RECENT EXPERIENCE FROM A PICU IN GREECE

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Background: Tracheostomy has become an increasing important issue for children who require prolonged mechanical ventilation. The aim of this study was to retrospectively evaluate our experience with tracheostomy in children.

Methods: We performed a retrospective chart review of all patients receiving new tracheostomies in our department over a 10 years period.

Results: During the 10 years study period 22 children (15 males) (median age 6.8 years) underwent elective tracheostomy. Indications were: congenital upper airway anomalies (5), encephalopathy/encephalitis (5), inadequate airway protection (7), due to head trauma (5), cerebral tumor (2) and miscellaneous causes (3) (burn, Moebius syndrome chronic lung disease). The median ventilation days were pre-tracheostomy 17 days and post-tracheostomy 7 days. In 5 patients at least one extubation trial was attempted. The PICU median stay was 43.5 days. Nineteen children were successfully weaned off ventilator. One was in mechanical ventilator at home and two children died because of accidental decannulation.

Conclusion: The indications for tracheotomy in children have changed over time. Nowadays, few children are tracheotomised because of infectious diseases. In our PICU prolonged ventilation, secondary to upper airway disease and inadequate airway protection, due to cerebral diseases, are the main reasons to get tracheotomised.

51 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

NON-INVASIVE VENTILATION WITH NEURALLY ADJUSTED VENTILATION ASSIST (NAVA). PRELIMINARY DATA OF A PILOT STUDY

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Objective: To assess the efficacy of a new non-invasive ventilation (NIV) mode NAVA (Neurally adjust ventilatory assist) in patients showing asynchrony on NIV.

Design: Prospective observational study.

Setting: Three university hospital PICUs participated between July 2010 and April 2011.

Methods: Patients using NIV who presented asynchrony on previous NIV modes or patients electively extubated to NIV and gave consent to be treated with NAVA NIV were included. Clinical data collected: Age, sex, interface used, respiratory rate, heart rate, FiO₂, Hemoglobin saturation, diaphragm electrical activity (EAdi)- (peak, min, trigger) and NAVA level were measured before beginning NAVA NIV; at starting point, 2, 6, 12, 24 h and when NAVA was stopped. NIV failure is defined as need for intubation.

Results: A total of 14 episodes, 12 patients, (50% male) aged 28 days to 5 months were documented. Interfaces used were nasopharyngeal tube (8), Helmet (4), oronasal (2). Median values were: time on NAVA 20 h (1–246 h), EAdi trigger ranged 97–99% during the first 24 h, NAVA level ranged from 0.5 to 0.9 cm/μv during this period. NAVA efficacy was 43%, but increased to 75% in elective post-extubation patients. No significant differences were observed between failure and success groups in any of the values studied. One patient was excluded from the failure analysis because a contraindication for NIV was diagnosed later on the admission.

Conclusions: NAVA improved synchrony and presented efficacy for infants showing asynchrony on NIV, especially for those extubated electively to NIV.

52 – POSTER PRESENTATION

USE OF NON-INVASIVE VENTILATION IN CHILDREN WITH BRONCHIOLITIS REDUCES PICU ADMISSION: AN EXPERIENCE

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Background and aims: The value of non-invasive ventilation (NIV) in Bronchiolitis has not been well studied. There is a single randomised controlled trial (29 patients) supporting its use in the literature. NIV is not routinely considered by many referring hospitals (RH) as a treatment option prior to intubation. The aim of our study was to determine whether using NIV in District General Hospital setting can reduce PICU admissions.

Method: Prospective audit of routinely collected data for children referred with Bronchiolitis to North West and North Wales Paediatric Transport Service (NWTs). Demographic details, clinical presentation; details of treatment received and number requiring PICU admission were collected from November 2010 to February 2011.

Results: Of 110 children, 86 (78%) received NIV. Median age 5 weeks (IQR: 3 weeks to 3 months). Of this, 57 (66%) received NIV at RH prior to referral to NWTs. A further 29 (33%) were advised to commence NIV by NWTs team.

Of 57 who received NIV at RH, 14 (24.9%) improved and did not need intubation. 28 (96.5%) out of the 29 advised by NWTs improved and remained at the RH. Risk factors for intubation prior to a trial of NIV (n = 24) were recurrent apnoea (25%) and rapidly progressing respiratory acidosis (29%).

Conclusion: NIV is beneficial in reducing PICU admission among children with bronchiolitis. In our experience 50% of those receiving NIV were successfully managed in the RH thus averting an intensive care admission. A larger, preferably randomised trial would be helpful to consolidate our finding.

Medical Topic 7 - Microcirculation/shock (non-septic) (53–60)

53 – ORAL PRESENTATION

THE EFFECT OF RED-BLOOD-CELL TRANSFUSION ON THE MICROCIRCULATION OF CHILDREN WITH SEVERE ANEMIA

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Objectives: Effects of red blood cell transfusion on sublingual microvascular perfusion of children with severe anemia.

Study Design: The sublingual microcirculation was visualized prospectively by Side stream-Darkfield Imaging (SDF) in 19 anemic children with cancer (12) or hemoglobinopathies (7) [Mean (95% CI) Hb: 7.24 g/dL (6.6–7.9)] before, directly after and 48–72 h after red blood cell transfusion and in 18 age matched healthy control children with normal blood hemoglobin levels [Mean (95%) Hb: 12.8 g/dL (12.3–13.5 g/dL)]. Functional capillary density (FVD), vessel length and diameter distribution was determined offline.

Results: Hemoglobin values and FVD correlated sig. (p = 0.0009) and both increased after transfusion [FVD before: 14.3 (13.5–1.1); after: 16.4 (15.4–17.4); p = 0.0002]. FVD before but after transfusion differed sig. between anemic and control group [FVD control 17.5 (16.5–18.1) p = 0.0001]. However, 48–72 h later FVD decreased significantly [48–72 h after: 15.0 (13.7–16.2); p = 0.005]. Subgroup analysis of children with/without infection revealed that FVD decreased only significantly at 48–72 h in children with infections (p < 0.01).

Conclusion: Transfusion of packed RBC improves sublingual microcirculation as indicated by an increased functional vessel density. This improvement is not sustained in children with infection, probably due to the impact of infection per se on microcirculation.

54 – ORAL PRESENTATION

POLYCYTHEMIA LEADS TO DISTURBED MICROCIRCULATORY FLOW IN THE SKIN OF TERM INFANTS

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Objective: Does polycythemia change the capillary perfusion during the first 3 days of life?

Study design: The microcirculation was visualized prospectively by Side stream-Dark field Imaging (SDF) in 15 polycythemic term infants and 15 matched controls with normal hematocrit levels. Functional capillary density (FVD) and quality of blood flow were determined offline. Blood flow was classified as disturbed, if no or sluggish flow was observed. Polycythemic infants received intravenous fluids to prevent further increase in hematocrit.

Results: Flow pattern did not change over the 3 days in both groups but the proportion of pathological flow was always significantly higher in polycythemic infants (P) versus the control (C). [Median (95 CI) for day 2: P 47 (37–55) % vs. C: 9 (3–9) % $p = 0.0001$]. FVD did not differ between the groups on day 1 and 2 but decreased significantly on day 3 in polycythemic infants [day 2 vs. day 3: FVD 174 (167–183) vs. 114 (105–119) mm/mm² $p = 0.0001$] whereas the decrease in hematocrit was barely significant [66 (63–68) vs. 64 (62–66) $p = 0.04$].

Fig. 1

Conclusion: Polycythemia leads to disturbed microcirculatory blood flow in the skin of infants and does not significantly improve despite decreased hematocrit in the first days of life. In opposite, FVD decreases significantly, possible due to the fluid challenge which might actually lead to an increase in microcirculatory perturbation.

56 – POSTER PRESENTATION

HYPERTENSION IN SICKLE CELL DISEASE (SCD) PATIENTS ADMITTED TO THE PAEDIATRIC CRITICAL CARE UNIT IN 2010: A RETROSPECTIVE STUDY

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Background and aims: Abnormal haemoglobin causes multifocal vas occlusion resulting in a multisystem disease in hemoglobinopathies. Systemic hypertension is found in 2–6% of patients of sickle cell disease patients. SCD patients tend to have significantly lower blood pressures compared to normal individuals. Normal or slightly elevated values should be considered a risk for cardiovascular and neurological complications in sickle cell patients.

Methods: A retrospective study looking at all children with sickle cell disease admitted to the Critical Care Unit in 2009–2010 in a tertiary hospital setting. Blood pressure was mainly monitored invasively and plotted to NIH blood pressure charts.

Results: 38 children between 1 and 16 were admitted in 2009–2010 with even age distribution. 9 elective postoperative admissions and 7 incomplete recordings were excluded. (n = 22) Male to female ratio was 0.7. Primary causes for admissions were: chest crisis 54%, postoperative admission 18%, neurology and pain crises 13% each. Majority of patients had no co morbidities. 77% of the admissions had systolic BP above the 95th centile and fulfilled the criteria for systemic hypertension. Thirty-six percent of the patients also had diastolic pressures above the 95th centile. 50% of these patients also

presented with hypertensive systolic BP in the outpatient setting. 2 hypertensive children had MRI brain studies done which revealed hypertensive changes related to hypertension.

Conclusions: Seventy-seven percent of critically ill SCD children were hypertensive. Systemic hypertension is an under recognised complication of SCD. Systemic Hypertension could contribute to neurovascular changes in SCD patients.

57 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

DETERMINATION OF NEAR NORMAL VALUES OF EXTRAVASCULAR LUNG WATER IN CHILDREN

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Objectives: Extravascular lung water (EVLW) can be measured at the bedside using the transpulmonary thermodilution method (TPTD) incorporated in the PiCCO device. EVLW reflects the amount of pulmonary edema. Currently normal or reference pediatric EVLWI values are not available. This study was designed to collect “near normal” lung water values in children after recovery from critical illness.

Methods: In this prospective multi-center study pediatric TPTD measurements were collected from patients without or after resolution of pulmonary abnormalities. Inclusion criteria were minimal or no respiratory support and stable hemodynamics. We searched typically for the last lung water measurement prior to removal of the PiCCO system. EVLW was indexed using predicted body weight (EVLWI) calculated using height, based upon WHO data.

Results: Data from 55 patients were collected from multiple European PICU sites. Two patients were excluded because of a high PEEP level and because of incomplete data. Mean values (range) were: age 5.7 years (2 week–16 year), weight 23.4 (2.7–80) kg, mean arterial blood pressure 79 (48–123) mmHg, PaO₂/FiO₂ ratio 381 (152–661) mmHg, cardiac index 4.6 (2.2–10.2) l/min/m², EVLWI 12.6 (4.6–29) ml/kg. Figure 1 shows the relation between EVLW indexed to predicted body weight and age.

Fig. 1

Table 1

Age (years)	5.7 (0.04–16)
Actual weight (kg)	23.4 (3.7–80)
Heart rate (bpm)	113 (74–174)
Mean Arterial Pressure (mmHg)	79 (48–123)
Cardiac index (l/min/m ²)	4.6 (2.2–10.2)
PaO ₂ /FiO ₂ (mmHg)	381 (152–661)

Conclusions: Indexed (near) normal values of extravascular lung water in children are strongly correlated logarithmic with age. Based upon these data normal values can be constructed for clinical use.

58 – POSTER PRESENTATION

SPONTANEOUS INTESTINAL PERFORATION IN PRETERM INFANTS: EXPERIENCE OF A UK SURGICAL CENTRE

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Background: Spontaneous intestinal perforation (SIP) in preterm infants is a clinical entity distinct from necrotizing enterocolitis (NEC). Several possible risk factors have been identified.

Objectives: To determine the incidence of these risk factors in our regional population affected by SIP.

Methods: Retrospective case note review of all preterm infants identified as having intestinal perforation on the NICU admission/surgical databases. Patients with NEC or causative congenital abnormalities were excluded.

Results: Thirty-five preterm infants with SIP were identified between August 2005 and February 2011. 25/35 were male. Median gestational age at birth was 26 weeks (23–34) with median birth weight 876 g (401–1732 g). 4/32 were IUGR (BW <2nd centile). 19/35 had a 1-min APGAR of ≤ 5 and 12/35 had required inotropic support in the first 48 h. 6/35 had received postnatal steroids. 23/35 had been identified as having a PDA, 16 of these had been treated (12 with Indomethacin, 4 with Ibuprofen). 16/35 had a raised CRP >24 h prior to diagnosis of SIP and 6/35 had positive blood cultures (3 CONS). At surgery, 17/35 had stoma formation, 14/35 had a primary anastomosis, 4/35 were over sown. 9/35 did not survive to discharge (4 of these died within a week of the SIP).

Conclusions: SIP is most commonly seen in ELBW infants of low gestational age. In our population, it more commonly affected males and was not related to IUGR. Almost half of affected infants had evidence of systemic sepsis just prior to their perforation. No link between treatment of PDA and SIP was demonstrated.

59 – ORAL PRESENTATION

CARDIAC OUTPUT MEASUREMENT USING TRANSPULMONARY ULTRASOUND DILUTION (TPUD) IN THE PRESENCE OF LUNG INJURY IN A JUVENILE LAMB MODEL

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Objectives: We evaluated the influence of lung injury on the reliability of the cardiac output measurement using the transpulmonary ultrasound dilution (TPUD) in a juvenile lamb model.

Methods: In 11 lambs (mean weight 8.6 kg) central venous and arterial catheters were inserted and connected to the TPUD-monitoring (CO-status, Transonic Systems, Ithaca, USA). Repetitive saline lavages (10–30 mL·kg⁻¹) were performed to induce lung injury. TPUD cardiac output measurements (COT_{TPUD})—using sessions of 3 injections of body temperature isotonic saline—were compared with simultaneous cardiac output measurements obtained by a perivascular flow probe around the main pulmonary artery (Transonic systems, USA) (COT_{UP}). The severity of lung injury was expressed by the oxygenation index (OI) during the experiment and by histopathological findings after the experiment.

Results: The number of lavages performed ranged from 3 to 14 per experiment. Sixty measurement sessions were analyzed. Mean COT_{UP} was 1.54 L·min⁻¹ (range 0.66–2.91 L·min⁻¹), mean COT_{TPUD} was 1.67 L·min⁻¹ (range 0.78–3.41 L·min⁻¹). The Bland–Altman plot (Figure 1) shows the agreement for the 2 methods with increasing OI. Mean bias (SD) was 0.13 (0.16) L·min⁻¹, limits of agreement were ± 0.32 L·min⁻¹. The overall percentage bias was 8.4%, the overall percentage error 20.7%. Histopathology scores were consistent with heterogeneous lung injury (not shown).

Conclusion: Cardiac output measurement using TPUD is reliable in the presence of lung injury.

Fig. 1 Bland–Altman plot

60 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

NEW DOUBLE INDICATOR METHOD FOR EXTRAVASCULAR LUNG WATER INDEX (EVLWI) MEASUREMENT FOR NEONATAL: PEDIATRIC USE (ANIMAL VALIDATION)

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Objectives: We compared EVLWI measured by transpulmonary ultrasound dilution (TPUD) (Novel HCM101-L, Transonic Systems

Inc, NY, USA) with gravimetric EVLWI measurements in an animal model with respiratory distress syndrome (RDS).

Methods: In 10 lambs (mean weight 8.7 kg) central venous and arterial catheters were inserted and connected to the TPUD monitoring system. Two ultrasound dilution sensors were clamped on the arterio-venous (AV-) loop and a thermistor was incorporated into the arterial part of the AV-loop.

RDS was induced by repetitive lung lavage with saline (10–30 mL·kg⁻¹). Sessions of three body temperature isotonic saline injections (non-diffusible indicator) and two ice cold isotonic saline (heat as diffusible indicator) were performed. Differences between the mean transit time of the diffusible indicator (measured by thermistor) and the non-diffusible indicator (measured by ultrasound sensor) were used to calculate EVLWI. At the end of the experiment animals were euthanized and lung tissue was removed to perform gravimetry.

Results: The initial EVLWI measured by TPUD was 13.3 (range 5.3–29) mL·kg⁻¹. After final lung injury EVLWI was increased to 24.1 (range 15.2–33.6) mL·kg⁻¹. Gravimetric determined EVLWI was 25.1 (range 18.2–33.1) mL·kg⁻¹. A Bland–Altman plot (Figure 1) shows good agreement between the two methods. Mean bias was -1.1 mL·kg⁻¹, limits of agreement ± 12.9 mL·kg⁻¹.

Conclusion: Transpulmonary ultrasound dilution can reliably measure EVLWI in an animal model with RDS.

Fig. 1 Bland–Altman plot

Medical Topic 8 - Congenital heart disease and cardiac surgery (61–86)

61 – POSTER PRESENTATION

SALINE ULTRASOUND DILUTION TECHNIQUE AS A MINIMALLY INVASIVE WAY TO DETECT INTRA-CARDIAC SHUNT IN AN ATRIAL SEPTAL DEFECT MODEL

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Objective: Ultrasound dilution (UD) technique is a minimally invasive method used to determine cardiac output (CO). This technique may also be useful in detecting intra-cardiac shunting. Our hypothesis

was that UD is a good method to detect left to right (L-R) shunting in a porcine atrial septal defect (ASD) model.

Measurements and results: Ten anesthetized piglets (1 mo of age 10 kg body weight) were studied at baseline (base) and after atrial septostomy (ASD). Pulmonary artery flow (Qp) and Aortic blood flow (Qs) were measured by surgically implanted ultrasound flow probe. Shunt fraction was calculated as Qp/Qs. Shunt status and CO were measured by UD technology with COStatus device. Data were analyzed using Kruskal–Wallis analysis; CO agreement to Qp was determined by Bland–Altman plot analysis. ASD shunt was 16 mm in all animals and patency of shunt was confirmed by angiogram. CO-status UD had good agreement with Qp with relative bias of 13.2% and limits of agreement (LOA) 26 and 30%. Success rate of UD in detecting L-R shunt was 91.7% when Qp/Qs <1.35 and 96.8% when Qp/Qs >1.35; percentage of false positive was 3% and false negative was 5.2%.

Conclusions: Ultrasound dilution technique was successful in identifying L-R shunt in atrial septal defect model.

62 – ORAL PRESENTATION

COMPARISON OF TRANSPULMONARY THERMODILUTION AND ULTRASOUND DILUTION TECHNIQUE: NOVEL INSIGHTS IN VOLUMETRIC PARAMETERS FROM A JUVENILE ANIMAL MODEL

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Objectives: Monitoring of cardiovascular function and volume status is essential in critically ill children. End-diastolic blood volumes have been shown to be more indicative for cardiac preload and intravascular volume status than cardiac filling strains. We compared measurements of end-diastolic volumes and cardiac output (CO) between ultrasound dilution technique (UDT) and the well-established transpulmonary thermo-dilution (TPTD) method (PiCCO) in a juvenile animal model.

Methods: Experiments were performed in 18 ventilated, anesthetized piglets during normovolemia and after four steps of isovolemic hemodilution. At baseline and 20 min after each step of hemodilution three independent measurements of CO and end-diastolic volume were performed with TPTD and UDT consecutively under haemodynamically stable conditions.

Results: We observed comparable results for CO measurements with both methods (mean 1.98 l/min; range 1.12–2.87 l/min) with a percentage error of 17.3% ($r = 0.92$, mean bias = 0.28 L/min). Global end-diastolic volume (GEDV) measured by TPTD was almost two times larger than analogous volumes (Total end-diastolic volume [TEDV]) quantified by UDT ($TEDV = 0.48 \times GEDV + 23.1$ ml). Bland–Altman approach revealed a trend to increased scattering with increasing volumes.

Conclusions: CO measurements by UDT were found to be interchangeable with TPTD. Discrepancies in end-diastolic volume could either be due to underlying algorithm or different types of indicators (diffusible versus non-diffusible). Compared to anatomically defined heart volumes determined with reference techniques like biplane ventriculography, TPTD seems to overestimate end-diastolic volumes. Future studies will be necessary to validate end-diastolic volumes with reference techniques.

63 – POSTER PRESENTATION

A RETROSPECTIVE AUDIT OF TRACHEAL EXTUBATION IN PAEDIATRIC CARDIOTHORACIC SURGERY PATIENTS

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Background: At our department we aim to extubate children following congenital heart surgery within 24 h. Because this has not been defined in departmental guidelines we assessed; (I) time to extubation, causes of delay and complications of extubation and; (II) if extubation was performed according to hospital guidelines. This was assessed in the postoperative phase of a well-defined group of surgical procedures.

Methods: A retrospective audit was conducted and 179 consecutive patients who underwent surgery for CHD (ASD, VSD, Ao coarctation, DORV, DCRV and Tetralogy of Fallot) over a 3-year period were included. Early extubation was defined as extubation within 24 h post-surgery. The following aspects of the guidelines were assessed: readiness for extubation (minimal ventilation, adequate gas exchange and afebrile) and corticosteroid administration.

Results: Median time to extubation was 21.6 [IQR 5.8 to 49.2] hours. Hundred-nine patients (61%) were extubated early. Main reasons for delay (Graph 1) were non-infectious pulmonary complications (n = 46, 31%). Most common complication was stridor (n = 10, 6%) and most complications were in the delayed extubation group (p < 0.001, OR 3.95). The criteria for readiness for extubation were met. In 5 patients corticosteroids were not administered according to guideline.

Graph 1 Reasons of delayed extubation

Conclusions: The majority of patients were extubated early and these had fewer complications. Non-infectious pulmonary complications were main cause of delay. Standards for extubation were met.

64 – POSTER PRESENTATION

EXTUBATION AFTER SURGERY FOR SIMPLE CONGENITAL HEART DEFECTS; STRIDOR AND RE-INTUBATION. A STUDY WITH KIMVENT* MICROCUFF* ENDOTRACHEAL TUBES FOR PEDIATRICS

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Objectives: Stridor is the most common complication post-extubation. The aim of this study was to evaluate the occurrence and management of stridor in patients after surgery for simple congenital heart defects.

Methods: All patients (N = 179) after cardiac surgery for simple congenital heart defects (ASD, VSD, Ao coarctation, DORV, DCRV and Tetralogy of Fallot) between December 2006 and April 2010, were included. All patients were intubated using a KimVent* Microcuff* endotracheal tube for pediatrics (Kimberley-Clark, Roswell, GA 30076, USA). Statistics: Fisher's exact test.

Patients were divided in two groups, based on extubation time and determined from admission in the paediatric ICU until extubation. Early extubation was defined as removal of endotracheal tube within 24 h post surgery.

Results: The median time to extubation was 21.6 [IQR 5.8 to 49.2] hours. 109 (61%) patients were extubated within 24 h and 70 (39%) patients were extubated later.

Stridor was observed in 19 patients (marked #, 11%), table 1. Most frequently in the delayed extubation group, p = 0.002. Re-intubation was necessary in three patients.

Table 1

Complication of after extubation	Early extubation (<24 h)	Delayed extubation (>24 h)	Extubation in OR
No complication	93	49	5
Post-extubation stridor requiring dexamethasone and/or adrenaline (#)	4	6	0
Bronchospasm requiring atrovent/ ventolin and stridor requiring dexamethasone and/or adrenaline (#)	1	5	0
Steroids post-extubation (dexamethasone or prednisolon)	2	2	0
Extra oxygen post-extubation other than through nasal cannula (venturi mask, optiflow, blender)	3	2	1
Mild stridor, no intervention	0	3	0
Re-intubation	0	3	0
Total	103	70	6

Conclusions: After intubation and ventilation with a cuffed endotracheal tube, incidence of stridor is 11%. Stridor is most frequently observed complication after delayed extubation, although reintubation is seldom necessary.

65 – POSTER PRESENTATION

PREDICTORS OF OUTCOME DURING PAEDIATRIC CARDIAC ECMO

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Objectives: ECMO has become an accepted therapy for paediatric patients with circulatory failure unresponsive to conventional management. This study aimed to identify possible risk factors for poor outcome.

Methods: A retrospective single centre study of all ECMO runs between 2004 and 2010. Patients were divided into two groups (A: survivors; B: non-survivors) and clinical data was analyzed using SPSS ($p < 0.05$ was considered significant).

Results: There were 27 episodes of ECMO (one patient was placed on ECMO twice). The median age was 16 days (range 3–3799 days) with 58% being neonates. Median weight was 3.42 kg (range 2.3–35 kg). All but three were submitted to ECMO post cardiectomy. Main diagnoses were transposition of great arteries, hypoplastic left heart variants, pulmonary atresia and truncus arteriosus.

The mean duration of ECMO was 5 days ($SD \pm 1.53$). The median length of hospital stay was 30 days (range 4–197 days). Three patients died immediately post-separation, with overall mortality 42%.

Children in group A had a lower creatinine and urea with a higher pH during ECMO ($p < 0.05$). AST, lactate, C reactive protein, SvO_2 and presence of infection were not statistically different between groups. The predicted pre-operative surgical mortality risk before ECMO was not significantly different between groups (A = 10%; B = 17%; $p = 0.26$).

Conclusions: During ECMO we found predictors of poor outcome to be renal failure and acidosis. This may be of relevance when making decisions regarding weaning or withdrawing ECMO support.

66 – ORAL PRESENTATION

MONITORING OF HEPARIN DOSE DURING PEDIATRIC EXTRACORPOREAL ASSISTANCES

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Background and aims: Extracorporeal life support (ECLS) is widely used in children with low cardiac output, hypoxemia or as a bridge to cardiac transplant. Continuous heparin infusion is used to prevent thromboembolic events. Bedside point of care assays to monitor anticoagulation include activated partial thromboplastin time (aPTT) and thromboelastography (TEG). Our aim was to assess the role of aPTT and TEG reaction time (r) on anticoagulation monitoring.

Methods: Simultaneous aPTT and r levels in patients undergoing ECLS were retrospectively retrieved. APTT was performed by Hemocron® (ITC, NJ, USA) whole blood coagulation system. TEG was performed by Thrombo Elastometer Automated® (Framar Biomedica, Rome, Italy). By institutional protocol, heparin dose was adjusted to obtain a aPTT value of 50 s. Associations were assessed by Pearson correlation.

Results: Fifty-nine aPTT/r couples from 15 children undergoing ECLS were analyzed. Median (interquartile range) patients age was 63 (10–339) days, and their weight was 5.5 (3–8) kg. Median administered heparin dose was 17 (10–27) i.u./kg/h, median aPTT value was 52.5 (45–58) seconds and median r value was 108 (45–200) seconds. We found no correlation between heparin dose and aPTT value ($p: 0.9$, $r^2: 0.0002$) and a significant correlation between r and heparin dose ($p: 0.0001$, $r^2: 0.25$). Mean heparin infusion time, at samples analysis, was

8 (5–14) days. The significant correlation between r and heparin dose was independent from the heparin infusion time.

Conclusion: R is more sensitive than aPTT to detect heparin dose modifications. We recommend the implementation of a daily TEG exam to aPTT tests when ECLS is delivered to pediatric patients.

67 – ORAL PRESENTATION

TRANSFUSION OF LEUKOCYTE-DEPLETED RED BLOOD CELLS IS INDEPENDENTLY ASSOCIATED WITH INCREASED MORBIDITY AFTER PAEDIATRIC CARDIAC SURGERY

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Background and aims: We tested the hypothesis that transfusion of leukocyte-depleted red blood cell (RBC) preparations within the first 48 h of PICU stay (RBCT $\times$ 48) was independently associated with prolonged duration of mechanical ventilation (DMV), irrespective surgery type.

Methods: Historical, descriptive cohort study of children <18 years consecutively admitted after PCS between February 2007 and February 2010.

Results: Data from 335 patients was used for analysis; 86 (77.5%) were transfused during the first 48 h of PICU stay. Duration of mechanical ventilation (115 ± 19 vs. 25 ± 4 h, $p < 0.001$), inotropic support (141 ± 20 vs. 55 ± 8 h, $p < 0.001$) and PICU stay (8.3 ± 0.9 vs. 3.5 ± 0.2 days, $p < 0.001$) was longer among transfused patients. Nosocomial infections (NI) (10.5% vs. 1.6%, OR 7.2, 95% CI 1.92–32.47, $p < 0.001$) and acute kidney injury (AKI) (25.7% vs. 14.3%, OR 2.08, 95% CI 1.03–4.17, $p = 0.04$) was more frequent among transfused patients. Mortality was not associated with transfusion (2.3% vs. 0.4%, $p = \text{NS}$). The number of discrete transfusion events was significantly correlated with the duration of mechanical ventilation ($\rho 0.617$, $p < 0.001$). After multivariate analyses, RBCs remained independently associated with prolonged duration of mechanical ventilation and inotropic support but not with AKI or NI.

Conclusions: Transfusion of leukocyte-depleted RBCs within the first 48 h of PICU stay after PCS was independently associated with prolonged DMV and inotropic support, but not to AKI or NI.

68 – POSTER PRESENTATION

MORBIDITY TRENDS ASSOCIATED WITH NUTRITIONAL STATE IN CONGENITAL CARDIAC SURGERY

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Background and aim: Nutritional condition is a very important factor in cardiac surgery morbidity outcome. Study focused in relation among nutritional state and morbidity trends in a group of patients led to surgical correction for cardiac malformation in a third care level unit.

Methods: Under ambispective serial cases design, we realized a study with a group of patients go cardiac surgery by congenital cardiopathy in the space of 3 years. By check patients files obtained anthropometric measures and calculated mass corporal index and Z value to establish nutritional condition, as well as, the trend for morbidity decided for alterations in clinical and laboratory test associated with; hypertension and renal, pulmonary, cardiac, hepatic and acid–base dysfunction.

Results: Were included 229 patients' files with an average age of 7.35 years. Predominated not complex cardiopathies (83%) and cyanogen type (85.20%). Nutritional state in 193 (84.30%) patients' was normal, with morbidity incidence of 58.10%. Existed difference in morbidity by hypertension on having compared nutrition state ($p = 0.040$), weight ($p = 0.010$), Z value ($p = 0.001$) and IMC ($p = 0.020$); by renal dysfunction in height ($p = 0.001$) and IMC 8P = 0.000); hepatic dysfunction in nutritional state ($p = 0.000$) and IMC ($P = 0.002$). Also existed difference between type of cardiopathy and complexity for; hypertension ($p = 0.000$) and pulmonary, cardiac, acid–base ($p = 0.000$) and hepatic ($p = 0.002$) dysfunction.

Conclusions: Nutritional state of patients with congenital cardiopathy have important role for after surgery morbidity, which joined with type and complexity. A better nutritional state control must be tried before surgery for adaptation to trauma metabolic response.

69 – POSTER PRESENTATION

TREND OF GLOBAL MORBIDITY IN PEDIATRIC CONGENITAL CARDIAC SURGERY IN A THIRD CARE LEVEL UNIT IN MEXICO

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Background and aims: Congenital cardiac diseases are the most common form of pediatric malformation. Then in development countries in last decade early diagnosis and treatment increase the surgery procedures. This study orientated towards global trends morbidity characterization in a patient's series go to repair cardiac anatomic alteration.

Methods: We carry out an ambispective study with patients treated in a school-hospital in Mexico, during three consecutive years by congenital cardiac anatomical disease. Files review in variables as: gender, age, type of cardiopathy, time of cardiopulmonary derivation, days of intensive unit care stay, for grouping morbidity in: cardiac, respiratory, renal, hematological, acid–base balance and RACHS-1 and Aristotles risk scale. Analysis data was non parametric.

Results: Two hundred and fifty patients were included, 56% girls and 44% boys, with 5.59 years age average. There existed difference between types of cardiopathy (cyanotic or not) for time of cardiopulmonary derivation ($p = 0.0007$), stay in intensive care pediatric unit ($p = 0.000$), arterial tension ($p = 0.006$), urea level ($p = 0.024$), satO_2 ($p = 0.009$), and triglycerides level ($p = 0.03$). More frequent complications were associated with coagulation disorders (100%) and cardiac dysfunction (82%), minor was renal alterations (34%). Most patients were risk 2 in RACHS-1 scale and low risk by Aristotle scale. Mortality not present in the group.

Conclusions: Global trend morbidity in this series was high in coagulation disorders and cardiologic complications, we must be attentive for early diagnosis and treatment of them in a development countries.

70 – POSTER PRESENTATION

RENAL DYSFUNCTION IN A TEMPORAL PATIENTS SERIES GO TO SURGICAL CONGENITAL CARDIAC DISEASE CORRECTION

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Background and aims: Renal dysfunction after cardiac surgery is a recognized complication in a 1 to 10% of patients. Problem have rates of mortality and therapeutic resources utilization bigger than other patients. Study was orientated for trend characterization of renal morbidity in a temporal series patients go congenital cardiac defect surgery in a reference hospital in Mexico.

Methods: Ambispect study carried out of discreet temporary series patients undergo to heart opened surgery during a period of 5 years in a third care level unit. We review files in the pediatric intensive unit care look for variables like; gender, age and renal function test alterations (gl, ur, cr, na, k, cl, ca, p and mg). Data analysis was non parametric.

Results: Three hundred and fifty patients 4.6 years age average included, 39% (137) girls and 61% (213) boys. Renal dysfunction appeared in 33% (116). Trans-surgical urinary expense was 3.94 ml/kg/h, in children with 17.99 kg average weight. Statistical difference was founded in urea and creatinine levels ($p = 0.000$) after arrived to PCIU and 24 h later. Hourly urinary flow was low down in a significant way ($p = 0.000$) after 24 h PICU stay. Patients with cyanotic disease presented major renal dysfunction ($p = 0.002$). All patients (100%) with renal dysfunction died, 60 (51.28%) early dead classified. Only in 15 (12.82%) tenckoff catheter was used.

Conclusions: Renal dysfunction and mortality related in the studied series was very high. Preventive measures must be established to mitigate this phenomenon in patients led to cardiac surgery for congenital disease.

71 – POSTER PRESENTATION

PULMONARY ARTERY SLING: A RARE CAUSE OF RESPIRATORY DISTRESS IN INFANTS

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Background: Pulmonary artery sling (PAS) is a rare congenital anomaly which may often cause unexplained respiratory symptoms in infants. Few studies of PAS have been reported in China.

Methods: Clinical histories, physical examinations, image studies and surgical interventions were retrospectively evaluated in 10 children (age range: 15 days–52 months, mean 13 months) with PAS. Chest radiography and echocardiography were performed in all patients. Computed tomography (CT) with 3-dimensional reconstructions were performed in 8 patients. Esophagography, cardiac catheterization and angiography, and bronchoscopy were performed in 2, 2 and 4 children, respectively.

Results: All patients had respiratory symptoms, including stridor and wheeze, 3 patients had cyanosis. Age at onset of symptoms ranged from 1 day to 24 months. Echocardiography failed to diagnose PAS in 3 patients. Besides PAS, four patients had other intra-cardiac malformation, including CoA, TOF, PDA, VSD and ASD. Contrast-enhanced CT diagnosed pulmonary artery sling in 8 patients. The esophagogram of 2 patients showed esophageal compression. Bronchoscopy of 4 patients showed compression of the distal trachea. Four of the 10 patients accepted surgical repair of the PAS, surgical observation confirmed the CT findings in each patient. One patient died shortly after surgery. Another two patients died of severe respiratory infection during follow-up.

Conclusions: Patients with recurrent stridor and wheeze should be examined for the possible presence of PAS. Contrast-enhanced CT can clearly show the anatomy of PAS. As a noninvasive technique, echocardiography is helpful for diagnosis. Early surgical management in symptomatic patients is effective. Tracheal stenosis is often life-threatening.

72 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

EARLY POSTOPERATIVE ARRHYTHMIAS IN CHILDREN WITH CONGENITAL HEART DISEASE

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Background: Studies that have focused on early postoperative arrhythmias in children report a prevalence between 14 and 48%. Risk factors that have shown to be associated with arrhythmias are younger age, lower body weight, use of cardiopulmonary bypass (CPB), longer CPB time, longer aortic cross clamp (ACC) time, use of deep hypothermia and circulatory arrest (DHCA), higher maximum troponin levels and higher surgical complexity score.

Methods: 174 paediatric cardiac patients were analyzed postoperatively in PICU at the Royal Brompton Hospital. Continuous monitoring was used and possible risk factors such as age, weight, birth weight, gestational age, ethnicity, prior surgeries, RACHS score, use of CPB, CPB time and ACC time were compared.

Results: 39 arrhythmias were detected in 35 patients (20.1%). Junctional rhythm occurred most (33%), followed by frequent ectopics (18%), ventricular arrhythmia (15%), sinus bradycardia (10%), complete heart block (10%), junctional ectopic tachycardia (8%), atrial rhythm (3%) and atrial flutter (3%). Treatment was done in 31 patients; electrolyte supplements (26), pacing (15), actively cooling (5), antiarrhythmic drugs (4). Risk factors for arrhythmia were ventricular septum defect (VSD) closure ($p < 0.0001$), higher RACHS score ($p = 0.0068$), use of CPB ($p = 0.012$), CPB time ($p = 0.0015$), ACC time ($p < 0.00001$), non-Caucasian ethnicity ($p < 0.0001$) and rhythm issues in theatre ($p < 0.0001$).

Conclusion: Postoperative arrhythmias were found in 20.1% of cardiac patients and majority received treatment (88.6%). Factors that appear to be associated with arrhythmias are VSD closure, higher RACHS score, use of CPB, CPB time, ACC time, non-Caucasian ethnicity and rhythm issues in theatre.

73 – POSTER PRESENTATION

PEDIATRIC EXTRACORPOREAL LIFE SUPPORT (ECLS): A 6 YEAR EXPERIENCE OF A SINGLE INSTITUTION

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Background and aims: Extracorporeal membrane oxygenation (ECMO) and ventricular assist devices (VAD) are increasingly used in neonates and children for circulatory or respiratory support or as a bridge to cardiac transplant. We reviewed our experience to outline predictors of survival.

Methods: Retrospective analysis of all consecutive ECLS treatments from January 2006 to May 2011.

Results: A total of 104 ECLS were delivered to 98 patients (81 ECMO, 17 VAD); in three cases two separate ECMO sessions were necessary; 1 patient was bridged from ECMO to VAD; 2 patients were bridged from VAD to ECMO. Indication to ECMO was pre-operative/non-surgical low cardiac output syndrome (LCOS) (11%), post-operative LCOS (67.4%), respiratory support (21.6%). Indication to VAD was bridge to heart transplant (100%). The average number of treatments per year tended to increase from the first 3 years to the last 3 years (14 ± 5 vs. 20 ± 10 , $p: 0.4$). Survival at ICU discharge was 50%, with no improvement over time. VAD patients tended to have a better survival than ECMO patients (71% vs. 46%, RR: 1.5, 95%CI: 1.0-2.3, $p: 0.06$). When ECMO patients are considered, age, weight, RACHS score, indication to treatment, need for renal replacement therapy and the presence of univentricular anatomy were not significantly associated with an increased mortality. Children who survived on ECMO had a significantly shorter treatment duration: 4 (2.7-7) versus 9 (5.7-16) days ($p: 0.0002$).

Conclusions: ECMO survival is lower than VAD and has not tended to improve in last 6 years. A timely ECMO weaning probably reduces early mortality.

74 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

ISCHEMIC MYOCARDIAL INJURIES AFTER CARDIAC MALFORMATION REPAIR IN INFANTS MAY BE ASSOCIATED WITH OXIDATIVE STRESS MECHANISMS

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Objectives: Despite advances in pediatric cardiac surgery, perioperative myocardial injury can be the major determinant of postoperative dysfunction after cardiac surgery. The objective was to investigate the pathology-related differences in 29 infants with congenital heart disease that led to death.

Methods: The patients were divided into four groups: Group 1, 16 infants who underwent operations for congenital heart disease on cardiopulmonary bypass; Group 2, four infants who underwent off-cardiopulmonary bypass operations for congenital heart disease; Group 3, nine infants who died from congenital heart disease prior to surgical treatment; and Group 4 (control group), five infants with no congenital heart disease and who died from other causes. The myocardial injuries and oxidative stress mechanisms were assessed by histopathology and immunohistochemistry and were quantified by morphometrical analyses.

Results: Contraction band necrosis and dystrophic calcification were found primarily in infants of Group 1. Coagulation necrosis and healing were prominent in Group 2, while infants without repair (Group 3) showed mainly colliquative myocytolysis. The control group showed no significant myocardial lesions.

Conclusions: Lipid peroxidation was the principal mechanism of oxidative stress accounting for the myocardial lesions. The diversity of the lesions observed in these hearts seemed to indicate a large spectrum of cell damage due to inadequate myocardial perfusion, especially when these infants underwent surgery. Oxidative mechanisms could be a common mediator in the pathogenesis of myocardial injuries, resulting in changes in the permeability of the cell membrane, cell death, and intracellular calcium overload.

75 – POSTER PRESENTATION

MYOCARDIAL STRUCTURAL CHANGES IN HUMAN SEVERE SEPSIS/SEPTIC SHOCK IN PEDIATRIC PATIENTS UNDERGOING SURGERY FOR CONGENITAL HEART REPAIR

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Objectives: Perioperative myocardial damage still remains the most common cause of morbidity and death after technically successful surgical correction. However, the situation is further complicated in patients with complex congenital cardiac malformations repair which developed septic shock/sepsis. The aim of the present study was to analyze the correlation between cell damage and oxidative stress in congenital heart disease (CHD) and septic patients' submitted to cardiac surgery.

Methods: The infants were divided into three groups: Group 1, 16 cases who underwent operations for CHD on cardiopulmonary bypass (CPB) with clinically diagnosed cardiogenic shock; Group 2, six cases who underwent operations for CHD on CPB in whom septic shock/sepsis developed, and Group 3 (control group), five cases with no CHD or sepsis/septic shock who died from other causes. The myocardial injuries and oxidative stress mechanisms were assessed by histopathology and immunohistochemistry for hydroxynonenal (4-HNE) and nitrotyrosine (3-NT), and were quantified by morphometrical analyses.

Results: Contraction band necrosis and dystrophic calcification were found primarily in infants of Group 1. Colliquative myocytolysis, coagulation necrosis and healing were prominent in Group 2. The control group showed no significant myocardial lesions.

Conclusions: Lipid peroxidation demonstrated by 4-HNE was the principal mechanism of oxidative stress accounting for the myocardial lesions observed in group 1. On the other hand, an increased concentration of 3-NT proteins adducts were observed in

human septic hearts, suggesting that protein nitration could be the most prevalent oxidative stress mechanism found in septic patients.

76 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

COSTATUS ULTRASOUND DILUTION TECHNOLOGY (UD): ACCURACY OF CARDIAC OUTPUT (CO) MEASUREMENTS IN INFANTS AND CHILDREN UNDERGOING CONGENITAL HEART SURGERY (CHS)

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Background and aims: The COstatus monitor (Transonic Systems Inc., Ithaca, NY) uses existing intravascular lines (arterial and central venous) to measure CO and blood volumes with new UD methodology. It also identifies the presence of shunts. This study was designed to evaluate the agreement between the CO measured by UD (COUD) with that measured by perivascular transit time (COTT) technology.

Methods: This prospective, observational study included 17 pts scheduled for CHS: weight 5.6 (3.2–14.1) kg, age 160 (6–1224) days [median (range)]. Simultaneously obtained measurements of COUD (2–4 injections of isotonic saline at body-temperature 0.5–1 mL/kg/session) and COTT (transit time flow probe (Transonic Systems Inc., Ithaca, NY) placed on the ascending aorta) were performed before and immediately after CPB. Agreement between methods was analyzed by the Bland–Altman diagram.

Results: Twenty-six measurement-sessions (total 72 measurements) were performed. 11 sessions did not have shunts and 15 had shunts detected. The correlation coefficient for the whole group was $r = 0.955$; error 2 SD/mean = 29.3%. For pts without shunts correlation was $r = 0.97$; error 2 SD/mean = 20.7%. Figure 1 depicts the Bland–Altman plot of simultaneous measurements of CO by TT and UD methodology. The coefficient of variation (CV) for COTT was 3.3% for all pts and 2.3% for no-shunt pts, and for COUD 5.1% respectively 3.8%.

Fig. 1

Conclusions: Over all COstatus offers accurate and reproducible measurements in infants and children.

References:

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77 – ORAL PRESENTATION

BALLOON ATRIAL SEPTOSTOMY AND PREOPERATIVE BRAIN INJURY IN NEONATES WITH TRANSPOSITION OF GREAT ARTERIES: A SYSTEMATIC REVIEW AND A META-ANALYSIS

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Objective: To perform a systematic review and a meta-analysis of the effects of balloon atrial septostomy on perioperative brain injury in neonates with transposition of the great arteries.

Data source: A systematic review of the literature was conducted to identify all observational studies that included neonates born with transposition of the great arteries that had perioperative evidence of brain injury.

Study selection and data extraction: The search strategy produced three prospective and two retrospective cohort studies investigating the association between balloon atrial septostomy and brain injury totalling 10108 patients. In 2 studies outcome was represented by the presence at discharge of a coded diagnosis of a clinically evident stroke whilst in 3 studies outcome was represented by the finding of preoperative brain injury identified by magnetic resonance scans.

Characteristics of included studies

Study, year	Patients, n	Events, n	Heart lesion	BAS (%)	Study design	BI type (%)	BI ascertainment	Timing of BI identification
Appelgate, 2010	1295	18	dTGA	34	Retrospective cohort	Stroke (100)	ICD-9	At discharge
Mukherjee, 2010	8681	36	dTGA	20	Retrospective cohort	Stroke (100)	ICD-9	At discharge
Block, 2010	44	28	dTGA, SV	71	Prospective cohort	WMI (21), Stroke (29), IVH (6)	MRI	Preoperative
Petit, 2009	26	10	dTGA	54	Prospective cohort	PVL (100)	MRI	Preoperative
Beca, 2009	44	13	dTGA	75	Prospective cohort	WMI (92), stroke (15)	MRI	Preoperative

Data synthesis: The overall brain injury rate for neonates who underwent balloon atrial septostomy versus control patients was 60 of 105 (57.1%) versus 45 of 105 (42.9%) (pooled odds ratio, 1.9; 95% confidence intervals, 0.9-3.8; $P = 0.08$). A subgroup analysis of the three studies that used preoperative brain injury as primary outcome found no significant association between balloon atrial septostomy and brain injury (pooled odds ratio, 2.69; 95% confidence intervals, 0.6-11.1; $P = 0.17$). Balloon atrial septostomy frequency was 22.4% (2273/10108) with reported rates ranging from 20 to 75%.

Forest plot of the OR for perioperative bra

Forest plot of the odds ratio for preoperative bra

Conclusion: Our analysis shows that balloon atrial septostomy is not associated with increased odds for perioperative brain injury. Balloon atrial septostomy should still be used for those patients with significant hypoxemia, hemodynamic instability or both.

78 – ORAL PRESENTATION

INCREASED MORTALITY OF VERY PRETERM/LOW BIRTHWEIGHT INFANTS WITH CONGENITAL HEART DISEASE: RESULTS FROM THE ITALIAN MULTICENTER ACTION STUDY

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Background and aims: To study the association between presence of congenital heart disease (CHD) and in-hospital mortality in a large area-based cohort of very preterm/low birth weight Italian infants.

Methods: We analyzed the data of all infants (*n.* 3684) with gestational age (GA) 22–31 weeks or birthweight <1500 g born in six Italian regions and admitted to neonatal care in July 2003–June 2005. CHDs were coded according to ICD9-CM. Population-averaged multivariable logistic regression analyses were used to calculate odds ratios for mortality of patients with CHD compared with those without CHD, adjusting for potential confounders.

Results: Seventy-one patients had CHD (19.3 per 1000). The most common lesions were atrial septal defect (*n.* 22, 31% of CHD children), ventricular septal defect (*n.* 20, 28.2%), tetralogy of Fallot (*n.* 5, 7%) and pulmonary valve stenosis (*n.* 5, 7%). CHD patients had significantly higher GA than the other infants. Even after adjustment for GA, sex, region, presence of chromosomal anomalies and extra-cardiac malformations, mortality of CHD patients was significantly higher (aOR 3.3, 95% CI 1.6–6.6). A significant interaction was observed between gestational age and mortality, with aORs increasing from 0.4 (95% CI 0.06–2.4) at 22–27 to 2.9 (95% CI 1.1–7.5) at 28–31, and 15.1 (95% CI 4.9–46.4) >31 weeks gestation.

Conclusions: CHD frequency is higher in these patients than in the general live-born population. Risk of hospital death is significantly increased compared to children without CHD only after 27 weeks gestation. Further studies are warranted to characterize the potential association between CHD and higher morbidity in VLBW population.

79 – POSTER PRESENTATION

THE IMPACT OF SCREENING FOR PATENT DUCTUS ARTERIOSUS (PDA) IN A TERTIARY NEONATAL UNIT (NICU)

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Objective: Audit on management of PDA in a tertiary NICU.

Method: Infants admitted to NICU and diagnosed with PDA in April 2010 to April 2011 were identified using the Electronic Neonatal Database retrospectively. Data was collected from patient notes, discharge summaries and echocardiograms. Audit standards were derived from unit guidelines which recommended screening for PDA in ventilated infants <29 weeks at day 2–3.

Results: 32 infants had PDA, 29/32 (90%) were <32 weeks gestation. Incidence of PDA in babies <32 weeks is 29/111 (26%). 18/32 (56%) babies had an echocardiogram at 48–72 h old and 94% (30/32) within 14 days. 21 infants were <29 weeks. 9/21 (43%) ventilated infants <29 weeks with PDAs had echocardiograms within 72 h. 63% (34/54) echocardiograms studied showed hemodynamically significant PDA. Treatment was recommended in 18. 15 courses were given (9 had single course, 3 babies had 2 courses). Early treatment <7 days was successful in 67% (4/6) and 1/6 failed to close completely but

resulted in clinical improvement. After 14 days treatment 17% (1/6) was successful, 50% (3/6) had restricted and 33% (2/6) failed to respond. Early treatment required fewer doses to close the PDA.

Conclusion: 90% of PDAs were diagnosed in infants <32 weeks gestation. 26% of infants <32 weeks have PDAs. The majority 73% were infants <29/40 gestation. Screening ventilated infants <29/40 weeks at day 2–3 would identify haemodynamically significant PDAs. Treatment is more effective if given <7 days.

80 – ORAL PRESENTATION

LEVOSIMENDAN INFUSION IN NEONATES UNDERGOING PEDIATRIC CARDIAC SURGERY

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Background and aims: To evaluate safety and efficacy of levosimendan, a novel calcium sensitizer inodilator, on postoperative hemodynamic and metabolic parameters in neonates undergoing cardiac surgery.

Methods: Retrospective analysis of neonates undergoing RACHS 3 and 4 procedures who received a 48 h continuous infusion of 0.1 mcg/kg/min levosimendan. Patients were matched with controls in a 3 years period. Demographic and clinical data, side effects, hemodynamic and metabolic parameters in the first 72 post-operative hours were compared by univariate analysis.

Results: Sixty-three patients were analyzed (32 cases and 31 controls). There were no differences between groups regarding age, weight, sex, RACHS and baseline clinical data. No side effects (intolerance, hypotension, arrhythmias) were observed. Three patients died among controls and 1 in the levosimendan group (*p.* 0.35). There were no significant differences on length of mechanical ventilation (6.9 ± 8 vs. 5.9 ± 5 days, *p.* 0.54) and PICU stay (14 ± 14 vs. 11 ± 8 days, *p.* 0.26). Post-operative heart rate tended to be lower in levosimendan patients, with a significant difference at 6 (159 ± 15 vs. 169 ± 14 bpm, *p.* 0.008), 12 (158 ± 14 vs. 166 ± 15 bpm, *p.* 0.037), and 24 h (158 ± 13 vs. 165 ± 14 bpm, *p.* 0.046). Lactate levels tended to be lower in the levosimendan group, with a significant difference at PICU admission (5.1 ± 2 vs. 6.9 ± 3 mg/dl, *p.* 0.015) and after 6 h (3.9 ± 2 vs. 5.4 ± 3 bpm, *p.* 0.05). No differences were found on vasopressors, diuresis, mixed venous saturation and brain natriuretic peptide levels.

Conclusions: Levosimendan infused in neonates undergoing cardiac surgery was well tolerated but its efficacy on postoperative hemodynamic and metabolic parameters of RACHS 3–4 neonates is questionable.

81 – ORAL PRESENTATION

A COMPARISON BETWEEN NOVEL STATIC AND DYNAMIC MARKERS OF FLUID RESPONSIVENESS: PRELIMINARY DATA FROM 47 CHILDREN

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Background and aims: Fluid resuscitation is common in intensive care; however, 30–60% of patients may not increase stroke volume (SV) after fluid bolus. We evaluated novel predictive variables of fluid responsiveness.

Methods: Prospective study, 47 ventilated children, median age 12 months. Median (IQR) tidal volume was 11 ml/kg (8–13). Fluid (10 ml/kg) was given for clinical indications; SV was measured pre/post using transpulmonary ultrasound dilution (CO-Status™). 65 measurements were made. Positive response = an increase in SV of >15%. Static or dynamic predictive variables (see table), were analysed using area under the ROC curve.

Results: 40% (26/65) had a positive volume response. Although dynamic markers performed better than static, all discriminated poorly. Static markers were comparable to CVP (AUC 0.41, 95% CI 0.26–0.55).

ROC curve analysis of static and dynamic markers

	Area under ROC curve	95% confidence interval
Static markers (CO-Status™)		
Active circulating volume	0.47	0.32–0.61
Central blood volume	0.53	0.39–0.67
Total end diastolic volume	0.44	0.28–0.59
Total ejection fraction	0.45	0.30–0.59
Dynamic markers (PRAM)		
Systolic pressure variation	0.58	0.42–0.73
Pulse pressure variation	0.61	0.45–0.78
Stroke volume variation	0.61	0.47–0.75

Conclusion: None of the markers discriminated adequately for volume responsiveness. This was in spite our ventilatory stimulus (11 ml/kg) being within the adequate range.

82 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

ACCURACY OF TRANSPULMONARY ULTRASOUND DILUTION (CO-STATUS™) FOR IDENTIFYING ANATOMIC SHUNTS

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Objectives: To quantify the accuracy of transpulmonary ultrasound dilution (TPUD, COstatus™, Transonic Systems) for diagnosing anatomic shunts.

Methods: 37 critically ill children, median (IQR) age 10 (3–38) months, weight range 2.8–68 kg had TPUD measured simultaneously with 2D echocardiography (reference method). Shunt was diagnosed by characteristic changes on the TPUD curve (figures), and considered positive if either 50% or at least three measurements suggested shunt.

Results: 8/37 (22%) patients had a shunt identified by ECHO, of which 7 were also diagnosed on TPUD (true positive). TPUD also suggested 1 shunt not seen on ECHO (false positive). This produced:

sensitivity 87.5%, specificity 96.6%, accuracy 92% and a false positive rate of 3.4%.

Conclusion: TPUD is accurate in detecting shunts in critically ill children. This technology can be beneficial in diagnosing extra-cardiac shunts not amenable to ECHO.

Figures: Right to left shunt curves (Figure 1) have shorter appearance time (a) and abnormal upslope or "extra hump" (b). In left to right shunts (Figure 2) the asymmetry in the down slope (d) increases the area under the curve, which is proportional to the shunt magnitude.

Fig. 1 Right to left shunt curve

Fig. 2 Left to right shunt

83 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

PREDICTION OF PREOPERATIVE DECOMPENSATION BEFORE FIRST STAGE SURGERY IN HYPOPLASTIC LEFT HEART SYNDROME

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Objectives: Prior to Norwood 1 surgery, neonates with hypoplastic left heart syndrome (HLHS) are at risk of decompensation from pulmonary overcirculation. We examined temporal profiles of physiological and laboratory variables to investigate predictors of decompensation.

Methods: Case control study, 40 antenatally diagnosed newborns with HLHS. Decompensation (n = 20) was defined as emergency intubation due to clinically diagnosed impaired systemic oxygen delivery. Case matching was by birthweight, presence of chromosomal/

extracardiac anomalies. The end point was time of either decompensation (cases) or discharge to surgery (controls). Trajectories of variables were modelled using generalised estimating equations.

Results: Decompensation occurred on median (IQR) day 4 (2–4). Oxygen saturation, respiratory rate and blood pressure trajectories were identical in both groups (all $p > 0.6$). Heart rate increased with time overall, but significantly faster in neonates who underwent decompensation, increasing by an average of 4 beats/min/day ($p = 0.007$, Fig). In cases, both pH and base excess began to decline 24 h before decompensation, unlike controls (Fig).

Temporal trajectories

Conclusions: Oxygen saturations have little value in predicting decompensation. Subtle increases in heart rate occur from birth, and at a faster rate in those who go on to decompensate. Metabolic acid base components begin to deteriorate up to 24 h prior to decompensation. These findings highlight the importance of evaluating rates of change rather than absolute values of physiological and laboratory variables.

84 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

EXTRACORPOREAL APPROACH TO MEASURE EXTRAVASCULAR LUNG WATER (EVLW) USING DOUBLE INDICATORS IN PEDIATRIC AND NEONATAL PATIENTS: THEORY AND METHODOLOGY

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Objectives: To test the feasibility of a novel extracorporeal approach for measuring EVLW using two indicators with ultrasound dilution and thermomodulation (EVLW, COstatus-L, Transonic Systems, Inc, USA).

Methods: An extracorporeal AV loop with a thermistor on the arterial end is connected between extant arterial and venous lines in the patient. For the duration of measurements (5–8 min), a pump is used to circulate blood from the artery to the vein at 8–12 mL/min through the loop. A bolus of warm saline (non-diffusible) followed by a bolus of cold saline (diffusible) are administered into the venous side of the AV loop. Non-diffusible indicator travels only in the intravascular space and remains within the vasculature during its first pass, including the heart, lungs, and blood vessels, and is detected using the ultrasound sensor. Diffusible indicator (heat) travels both the intravascular space and the extravascular space, and is detected by the thermistor.

$EVLW = CO (MTT_{thermal} - MTT_{ultrasound})$

Results: Preliminary feasibility study done in 8 piglets (4.3–29 kg) gave an EVLW in the range of 2.8–24.4 mL/kg with a CV of 9%.

EVLW set up and indicator travel time

Conclusion: Preliminary data suggest that COstatus-L based on the extracorporeal dual indicator approach has a potential to be used with PICU and NICU patients to measure EVLW.

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85 – ORAL PRESENTATION

DOES MALNUTRITION IN CHILDREN AT THE TIME OF CARDIAC SURGERY AFFECT LONG-TERM GROWTH?

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Objectives: Children with congenital heart defects often have impaired growth after birth, with catch-up-growth after surgery. We previously studied metabolism and nutritional status in 47 children undergoing cardiac surgery. 17% was acutely malnourished at surgery (<-2 SD weight-for-age (WFA)). We now evaluated long-term growth.

Methods: Subjects were grouped by WFA at surgery; group 1 <-2 SD and group 2 ≥ -2 SD. WFA, height-for-age (HFA) and weight-for-height (WFH) were compared between groups at birth, surgery, 1 year after surgery and last-follow-up (LFU). Results as mean $\pm$ SEM or median (min–max); statistics by T-tests.

Results: 47 children (24 male) with age at surgery of 1.7 (0.2–16.6) years were studied. LFU was at 6.9 (3.2–9.5) years. WFA and HFA in Figure 1. WFA in group 1 was significantly lower at birth, surgery and 1 year but not different from group 2 at LFU. HFA and WFH were only significantly lower in group 1 at surgery. Overall WFA and HFA at LFU were significantly lower than zero ($p = 0.013$, $p = 0.002$, respectively), WFH was not.

Fig. 1 WFA and HFA

Conclusions: WFA, HFA and WFH were corrected above -2 SD in malnourished children 1 year after cardiac surgery and were not different from non-malnourished patients at long-term. In the total group proportional stature was achieved at long-term, but weight and height remained below the general populations mean. Effects of impaired growth on cognitive development should be further investigated.

86 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

MECHANICAL CIRCULATORY SUPPORT (MCS) AS A BRIDGE TO PAEDIATRIC HEART TRANSPLANTS: DOES THE END JUSTIFY THE MEANS?

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Objectives: MCS as bridge to cardiac transplant in children is common. We review the post transplant course of children on MCS as compared to medical support.

Method: Five year retrospective review (2005–2010) of all first heart transplants.

Results: 70 children received a primary transplant. Commonest diagnosis was dilated cardiomyopathy (73%). 40 required MCS pre transplantation (57%). Commonest device used was the Berlin Heart (75%). Median age of the MCS group was 2.8 years versus 8.3 in the medical. The MCS group was more likely to be classed as NYHA IV and require intensive care pre transplant. They were significantly more likely to receive an ABO/HLA incompatible transplant ($p = 0.04$).

Survival in the MCS group was 83% versus 97% in the medical ($p = 0.07$). The MCS group median length of post transplant hospital stay was 113 days versus 25 in the medical. 18% of the MCS group required long term ventilation post transplant as compared to none in the medical group ($p = 0.02$). The stroke rate in the MCS group was 28% versus 7% in the medical ($p = 0.03$). 71% of all post transplant positive blood cultures were in the MCS group.

There was no increased risk of rejection and no difference in post transplant renal replacement therapy use. The mortality difference was manifest in the first 4 months post transplant with similar survival thereafter.

Conclusion: Survival post transplant is less in the MCS group with attrition occurring early. Nevertheless, MCS is still associated with good outcomes despite illness severity of these children.

Medical Topic 9 - Ethics (87–97)

87 – POSTER PRESENTATION

SUFFERING IN CHILDREN: PERCEPTIONS FROM PARENTS AND CAREGIVERS

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Objective: Alleviation of suffering is one of the most important goals of medical interventions that may itself, however, cause suffering. An understanding of what constitutes suffering of children admitted to a pediatric intensive care unit (PICU) is lacking. This study aims to qualitatively assess the perceptions of parents, doctors and nurses on suffering of critically ill children.

Methods: A structured audio taped interview with parents, doctors and PICU nurses caring for admitted children in a 20 bed level III PICU of a university teaching hospital to assess whether and to what degree a child was perceived to suffer and to identify perceived aspects of suffering.

Results: Most participants made a distinction between physical and psychosocial suffering. All participants identified common attributes of suffering related to physical symptoms. Parents described these symptoms. Nurses linked these symptoms to the child's state of comfort and physicians linked them to the intensity and impact of treatment. A child's admission to a PICU and its suffering cause suffering of parents and may result in disintegration of the family.

Conclusions: Parents, doctors and nurses have overlapping perceptions of physical symptoms of children's suffering but have different perceptions on other aspects of suffering. A child's admission to a PICU and its suffering may cause suffering of its parents and disintegration of the family.

tegration of the family. Caregivers in pediatric intensive care units need to be aware of these phenomena and should incorporate them in the decision making process.

88 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

HOW SAFE IS IT TO DELIVER EXTREME PREMATURE BABIES AT LOCAL NEONATAL UNITS?: A REGIONAL PRACTICE EVALUATION

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Introduction: National guidelines for preterm care requires extreme premature babies (<27 weeks) to be delivered in tertiary neonatal centres. We audited the practice of transfer and delivery of these babies in 6 local neonatal units (level 2).

Method: We reviewed maternal and neonatal case notes of extreme premature babies (<27 weeks) delivered in 6 local neonatal units for year 2009. The results were analysed using ME2007.

Results: 21 babies delivered in level 2 units. Looking at antenatal causes, 17/21 (81%) were due to obstetric reasons and unsafe for transfer. 4 were suitable for transfer. 3/4 (75%) delivered in local unit as there were inadequate beds [1 obstetric and 2 neonatal-twins]. They were then transferred to the nearby local tertiary centre soon after birth. One delivered locally as per network agreement.

Postnatally 12/21 (57%) babies were transferred to tertiary centre. 9 babies (43%) were managed locally, 6/9 were due to local network agreement, 1/9 died at 3 h of age and 2/9 were not transferred as very stable after birth.

Final outcome: 6/12 (50%) babies died in tertiary centre, 1/9 (11%) died in local unit.

Conclusion: Most common cause for failure to comply with guidelines were obstetric reasons, but inadequate beds in tertiary centres are an ongoing issue and it is essential that doctors and nurses in these level 2 units keep themselves updated in management of these babies should such a situation arise.

89 – POSTER PRESENTATION

MORAL CONSIDERATIONS IN PEDIATRICS

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Objectives: Pediatricians often have to treat the parents and sometimes, the family, rather than just the child. A major difference between pediatrics and adult medicine is that children are too minors

to make decisions for themselves. The issues of guardianship, privacy, legal responsibility and informed consent must always be considered in every pediatric procedure. In present paper we reviewed the literature and try to show the conflict aspects of the medical ethics of pediatrics field in related subjects.

Methods: We studied some old and modern texts, literatures on ethics, bioethics, medical ethics and the philosophy of ethics. Then selected and classified the results on its' proper titles.

Results: The famous Persian physician Rhazes (860 A.D.-923/932 A.D.; Iran) wrote The Diseases of Children, the first book to deal with pediatrics as an independent field of medicine. For this reason, some medical historians consider him the father of pediatrics. He has considered to patient's rights in some treatment procedures. Gregory was perhaps the first medical ethicist in the history of Western medical ethics to articulate the concept of patient's rights. He has said: "Every man has a right to speak where his/her life or health is concerned". Ethical decisions are based on the four principles of beneficence, non-maleficence, parental autonomy and justice.

Conclusions: Due to the increasing public awareness and rapid strides in medical technology over the years in the care of children, pediatricians should consider the complex medical, social, ethical, philosophical, moral and legal issues.

90 – POSTER PRESENTATION

THE CHILD ABUSE SYNDROME IN A PRIVATE HOSPITAL, MYTH OR FACT?

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Background and aims: Child abuse is referred to all actions that can cause physical, psychological, emotional or social damage (action or omission). The aim of this research was to identify the frequency of child abuse syndrome in a private Hospital.

Methods: It is an ambispective, cross-sectional, observational and analytical study, carried out at "Hospital Betania", Puebla, Mexico, during the period 2010-2011 (April 30). The variables that were considered were: Age, gender, mechanism of aggression, aggressor, more frequently found injuries, evolution (improvement/death). For the data analysis we used measures of central tendency and frequencies.

Results: We found 43 cases of child abuse were identified, with a greater proportion of males affected (60%), the ages of these children oscillated between 1 day and 15 years old, with an average of 2.7 years. Most frequently the aggressors were indirect relatives and among the most common injuries we found: Cranio-encephalic traumatism, burns and contusions. The evolution in 98.3% was towards the improvement, with one case of a dead newborn.

Conclusions: The child abuse syndrome is a reality that can be found in any socioeconomic atmosphere, for this reason the early identification of cases derived from the child abuse is mandatory. Once confirmed, it is obligatory to denounce.

91 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

WITHHOLDING AND WITHDRAWAL NUTRITION AND HYDRATION FROM NEONATES AT END-OF-LIFE (EOL)

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Background and aims: To assess practice of withholding and withdrawing hydration and nutrition from neonates in EOL situations.

Methods: A 3 months prospective multicenter survey (November 15, 2010 to February 15, 2011) was conducted in 14 Neonatal Intensive Care Units (NICUs) from Ile de France. We included all newborns for whom withholding or withdrawing active treatments were discussed.

Results: Discussion on withholding or withdrawing active treatments was considered in 54 of 1272 (4.2%) newborns. Active treatments were withheld and withdrawal in 44 cases (all died in NICUs). Ten decisions to continue active treatment were done. Nutrition and hydration were withdrawal or withheld from 14 neonates (31.8%). Other life sustaining treatments were also withdrawal (5 mechanical ventilation, 3 inotropic drugs). Two infants had no chance to survive, 8 “no purpose situation”, 4 were autonomously breathing, but their quality of life was judged extremely poor. Death occurred 3 days following nutrition/hydration withdrawal.

Conclusion: Decisions to withhold or withdrawal life-sustaining treatments from EOL newborns are common. We report the first experience of neonatal withdrawal nutrition and hydration in a French regional study. This practice is controversial, because nutrition and hydration are considered as a basic care. Withdrawal them must be discussed with parents, nurses and other staff before its application, because it will be difficult for parents and nurses to accept.

92 – POSTER PRESENTATION

PARENTAL INVOLVEMENT IN NEONATAL END-OF-LIFE (NEOL) DECISION-MAKING

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Background and aims: In France, nEOL decision-making procedure is a medical prerogative. Parents are informed, but they don't participate directly to the decision-making process. We assessed changes toward parental involvement in nEOL decision making process 5 years following Leonetti's law.

Methods: A 3 months (November 15, 2010 to February 15, 2011) prospective survey conducted in fourteen NICUs in Ile de France. All certified neonatologists (n = 92) participating to nEOL decision-making received a 14 items questionnaire.

Results: The response rate was 84.7%. Sixty-four (83%) of neonatologists considers nEOL decision-making as medical prerogative and will refuse direct participation of parents if requested. Only 9% of

respondents accepted parent's request. During the study period, nEOL decision-making concerned 54 of 1272 neonates (4.2%). Parent's opinion was explored through serial meetings with mean interview duration of 49 min. Fathers attended the interview less often than mothers (10.6% vs. 3.3%) and more frequently refused unreasonable obstinacy (48.8% vs. 37.7%). Mothers tended to not express their opinion (16.4% vs. 8.2%) and to request continuing active treatment (18.8% vs. 9.8%) more frequently than fathers. Most of parents (66.6%) were informed of the medical decision-making date, but none participated. Thirty-nine (72%) of parents were immediately informed about the decision.

Conclusion: French neonatologists consider that nEOL decision-making should be made by doctors. Parent's views were explored through serial meetings. Neonatologists feel they should shoulder the EOL decision responsibility mostly to protect parents against guilt and grief.

93 – POSTER PRESENTATION

WHAT DO THINK FRENCH NEONATOLOGISTS ABOUT PATIENT'S END-OF-LIFE (EOL) RIGHTS LAW

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Background and aims: In 2005, French legislature enacted a law concerning patient's rights at the EOL (Leonetti's law), which prohibits active euthanasia, avoid unreasonable obstinacy in investigations and treatment, authorise withholding and withdrawing useless active treatments and administration of sedatives and analgesics, even at the risk of hastening death.

Methods: We questioned the validity of the Leonetti's law in neonatal EOL decision-making. All certified neonatologists participating to end of life decision-making in the fourteen neonatal intensive care units (NICUs) from Ile de France received a 14 items structured questionnaire.

Results: Response rate was 84.7%. Characteristics of the respondents are summarized (table).

Characteristics of the respondents

Characteristics	Respondents (78)
Female/male	1.36
Age >40 years	60%
Professional experience >10 years	49%
Good knowledge of Leonetti's law	79.5%
Law modified their nEOL decision-making practice	49%
Euthanasia could be legal in some situations	53%
Law must evolve toward an “exception d'euthanasie”	61%

* “expression used d buy French National Consultative Committee on ethics for life sciences and health in 2000”

Conclusion: For most of Ile de France neonatologists, Leonetti's law must evolve to legalisation of euthanasia in some situations, and its adaptation to special population such newborn seems mandatory.

94 – POSTER PRESENTATION

IS LEONETTI'S LAW ADAPTED TO NEONATAL END-OF-LIFE (NEOL) DECISION-MAKING?

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Background and aims: In France, since 2005 Leonetti's law prohibits active euthanasia, unreasonable obstinacy, authorises limiting useless treatments, and use of sedatives even at the risk of hastening death. The aim of this study is to evaluate impact of the law on nEOL decision-making practice.

Methods: A 3 months prospective survey (November 15, 2010 to February 15, 2011) was conducted in 14 neonatal intensive care units (NICUs) of Ile de France. We included all neonates for whom withhold or withdrawal life sustaining treatment was discussed.

Results: Limitation of active treatment was discussed in 54 (4.24%) out of 1272 admitted neonates. Their characteristics are summarized (table).

Characteristics of neonates

Characteristics	n = 54
Premature infants	51%
CPR before NICU admission	81.5%
Decision obtained after a planned meeting	79%
Withhold or withdrawal active treatment	(44) 81.5%
Decision to continue active treatment	(10) 18.5%

A median of 11 professionals participated to the collegial deliberation. Absolute consensus was obtained in 83.3%, and external consulting physician view in 50%. Following the decision, sedatives were added in 39 cases. nEOL implementation consisted in 25 terminal weaning, 8 withdrawing hemodynamic support. Thirty-six deaths were attributable to withdrawal active treatment. Nine newborns were not dependent of intensive care, but their quality-of-life was judged extremely poor.

Conclusion: Most of Leonetti's law recommendations was respected, except for the external consulting physician view.

95 – POSTER PRESENTATION

A STATEMENT OF THE EUROPEAN ACADEMY OF PAEDIATRICS ON THE ETHICS OF WITHHOLDING OR WITHDRAWING TREATMENT IN CHILDREN

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Background: In 2001 the ethics working group of the Confederation of the European Specialists of Paediatrics (CESP), itself the predecessor of the European Academy of Paediatrics (EAP), published a statement concerning the withholding or withdrawing of life support in children (1). Ten years on since that work was undertaken, seemed an appropriate time to review the recommendations made.

Methods: The current working group have therefore debated the issue, noting changes in attitude across the globe. Several draft versions were created and discussed at meetings held over 18 months. These drafts were also sent to and commented on by external ethicists. The final draft version was then submitted to the General Assembly of the EAP where it was approved. It is now available on the EAP website.

Results: We have produced an updated statement incorporating several sections: fundamental principles, axioms on which to base practice, the importance of language, dealing with conflict and bereavement follow up. Variability between countries has meant that the statement does not address legal aspects of withholding treatment. We offer these principles that we believe are generic to all the major cultural and religious groups, and hope that they may guide clinicians and carers in this difficult area.

Reference:

1. Kurz R. Eur J Pediatr 2001; 160(4):214-216.

96 – POSTER PRESENTATION

AN INTERNATIONAL STUDY FOR THE IMPORTANT MEDICAL AND LEGAL ISSUE REGARDING THE RIGHTS OF EMBRYOS

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Aim: To study the rising issue regarding legal rights of embryos.

Materials and method: The material used comprised of published articles, trials, bills and country guidelines on an international level selected after an elaborate search of the bibliography.

Results and conclusions: Rights of the fetus are introduced very frequently during debates concerning abortions, which don't include cases of external abuse and damage to the embryo caused by the mother or a third party. That is to say, cases whereby the mother uses drugs, alcohol, tobacco or other substances, undergoes dietary or other restrictions or shows "prenatal prejudice" (favouring male embryos) due to social or religious beliefs with an obvious harmful repercussion to the fetus or cases whereby the mother or a third party is responsible (e.g. by voluntary cause of damage, abortion or use of violence) the fetus itself or its optimal development are compromised. The fetus is a living organism and there is a new movement in many countries to ensure its health and its recognition as an independent legal entity as in the U.S.A the SCHIP health programme includes embryos in the category of uninsured children. Furthermore, numerous laws (UVVA, 36 laws in the U.S.A, Bill C-484 in Canada, American Convention of Human Rights-1969, 8th Constitutional

Evaluation of Ireland, ruling of the Federal Court of Law of Germany-1993 et al.) and guidelines (in Australia, France, United Kingdom, Netherlands, Iceland, Iran, India et al.) internationally highlights the multidimensional importance of this issue, in respect to religious, cultural, medical, legal and social factors.

97 – POSTER PRESENTATION

THE DEVELOPING FIELD OF FETAL SURGERY. INDICATIONS, CONTRAINDICATIONS, ETHICAL DILEMMAS AND FUTURE DEVELOPMENTS REGARDING THE INTRAUTERINE ACCESS OF THE FETUS

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Aim: To outline the current status and possible future developments in the field of intrauterine fetal surgery internationally, emphasizing the bioethical aspects as well as the overall difficulties pertained in this medical field.

Materials and method: The material used consisted of published articles, trials and guidelines on a worldwide basis.

Results and conclusions: In Europe, endoscopic methods for intrauterine fetal surgery have been adopted widely, whilst there is still limited use of the corresponding open methods. The indications for each type of surgery obviously differ and therefore the methods cannot be substituted. Although experimental fetal surgery is at its ending, most surgical methods remain under question (this is true even for procedures regarding diaphragmatic hernias, myelomeningocele repair, congenital urinary tract defects etc.). Starting at the University of California in the 1980's up to the establishment of fetal surgery in many centres internationally there has been a constant evolution regarding the diagnosis and surgical procedures performed for an increasing number of fetuses with congenital anomalies which has increased the number of legal (conflicting interests of mother and fetus,) and bioethical issues. Great attention has been given to fetal therapy, partly because research teams like CHOP have provided knowledge on these matters.

Fetal surgery is a new concept for the neonatologist, gynaecologist-obstetrician, paediatric surgeon and anesthesiologist in Greece. However, this field marks a breakthrough in medicine, since it changes our conception of a therapeutic intervention, opening new horizons for the treatment of even genetic disorders (gene therapy and transplant of polipotent cells).

Medical Topic 10 - Infection, systemic inflammation and sepsis (98–168)

98 – ORAL PRESENTATION

IMPLEMENTATION OF SEPTIC SHOCK CLINICAL PRACTICE GUIDELINES DECREASES MORTALITY AND SHORTENS LENGTH OF STAY IN SAUDI PEDIATRIC INTENSIVE CARE SETTING

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Background and aims: Severe sepsis and septic shock (SSSS) are major healthcare problems, resulting in high morbidity and mortality. The first internationally accepted guidelines for SSSS was published in 2004 and has been updated in 2007. This study aimed to assess compliance of implementation of adapted septic shock clinical practice guidelines (CPGs) and its effect on outcome of SSSS.

Method: This is a cohort study at Pediatric Intensive Care Unit (PICU), King Saud University, Riyadh, Saudi Arabia. Group I consisted of patients admitted to PICU with suspected or proven sepsis and/or septic shock over a period of 9 months after implementation of sepsis CPGs. Group II consisted of similar patients over a period of 9 months before implementation of sepsis CPGs. A predesigned screening tool and step wise management for severe sepsis in infants and children adapted from the Surviving Sepsis Campaign (SSC) CPGs was implemented. Documents were collected and statistically analyzed.

Results: Group I: N = 42; Group II N = 23. Group I had more cases of pneumonia; other demographic, clinical and laboratory features were not statistically significant. Compliance with SSC-CPGs was 100% for each step. Group I had higher percentage of survival 31 (73.81%) compared to 12 (52.17%) for Group II. Also, Group I had shorter mean length of stay (LOS) in PICU (days) 8.52 compared 9.95 for Group II.

Conclusion: Implementation with high compliance of SSC-CPGs may result in lower mortality and shorter LOS in similar setting of our study.

99 – POSTER PRESENTATION

NEC AND NEURODEVELOPMENT

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Background: Necrotizing enterocolitis (NEC) is one of the most severe complications of prematurity, and mortality rates as high as 15 to 30% are reported and have not changed appreciably over the past decades. Several studies have showed an association between NEC and poorer neurodevelopment outcome.

Objective: We aimed to examine a possible relationship between NEC and abnormalities on neuroimaging and neurodevelopmental outcomes.

Methods: A prospective database of infants with NEC from 2003 to 2010 was used to identify eligible infants. Infants with a Bell's stage <2, congenital abnormalities, or who were diagnosed elsewhere were excluded from the study. Cranial ultrasound scans (CrUS) were performed prior to, and after the development of NEC, and MRI scans were performed at term. All infants <32 weeks gestation had a 2-year Bayley score.

Results: 68 infants were eligible for inclusion, with age at onset of NEC of 18 ± 14 days. 25 of the infants in the study died. 46 infants were excluded as above. CrUS was performed on 60 of the babies, of

which 24 were abnormal: 5 intraventricular haemorrhage (IVH); 13 Periventricular leucomalacia (PVL).

54% of non-survivors had an abnormal CrUS, compared to 31% of the survivors (p -value = 0.067). 32% of non-survivors had PVL, whilst 11% of survivors developed PVL (p -value = 0.073). Fifteen of 43 surviving infants had an MRI scan after the diagnosis of NEC: 8 abnormal: 4 PVL. Bayley's score showed an average motor score of 98 ± 23 .

Conclusion: Survivors of NEC have a significant neurological morbidity. Anti-inflammatory strategies may reduce this complication.

100 – POSTER PRESENTATION

STAPHYLOCOCCUS AUREUS BACTERAEMIA IN A TERTIARY NEONATAL INTENSIVE CARE UNIT: A 10-YEAR SINGLE-CENTRE RETROSPECTIVE STUDY OF MANAGEMENT AND OUTCOMES

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Objectives: *Staphylococcus aureus* bacteraemia (SaB) is a serious infection associated with complications. Recommended duration of treatment in adults is 4–6 weeks. To audit duration of antimicrobial treatment in neonates who had SaB and their subsequent complications.

Methods: Neonates with SaB from January 2001 to December 2010 admitted in the NICU at the study centre were included.

Results: There were 45 SaB and 3 MRSA bacteraemias. The mean postmenstrual age (PMA) at presentation was 31.03 weeks (25.4–35.7) and the mean PMA at birth was 28.07 (24.28–33.71). The mean birth weight was 939 grams (560–1940). Central line was present in 29 cases and was removed in 28 following culture, mean CRP was 68.25 mg/L (5–280). Duration of intravenous antibiotic usage varied. Out of 45 episodes, 35 received antibiotics for less than 14 days. 6 died, 5 had NEC and 2 had concurrent *Klebsiella* septicaemia. 5 neonates treated with <28 days of IV antibiotics subsequently developed abscess or osteomyelitis (OM), 3 were discharged on home oxygen and 1 developed *S. aureus* meningitis. Of the 4 neonates treated with 28 days of antibiotics 2 developed NEC (none died).

Conclusion: 10 year data from our institution demonstrate a wide variation in the duration of antibiotic usage in SaB. Death was the commonest outcome (13.3%) followed by abscess and OM (11%). It seems that incidence of death and complications were less in the babies with longer antibiotic courses, however, numbers were small to make robust conclusions.

101 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

STAPH EPIDERMIDIS SEPTICAEMIA CANNOT BE EXCLUDED USING IMMATURE/TOTAL RATIO OF NEUTROPHILS (I/T RATIO) IN VERY PREMATURE INFANTS

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Background: A positive blood culture of *S. epidermidis* in preterm infants is commonly classified as a contaminant if the I/T ratio is less than <0.2. Infants with a convincing clinical picture of infection often have a low I/T ratio which is interpreted as a false-positive culture.

Aims: To compare the I/T ratio in culture positive and culture negative infants.

Method: Infants born at <32 weeks and admitted to the NICU during 2006–2010 were included. The test date and time, the neutrophils and immature forms from every full blood examination (FBE) performed were downloaded from the pathology database and the I/T ratio calculated. The date and time and result of blood cultures were recorded. These were matched to the FBE performed at or closest to the same time.

Results: 4421 FBE test were performed on 540 infants. Overall an I/T ratio >0.2 decreased significantly with increasing gestational age (GA) and increasing age. During the first 72 h it was significantly increased with membranes ruptured >24 h, and reduced for those born following no labour. In a multivariate analysis, correcting for GA, age PROM and no labour, a high I/T was not associated with the blood culture result.

Conclusions: The I/T ratio varies significantly according to the infant's GA, age, labour versus no labour and prolonged rupture of membranes, but is not significantly associated with the a positive blood culture. We conclude that a low I/T ratio does not rule out a positive *S. epidermidis* culture result.

102 – POSTER PRESENTATION

INCIDENCE AND CLINICAL FEATURES OF HUMAN METAPNEUMOVIRUS INFECTION IN A PICU POPULATION: 2007–2011

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Objectives: To assess incidence of Human Metapneumovirus (hMPV) in Paediatric Intensive Care Unit (PICU) patients with acute respiratory tract infections (ARTI). To assess the impact of hMPV infection on length of stay, duration of ventilation, inotrope and antibiotic usage.

Methods: Nasopharyngeal aspirates (NPA) or viral Throat Swabs (TS) are obtained on admission to our hospital with an ARTI. Direct Immunofluorescence (IF) for hMPV is performed on NPA specimens locally. Since 2006, throat swabs and NPA specimens negative by IF undergo hMPV polymerase chain reaction (PCR) at a reference laboratory. Databases were searched retrospectively for positive hMPV results over 51 months (01/01/2007–30/04/2011), and cross-referenced with electronic clinical records to obtain patient demographics and clinical course.

Results: 139 children had ARTI and hMPV-positive NPA. 19 were admitted to PICU. No other pathogen was isolated in 14/19 (74%). 4/19 (21%) patients had positive respiratory bacterial culture (2 primary, 2 secondary). 1 tested positive for Mycoplasma PCR. All received empirical antibiotics at presentation. Median age was 1.89 years (mean 3.61 years, range 50 days–15 years). Median length of PICU stay was 10.32 days (11.05, 3.46–22.88).

16/19 (84%) required invasive ventilation—median duration was 248 h (265, 63–445). 3/19 required an average 160 h of non-invasive ventilation. 9/19 (47%) received inotropic support, 5 required high-frequency oscillatory ventilation and 3 received inhaled nitric oxide.

14/19 (74%) had cardiac, respiratory, neurological or oncological comorbidity. 2 were palliated.

Conclusion: Even without other infection, hMPV caused significant respiratory morbidity, with prolonged PICU interventions. In children with ARTI and co-morbidity, hMPV testing is advised.

103 – POSTER PRESENTATION

SIRS IS DECREASED BY IN-LINE FILTRATION IN CARDIAC INTENSIVE CARE MEDICINE

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Objectives: Cardiac surgery with cardiopulmonary bypass is associated with the development of systemic inflammatory response syndrome (SIRS) that often leads to organ failure or dysfunction. Infused particles may contribute to inflammatory syndromes as they have been shown to induce thrombogenesis, deterioration of micro-circulation and modulation of immunoresponse. In a randomized, prospective trial we assessed the effect of particle retentive in-line filtration on reducing major complications in critically ill children (Clinical Trials.gov ID NCT 00209768).

Methods: Children admitted to the interdisciplinary paediatric intensive care unit of a tertiary university hospital were assigned either to control or interventional group the latter receiving infusion filters (Pall ELD96LLCE/NOE96E, Braun Intrapur Lipid/Intrapur Neonat Lipid) throughout complete infusion therapy. Prior to this study, infusion regiment was optimized to prevent precipitation and incompatibilities of solutions and drugs. One of the primary objectives was a reduction in the incidence of SIRS.

Results: 300 children (112 female, 188 male) patients suffered from cardiac disease and most of them ($n = 226$) were admitted after surgery for congenital heart disease with or without cardiopulmonary bypass. Preliminary assessment demonstrated a significant reduction in the incidence of SIRS for the interventional group (95% CI, 38 vs. 54; filter vs. control group; $P < 0.05$).

Conclusions: With an incidence of 36.7% SIRS is a frequent complication in neonatal and paediatric cardiac intensive care medicine. In-line filtration is most effective reducing the incidence of SIRS to 24.8% and offers a novel therapeutic option.

104 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

CYTOMEGALOVIRUS HYPERIMMUNE GLOBULIN (HIG) FOR PREGNANT WOMEN TO PREVENT CONGENITAL CMV-DISEASE: RETROSPECTIVE RESULTS FROM 42 MOTHER-CHILD PAIRS

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Introduction: Cytomegalovirus is the most common congenital infection (cCMV). Off-label-use of CMV hyperimmune globulin (HIG) during pregnancy may reduce the risk of cCMV-disease.

Materials and methods: Retrospective analysis of mothers and their newborns born between 1st of January 2006 and 30th of June 2010 treated with CMV-HIG during pregnancy. After parental consent available clinical and virological data were collected from maternal and pediatric medical reports.

Results: None of the 42 women treated with CMV-HIG showed severe side effects. In 4 cases CMV-HIG was given after maternal seroconversion and positive CMV-PCR amniotic fluid testing (therapeutic group, TG). 3 children were born asymptotically cCMV-infected and remained asymptomatic in the follow-up (12–24 months). One fetus of the TG had sonographic symptoms of cCMV-infection (IUGR, microcephalia) prior to CMV-HIG-administration, was born with cCMV-disease and suffered from impaired mental, motor, acoustical and visual skills with 32 month.

38 women received CMV-HIG after maternal seroconversion and unknown CMV-status of their fetus prior to the treatment (multinomial group, MNG). 30 children (30/39; 77%; 1 × twins) showed no cCMV-infection; 9 (9/39; 23%) infants were cCMV-infected. 8 of them were born and remained asymptomatic (follow up 1–36 months). One pregnancy was interrupted after CMV-detection in the amniotic fluid. This fetus showed no sonographic symptoms of cCMV-disease.

Conclusion: CMV-HIG was well tolerated. The rate of cCMV-infection in the MNG was lower (23%) than in studies without treatment (46.6%, Bodéus 2010). No case of cCMV-disease was observed in the MNG. However, symptoms of antenatal cCMV-disease persisted after CMV-HIG in the TG.

105 – POSTER PRESENTATION

CLINICAL FEATURES OF LATE-ONSET GRAM NEGATIVE SEPSIS AND THE RISK FACTORS OF MORTALITY IN NEONATES WITH LAST-ONSET SEPSIS

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Background: Late-onset gram negative sepsis (LOGNS) is supposed to cause significant mortality or morbidity in the neonatal intensive care unit (NICU). We planed to present the clinical features of LOGNS and determine the risk factors of mortality in the NICU.

Methods: We retrospectively reviewed the medical records of infants with LOGNS hospitalized in NICUs of Chang Gung Children's Hospital between January 2003 and December 2009. The clinical features of these infants were compared with a cohort of gram-positive sepsis (GPS) during the same period.

Results: The clinical manifestations of LOGNS were clinically more significant than those of GPS, including higher rate of hypotension, leucopenia, metabolic acidosis, thrombocytopenia, and coagulopathy (all $P < 0.005$). The sepsis-contributed case fatality rate was 7.7% (8 of 104) in the LOGNS, not significantly different from that of GPS (6 of 146, 4.1%) ($P = 0.225$). In the neonates with late-onset sepsis, neither lower birth body weight nor extreme prematurity significantly increased the risk of mortality. Neonates with cholestasis, neonates who experienced recurrent sepsis, and neonates who were on high frequency oscillatory ventilator at onset of sepsis were more likely to die than their peers with late-onset sepsis (odds ratio [OR]: 11.51, 95% confidence interval [CI]: 1.51–87.51, $P = 0.018$; OR: 8.77, 95%

CI: 1.54–49.93, $P = 0.014$; and OR: 250.1, 95% CI: 5.51–11359.7, $P = 0.005$, respectively).

Conclusions: The outcome of the infants hospitalized in the NICU with LOGNS was not indispensably grave, even with more severe clinical manifestations. Additional researches for prevention of recurrent sepsis are necessary in the future.

106 – POSTER PRESENTATION

NEPHROTIC SYNDROME DUE TO CONGENITAL SYPHILIS: CASE REPORT

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Background: The Congenital Nephrotic Syndrome (CNS) is a renal disruption due to heavy proteinuria, hypoproteinemia, dislipidemia and edema starting as early as the first 3 months of life. It can be primary due to genetic alterations, and secondary, as a source of intrauterine infections.

Objective: We are reporting the case of a female patient, 13 days old diagnosed with Nephrotic Syndrome caused by Congenital Syphilis.

Methods: The patient is the product of the fourth gestation, without abnormalities during pregnancy, delivery at 39 weeks of gestation, weight 3500 grs (p50), height 52 cms (p50). She started with bilateral edema in the lower extremities, without fever, hiporexia or irritability. Evaluated 48 h after onset of symptoms.

During initial evaluation, she presents a blood pressure above the 95 percentile for her age. Lab tests were taken, reporting normocytic normochromic anemia, proteinuria, dislipidemia and hypoalbuminemia. Next day showed signs of desquamation in hands and feet. VDRL determination was positive 1:128 (maternal 1:8). FTA-Abs also was positive.

Results: The diagnosis of CNS was confirmed, Penicillin G treatment was started for 10 days with an excellent response and resolution of proteinuria 2 weeks after the beginning of the treatment.

Conclusion: Usually, products infected with syphilis presents ictericia, hepatosplenomegaly, fever and macular rash. This case was really interesting because the first manifestation was edema which led us to the diagnosis of CNS.

107 – POSTER PRESENTATION

DO WE FOLLOW THE SURVIVING SEPSIS CAMPAIGN GUIDELINES 2008 IN PAEDIATRIC ICU?

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Background and aims: Sepsis and septic shock requires urgent and adequate management. The aim of the study was to audit current management of severe sepsis/septic shock in paediatric ICU.

Methods: Retrospective observational study of medical care of patients with severe sepsis/septic shock, treated in single paediatric ICU.

Results: Records of 28 patients were audited: 8 (28.6%) with severe sepsis, and 20 (71.4%)—septic shock. Admitted with community-acquired severe infection—24 (85.7%). Blood cultures were taken for all patients. The median predicted mortality (PIM2) was 3.5% (IQR 15.63), the observed mortality was higher (7, 25%, $p = 0.03$). The average total fluid (ml/kg) given during the 1, 6 and 24 h period was as follows: 21.43 (SD 17.94), 74.85 (SD 48.43) and 164.37 (SD 81.53). The fluid <100 ml/h given during the 6 h period was significant factor for the lethal outcome (OR 6.25, 95% CI: 2.78–23.26). Inotropes/vasoactive drugs were prescribed in 23 (79.6%) patients, and most of them 22 (95.0%) were Dopamine or Dobutamine. The median time-period until the first antimicrobial was given resulted in 0.29 (IQR 0.95) hour, meaning that 23 (82.1%) patients received antimicrobials during the first hour.

Conclusions: Observed mortality was higher than predicted, and the patients were under-resuscitated with the fluids during the first hour of admission; in general, prescription of the antimicrobials followed the guideline.

Reference:

1. Dellinger RP, Levy MM, Carlet JM, et al.: Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock: 2008 *Crit Care Med* 2008; 36:296–327.

108 – POSTER PRESENTATION

CHARACTERISTICS IN PEDIATRIC PATIENTS WITH H1N1 INFLUENZA ADMITTED TO A THIRD LEVEL HOSPITAL DURING THE PANDEMIC IN MEXICO

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Background: Although seasonal influenza viruses have been associated with a high rate of hospitalization but low mortality among children, the effect and severity of 2009 H1N1 influenza in children are unknown.

Objective: Establish a relation between the clinical presentation and the risk factors during Influenza A H1N1 complications.

Methods: We conducted a retrospective case series involving children from 0 to 21 years old in whom 2009 H1N1 influenza was diagnosed on reverse-transcriptase polymerase-chain-reaction assay and who were admitted to a third level hospital in Monterrey, Mexico between April 2009 and April 2010. We recovered age, weight, gender, number of hospitalization days, number of sick days prior to admission and seasonal influenza immunization status. Lymphocyte/monocyte ratio was obtained retrospectively. The Hak score was applied to these patients as a predictor of influenza severity.

Conclusions: The higher incidence of disease was between 0 and 4 years old. Obesity as a risk factor for complications seems to have no role in this age group. Past history of asthma, epilepsy or cerebral palsy were found as risk factors for complicated influenza. Previous seasonal influenza immunization probable confers a cross protection against H1N1-Influenza A. *Mycoplasma pneumoniae* represented a frequent coinfection agent. Lymphocyte/monocyte ratio could be a good predictor of disease. The Hak score could be a good predictor of complications in patients not younger than 4-years-old.

109 – ORAL PRESENTATION

CD11B AND CD64 CELL SURFACE EXPRESSION RELATED TO ACUTE PHASE PROTEINS AND METABOLIC RESPONSE TO STRESS IN CHILDREN

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Background: CD11b, CD64 neutrophil expression was shown to be a better diagnostic marker for sepsis than procalcitonin (PCT), C-reactive protein (CRP) in high risk populations.

Aim: 1) To evaluate the cell expression of CD64, CD11b in children with severe sepsis (SS), sepsis, trauma and healthy controls; 2) to relate their expression with acute phase proteins and metabolic response to stress.

Methods: Blood samples were collected within 24 h after admission for analysis of CD64, CD11b on the neutrophils, lymphocytes and monocytes of children with SS (8), sepsis (10), trauma (9) and healthy controls (12). Procalcitonin (PCT), C-reactive protein (CRP), glucose, cholesterol, LDL, HDL were measured. Clinical and outcome endpoints were recorded.

Results: The CD11b in subpopulations was the same. Lymphocyte CD64 was elevated in trauma compared to healthy controls ($1.9 \pm 0.8\%$ vs. $0.3 \pm 0.2\%$, $p = 0.05$); Neutrophil CD64 was higher in SS and sepsis ($65 \pm 12.8\%$) as compared with trauma ($7.2 \pm 1.4\%$) or healthy controls ($1.2 \pm 0.36\%$) ($p < 0.0001$); PCT, CRP, glucose ($p < 0.05$) were higher; LDL, HDL, cholesterol were lower ($p < 0.001$) in septic patients. Neutrophil CD64 was positively related with PCT ($p = 0.01$), CRP, glucose ($p = 0.05$) and negatively with LDL, HDL, cholesterol ($p = 0.01$).

Conclusion: CD11b may not differentiate critically children in stress from healthy controls. CD64 expression on lymphocytes is elevated in trauma whereas CD64 on neutrophils may differentiate children with SS and sepsis from those with trauma or healthy controls and is associated with high CRP, PCT, glucose and low LDL, HDL, cholesterol.

110 – POSTER PRESENTATION

BLOODSTREAM INFECTIONS IN A PAEDIATRIC INTENSIVE CARE UNIT: A SURVEILLANCE STUDY

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Objectives: To determine the incidence of health care associated infection and BSI, identify microbiological agents and determine the risk factors.

Methods: A prospective study during a 6 month period (July to December 2010) was realized. The diagnosis of health care associated infections was based on the CDC criteria. Two groups were formed: group A—with BSI and group B—without health care associated infection. Intrinsic and extrinsic risk factors were compared.

Results: There were 171 admissions. Health care associated infections were identified in 20 (11.7%) and 6 (3.5%) of these were from

the bloodstream. The most frequently isolated microorganisms were Gram positive. There were no differences in the intrinsic risk factors in the two groups apart from age. The average age in group A (3.5 months) was lower than in group B (55 months, $p = 0.031$). Although there were no differences in exposure to extrinsic risk factors between the groups, the average duration of central venous catheters use, invasive mechanical ventilation and urinary catheterization was significantly higher in group A (10.3, 8, 8.5 days, respectively) when compared with group B (2.7, 1.4, 1.97 days, respectively, $p = 0.045$, $p = 0.001$, $p = 0.002$).

Conclusions: BSI in PICU are associated with prolonged use of invasive procedures.

Keywords: Health care related infections, bloodstream infections, PICU, incidence, risk factors.

111 – ORAL PRESENTATION

PAEDIATRIC INTENSIVE CARE PATIENTS HAVE DECREASED NEUTROPHIL ENDOTOXIN RESPONSES

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Background: Protein C synthesised in the liver and released in circulation as an inactive zymogen. When activated it has significant anti-inflammatory and cytoprotective effects. Clinical trials of activated protein c (APC) in sepsis have been controversial and no benefit was seen in paediatric patients.

Aim: To compare neutrophils responses to lipopolysaccharide (LPS) $\pm$ APC stimulation in children in paediatric intensive care at the time of evaluation for sepsis (PICU: $n = 10$) compared with healthy paediatric (Paed Con: $n = 11$) and adult controls (Adult: $n = 10$).

Methods: Whole blood was incubated with LPS $\pm$ APC and TLR4, CD11b expression, and reactive oxygen intermediate (ROI) release from neutrophils was examined by flow cytometry.

Results: PICU patients had significantly decreased endotoxin responses compared with adults and paediatric controls for ROI, CD11b and TLR4. APC did not alter the expression of these markers at baseline and did not abrogate the LPS response.

Conclusion: PICU patients have significantly reduced responses to endotoxin which may predispose them to sepsis.

112 – POSTER PRESENTATION

SERUM VITAMIN D LEVELS AND MARKERS OF CHILDHOOD ASTHMA SEVERITY IN GREATER CAIRO

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Vitamin D deficiency is a public health problem worldwide. We study the relationship between 25-hydroxy vitamin D, markers of allergy and markers of disease control and severity among Egyptian children with asthma.

Methods: A cross-sectional study of 185 Egyptian asthmatic child (defined as physician-diagnosed asthma and either at least two respiratory symptoms or asthma attacks in the previous year) age range (5-12 years, 105 males). Study participants completed a protocol that included questionnaires, spirometry, measurements of serum total IgE, and peripheral blood eosinophil count to study the relation between 25-hydroxyvitamin D levels and this markers of allergy and asthma severity. Statistical difference between individual groups was tested by t-test. Correlation was tested by Pearson's test. Results were considered significant if $p \leq 0.05$. Statistical analysis was done using SPSS software.

Results: Asthmatic child, 65 (35%) had insufficient levels of vitamin D (≤ 20 ng/mL), vitamin D levels were significantly and inversely associated with total IgE ($p = 0.03$) eosinophil count. ($p = 0.03$) significant positive correlation was obtained between vitamin D level and pulmonary function tests in those asthmatic children ($p = 0.01$) increase in vitamin D levels was associated with reduced times of any hospitalization in the previous year (The study revealed that vitamin D insufficiency was highly prevalent in Egyptian asthmatic children ($p = 0.03$), also with the use of antiinflammatory medications in the previous year ($p = 0.01$).

Conclusion: Our results indicate that, lower levels of vitamin D are associated with increased level of allergy and asthma severity markers in Egyptian asthmatic children.

113 – POSTER PRESENTATION

SOLITARY LIVER ABSCESS IN PRETERM INFANTS

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Background and purpose: Neonatal liver abscess is a rare entity and usually arise in the setting of sepsis in patients with several other morbid conditions. We present two cases of hepatic abscess in pre-term neonates and an approach to discuss diagnostic and therapeutic measures.

Methods: Retrospective reviewed of the two cases of neonatal liver abscess diagnosed in our NICU in the current year.

Results: Two premature babies of 26 and 27 weeks of gestation developed this uncommon complication. Both of them presented features of nosocomial infection with abdominal distension, hepatomegaly and poor digestive tolerance. The two patients had history of umbilical catheterization. Blood culture revealed *Staphylococcus epidermidis* in the first case. *Enterococcus faecalis* and *Staphylococcus capitis* were isolated at blood and cerebrospinal fluid culture of the second. Persistence of positive blood culture with elevated reactants despite appropriate antibiotic treatment prompted to do an abdominal ultrasound which showed at both cases, a solitary avascular cystic mass in the right lobe of the liver with well defined margin and hypoechoic center. The decision to perform an imaging-guided percutaneous aspiration was made depending on the size of the collection and failure to respond to antibiotics. Only one patient needed it. The microbiological study of the pus isolated *Staphylococcus epidermidis*. Both patients completed antibiotic treatment with vancomycin during 21 days. Serial sonography and clinical follow-up showed complete clinical remission.

Conclusion: Neonatal hepatic abscesses are rare but should enter the differential diagnosis of a neonate with ongoing sepsis and previous history of umbilical catheterization. Failure to respond to antibiotic therapy necessitates interventional drainage.

114 – POSTER PRESENTATION

SERUM LEVELS OF MANNOSE-BINDING LECTIN (MBL) AND THE RISK OF INFECTION IN PEDIATRIC ONCOLOGY PATIENTS WITH CHEMOTHERAPY

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Background: Morbidity and mortality due to infections remain serious problems in pediatric oncology patients receiving chemotherapy. Association of MBL levels with an increased risk for infection in previous studies was contradictory. The aim of this study was to determine whether MBL deficiency is associated with the risk of infections in pediatric oncology patients.

Methods: Prior to the start of chemotherapy a blood sample was taken from 75 patients with childhood leukemia and MBL serum concentration was measured using a commercially ELISA kit.

Results: Twenty patients had concentrations under 1000 µg/L, defining MBL deficiency and the remaining 55 patients had concentrations >1000 µg/L.

Ten patients suffered from more than one episode of severe infection. Sixty-five percent of patients with MBL below 1,000 µg/mL suffered from 2 or more episodes of infections (3 of 16 individuals with 1 severe infection; 10 of 16 with 2 and 3 of 16 with 3), in contrast to only 29 of 55 (52%) patients with MBL above 1,000 µg/mL (19 of 27 individuals with 1 severe infection and 10 of 27 with 2). The difference between two groups was significant ($P < 0.001$).

Conclusions: The results of this study indicate that low MBL serum levels (<1000 µg/L) identify pediatric cancer patients at increased risk for infections.

115 – POSTER PRESENTATION

NEONATAL EARLY WARNING SCORE (NEWS)

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Background: A departmental audit in Craigavon Area Hospital, a district general hospital in the United Kingdom, highlighted that the current policy where all babies with prolonged rupture of membranes (PROM) have screening blood tests performed may not be the best way of detecting babies with early onset sepsis and that regular recording of observations over the first 12 h of life maybe more sensitive. This raised concerns that babies who became unwell may not have been picked up as soon as possible and therefore the opportunity to intervene at an earlier stage was being missed.

Methods: The quality improvement project involved the development and implementation of a Neonatal Early Warning Score (NEWS) chart for recording observations in newborn babies.

[illegible]

Results: The introduction of the NEWS chart has allowed the department to respond to the audit results by switching from screening bloods to regular observations as the method of detecting early onset sepsis in neonates with PROM. It is hoped that it will be possible to identify babies who become unwell at an earlier stage therefore ensuring a better outcome.

116 – POSTER PRESENTATION

K. Fortecka-Piesterzeniewicz, I. Maroszyńska

Introduction: The incidence of bacterial meningitis in neonates is approximately 0.3-3.5 per 1000 live births. In neonates it usually occurs with non specific symptoms. However, we still don't have clear guidelines for lumbar puncture in the investigation of early and late onset infections. As an indication for lumbar puncture positive blood culture is usually used.

Objective: The aim of the study was to determine whether neonates with possible early or late onset infection should always have a lumbar puncture.

Materials and methods: According to department's protocol all neonates suspected of sepsis with positive CRP serum level underwent LP procedure. It has been reviewed 130 medical records (physical examination, FBC, CRP, blood culture and cerebrospinal fluid results) of relevant neonates treated in Department of Intensive Care and Congenital Malformations of the Neonates and Infants, Polish Mother's Health Center-Research Institute from 1st January 2008 to 1st April 2011.

fever. Only in four patients abnormal neurological signs were present. 30% of neonates with positive CSF culture had negative blood culture. **Conclusions:** Considering that neonates have non specific symptoms of meningitis and that almost one-third of them have negative blood cultures it seems to be reasonable to perform lumbar puncture in all CRP positive patients evaluated for sepsis.

SUB-GLOTTIC STENOSIS IN A 7-MONTH-OLD CHILD FOLLOWING INTUBATION WITH A CUFFED ENDOTRACHEAL TUBE FOR ACUTE LARYNGOTRACHEOBRONCHITIS

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Objectives: To report significant sub-glottic stenosis in a 7-month-old boy following intubation with a cuffed endotracheal tube.

Methods: The infant was intubated for 2 days post ASD repair of a Tetralogy of Fallot with an uncuffed tube. Parainfluenza virus was isolated from nasopharyngeal aspirate on day 10 post-op. On day 24 post-op the patient was noted to have stridor. He developed respiratory distress and increased work of breathing on day 27 and was transferred to PICU for a trial of CPAP. On day 28 flexible laryngoscopy showed >50% subglottic narrowing with vocal cord movement. The infant was re-intubated with a cuffed oral 2.5 mm ID and transferred to a paediatric ENT centre. Dexamethasone was administered and the cuff deflated the same day.

Results: On Day 32 microlaryngoscopy showed 41% sub-glottic stenosis with an ischaemic ulcerated area in the posterior subglottis and circumferential ischaemia of the glottis.

Conclusion: This infant developed a significant sub-glottic injury following an acute parainfluenza infection requiring intubation with a cuffed endotracheal tube for respiratory distress. The use of cuffed endotracheal tubes in children is becoming more common as research shows no significant difference in morbidity to un-cuffed tubes [1]. However, this case leads us to consider due caution in the use of cuffed tubes in children with acute infection of the airway. We also believe the use of cuffed endotracheal tubes should be of short duration with cuff pressures monitored continuously according to clinical research and manufacturers' guidelines.

Reference:

- 118 – POSTER PRESENTATION

NOSOCOMIAL INFECTIONS SURVEILLANCE IN A PEDIATRIC INTENSIVE CARE UNIT

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Background/objectives: A nosocomial infection surveillance study was performed in a 24-bed multidisciplinary PICU in Genova, during the first 6 months of the year from 2006 to 2010. The aim of the study

was to reduce the nosocomial infection rate and the related mortality in our unit.

Methods: The CDC definitions for nosocomial infections were adapted to the current practice of pediatric intensive care in Italy. Case selection was performed using a consensus method involving three experts. All patients hospitalized for more than 48 h were enrolled in the study. Surveillance culture were performed once a week in stable patients.

Results: We reported a reduction in nosocomial infections and mortality rate as shown in the following table:

Nosocomial infections PICU Gaslini 2006–2010

	2006	2007	2008	2009	2010
Per 100 patients	12.6	5.0	4.0	6.3	9.6
Per 1000/pts days	4.9	3.6	3.2	4.8	7.7
Bacteremia per 1000/pts days	2.3	2.7	1.9	2.9	3.2
Pneumonia per 1000/pts days	2.6	0.9	1.1	0.9	2.8
Urinary tract infections per 1000/pts days	0	0.9	0.3	0.9	1.6
Mortality related to nosocomial infections %	27.3	0	0.2	0.7	0.5
Global mortality %	6.7	7.0	4.0	3.6	6.5
PIM2	0.05	0.05	0.06	0.04	0.06

Conclusion: Surveillance data are indispensable for quality control and are an essential component of hospital infection control strategies. Prevention of nosocomial infections requires continuous education and judicious use of antimicrobial agents.

119 – POSTER PRESENTATION

SERRATIA MARCESCENS INFECTIONS IN THE NEONATAL INTENSIVE CARE UNIT: TRENDS IN ANTIBIOTIC RESISTANCE AND IMPLICATIONS FOR TREATMENT

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Introduction: *S. marcescens* has emerged in recent years as an opportunistic pathogen of severe nosocomial infections of neonatal intensive care unit (NICU).

Purpose: To analyze clinical signs, risk factors in newborns with sepsis by this bacteria as well as the therapy which is commonly used.

Methods: Retrospective study that includes all newborns with confirmed sepsis by *Serratia marcescens* admitted in our NICU from January 2007 to December 2010.

Results: 28 babies were enrolled. 68% males. Mean birth weight and gestational age (GA) 1276 g and 29 + 6, respectively. Most of patients presented several potential risk factors for nosocomial infection being the admission to NICU (100%) and epicutaneous line the most frequent (86%). Laboratory finding: thrombocytopenia 54%. Acute phase reactants were elevated in all patients. In 22 cases was the only microorganism isolated. 39% presented other infections

documented: 25% bloodstream infection, 25% meningitis, 17% necrotizing enterocolitis, 17% conjunctivitis, 8% pneumonia, 8% cholecystitis. Patients received monotherapy with amikacin (6), meropenem (2) cefotaxima (2) according to antibiogram. In seven cases was necessary added combined therapy with meropenem due to clinical worsening.

Conclusions: Sepsis caused by *S. marcescens* continue being a problem in NICU. They are usually difficult to treat because of *Serratia* propensity to become resistant to antibiotics. Susceptibility to the antimicrobials may differ in a manner that is dependent on whether these antibiotics were previously used in the units. Thus, current strategy of empiric antibiotic treatment should be reevaluated by a medical microbiologist.

120 – POSTER PRESENTATION

OBSERVATIONAL STUDY IN EXTREMELY LOW BIRTH WEIGHT INFANTS BEFORE AND AFTER INTRODUCTION OF FLUCONAZOLE PROPHYLAXIS AT A TERTIARY NEONATAL UNIT

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Background and aims: Invasive fungal infection is an important cause of mortality and morbidity in extremely low birth weight (ELBW) infants. Early diagnosis is difficult and treatment is often delayed.

We assessed the impact of intravenous fluconazole prophylaxis in ELBW infants on the incidence of invasive candidiasis in Neonatal Intensive Care Unit.

Methods: ELBW infants born during the pre-prophylaxis era (Jan 2004-Dec 2006) were compared with post-prophylaxis era (Aug 2007-July 2010). Infants <750 g or <27 weeks born during prophylaxis era received fluconazole prophylaxis for 6 weeks or as long as they had intravenous access. Demographic and clinical data were collected. The two groups were compared for baseline demographics, risk factors for candidiasis and the incidence of invasive candidiasis.

Results: 6 of 53 (11.3%) <750 g infants developed invasive candidiasis during pre-prophylaxis era compared to 1 of 88 (1.13%) during post-prophylaxis era. There was no adverse events or the emergence of fluconazole resistant *Candida* sp. with fluconazole prophylaxis.

Before & after antifungal prophylaxis

	Pre-prophylaxis 2004-2006 (Incidence)	Prophylaxis 2007-2010 (Incidence)	Risk ratio
Gestation <27 weeks	6.3% (6/95)	0.8% (1/124)	7.8
Birth weight <750 g	11.3% (6/53)	1.13% (1/88)	9.9

Conclusions: In the fluconazole prophylaxis era there is a reduction of 83% in invasive fungal sepsis in <27 weeks gestation infants and in <750 g infants.

This study suggests that a targeted fluconazole prophylaxis regimen for ELBW infants is safe and effective in significantly reducing invasive candidiasis.

121 – POSTER PRESENTATION

RISK OF INTERCURRENT BACTERIAL INFECTION IN INFANTS WITH RESPIRATORY SYNCYTIAL VIRUS (RSV) IN A PAEDIATRIC INTENSIVE CARE UNIT (PICU)

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Background: It is our practice to screen infants admitted to PICU with RSV positive bronchiolitis for bacterial infection. Those presenting with apnoea all have CSF screened. Viral lower respiratory tract infection (LRTI) is considered a risk factor for bacterial super-infection. Recent studies have demonstrated low rates of bacteraemia and no cases of meningitis in RSV positive infants and children.

Objective: To determine the prevalence of bacterial co-infection in infants admitted to our PICU with RSV positive bronchiolitis and assess whether screening CSF is justified.

Methods: We conducted a retrospective cohort study using data from our operational database and electronic patient record over a 5 year period (2006-2010). Patients <12 months of age who were admitted to PICU with a RSV positive nasopharyngeal aspirate (NPA) were reviewed. Data was collected on a standardised proforma and collated on to an electronic database.

Results: 61 patients met the inclusion criteria. 32% were <28 days of age, 56% aged 1-6 months and 9.8% 6-12 months.

88% of patients had blood cultures taken, of which 12.9% were positive. The only organism cultured from blood in our group was coagulase-negative staphylococcus (CONS).

CSF was sampled in 27.8% of the study group and was negative in all but one patient, who had a VP (ventriculoperitoneal) shunt 'in situ', again this was CONS.

Further results are tabulated.

Microbiological sample	% of study group sampled	% positive organisms	Positive isolates (number positive)
Urine	42.6	19.2	Escherichia coli (1) Klebsiella (1) Staphylococcus (1)
BAx (bronchoalveolar lavage)	52	37.5	Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1)
CSF (ventriculoperitoneal shunt)	23	4.2	Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1) Klebsiella (1)
Throat swab	28.3	1.8	Klebsiella (1) Klebsiella (1)

MPG1 microbiology

Conclusions: Our results suggest that CSF sampling is not required in patients admitted to PICU with RSV. Cultures from other sites were significant and helpful in guiding antibiotic therapy.

122 – POSTER PRESENTATION

SEPTIC SHOCK IN CHILDREN: A RETROSPECTIVE ANALYSIS OF A TERTIARY SINGLE CENTER FROM AN URBAN AREA IN GERMANY

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Background/aims: The purpose of this study was to collect information about the epidemiology of children with septic shock and to determine adherence to current treatment guidelines in a single tertiary care center.

Methods: A 5-year retrospective review of our PICU patient database was performed. We identified children who met clinical criteria for septic shock according to the ACCM definition.

Results: Overall we identified 62 cases of septic shock (mean age 9.2 years). 76% of the children had underlying comorbidity.

13 patients died before discharge (mean age 6.5 years) accounting for a mortality of 21%. The main causes of infections were either primary bacteremia (34%) or respiratory (16%).

The patients who survived were older and had significantly higher pH and lower lactate levels when compared to the group of non-survivors. However, base deficit, CRP, invasive ventilation and the need of dialysis were not significantly different between the two groups.

The nonsurvivors received more fluids than those who successfully reversed shock. However, the overall administration of fluids in the first 60 min after diagnosis of shock remained significantly below the ACCM-PALS guideline recommendations in both groups.

Conclusion: We found that septic shock is a major health problem in children with a mortality of 21% in our cohort. Overall, adherence to the current ACCM-PALS guidelines according to fluid administration was poor. We are currently planning a multicenter study to evaluate data of children with septic shock in the Rhein-Ruhr-Area.

123 – ORAL PRESENTATION

USING ULTRASONOGRAPHY TO TARGET ANTIMICROBIALS IN RESPIRATORY INFECTIONS, A COHORT STUDY

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Background: Respiratory infections are amongst the commonest causes of admission for intensive care and antibiotic prescription in Europe.

Objective: Determine if ultrasonography can identify pneumonia in children with infections to target antibiotics.

Study design: Prospective, observational cohort study.

Setting: Paediatric Primary Care Service, Germany.

Main Outcome Measures: Number of children with clinically suspected pneumonia showing abnormal scans and their x-ray findings.

Complications or hospitalisations, if only patients with abnormal scans receive antimicrobials.

Methods: Children with possible pneumonia had lung sonography and when abnormal, also a chest x-ray. If symptoms persisted despite normal scans they had both. Antibiotic treatment was withheld if imaging was normal and all patients followed-up for 3 months.

Results: In 2098 episodes of acute respiratory infections 680 were suspected of pneumonia and scanned: 100 were abnormal of which 92 also x-rayed. In them 70.6% (65/92) x-rays were abnormal and 29.3% (27/92) normal. In 50 episodes with normal scans children were also x-rayed for persistent symptoms, only one showed a consolidation. There was a strong correlation between an abnormal PA chest x-ray and abnormal lung sonography ($p < 0.0001$). Only 101/685 episodes received antibiotics. The 572 episodes with suspected pneumonia but normal scans not receiving antibiotics had no complications or hospitalisations. Mean age was 5.5 years. In the pneumonia group girls outnumbered the boys by twofold.

Conclusions: Transthoracic ultrasonography in children detected lower airway involvement more frequently than a single PA chest x-ray. No complications were recorded if antibiotic treatment was withheld in those with normal ultrasound scans.

124 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

PREDICTING OUTCOME IN PAEDIATRIC BONE MARROW TRANSPLANT PATIENTS ADMITTED TO PICU

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Background and aims: Patients surviving PICU have correctable organ dysfunction. We investigated if organ dysfunction changes after PICU admission predict outcome in paediatric bone marrow transplant (BMT) patients.

Methods: An organ dysfunction score (ODS)¹ collated dysfunctional (1) and failed (2) organs to give an aggregate score for 5 organs from 0 to 10.

Cross-reference of local PICU and BMT databases identified 54 patient episodes 2004–2009, representing 41 patients. ODS was calculated from notes on days 1, 3 and 5.

Results: Mean age was 7.67 (0.4) years, with 27% matched unrelated donor, 15% matched related donor, and 56% autologous transplants. Of the 54 episodes, 80% survived to PICU discharge. Mean length of stay was 4.5 (range 1–26) and 23.25 days (range 1–46) for survivors and non-survivors, respectively. 46 were discharged, but 13 readmitted. Eventual death occurred in 20, with 8 deaths on PICU, 12 after discharge.

For the last episode the mean admission ODS was 3.9 and 5.0 in survivors and non-survivors, respectively ($p = 0.02$). The pattern of change in ODS over the first days was examined. All ($N = 14$) improving at D3 survived, as did 7/8 who had not worsened by D3. Of those worse at D3 and D5, 8/14 and 5/10 still survived PICU.

Of all organ failures, renal was most predictive of death.

Table 1

ODS change	Survived/total
Deteriorates D1-3	8/14 (57%)
Deteriorates D1-5	5/10 (50%)
Same D1-3	7/8 (87.5%)
Same D1-5	7/8 (87.5%)
Improves D1-3	14/14 (100%)
Improves D1-5	6/7 (86%)

Table 2

Total N = 41	Patients with organ failure	No. died	%
Respiratory failure	24	8	33
Cardiovascular failure	19	5	26
Haematologic failure	34	7	21
Renal failure	8	5	63

Conclusions: This BMT PICU admission series shows that rapid improvement in organ dysfunction predicts survival. However, those who deteriorate over the first 3 or 5 days are still as likely to survive as not.

Reference: 1 Wilkinson *CCM*, 14(4):271–274.

125 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

HOW IS SURVIVAL PREDICTED BY PREADMISSION FACTORS IN PICU PATIENTS WHO HAVE UNDERGONE BONE MARROW TRANSPLANTATION?

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Aims: To examine how prePICU admission characteristics predicts outcome for paediatric bone marrow transplant (BMT) patients.

Methods: Cross-reference of local PICU and BMT databases identified 54 patient episodes 2004–2009, representing 41 patients. The preadmission age, sex, underlying diagnosis, transplant type, time since transplant, and reason for admission were identified. Survivors and non-survivors were compared using Mann–Whitney and Fisher's Exact tests.

Results: Of the 41, 8 died in PICU and 12 were discharged and died later without another admission. 21 are still alive. Mortality for each episode was 20% overall.

Age was similar, but there was an excess of boys in non-survivors. Survivors were admitted earlier post-transplant than non-survivors [59.7 (2.00) vs. 89.1 (3.33) days $p = 0.05$]. Survivors more often had autologous transplants (58% vs. 12.5% $p = 0.045$), but those who died had more matched related or unrelated transplants.

Neuroblastoma was a more common primary diagnosis in survivors (48% vs. 0% $p = 0.014$) although haematogenous conditions were more common in non-survivors (87.5% vs. 33% $p = 0.014$).

Survivors were more often admitted with sepsis (67% vs. 25% $p = 0.049$), but renal failure on admission predicted death (37.5% vs. 3% $p = 0.019$).

Conclusions: Preadmission factors have a profound effect on PICU outcome in this group. This may arise from the underlying diagnosis that required non-autologous transplantation. This alone may be responsible for our findings.

They also tell us more about risks and benefits of BMT, enabling clinicians and parents to make more informed decisions and researchers to better understand how to reduce mortality in oncology children.

126 – POSTER PRESENTATION

LOW GRADE SYSTEMIC INFLAMMATION, DIETETIC HABITS AND QUALITY LIFE IN PATIENTS WITH CHRONIC CONDITIONS

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Background and aims: Dietetic habits are associated to plasmatic concentrations of systemic inflammation markers affecting the quality of life in patients with chronic conditions. The aim of study was characterized the association between low grade systemic inflammation, dietetic habits and quality of life in children with chronic diseases.

Methods: Prospective, transversal, comparative and analytical study in a third care level unit, under a non probabilistic sample, taking part children's and their parents, was realized. Frequency of healthy food consumption instrument and quality life inventory (COOP-DAR-MOUTH) were applied both. We took patients one blood sample for inflammation markers (leukocytes, albumin, PRC, VSG and fibrinogen), establishing chronic condition and gender groups. Data analysis was non parametric.

Results: Fifty patients and one of his parents were included, 29 (58%) with cancer and 21 (28%) non cancer patients, with an average age of 10.8 years. Statistical difference existed in PCR level ($p = 0.038$), cholesterol ($p = 0.023$) and Tpt ($p = 0.041$) determined by women and oncologic patients. Not difference exist ($p > 0.05$) between parents and patients quality of life perception. Not healthy food consumption predominated, and not association was founded between inflammation and the others variables.

Conclusions: Inflammation is not associated with dietetic habits and quality of life in studied patients, seems to be secondary to his pathology and treatment.

127 – POSTER PRESENTATION

SOMATOTYPE AND LOW GRADE SYSTEMIC INFLAMMATORY MARKERS ASSOCIATION IN HOSPITALIZED PATIENTS

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Background and aims: Unfortunately anthropometric evaluation and follow-up of children with inflammation associated hospitalized condition, is not do it adequately in many medical units. Study tried to compare somatotype profile and low grade systemic inflammation markers between patients during hospitalization for acute and chronic conditions.

Methods: A prospective, observational, transversal and analytic design was used, to approach patients during hospitalization in a third care level unit. Using a non probabilistic sample, we divided in two groups: acute and chronic conditions. One Once anthropometric measures under Heath-Carter method and blood samples for systemic inflammatory markers (leukocytes, albumin, PCR, VSG, fibrinogen) were used in all participants. Analysis data was non parametric.

Results: One hundred and twenty patients take part, 60 for type condition (acute/chronic) and 60 for each gender, with 5.3 years age, 22.62 kg weight and 100.43 cm of height average. Seventy-six (63.33%) with malnutrition by BMI. Not difference exist by condition and gender in systemic inflammatory markers or somatotype measures. Endomorphic type was most common in girls (44%) and ectomorphic in boys (30%). Not association between somatotype components and inflammatory markers was founded.

Conclusions: Malnutrition prevalence in the group recognize relevance of anthropometric evaluation in hospitalized patients, nevertheless medical attention cause not be direct related with it.

128 – POSTER PRESENTATION

LOW GRADE INFLAMMATORY MARKERS AND METABOLIC SYNDROME DATA ASSOCIATION IN PATIENTS WITH CHRONIC DISEASES

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Background and aims: Metabolic syndrome is one of the most important problems in developing countries. In chronic diseases often emphasized more in treatment of primary condition forgetting pres-

ence of co-morbidities. Study estimate association between low grade inflammatory markers and metabolic syndrome components in patients with chronic conditions.

Methods: By probabilistic sample we realized under prospective, transversal, comparative and analytical design, a study in a group of children with chronic diseases attended in a third care level unit. Groups by gender and type of condition was established, taking blood samples for markers of systemic inflammation and metabolic syndrome. Besides arterial tension, weight and height of patients were registered. Analysis data was parametric.

Results: One hundred patients take part, 50 women and same men number, with 7.8 years age average. Metabolic syndrome presented in 16 (16%) patients; 6 (37.50%) women and 10 (62.50%) men, without difference ($p > 0.50$). In 66 (66%) cardiovascular risk was high, with difference determined by women ($p = 0.01$), as well as, in BMI ($p = 0.04$) and waist ($p = 0.02$). Oncological patients determined difference in albumin level ($p = 0.008$) and waist/hip index ($p = 0.02$). Cholesterol showed relation with PCR ($r = 0.995$) and VSG ($r = 0.897$); waist/hip index with albumin ($r = 0.854$) and systolic arterial tension ($r = 0.920$).

Conclusions: Relation between certain systemic inflammatory markers and metabolic syndrome components in patients with chronic diseases. We must be alert to treat co-morbidity associated with primary conditions.

129 – POSTER PRESENTATION

MINIMUM INHIBITORY CONCENTRATION OF CIPROFLOXACIN AND CLINICAL OUTCOME FOR NEONATES WITH CONFIRMED GRAM NEGATIVE SEPSIS

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Background/Aims: Ciprofloxacin is administered in 26% of European neonatal units mainly for culture proven gram negative (GN) sepsis due to multi-drug resistant organisms. Ciprofloxacin 5 mg/kg 12 hourly has been the second line antibiotic in our unit for >6 years. The study aims to determine whether the likelihood of cure during ciprofloxacin treatment was associated with minimum inhibitory concentration (MIC).

Methods: Stored GN isolates from blood cultures drawn between 2004 and 2010 were recultured and the MIC was determined using ETest (BioMerieux). Cure was defined as survival with CRP <10 mg/L on day 10 after GN was isolated. Inclusion: administered ciprofloxacin within 48 h of confirmed GN sepsis continuing for >5 days, MIC <1 mg/L. Variables were tested for association with cure using Mann-Whitney test, those with $p < 0.1$ were entered into a logistic regression model. ROC curve analysis was used to detect optimal MIC threshold to predict cure.

Results: 34 babies met the inclusion (median 8 days ciprofloxacin treatment). Gestational age at birth, postnatal age and illness severity were not associated with likelihood of cure. Logistic regression showed that days of treatment ($p = 0.052$) and MIC ($p = 0.058$) were associated with likelihood of cure. Survival with an MIC less than the optimal cut off (0.035 mg/L) was 81%, above this 19%, $p = 0.025$, OR 6.8 (95% CI 1.42–32.4); 35% of isolates had MIC values >0.035 mg/L.

Conclusions: These data suggest a significant proportion of isolates causing GN sepsis in neonates would not be optimally treated using this dosage regimen. Further Pharmacokinetic -pharmacodynamic data with AUC/MIC breakpoints are required to optimise dosing regimens.

130 – ORAL PRESENTATION

IMPACT OF H1N1 PANDEMIC ON QUALITY INDICATORS IN CANADIAN PEDIATRIC INTENSIVE CARE UNITS: PRELIMINARY DATA

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Background and aims: The emergence respiratory failure due to H1N1 virus led to concerns regarding resource limitations and the possibility of compromised quality of care in Pediatric Intensive Care Units (PICUs). We investigated the impact of the second wave of pandemic H1N1 in 2009 on the quality of care delivered to children admitted to Canadian PICUs.

Methods: This project included an observational study of every child admitted to all 16 Canadian PICUs and a questionnaire about all PICU admissions, personnel and resource use during the 2nd wave of pandemic H1N1 (Oct. 17th to Nov. 20th 2009) and a control period (Oct. 17th to Nov. 20th 2010). Differences between the periods were analyzed using a paired t-test.

Results: We present the preliminary data from 14 of 16 PICUs studied. 1023 and 990 PICU admissions occurred during the pandemic and control periods, respectively. There were no significant differences in quality indicators between the two periods:

Table 1

Quality indicators	2009 pandemic period	2010 control period	p
Readmissions in PICU within 24 h (%)	0.7 ± 1.2	1.0 ± 1.6	0.53
Nighttime discharges from PICU (%)	12.7 ± 9.5	9.5 ± 10.8	0.40
Cancelled surgery due to (%)	8.8 ± 13.7	4.5 ± 7.5	0.52
Medication errors reports (n)	11.1 ± 21.9	9.3 ± 13.6	0.81
Safety/incidents reports (n)	23.0 ± 43.4	13.9 ± 10.5	0.47

Conclusions: Although the 2nd wave of pandemic was associated with a 3% increase in admissions to Canadian PICUs, there were no differences in the quality indicators between the two periods. This suggests that our quality indicators are insensitive to workload

increases experienced during H1N1, and/or, there is substantial flexibility in personnel and resources in Canadian PICUs.

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131 – POSTER PRESENTATION

AUDIT ON PREVENTION OF VENTILATOR ASSOCIATED PNEUMONIA IN CHILDREN

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Introduction: Early onset VAP—Primary infection of the lungs after 48 h of intubation and within 4 days of receiving mechanical ventilation. Late-onset VAP—infection identified after 4 days of mechanical ventilation.

Risk factors include primary bloodstream infection, Immunodeficiency, Neuromuscular blockade or weakness, Burns, Reintubation, Gastric aspiration, Mechanical ventilation for >3 days. Prevention includes prevention of aspiration, colonisation of aerodigestive tract and contamination.

Methods: Assessments made on daily ward rounds. 51 set of assessment recorded.

Results:

8/51 did not have semi-recumbent position
All had orotracheal intubation
7 did not have peptic ulcer prophylaxis
14/51 did not have oral care
hand hygiene not followed in 20/51

Conclusion and recommendation:

Deficiencies in care relating to semi-recumbent position partly explained by clinical details.
Peptic ulcer prophylaxis, oral care and hand hygiene need to be improved.
To design a VAP care bundle?
To increase staff awareness by involving educators and including in staff induction
Re-audit.

132 – POSTER PRESENTATION

AUDIT ON GROUP A STREPTOCOCCAL INFECTION IN CHILDREN

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Introduction: Group A streptococcal infection is the most common bacterial infection of the throat and is most common in children between the ages of 5 and 15. It usually causes pharyngitis or impetigo

but, in rare cases, can also cause invasive diseases such as cellulitis, bacteremia, necrotising fasciitis, and toxic shock syndrome.

Aims: To assess disease pattern of group A streptococcal infection. To assess treatment and outcomes.

Methods: Retrospective audit. All culture positives for group A streptococcus in 2008 & 2009 identified and analysed. Total number of cases—98.

Results: Most Common presenting symptom was fever, followed by sore throat and vomiting. 90/98 had positive throat swab cultures. 5 had positive blood cultures. At least half of the children presented with fever of 38–39 degrees. 46% had enlarged tonsils, 54% had exudates. 6 had invasive streptococcal infection, of which there was one death.

Conclusion: The successful investigation and management of every case of GAS is important for preventing possible serious infections.

133 – ORAL PRESENTATION

PERSISTING INCREASED TNF-ALPHA-SECRETION BUT NO BACTERIAL TRANSLOCATION IS DETECTABLE IN A PORCINE MODEL OF 18-HOURS-LASTING IAH FOLLOWED BY DECOMPRESSION

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Objectives: Surgical decompression is gold standard of treatment in cases of established ACS. Even after opening-up the abdomen the mortality remains as high as 50%. One possible explanation might be bacterial translocation from IAH-derived ischemic gut as well as the release of inflammatory mediators as a result of ischemia and/or reperfusion. There is still lack of knowledge, at what duration of IAH/ACS a “point-of-no-return” might be exceeded, after which patients suffering from IAH/ACS possibly stop profiting from any therapy. Against this background, this study aimed to clarify whether decompression after 18-hours-lasting IAH promotes bacterial translocation and systemic inflammation.

Methods: 18 pigs were divided into 3 groups, analog sedated, ventilated and monitored for 24 h. IAD was increased to 30 mmHg for 18 h (Reperfusion-group) and 24 h (IAH-24-group). In controls: IAP unchanged. Hemodynamics and PIP were recorded continuously. Additional volume was given whenever CO fell below control values. Concentrations of IL-6, IL-10 and TNFα were detected 3-hourly. Central- and portal venous blood samples and MLN were taken intravital. After killing further specimen were taken from lungs and MLN for histopathological and microbiological examination. Damage was classified semiquantitative. Statistics: ANOVA + Mann-Whitney-U ($p < 0.05$).

Results: Edema and granulocytic cell infiltrations most often were seen in lungs and lymph nodes of study-pigs. Microabscesses only were found in the Reperfusion-group. TNFα increased in both IAH-groups and remained elevated even after decompression.

Conclusions: 18 h of IAH followed by reperfusion were sufficient to induce immunological activation. This implies that decompression should be performed as soon as possible whenever IAH remains or promotes.

134 – POSTER PRESENTATION

FROZEN PLASMA AND CRYOPRECIPITATE TRANSFUSION PRACTICES AMONG NEONATOLOGISTS: A NATIONAL SURVEY

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Background: Frozen Plasma (FP) and cryoprecipitate (Cryo) are frequently transfused to neonates although indications remain unclear. This survey aimed to characterize current UK neonatal FFP/Cryo transfusion practices.

Methods: 15 question survey developed by neonatologists and transfusion medicine specialists. Including clinical scenarios and direct questions about FP/Cryo transfusion decisions. Pre-piloted survey was posted to all UK neonatal units (n = 200).

Results: Response rate was 53% (105/200), 42% level 2, 25% level 3 and 12% level 1 units. Overall, neonatologists would consider FP/Cryo transfusions for broad indications. 48% of clinicians, would consider using FP for volume expansion in a non-bleeding, non-coagulopathic infant with hypotension refractory to inotropes and crystalloids. In a clinical vignette describing the same case scenario, 11% of clinicians would use FP to raise oncotic pressure. 19% of neonatologists would use FP as an adjunct to diuresis in an infant with oedema, when other interventions failed whereas in a clinical vignette describing this scenario, 5% of clinicians would order FP. For isolated abnormal haemostatic test results in the absence of bleeding, 21% of clinicians would give FP (irrespective of laboratory results), while 66% would order FP for clinical bleeding in the absence of coagulation results. FP dosage practice (51%: 10 mls/kg, 43%: 15-20 mls/kg, 26% of respondents did not use Cryo).

Conclusions: Neonatologists would consider using FP to expand volume and raise oncotic pressure in neonates. FP dosage practice

varies amongst units. There was limited consideration of Cryo for transfusion. This survey highlights several areas where more evidence and education are needed to improve practice.

135 – POSTER PRESENTATION

THE FUNCTIONAL ACTIVITY OF DONOR PLATELETS MAY BE ASSOCIATED WITH PLATELET INCREMENTS IN PREMATURE NEONATES

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Background: Neonates admitted to NICU often have thrombocytopenia and up to two-thirds receive platelet transfusions. Functional activity of donor platelets (largely genetically controlled) may exert an effect on the increment after a platelet concentrate (PC) transfusion. We analysed the increments achieved in neonates receiving PCs from donors representing the tail-ends of the distribution for platelet functional responsiveness.

Methods: Setting: tertiary NICU. Two year retrospective case review of neonates receiving hyper and hypo responsive platelet transfusions. Platelet counts were recorded pre, at 24 and 72 h post transfusion.

Results: Overall group: median birth weight: 855 (IQR: 726-1142) g. Median gestational age: 27 (IQR: 25-32) weeks. 12 neonates were administered 16 PCs; 10 neonates had sepsis/NEC; two were transfused following a major IVH.

Conclusions: This is the first suggestive evidence that platelet increments after PC transfusion may differ between neonates transfused with hypo- or hyper-responsive donor platelets probably due to a more rapid clearance. A larger study is required to confirm the hypothesis that platelet function may be an independent contributing factor to the frequency of PC transfusions and neonatal outcomes.

PLT count response

	Hyperreactive donor n = 10			Hyporeactive donor n = 6		
	Pre-transfusion	Transfusion + 24 h	Transfusion + 72 h	Pre-transfusion	Transfusion + 24 h	Transfusion + 72 h
Platelet Med (IQR)	37 (31–44)	92 (54–133)	53 (36–92)	37 (29–70)	135 (96–175)	121 (108–117)

Platelet count by diagnosis

	Hyperreactive donor transfusions				Hyporeactive donor transfusions			
	Sepsis/NEC n = 9		IVH n = 1		Sepsis/NEC n = 5		IVH n = 1	
	Pre-transfusion	Transfusion + 72 h	Pre-transfusion	Transfusion + 72 h	Pre-transfusion	Transfusion + 72 h	Pre-transfusion	Transfusion + 72 h
Platelet count median (IQR)	36 (29–38)	39 (32–104)	46	66	54 (32–75)	106 (103–115)	29	121

136 – POSTER PRESENTATION

SEROEPIDEMIOLOGICAL STUDY OF BRUCELLOSIS IN HIGH RISK GROUP IN BOYERAHMAD 2010

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Objective: Brucellosis is a zoonotic disease that may have a major public health and economic impact in most countries which is appear as a malt fever in humans and abortion in animals. This study was designed to determine the serologic titer of Brucella in high risk and non high risk people in Boyerahmad.

Method: A retrospective seroepidemiological study on samples collected at 604 high risk and non high risk people using Rose Bengal test, tube standard test as a rapid test and 2 mercaptoethanol (2ME) and comb's wright as a confirmatory test.

Result: Seroprevalence of Brucellosis in high risk people appears to be high in the Rose Bengal and tube standard test (TST) 6.62 at titer $\geq 1/40$ whereas for non high risk was 0%.

Confirmation test in high risk people were shown with 2ME in four people. The data collected were analysed by χ^2 test via SPSS.

Conclusion: Brucellosis is a major cause of disease in high risk people which related to direct or indirect contact with dairy products related animals.

137 – POSTER PRESENTATION

ETIOLOGY OF BACTERIAL SEPSIS IN PRE-TERM NEWBORN INFANTS

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Background and aim: Infections cause significant mortality and long term morbidity in neonates, especially for premature. Newborn infant have quantitatively and qualitatively “impaired” immunologic system and are less capable of responding to infections. Maternal, environmental, and host factors determine which infant exposed to a potentially pathogenic organism will develop serious or other potentially invasive infections. The purpose in this retrospective study was to identifications the bacterial microorganisms caused neonatal sepsis and/or meningitis in pre term newborns hospitalized in the Center of Neonatology, during the period of 2002, 2003 and 2004.

Method: We used clinical, microbiological, laboratory and radiology methods.

Results: 682 pre-term (PNB) were treated at the Center of Neonatology in Podgorica during the period 2002-2004. In 98 PNB with proven infections (omphalitis, cutaneous infections, conjunctivitis, infection tracti urinary, pneumonia, diarrhea), 30 PTB were diagnosed and treated for sepsis and/or meningitis (30.6%). Dominant pathogens responsible for sepsis and/or meningitis were: Staphylococcus aureus (26.6%), Staphylococcus Co negative (20.0%), Klebsiella pneumonia (20.0%), Serratia marcescens (13.3%) then with equally frequency SGA, Acinetobacter (3.3%). Meningitis were proven in 7 PNB or 23.3% per cent.

Conclusions: Dominant bacterial microorganisms caused neonatal sepsis in preterm newborn infants in our region and during this period were Gram- positive Staphylococcus spp., and from Gram negative

group Klebsiella pneumonia. There are significant regional differences in pathogens of neonatal infections. It is important to identifications the bacterial microorganisms, analysis of longitudinal trends assist in the formulations of strategies to treat and prevent neonatal serious infections.

138 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

ANTIBODY-MEDIATED NEUTRALIZATION OF BACTERIAL GAPDH PREVENTS NEONATAL DISEASE CAUSED BY GROUP B STREPTOCOCCUS

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Group B Streptococcus (GBS) is the leading agent of neonatal infections. This bacterium is a commensal organism of the genital and gastrointestinal tracts of healthy women and neonatal infections are commonly caused by vertical transmission of bacteria. According to the period of manifestation, neonatal GBS infections are divided into early- (EOD) and late-onset disease (LOD). LOD is almost exclusively associated with meningitis, whereas EOD results frequently in septicaemias and pneumonias. We showed that GAPDH is an extracellular virulence factor of GBS that induces host production of interleukin-10 (IL-10) early upon bacterial infection. Here we investigate whether immunity to neonatal GBS infection could be achieved through maternal vaccination against bacterial GAPDH. Before pregnancy, female mice were immunized or not (sham-immunized) with rGAPDH and infected intra-vaginally with GBS in the late gestational period. Pups born from rGAPDH-immunized mothers were protected against GBS infection, even against the highly virulent clone ST-17. In contrast, all pups born from sham-immunized mothers died within 48 h after birth. Severe cases of GBS infections are characterized by a lack of neutrophil recruitment into infected organs. Interestingly, anti-rGAPDH or anti-IL-10R treatment of pups before GBS infection resulted in increased neutrophil numbers and lower bacterial load in infected organs. Therefore, neutralizing antibodies produced in rGAPDH-immunized mothers protect the progeny against lethal GBS infections by blocking IL-10 production and enabling neutrophil recruitment to infected tissues. These results uncover a novel mechanism for GBS virulence in a neonatal host that could be neutralized by vaccination or immunotherapy, preventing both EOD and LOD.

139 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

PATTERN OF MULTI-DRUG RESISTANT BACTERIAL COLONIZATION IN PEDIATRIC INTENSIVE CARE UNIT: A SINGLE CENTER PROSPECTIVE STUDY

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Background: Colonization is the first stage of microbial infection. Pathogens colonize host tissues in contact with the external environment. In critically ill patients, these pathogens can overcome the host defenses.

Aim of the study: To determine the pattern of colonization acquisition of multi-drug resistant bacteria among critically ill children during their PICU stay.

Study design: A prospective study from March 2009 to September 2009 in PICU of Ain Shams University.

Methods: Fifty patients were screened for bacterial colonization; immediately after their admission to PICU (initial colonization), then 3 days later (acquired colonization). Four sites were examined; oropharynx, axillary folds, perianal area, and urine. Samples were cultured on Blood agar, Mannitol salt agar for MRSA and on Aesculin bile agar for VRE.

Results: Thirty per cent of patients were initially colonized (15/50). Initial MRSA and VRE colonization were 22% (11/50), and 14% (7/50), respectively. Initial axillary, anal, oral & urinary colonization were 20% (10/50), 10% (5/50), and 2% (1/50). Three patients were colonized at more than one site by MRSA. Acquired colonization in the PICU significantly increased by 53% (8/15, $p = 0.05$). MRSA colonization increased by 40% (4/10). VRE increased by 40% (2/5). Mixed MRSA and VRE appeared in 4 cases. MRSA infection recorded in 8% (4/50).

Conclusion: Community colonization by MRSA and VRE is alarming. The significant increase in colonization and infection by multi-drug resistant bacteria in the PICU emphasize the hostile hospital environment that necessitate adherence to basic infection control policies and better antibiotic strategies.

140 – POSTER PRESENTATION

EARLY ONSET GROUP B STREPTOCOCCUS SEPSIS: GUIDELINES REVIEW

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Objectives: Group B Streptococcus (GBS) is the most common cause of early onset bacterial sepsis in UK newborns. A number of risk factors for early onset GBS sepsis (EOGBS) have been described and the presence of these provides an opportunity for intrapartum antibiotic prophylaxis (IAP). This is the basis of current UK national guidelines for intrapartum and postnatal management. A previous study showed poor compliance with national guidelines among cases of EOGBS, suggesting missed opportunities for prevention. Therefore, we conducted a review of neonatal unit EOGBS guidelines.

Methods: All 18 units within the UK Neonatal Infection Surveillance Network (NeonIN) were invited to contribute and 14 guidelines were offered for review.

Results: All guidelines were written or updated since 2003 and cited references to the evidence-base, including national guidelines. Within

this network of units with a declared interest in infection we found substantial inconsistency within and between their recommendations. They varied both on use of IAP and in the targeting of risk factors as indications for enhanced investigation or treatment of asymptomatic newborns. All units recommended treatment of symptomatic infants with benzylpenicillin and gentamicin.

Conclusions: Our findings suggest the lack of high quality evidence in this area and related ambiguity in national guidance have contributed to diverse local approaches. Observed discrepancies between obstetric and neonatal guidelines may put infants at further risk of infection. A common national or international approach would permit a prospective evaluation of an EOGBS prevention strategy and generate an evidence base which will benefit future guidelines.

141 – POSTER PRESENTATION

NYSTATIN VS FLUCONAZOLE AS NEONATAL ANTIFUNGAL PROPHYLAXIS. NON-INFERIORITY TRIALS

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Background: Candida is the 3rd causal agent of late onset sepsis in very low birth weight (VLBW) neonates, estimated incidence of 1.6 to 9% and mortality of 30 to 75%. Fluconazole has shown to be effective in reducing infection in VLBW neonates, we would like to test the hypothesis that nystatin is as effective.

Method: By using SPSS software to generate random numbers, 37 infants were assigned 19 babies on Fluconazole (6 mg/kg q72 hour for 1st week then q48 h for 6 weeks) and 18 on Nystatin (100,000 unit q8 hour for 6 weeks). Risk factors such as broad spectrum antibiotics, T.P.N, H2 blocker, central line and corticosteroids. Side effects, efficacy and cost of each medication recorded.

Results: Our interim analysis, no differences in birth weights 1.15 kg Nystatin, Fluconazole (1.01 kg), gender Nystatin females (8) males (9), Fluconazole female (9) male (10), Gestational age Nystatin (29.28) Fluconazole (28.22) or risk factors. Rectal swab colonization occurred in 2/18 (11.1%) and none in the Fluconazole group, no systemic candidacies. 3/19 (15.78%) had transaminase elevation 1 standard deviation above the mean in the Fluconazole group. The cost of the Fluconazole 106.4 US/pt, the cost of Nystatin 50 US/pt.

Conclusion: Intravenous Fluconazole and oral Nystatin at the recommended doses are equally effective in preventing systemic Candida infection in preterm infants, no side effects were observed, however, oral Nystatin is readily available, with half the cost per infant and easily administered.

142 – POSTER PRESENTATION

RESPIRATORY SYNCYTIAL VIRUS SUBTYPES' A AND B INFECTIONS IN ZAGREB REGION

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Background: The epidemic pattern of respiratory syncytial virus (RSV) in Croatia is biennial. In order to determine if the circulation of different RSV subtypes affect the outbreak cycle, the paper analyses the epidemic pattern of RSV in children in Croatia (Zagreb region) over a period of 3 consecutive years.

Methods: RSV was identified in the nasopharyngeal secretions of 700 Zagreb inpatients, aged 0-5 years, who were hospitalised with acute respiratory tract infections over the period from 1 January 2006 to 31 December 2008, using direct virology methods. The virus subtype was determined by real-time PCR.

Results: Of 700 RSV infections identified in children, subtype A virus caused 374 infections, and subtype B 318. Four patients had a dual RSV infection (subtypes A and B). The period of study was characterized by 4 epidemic waves of RSV infections-one, smaller, in the spring of 2006, the second, larger, in December 2006/January 2007, the third in spring 2008 followed by a fourth outbreak beginning in November of 2008. Bronchiolitis or pneumonia occurred in 210 of 374 (56.15%) subjects with proved infections caused by subtype A. Subtype B infection caused bronchiolitis or pneumonia in 184 of 318 cases (57.86%, $p = 0.65$) of documented infection caused by this subtype.

Conclusion: Our results demonstrate that, over a 3-year period of observation, the biennial RSV cycle in Croatia cannot be explained by a difference in the predominant circulating serotype of RSV. Other unknown factors account for the biennial cycle of RSV epidemics in Croatia.

143 – POSTER PRESENTATION

GROUP NON SPECIFIC RED CELL TRANSFUSIONS IN PRETERM INFANTS AND NECROTISING ENTEROCOLITIS

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Introduction: Transfusion related gut injury (TRAGI) has been suggested as a possible mechanism in necrotising enterocolitis. RBC alloantibody formation in infants of less than 4 months of age is considered to be extremely rare therefore all neonates receive group O blood irrespective of their own blood group.

Aim: Assess the association between the development of NEC and red cell transfusions that are not group specific.

Methods: A retrospective study which looked at confirmed cases of NEC from 2006 to 2010 with Bells staging >2 and those patients who developed NEC after receiving a red cell transfusion for any reason. All neonates received 20 ml/kg of red cell concentrate irrespective of aetiology of anaemia. All infants received either O positive or O negative red cells irrespective of their own blood group. Therefore all neonates with group A, B, or AB did not receive patient group specific red cells.

Results: Of 779 transfusions, 47% of neonates were transfused with the same blood group compared with 48.8% of neonates who developed NEC ($n = 49$ infants). 39 of the 49 patients with NEC had received a red cell transfusion before they developed NEC. There was a similar percent of each blood group in infants who did and did not

develop NEC, although there was an increased number of positive types who developed NEC (46 versus 37%).

Conclusion: There was no increased incidence in the development of NEC following a non group specific red cell transfusion. However, more detailed research investigating TRAGI in these infants are warranted.

144 – POSTER PRESENTATION

LATENT HEPATITIS B PREVALENCE IN PARTURIENTS AT THE GENERAL HOSPITAL OF CORINTH. AN ANNUAL EPIDEMIOLOGICAL STUDY

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Objectives: To examine the prevalence of Hepatitis B carriers in parturients (Greek and foreign nationals) that gave birth at General Hospital of Corinth in 2010 and its correlation with demographic factors.

Materials-methods: 519 serum samples were examined that were obtained from parturients either during their scheduled pre-partum visits or on the day of parturition. 118 (22.7%) women were Greek nationals, 95 (18.3%) were Roma and 306 (58.9%) were foreign nationals. Elisa method was used for the serological examination. The statistical analysis of the data was done using the SPSS 15 programme.

Results-Conclusions: A positive HBsAg was found in 33 (6.4%) of parturients. 51.5% of newborns were delivered naturally whereas 48.5% were delivered by Cesarean section. 48.5% concerned second partum, 27.3% were first partum and 24% were at least third partum. All neonates of HBsAg positive mothers were immunized immediately after birth with the Hepatitis B vaccine and given human immunoglobulin against Hepatitis B intramuscularly.

A significant correlation was found only between the HBsAg presence and nationality as 12.6% of the 33 parturients were Roma, 6.4% were foreign nationals and 5.1% were Greek nationals.

It is a known fact that neonates which are exposed to HBV during labour have a 90% probability of becoming chronic carriers. In a recent pan-Hellenic study the percentage of latent Hepatitis B in parturients was 2.2% whereas the respective percentage in our hospital is higher. This highlights the need of pre-partum screening for HBV in all pregnant women, especially in the foreign and Roma populations for the timely immunization and prophylaxis of neonates.

145 – POSTER PRESENTATION

NEONATAL MENINGITIS: FACTORS RELATED TO POOR NEUROLOGICAL OUTCOME IN A GROUP OF 21 CASES

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Background and aims: Neurological outcome is frequently poor in newborns with meningitis. The purpose of this study was to analyse clinical, laboratory, neuroimaging and electrophysiological characteristics of newborns with meningitis and to identify factors that are related to poor prognosis.

Methods: Inpatient charts of 21 newborns with meningitis were studied retrospectively. Correlations between clinical, laboratory, neuroimaging and neurophysiological characteristics and neurological outcome at the age of 3 months were studied.

Results: Twenty-one newborns (gestational age 32 to 41 weeks, birth weight 1320 to 4320 g) were admitted at the age of 1 to 28 days. Purulent meningitis was diagnosed in 11 and nonpurulent in 10 newborns. At admission the WBC count was 2800 to 28000/ μ L, CSF WBC count 500–3800/ μ L, CSF glucose 0.0–3.3 mg/dL, CSF protein 1.4–7.6 g/L. Neurological evaluation at the time of admission revealed severe abnormalities in 6, moderate in 5 cases and mild abnormalities in 10 cases. EEG was abnormal in 6 cases. Neuroimaging studies showed abnormalities in 16 cases.

Neurological assessment at the age of 3 months was normal in 6 and abnormal in 15 infants. It was abnormal in all premature infants, in those with birth weight <2500 g, in the case of bacterial aetiology, in infants with WBC count <4000/ μ L, CSF glucose <0.18 mg/dL and CSF protein >1.7 g/L, but only neurological assessment in the neonatal period was significantly related with neurological outcome ($p < 0.05$).

Conclusions: Among factors studied only neurological assessment in the neonatal period was significantly related to neurological outcome.

146 – POSTER PRESENTATION

MICAFUNGIN: MONOTHERAPY FOR RENAL FUNGAL BALLS IN A PRETERM IUGR BABY

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A preterm (28 weeks), low birth weight (860 gms) infant became unwell with sepsis on day 3 of life. At 1 week of age he developed urinary retention requiring suprapubic catheterization. Urine cultures confirmed *Candida albicans*. He was initially treated with intravenous Fluconazole followed by oral fluconazole with no response. The renal ultrasound revealed non-obstructive unilateral fungal balls (fig). Subsequent treatment with Micafungin for 2 weeks led to clinical improvement and resolution of the fungal balls.

Conclusion: Micafungin is an echinocandin-class antifungal agent licensed for treatment of invasive disease in adults. The optimal dosing regimens for infants are not established yet. There are studies confirming the safety and efficacy of Micafungin in preterm infants with hepatitis as the most common side effect reported. We are reporting the case of fungal septicaemia with renal fungal balls which responded to Micafungin monotherapy with no complications and obviated the need for surgical intervention. We preferred Micafungin over amphotericin B because of potential risk of adverse effects with the latter in sick preterm with known renal problems. Further studies will be needed to compare this advantage of Micafungin over amphotericin in sick neonates.

147 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

H1N1 INFLUENZA IN PAEDIATRIC INTENSIVE CARE IN THE UK AND IRELAND

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Background and aims: The 2009–10 H1N1 influenza pandemic had less impact on the UK and Ireland populations than published projections, but some groups of patients proved vulnerable to the disease. We have examined how H1N1 influenza affected children admitted to paediatric intensive care.

Methods: Cases were identified to the Paediatric Intensive Care Audit Network (PICANet) by Paediatric Intensive Care Units (PICUs) in Great Britain and Ireland. Diagnostic information was reviewed by a consultant paediatric intensivist (PL). Demographic details and outcomes are reported. Effects on mortality were investigated using logistic regression models, adjusting for predicted mortality using Paediatric Index of Mortality 2 (PIM 2).

Results: There were 295 admissions of 282 children, 52% boys and 16% south Asian. Median age at first admission was 57 months. The first admissions were in June 2009 peaking in October 2009 ($n = 86$). 46 children died (16.3%), higher than predicted by PIM2. Mortality was higher among girls and south Asians (risk adjusted odds ratios for death: girls 2.36; 95% Confidence Interval, 1.2–4.7, $p = 0.015$; south Asians 2.3; 1.05–5.0 $p = 0.037$). Children who died were older (median 106 months). Median length of stay was 6 days. Invasive ventilation was used in 67% of admissions (median 6 days), inotropic support in 31%, and renal support in 4%; 6 children required ECMO.

Conclusion: The H1N1 pandemic was more limited in numbers than had been feared. However, the disease carried a high mortality, especially in older children, girls and south Asians.

148 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

CONCOMITANT BACTERIAL PNEUMONIA IN CHILDREN WITH SEVERE RESPIRATORY SYNCYTIAL VIRUS (RSV) BRONCHIOLITIS

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Background and aims: Diagnosis of concurrent bacterial pneumonia in children with severe bronchiolitis requiring assisted ventilation is difficult. The aim of pilot study was to compare diagnostic accuracy

of different methods for diagnosis of bacterial pneumonia in children with severe RSV bronchiolitis.

Methods: 17 children with severe RSV infection admitted to tertiary PICU were classified into group 1 (n = 6)-bronchiolitis with bacterial pneumonia and group 2 (n = 11)-bronchiolitis without bacterial pneumonia. On admission (day 1) and after 48 h (day 3) quantitative cultures of endotracheal aspirates and blood for determination of neutrophil CD64 index (CD64in), lipopolysaccharide-binding protein (LBP), PCT and CRP were taken. The diagnostic accuracy of markers was expressed as the area under the ROC curve (AUC). The diagnosis of bacterial pneumonia was based on consensus criteria proposed by Langley and Bradley.

Results: Groups 1 and 2 were similar regarding CRP and PCT. CD64in was higher in group 1 than in group 2 on day 1 (median 5.6 vs. 2.2; $p < 0.05$) with $AUC_{CD64in} = 1$. The quantitative cultures yielded higher numbers of bacteria in group 1 than in group 2 on day 1 (median 502750 vs. 250 CFU/ml; $p < 0.01$) with $AUC = 1$. LBP was higher in group 1 than in group 2 on day 3 (median 23.7 vs. 12.7 mg/l; $p < 0.05$) with $AUC = 0.75$.

Conclusions: Quantitative cultures of endotracheal aspirates and CD64in have high diagnostic accuracy for concomitant bacterial pneumonia in children with severe RSV bronchiolitis. The results of quantitative cultures and LBP on day 3 could help optimize antibiotic therapy.

149 – POSTER PRESENTATION

RESPIRATORY SYNCYTIAL VIRUS AND CONCOMITANT BACTERIAL PNEUMONIA IN CHILDREN IN RESPIRATORY FAILURE

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Objectives: Recent studies have found a high incidence of concomitant bacterial pneumonia (CBP) in children with severe respiratory illness caused by respiratory syncytial virus (RSV).

The authors looked for evidence of CBP in RSV-infected children with respiratory failure.

Methods: Retrospective review of demographic and clinical data of children with documented RSV infection admitted to our PICU in respiratory failure during three consecutive RSV seasons (2008–2011).

Results: Fifty-two children were included. The median age was 6.2 weeks. High risk factors for severe disease were present in 7 and the median PRISM II score was 9 (IQR 5.5–11.0).

Fever was present in 37. C-reactive protein median value was 2.3 mg/dl (IQR 0.6–6.9). Chest x-ray showed pulmonary consolidation (20) and atelectasis (10). Airway secretions were positive for bacteria in 26 children: most frequently *Haemophilus influenzae* (18) and *Streptococcus pneumoniae* (6); 7 had more than one microorganism isolated. Three children didn't receive antibiotics. Mechanical ventilation was required in 41: non invasive in 18 (median 2.5 days) and invasive (IV) in 24 (median 4.0 days). Median length of stay in PICU was 5 days. No patient died.

Children with positive bacterial cultures were older (>6 weeks, $p = 0.005$) and had higher lactates on admission ($p = 0.018$); comorbidity, higher PRISM score, abnormality on chest x-ray and requirement of IV were not predictive of positive cultures.

Conclusions: A high percentage of children with severe RSV infection were concomitantly infected with bacteria. Older age and higher lactates on admission should alert for CBP and may prompt empirical antibiotic treatment.

150 – POSTER PRESENTATION

GENETIC VARIATION IN THE ASSOCIATION OF AIR POLLUTANTS WITH A BIOMARKER OF VASCULAR INJURY IN CHILDREN AND ADOLESCENTS

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Objective: Some experimental studies revealed that exposure to air pollution increases the expression of tissue factor (TF) in atherosclerotic lesions. We aimed to investigate the role of TF +5466A >G (rs3917643) polymorphism in the association of air pollution on serum levels of TF as a biomarker of vascular injury in children.

Methods: This cross-sectional study was conducted among 110 children, consisting of 58 (52.8%) girls and 52 (47.2%) boys with a mean age of 12.7 ± 2.3 years, living in Isfahan, Iran. Enzyme-linked immunosorbent assay were used for measurement of serum TF. Genotype of +5466A >G (rs3917643) polymorphism was determined by the polymerase chain reaction-restriction length fragment polymorphism (PCR–RFLP) method.

Findings: We identified 2 individuals with +5466AG genotype and 108 homozygous for the +5466A allele (no +5466GG homozygotes). The mean pollution standards index (PSI) value was at moderate level, the mean particular matter measuring up to $10 \mu\text{m}$ (PM_{10}) was more than twice the normal level. Multiple linear regression analysis showed that after adjustment for confounding factors, i.e. weight status, dietary and physical activity pattern, serum TF level had significant relationship with PSI (beta: 0.55, SE: 0.07, $p < 0.000$) and PM_{10} (beta: 0.51, SE: 0.03, $p = 0.001$).

Conclusion: In spite of similar genetic polymorphism of TF, air pollutants might have an independent association with systemic inflammatory and coagulation responses. The harmful effects of air pollutants on the first stages of atherosclerosis in the pediatric age group should be underscored in primordial and primary prevention of chronic diseases.

151 – POSTER PRESENTATION

STUDY ON RELATIONSHIP BETWEEN *HELICOBACTER PYLORI* AND INFANTILE HYPERTROPHIC PYLORIC STENOSIS

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Objective: Recently, it has been suggested that *Helicobacter pylori* (*H. pylori*) might be a cause of some cases of IHPS in infancy. This study performed to evaluate the possible relationship between IHPS and *H. pylori*. **Methods:** In a case-control study, 20 infants with definite diagnosis of IHPS and thirty otherwise healthy sex and age-matched infants who were intended to go under a circumcision were recruited as the control counterparts. Serum antibody against *H. pylori* (IgG) was measured in infants and their mothers. Likewise, stool *H. pylori* antigen was also evaluated by ELISA in the infants.

Results: Twenty infants with IHPS, with a mean age of 42.40 ± 19.09 (25-90) days and 30 controls were enrolled. In the case group, 18.2% of the infants were *H. pylori* + comparing with 23.1% of the controls ($p = 1$). All the mothers of the case group were *H. pylori* + comparing with 95.8% of the mothers in the control group ($p = 1$). Simultaneous infection of HP, 18.2% of the mothers and infants of the case group were *H. pylori* + comparing with 33.3% of the mothers and infants in the control group ($p = 0.617$). The mean titer of infant serum HP antibody was comparable between the two groups (14.21 ± 8.18 ng/dl vs. 11.80 ± 19.07 ng/dl in the case and control groups, respectively; $p = 0.342$). Mean stool antigen was significantly higher in the case infants (1.74 ± 4.59 ng/dl vs. 0.62 ± 0.44 ng/dl; $p = 0.020$).

Conclusion: According to our results, there might be a connection between HP infection and IHPS in infants; however, controlled studies with larger sample size are required.

152 – POSTER PRESENTATION

DETERMINATION OF THE BEST CUT OFF POINT FOR ELISA IN HUMAN BRUCELLOSIS

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Introduction and aims: Brucellosis is a worldwide disease that due to its diverse clinical manifestations needs to be proved by laboratory data. Serum agglutination test (SAT) is the most widely used test for diagnosing brucellosis. The enzyme linked immunosorbent assay (ELISA) can determine specific antibody classes against brucella; it is a sensitive, simple and rapid test, which could be an acceptable alternative to SAT, with fewer limitations but like any other new test, should be further evaluated and standardized according to the local situations and population. This study was planned to compare the diagnostic ability of ELISA with SAT and determine an optimal cut-off point for ELISA.

Materials and methods: Four hundred and seven consecutive patients which fever and other compatible symptoms of brucellosis, were enrolled in the study. Serum agglutination test and ELISA were performed on their sera.

Results and conclusion: The cut-off point of 53 IU/ml of ELISA-IgG yielded the maximal sensitivity plus specificity comparing to the other levels of ELISA-IgG and was considered as the best cut off- point of ELISA-IgG to diagnose acute brucellosis. At this cut-off, the sensitivity, specificity, positive predictive value, negative predictive value, positive likelihood and negative likelihood ratio were 84.09%, 85.38%, 62.20, 94.90, 5.75, 0.18, respectively.

153 – POSTER PRESENTATION

RECOMBINANT HUMAN GRANULOCYTE COLONY-STIMULATING FACTOR IN PRETERM NEONATES WITH SEPSIS AND NEUTROPENIA

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Background: Systemic sepsis is a major cause of death in preterm infants. Neonates are at high risk for developing bacterial infections due to quantitative and qualitative insufficiencies of innate immunity, particularly granulocyte lineage development and response to infection. Granulocyte colony-stimulating factor stimulate proliferation and maturation of myeloid precursors in the bone marrow and modulate functions of mature neutrophils.

Purpose: To assess the effectiveness of recombinant granulocyte colony-stimulating factor (rG-CSF) in correcting neutropenia induced by sepsis.

Methods: Retrospective study that includes all newborns with sepsis and neutropenia (<1000 neutrophils/mm³) admitted in our NICU from September 2009 to October 2010.

Results: 9 babies were enrolled. 66% female. Mean birth weight and gestational age (GA) 969 g and 29 + 3, respectively. Apgar score was >7 in most patients (78%). Risk factors for neutropenia included: prematurity (100%), antenatal steroids (55%), pre-eclamptic mother (45%) and intrauterine growth restriction (23%). 4 patients presented with neutropenia at first day of life, 3 developed at second day and 2 at third. RG-CSF (10 mcg/kg daily, 2 days) were administered intravenous in all cases because of clinical and laboratory findings compatibles with early onset sepsis. All patients initiated empirical antibiotic therapy with ampicillin and gentamicin. Neutrophil counts after rG-CSF administration rose significantly with an average of 54 h. There were no adverse reactions attributable to rG-CSF. No thrombocytopenia and anemia were detected. Three patients had proven sepsis with positive blood cultures to *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Acinetobacter*. 7 patients had resolution of neutropenia and survived the septic episodes.

Conclusions: According with data available in literature, our patients had a quicker recovery of their total of neutrophils without serious adverse effects. Further studies are needed to assess whether the administration of G-CSF may modify the long-term.

154 – POSTER PRESENTATION

SCHISTOSOMIASIS AS A CAUSE OF TERMINAL HAEMATURIA IN A 14 YEAR OLD BOY IN UNITED KINGDOM

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Urinary schistosomiasis is one of the main public health problems in Africa and the Middle East. Schistosomiasis (Bilharziasis) seems to

be on the rise in developed countries like United Kingdom with the continuing influx of immigrants and refugees, as well as the return of travellers and soldiers from endemic areas.

We present case report from UK, of a 14 year old Asian boy, who presented to a general paediatrician with a 2 month history of painless, gross, terminal haematuria. He also had general symptoms of malaise, early fatigability with poor appetite and was a known carrier of thalassemia trait.

On Full blood count, his haemoglobin was 11.4 gm/dl with eosinophilia 0.71×10^9 (Normal range 0.04–0.40). An ultrasound scan of urinary tract revealed localised thickening of bladder located towards the trigone. This raised suspicion of rhabdomyosarcoma of bladder. An urgent cystoscopy was performed which revealed multiple lesions in the area of trigone, studded with white spots within the lesion. Punch biopsy was done which showed eggs of *Schistosoma haematobium* and the inflammatory mass constituted eosinophilic infiltration.

History was revisited and it was discovered that he had travelled to Malawi, where his father was working. As a treatment two doses of Praziquantel was given and patient will be followed up with ultrasound scan later to assess the bladder lesions.

155 – ORAL PRESENTATION

ANTIBIOTIC SURVEILLANCE IN A PICU: ATTAINABLE EVALUATION AND INTERVENTION ACCORDING TO THE CDC 12-STEP CAMPAIGN

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Background: Guidelines for developing an institutional program to enhance antimicrobial stewardship are published containing interventions with good impact but high level of organisational changes. The Centre for Disease Control and Prevention 12-step program to prevent antimicrobial resistance was launched educating clinicians about antimicrobial resistance and providing strategies to improve clinical practice.

Methods: Prospective, 3 months surveillance of antibiotic use on our paediatric intensive care unit (phase 1) and evaluation according to the 12-step campaign with development of attainable interventions. Second 3 months surveillance phase after implementation of the intervention with comparison of antibiotic use.

Results: Antibiotic use >48 h for culture-negative infections (step 10) and target the pathogen for proven infections (step 4) were the two main areas with possible improvement. The intervention was a mandatory form requesting indication, likelihood of infection at start of antibiotic therapy, review after 48 h and 5 days questioning possible stop of antibiotic therapy, reasons for continuation and possible target pathogen. Phase 1 had 174 admissions (952 hospitalisation days) with 12 proven and 53 culture-negative infections. Phase 2 had 185 admissions (1186 hospitalisation days) with 24 proven and 57 culture-negative infections. The percentage of antibiotic therapy for culture-negative infections <3 days increased from 18% (10/53) to 35% (20/57; $p = 0.05$) and correct targeting of pathogen increased from 58% (7/12) to 83% (20/24; $p = 0.11$).

Conclusions: Antibiotic surveillance using the 12-step campaign is a possible way to evaluate institutional antibiotic therapy. Development of attainable interventions are possible and can show improved antibiotic use with minimal expense.

156 – POSTER PRESENTATION

NECROTIZING ENTEROCOLITIS IN PRETERM INFANTS AND MODE OF DELIVERY

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Objective: The aim of our study was to investigate the relationship between the mode of delivery and necrotizing enterocolitis (NEC) in preterm infants. We hypothesize that caesarean section would place preterm neonates at increased risk of NEC.

Methods: Ethics approval was obtained for this single center retrospective cohort study. Maternal and infant charts were reviewed on infants born between 2001 and 2007 at less than or equal to 28 weeks gestation. Out born infants were excluded. Antenatal, intrapartum and neonatal data were extracted from the medical records. NEC was diagnosed based on clinical, radiographic and laboratory findings. Chi-square with Fisher's exact test was used to compare categorical variables and the Student's T-test was used for continuous variables.

Results: 63 infants were included with an average gestational age of 25.7 ± 1.3 weeks and an average birth weight of 856 ± 166 g. A total of 29 infants were delivered by caesarean section and 34 infants were delivered vaginally. Of the 11 infants that developed NEC 4 were delivered by caesarean section and 7 were delivered vaginally which was not statistically significant ($p = 0.526$). Maternal and neonatal factors, such as preterm prelabour rupture of membranes, chorioamnionitis, maternal antibiotic use, medical or surgical ductal closure, the use of steroids, early feeds, or prolonged use of inotropes, were not significantly associated with the development of NEC.

Conclusion: Based on this study, delivery of preterm infants less than 28 weeks by caesarean section does not increase the risk of developing NEC.

157 – POSTER PRESENTATION

CYTOKINE GENE EXPRESSION OF TH1 AND TH2 LYMPHOCYTES IN ALLERGIC AND NON-ALLERGIC PATIENTS WITH NASAL POLYP BY PCR METHOD

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Aims: Several researches performed to study the probable roles of different predisposing etiologic mechanism's in nasal polyposis including the immunopathologic.

Conditions: In order to elucidate the probable participation of Th1, Th2 lymphocytes in duction and progression of nasal polyposis this study designed.

To differentiate Th1, Th2 cytokine gene expression in excised polyp tissues

75 patient's with polyps with mean age of 38 (18–81 years) selected, with and with out allergies in according clinical laboratory evaluations total serum IgE and allergen specific IgE measured by commercial immunoassay and allergic skin test performed for disease diagnosis and to determinate the allergic background a cytokine (&Imf/hl-4) gene expression done on extracted RNA using RT-PCR.

Results: Frequency of & IFN and IL-4 gene expression was statistically significant in allergic versus non allergic patients (39.5% vs. 14.2%, $p = 0.3$, 44.7% vs. 18.9% $p = 0.02$, respectively). The IL-10, IL-12 (p35, p40) genes do not differ significantly in two groups.

Discussions and conclusion: The data of present study is more or less compatible with the finding of Bernsteu and Kirstsdihl concluding that both Th1, Th2 genes expressed in nasal polyps I allergic patients and no cellular polarization is detected o The role of Th2 infiltrating in allergic inflammation of upper respiratory tracts and allergic rhinitis is not implied in polyps with or with out allergies on nasal polyps could considered as special in inflammatory reaction with several cellular involvements.

158 – POSTER PRESENTATION

CLINICAL CHARACTERISTICS OF CARBAPENEM-RESISTANT ACINETOBACTER INFECTIONS IN THE NEWBORNS

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Carbapenem-resistant strains of Acinetobacter is an important problem in hospitals including newborn wards and treatment choices are limited. Elucidation of clinical risk factors are important for prevention of these infections. We evaluated the frequency, associated factors and prognosis of carbapenem-resistant Acinetobacter infections in our tertiary care newborn unit between the years 2004 and 2009. Clinical records of 56 newborns (34 term, 22 preterm) with Acinetobacter spp. infections have been evaluated. 78.6% of newborns had co-morbidities such as RDS, LBW, meconium aspiration syndrome, intraventricular hemorrhage, congenital heart disease or other congenital anomalies. 87.5% of them required intensive care and 83.9% of them were intubated and mechanically ventilated. Isolates were obtained from tracheal aspirate (28), urine (13), blood (14), and CSF (1). Carbapenem-resistance have been determined in 37.5% of all Acinetobacter isolates. We have observed no association between presence of carbapenem resistance and intensive care unit stay, mechanical ventilation, TPN, urinary or central line catheterization and other co-morbid clinical conditions. Acinetobacter infections were 2.7 times more common in preterm than term newborns (OR 2.7; 1.0-6.9, $p = 0.016$). Among patients with ventilator associated pneumonia ($n = 28$), carbapenem resistant Acinetobacter infections were related with prematurity (OR 3.23; 0.86-12; $p = 0.04$) and presence of surgical interventions mainly pleural tap (OR 3.55; 0.96-13, $p = 0.02$). In this 6 year period 5260 newborns were hospitalized and NICU mortality was 4.6%. 53.6% of newborns with Acinetobacter infection died ($n = 30$) which was the 12% of all cause deaths during 6 year period. We observed no difference about the prognosis of newborns with and without infected with carbapenem resistant isolates.

159 – POSTER PRESENTATION

NEONATAL SUPPURATIVE PAROTITIS

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Suppurative salivary gland diseases are rare in neonates. *Staphylococcus aureus* is the common causative organism which reaches the parotid through Stenson's duct. Antimicrobial therapy is generally effective without need for surgical intervention.

Only 32 cases of neonatal suppurative parotitis are described in the English literature in the last 35 years¹. During a 9-year study by Sabatino et al., five cases of neonatal suppurative parotitis were detected in 3624 hospital admissions².

We report a case of suppurative parotitis in an 11 day old baby with no perinatal risk factors for sepsis. He presented with a tender swelling on the right cheek. Application of pressure on the swelling resulted in discharge of purulent exudate at the buccal opening of the parotid duct. A diagnosis of suppurative parotitis was made based on above clinical features. Full blood count showed leucocytosis and pus culture grew *Staphylococcus aureus* sensitive to Flucloxacillin. He responded well to intravenous antibiotics and the swelling subsided completely. No recurrence was noted in the follow up.

Conclusion: Although neonatal suppurative parotitis is uncommon in the newborn, it cannot be considered a “vanishing disease”. A high index of suspicion is needed to pick these cases quite early. Treatment with appropriate antibiotics results in good resolution without surgical intervention.

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160 – ORAL PRESENTATION

TRANSFUSION-ASSOCIATED NECROTIZING ENTEROCOLITIS: A SYSTEMATIC REVIEW

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Objectives: Necrotizing enterocolitis (NEC) has been associated with transfusion of Packed Red Blood cells (PRBC). We reviewed the literature and outcomes of transfusion-associated NEC.

Methods: A systematic review was undertaken of published literature (1980-2011) relating to transfusion-associated NEC. Three groups (NEC within 48 h of transfusion; NEC after >48 h and NEC without transfusion) were analysed and compared using Chi Square test. Only those cases with definite details of transfusion history were included.

Results: Eight studies (457 cases of NEC) were included. 364 cases (80%) were associated with a history of transfusion; 165 (36%) developed NEC within 48 h of transfusion, 199 (44%) more than 48 h after transfusion, 93 (20%) had never been transfused. Overall mortality was 20%. Mortality was highest in infants developed NEC <48 h after transfusion ($p < 0.0001$; Figure 1, 2).

Conclusions: There is an association between blood transfusion and development of NEC in some infants. Those who develop NEC within 48 h of transfusion have higher mortality than those who develop NEC later. Further understanding of this association is required to prevent development of NEC.

Mortality and transfusion status

Prevalence of transfusion-associated NEC

161 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

EPIDEMIOLOGY OF PEDIATRIC SEPSIS

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Object: To evaluate epidemiology, outcome and clinical features of the largest Hungarian pediatric sepsis database.

Methods: Retrospective study was performed by analysing the data of septic children (age: 0-18 years) treated in the PICU of Hungary's leading hospital for infectious diseases.

Results: In the study period (1993-2009) 496 patients (boys: 285, girls: 211) were treated with sepsis diagnosis (mortality rate: 19.4%). 315 patients (63.5%) required mechanical ventilation. Mostly infants were affected by sepsis (40%), only 18% of all patients were older than 7 years. There was no significant difference in mortality according to gender. Community acquired/CA/sepsis was the most common (73.6%), while nosocomial origin was

26.4% (hospital acquired/HA/20.4%, PICU-acquired 6%). Mortality rate of HA-sepsis was higher than in the CA-group (37.6% vs. 14%, $p < 0.001$). The most common source of sepsis were respiratory tract infections and neuroinfections. Comorbidities (OR: 3.55; $p < 0.001$) and immunosuppression (3.67; $p < 0.001$) significantly increased risk of fatal outcome. Microbiological diagnosis was made in 75% of septic patients. The leading causative agents were *N. meningitidis* and *S. pneumoniae*. Mortality rate was the highest in the case of patients with 0-3 day long ICU stay (55.4%!), comorbidity (33.2%), immunocompromised patients (40.2%), acute renal failure (56.8%) and certain causative agents (*Pseudomonas*, *Serratia* and fungi). Sepsis mortality decreased from 25% (1993-2000) to 14.5% (2001-2009).

Conclusion: Implementation of sepsis markers into everyday practice improved diagnosis of sepsis. Early admission to the PICU and implementation of sepsis guidelines improved outcome.

162 – ORAL PRESENTATION

DEVELOPMENT OF A NOVEL BLEEDING ASSESSMENT TOOL IN A HIGH RISK NEONATAL POPULATION

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Objectives: Neonates are at high risk of bleeding. Our objective was to develop and pilot a bleeding assessment tool (BAT) and validate its use in neonates admitted to intensive care in UK and US.

Methods: BAT was developed and modified from WHO Bleeding Grade by neonatologists and haematologists. 14 day prospective daily record of bleeding undertaken in neonates admitted for high-dependency or intensive care in 8 tertiary NICUs (2 US, 6 UK) over 2-4 weeks.

Results: 149 (75 US, 74 UK) neonates were assessed for 1522 days (median gestational age: 33 US vs. 30 weeks UK). Overall 25% (40.5% UK, 9.3% US) of babies developed some form of bleeding. Incidence of bleeding (represented as bleeding days/study days) was: severe 7.4% UK 0% US; major 11.5% UK versus 1.3% US; moderate 3.2% UK versus 1.3% US; minor 28.2% UK versus 6.7% US. Babies born <28 weeks gestation had a greater incidence of both overall bleeding (59% vs. 15%) and major/severe bleeding (35.3% vs. 4.3%) than infants >28 weeks. Major bleeds included: intraventricular haemorrhage (6.7%), pulmonary haemorrhage (4%), rectal/GI haemorrhage (3%). 218 of 648 UK daily assessments were duplicated and showed excellent agreement, Kappa value 0.93.

Conclusions: One in four babies in this study experienced a bleed event. US infants had a lower rate of bleeding probably related to higher median gestational age. Interventions to reduce bleeding in this vulnerable population will benefit from a validated recording tool, such as this BAT, specifically adapted for neonatal use.

163 – POSTER PRESENTATION

INSUFFICIENT CYTOMEGALOVIRUS (CMV)-IMMUNE RESPONSE IN AN EXTREME LOW BIRTH WEIGHT INFANT WITH SYMPTOMATIC POSTNATAL CMV-INFECTION AND SUBSEQUENT CMV-HYPERIMMUNE GLOBULINE (HIG) THERAPY

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Background: Preterm infants may suffer from postnatal acquired CMV-infections. Cases with CMV-related pneumonia, thrombocytopenia and leucopenia are published.

Case: A female preterm infant (GA 24+2 weeks, birth weight 570 g) developed at the age of 2 months a symptomatic postnatal CMV-infection (congenital CMV-infection was excluded by negative CMV-culture from urine in the first week of live) with thrombocytopenia, leucopenia and persistent demand of additional oxygen. CMV was isolated from blood-, urine- and throat-samples. Antiviral therapy with Valganciclovir (VGCV) was commenced, CMV-related symptoms improved and the viral load in the blood and urine became negative. Unfortunately, the preterm developed a leucopenia due to VGCV. Accordingly, VGCV-therapy was stopped, which was followed by a secondary raise in CMV-viral load. At that time the infant produced CMV-IgM- and marginal CMV-IgG-antibodies. Both became negative 6 weeks after onset of the postnatal CMV-Infection. Hence CMV-HIG therapy, 6 × 100 IU/kg within 16 days, was initiated. The therapy was well tolerated. CMV-viral load in urine remained positive and was low (< 200 copies/ml) in blood. The clinical status of the patient improved. Three weeks after CMV-HIG therapy the patient was discharged with a normal full blood cell count and without supplemental oxygen. A 5-month follow-up revealed positive CMV-IgG and negative -IgM antibodies.

Conclusion: Extreme low birth weight infants may show an insufficient immune-response to postnatal acquired CMV-infections. Application of CMV-HIG might be a therapeutic option in these cases to improve the patient's clinical condition.

164 – POSTER PRESENTATION

PROPHYLACTIC FLUCONAZOLE IN A TERTIARY REFERRAL SURGICAL NICU: A 6 YEAR REVIEW

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Objectives: Invasive candida infections are a significant cause of morbidity and mortality in preterm infants, especially surgical newborns. As GOSH-NICU has no inborn facility babies are transferred for specialist neonatal surgical or children's hospital care and at admission have high severity scores and dependency.

In 2001 a policy of prophylactic fluconazole was introduced for all VLBW infants and others at risk due to immunodeficiency, ongoing antibiotics, CVC and abdominal wall defects.

Methods:

Candida GOSH NICU

	N	% Invasive fungal infection	Blood culture	Urine	% Candida colonized	Peritoneal swab only	%On fluconazole when candida infection
VLBW	199	3.5	5 (2P)	1 (1P)	9 (7 urine, 11 skin)	2	83
N-VLBW	1738	0.17	3	0	7 (23 urine, 95 skin)	5	66

P- candida also isolated from peritoneum

Retrospective case note/microbiology database review of admissions 2005-2011. Fungaemia pre-admission excluded (3). All fungal cultures, fluconazole prophylaxis administration and mortality rates reviewed.

Results: Candida GOSH NI... 83% VLBW infants with invasive candida had received fluconazole-prophylaxis. 66% non-VLBW infants on fluconazole prophylaxis when positive culture. No neonate developed invasive infection after colonization.

VLBW mortality with invasive candida 67% compared with 12% for all VLBW infants. No deaths in infants >1 kg with invasive fungaemia. Overall unit mortality: 8.2%.

Conclusion: VLBW infants with invasive candida have a high mortality rate. The uses of routine fluconazole prophylaxis in high-risk surgical VLBW infants leads to a rate of invasive candida similar to that of the lower risk general VLBW population. Fluconazole prophylaxis does not appear to confer resistance if invasive candida occurs. No incidence of invasive infection following colonisation was demonstrated.

165 – POSTER PRESENTATION

ACUTE PAROTITIS IN THE NEONATE: POSSIBLE LATE ONSET GROUP B STREPTOCOCCUS?

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Background and aim: Neonatal group B streptococcal infection (GBS) is associated with significant morbidity and mortality ⁽¹⁾. Typically late onset GBS is associated with bacteraemia and meningitis. This case report describes a case of late onset GBS presenting as parotitis. GBS parotitis is rarely reported ⁽²⁾ and this case highlights the importance of consideration of GBS in the initial investigation and management of neonatal parotitis.

Methods: A case based report of late onset GBS serotype III on the neonatal unit presenting as acute parotitis, with overlying cellulitis and sepsis, confirmed by blood culture.

Results: A well preterm neonate developed parotid swelling and overlying cellulitis on day 55 of life, with subsequent respiratory distress and signs of sepsis. Blood culture demonstrated positive GBS serotype III. The patient received 10 days of intravenous antibiotics and made a full recovery.

Conclusion: Parotitis is a rare but important presentation of late onset GBS disease. Blood culture is essential to diagnosis and the possibility of late onset GBS disease must be considered when selecting appropriate antibiotic cover, especially in the presence maternal GBS carriage, or in the event of treatment failure.

References:

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166 – POSTER PRESENTATION

SEROLOGIC PERFORMANCES AND CLINICAL FEATURES IN CHILDREN WITH PRIMARY/PAST EPSTEIN-BARR VIRUS INFECTION

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Objectives: The aim of the study was to explore serologic performances and clinical features in children with EBV infection.

Method: A prospective study of children suspected infectious mononucleosis was conducted. Peripheral blood samples were analyzed by IFA to detect antibodies to EBV. A standard medical history was taken, including epidemiological data, clinical manifestations, the percentage of ALC in peripheral blood.

Results: (1) 37 were younger than 8 months, 3 of whom were VCA-IgM positive, VCA-IgG negative and EBNA-IgG negative. 7 patients were VCA-IgM positive, the youngest of whom was 1 month. 280 of the patients were older than 8 months, the incidence of VCA-IgM negative, VCA-IgG positive and EBNA-IgG negative was 4.64%, while VCA-IgM positive, VCA-IgG positive and EBNA-IgG positive the 2.86%. (2) The infection rate of EBV ranges from 21.43% in the subjects aged 8–12 months to 84.21% in those aged >9 years. (3) Lymphadenopathy (12/23, 60.87%) was more frequent in EBV primary infected children. The children with EBV primary infection had longer hospital stays (10.74 ± 3.14 days), and was more common in palatal petechiae (52.17%), hepatomegaly, splenomegaly, ALC higher than 10% (4) The pattern of VCA-IgM positive, VCA-IgG negative and EBNA-IgG negative had longer hospital stays, and was more common in palatal petechiae and Lymphadenopathy.

Conclusion: The infection rate of EBV ranges from 21.43% in the subjects aged 8–12 months to 84.21% in those aged >9 years in central China, and the patterns of “VCA-IgM⁺, VCA-IgG⁺, EBNA-IgG⁺” and “VCA-IgM⁺, VCA-IgG⁺, EBNA-IgG⁺” did not have specific clinical features.

167 – POSTER PRESENTATION

ANALYSIS OF CLINICAL FEATURES FOR CHILDREN INFECTED WITH INFLUENZA A IN 2009

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Objectives: The aim of this study is to explore the clinical and pandemic features of children infected with influenza virus A (Flu A) in 2009 by a retrospective analysis.

Methods: We conducted children having flu-like clinical symptom in 2009. Peripheral blood samples were analyzed for common respiratory agents, including Flu A, RSV, Adv, Flu B, PIV I, II and III, CP and MP, HI, KP and LP I by using IFA for the antibody detection (IgM). And medical history was taken, including epidemiological data, clinical antecedents, clinical manifestations and chest X-ray elsewhere. All specimens were collected from Jan to Dec 2009.

Results: (1) Flu A were detected in 234 (39.1%) of the 599 flu-like children. The mean age was 48.68 months (range from 3 months to 176 months). The detection rate in less than 1 year old group was obviously lower than the older groups. Especially for the group <6 months. (2) In Flu A positive group, the days of hospitalization and cough were longer. However, asthma and diarrhea cases were less. (3) The detection rates of Flu A reached a peak of 57% in November and December. (4) The primary coinfection pathogens were KP (53.8%, 126/234) and Flu B (48.3%, 113/234). (5) These is no difference between Flu A coinfecting with KP and KP negative group.

Conclusions: Flu A in 2009 had a high detection rate in flu-like symptom children, but a low detection rate in less than 1 year old group. Flu A children were prone to KP coinfection.

168 – POSTER PRESENTATION

PAEDIATRIC LOGISTIC ORGAN DYSFUNCTION SCORE (PELOD) FOR THE EVALUATION OF THE SEVERITY OF MULTIPLE ORGAN DISFUNCTION SYNDROME (MODS)

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Background and aims: MODS is a main courses of death in PICU. Estimation of the severity of this syndrome could be a useful additional outcome measure. We aimed to evaluate MODS severity and outcome according to PELOD.

Methods: We retrospectively evaluated 1429 patients admitted to the PICU of Vilnius University Children's Hospital during 2010. Under the International Pediatric Sepsis Consensus Conference criteria MODS was diagnosed in 12 patients. We calculated daily PELOD score for six organ systems and analyzed a set of 7 days. The outcome was the patient's vital status at discharge from the PICU.

Results: Primary MODS was in 9 cases, 5 of them survived and 4 no survived. Secondary MODS was in 3 cases, 1 of them survived and 2 no survived. Primary category of illness was cancer 5, meningococemia 1, osteomyelitis 1, burn 1, congenital disease 3, encephalitis 1. In primary MODS 3 patients had two, 2 three, 3 four and 2 five organ dysfunctions. Mean first day PELOD score of survivors was 13.8 and no survivors 24.5. We didn't have reliable difference in daily PELOD score over time in survivors and no survivors due to lack of cases.

Conclusions: Mean first day PELOD score of survivors was statistically significant lower than no survivors. First day PELOD and number of organ dysfunctions can be used as a marker of MODS severity and predictive criteria of outcome. We need more cases to

analyze the epidemiology of MODS and PELOD scoring over time of treatment.

Medical Topic 11 - Neuro critical care (169–194)

169 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

PREDICTIVE FACTORS OF OUTCOME IN PEDIATRIC ICU-PATIENTS WITH TRAUMATIC BRAIN INJURY: A DESCRIPTIVE HISTORICAL COHORT-STUDY

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Background and aims: Traumatic brain injury (TBI) is the leading cause of mortality and neurological impairment in children. Hence, predictors for adverse outcome need to be identified at an early stage. The objective of our study therefore was to determine early identifiable factors predictive of poor outcome in children admitted to a paediatric ICU with TBI.

Methods: We performed a 10-year single-center retrospective review of all children <18 years of age consecutively admitted with TBI (2000–August 2010). Good outcome was defined as a King's Outcome Scale for Childhood Head Injury (KOSHI) score of $\geq 5a$. Variables that were investigated included hypo-/hyperglycaemia, hypo-/hypernatraemia, hypotension, intracranial pressure, cerebral perfusion pressure, need for transfusions, CT-lesions, cerebral edema, hypoxemia, hypercapnia, and ventilator settings. Multivariate analysis was used to identify the independent contribution of these variables to outcome.

Results: 172 children (60% male, 40% female) were studied. Mean age was 7.7 ± 0.4 years. Predominant mechanisms of injury were falls (41%) and motor vehicle accidents (41%). Mean values for the pre-hospital Glasgow Coma Scale (GCS), Pediatric Trauma Score and Injury Severity Score were 9.6 ± 0.3 , 8.0 ± 0.2 and 18.5 ± 1.1 , respectively. Multivariate analysis showed that low initial GCS score, high age, cerebral edema, early hyperglycaemia and a high maximum serum sodium concentration were independently associated with adverse outcome.

Conclusions: Low initial GCS score, high age, cerebral edema, early hyperglycaemia and a high maximum serum sodium concentration were independently associated with adverse outcome in paediatric TBI.

170 – POSTER PRESENTATION

THE EFFECT OF STIMULATING SUBSTANCES ON BRAIN ACTIVITY OF PRETERM INFANTS BELOW A GESTATIONAL AGE OF 30 WEEKS

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Introduction: Methylxanthines and doxapram have been widely used for the treatment of apneas of prematurity. Both substances have effects on the central nervous system. While there are data available concerning the use of caffeine (the methylxanthine used at our NICU) even proposing a positive effect on neurodevelopmental outcome of very preterm infants, there are data which suggest a negative effect of the central stimulants doxapram on longterm outcome. Nevertheless, only scarce data are available concerning the effect of these medications on brain activity of very preterm infants until now.

Aim: The aim of this study was the assessment of the effect of stimulating substances on brain activity of preterm infants born below 30 weeks of gestation.

Methods: Brain activity was measured by one-channel amplitude-integrated EEG (aEEG). The first aEEG measurement was performed without caffeine and/or doxapram medication. At least 1 h of brain activity was registered. The second measurement was done at least 24 h after the start of caffeine and/or doxapram treatment. The percentage of different background patterns, the occurrence and duration of sleep-wake-cycling, and the occurrence and duration of seizures was assessed and analysed. Neurodevelopmental outcome will be assessed at one and 2 years of corrected age by assessment of the Bayley Scales of Infant Development II and standardized clinical neurological examination.

Summary: Doxapram therapy lead to significantly more continuous patterns as well as to more seizure activity in preterm infants below a gestational age of 30 weeks.

171 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

THE EFFECT BLOOD WITHDRAWALS ON CEREBRAL OXYGENATION AND HEMODYNAMICS IN NEWBORNS TREATED WITH VA-ECMO

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Objectives: Veno-arterial extracorporeal membrane oxygenation (va-ECMO) is a rescue therapy for neonates with severe respiratory insufficiency. An important complication is intracranial hemorrhage (ICH). In previous studies we demonstrated that bladderbox alarms during va-ECMO resulted in significant changes of mean arterial blood pressure (MABP), cerebral blood flow (CBF) and cerebral blood volume (CBV). The objective of this study was to determine the effect of blood withdrawals on the occurrence of bladderbox alarms, cerebral oxygenation and hemodynamics.

Methods: In this prospective observational study in newborns ($n = 11$), blood withdrawals were studied using near infrared spectrophotometry. Based on concentration changes of cerebral oxyhemoglobin (cO_2Hb) and deoxyhemoglobin ($cHHb$) changes in hemoglobin oxygenation index ($cHbD = cO_2Hb - cHHb$) and total hemoglobin ($ctHb = cO_2Hb + cHHb$) were calculated, reflecting changes in CBF and CBV, respectively. Physiologic parameters and bladderbox alarms were continuously measured. MABP and the occurrence of bladderbox alarms were continuously registered.

Results: 133 blood withdrawals were analyzed. Small volume blood withdrawals (<5 mL) did not result in bladderbox alarms or significant changes in $cHbD$ or $ctHb$. On the contrary, 40% of large volume blood withdrawals (range 5–9 mL, $n = 10$) resulted in bladderbox alarms and a significant decrease of MABP and $cHbD$.

Conclusions: Large volume blood withdrawals during va-ECMO resulted in bladderbox alarms and (consecutive) changes in cerebral oxygenation and hemodynamics. This might be a risk factor for ICH. We recommend to avoid bladderbox alarms due to large volume blood withdrawals. Small volume blood withdrawals, which are frequently performed in ECMO patients, do not effect cerebral oxygenation and hemodynamics.

172 – POSTER PRESENTATION

NUCHAL CORDS, BODY LOOPS AND UMBILICAL KNOTS: PERIPARTUM NEUROBEHAVIOURAL OUTCOMES—A PROSPECTIVE STUDY

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Introduction: Umbilical cord knots/loops are common, noted in up to 30% of deliveries. There is debate as to whether they confer an increased risk of neurological morbidity. We aimed to evaluate affected term infants around birth to assess the incidence of encephalopathy and fetal distress.

Materials and methods: Term infants with a nuchal/body loop(s) or true knot(s) were enrolled. Normal term infants were controls. Cord gases and APGAR scores were recorded. Infants were reviewed before discharge and a neurobehavioural examination was performed. Data was statistically analysed in Microsoft Excel.

Results: There were 115 cases and 100 controls. The two groups were similar demographically.

Results

Variable	Case n = 115 (%)	Controls n = 100 (%)
Induction	35 (33)	16 (18)
PROM	22 (30)	8 (8)
Meconium stained liquor	33 (30)	18 (19)
Fetal blood sampling	21 (21)	13 (15)
Emergency delivery	43 (37)	24 (24)
Mean arterial pH (cord)	7.22	7.25
Encephalopathy score	0	0

Conclusions: There were significant differences in evidence of fetal distress and in umbilical arterial pH. All infants were neurologically normal. It is unclear how relevant the intrapartum differences are and while nuchal loops/knots may be associated with adverse outcomes, our study was not sufficiently powered and a larger prospective study is needed. We found the neuro-behavioural scoring easy to administer, and has many applications in the NICU.

173 – POSTER PRESENTATION

UMBILICAL CORD PROLAPSE: AN ALL OR NOTHING EFFECT

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Introduction: Cord prolapse is an uncommon obstetrical emergency. Its perinatal mortality has improved through early recognition and intervention. The pattern of brain injury associated with the total/near-total asphyxia induced is established but what about neurodisability? Our aim was to review all cases of cord prolapse since documentation of neonatal encephalopathy (NE) began to assess the pattern of neurological morbidity.

Materials and methods: The annual clinical reports of the National Maternity Hospital were reviewed from 1972 to 2009. Cases of umbilical cord prolapse (UCP) were identified and reviewed.

Results:

Results

Decade	1970's	1980's	1990's	2000's
Cord prolapse cases	185	145	167	143
Mortality	19.3%	16.6%	7.2%	6.29%
Neonatal encephalopathy	5	5	1	3
Persistent neurological disability*	1	2	0	0

*Choreoathetoid Cerebral palsy, Severe CP and Neurodevelopmental delay.

Discussion: 683 cases were identified (0.2/1000 births). There were 3 cases of persistent neurological morbidity (0.4/1000 births). This small number seems surprising. We know that UCP can induce a total asphyxia. This is compensated for by redistribution of systemic and cerebral blood flow so that the brainstem and basal ganglia are prioritised due to metabolic demand. In total asphyxia, compensation fails, with rapid cell death. This pattern is reflected here, with most infants either intact or suffering brain stem death. Any disability tended to reflect basal ganglia injury. Our study explains the pattern of high mortality in the absence of significant neurological morbidity.

174 – POSTER PRESENTATION

THE DIAGNOSTIC AND PROGNOSTIC VALUE OF VEGF, DR5 AND ALCAM LEVELS IN NEWBORNS WITH POSTHYPOXIC BRAIN DAMAGE

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Background and aim: Different mechanisms of cellular injury may lead to neuronal or glial cell loss from asphyxia. Complex pathophysiological changes following asphyxia results in temporal disturbance of cell functions, inflammations and apoptosis. In this study we investigated the role of biochemical markers of apoptosis (DR5), inflammation (ALCAM), vascular factor (VEGF) and their diagnostic significance.

Materials and methods: 80 newborns with severe hypoxic damage of CNS were examined. All methods of definition of research factors were based on principle of ELISA. The procedure was carried out according to standard protocols.

Results: DR5 level exceeded normal in all groups in first day of life. Maximum ALCAM levels were registered in all newborns during the first 48 h of life, later ALCAM level started to decrease. VEGF blood

serum level of newborns with PVL and IVH decreased on 7th and 28th days of life.

Conclusions: The increasing of DR5 and ALCAM level in early neonatal period and VEGF serum level decreasing after 7th day of life is unfavorable in case of newborns with severe CNS posthypoxic damages.

175 – POSTER PRESENTATION

TOTAL BODY HYPOTHERMIA FOR HYPOXIC ISCHEMIC ENCEPHALOPATHY: A UK TERTIARY NEONATAL INTENSIVE CARE UNIT EXPERIENCE

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Background and objectives: Total body hypothermia is becoming standard practice for neonates with perinatal asphyxia. There is emerging evidence that induced hypothermia (cooling) of newborn babies who may have suffered from a lack of oxygen at birth reduces death or disability, without increasing disability in survivors. We assessed our practice to determine the effectiveness and safety of moderate whole-body hypothermia in newborns with hypoxic-ischemic encephalopathy.

Methods: Retrospective study of all the cooled neonates for a period of 26 months (Dec 2008-Jan 2011). All the infants met required cooling criteria (TOBY study guideline) to qualify for cooling and underwent active whole body hypothermia to temperature 33.5°C for 72 h.

Results: 18 infants were cooled during study period. 78% (n-14) had evidence of fetal distress before birth. 18% (n-3) had other diagnosis along with perinatal asphyxia. Mortality was 22% (n-4). MRI done on all the surviving infants between days 5 to 15 was normal. Infants were followed up until 18 to 24 months showed no evidence of significant neurodisability on child development assessment. No cooling associated complications was seen.

Improvement in different organ systems

Complication due to perinatal asphyxia	Before & during cooling period	After cooling period
Seizures needing anticonvulsants	67% (n-12)	0% (n-0)
Renal failure	44% (n-8)	0% (n-0)
Hypotension needing Inotropes/ medications	67% (n-12)	0% (n-0)

Conclusion: Total-body hypothermia is effective in surviving neonates with perinatal asphyxia in improving the overall outcome. It is feasible and safe in term neonates, without any major adverse events.

176 – POSTER PRESENTATION

ACCESS TO EARLY NEURO-REHABILITATION FOLLOWING ADMISSION TO A NEUROSCIENCES CENTRE WITH TRAUMATIC BRAIN INJURY

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Objective: To evaluate the characteristics, access to neurodisability assessment, early rehabilitation and follow up arrangements for children admitted to a neurosciences centre with traumatic brain injury (TBI).

Methods: A retrospective cohort study was conducted. Patients admitted to a neurosciences centre with an ICD 10 code for head injury over a 5 year period were collated. Data was extracted from their medical records, the electronic patient record and the electronic patient administration system. This data was subjected to quality analysis and validated by a clinical auditor.

Results: 146 patients were identified after patients without TBI were excluded by the clinician. 22 patients had severe head injury, 27 moderate and 97 mild. 6 patients died, they were all patients with severe head injury that had been sustained as a result of a road traffic accident. 88% of all patients had CT imaging with all patients with moderate and severe injury being imaged. 69% of all patients had lesions on CT and 16% of all survivors left hospital with a new morbidity. Despite this only 27% of all patients had an acute neurodisability assessment at the time when rehabilitation is most effective. Most of the patients that did have an assessment were those with severe head injury. All patients who had a neurosurgical procedure had an outpatient follow up appointment with >60% of all survivors having some form of follow up.

Inpatient assessments

New morbidity at discharge

Conclusion: The low number of patients receiving a post acute neurodisability assessment represents a missed opportunity for early rehabilitation in these patients.

177 – ORAL PRESENTATION

DOES NEAR INFRARED SPECTROSCOPY (NIRS) PREDICT SURVIVAL AFTER MILD THERAPEUTIC HYPOTHERMIA

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Background: The American Heart Association Guidelines (2005) advice hypothermia in children after resuscitation for 12–24 h, and is extrapolated from studies in newborns and adults. Nowadays NIRS is increasingly used as tool to monitor oxygen delivery to the brain in critically ill PICU patients.

Aim: To evaluate the predictive value of NIRS for survival.

Methods: Directly following resuscitation we induced a rectal temperature of 32 to 34°C for at least 24 h, followed by rewarming +0.5°C/2 h, using standardized protocols for sedation and analgesia (midazolam and morphine). Prospective, longitudinal data was gathered using real-time regional oxygenation (rSO₂) with NIRS (INVOS 5100C, Somanetics). We compared change in rSO₂ during rewarming between survivors and non-survivors.

Results: 15 Patients were included. Five patients arrested due to hypoxia, 3 primary cardiac arrests, and 7 near-drownings. Median age was 47 months (range 2.5–135 months). In the survivors group (n = 7) data were lacking in 1, so we evaluated 6 survivors and 8 non-survivors. At start of rewarming no significant difference was found between the rSO₂ values of survivors and non-survivors (resp. 62.8 (IQR 23.1) and 57.3% (IQR 38.3), p = 0.74). Whereas at normothermia survivors had a significant higher rSO₂ than non-survivors (resp. 80 (IQR 22.8) and 46% (IQR 15.3), p = 0.02). rSO₂ was positively correlated with rewarming in survivors (R = 0.178, p = 0.006), but not in non-survivor (R = 0.003, p = 0.51).

Conclusions: The absence of a rise in rSO₂ during rewarming is associated with non-survival. NIRS is a valid bedside tool for survival prediction after resuscitation and therapeutic hypothermia.

178 – ORAL PRESENTATION

INCIDENCE OF RAISED INTRACRANIAL PRESSURE IN CHILDREN <2 YEARS ADMITTED FOR SEVERE BRAIN INJURY

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Objective: To report the incidence of raised intracranial pressure (ICP) in children <2 years with severe brain injury; to identify factor associated with ICP monitoring.

Methods: Retrospective study including children <2 years admitted for traumatic brain injury (TBI), meningitis or stroke, between March 2008 and February 2011. Characteristics and outcome of children

with and without ICP monitoring, and children with or without raised ICP, were compared.

Results: From 118 children <2 years included, 30 were monitored for ICP (25.4%) and 24 of them had raised ICP. Children with ICP monitoring were younger than those who were not monitored. Children monitored presented more likely with clinical signs of raised ICP (tense fontanel, altered level of consciousness or behavioural disorder) and with signs of cerebral herniation. Only cerebral herniation signs were significantly associated with raised ICP. The cerebral CTscan at admission did not differed significantly between groups. Twenty percent of not-monitored infants (n = 18) received ICP targeted therapy. The outcome, using POPC scale, was better in the non monitored group (p < 0.01). Mortality rate was 3.4% in the non-monitored group compared to 13.3% in the monitored group (p < 0.01). Mild haemorrhagic complication occurred in two children with ICP monitoring, not requiring intervention.

Conclusion: Young children are not protected from raised ICP. The predictive values of clinical signs and cerebral CT scan for raised ICP are insufficient excepted signs of cerebral herniation. ICP monitoring is feasible and justified in children <2 years.

179 – POSTER PRESENTATION

OPTIC NERVE SHEATH DIAMETER MEASURED PAR ULTRASONOGRAPHY AS PREDICTOR OF RAISED INTRACRANIAL PRESSURE IN CHILDREN

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Introduction: Clinical diagnosis of raised intracranial pressure (ICP) is difficult in children. The objective of this study was to test the predictive value of the optic nerve sheath diameter (ONSD) compared to the gold standard for ICP measurement.

Methods: All children with ICP monitoring during 2010 were included in this retrospective study. A positive test was defined as an ICP >15 mmHg for infants, and >20 for children >2 years. The diagnosis performance of the ONSD measure was tested and a ROC curve analysis was performed. The ONSD was measured by ultrasonography using a 7.5 MHz probe, at 3 mm behind the ocular globe. Correlation between ONSD and ICP was studied.

Results: In 2010, 33 children were monitored for ICP. Among them, 16 had severe traumatic brain injury, and 10 had central nervous system infection (7 other causes). The raised ICP prevalence was 70%. Eight children required neurosurgery before ICP monitoring and were excluded from analysis. ONSD measures were available in 12 children. The area under the curve of the ROC curve for ONSD was 0.83 (p = 0.01). The best threshold for ONSD was 5.05 mm, with a sensitivity of 100% and a positive predictive value of 77.8%. We found a relatively good correlation between ONSD and open ICP values: r = 0.63 (p < 0.05).

Conclusions: ONSD measured by ultrasonography may help to predict raised ICP in children. Its predictive value should be better assessed by a prospective study.

180 – POSTER PRESENTATION

INDUCED MILD HYPOTHERMIA IN CHILDREN AFTER BRAIN INJURY

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Objective: The main goal of treatment after traumatic or post-anoxic brain injury is the prevention of secondary brain injury. Mild hypothermia (33–34°C) may improve outcomes in these patients. Aim of the study was to evaluate patient's condition after traumatic or post-anoxic brain injury treated using mild induced hypothermia on admission and at discharge.

Methods: Study included 40 children (mean age 10.2 ± 1.0 years) after traumatic or post-hypoxic brain injury treated using mild induced hypothermia. GCS (Glasgow Coma Scale) and PIM2 (Pediatric Index of Mortality2) were measured on admission. Patients were divided in two groups according to the type of brain injury. Outcomes using GOS (Glasgow Outcome Scale), PICU hospitalisation and ventilation length were compared in both groups.

Results: 29 (72.5%) patients after severe head trauma, 11 (27.5%) patients with post-anoxic brain injury were included. Average GCS in patients after severe head trauma was 6.07 ± 0.4 points, average PIM2 in these patients was 6.0 ± 0.4 . Average GCS in patients with post-anoxic brain injury was 5.6 ± 0.7 points; ($p > 0.05$), average PIM2 in these patients was 30.6 ± 9.4 ; ($p < 0.05$). There were no differences in protocol starting time and reaching goal temperature time. The duration of cooling protocol was longer in trauma group: 54.3 ± 3.3 vs. 31.8 ± 3.1 h ($p < 0.05$). Average GOS in patients after severe head trauma was 3.6 ± 0.9 points, in patients with post-anoxic brain injury 5 ± 0 points, ($p < 0.05$). Traumatic brain injury group had longer ventilation and PICU hospitalisation time.

Conclusions: Mild hypothermia is a safe method for treating brain injury and can result in favorable outcomes.

181 – POSTER PRESENTATION

IS OUR WARD NOISE FREE? A STUDY ON SOUND LEVELS IN INTENSIVE CARE AND EMERGENCY WARDS

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Introduction: Technology development has increased sound level beyond standards in hospitals. Such pollution undoubtedly has negative effects on staff health and quality of care accordingly. Our goal with this study carried out to investigate noise levels in intensive care and emergency wards.

Materials & methods: This study was performed on measuring of sound level of 10 intensive care and emergency wards of Imam Reza Hospital in a 30-min-interval of AM working shift by a EXTECH (M-407727) Device at one meter distance from nursing stations getting maximum sound level (Lmax) and Average Sound Level (Leq).

Results: Lmax in most wards were between 85 and 86 dB. Leq in all wards were between 60.2 dB. Average Leq in emergency wards was

62.2 dB without any justification. In most of wards peak of noise were between 9:30 and 11 AM.

Leq in all wards were more exceeded the standards levels.

Conclusion: The average of sound levels in our wards remarkably exceeds the standards levels.

182 – POSTER PRESENTATION

COMPARISON OF THE EFFECTS CONVENTIONAL CARE AND KMC CARE IN LOW BIRTH WEIGHT NEONATES IN INTENSIVE CARE UNIT -IRAN-TEHRAN 2009-2010

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Background: Every year about 20 million low birth weight infants born in the world. Kmc is identified as alternative methods of care that can help to reduce risks and threats in hospitalized preterm neonates.

Methods: This study was a semi-experimental clinical trial in which a researcher examine effects of independent variables (kmc care, Incubator care) on the dependent variables (body temperature, weight gain, exclusive breastfeeding, physiological measures) in 130 low birth weight infants admitted to neonatal intensive care in Tehran Mahdiah hospital (2009-2010).

Results: In this study the presence of the mother in the hospital, has increased. We didn't find any variable difference (gestational age, Apgar score, weight and height at birth, in stability time and at discharge time) between two study groups. Duration of antibiotic using, patent ductus arteriosus, sepsis, apnea and death increased in incubator group and these differences were significant. Exclusive Breastfeeding was better and earlier in kmc group. Satisfactory research showed that personnel and parents were satisfied from kmc care.

Conclusion: In this study showed that kmc care reduce mortality, develop exclusive breastfeeding, cause better emotional relation between parents and neonates, reduce sepsis, decreased patent ductus arteriosus and reduce duration of antibiotic using. In kmc group parental and personnel satisfaction is more than incubator care group. Since the success of kmc implementation and follow-up for the proper function and protection of mothers related to doctors and personnel knowledge and experience, the importance and necessity of training courses in this respect is obvious.

183 – POSTER PRESENTATION

COOLED IN CORNWALL: EXPERIENCES AND OUTCOME

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Background: Hypoxic Ischaemic Encephalopathy (HIE) is a major cause of morbidity. Recent multicenter randomised trials have shown the benefit of moderate total body hypothermia on neurodevelopmental outcome. Our aim is to show that neonatal cooling is a safe treatment in a Level 2 NICU.

Methods: Records of 20 newborns with HIE grade 2 and 3 who underwent total body hypothermia were reviewed. All infants were cooled using the Tecotherm mattress and were enrolled in the TOBY register. Data were collected to compare practice with TOBY standards and outcomes.

Results:

Gestation (weeks): 35–42
Birthweight (g): 1785–4365
Mode of delivery: Caesarean 7
Instrumental 7
Vaginal 6
Apgar at 10 min: 0–7
Cord gas: pH 6.69–7.08
BE 7.3–24.6
HIE-Score: 10–20
aEEG abnormalities: Severe 14
Moderate 6
Initial temperature (°C): 28.0–37.0
Tmin (°C): 30.5–33.1
Tmax (°C): 33.8–35.7
Co-morbidities: Seizures 20
Hypotension 11
Coagulopathy 12
Sepsis 3
Respiratory support 19

Cooling criteria as per TOBY protocol were met in 19 infants. One infant born at 35 weeks was cooled in liaison with the tertiary centre. One infant was transferred to the tertiary centre being passively cooled.

All infants had cranial ultrasound scanning in the first days of life and all surviving infants had MRI scans between day 6 and 11. In our cohort 6 infants died.

Conclusions: There is controversy regarding where infants requiring therapeutic hypothermia should be treated. Our data compare to the TOBY trial data and suggest that it is safe to cool infants with HIE in Level 2 neonatal units.

184 – POSTER PRESENTATION

AZATHIOPRINE AND ASPIRIN IN CHILDHOOD PRIMARY ARTERIAL STROKE

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Result: 68 children with cAIS (boys 62%, girls 38%) with mean age of 8.5 years (median age 7.4 ± 3.5 years), were enrolled in this study. Motor deficit (70%); headache (64%) and fever (20%) were the commonest symptoms, whereas, hemiparesis (60%); seizure 55% (focal 35%, generalized 20%); and decreased conscious level (30%), were the commonest neurological findings. Neuroradiological findings of head revealed; ischemic strokes 50 (73.5%); hemorrhagic strokes 10 (14.7%) and ischaemic- haemorrhagic lesions 8 (11.8%). Conventional angiography and/or MRA revealed that at the time of admission 51 (51/68, 75%) of the cohort had non-progressive (obliterative) and 17 (17/68, 25%) had evidence of progressive arteriopathy. No secondary hemorrhagic was documented among infarcts strokes, which were treated with heparin and anticoagulants. Hospital outcome was as; survivors 56 (81.5%) and deaths 12 (18.5%). 40 patients discharged on long term oral aspirin, and 14 children of these

were commenced also on Azathioprine and are on follow-up. Male sex, deep conscious level and intra cerebral bleed causing severe raised intracranial pressure were the poor prognostic factor. The Neurological findings among 56 survivors were; normal 20%; minor disabilities 25%; moderate disabilities 20% and severe disabilities 35%.

185 – POSTER PRESENTATION

COMPARISON OF NIRS TECHNIC WITH TRANS-CRANIAL DOPPLER TO EVALUATE CEREBRAL BLOOD FLOW IN PEDIATRIC CRITICAL CARE

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Objective: To evaluate the correlation between the measurements of regional cerebral SO_2 (crSO_2) using Near InfraRed Spectrometry technic (NIRS) and transcranial Doppler values to monitor cerebral blood flow in children.

Material and method: We included 8 consecutive children referred to our paediatric intensive care unit with no contraindication for any of each technic.

We proceeded to 58 measures of crSO_2 using NIRS (INVOS[®] System, Somanetics[®] Corporation, Troy, Michigan) and cerebral Doppler parameters [maximal Velocity (V_{max}), minimal Velocity (V_{min}), Resistivity index (IR) and Pulsatility Index (IP)] using SonoSite M-Turbo[®] Sonosite[®] Inc, Bothell Washington USA, measured on the cerebral anterior artery through the transfontanelar window. Blood pressure, SpO_2 and heart rate were recorded at the same time. We calculated oxygen extraction index (EO_2) and the correlation indexes between crSO_2 , EO_2 and each of the Doppler parameters.

Results: Correlation indexes between crSO_2 , V_{max} , IP and IR were small (0.21, -0.15 and -0.20) and were not statistically different from 0 ($p = 0.05$). But there was a statistical correlation between calculated EO_2 and V_{max} and between EO_2 and IR (-0.33 and 0.30 , $p = 0.05$).

Conclusion: crSO_2 measured using NIRS technic is not correlated to V_{min} , V_{max} and IR and should be used with caution as a non invasive continuous monitoring of cerebral blood flow in paediatric critical care. However, there is a correlation between EO_2 and Doppler parameters that should be studied and developed as a monitoring tool in the future.

186 – POSTER PRESENTATION

LIVER FUNCTION IN HYPOXIC ISCHAEMIC ENCEPHALOPATHY AND EFFECT OF THERAPEUTIC HYPOTHERMIA

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Objectives: Hypoxic-ischaemic encephalopathy (HIE) is associated with hepatic dysfunction as evidenced by raised alanine transaminase (ALT). Our aim was to assess biochemical liver function in neonates with HIE and the possible effects of whole-body therapeutic hypothermia on liver function.

Methods: Retrospective study of 71 neonates admitted to our tertiary-level NICU with HIE in the 5-year period 2006–2011. Serum ALT concentrations measured on postnatal days 1, 3 and 7 were compared with the contemporaneous clinical grading of HIE (Sarnat–Sarnat classification), and according to the provision of whole-body therapeutic hypothermia.

Results: Median (range) ALT concentrations at baseline (day 1) according to clinical severity of HIE were: Grade 1 HIE, 29 U/L (7–312 U/L); Grade 2 HIE, 46 U/L (6–569 U/L); Grade 3 HIE, 148 U/L (9–1620 U/L), $p = 0.003$. Overall, ALT concentrations on day 1 (baseline) and on day 7 were similar in cooled and control infants, but were significant lower on day 3 in cooled infants (Table).

ALT concentrations in infants with HIE

ALT U/L	Control infants (n = 24)	Cooled infants (n = 47)	P-value Mann–whitney U test
Day 1 median (range)	141 (6–671)	61 (7–1620)	$p = 0.14$
Day 3 median (range)	180 (6–750)	58 (11–761)	$p = 0.029$
Day 7 median (range)	98 (6–335)	47 (7–140)	$p = 0.09$

Conclusion: In asphyxiated neonates, day 1 ALT concentrations are significantly higher with increasing clinical severity of HIE. These data suggest that whole-body therapeutic hypothermia is hepatoprotective.

187 – POSTER PRESENTATION

THE OUTCOME OF ROAD TRAFFIC ACCIDENTS INVOLVING CHILDREN IN GREECE. (COMPARATIVE STUDY BETWEEN THE LAST TWO DECADES)

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Road traffic accidents (RTAs) remain a worldwide epidemic disease, despite the reduction of mortality rate and the improvement of outcome that is observed the last years, especially in countries with advanced health systems.

The present retrospective study describes and compares the epidemiology of RTAs in children who were admitted in PICU with severe trauma during periods 1991–2000, compared to period 2001–2010.

Results: The percentage of RTAs to the total of the accidents remains the same, (46.2% vs. 46%), in both decades. During the last decade it has been observed:

- Small reduction of the proportion of RTAs to the total of admissions (7.35% vs. 9%),
- Reduction of the number of children involved as passengers (41.3% vs. 60.5%),
- Increase of the number of RTAs with children, involved as cyclists/motorcyclists (12.6% vs. 28.3%),
- Mild increase of the RTAs mortality rate (15% vs. 13%),
- Improvement of cure rate (65% vs. 61%),
- Increase of improvement of neurological sequelae (26% vs. 20%).
- Head trauma is still the main injury which determines the final outcome and prognosis.

Conclusion: The RTAs remain a serious problem of public health despite the awareness campaigns for the public.

More efforts need to be done on educating people for prevention, further institutionalizing, improving prehospital care, transportation to medical centers and final therapy (development of neuromonitoring and neuroprotection standard methods in PICU and palliative care.) and encouraging doctors to get trained in the management of trauma.

188 – POSTER PRESENTATION

CORRELATION BETWEEN CORD BLOOD IL-6 & THE SEVERITY AND OUTCOME OF HYPOXIC ISCHEMIC ENCEPHALOPATHY IN ASPHYXIATED NONINFECTED FULLTERM NEONATES

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Sixty fullterm neonates with manifestations of perinatal asphyxia were included in the present study. Infected neonates were excluded. They were divided into three groups according to Sarnat & Sarnat classification, 20 for each. In addition a control group of 30 healthy neonates with no history or manifestations of infection or asphyxia were included in the study. IL-6 was measured in the cord blood of both the noninfected asphyxiated group & the control group. Results showed the following:

- Male neonates were more vulnerable to HIE than female neonates as a result of perinatal asphyxia.
- No significant statistical difference between the three hypoxic groups as regard weight gender & mode of delivery.
- There was highly significant statistical difference between those with perinatal asphyxia & the control group as regard cord blood IL-6 levels.
- Cord blood IL-6 levels had high significant statistical correlation with the severity of neonatal encephalopathy that developed, with higher median levels in severe HIE than those with moderate HIE & both were higher than those with mild HIE & control groups.
- Cord blood IL-6 had statistical significant correlation with delayed development at 12 months follow up of the survived cases.

Conclusion: Cord blood IL-6 is correlated with the clinical presentation & severity of HIE, & it correlates with poor neurodevelopmental outcome at 12 months of age.

189 – POSTER PRESENTATION

A MODIFIABLE DESCRIPTIVE CLASSIFICATION SYSTEM FOR ENCEPHALOPATHIC/NEUROTOXIC ACUTE CHILDHOOD POISONINGS WITH REMARKS FOR COMMONLY OCCURRING CONTEMPORANEOUS CONFOUNDING FACTORS

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Background/purpose: Syncope, hypoglycaemias, haemorrhage, hyperglycaemia, ketosis, seizures, hyperpyrexias, hyperthermia, tachypnoeas were shared/overlapping features between poisonings/infective encephalopathies/acute/cryptogenic hepatic failures/inborn

errors of metabolisms/DKA/HHS/pulmonary oedemas. Specific antidotes, expert advice, toxicological assays may not always be rapidly achievable/reliable, because absorbed circulating poisons were rapidly cleared, and occasionally in older children ingestions of multiple psychotropics were common. In high concentrations, intracellular poisons disrupt mitochondrial functions causing cellular death/multiorgan dysfunction/failures, especially hepatic dysfunctions mimicking infective hepatitis/Reyes syndrome. Instances where multiple aetiological factors including acute poisonings co-exists in cryptogenic encephalopathies were on record. A proximate aetiological diagnosis will be beneficial from the context of nosology, logistics planning, proffering deterrent options/directing invasive instrumentations such as RRTs (HP/HF)/ECMO) etc.

Methodology: On the basis of the historical, clinico-patho-radiological certainty/confidence with which the diagnosis of poisoning related neurotoxicities/encephalopathies were achieved, the cases were classified systematically into subsets using a pragmatic modifiable descriptive classification system. The putative poisonous agents were itemized/annotated, the neurotoxidromes, the seizure patterns/other neurological aspects of poisonings were reviewed. Relevant grey literature were examined. Limitations of the plausible interventions/deterrent options were discussed.

Results: 181 cases of putative acute poisonings were examined, 91 were historically/clinically undoubtful, but laboratory/toxicological back up/definite infective antecedent were lacking, and as such were considered probable cases, presenting with features suggestive of miscellaneous subsets of neurotoxicities/neurotoxidromes, ranging from hyperpyrexias ($n = 49$), stupor ($n = 28$), somnolence ($n = 26$), drowsiness ($n = 20$), deeply comatose ($n = 17$), prostration ($n = 15$), dizziness ($n = 13$), dystonic reactions ($n = 11$), cephalgias ($n = 9$), nystagmus/oculogyric crisis ($n = 7$), hypothermia ($n = 6$), convulsive seizures ($n = 7$), mostly GTC/automaticities/coincidental systemic features. Pharmaceuticals meant for adult relatives, domestic/agrarian products were implicated most. In ($n = 17$), poisoning events were indeterminate/presumptive or co-incidental/incidental with trauma/infections/etc. Other remarkable features were contemporaneous antipsychotics ingestions in three sibs, aneuploidy ($n = 1$), maternal epilepsy ($n = 2$), unexpected sibling deaths ($n = 5$).

Conclusions/importance: When ever neurological features were inconsistent/non-specific, acute poisonings should be considered/excluded, especially in the younger aged, where reliable histories could be unachievable. However, occasionally, basic evaluations/interventions may suffice. For these aetiologically ambiguous subsets, their evaluations/interventions may need to be more inclusive.

190 – POSTER PRESENTATION

PREVALENCE OF VISUAL DISTURBANCES IN CHILDREN WITH SPASTIC CEREBRAL PALSY

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Background and aims: Cerebral palsies (CP) represent a group of neurological disorders characterized by nonprogressive motility and posture disorders which can be associated with a number of comorbidities, the consequence of pre-, peri or postnatal acquired brain

injury. Evaluation of visual impairment associated with cerebral palsy in relation to clinical forms and severity of mental retardation.

Methods: 78 children with CP were included, ages between 24 and 208 months (median 72 months), having pyramidal syndrome, being hospitalized during 01/01 to 12/31/2009. Each patient had a record of data which included history, general and neurological examination, laboratory investigations, eye examination, audiometry, EEG, psychological evaluation.

Results: The prevalence of visual impairment in children with CP was 57.7%. The association between visual acuity disturbances and spastic tetraplegia or mixed CP, was statistically significant compared with hemiplegia ($p < 0.002$) or spastic diplegia ($p < 0.02$). Rates of visual impairment severity was directly proportional to the severity of motor deficit and mental retardation. Blindness has been identified in different percentages (23.7% spastic quadriplegia, mixed 40% CP). In most cases, blindness was associated with severe mental retardation. 13.2% of those with spastic quadriplegia associated optic atrophy. 29.6% of children with spastic diplegia developed strabismus.

Conclusions: Visual disturbances are a commonly associated with spastic cerebral palsy. Their complexity is correlated with the severity of underlying brain damage. The existence of visual disturbances adversely influence the response to rehabilitation therapy and the patient's insertion into society by default.

191 – ORAL PRESENTATION

ELECTRO-ENCEPHALOGRAPHY CORRELATION WITH OUTCOME IN CHILDREN FOLLOWING OUT-OF-HOSPITAL CARDIAC ARREST

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Background: Electro-encephalography (EEG) is used to provide objective information on cerebral function following cardiac arrest (CA) and as a prognosticator¹.

Aim:

- To investigate the correlation of EEG following out-of-hospital cardiac arrest (OOHCA) in children and outcome.

Methods:

Inclusion criteria:

- All children >36 weeks gestation and ≤ 18 years, following OOHCA.
- Admitted to PICU/NICU/CICU at Great Ormond Street Hospital between 1st January 2001 and 31st December 2010.

Data collected retrospectively.

Results:

47 children fulfilled the inclusion criteria.

18 (38.3%) survived to ICU discharge and 29 (61.7%) died. 15 had either no electrical activity or severe cortical dysfunction on EEG in the first 24 h after CA, of which 13 (87%) died.

8 had mild-to-moderate cortical dysfunction, from which 4 (50%) progressed to either moderate or severe dysfunction.

Of those that died, 23 (79.3%) had intensive care withdrawn. The EEG findings assisted in this decision in 12 as implied by the timing of withdrawal of intensive care (52.1%).

Conclusions: Poor prognosis with isoelectric or severe cortical dysfunction on EEG after CA was in line with published literature¹. Progression to severe dysfunction after the first 24 h may help with prognostication. Withdrawal of intensive care is a holistic decision, but EEG may add to the clinical information and enable an informed decision making.

References:

1. Nishisaki A, Sullivan J 3rd, Steger B, et al (2007) Retrospective analysis of the prognostic value of electroencephalography patterns obtained in pediatric in-hospital cardiac arrest survivors during 3 years. *Pediatr Crit Care Med* 8:10–17.

192 – ORAL PRESENTATION

THERAPEUTIC HYPOTHERMIA GUIDANCE BY CEREBRAL PERFUSION CONTROL BY DOPPLERULTRASOUND AFTER CPR IN CHILDREN

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Objectives: Despite hypothermia treatment (12–24 h) survival after cardiopulmonary arrest (CA) is poor in children compared to adults particularly depending on the number out-of-hospital/in-hospital CPR (7–53%). We observed cerebral hyperperfusion in children with adverse outcome after 24 h hypothermia post CA during the re-warming by transcranial Doppler-Ultrasound (DU). We interpreted this as reperfusion injury after too early and fast re-warming which might be avoidable by Dopplerultrasound guidance.

Methods: Intention-to-treat protocol: Inclusion criteria: Children with CA in- and out-of-hospital, aged 4 weeks–18 years; lactate ≥ 100 mg/dl, CPR ≥ 10 min; given parental consent. Treatment with hypothermia 32–34° C for 48 h after CPR and re-warming by 0.5°C/6 h under DU steering. If vascular Resistive Index (RI) decreased below 0.6 re-warming was reversed or at RI 0.6–0.65 re-warming was withheld for 24 h and was re-started after 24 h. No fever is allowed for 7 days following hypothermia. We looked for the outcome (survival, GOS at discharge + 6 month) and possible side-effects (bleeding, cardiac arrhythmias, coagulation disturbances, platelet count, infections).

Results: 15 children are included so far. Median for: ROSC 25 (10–120) min, PRISM and PIM Score >90%, and lactate 159 mg/dl. Median Hypothermia-time 147 (65–212 h). In 12 children re-warming was withheld for 24 h in 8 re-warming was reversed. We saw no severe adverse effects. 12/15 (80%) patients survived, 9/12/15 (75%/60%) survived without neurological residuals after 6 month.

Conclusions: Our results suggest that hypothermia and re-warming steered by DU might be a safe and lifesaving treatment after CPR.

193 – POSTER PRESENTATION

AEEG AS A EARLY PREDICTOR OF BRAIN DAMAGE IN PRETERM INFANT

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Background and aims: Predicting brain damage in preterm infants has always been a challenge in NICU all over the world. Ultrasonography only detects major lesions and MRI is difficult to obtain in several Units. In this study our purpose is to verify if background electrical activity at aEEG can predict brain damage in preterm infant.

Methods: 27 preterm babies between 26 and 30 weeks of gestational age was investigated for electrical activity during the first 24 h of life with aEEG. The averaged signals were analysed off-line. Background activity was classified into three patterns categories: discontinuous low-voltage pattern (minimal amplitude <3 μ V), discontinuous high voltage pattern (minimal amplitude between 3 and 5 μ V) and continuous pattern.

Results: Results of 27 babies 5 had discontinuous low-voltage pattern, 22 had discontinuous high voltage and continuous pattern. Among the five babies with unfavorable pattern 3 showed grade 4 IVH and one multiple subcortical PLV at 40 weeks of postmenstrual age. The other 22 showed normal cerebral USG or minor abnormality.

Conclusions: Discontinuous low voltage pattern at aEEG in preterm babies could be expression of severe brain damage and/or altered maturation. The positive predicting value of aEEG for detecting brain damage was 80% in this range of gestational age.

194 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

DISTRIBUTION OF BRAIN INJURY ON MRI CORRELATES WITH ELEVATED SERUM TROPONIN-T LEVELS IN INFANTS WITH NEONATAL ENCEPHALOPATHY

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Introduction: Troponin-T is a sensitive marker of asphyxia in term infants and indicative of the myocardial injury sustained during a hypoxic-ischaemic insult perinatally. The clinical severity of neonatal encephalopathy (NE) has been previously correlated with elevated Troponin-T.

Aims: To examine the relationship between Troponin-T and the distribution of brain injury on MRI in infants with NE.

Methods: Serum Troponin-T was sampled in infants with NE in a tertiary level NICU from 07/06 to 12/07. MRI brain scans were performed (day 5-10) and were retrospectively scored according to the Barkovich System of scoring MRI brain abnormalities in term infants with perinatal asphyxia. The distribution of the abnormalities were compared to the maximum serum Troponin-T level of each infant.

Results: 19 infants with NE were included. Elevated Troponin-T levels correlated significantly with abnormalities in the watershed (W) distribution but not in the basal ganglia (BG) or combined basal ganglia/watershed (BG/W) distribution ($p = 0.045$).

Relationship between elevated Troponin T and MRIs

	BG score		W score		BG/W score	
Result	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
n	14	5	10	9	6	13
lnTroponin Mean (ng/ml)	-2.2398	-1.4492	-1.5983	-2.5134	-1.8399	-2.1203
p-value	0.137		0.045		0.588	

Conclusions: A significant association was found between elevated Troponin-T and abnormalities in the watershed distribution on MRI scan. Infants with brain injury on MRI following perinatal asphyxia who have elevated troponin may have a definitive pattern of brain injury but further study with a larger sample size is required to confirm this hypothesis.

Medical Topic 13 - Metabolism and endocrinology (195–213)

195 – POSTER PRESENTATION

CO-EXISTING ISOLATED LEVOCARDIA WITH SITUS INVERSUS ABDOMINUS AND PITUITARY HYPOPLASIA

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Isolated levocardia (IL) is a situs anomaly, characterized by a left-sided heart associated with visceral heterotaxy. It is an extremely rare condition commonly associated with cardiac and splenic defects. IL has also been found unexpectedly in surgical cases, for instance, bowel obstruction or volvulus. However, none of the association between IL and pituitary dysfunction has been reported in the literature. We present a case of pituitary hypoplasia with panhypopituitarism (a midline abnormality), in association with situs inversus abdominus (a laterality defect), patent ductus arteriosus (PDA) and intestinal malrotation.

A female newborn was referred to our hospital for situs inversus abdominus diagnosed by prenatal ultrasound. Further radiologic

studies showed isolated levocardia with situs inversus abdominus, polysplenia, and PDA with heart failure. After she was treated with clip ligation for PDA, she got a Ladd's operation and duodenoduodenostomy for intestinal malrotation with duodenal obstruction. After she discharged from our neonatal intensive care unit, despite of her well-tolerated feeding and normal neurodevelopment, her growth was retarded severely. Even though her neonatal screening test was normal, thyroid function test showed the congenital hypothyroidism of central origin. Pituitary MRI showed hypoplasia of anterior pituitary gland and combined pituitary hormone provocation test was revealed as multiple pituitary hormone deficiency. She started levothyroxine and hydrocortisone therapy but her catch-up growth was not achieved. At 24 months of age, the recombinant human growth hormone therapy was planned to improve her growth.

196 – POSTER PRESENTATION

LEVELS OF METHAEMOGLOBINAEMIA

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Objectives: The admission of a 6 week old infant with a methaemoglobin >40% caused the demand for the frequency of pathological values (>1.5%) in recent years.

Methods: Retrieval of all methaemoglobin results (Radiometer ABL 835) in our laboratory software in the years 2008-2010.

Results: In 2008 2.02% (188 of 9309) were >1.5%, in 2009 2.60% (249 of 9562), and in 2010 5.65% (551 of 9746); altogether 3.45% (988 of 28617 in 2008-2010). The results were divided in 15 age groups, most values >1.5% were in the age groups between 14 days and 6 months.

The percentile p 97.5 for each age group was calculated and increased on average by 0.1 to 0.2% over the years.

N	0-24 h	1-3 d	4-7 d	8-14 d	15-30 d	1-3 m	3-6 m	6-12 m	1-2 a	2-4 a	4-6 a	6-12 a	12-15 a	15-18 a
2008	463	1,797	1,300	959	831	979	406	368	472	459	211	512	255	209
2009	399	1,507	1,230	893	967	1,560	646	384	378	378	201	454	273	274
2010	408	1,672	1,574	863	851	1,262	550	431	442	415	207	398	312	339

Results per age group

MetHb percentiles p97.5

Conclusions: There is a need to control (reference) values and influences on these. Causes of increasing MetHb values are still

unclear. The quality data of both blood gas analyzers showed no trend.

197 – POSTER PRESENTATION

THE HIDDEN DANGERS OF CONSUMING HIGH ENERGY GLUCOSE DRINKS IN PREGNANCY. WE PRESENT CASES OF ASSOCIATED NEONATAL HYPERINSULINAEMIA

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Objectives: We present two recent cases of severe neonatal hypoglycaemia requiring high concentration intravenous dextrose infusions which were associated with significant maternal intake of high energy glucose drinks in pregnancy. The aim of presenting these cases is to highlight the problem to neonatologists and to educate health professionals giving dietary advice to expectant mothers to avoid high intake of glucose rich drinks

Method: Literature search revealed high energy drinks are often encouraged as a calorie source in pregnancy. Similar cases have been reported. Few papers exist demonstrating potentially harmful side effects for the newborn

Results:

Case 1. Blood glucose of 0.1 mmol/l dependent on 12.5% dextrose IV to maintain normoglycemia. Mother drank 2 litres cocacola daily. Case 2. blood glucose 0.2 mmol/l unresponsive to feed or IV 10% dextrose bolus. Mother drank 1 litre cherryade daily. Both were term infants, both under 3.2 kg birth weight. Serum screening demonstrated hyperinsulinemia, raised cortisol and C Peptide levels with persistent serum glucose levels below 1 mmol/l which were resistant to corrective mechanisms. The mothers were not diagnosed with gestational diabetes which reduced anticipation of hypoglycaemia risks to their infants

Conclusion: The long term effect of early extreme hypoglycaemic episodes carries marked morbidity as damage can occur to the neonatal brain deprived of glucose. As the trend for using high energy drinks increases so does the associated risk to newborns which obstetric and neonatal teams should be aware of.

Reference:

1. West N, Thorpe M (2009) Neonatal hyperinsulinism secondary to maternal intake of high-sugar drinks. ESPNIC Annual congress 20, Verona p 84 A.

198 – POSTER PRESENTATION

HYPERGLYCEMIA IN CHILDREN WITH SEVERE ACUTE ASTHMA: IS THERE A PLACE FOR INSULIN THERAPY?

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Objectives: To assess the effect of administration of intravenous (IV) insulin on the use of IV salbutamol and length of stay in a pediatric

intensive care unit (PICU) in children with severe acute asthma and hyperglycemia.

Study design: Retrospective study.

Setting: PICU of a tertiary care university hospital.

Patients: 163 children with severe acute asthma requiring IV salbutamol, admitted between 1994 and 2010.

Measurements and results: In 2006 a protocol for treating hyperglycemia was initiated in our PICU, incorporating the administration of IV insulin in children with glycemia levels >8 mmol/L. Children admitted before and after 2006 did not differ significantly regarding severity of illness, nor were there changes in the treatment protocol of asthma.

The cumulative dose of IV salbutamol, duration of IV salbutamol administration and length of stay did not differ significantly when comparing children admitted between 1994–2005 (n = 95) and 2006–2010 (n = 68).

Significantly higher cumulative dose of IV salbutamol was found in hyperglycemic children treated with IV insulin (n = 41) compared with hyperglycemic children not treated (n = 63) (P = 0.008, adjusted for PRISM P = 0.022). However, the maximum glycemia level was also significantly higher in the treated group (P < 0.001). No differences were found in duration of IV salbutamol administration and length of stay in PICU.

Conclusions: The use of IV insulin in children with severe acute asthma and hyperglycemia does not decrease the use of IV salbutamol or length of stay. Since this protocol is labour-intensive and has a possible risk of hypoglycemia, withdrawal of this protocol should be considered.

199 – POSTER PRESENTATION

MANAGEMENT OF HYPOGLYCAEMIA IN NEWBORN IS STILL AN ENIGMA: A NATIONAL SURVEY

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Introduction: In spite of national guidelines (NICE) for the management of hypoglycaemia, inconsistencies exist regarding optimum blood glucose concentrations, investigations and method of point of care testing (POCT).

Method: A telephone survey across the country to look at the management of hypoglycaemia in newborn babies and POCT used. We contacted 59 Hospitals, 14 units were level 1, 26 level 2 and 20 level 3 units

Results: All units had their own guidelines. 14/59 [23%] hospital had different threshold of intervention depending on symptoms of the baby. Of this 13 units used <2 mmol/l if asymptomatic and <2.6 if symptomatic. One used <2.6 mmol/l if asymptomatic and <3.0 if symptomatic. 45 [77%] units used same threshold irrespective of their symptoms. 9 units used <2, 33 units used <2.6 and 3 units used 2.9 mmol/l. 50 [84%] hospitals had same threshold for babies of Insulin dependant diabetic mother. 8 units had lower threshold to intervene, i.e. <2.5 mmol/l for this group and <2 for the rest. One hospital had higher threshold i.e. <2 for this group and <2.6 mmol/l for the rest. There was variation in the POCT, blood gas analyser was used in 17/59 (29%), yellow springs analysers in 7/59 (12%) hemocue were used in 4/59 (7%) and the rest 59% used varying glucometers.

Conclusion: There is an urgent need for consensus on POCT of glucose and large prospective studies. It is worrying that operational thresholds still vary among units, establishing network guidelines will be a step forward in this regard.

200 – POSTER PRESENTATION

HYPERGLYCEMIA COULD POTENT ARDS IN CRITICALLY ILL CHILDREN

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Objectives: ARDS belongs to the main risk factors increasing mortality of critically ill children. Various factors trigger surfactant damage and ARDS development. Localization of non-insulin dependent glucose transporters in respiratory epithelium could by acute hyperglycemia cause cellular glucose overload with activation of inflammatory markers and trigger ARDS. The aim of this study was to compare glucose parameters in critically ill children with or without ARDS.

Methods: In prospective clinical study 122 patients (median age 6.0 years) admitted to PICU fulfilled inclusion criteria, diabetic children were excluded. The mortality was 18.8%. Blood glucose (BG) was measured in 3 h period. No insulin therapy was used. Subjects were divided in primary ARDS, secondary ARDS, no ARDS group.

Results: BG over 110 mg/dl was in 89.9% patients. No differences were presented in prevalence of hyperglycemia between studied groups. Peak BG ($p < 0.001$, resp. $p < 0.01$), intensity of hyperglycemia ($p < 0.001$, resp. $p < 0.01$) and hyperglycemic index ($p < 0.001$, resp. $p < 0.001$) were significantly higher in children with primary resp. secondary ARDS in comparison with no ARDS. There was no significant difference between primary or secondary ARDS. Admission BG was significantly higher in primary ARDS than in secondary and elevation of admission BG during 48 h increase the risk of ARDS two times. Negative correlation between paO_2/FiO_2 and peak blood glucose ($r = 0.626$) resp. hyperglycemic index ($r = 0.502$) was established.

Conclusion: The severity of hyperglycemia is negative predictive factor of lung injury and ARDS development. Higher peak blood glucose, intensity of hyperglycemia and hyperglycemic index are associated with severity of ARDS.

201 – POSTER PRESENTATION

EVALUATION OF ERYTHROCYTE ANTIOXIDANT SYSTEMS IN PREGNANT WOMEN

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Pregnancy related oxidative stress is well documented by now. Literature reports suggest causes of oxidative stress belonging to metabolic pathways perturbations and immune system response to pregnancy. Maternal oxidative stress may influence foetus antioxidant systems. Blood systems fighting with oxidative stress include anti-oxidant enzymes present in erythrocytes. We have considered of interest to study antioxidant systems performance in venous and cord blood erythrocytes.

The study included 200 pregnant women with normal pregnancies: gestation longer than 37 weeks and fetal weight more than 2700 g - also no pathologies associated to the mother or to the new born child. Venous and cord blood have been collected at birth. On erythrocytes lysates catalase, superoxide dismutase, glutathione transferase, glutathione peroxidase activities and total and non protein thiols level (mainly glutathione) have been determined. Statistical analysis performed revealed a linear correlation of superoxide dismutase activity in cord blood erythrocytes with the enzyme activity in mother venous blood. No other correlations have been identified. Superoxide dismutase, catalase, glutathione peroxidase activities were significantly higher in mother venous erythrocytes while glutathione transferase was higher in cord blood. No statistical significant differences have been found between thiol levels, both protein and non protein. Increased level of glutathione transferase activity in cord blood erythrocytes suggest it as one of the principal enzymes implicated in foetus antioxidant defence. Further studies are needed to elucidate how fetus antioxidant systems are fighting with mother increased oxidative stress.

202 – POSTER PRESENTATION

PREVALENCE OF METABOLIC SYNDROME AMONG OBESE EGYPTIAN SCHOOL STUDENTS

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Background: Egypt has experienced an increase in the prevalence of childhood overweight/obesity over last decades.

Aim: Of study was to assess prevalence of metabolic syndrome (MS) and other metabolic features among obese Egyptian school students.

Methods: Study included 462 obese students (body mass index >95 th percentile), 122 prepubertal and 340 pubertal, aged 7-18 years. Approved by Ethical Community, National Research Centre. Each subject was submitted to clinical, anthropometric and laboratory assessment. Diagnosis of hypertension, impaired fasting glucose, hyperinsulineamia, insulin resistance (HOMA-IR), dyslipideamia and MS were defined according to Grundy (2004).

Results: MS was found in 39.7%, with a significantly higher rate among prepubertal (45.5%) than among pubertal students (37%). Prevalence of MS was higher in girls than boys in pubertal age and total sample, while boys have higher prevalence in prepubertal age. Hypertension was significantly more common in pubertal (22.3%) than prepubertal group (14.8%) with obesity. Prevalence of impaired fasting glucose, hyperinsulineamia and HOMA-IR was 20.5, 13.6 and 13.6% among prepubertal and 25.0, 3.3 and 22.8% among pubertal, respectively. Prevalence of fasting hyperinsulineamia in prepubertal was significantly higher than pubertal, while prevalence of impaired fasting glucose and HOMA-IR in pubertal was significantly higher than prepubertal. Overall, dyslipideamia in prepubertal and pubertal

was identified in 93.2 and 91.3%, respectively, with significant differences.

Conclusions: MS prevalence among prepubertal is quite higher than pubertal students and in girls more than boys in Egypt, with abnormal lipid profiles, obesity and nutritional mistakes.

Acknowledgements: To National Research Centre, Egypt for funding this project.

203 – POSTER PRESENTATION

SECRETION OF GROWTH HORMONE AND INSULIN-LIKE GROWTH FACTOR (IGF-1, IGFBP-3) IN HEREDITARY PATHOLOGY IN UZBEK POPULATION

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Medical sources do not have sufficiently detailed data on studying a hormonal spectrum and pathogenesis of stunting in hereditary pathology (HP).

Goal: To study the growth hormone (GH) and insulin-like growth factor (IGF-1, IGFBP-3) secretion in HP of the Uzbek population.

Materials and methods: 92 patients with genetically determined types of stunting (GDTS) (11 patients with Russell-Silver, 16 ones with Noonan, 10 with Sekkel, 9 with Prader-Willi, 8 with Cornelius de Lange syndromes, 38 girls with TS) aged 7 to 18 were examined. Blood serum was tested for the level of GH, IGF-1, IGFBP-3. Anthropometry (SDS) was also studied

Results: Past histories showed that 45.6% of patients with HP had parents married to close relatives. The most expressed stunting was found in patients with Russell-Silver (-5.16 ± 1.18 SDS), Sekkel (-4.18 ± 1.12 SDS) and Cornelius de Lange syndromes (-6.10 ± 1.14 SDS). A reliably low level of GH was found in patients with Cornelius de Lange (0.64 ± 0.05 ng/ml, $p < 0.05$), Russell-Silver (0.7 ± 0.04 ng/ml, $p < 0.05$), Sekkel syndromes (1.02 ± 0.07 ng/ml, $p < 0.05$) on the background of a low level of IGF-1 and IGFBP-3. Patients with Noonan syndrome, TS and Prader-Willi syndromes had the level of GH within the low limits.

Conclusions: The results obtained suggest that patients with HP in Uzbek population had a pronounced stunting in patients with Russell-Silver, Sekkel and Cornelius de Lange syndromes due to disturbances in the GR-IGF-IGFBP-3 system.

204 – POSTER PRESENTATION

LENTIVIRAL VECTOR-MEDIATED KNOCKDOWN OF SOCS3 ENHANCES LEPTIN-INDUCED STAT3 ACTIVATION IN RAT GLIOMA CELLS

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Objective: The present study was to investigate the role of SOCS3 knockdown in leptin-induced Stat3 activation in vitro.

Methods: We first constructed the lentiviral RNA interference (RNAi) vectors of rat SOCS3 gene and evaluated the effects of silencing SOCS3 gene expression by siRNA in rat glioma cells. Three

gene-specific sequences of siRNA targets for SOCS3 were designed, and the complementary DNA containing both sense and antisense oligonucleotides was synthesized. After phosphorylation and annealing, the double-stranded DNA was cloned respectively to corresponding pRNA-lentivector-VGFP to construct pRNA-Lenti-SOCS3-VGFP recombinants with U6-containing promoter, target sequence and PolyIII terminator. Three target sequences were correctly cloned to corresponding pRNA-lentivector-VGFP, and the effects of RNAi to reduce gene expression were further evaluate by real-time PCR. To examine the role of SOCS3 knockdown in leptin-induced Stat3 activation, the glioma cells were cultured and transfected respectively with pRNA-Lenti-SOCS3-VGFP, or pRNA-Lenti-Control-VGFP by Lipofectamine 2000 after 80% cell confluence, 48 h later, cells were stimulated or not with 100 nM leptin for 10 min, cell lysates were prepared and proteins were quantified, and Western blot analyses were performed for leptin-induced Stat3 phosphorylation.

Results: The target sequence of siRNA-SOCS3 was successfully cloned to pRNA-lentivector-VGFP, and the RNAi protocol specifically reduced expression of SOCS3 mRNA by approximately 80%. Stats3 activation was significantly greater in cells transfected with pRNA-Lenti-SOCS3-VGFP compared with their controls.

Conclusion: SOCS3 knockdown by siRNA enhances leptin receptor signaling, and this molecule is a potential target for therapeutic intervention of leptin resistance and diet-induced obesity in vivo.

205 – POSTER PRESENTATION

HYPODIPSIA-HYPERNATREMIA SYNDROME WITH SECONDARY HYPERALDOSTERONISM IN A CHILD WITH DYSGENESIS OF CORPUS CALLOSUM

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Objectives: Hypodipsia- hypernatremia syndrome is connected with hypothalamic osmoreceptor dysregulation of thirst. Mineralocorticoid excess is very rare in childhood, with the exception of the secondary hyperaldosteronism in patients with cardiac and renal diseases and chronic volume depletion.

Methods: A 1 year 3 month old girl with neurologic and psychologic developmental delay presented with prolonged fever and muscle hypotonia. The laboratory tests excluded infectious genesis of the condition and established hypernatremia- sodium 163-158 mmol/l, potassium 3.9-4.2 mmol/l, hyperaldosteronism 1153 pmol/l (r 55-470) and elevated plasma renin activity (PRA) 31.6 ng/ml/h (r 0.3-3.5). The differential diagnostic investigations directed to hypodipsia as the most probable cause. Active oral rehydration together with Spironolactone treatment restored the electrolyte status, but with still elevated aldosterone and PRA. Abdominal CT did not found source of autonomous production of renin or aldosterone. Cerebral MRI visualized dysgenesis of corpus callosum, a structural defect which can be associated with thirst regulation disturbance. The child was found to have a single central maxillary incisor, which together with the dysgenesis of corpus callosum directed to an incomplete form of the corresponding syndrome.

Results: The ability to achieve positive water balance was enough to maintain normal serum sodium, aldosterone and PRA without Spironolactone treatment, which led to improvement in child's development.

Conclusions: Keeping normal serum sodium levels is important to prevent complications of hyponatremia like convulsions, cerebral haemorrhage, rhabdomyolysis, acute renal failure.

Reference:

1. Komatsu H et al. (2001) *Ped Int* 43:663–687.

206 – POSTER PRESENTATION

THE EFFECT OF RECOMBINANT HUMAN GROWTH HORMONE IN CHILDREN WITH GROWTH HORMONE DEFICIENCY

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Objective: To evaluate the value of insulin and arginine provocation test in children with short stature and the effect of recombinant human growth hormone in children with GH deficiency.

Methods: GH provocation tests were performed with insulin and arginine in 65 short stature children aged 5–12 years, the GH concentrations were determined by RIA, and 35 children with peak GH concentration less than 10 ng/ml were referred to as GH deficiency and treated with r-hGH replacement therapy, and 27 children were treated for 12 months. Body height and body weight were monitored every month, the concentrations of T₃, T₄, TSH, IGF-1 and glucose were measured every 3 months, and the bone age was examined every 6 months.

Results: The accuracy of insulin provocation test (80%) was significantly higher compared with arginine provocation test (66.7%), and the accuracy of both insulin and arginine provocation tests was 96.6%. In insulin provocation test, nadir glucose occurred during the 15–30 min after insulin injection, and there was significant positive relationship between nadir glucose level and BMI. The GHD children with GH therapy for 12 months had obviously increased in body height and height velocity.

Conclusion: The accuracy of insulin provocation test is better than arginine provocation test, and combination of drug provocation tests are more accurate than single drug provocation test. The GH replacement therapy for GHD children is effective, and the body height and height velocity are obviously increased, which is helpful for improving adult height.

207 – ORAL PRESENTATION

RELATIONSHIP BETWEEN GLYCEMIA AND HORMONAL ALTERATIONS AND MORTALITY IN HYPERGLYCEMIC CRITICALLY ILL CHILDREN

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Objectives: To study clinical factors and hormonal changes associated with hyperglycemia in critically ill children and the relationship

between these factors and mortality and length of stay in intensive care.

Patients and methods: 31 patients aged between 1 and 204 months with hyperglycaemia defined as 2 blood glucose measurements greater than 180 mg/dL, separated by at least 2 h were included. Clinical severity assessment performed by PIM2, PRISM and PELOD scales, determination of glucose, glycosuria, insulin, C peptide, cortisol and ACTH, somatomedin C, growth hormone (GH), TSH, free T4 and treatment with inotropic drugs and insulin were registered at the time of diagnosis of hyperglycemia, and 24 and 72 h after.

Results: Initial blood glucose was 264.6 mg/dL and decreased gradually to 125 mg/dL after 72 h. The initial blood glucose was not correlated with any other factor. Blood glucose at 24 and 72 h correlated with levels of insulin and C-peptide and the values of PRISM and PELOD. 5 patients died (16%). There was no relationship between glucose levels and mortality. Factors associated with mortality and prolonged stay in PICU were: heart disease, infection and the need for ECMO or CRRT. Patients who died had higher levels of cortisol and GH at diagnosis. Length of stay was associated with glycemia at 24 h and severity of illness scores.

Conclusions: There was no relationship between blood glucose levels and hormonal changes in critically ill children with hyperglycaemia. Patients who died had higher cortisol and growth hormone values than survivors.

208 – ORAL PRESENTATION

LACTATE PREDICTS MORTALITY IN A MULTICENTRE POPULATION IN PAEDIATRIC INTENSIVE CARE

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Background and aims: The Paediatric Index of Mortality 2 (PIM2) uses presenting physiological measurements to predict expected mortality on admission to paediatric intensive care (PIC). We have examined whether blood lactate measurement on the first day in PIC predicts mortality, and whether it does so independently of PIM2.

Methods: We analysed data on 5602 children admitted to 15 paediatric intensive care units in France or Belgium between 01/06/2006 and 31/10/2007. Peak day-1 lactate measurements were compared between survivors and non-survivors. Relations between lactate and PIM2 and its components were analysed using correlation and regression. Logistic regression was used to estimate effects on mortality adjusting for PIM2 expressed as odds ratios (OR) with 95% confidence intervals (CI). Improvements in fit were assessed by changes in log-likelihood. Age and diagnosis were included as potential confounders.

Results: 2480 day-1 lactate measurements were available. Mortality was higher in those where lactate was measured (11.5% vs. 4.2%, $p < 0.001$). PIM2 predicted mortality was also higher: 9.9% vs. 4.4%, $p < 0.001$. Mean lactate was 8.4 mmol/l in those dying and 2.8 in survivors. Lactate measurement was correlated with PIM2 ($r = 0.53$; $p < 0.001$). Adding lactate to PIM2 significantly improved fit (Chi-square = 36, $p < 0.001$). The OR (per unit) was 1.097 (95% CI 1.065–1.130, $p < 0.001$). Adding a quadratic term in lactate produces a further improvement (Chi-square = 10; $p = 0.002$).

Conclusions: Day 1 blood lactate level predicts death independently of PIM 2 and improves its performance. Lactate should be considered as a component of mortality prediction scores such as PIM2.

209 – POSTER PRESENTATION

RANK LIGAND INHIBITION WITH DENOSUMAB FOR THE MANAGEMENT OF RESISTANT HYPERCALCAEMIA SECONDARY TO BONE MARROW TRANSPLANT IN OSTEOPETROSIS

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Case report: RANK ligand inhibition with denosumab for the management of hypercalcaemia secondary to bone marrow transplant in osteopetrosis.

Background: Autosomal recessive osteopetrosis is a rare disorder of bone resorption that results in generalized sclerotic bones and bone marrow failure. Allogeneic Bone marrow transplant (BMT) is the only curative treatment. One of the complications in this patient group following a successful BMT is hypercalcaemia.

OUTLINE: This report describes a three-year-old girl with atypical osteopetrosis who developed severe hypercalcaemia with a maximum calcium level of 4.99 mmol/l following her successful BMT. This indicated an active donor-derived osteoclastic function following the successful engraftment in the patient.

Discussion: Treatment with hyperhydration, furosemide, calcitonin, bisphosphonate and methylprednisolone failed to normalize her serum calcium level. Continuous veno-venous haemodiafiltration (CVVHDF) worked but was not a practical longterm solution. Denosumab, a potent inhibitor of RANK ligand that reduces bone osteolysis, was used to reduce the differentiation, activity and survival of osteoclasts, thereby slowing the rate of bone resorption. Calcium levels returned to normal values enabling discharge from the paediatric intensive care unit (see Fig. 1).

Conclusion: The monoclonal antibody Denosumab has proved highly effective in treating the hypercalcaemia secondary to osteoclastic function in this patient. Denosumab may be of use in treating other oncology patients with resistant hypercalcaemia.

Fig. 1: Flow chart of Total Laboratory Calcium

210 – POSTER PRESENTATION

COMPATIBLE CONGENITAL ADRENAL HYPERPLASIA (CAH) PRESENTING COVERTLY AS CHRONIC PERSISTENT GASTROENTERITIS/FAILURE TO THRIVE (FTT) IN FEMALE INFANTS WITH CLINICIAN IDENTIFIED AMBIGUOUS GENITALIA IMPLIES EVALUATING DIFFICULT CASES METICULOUSLY

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Context/Purpose: (CAH) is an AR disorder due to deficiencies of specific committed pathway enzymes in corticosteroid biosynthesis. 21-hydroxylase-deficiency (21HD), commonest, follows mutations in 2-genes (CYP 21 B/CY21 A) on the short-arm-of-chromosome-6. Cases present classically with salt-wasting, vomiting-diarrhoea, dehydration, FTT, adrenal-crisis, arrhythmias, syncope, early demise. Its non-classic-forms presents with normal genitalia at birth/latter precocious-puberty. Cases were prone to severe-bacterial-infections, the attenuated-expressivities were tilted to crises during infective events. Its clinico-patho-radiological-features were more likely to overlap with its differentials (pyloric stenosis, intussuceptions/intestinal-obstructions/FTT.)

Methodology: Cases/clinico-auxio-patho-radiological/medical contents of relevance were examined, evaluated/investigated further for features consistent with CAH, against its differentials.

Cases: The investigators experience with CAH is epitomized/represented by two cases of compatible-CAH with clinician identified ambiguous-genitalia/ultrasonographically demonstrated ovaries, against its differentials-represented by five cases of radiological/ultrasonographically/intraoperatively demonstrated intussuceptions presenting atypically/non-classically with progressive abdominal-distensions/features suggestive of non bloody gastroenteritis (n = 2), in (n = 3) cases with blood-tinged-stools, not in the classically described red currant jelly pattern, in addition to four cases of pyloric stenosis with hypochloreaemic-metabolic-acidosis. Although in the compatible CAH cases, inpatient pharmacotherapeutic interventions with inotropic-support, aminophylline, crystalloids/solute replacements sufficed tentatively, for its differentials extramural instrumentations were mandatory. Outcome measures were fair/spectral, but were most guarded for the intussuceptions subsets.

Conclusions/Importance: Since presentations of CAH/its differentials could be quite atypical, given its frequent deleterious consequences, a high index of suspicion will be implied for earlier case identification/apposite interventions. Although features of CAD/its differentials overlap considerable, their distinct emergent/urgent/ongoing and follow up interventional approaches suggests the need for an exact initial diagnosis. This could be achieved by a higher index of suspicion, an in-depth historic inquiry, a comprehensive clinical evaluation/investigations, especially for the male infant presenting covertly.

A transabdomino-pelvic-ultrasonography/basic biochemical evaluations could be adequate to achieve a clinically/therapeutically useful working diagnosis and should be recommended/undertaken at the first instance.

211 – POSTER PRESENTATION

BLOOD LACTATE MEASUREMENTS IN UMBILICAL ARTERY AND AFTER BIRTH AS A DIAGNOSTIC AND PROGNOSTIC TOOL AFTER BIRTH ASPHYXIA

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Background: Blood lactate at birth as result of activated anaerobic glycolysis is a marker of perinatal asphyxia.

Aim: To evaluate the dynamics of blood lactate, pH and base excess (BE) as a tool for assessing the severity of fetal hypoxia and predicting neonatal outcome.

Methods: 79 neonates (≥ 34 gestational weeks) were included and followed up until discharge: 43 with pathologic fetal heart rate patterns and/or 1-minute Apgar score < 7 (“asphyxia group”); 36 without obstetric or clinical signs of asphyxia (control group). Samples from umbilical artery (u.a.), capillary blood at 2 h and 12–24 h after birth were analyzed for blood lactate, pH and BE.

Results: Lactate value (u.a.) was significantly higher (5.3 ± 3.4 mmol/l), pH and BE were lower (7.29 ± 0.05 and -14.1 ± 5.9 mmol/l) in the “asphyxia group” compared to the control group (2.7 ± 1.2 mmol/l, 7.29 ± 0.05 and -5.9 ± 3.3 respectively). The 2 h lactate-concentration increased significantly in infants with asphyxia (6.7 ± 4.7) compared to the controls (3.2 ± 1.1), the 12–24 h values were reduced in the main group (4.6 ± 1.5) and without changes in the controls (3.2 ± 0.88). Values of pH and BE at 2 h and 12–24 h increased progressively in both groups without significant differences between them. Hypoxic-ischemic encephalopathy (HIE) stage II–III was observed in infants with u.a. pH < 7.05 , BE < -15 if u.a. lactate was high and progressively increased in next 2 h.

Conclusions: High u.a. lactate values correlate with low pH and BE and is a reliable tool for assessing the severity of fetal asphyxia. Increasing lactate concentration after birth is better predictor of severe HIE.

212 – ORAL PRESENTATION

REDUCING GLUCOSE INTAKE AS A SAFE TOOL TO DECREASE HYPERGLYCEMIA IN INFANTS AFTER CONGENITAL HEART SURGERY

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Objective: Tight glycemic control with insulin has been shown to decrease morbidity and mortality in the pediatric intensive care unit (PICU), especially in (post-) cardiac surgery patients. However, hypoglycemia is a potential detrimental side effect. Decreasing glucose intake might be a safe alternative to prevent hyperglycemia.

Methods: All children underwent cardio-pulmonary bypass (CPB) and received 30 mg/kg methylprednisolone as standard care during cardiac surgery. Post-operative they received intravenous low glucose (LG; 2.5 mg/kg/min) vs. standard glucose (SG; 5.0 mg/kg/min) both during 4 h, in a randomized blinded crossover setting, while an 8 h stable isotope tracer protocol was performed to study glucose and protein kinetics using $^2\text{H}_2\text{O}$, $[6,6-^2\text{H}_2]\text{-glucose}$ and $[1-^{13}\text{C}]\text{-leucine}$.

Data as median (IQR). Statistics by Wilcoxon signed ranks test.

Results: 11 Subjects (age 0.43(1.68) years) were studied. During LG, blood glucose levels decreased significantly (LG 7.4(0.8) vs. SG 8.9(3.1) mmol/l; $p = 0.004$), although normoglycemia (4.0–6.0 mmol/l) was not reached in either intervention. No hypoglycemic events occurred. Endogenous glucose production increased during LG (LG 3.1(1.4) vs. SG 1.7(1.6) mg/kg/min; $p = 0.013$), due to increased glycogenolysis (LG 1.2(1.1) vs. SG -0.2 (1.5) mg/kg/min; $p = 0.028$). Leucine balance as indicator of protein balance was negative but not affected by glucose intake (LG -50.7 (21.0) vs. SG -58.8 (25.8) $\mu\text{mol/kg/h}$; $p = 0.18$). Cortisol levels were similar (LG 240(192) vs. SG 207(86) nmol/l; $p = 0.39$).

Conclusions: Decreasing glucose intake below standard care in post-cardiac surgery children safely decreased blood glucose levels, without causing hypoglycemia or increased protein catabolism. Normoglycemia was not reached, probably due to the increased metabolic stress response after CPB and use of steroids.

213 – POSTER PRESENTATION

SUCCESSFUL TREATMENT OF HYPERAMMONEMIA IN 3 NEWBORN PATIENTS BY CONTINUOUS HEMODIAFILTRATION

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In newborns, hyperammonemia leads to the development of encephalopathy which is manifested by symptoms such as vomiting, hypotonia, lethargy, seizures and coma. Therapy consists of a special formulated protein diet, high caloric intake, carnitine supplementation, agents activating alternative nitrogen pathways and emergent detoxification by various dialysis modalities.

Here we report 3 newborn patients with ammonium levels 573 $\mu\text{mol/l}$, 1123 $\mu\text{mol/l}$ and 4609 $\mu\text{mol/l}$ successfully treated with continuous hemodiafiltration (CHDF) and decreased to 83 $\mu\text{mol/l}$, 340 $\mu\text{mol/l}$ and 268 $\mu\text{mol/l}$ in 24 h. Two patients were treated with peritoneal dialysis (PD) before hemodiafiltration, however CHDF was more effective than PD. There was no complication except for moderate (34–35°C) hypothermia during CHDF.

Medical Topic 14 - Nutrition (214–236)

214 – ORAL PRESENTATION

INCREASED RESTING ENERGY EXPENDITURE IS RELATED TO DIMINISHED NUTRITIONAL STATUS IN CHILDREN WITH DILATED CARDIOMYOPATHY

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Introduction: Growth failure is a major problem in children with heart failure secondary to dilated cardiomyopathy (DCM). We hypothesized that children with DCM and a poor nutritional status have an altered metabolism.

Methods: In 22 patients real REE was assessed with indirect calorimetry. The predicted REE (PREE) was calculated with the Schofield formula for weight and height. Children were classified as hypometabolic (<90% of PREE), hypermetabolic (>110% of the PREE) or as normal (within 10% of the PREE). Heart failure was scored with the New York University Pediatric Heart Failure Index (NYU PHFI), scores from 0 (no heart failure) to 30 (severe heart failure).

Results: Patients were 9.9 (± 5.7) years old and were diagnosed at an age of 5.2 (± 5.3) years. Children had moderate heart failure, NYU PHFI of 10 (± 3). The weight-for-height SD score (WFH-SD) was -0.89 (± 1.41) and the height-for-age SD score (HFA-SD) was -1.1 (± 1.2). Fifty percent of the children had a WFH-SD and/or a HFA-SD < -2 . The REE was 41 (± 17) kcal/kg. WFH-SD was negatively correlated with REE per kg, $r = -0.66$, $p = 0.001$. Indirect calorimetry showed hypometabolism in 6 children (69% ± 18), hypermetabolism in 6 children (125% ± 15), and a normal metabolism in 10 children (101% ± 6).

Conclusions: In this sample of children with only moderate heart failure 50% exhibited growth failure. The PREE was accurate in only 45% of the children. Hypermetabolism and hypometabolism were both found. In children with a poorer nutritional status a higher REE per kg was measured.

215 – POSTER PRESENTATION

HONEY, AN ADJUVANT THERAPY IN ACUTE INFANTILE DIARRHEA

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Objectives: Diarrhea is one of the major causes of mortality of infants in developing countries. Honey has an antimicrobial and anti-inflammatory. We study the effect of using pure honey as an adjuvant therapy to the oral rehydration solution in management of acute infantile diarrhea.

Methods: The effect of floral honey on (200 patient 6–24 ms), suffering from acute diarrhea with mild to moderate dehydration. Divided into a control group and three honey treated groups (50 patients each). The control group received the WHO-ORS only. The other three received floral honey in various forms. All were observed for rehydration time, weight gain, amount of rehydration solutions consumed, vomiting, diarrhea and recovery time. Stool culture was done, stool pH, serum sodium and potassium.

Results: In the pure honey-ORS group, the recovery time was 3.5 ± 2.88 days compared to 5.6 ± 3.8 days in the control group and 5.4 ± 3.7 , 5.3 ± 3.8 in group I and III respectively, showing significant shorter recovery time ($P < 0.05$) specially in cases of bacterial diarrhea. Also persistent diarrhea was significantly less in pure honey-ORS treated group than other groups ($P < 0.05$). Statistical analysis was performed using SPSS program version 13 and the comparison between groups of patients and control were evaluated by the unpaired student's t-test differences were considered significant when ($P < 0.05$).

Conclusion: Honey is a non allergic, natural agent of high nutrient value. We observed a significant decrease in stool motions number and improvement in consistency in cases treated with pure honey + ORS.

216 – POSTER PRESENTATION

RETROSPECTIVE NEONATAL NUTRITION AUDIT–CALORIE COUNTING COUNTS

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Background and aims: It is widely accepted that nutrition is crucial for many processes including neurodevelopment, and is particularly important in sick or premature infants. Determination of feed volume and weight gain are the most commonly used markers in measuring nutritional adequacy. We aimed to determine whether our practice of assessing and targeting daily feed volumes results in adequate calorie intake and weight gain in premature infants.

Methods: This was a retrospective audit over a 6 month period of premature infants who were exclusively enterally fed. Data were collected on the quantity and type of milk (mothers own; donor; formula) on each occasion that the baby was weighed. The caloric intake was therefore calculated.

Results: Data were collected for 32 infants with gestational age of 31–36 weeks on the 140 occasions that they were weighed. The majority ($n = 23$) received breast milk for at least part of their admission and 20 babies received donor milk at some stage.

Babies received at least adequate volumes (according to unit policy) on 136 occasions. The average weight gain was 13 g/day but 11 babies had not regained their birth weight by 14 days of age. However, weight gain was superior in the 7 babies who achieved an intake of 120 kcal/kg/day, which approximates to ESPGHAN guidelines.

Conclusion: This was a small audit which reflects our practice of caring for near term babies. We suggest that using daily calorie targets rather than volumes, alongside regular weighing, may be more effective in monitoring adequacy of nutrition.

217 – POSTER PRESENTATION

MALNUTRITION AS AN INDEPENDENT PREDICTOR OF CLINICAL OUTCOME IN CRITICALLY ILL CHILDREN

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Objectives: To determine the nutritional status of a cohort of children admitted to a pediatric intensive care unit (ICU) and to assess the effect of malnutrition as an independent risk factor affecting outcome in this patient group.

Methods: In a prospective cohort study, 385 children admitted to the ICU of a teaching hospital over a 2-year period were assessed for nutritional status at admission and clinical outcome. The outcome variables were: 30-day mortality, length of ICU stay and length of mechanical ventilation. Potential exposure variables were: gender, age, diagnosis (clinical versus surgical), septic shock, malnutrition, and scores on the Pediatric Index of Mortality - PIM2 and Pediatric Logistic Organ Dysfunction - PELOD. Nutritional status was determined using z scores of weight for age, height for age, and body mass index, based on the World Health Organization child growth standards. Patients with z score < -2 of anthropometric indexes were considered malnourished.

Results: 45.5% of patients were malnourished on admission. Sixteen patients of the malnourished group (9.14%) and 25 patients (11.9%)

of the non-malnourished group died. Malnutrition was associated with greater length of mechanical ventilation and length of ICU stay, but not with mortality on univariate analysis. Malnutrition was associated with greater length of ventilation on the multiple logistic regression model (OR 1.76, 95%; CI 1.08–2.88; $p = 0.024$).

Conclusions: Malnutrition is common among children admitted to an ICU. This factor was not a predictor of mortality but showed independent association with length of mechanical ventilation.

218 – POSTER PRESENTATION

MALNUTRITION IS A MARKER OF MORTALITY IN CRITICALLY ILL CHILDREN WITH HYPERGLYCEMIA

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Objectives: To determine whether hyperglycemia is associated with poor outcome of children hospitalized in the ICU while taking into account the clinical severity and nutritional status.

Methods: A prospective cohort study was conducted on 221 children admitted to the ICU. Independent variables in the outcome analyses included hyperglycemia (blood glucose >110 mg/dl), severe hyperglycemia (blood glucose >180 mg/dl) during the first 72 h after admission, age, gender, nutritional status, Pediatric Index of Mortality 2 and Pediatric Logistic Organ Dysfunction scores. The dependent variables were mortality, length of stay, and time on mechanical ventilation.

Results: 47.1% of patients were malnourished. Hyperglycemic peaks in the first 24, 48, and 72 h were 123 ± 28.7 mg/dl, 121 ± 24.5 mg/dl, and 119 ± 21.8 mg/dl, respectively. Severe hyperglycemia in the first 24 h after admission was independently associated with organ dysfunction (OR 4.08, CI 95% 1.87–8.88; $p = 0.001$) and with mortality (OR = 4.35, CI 95% 1.28–14.71, $p = 0.018$). In the multiple logistic regression model, adjusting for the severity of organ dysfunction, severe hyperglycemia in the first 24 h of admission increased the mortality risk (OR 4.35 CI 95% 1.29–14.71, $p = 0.018$). Adjusting for the same variable in the malnourished subgroup of patients, severe hyperglycemia in the first 24 h was associated with an increased mortality (OR 5.41, CI 95% 1.34–21.92, $p = 0.018$), where this was not observed in the well-nourished subgroup.

Conclusions: Malnourished patients with severe hyperglycemia in the first 24 h are at a greater risk of mortality, independent of clinical severity.

219 – ORAL PRESENTATION

WHAT ARE THE FACTORS THAT INFLUENCE ATTAINMENT OF ENERGY INTAKE IN A PEDIATRIC INTENSIVE CARE UNIT?

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Objectives: Children admitted to the intensive care unit (ICU) are at risk of inadequate energy intake. This study aimed to identify factors

associated to non-attainment of estimated energy requirements in pediatric ICU patients.

Methods: Prospective study involving 207 children hospitalized in the ICU and receiving enteral and/or parenteral nutrition. The outcome variable studied was maintaining 90% of the estimated BMR for at least half of the ICU stay (satisfactory energy intake). The following potential exposure variables for outcome were considered: gender, age, diagnosis, sepsis, use of vasopressors, malnutrition, fasting time, route of nutrition support, Pediatric Index of Mortality-PIM2 and Paediatric Logistic Organ Dysfunction-PELOD scores.

Results: 20.8% of patients attained the satisfactory energy intake within a mean time of 5.07 ± 2.48 days. An independent association was found between heart disease diagnosis, malnutrition and use of parenteral nutrition, and not receiving satisfactory energy intake (OR 3.62, 95% CI 1.03, 12.68, $p = 0.045$; OR 0.43 95%, CI 0.20, 0.92, $p = 0.030$; OR 0.34, 95% CI 0.15, 0.77, $p = 0.001$, respectively).

Conclusion: Satisfactory energy intake, as measured by maintaining 90% of the estimated BMR for at least half of the ICU stay was reached by a small proportion of patients during the ICU stay. Heart disease was an independent risk factor for non-attainment of satisfactory energy intake, whereas malnutrition and use of parenteral nutrition were protective factors against this outcome.

220 – POSTER PRESENTATION

FACTORS ASSOCIATED WITH PEPTIDE-BASED FORMULAS PRESCRIPTION IN A PEDIATRIC INTENSIVE CARE UNIT

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Background: This study aimed to identify the factors associated with the choice of peptide-based formulas in the first enteral nutrition prescription for critically ill children and to compare the direct costs of the enteral formulas used in a pediatric ICU.

Methods: In a prospective study children admitted to the ICU and receiving tube feeding for at least 48 h were evaluated for the use of peptide-based formulas as the first nutrition prescription, considered as the outcome variable. The potential exposure variables were: age, gender, malnutrition, sepsis, fasting period >2 days, use of alpha-adrenergic drugs before initiating first diet and pediatric index of mortality (PIM 2). A direct cost comparison of prescribed formulas was performed.

Results: Of 291 patients included (41.2% were malnourished) 60% received enteral nutrition within 2 days, 70% of whom were given polymeric formulas in the first nutrition prescription. This choice was independently associated with malnutrition (OR = 2.94; CI 1.60–5.39; $p < 0.01$), fasting period >2 days (OR = 3.46; CI 1.93–6.20; $p < 0.01$) and use of alpha-adrenergic drugs (OR = 2.32; CI 1.24–4.31; $p < 0.01$). Peptide-based formula costs were, on average, ten times higher than standard polymeric formula costs.

Conclusions: The choice of peptide-based formula as the first enteral nutrition prescription was associated to the greater severity of patients' clinical status during the stay in the intensive care unit - patients receiving alpha-adrenergic drugs, those who were malnourished and with longer fasting periods. These prescriptions engendered costs up to 10 times higher than those associated with standard polymeric formula.

221 – POSTER PRESENTATION

LOW PLASMA SELENIUM CONCENTRATIONS IN CHILDREN WITH CRITICAL ILLNESS: RISK FACTORS AND PROGNOSTIC SIGNIFICANCE

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Objectives: To determine the frequency of low plasma selenium concentrations, risk factors associated with this event and evaluate this condition as a predictor of clinical outcomes in children admitted to an ICU.

Methods: In a prospective cohort study, 173 children had their plasma selenium concentrations assessed by HPLC on admission and on the 5th day of ICU stay. Age, gender, diagnosis at admission, malnutrition (WHO 2006), C-reactive protein and albumin serum concentrations, Pediatric Index of Mortality (PIM 2) and Pediatric Logistic Organ Dysfunction (PELOD) scores were analyzed as potential exposure variables for selenium deficiency. The dependent variables in the outcome analyses were mortality, length of stay, and time on mechanical ventilation.

Results: Upon admission, selenium concentrations were below normal (<0.58 micromol/L) in 90.7% of patients, and remained low in 78.82% (78/99) of patients who stayed in the ICU for ≥5 days. Malnutrition was detected in 46.2% of patients. In multivariate analysis malnutrition was associated with extremely low selenium values (<0.29 micromol/L) on admission after adjustment for C-reactive protein and prior hospitalization (odds ratio 2.30; 95% CI: 1.21–4.37; $p = 0.011$). Extremely low selenium concentrations on the 5th day were independently associated with longer length of ICU (odds ratio 5.30; 95% CI: 1.03–27.3; $p = 0.046$) and hospital stay (odds ratio 2.67; 95% CI: 1.02–6.98; $p = 0.045$) but not with mortality.

Conclusion: Selenium deficiency is frequent during the first 5 days of ICU stay. Extremely low selenium concentrations were shown to be independently associated with malnutrition, and with longer ICU and hospital stays.

222 – POSTER PRESENTATION

COST ANALYSIS OF HOSPITAL-COMPOUNDED PARENTERAL NUTRITION FOR NEONATAL AND PEDIATRIC CARE IN GERMANY

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Background and aims: Parenteral nutrition (PN) is critical for neonatal care and for infants unable to tolerate oral or enteral feeding during this important growth period. This study assessed the total cost of compounded PN therapy for neonates, infants, and children.

Methods: A cost model was constructed to estimate total costs of PN therapy including prescribing and compounding. This tool was piloted in 4 German hospitals, totaling 1,183 patients and 12,458 compounded bags annually. PN was compounded either in the pharmacy or in the ward. Data were collected via literature review and interviews with professionals in 12 hospitals in 4 EU countries about

resource-utilization and costs. A bottom-up costing was used to assign monetary values using published list-prices.

Results: The daily total cost of one bag of in-hospital compounded PN across all weight groups of neonates totaled €64.05 (weighted average by PN days). Nutrient costs varied from 12% to 34% of total costs depending on neonate weight. Wages accounted for 48–67% of costs: 15 min were for prescribing and 16 min for compounding within the pharmacy, the compounding time increased to 27 min for ward compounding. Average cost per bag for infants <2 years was €92.70, and for children 2–18 years €124.54, of which 63% are attributable to nutrients and 28% to wages, respectfully.

Conclusions: Our data indicated a significant proportion of PN costs were due to staff time. Ready prepared PN could reduce staff time spent on compounding for patient-related activities.

223 – POSTER PRESENTATION

DEVELOPING AND IMPLEMENTING STANDARD PARENTERAL NUTRITION SOLUTIONS FOR A NEONATAL UNIT

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Background and aims: Parenteral nutrition (PN) forms an essential part of nutritional support, particularly in the vulnerable very-low-birth-weight neonate. Recent studies highlighted the benefits of standardised PN in this subset of patients. We therefore set out to develop and implement standard PN solutions (SPNS) for a neonatal unit, in Basel, Switzerland.

Methods: Published guidelines from the European Society of Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) were used as baseline. In addition, a literature search was performed, to ensure the inclusion of new research. Neonatal units that already use SPNS were contacted to obtain their composition information. The dietitian, pharmacist, gastroenterologist and neonatologists were involved in the development of SPNS and compatibility/stability was also tested.

Results: Information on the composition of existing SPNS was obtained from Switzerland, South Africa, United Kingdom, Australia, as well as the Babiven SPNS (Fresenius Kabi) and 2 publications outlining the composition of two further SPNS. Three lipid free standard solutions were developed with a stability of 7 days: Start-up, Maintenance (both 500 ml) and a Concentrated (330 ml) bag. Since introduction of SPNS (8 week period), 25 neonates, with a mean weight of 1.2 kg (SD 0.65) required PN: 86 Start-Up, 100 Maintenance and 22 Concentrated. Seven neonates required some electrolyte manipulation of the SPNS during the course of the PN.

Conclusion: SPNS can successfully be developed and implemented within a multidisciplinary team setting. The majority of neonates tolerated the SPNS without electrolyte manipulation. However, further prospective data is required to judge nutritional adequacy.

224 – POSTER PRESENTATION

ASSESSMENT OF GASTROINTESTINAL PROBLEMS EXPERIENCED DURING TREATMENT AMONG EGYPTIAN PEDIATRIC CANCER PATIENTS: A SINGLE CENTER STUDY

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Objectives: This study was designed primarily to acquire a deeper understanding of cancer patients' symptoms experienced during treatment with focus on gastrointestinal problems.

Patients and methods: In a sample of 150 children having different childhood malignancies, gastrointestinal symptoms were analyzed with special stress on nausea, vomiting, anorexia, oral ulcers, diarrhea, and constipation, altered perception of taste or smell.

Results: Overall prevalence of anticipatory vomiting was 12%, acute vomiting was 51.33%; delayed vomiting was 26% which was highest in day 2 with 18% experiencing vomiting and decreased the days after reaching 8% by day 5. Expectancy of nausea was found to be a strong predictor of subsequent prevalence of nausea and vomiting ($P = 0.047$) as well as the chemotherapeutic regimen potentiality that significantly affected delayed vomiting ($P = 0.02$). Other predictive factors as age, gender, severity did not affect different types of vomiting ($P = 0.156$, $P = 0.802$, $P = 0.147$ respectively). Forty percent of the enrolled patient suffered from mucositis, ranging from grade 1 to 3 according to WHO classification mostly associated with neutropenia, radiotherapy exposure and low body mass index. Clinical features of oral candidiasis were present in 10% of patients. 28% of the enrolled patients had attacks of diarrhea while 11.33% experienced constipation mostly due to vincristine and/or opioids, 8% had altered perception of taste or smell.

Conclusion: Almost 30% of pediatric cancer patients experienced one or more episode of GIT problems. Early recognition of onset, frequency, severity of GIT symptoms is essential to alert physicians to the need for early intervention and guide nutritional support.

225 – POSTER PRESENTATION

DO NEWBORN INFANTS OF ETHIOPIAN ORIGIN SPIT UP MORE THAN OTHER NEWBORN INFANTS

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Background: Differences in incidence of spitting up among ethnic groups were not previously published. Nurses at our nursery observed that newborn infants of Ethiopian origin spit up more than other infants.

Methods: Files of all newborn infants of Ethiopian origin mothers born in Hillel Yaffe medical center over 12 month were retrospectively surveyed. Control group of non-Ethiopian origin newborns were randomly selected. Exclusion criteria: preterm infants, admission to NICU and congenital birth defects. 3663 newborn infants were included. 55 of them were of Ethiopian origin. The control group included 167 infants that were randomly selected.

Results: Newborn infants of Ethiopian origin spit up 57% more than control infants (1.1 ± 1.6 vs. 0.7 ± 0.9 , $p = 0.045$). The difference was more obvious when only infants who spit up were analyzed (2.3 ± 1.7 vs. 1.5 ± 0.9 , $p = 0.002$), though the percentage of spitting up infants was the same in the two groups (45% vs. 47%, $p = 0.872$). There was no difference in weight loss, days of hospitalization, bilirubin levels or nutrition type between the groups. Additionally, when the control group was divided to spitting up and non-spitting infants, the only difference was higher rate of bilirubin measurements in the spitting up infants group (83% vs. 69%, $p = 0.023$), however no difference was found in bilirubin levels (7.9 ± 2.7 vs. 8 ± 2.8 , $p = 0.709$).

Conclusions: Infants of Ethiopian origin spit up more than control infants, although other clinical parameters were not affected. Spitting up, in the absence of other pathological signs, is benign.

226 – POSTER PRESENTATION

PRACTICAL HANDLING AND EXPERIENCE OF THE NEW PEDIATRIC TRIPLE-CHAMBER BAG FOR PARENTERAL NUTRITION FOR PRETERM INFANTS

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Background and Aim: Ready-to-use (RTU) industrially manufactured multichamber bags (MCBs) are widely available and used in adults but not in preterms. The study objective was to evaluate the flexibility of use of the first ready to use multi-chamber parenteral nutrition system (Ped3CB-A), with optional lipid bag activation, specially designed for administration to preterm infants.

Methods: Prospective, open-label, multicenter, noncomparative, Phase III clinical trial, preterm infants were treated with Ped3CB-A for 5-10 consecutive days. Compatibility of potential additions to the reconstituted bag were provided by the manufacturer. Macronutrient, electrolyte, and mineral supplements directly administered in the activated bag were evaluated.

Results: 97 (BW: 1382 ± 520 g; GA: 31.2 ± 2.5 ; PNA: 5.6 ± 6.1 d) were included in the per protocol analysis accounting for 854 perfusion days. Double-chamber bag activation was used for 32 perfusion days. Ped 3CB was used without supplementation on 657 infusion days (76.9%) in 54 infants (55.7%). Macronutrient supplementations represented in all 56 days of 854 (6.6%) in 20 infants (20.6%). However, supplementation directly in the chamber bag accounted for only 18 days of perfusion (2.1%) in 11 infants. Electrolytes and minerals supplementation represented in 387/854 (45.0%) days of perfusion in 65 infants. However, addition to the chamber bag accounted for 185 days of perfusion (21.7%) in 36 infants (37.1%). In all, 199 additions (mainly sodium, 95%) were made to the Ped3CB-A bags on 197 infusion days (23.1%) in 43 infants (44.3%).

In conclusion: Ped3CB-A has the flexibility required to meet the varied and changing nutritional needs of preterm infants.

227 – POSTER PRESENTATION

INTAKES, EFFICACY AND EXPERIENCE OF THE NEW PEDIATRIC TRIPLE-CHAMBER BAG FOR PARENTERAL NUTRITION FOR PRETERM INFANTS

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Background and Aim: Industrially manufactured multichamber bags are not in use in preterms. The study objective was to evaluate the first ready to use multi-chamber parenteral nutrition system (Ped3CB-A), with optional lipid bag activation, specially designed for administration to preterm infants.

Methods: Prospective, open-label, multicenter, noncomparative, Phase III clinical trial, preterm infants were treated with Ped3CB-A for 5-10 consecutive days.

Results: 97 (BW: 1382 ± 520 g; GA: 31.2 ± 2.5 ; PNA: 5.6 ± 6.1 d) were included in the per protocol analysis accounting for 854 perfusion days. Intakes were recorded daily and mean and maximum intakes were compared to ESPEN-ESPGHAN recommendations.

Table 1

Mean $\pm$ SD	Mean Ped3CB intakes	Maximal Ped3CB intakes	ESPGHAN-ESPEN 2005
Protein (g/kg day)	2.8 ± 0.7	3.6 ± 0.8	3.5–4
Glucose (g/kg day)	11.8 ± 3.0	15.4 ± 3.5	12–18
Lipid (g/kg day)	2.1 ± 0.6	2.8 ± 0.7	2–4
Energy (kcal/kg day)	80 ± 20	104 ± 22	100–120
Sodium (mmol/kg day)	1.89 ± 0.47	2.45 ± 0.55	2–7
Potassium (mmol/kg day)	1.83 ± 0.46	2.38 ± 0.54	2–5
Calcium (mmol/kg day)	1.12 ± 0.28	1.46 ± 0.33	1.25–3.0
Phosphate (mmol/kg day)	1.11 ± 0.28	1.45 ± 0.32	1.0–2.5

Combined with enteral nutrition, mean total protein and energy intakes represented 3.6 and 115 kcal/kg d. Mean weight gain represented 10.0, 21.5, and 22.6 g/kg d according to age at inclusion (0–3 n = 34, 4–7 n = 35, or >7 days of life n = 28).

Conclusions: Ped3CB-A provides well balanced and safe nutritional support required to meet the nutritional needs of preterm infants, providing nutrient levels within the ranges of recent recommendations.

228 – POSTER PRESENTATION

ASSESSMENT OF EASE OF USE AND EXPERIENCE OF THE NEW PEDIATRIC TRIPLE-CHAMBER BAG FOR PARENTERAL NUTRITION FOR PRETERM INFANTS

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Background and Aim: In adults, ready-to-use (RTU) industrially manufactured multichamber bags (MCBs) have been widely available for over 10 years. The guaranteed sterility and longer shelf-life of these MCB systems are major technological advances and minimize the risks of nutrient imbalances as well as of inadvertent contamination during compounding and storage.

The study objective was to evaluate the ease of handling and practical use of the first ready to use multi-chamber parenteral nutrition system (Ped3CB-A), with optional lipid bag activation, specially designed for administration to preterm infants.

Methods: Prospective, open-label, multicenter, noncomparative, Phase III clinical trial, preterm infants were treated with Ped3CB-A for 5–10 consecutive days. Responses were measured daily during the study using a questionnaire and a visual analog scale (VAS) completed by clinical (nursing and pharmacy) staff members and it was compared to the units' routine PN preparations.

Results: 113 preterm infants were enrolled (BW: 1373 ± 501 g, GA: 31.3 ± 2.4 weeks gestational age) accounting for 934 bags were infused over the study course.

Table 1 Visual analog scale results

Comparison condition	n	Bag Manipulation (cm) ^a	n	Prescription-to-infusion time (cm) ^a
Ward-compounded bags	460	8.1 ± 1.1	373	7.4 ± 1.6
Ready-to-use compounded bags	241	6.0 ± 2.6	240	7.6 ± 1.9
Tailored premixes	223	6.2 ± 2.2	223	7.0 ± 1.7

^a Measured on a 10 cm straight line; a higher number of centimeters indicates more favorable performance of the Ped3CB system.

Conclusions: Ped3CB-A has been found to be well accepted and easy to use in the clinical setting.

229 – POSTER PRESENTATION

BIOLOGICAL TOLERANCE OF THE FIRST READY TO USE MULTI-CHAMBER PARENTERAL NUTRITION (PN) SYSTEM SPECIALLY DESIGNED FOR ADMINISTRATION TO PRETERM INFANTS

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Background and Aim: Multichamber bags (MCBs) are major technological advances not in use in pediatrics populations. The study objective was to evaluate the biological tolerance of the Ped3CB-A, with optional lipid bag activation, for preterm infants.

Methods: Prospective, open-label, multicenter, noncomparative, Phase III clinical trial, preterm infants were treated with Ped3CB-A for 5–10 consecutive days. Biological parameters, including plasma electrolytes, minerals, urea, triglycerides, glucose, and bicarbonates were evaluated at baseline, on Day 5, and at the end of treatment. Any other abnormal laboratory values were reported as adverse events in the report form.

Results: 97 (BW: 1382 ± 520 g; GA: 31.2 ± 2.5 ; PNA: 5.6 ± 6.1 d) were included in the per protocol analysis accounting for 854 perfusion days.

Table 1

Mean $\pm$ SD mmol/L	N	Enrollment	N	Day 5	N	Study end
Triglycerides	90	1.16 ± 0.78	92	$1.43 \pm 0.56^*$	71	1.17 ± 0.62
Urea	96	10.7 ± 7.8	96	9.7 ± 8.3	76	$6.7 \pm 5.0^*$
Glucose	96	5.5 ± 2.0	93	5.7 ± 2.2	76	$4.7 \pm 1.2^*$
Sodium	97	$141 \pm 3.7^*$	96	139 ± 2	80	138 ± 3
Potassium	96	$4.5 \pm 0.8^*$	94	5.0 ± 0.6	79	4.9 ± 0.6
Calcium	95	2.4 ± 0.2	96	$2.6 \pm 0.2^*$	80	2.5 ± 0.1
Phosphates	96	1.8 ± 0.4	95	$1.7 \pm 0.4^*$	76	1.8 ± 0.4
Bicarbonates	90	21.0 ± 3.4	90	$25.6 \pm 3.2^*$	74	24.8 ± 3.2

* $p < 0.05$ vs other values

° $p < 0.05$ vs end

Conclusions: The use of Ped3CB-A, the first standardized, commercially manufactured, triple-chamber bag developed to provide well balanced and safe nutritional support in premature infants maintained biological parameters in the range of reference values for preterm infants.

230 – POSTER PRESENTATION

ADEQUACY OF THE NEW PEDIATRIC TRIPLE-CHAMBER BAG FOR PARENTERAL NUTRITION IN PRETERM INFANTS DURING THE FIRST WEEK OF LIFE

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Background and Aim: Ready-to-use (RTU) industrially manufactured multichamber bags (MCBs) are not used in preterm infants. The study objective was to evaluate during the first week of life the first ready to use multi-chamber parenteral nutrition system (Ped3CB-A), specially designed to preterm infants with optional lipid bag activation.

Methods: Prospective, open-label, multicenter, noncomparative, Phase III clinical trial, preterm infants were treated with Ped3CB-A for 5-10 consecutive days.

Results: 34 (BW: 1571 ± 514 g; GA: 31.3 ± 2.6 wks; PNA: 2.2 ± 0.8 d) were included as soon as informed parental consent was obtained. Mean duration of Ped3CB-A represented 8.4 ± 2.0 d accounting for 281 perfusion days. Lipid bag was not activated in 5 infants accounting for 15 d of perfusion (5.3%) mainly due to the increase of oral intakes. Hypertriglyceridemia >250 mg/dl were reported in 2 patients. Mean and maximum parenteral protein and energy intakes/kg day in PN represented respectively 2.6 and 3.3 g AA, and 71.5 and 90 kcal. Combined with enteral nutrition, mean protein and energy intakes represented 3.4 g AA and 108 kcal/kg day. Use of insulin to reduce hyperglycemia and promote AA and energy intake was limited to 3 infants and 10 days of perfusion. Biological parameters remained in the normal range for preterm infants. Minimal adjustment of electrolyte and mineral supplies were provided by direct adjunction to the Ped3CB-A or by Y-route. Mean weight gain was 10.0 ± 9.5 g/kg day.

Conclusions: From the first days of life, Ped3CB-A provides well balanced and safe nutritional support allowing early AA and energy intakes in the range of more recent recommendations.

231 – ORAL PRESENTATION

METABOLIC ACIDOSIS DURING THE FIRST 2 WEEKS OF LIFE IN VLBW INFANTS RECEIVING HIGH PROTEIN INTAKES

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Objective: High protein intakes have been associated with metabolic acidosis. This study evaluated base deficit (BD) values with optimal nutritional support according to recent recommendations, including higher protein intakes during early postnatal days.

Methods: BD were evaluated in 102 infant with a birth weight <1250 g during the first 2 weeks of life. Analyses were evaluated during 3 periods of 5 days. Protein intake was 2.4 ± 0.3 , 3.8 ± 0.6 and 4.0 ± 0.6 g/kg day on the first day, after 1 week and after 2 weeks respectively.

Results: Simple correlation analyses demonstrated that BD decreased with postnatal age ($r = -0.61$, $p < 0.01$), enteral feeding progression ($r = -0.45$, $p < 0.01$), and protein intake (-0.31 , $p < 0.01$); and BD increased with birth weight ($r = 0.11$, $p < 0.01$), blood creatinine value ($r = 0.36$, $p < 0.01$), natremia ($r = 0.19$, $p < 0.01$) and chloremia ($r = 0.45$, $p < 0.05$). During first 5 days, multiple regression analysis demonstrated that the major independent factor influencing BD was birth weight, accounting for $\sim 7\%$ of the value. Between 5 and 9 days, the major factor was chloremia, accounting for $\sim 16\%$ of the value. Between 10 to 14 days, the major factor was blood creatinine value, accounting for $\sim 28\%$ of the value.

Conclusions: Metabolic acidosis in VLBW infants may not be interpreted in term of protein tolerance during the first 2 weeks of life. Metabolic acidosis is mainly determined by perinatal factors in early life like birth weight and afterwards by renal function and chloremia.

232 – POSTER PRESENTATION

DRAMATIC REDUCTION OF POSTNATAL GROWTH RESTRICTION AFTER OPTIMIZING NUTRITION IN EXTREMELY PRETERM INFANTS

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Objective: The aim of this study was to evaluate postnatal growth up discharge in extremely preterm infants after optimizing nutritional support based on most recent recommendations.

Methods: A prospective non randomized, consecutive and observational study in <28 wks infants during a 2 years period.

Results: 40 infants were included (BW = 901 ± 148 g, GA = 26.8 ± 0.8 weeks). First day nutritional intake was 38 ± 7 kcal/kg day with 2.5 ± 0.4 g/kg day of protein. Mean intake during the first week of life was 78 ± 12 kcal/kg day with 3.2 ± 0.5 g/kg day of protein and 121 ± 9 kcal/kg day and 3.7 ± 0.2 g/kg day of protein during all the study period.

Postnatal weight loss was limited to the first 2.6 ± 1.2 days of life and BW was regained after 6.5 ± 2.8 days. Weight z score loss was limited to the first 3 days of life and increased in weight z score occurred after 3 weeks. The same number of infants were SGA at birth ($n = 4$) and at discharge ($n = 3$).

Conclusion: This study confirmed that the first week of life is a critical period and that early nutritional support is essential to promote growth. Postnatal growth may be optimized with a dramatic reduction of postnatal growth restriction in extremely preterm infants.

233 – POSTER PRESENTATION

COMPARISON OF TWO DIFFERENT DOSES OF INTRAVENOUS OMEPRAZOLE FOR THE PREVENTION OF GASTROINTESTINAL BLEEDING IN CRITICAL PEDIATRIC PATIENTS

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Background and aims: There are no data about the most effective intravenous dose of omeprazole for gastrointestinal bleeding prophylaxis in critically ill children. The aim of this study was to compare the effect of two different doses of omeprazole on gastric pH and gastrointestinal bleeding.

Methods: We conducted a prospective randomized study in critically ill children. Patients were divided in two therapeutic groups: 1 (0.5 mg/kg/12 h) and 2 (1 mg/kg/12 h). Gastric pH was monitored continuously during 48 h by a multichannel catheter inserted at the admittance in the PICU. Gastrointestinal bleeding was determined by visual inspection. Blood samples were collected at 0.5, 2, 6, 12 and 24 h.

Results: Thirty-five patients (mean age 18.2 months) were included in the study. The median of the plasma concentrations (ng/ml) were at 30 min (690.2 vs 1718.8), 2 h (56.4 vs 309.4), 6 h (1 vs 18.3), 12 h (1 vs 1.1) and 24 h (1.4 vs 9.3) for group 1 and 2 respectively. Patients treated with 1 mg/kg achieved a gastric pH >4 during the 61.8% of the time while those treated with 0.5 mg/kg only during the 47.4% of the time. 50% and 58% of the patients presented coffee grounds in gastric juice in group 1 and 2 respectively, but none patient presented significant clinical bleeding.

Conclusion: The dose of 1 mg/kg/12 h of intravenous omeprazole achieves higher plasma concentrations and longer time of gastric alkalisation than 0.5 mg/kg without significant clinical differences regarding gastrointestinal bleeding.

234 – POSTER PRESENTATION

EARLY PARENTERAL NUTRITION OF VERY LOW BIRTH WEIGHT INFANTS: PRACTICAL APPLICATION

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Background: The goal of parenteral nutrition (PN) for very-low-birth-weight infants (VLBW) is to minimize the risk of nutritional deficiency and complications.

Aim: To evaluate the safety and efficacy of early PN administration in VLBW infants.

Methods: Patients - 26 VLBW babies, admitted to NICU from March to April 2009. PN started on day 1 with glucose and aminoacid solutions (1 g/kg/d), adding lipid solutions on day 2 (0.5 g/kg/d) in gradually increasing quantity. Enteral feeding started according protocol. Daily intakes of fluids, energy and nutritional substances were determined. All babies were followed up during the first 20 days for weight gain, complications related to PN.

Results: The minimal daily needed energy amounts were reached at day 4 (50 kcal/kg/d). Nutritional intakes at day 7-10 (85-90 kcal/kg/d) in most children were enough for growth. Positive mean weight gain for the study period was found (6.6 g/kg/d). Negative weight gain showed critically ill babies who needed fluid restriction. The most common laboratory abnormalities were found in infants with extremely-low-birth-weight: transient hyperglycemia and hypertriglyceridemia (until stable condition was achieved), transient increase of urea levels (in the first week), increase of alkaline phosphatase (in

babies with prolonged total PN). Some subjective errors were established too: no even distribution of the PN for 24 h, missing reduction of PN when enteral nutrition was increased and not exactly calculated daily nutritional requirements.

Conclusions: Early PN in VLBW babies corresponding to their nutritional needs is safe and guarantees adequate growth. PN intolerance show critically ill VLBW babies.

235 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

IS OUR NUTRITIONAL PROTOCOL EFFECTIVE TO ACHIEVE PROTEIN AND ENERGY GOAL INTAKES IN CRITICALLY ILL INFANTS AT DAY-4 POST-ADMISSION?

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Background: Infants often develop cumulative protein and energy deficits during the first week at the PICU. We use an aggressive feeding protocol to establish nutritional goals at day-2 post-admission. This study evaluated its efficacy at day-4 post-admission in relation to outcome.

Objectives: Infants (1 month–1 year) admitted to our PICU in 2008-2009 with LOS ≥ 4 days were studied. Achievement of protein (minimal ≥ 1.8 , optimal ≥ 2.5 g/kg/d) and energy (resting energy expenditure + 30%) goal intakes was determined. Nutritional status and clinical outcome variables were recorded. Data as median (range).

Results: 101 infants (62 male) aged 2.5(11.0) months with various diagnoses were included. 28% was malnourished (< -2 SD weight-for-age) at admission. LOS was 9(140) days; 9% deceased, at median 23(105) days post-admission. At day-4 66% of all patients achieved minimal protein intake, 41% optimal protein intake, 82% energy goal intake. 82% was exclusively enterally fed. During admission 53% declined in SD weight-for-age. The proportion of infants losing weight during admission was smaller in the group receiving optimal protein intake than in the group receiving less (9% vs 27%, $p < 0.05$). Malnourished infants achieved nutritional goals more often than non-malnourished (86% vs 53%, $p < 0.01$), despite severer illness. LOS and mortality were not different between subjects who achieved nutritional goals and those who did not, neither between malnourished and non-malnourished subjects.

Conclusions: At day 4 post-admission our feeding protocol was effective to achieve adequate energy intake in the majority of infants, but protein intake should be improved. Optimal protein intake may prevent weight loss during admission.

236 – POSTER PRESENTATION

THE CHANGE OF PREVALENCE OF NTD IN HIGH PREVALENCE AREAS OF CHINA BEFORE AND AFTER WHEAT-FLOUR FORTIFICATION WITH MULTI-NUTRIENTS 2006–2007

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Objective: To evaluate efficacy of the wheat-flour fortification with multi-nutrients in preventing occurrence and recurrence of NTD among reproductive women.

Methods: We recruited the outcomes of pregnancy in 155 women who took the wheat-flour fortification and 62 women without take as control group.

Results: The findings indicate that prevalence of NTDs with 7.29‰(1/1,000 pregnancies) after the wheat-flour fortification with multi-nutrients reduced in compared to prevalence of NTDs with 19.94‰ before fortification. The geometric mean serum tHcy concentration was significantly higher in the control group(adjusted geometric mean, 95% CI;21.5 mmol/L, 9.6-33.4) than in the intervention group (14.3 mmol/L, 5.7-22.8) after adjustment for confounding factors, including sex, age, gestational week and season; 68.9% of control women and 27.0% of intervention women had serum tHcy concentrations $\geq 15.0 \mu\text{mol/L}$; while the geometric mean serum folate concentration was significantly lower in the control group(adjusted geometric mean, 95% CI; 8.3 ng/ml, 5.8-10.7) than in the intervention group (12.0 ng/ml, 8.6-15.3) after adjustment for sex, age, and season; serum vitamin B12 concentrations was also much more lower in control group (180.0 pg/ml, 95% CI 94.2-265.8) than that of intervention group(207.4 pg/ml, 125.1-289.7), whose deficient rate was 60.0% and 53.3%, respectively. Serum ferritin concentration was much more higher in intervention group (52.69 ng/ml, 95% CI 17.0-88.4) than that of control group (39.23 ng/ml, 95% CI 11.2-67.3).

Conclusions: Fortification of wheat flour is an effective, simple, and inexpensive strategy for supplying folic acid, iron, zinc, vitamin B1, B2 to a large number of the population and also effective intervention for NTD.

Medical Topic 16 - Resuscitation and emergency medicine (237–266)

237 – POSTER PRESENTATION

PIMPLES IN PICU: 20 YEARS OF ADOLESCENTS ADMISSIONS IN REVIEW

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Although adolescence is one of the physically healthiest periods in life, sometimes adolescents' lives are in danger, mainly due to environmental factors, and need to be treated in intensive care units. The authors aimed to take a better look at this subgroup of PICU patients.

Retrospective review of clinical records of adolescents older than 13 years old admitted to our PICU since January 1991 until January 2011. Demographic and clinical data were collected.

During the past 20 years 957 adolescents were admitted to our PICU (6% of 15821 admissions), 521 (54.4%) were male, with a median age of 14 years. Average admissions per year were 36 until 2004 and 75 since 2005. Fifty nine percent were admitted non-electively. The leading cause of admission in this group was trauma and accidents

(168/17.5%); road traffic accidents were the main cause of injury, followed by intoxication with medications as suicide attempts. Respiratory (8.3%), neurological (7.3%), gastrointestinal (3.9%) and oncologic (3.8%) problems were the other most common admission diagnosis. In the 41% of patients admitted electively, the majority had orthopaedic surgery (43%), renal transplant (8%) and oncologic surgery (8%). Average length of PICU stay was 3, 2 days (1-25 days); 80% were transferred to the ward, 10.4% were discharged home and 5.6% were transferred to another hospital. Thirty-five patients died (3.6%).

The main causes of adolescents' admissions in PICU were accidental and non-accidental injuries; some adaptations in the overall treatment need to be made to meet their very own physiological, psychological and emotional specificities.

238 – POSTER PRESENTATION

NORMAL SALINE AS MAINTENANCE FLUID IN RESPIRATORY PATIENTS IN A PICU (PEDIATRIC INTENSIVE CARE UNIT)

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Introduction: A project aiming to study the benefits and risks of normal saline (NS) is ongoing in a portuguese PICU. The authors present the preliminary results of the respiratory patients included in the pilot study.

Methods: Descriptive study with prospective data collection.

Results: Forty-two patients with respiratory disease were included; age 1.9 mean (0.1-16 years); all in mechanical ventilation, invasive or non invasive; Na^+ at admission varied between 135-149 mEq/L (mean 137.6); Na^+ at 24 h was 142.7 mEq/L (135-156) and at 48 h 144.2 mEq/L (138-150); Cl^- at admission was, mean 101.4 mEq/L (90-115) at 24 h 106.8 mEq/L (99-118); mean urinary Na^+ and Cl^- were 93.8 mEq/L (56-224) and 121.6 mEq/L (55-249). Fifteen of the 42 patients had hypotension treated with inotropes and 7 with fluid expansion; 8 patients needed a change in maintenance fluid because of hyponatremia $>150 \text{ mEq/L}$.

Conclusion and discussion: the ideal fluid for severely ill patients is a controversial issue in PIC; NS seems to be a possibility but some issues need to be discussed, as hyponatremia was detected in 20% in this study.

239 – ORAL PRESENTATION

VALIDATION OF A PAEDIATRIC EARLY WARNING SCORE AT REFERRAL OF CHILDREN TO PAEDIATRIC INTENSIVE CARE FROM DISTRICT GENERAL HOSPITALS

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Background and aims: Several paediatric early warning scores (PEWS) have been developed to identify early clinical deterioration of inpatients admitted to wards in children's hospitals. However, a

large proportion of admissions to PICU come from district general hospitals (DGH), and it is not known if PEWS can be used in this population.

Methods: From February-May 2011, data were collected on all children referred to the Children's Acute Transport Service (CATS), where admission to PICU had not been decided prior to referral. The Toronto Bedside PEWS was retrospectively calculated for each patient based on referral data. The sensitivity and specificity of PEWS to predict admission to PICU was studied, and discrimination tested using ROC curve analysis. In retrieved patients, vital interventions during stabilization and transport were also collected.

Results: Out of a total of 391 children evaluated, 153 met inclusion criteria (81 were retrieved to a PICU). 95 children had a score ≥ 8 at CATS referral. The sensitivity and specificity of a score ≥ 8 to predict PICU admission were 77% and 53% respectively. Specificity was mainly weakened by children with acute asthma and diabetic ketoacidosis, who improved at local units despite high scores. AUC was 0.67.

Conclusions: The Bedside PEWS performed relatively poorly in the setting of PICU retrieval. This may reflect different PICU admission criteria for critically ill children referred from other hospitals compared to wards within the children's hospital. Further research is urgently required to develop more reliable and valid early warning scores for the setting of paediatric retrieval.

240 – ORAL PRESENTATION

TWO YEARS EXPERIENCE OF INTENSIVE CARE OUTREACH NETWORK (ICON) AT A LARGE TERTIARY PAEDIATRIC CENTRE

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Background: The Intensive Care Outreach Network (ICON) was an initiative launched at our quaternary paediatric hospital in 2009 in an attempt to improve early recognition and resuscitation of deteriorating children outside of intensive care.

ICON roles include: early evaluation and management of the acutely deteriorating children on the wards, coordinating Intensive Care Unit (ICU) admissions; responding to crash-calls; 48 h follow-up of children discharged from ICU; and simulation training programme.

Methods: ICON activity database review 2009-2011 and comparison pre ICON baseline (2006-2007). Variables recorded included: number of urgent ward reviews and clinical emergency team activation (2222 calls).

Results: ICON reviewed 2268 patients - 522 (23%) as urgent reviews, 1347 (59.4%) as follow-up post PICU/NICU discharge and 341 (15%) as follow-up of flagged patients and 59 (2.6%) as 2222 calls.

Pre-ICON, there were 204 '2222' calls between January 2006-September 2007 (Median 9/week, IQR 7-17) but only 59 between September 2009-May 2011 (Median 2/week, IQR 1-9) which reflects a 71% drop. There is evidence that scenarios that previously triggered '2222' calls and full clinical emergency team activation are now managed with urgent ICON reviews.

Conclusions: ICON is well-established and well-used service. There is a temporal relationship between ICON being available and decreased 2222 calls. ICON has been associated with a reduced threshold for review by the intensive care team.

241 – POSTER PRESENTATION

ADOLESCENTS IN PEDIATRIC INTENSIVE CARE IN PORTUGAL

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Objectives: To characterize the adolescents admitted to PICU, regarding to demographic and clinical variables.

Methods: Prospective study in adolescents (aged between 13 and 18 years) admitted to PICU from 01-Jan-2005 to 31-Dec-2010 (6 years). Collected data were submitted to a central database through a web-based, specifically developed, application.

Results: During the last 6 years from 11016 patients admitted in nine Portuguese PICU, 1432 (13%) were adolescents, 51.7% cases were males. Median age was 14.6 years. Admissions were non-elective in 41 (%). The main admission diagnostic groups were Postoperative (52%), Trauma (12.2%) Respiratory (9.5%) and Neurologic (8%). 68% cases had a documented history of chronic disease, most frequently associated with respiratory and neurologic pathologies. Mechanical ventilation was necessary in 39% of the cases with a median of 3.3 days. Median length of PICU stay was 4.3 days. A total of 58 adolescents died in PICU.

Comments: These data provide useful information in order to characterize the actual status of Portuguese adolescents admitted in PICU and will allow intra-national and international comparisons with other PICU populations.

242 – POSTER PRESENTATION

DECREASING RATE OF CRIMEAN-CONGO HAEMORRHAGIC FEVER IN IRAN DUE TO THE RAPID LABORATORY DIAGNOSIS AND MEDICAL SURVEILLANCE SYSTEM

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Background: Crimean-Congo Haemorrhagic Fever (CCHF) is a viral zoonotic disease with a high mortality rate up to 50% in humans. The virus belongs to Nairovirus genus, Bunyaviridae family and is transmitted to humans through infected tick bite, contact with blood or tissues from infected livestock or nosocomially. CCHF manifestations include fever, myalgia, nausea, hemorrhages and in severe cases it leads to coma and finally death.

Methods: From June 2000 till now, Iranian CCHF probable patients sera were collected throughout the country and sent according to safety procedures to the Laboratory of Arboviruses and Viral Haemorrhagic Fevers (National Reference Laboratory) to be tested by specific Elisa for IgM and IgG detection of anti-CCHF antibodies and by RT-PCR and Real time RT-PCR for analyzing the presence of a fragment of CCHF virus genome in their sera (s segment).

Results and discussion: Due to the state of the art techniques used in our laboratory as National Reference Laboratory to detect accurately and rapidly (in one day time) the confirmed patients and our swift communication of the results to the CDC of Iran, besides thanks to the high quality supportive therapy, nursing care and Ribavirin given to the patients following their admission to the hospital, the current rate of mortality due to CCHF in Iran has dropped drastically to around 10%.

243 – POSTER PRESENTATION

NEONATAL RESUSCITATION CAN BE ACHIEVED FASTER USING A LARYNGEAL MASK AIRWAY (IGEL) COMPARED TO STANDARD BAG VALVE MASK IN NOVICES

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Background: Laryngeal Mask airways, and specifically the i-gel (Intersurgical) airway have been used in the adult population for securing the airway during resuscitation for several years. Achieving an open airway and commencing adequate ventilation is paramount in the majority of newborn resuscitation scenarios. Many of the delays in neonatal resuscitation are related to very simple factors that close the neonatal airway such as poor head positioning, and either pushing on the face mask too hard or not recognising a poor seal around the mask. Our hypothesis was that that use of the Igel LMA would reduce the time taken to secure the neonatal airway in novices.

Methods: We evaluated the insertion of the i-Gel LMA vs the standard bag and mask (BMV) using neonatal manikins. Forty 4th year medical students were assessed using both techniques and the time to completing (i) the first breath and (ii) 5 breaths successfully were recorded.

Results: The mean time to complete the first breath with the BMV was 11.5 s compared to 10.0 s with the iGel. The mean difference was 1.5 s (95% CI 0.8 to 2.4 s, $P < 0.05$). The time to completion of five breaths was 16.8 s versus 15.3 s with the iGel. The mean difference was 1.5 s (95% CI 0.6 to 2.5 s, $P < 0.05$).

Conclusions: The use of an Igel LMA leads to significantly faster resuscitation of the newborn manikin when used by novices.

244 – ORAL PRESENTATION

SHOCKABLE RHYTHMS AND OUTCOMES OF PEDIATRIC IN HOSPITAL CARDIAC ARREST

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Background and aim: The objective of this study was to analyse the results of cardiopulmonary resuscitation (CPR) that included defibrillation in in-hospital CA in children.

Methods: prospective, international, observational, multicentric study was performed. 124 hospitals from 16 european and latin-american countries participated during 24 months. CA in children were analysed using the Utstein template. CA episodes presenting a rhythm which required defibrillation were analysed.

Results: 51 of 564 in hospital CA in children (9%) presented a shockable rhythm. Cardiac disease was the major cause of arrest in this group (57%). Ventricular fibrillation (VF) or pulseless ventricular tachycardia (PVT) was the first documented ECG rhythm in 21 episodes (3.7%). In 30 CA (5.3%) a shockable rhythm developed during resuscitation. The first shock terminated VF or PVT in 11 patients (28.9%). 6 patients (11%) needed more than 3 shocks to solve VF or PVT. ROSC was achieved in 30 cases (58.8%) and sustained in 23 (45%). Only 15 (29.4%) survived to hospital discharge. Children with VF or PVT as first documented rhythm had better survival rates (52.4%) than children with subsequent VF or PVT (13.3%) ($p = 0.004$). Outcome was not related to cause or location of arrest. Survival rate was inversely related with duration of CPR.

Conclusion: Defibrillation is needed in 9% of children who suffer in hospital CA. Termination of VF or PVT after the first defibrillation dose is achieved in a low percentage of cases. Despite sustained ROSC can be obtained nearly half of the cases, final survival remains low.

245 – POSTER PRESENTATION

STUDENTS PRESCRIBING EMERGENCY INFUSIONS UTILISING SMARTPHONES OUTPERFORM CONSULTANTS USING BNFCs

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Objective: To compare the use of a drugs calculator on a smartphone with use of the British National Formulary for Children (BNFC) for accuracy, speed and confidence of prescribing in a simulated paediatric emergency.

Design: 28 doctors and 7 medical students in a paediatric department of a District General Hospital, were asked to prescribe both a dopamine infusion and an adrenaline infusion for a hypotensive child. For one calculation they used the BNFC as their reference source and for the other they used the “PICU Calculator” on the iPhone.

Results: The drugs calculator on the smartphone was more accurate than the BNFC, with 28.6% of participants being able to correctly prescribe an inotropic infusion using the BNFC and 100% of participants being able to do so using the drugs calculator on the smartphone ($p < 0.0001$). The smartphone calculator was 376% quicker than the BNFC with the average time saved being 5 min and 17 s per participant ($p < 0.0005$). Participants were more confident in their prescription when using the drugs calculator on the smartphone with an average confidence score of 8.5/10 compared with 3.5/10 when using the BNFC ($p < 0.0005$).

Conclusions: Utilising the smartphone was significantly more accurate and faster, with prescribers more confident in their calculations, than use of the BNFC. This applied irrespective of clinical experience with medical students utilising the smartphone technology outperforming Consultant Paediatricians when they used the BNFC.

246 – POSTER PRESENTATION

KNOWLEDGE ON PEDIATRIC CARDIOPULMONARY RESUSCITATION AMONG HEALTH CARE PROFESSIONALS IN WESTERN GREECE

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Objectives: To evaluate the knowledge on pediatric cardiopulmonary resuscitation (CPR) among health care professionals working in hospitals of Western Greece.

Methods: The study participants were 314 health care professionals (physicians and nursing staff) from nine public hospitals of Western Greece. Participants filled out a special questionnaire, voluntarily and anonymously. Factors that affected participants' knowledge on CPR, such as gender, age, position in the health care system, previous experience in arrest situations, number of basic life support courses, and last time of training, were analyzed.

Results: 54.1% of the participants were physicians and 45.9% nurses. The 38.2% stated that their knowledge on CPR was sufficient. Only the 29.9% had been trained at least once in pediatric basic life support, whereas the time since last training was 3.2 ± 3 years. Assessing participants' knowledge on basic CPR steps and using a score scale from 1 to 7, the mean total score was 3.1 ± 0.6 . Only the 3.5% responded correct to all questions. Participants with previous CPR training experience had a 4-times greater possibility to know the CPR algorithm (OR 4.2; $P < 0.001$), whereas for each year elapsed since the last training, this possibility was reduced by 20% (OR 0.81; $P < 0.001$).

Conclusions: Knowledge on pediatric CPR of health care professionals working in public hospitals of Western Greece is deficient. This should be attributed to the lack of certified courses and the large time intervals since the last CPR training.

247 – POSTER PRESENTATION

RESUSCITATION PROCEDURES AT BIRTH IN VERY LOW PRETERM INFANTS

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Background: Approximately 10% of the newborns require some degree of resuscitation at birth. Nearly 80% of very low weight (VLBW) babies <1500 g requires some assistance to begin breathing.

Objective: To determine the need to initiate resuscitation procedures at delivery room in this group of neonates.

Methods: Retrospective study including all VLBW infants born in our hospital between January 1 and December 31, 2010.

Results: A total of 195 babies were enrolled 51% males. Median birth weight and gestational age(GA) were 1130 g and 29 + 3 respectively. 115 newborns require any degree of assistance at

birth. 99 were ventilated with Neopuff (82% of total resuscitated and 51% of total of VLBW neonates). 95 newborns were intubated (49% of the total) and 50 of them received early surfactant (44% of total resuscitated). Very few babies required advanced resuscitation with cardiac massage and drugs (7% and 3% of total resuscitated respectively). When it comes to VLBW neonates, resuscitation procedures were more frequent in males (59%) with less weight (1013 vs 1291 g) and GA (27 + 3 vs 30 + 3). Multiple pregnancies were more frequent at no resuscitated group (39% vs 27%) 79% of no resuscitated neonates had received a full course of antenatal steroids and this percentage was higher compared to babies who had received a single or no doses. Regarding to delivery, eutocic delivery and elective cesarean were more frequent at nonresuscitated. Urgent cesarean was more common at resuscitated group. Apgar score was lower and Cribb index was higher at resuscitated.

Conclusions: Compared with data available in literature, resuscitation procedures at birth were less common in our patients (59%) Most of cases required any degree of assistance to breathing. Cardiac massage and epinephrine were exceptional

248 – ORAL PRESENTATION

SUPRACLAVICULAR ULTRASOUND GUIDED CATHETERIZATION OF THE SUBCLAVIAN VEIN IN PEDIATRIC AND NEONATAL INTENSIVE CARE

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Ultrasound guided placement of central venous catheter both increases the success of catheterization and reduces complications compared with the landmark technique.

Catheterization of subclavian vein (SCV) by the landmark technique in child or newborn is associated with a high complication rate and usually requires deep sedation or general anesthesia. In pediatric anesthesia some studies focused on a new ultrasound technique to puncture SCV: the supra clavicular way, which facilitates the visualization of vascular structures.

Objectives: To assess the feasibility and safety of ultrasound (US) guided supraclavicular catheterization of SCV in pediatric and neonatal ICU.

Methods: All children and newborns undergoing supraclavicular US guided SCV catheterization from March 2010 to March 2011.

The placement of central venous catheter in ICU was carried out either by one of the expert in US guided puncture of the unit or by a novice completely supervised by the expert. Success and early complications were recorded. A comparison between novice and expert operators was also made.

Results: 112 catheters were placed in 105 children. The median age and median weight were respectively 10 months and 7 kg. The success rate was 98% and early complication rate was 3.7%. No significant difference was found between expert and novice operators success.

Conclusion: Supraclavicular US guided catheterization of the SCV in pediatric and neonatal ICU seems to be a promising technique in the context of emergency. It is safe, reliable, with few early complications.

249 – POSTER PRESENTATION

END TIDAL CO₂ MONITORING DURING MECHANICAL VENTILATION OF CRITICALLY ILL PEDIATRIC PATIENTS AS A MARKER OF WEANING SUCCESS

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Background: Weaning constitutes a major challenge for the intensive care staff, so a reliable predictor of weaning failure is needed. ETCO₂ is a valuable tool to evaluate ventilation because it provides the caregiver with breath-to-breath information.

Patients and Methods: The study was conducted in pediatric intensive care unit of Ain Shams University. The study population consisted of thirty consecutive patients who were classified into successfully weaning group, which included 20 patients (67%) (Mean age 23.65 months), and Failed weaning group, which included 10 patients (33%) (Mean age 15.40 months). Weaning was considered successful if the patient sustained spontaneous breathing for more than 48 h after extubation. End tidal CO₂ was recorded during 3 phases of mechanical ventilation (*Phase (1):* immediately after ventilation. *Phase (3):* pre extubation period *Phase (2):* period between phases 1 and 3).

Results: End tidal CO₂ monitoring showed non significant difference between group 1 and group 2 during phase 1 (46.10 ± 8.77 versus 62.10 ± 5.97 mmHg $P < 0.05$) and it was significantly higher among group 2 versus group 1 during phase 2 and phase 3 (49.11 ± 1.90 versus -41.26 ± 2.69 and 48.10 ± 1.85 versus 40.20 ± 2.67 mmHg respectively). There was a strong positive correlation between end tidal CO₂ and PCO₂ ($r=0.79$ & $P < 0.05$) Receiver operating characteristic (ROC) curves for End tidal CO₂ revealed that the best cut-off value for capnometry to predict weaning success was <43.5 with sensitivity 90%, specificity 68% and PPV59%. NPV 93% and diagnostic accuracy of 75%.

Conclusion: Capnometry is considered as a non invasive significant predictor for weaning success that can save repeated sampling.

250 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

ASSESSMENT OF PARENTS' PRIORITIES AND SATISFACTION WITH CARE IN THE PEDIATRIC INTENSIVE CARE UNIT OF AIN SHAMS UNIVERSITY

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Background: Evaluation of patients' satisfaction and responding to patients' priorities is a key domain in quality of care improvement.

Objective: To identify parents' priorities and satisfaction with care in the PICU and to assess staff ability to fulfill parents' needs.

Design, setting and participants: We approached 104 parents of children in PICU of Ain Shams University. Face to face interview questionnaire was used in two situations; *first* at admission in the PICU to identify their priorities of care and *second* after discharge to assess their level of satisfaction with care.

Results: Response rate was 91.3% in first situation and 81% in second situation. The majority of responders thought most aspects of care as important. The most important priorities were related to professional

attitude domain (mean = 4.82), care and cure, and information domains (mean = 4.70) while organization domain (mean = 4.36). Regarding parents' satisfaction, "care and cure" was the dimension showing the highest satisfaction score, (mean = 4.16, SD = 0.62), followed by professional attitude (mean = 4.15, SD = 0.56); while parental participation and information had the lowest level of satisfaction (Mean = 2.58 and 2.29). The greatest gap between satisfaction and priorities was related to parental participation and information, while parents' needs were fulfilled in items related to "care and cure" and professional attitude.

Conclusion: Parents' priorities and assessment of their satisfaction rest heavily on communication between physicians and parents and this highlights the importance of good communication with the parents and the need for their involvement and participation as well as partnership between parents and health care professionals.

251 – POSTER PRESENTATION

USE OF THE PEDIATRIC ASSESSMENT TRIANGLE IN CHILDREN WITH POLYTRAUMATISM

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Background: The pediatric Evaluation Triangle (PAT) is composed by three parameters that reflect the global physiological state of the patient, in other words it can give us a general idea of the state of oxygenation, ventilation, perfusion and cerebral function. The components of the PAT are: appearance, work of breathing and circulation. The aim of the study was to describe the relationship among the aspects evaluated in the PAT and the injuries found children with polytrauma.

Methods: It is an observational, prospective, descriptive and longitudinal study carried out from august 2010 to June 2011 in which we included 35 children who met the established inclusion criteria. Variables considered were: gender, components of the triangle, auxiliary diagnostic procedures, found injuries and evolution.

Results: From the 35 children included, 69% were male, the average age was 9.5 years old, the most common injuries were cerebral edema in 24 cases, related to cranioencephalic trauma, the most frequently used study was head computed tomography. The evolution in 94% of the cases was towards improvement. In all the cases there were at least one of altered aspect of the PAT (most commonly appearance).

Conclusions: The PAT includes useful data to make a first general impression, it is useful for children with an illness or in trauma, for that reason it was implemented as a helpful tool in many programs of pediatric advanced life support.

"It is the paradigm of evaluation at first sight", that is why we recommend its utilization.

252 – ORAL PRESENTATION

HOSPITAL ADMISSIONS AND MORTALITY OF CHILDREN ADMITTED TO PAEDIATRIC INTENSIVE CARE IN THE UK—A LINKAGE STUDY

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Objectives: To describe the wider hospital experience of children admitted to paediatric intensive care units in Great Britain, and to investigate factors affecting the number of admissions and long term in-hospital mortality.

Patients: 45,152 children admitted to Paediatric Intensive Care Units in Great Britain before 1st April 2007.

Methods: Data were linked to 'Hospital Episode Statistics' (HES), a dataset recording details of all patients admitted to NHS hospitals. Univariate effects on mortality were analysed using Kaplan–Meier plots and logrank tests; multivariate effects were investigated with a proportional hazards model.

Results: Linkage was 74% complete.

Mortality: Most in-hospital deaths occurred in PICU. 551 deaths in hospital after last discharge from PICU were identified. Factors predictive of death were Paediatric Index of Mortality (PIM) at first admission, South Asian origin, age and diagnostic group ($p < 0.001$ for all). Among diagnostic groups the highest mortality occurred in children with malignancy. Median follow up among survivors was 760 days. Admissions and stay: The number of hospital admissions was highly skewed, and varied by diagnostic group, with children with malignancy having a median of 13 admissions compared with 4 for other groups. Total hospital stay was also longer among children with malignancy.

Conclusion: Linkage to HES data provides valuable information on the wider hospital experience and outcome of children admitted to intensive care. Long term in-hospital mortality is relatively low. A longer term study would provide more information.

253 – POSTER PRESENTATION

RESULTS OF IN-HOSPITAL PEDIATRIC CARDIOPULMONARY RESUSCITATION—A SINGLE CENTRE EXPERIENCE

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Aim of the study: Aim of the study was to assess a short term survival rate in pediatric patients after cardiopulmonary resuscitation (CPR) out of the Pediatric Intensive Care Unit (PICU).

Patient and method: Study was conducted in tertiary pediatric hospital. Retrospective search of all calls for CPR out of the PICU recorded during period of 2 years (2009–2010) in the data base of the PICU has been performed. Data on underlying diseases, duration of treatment and mortality were collected from the hospital digital data base.

Results: Total number of children admitted to the hospital during period of 2009–2010 was 30605 and 32565 respectively. Staff of the PICU was called for CPR 190 times (103 in 2009, 87 in 2010). A majority of patients were below 2 years of age (107 newborns, infants and toddlers). Place of CPR were different hospital wards (most frequent CPR performed in the cardiology ward—44 times, representing 23% of total interventions), 19 children were resuscitated in the emergency unit. In 12 children CPR was stopped, 107 children were admitted to the PICU, treatment of 71 children was continuing on site. Among children admitted to the PICU there were 19 deaths (18%) with a varied period of treatment (from 1 h to 49 days). For survivals length of stay in the PICU varied from 1 day to 92 days.

Conclusions: Results of our study have shown a good short-term prognosis. Further, prospective study is needed to assess a long-term outcome following in-hospital CPR.

254 – POSTER PRESENTATION

FACTORS THAT INFLUENCE NEONATAL TRANSPORT IN ATTICA, GREECE

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Introduction: Since premature and seriously ill neonates continue to be born in hospitals without an appropriate infrastructure, there is a continuous need for postnatal transfer to neonatal intensive care units (NICU).

Purpose: To list the frequency, the main causes of neonatal transport in Attica and to examine a connection between the type of transport and the existence or not of NICU at the hospital of uptake.

Materials and methods: All neonates that had to be transferred to NICU in Attica during 2009. For statistical analysis we used the Chi-square test, from SPSS-15. Statistical significance was set at $p < 0.05$.

Results: 1580 neonates were in need to be transported: 633 from Attica's hospitals, 200 by airtransport, 226 from peripheral hospitals and 507 neonates remained on the waiting list. The greatest percentage of neonates that is being transported derives from Attica's NICU's (62.2%). Most of neonates are transported on the first day of life (51.7%). Respiratory distress (55.6%), prematurity (47.6%) and congenital heart disease (12.6%) are the main causes of transport. Additional 17.8% of neonatal transport takes place because of exceeded hospitalization capacity of the NICU's. Neonates with congenital heart disease are transported mainly from NICU's of peripheral hospitals ($p < 0.001$), whereas neonates transported due to prematurity derive mainly from hospitals in Attica ($p < 0.001$). Neonates that are being transported for intermediate care derive from peripheral hospitals without a NICU ($p < 0.001$).

Conclusion: There is an increased need for neonatal transport in Attica. Increasing the number of intermediate care units in peripheral hospitals and the hospitalization capacity of Attica's NICU's one would reduce the number of neonatal emergency transport.

255 – POSTER PRESENTATION

FACTORS WHICH ARE ASSOCIATED WITH COMPLICATIONS DURING NEONATAL TRANSPORT

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Purpose: To study the frequency of complications during neonatal transport and their correlation with clinical factors, type of transfer and the facilities of the transferring hospital.

Materials and Method: All neonates which were transferred during 2008–2009 by the mobile unit for neonatal transport of National Centre of Emergency Care (EKAB) were studied (N = 1010). For statistical analysis SPSS-15, χ^2 test, and logistic regression were used.

Results: 33.9% of neonates presented with at least one complication during transport: hypothermia (14.8%), hyperglycaemia (10.2%), hypoglycaemia (4.3%), hyperthermia (3.4%), apnea (3.2%), emergency vascular catheterisation and emergency intubation (1.6%).

Hypothermia has statistically important correlation with seasonal distribution ($p < 0.001$) since it is mostly observed during winter. A strong positive correlation was found with birth weight, as 28.9% of ELBW neonates presented with hypothermia but also with hyperglycaemia (18.6%) ($p < 0.001$). On the contrary, hyperthermia presents mainly in NBW ($p = 0.003$).

Neonates which are transferred by airtransport are 33% more likely to develop a complication, 4 times more likely to develop hyperthermia, 23 times more likely to extubate and 3.2 times more likely to require emergency intubation, taking into account various misleading factors. Furthermore, neonates that are transferred from hospitals with NICU are 33% less likely to develop hypoglycaemia, 97% less likely to require emergency venal catheterisation and 96% less likely to require emergency intubation in relation to neonates which originate from hospitals without NICU.

Conclusions: ELBW neonates as well as neonates which are transferred from hospitals without NICU or are air transferred have a greater probability of developing a complication. Hypothermia and hyperglycaemia are the commonest complications observed.

256 – ORAL PRESENTATION

EFFECTS OF ADMISSION PERIOD, UNIT SIZE AND SEASON ON MORTALITY IN PAEDIATRIC INTENSIVE CARE IN ENGLAND AND WALES

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Background and aims: Questions continue to be raised about the effect of out-of-hours admissions and winter pressures on outcomes in different clinical settings and the optimum size of specialist clinical units. We investigated effects on mortality of out-of-hours and winter admissions to paediatric intensive care units (PICUs), and the relationship between mortality and PICU size.

Methods: We conducted an observational study of within-unit mortality among admissions to all 28 PICUs in England and Wales recorded on the Paediatric Intensive Care Audit Network (PICANet) database between 01/01/2006 and 31/12/2009. Out-of-hours admissions were defined as night (20:00–08:00), weekend (Friday 18:00–Monday 07:00) or public holidays. PICU size was categorised into four bands based on average yearly admissions (<300, 300–500, >500–750 and 750+). Risk-adjusted odds ratios (OR) and 95% confidence intervals (CI) were estimated using random effects logistic regression models. Risk adjustment used the Paediatric Index of Mortality 2.

Results: There were 58,829 admissions and 2,854 in-unit deaths. More out-of-hours admissions were emergencies, with higher observed and predicted mortality but with no increased risk-adjusted mortality (OR: 0.91; 95% CI 0.83–1.0; $p = 0.048$). There was a

non-significant increase in risk-adjusted mortality in winter (Nov–Jan) (OR: 1.09; 0.99–1.19; $p = 0.081$). The smallest PICUs had significantly reduced risk-adjusted mortality (OR smallest vs. largest 0.67; 0.50–0.89; $p = 0.005$).

Conclusions: There was no increase in risk-adjusted mortality for out-of-hours emergency admissions or winter admissions suggesting that PICUs provide consistent quality of care throughout the day and week and during winter. Lower risk-adjusted mortality in smaller PICUs requires further investigation into their patient case-mix.

257 – POSTER PRESENTATION

PREEMPTIVE ANALGESIA WITH PARACETAMOL IN PEDIATRIC NEUROSURGICAL PATIENTS

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Objective: To investigate the effectiveness of preemptive analgesia with rectal paracetamol in children undergone neurosurgical interventions.

Methods: With informed consent from parents we enrolled 16 children under 1 year underwent ventriculo-peritoneostomy. Monitoring included pulse oximetry, HR, ECG, NIBP, ETcapnography (Nihon Kohden, Siemens KION). Premedication: oral midazolam (0.08 mg/kg); total intravenous anesthesia: fentanyl (3.5 mcg/kg/h), propofol (2.5 mcg/kg/h); neuromuscular block: pipecuronium (0.1 mg/kg).

Patients received preemptive analgesia with rectal paracetamol before incision (10 mg/kg). In postoperative period all the patients had been receiving rectal paracetamol (10 mg/kg) every 8 h for 2 days.

Blood samples were taken before anesthesia induction, during the operation and the next morning. We investigated prolactin, cortisol levels (IMMULITE). Also we assessed patient's pain with biobehavioral scales (NIPS, CHIPPS, CRIES).

Results: Before operation there were age-related normal hormone levels.

We observed intraoperative increase of prolactin concentration.

On the 1st postoperative day prolactin concentration decreased significantly comparing to intraoperative levels. Levels of cortisol during anesthesia and on the first postoperative day also decreased comparing to preoperative levels.

There was a statistically significant difference ($p < 0.05$) between preoperative and postoperative levels of stress hormones.

Biobehavioral scales in postoperative period showed 0–2 grades in all patients that indicated pain absence.

Conclusion: decreasing of stress-hormones levels demonstrated that the preemptive analgesia with rectal paracetamol provides physiologically appropriate level of postoperative analgesia after neurosurgical operations in children.

258 – POSTER PRESENTATION

EXPANSION OF CONSULTANT WORKFORCE CAN EFFECTIVELY CONFRONT THE SHORTAGE IN JUNIOR DOCTOR RECRUITMENT IN A PAEDIATRIC INTENSIVE CARE UNIT

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Objectives: In September 2009, the number of full-time consultant staff within our institution's Paediatric Intensive Care Unit (PICU) increased from 7 to 13, to confront a national problem of insufficient junior doctor staffing. The additional fiscal cost was zero: junior doctor posts and consultant working hours were reduced in line with the UK consultant contract.

We hypothesised that this change in staffing would not result in a worsening of clinical outcomes and staff satisfaction.

Methods: Setting: 20-bedded PICU in a tertiary paediatric hospital. Retrospective cohort study of clinical outcomes, and survey of staff satisfaction. 12 month time periods before and after the change were compared.

Results: Following the change, the numbers of patients admitted to PICU increased (1204 vs. 1329) and length of stay (LOS) decreased (median LOS 52.5 vs. 45.4 h, $p = 0.048$). The standardised mortality ratio (SMR) did not significantly change (0.83 [95% CI 0.67–0.98] vs. 0.77 [CI 0.60–0.94]).

The proportion of elective cardiac surgery admissions increased (29 vs. 32%), potentially accounting for these differences.

After removal of elective cardiac surgery admissions, the trends of increased PICU admissions (858 vs. 910) and decreased LOS (median LOS 67.8 vs. 61.3 h) persisted, but the differences were not statistically significant.

The survey revealed overall improved staff satisfaction following the change in consultant staffing.

Conclusions: The results suggest that the problem of inadequate junior doctor staffing may be effectively answered by a cost-neutral increase in consultant-delivered care with potential benefits in clinical outcomes and staff satisfaction.

259 – POSTER PRESENTATION

ADMISSIONS AND DEATHS IN UK PICUS FOLLOWING ACCIDENTAL DROWNING

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Objectives: To establish admission patterns to PICU and survival to discharge following accidental drowning in the UK.

Methods: Retrospective review of admissions with 'Drowning' or 'Near-Drowning' to UK PICUs 2003–2009, reported to the National PICU Audit Network (PICANET).

Results: 191 admissions, the number per year (36, 27, 23, 17, 30, 33, 25) remaining similar. Survival to discharge (81, 81, 74, 88, 83, 76, 68%) is fairly static although recently declining. Majority male until 2009 when 56% were female. The median ages are unchanged. Majority of admissions and deaths occur in children 1–4 years old. Death varied between 12 and 32% per year, averaging 21%. The subgroup coded for 'cardiorespiratory arrest' had 38% average chance of death.

Conclusions: Children who suffer 'cardiorespiratory arrest' in the UK following drowning have an average survival of 62%, notably higher than previous estimates following out-of-hospital arrest (6 to 12%) [1, 2], in-hospital arrest (36%) [3], and arrest following drowning reported in a worldwide review of the literature 1966–2004 (23%) [1].

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260 – POSTER PRESENTATION

PRE-PICU CARE OF ADOLESCENTS NEEDING RETRIEVAL TO INTENSIVE CARE

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Objectives: Intensive care for children is initiated by local teams at the point of secondary care presentation. Adolescents make up just over 10% of admissions to PICU, with a different profile of illnesses compared to younger children. We examine if the treatment of adolescents pre-PICU admission is similar to the treatment received by younger children.

Methods: We analysed retrieval data from a centralised paediatric intensive care retrieval service, prospectively collected between January 2009 and December 2010. Children retrieved from neonatal units were excluded. Data were compared according to age (greater and less than 12 years) using univariate analyses to explore referral reasons, care environments, interventions performed and predictors of mortality.

Results: There were no significant differences in referral reasons or outcomes between adolescents and younger children. More adolescents were retrieved from emergency departments and adult ITU compared to younger children. Local teams performed more major interventions in adolescents, although the retrieval teams consequently performed fewer ($p < 0.001$). The PIM2 scores for adolescents tend to be lower ($p = 0.03$) although similar proportions of adolescents and younger children had scores $>30\%$

Conclusion: Local teams are adept at initiating intensive care in adolescents, performing major interventions more readily in adolescents needing retrieval compared to younger children.

261 – POSTER PRESENTATION

NOMOGRAM OF PEDIATRIC RISK OF MORTALITY (PRISM) FOR POSTOPERATIVE CHILDREN BY COMPUTATIONAL METHOD

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Background and aims: The PRISM is the most frequently reported scoring system in PICU trials. We propose a graphic alternative for the complicated logistic function used to calculate the Predicted Mortality Rate (PMR) of PRISM score in post-operative children, and evaluate the impact of age on PRISM score.

Methods: The nomogram was constructed for the main age groups. From 1–19 years, the interval between two curves was 2 years. 8,371 points were calculated by data processing (Excel-Microsoft) for PRISM score values ranging from 0–76, with increments of 0.1, according to Pollack's formula (1988) for postoperative patients: $PMR(ICU_death) = \exp(r) / [1 + \exp(r)]$ where $r = 0.207 \times PRISM - 0.005 \times (\text{age_in_months}) - 0.433 \times \text{operative_status} - 4.782$ (postoperative = 1). The operating range (OR) was defined as PRISM score from 11–40.

Results: Eleven monotonic curves were generated (Fig. 1). Patients with higher PMR are in younger patients (1 month group). Up to 11 of PRISM score, the PMR is lesser than 5% for all age groups. With the Prism of 40, the PMR is always higher than 88.5%. For the same PRISM score, non-operative patients had higher PMR than postoperative children.

Pediatric Risk of Mortality (PRISM) score for Postoperative Children by Age

PRISM score for Postoperative Children by Age

Conclusions: Nomogram by computer models could provide a graphical solution to prevent the lack of reporting of PRM of PRISM score, and could allow the quantification and understanding of the effect of postoperative status in trials of PICU.

Funding: No Funding.

262 – POSTER PRESENTATION

INCIDENCE AND RISK FACTORS FOR DEATH AFTER SUCCESSFUL ECMO WEAN IN PEDIATRIC PATIENTS

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Objectives: Multiple studies on extracorporeal membrane oxygenation (ECMO) for cardiac purposes report attrition in survival from decannulation to hospital discharge, where approximately 20% of all

patients die after surviving decannulation. Our goal was to analyze all pediatric patients in the Extracorporeal Life Support Organization (ELSO) data registry to determine those demographic, physiologic, and ECMO support-related variables associated with mortality after successful decannulation.

Methods: Retrospective cohort study using patients less than 18 years old in the ELSO database from 2007–2009 who were successfully decannulated due to organ recovery (n = 4713). Demographic and ECMO management factors and complications were evaluated using multivariable logistic regression to identify the following independent risk factors.

Results: Weight less than 3 kg (adjusted odds ratio (AOR) 2.4; 95% confidence interval (CI) 1.9–2.9) and delayed time to cannulation (AOR 2.6; 95% CI 2.1–3.4 for >124 h from admission to cannulation) were significant predictors of mortality. Cardiac and ECMO to aid cardiopulmonary resuscitation (ECPR) reasons for cannulation were also associated with nonsurvival when compared to respiratory indications. For ECMO management factors and complications, veno-arterial and thoracic modes of cannulation (AOR 2.4; 95% CI 2.0–2.9) were significant predictors of mortality as well as ECMO courses longer than 223 h (AOR 3.6, 95% CI 2.9–4.5).

Conclusions: Timing, mode, and duration of ECMO in pediatric patients affects mortality even after successful decannulation.

Reference:

1. Morris M et al (2004) Risk factors for mortality in 137 pediatric cardiac intensive care unit patients managed with extracorporeal membrane oxygenation. *Crit Care Med* 32:1061–1069.

263 – ORAL PRESENTATION

LACTATE AND OTHER INDICES OF ACID–BASE STATUS AS ALTERNATIVES TO BASE EXCESS IN THE PAEDIATRIC INDEX OF MORTALITY (PIM2) SCORE

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Background and aims: Base excess (BE), one of 10 variables in the PIM2 score, measures metabolic acid–base status which includes effects of lactate, sodium, chloride, albumin, phosphate and other strong anions. We aimed to test if selective use of these components replacing BE improved PIM2 performance.

Methods: We extracted, for all 5440 admissions to this PICU in 2006–2010, PIM2 variables and admission laboratory results, including pCO₂, electrolytes, lactate, albumin, phosphate. Other strong anions were calculated. Defaults for missing values were chloride 106, sodium 140, phosphate 1.74, bicarbonate 24, lactate 1, other anions 1 mmol/L, albumin 45 g/L. Univariate and multivariate logistic regression examined the relationship with mortality.

Results: 1,900 admissions had missing laboratory values. All 10 PIM2 variables were significant in univariate analysis (p < 0.0001) but blood pressure, recovery and cardiopulmonary bypass lost significance in the standard multivariate PIM2 model. Lactate, albumin,

absolute chloride-106 and absolute phosphate-1.74 were also significant in univariate analysis and in a custom multivariate model (all $p < 0.0001$, high albumin protective) but $p\text{CO}_2$, sodium, other electrolytes and other anions were not. Allowing actual venous BE values in place of default zero increased the area under the receiver-operator characteristic curve from 0.9101 to 0.9142. Replacing BE with lactate, then adding albumin, chloride and phosphate successively increased the area further to 0.9161 then 0.9221, 0.9235, 0.9251.

Conclusions: PIM2 performance is improved by allowing venous BE, and better by replacing BE with lactate, albumin, chloride and phosphate which have significant association with mortality. A prospective multicentre study is needed.

264 – POSTER PRESENTATION

PAEDIATRIC SPINAL CORD INJURY: REVIEW OF PATIENTS TREATED IN A TERTIARY LEVEL PEDIATRIC HOSPITAL

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Background and aims: Spinal cord injury (SCI) is rare in children but is often associated with significant morbidity and prolonged stay in PICU. The main objective of this review was to determine the epidemiology, clinical presentation, imaging studies, treatment and outcome of these patients.

Patients and methods: Retrospective review of patients with SCI admitted to our PICU between 2003 and 2011.

Results: We included 14 patients, 10 were male (71.4%); the mean age was 10 years (3–17). Motor vehicle accidents were the most common cause (42.8%), followed by diving accidents (30.8%). Head trauma was present in 7 patients (50%). Cervical injury represented 78.6% of SCI. Eight patients (57.1%) had complete spinal injury on admission. Vertebral fractures were the most common radiological findings (64.3%). Nine patients (64.3%) were treated surgically, 8 received steroids (57.1%) and five (28.6%) needed vasoactive drugs. Nine patients (64.3%) needed mechanical ventilation (average: 8.2 days; 1–24), none was tracheostomized. Respiratory rehabilitation comprehended daily chest physiotherapy and cough assist. Main complications were urinary (28.6%) and respiratory (50.0%) infections. The average length of PICU stay was 19.2 days (4–46). Nine patients were transferred to the ward and five directly to a rehabilitation centre. At discharge, six patients were tetraplegic and four paraplegic. No patient died.

Conclusions: Most children had cervical injury, as expected due to their anatomical specificities. Very good respiratory rehabilitation care avoided tracheostomies in this series. Multidisciplinary approach maximizes recovery.

265 – POSTER PRESENTATION

INFRARED IRRADIATION DISTURBS PULSE OXYMETRY MONITORING IN PRETERM INFANTS

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Introduction: Over the past years infrared irradiation has gained increasing importance as a source of heat in the treatment of preterm infants. However, in our ward we have become aware of the fact that pulse oxymetry monitoring can be disturbed if the sensor is exposed to infrared light. The study should clarify how sensitively different oxygen sensors react at different distances from an infrared source.

Method: Four different oxygen saturation sensors were tested. The sensors were attached to the index finger of two adult test persons and were exposed to infrared irradiation (Hydrosun 300N, Hydrosun Medizintechnik GmbH). The Hydrosun was localized at a distance of 100 cm and was then approached continuously until the recording on the monitor failed. Both test persons repeated the experiment 40 times with each sensors.

Results: The Nellcor OxiMax Neonatal/Adult Oxygen sensor failed at a mean distance of 41.5 (± 22.6) cm, the Nellcor SC Neo 1.5–5kg Softcare sensor at a distance of 14.6 (± 5.1) cm, the Masimo[®] LNOP NeoPt-L sensor at a distance of 20.5 (± 8.1) cm and the Masimo Set[®] LNOP Neo-L sensor at a distance of 13.8 (± 4.1) cm.

Conclusion: Dependently of their construction design, pulse oxymetry sensors are disturbed in their function by irradiation with broad-spectrum infrared light at different distances ($p < 0.001$). This may be caused by the fact that the sensors cannot distinguish between the ambient light and the light that they produce themselves. The sensors tend to function better when they can be fixed to the patient's skin more firmly and when they are protected against ambient light.

266 – POSTER PRESENTATION

A PROSPECTIVE AUDIT OF THE PROVISION OF PAEDIATRIC HIGH DEPENDENCY CARE IN THE DISTRICT GENERAL HOSPITAL

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Objectives: To determine the number of children and nature of conditions requiring HDU care, and their resource use and outcomes.

Methods: The Children's services at Walsall comprise of a 20 bedded in-patient unit and 8 bedded Paediatric assessment unit. Children meeting the criteria for HDU care were prospectively identified over a 6 month period (October 2009–Mar 2010)

Results: During this period, there were 3,895 children admitted to the children's services.

Of these 44 meet the criteria for HDU care. Majority of these children were admitted through A & E (23/44, 42%) and PAU (20/44, 45%). Infants accounted for 24% of this cohort.

Respiratory problems were the main reason for HDU care (22,50%), followed by neurological (5,11%) and cardiac (5,11%). These children resulted in 90 HDU days. With a difference in the cost of £400/- between the General Paediatric and HDU care, there was a potential loss of revenue of £72,000 annually if these children were not recognised and coded as HDU. 11 (68%) were transferred to Regional PICU and 5 (31%) to other hospitals. 9/16 (56%) were transferred by PICU team, 6 (37%) by the local team and 1 by the anaesthetic team. Majority of children were managed locally (28/44, 63%) which has implications for medical and nursing staff, also for the quality and cost of care.

Conclusions: As a result of this audit, 2 HDU beds have been provided locally which does impose substantial resource commitments.

Medical Topic 17 - Pharmacology (267–275)

267 – ORAL PRESENTATION

TO WHAT EXTENT DOES IBUPROFEN AFFECTS GLOMERULAR FILTRATION RATE IN PRETERM NEONATES?

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Background: We recently quantified the extent of ibuprofen on GFR based on aminoglycoside or vancomycin clearance (-18-22%). Since creatinaemia also is a clinical tool to estimate GFR, we wanted to evaluate if ibuprofen affects neonatal creatinaemia in ELBW (i.e. <1000 g, extremely low birth weight) infants.

Methods: Retrospective study in 152 ELBWs. Clinical characteristics (birth weight, ventilation, respiratory disease) and creatinaemia (day 1, peak crea, day 7, 14, 21, 28) were extracted from the databases. Cases treated with ibuprofen were compared with cases not treated.

Results: 77/152 ELBWs received ibuprofen (10-5-5 mg/kg). Birth weight (785 vs 820 g, $p = .05$), gestational age (26 vs 28 weeks, $p = .0004$), and disease characteristics, both respiratory (ventilatory support 14 vs 4 days, additional oxygen 45 vs 15 days) and non-respiratory disease characteristics (full enteral feeding on day 38 vs 29 days $p = 0.03$, intracranial haemorrhage 32/77 vs 7/73, $p < 0.0001$) were different. Creatinaemia at birth was not significantly different (0.72 vs 0.76 mg/dl), but from the peak creatinaemia onwards (1.2 vs 1.08 mg/dl), observations on day 7, 14 and 21 remained different with subsequent normalization on day 28. In a multiple regression model, ibuprofen administration was only a significant covariate of peak creatinaemia in combination with gestational age or weight. Gestational age was the prominent covariate.

Conclusions: Ibuprofen administration results in increased creatinaemia (+10%) in the first 3 weeks of postnatal age. This does not merely reflect ibuprofen induced renal dysfunction, but also immaturity (gestational age, weight).

268 – POSTER PRESENTATION

BRYOSTATIN-1, FENRETINIDE AND 1 α ,25(OH) $_2$ D $_3$ INDUCE GROWTH INHIBITION, APOPTOSIS AND DIFFERENTIATION IN T AND B CELL-DERIVED ACUTE LYMPHOBLASTIC LEUKEMIA CELL-LINES

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In many acute leukemias, normal differentiation does not occur. However, in many cell lines derived from hematologic malignancies,

differentiation or apoptosis can be induced by variety of agents. Despite advances in the treatment of acute lymphoblastic leukemia (ALL), in most patients long-term survival rates remain unsatisfactory, especially in T-cell derived ALL. Thus we studied the anticancer effects of fenretinide, 1 α ,25(OH) $_2$ D $_3$, and bryostatin-1 in CCRF-CEM (T-cell derived) and Nalm-6 (B-cell derived) ALL cell lines. Using MTT assays, both cell lines were shown to exhibit increased inhibition of proliferation at micro and nanomolar concentrations and induce apoptosis via activation of caspase-3 pathway. Furthermore, for the first time we are reporting consistent anti-proliferative and apoptotic effects of Bryostatin-1 in ALL T-cell derived cell line with the lowest ED50. To evaluate the differentiation induction by fenretinide, 1 α ,25(OH) $_2$ D $_3$, and bryostatin-1 in ALL cell lines, we assayed for the expressions of CD19, CD38 markers on Nalm-6 and CD7 marker on CCRF-CEM cell line. The flow cytometric analysis showed a significant increase in expression of CD markers in response to anticancer drug treatments. Overall results demonstrate that the anticancer agents used in this study are strong inhibitors of ALL cell proliferation and inducers of apoptosis and differentiation in vitro. These findings may be quite significant if these drugs are to be used for differentiation therapy of ALL patients in the clinic in the future. Further studies are warranted to establish the in vivo effect of these drugs particularly in patients with T-cell derived ALL.

269 – POSTER PRESENTATION

MEDICATION USE IN NEONATES: DATA FROM A COMPUTER BASED CLINICAL CHART OF AN ITALIAN NICU

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Background: Despite major improvements in neonatal care, information on the medication use remain poor and a great percentage of drugs are still not labeled for pediatric use.

Objective: To present a picture of medication use in a large Italian NICU and to determine the extent use of off and on-label drugs on neonates, using a computer based clinical chart.

Design/Methods: A retrospective analysis of all drugs administered in our NICU during the year 2009 has been conducted. The drug treatment process was electronically assisted and recorded in the computer based clinical chart. Medicines with no information for pediatric use in the marketing authorization or used with no regard to authorized age/dose/route of administration were off-label.

Results: 641 patients were admitted to our NICU. 439 patients (68.4%) were preterm. 8.9% had a birth weight 1000 g, 13.8% 1001-1500 g, 15.9% 1501-2000 g, 17.5% 2001-2500 g, 43.9% >2500 g. Medications at our disposal were 191: 47.6% were for parenteral route. 24% of medicines were on-label, 75.5% off-label and 0.5% unlicensed. The total amount of drug doses was 121686: 44.3% off-label, 55% on-label and 0.7% unlicensed. 16309 doses (13.4%) were given to term (54.5% off-label) and 105377 doses (86.6%) to preterm (42.7% off-label) infants. The percentage of off-label doses was greater for lower gestational ages.

Conclusions: Our study confirms a persistent extremely high percentage of off-label medicines for neonates. Even if an off-label use of drugs does not imply an improper use, labeling is important to reduce medication errors.

270 – POSTER PRESENTATION

OFF LABEL PRESCRIPTIONS IN PEDIATRIC AND NEONATAL INTENSIVE CARE UNITS

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The aim of this study is to quantify off label prescriptions in children hospitalized in intensive care units.

Patients and methods: The study was prospectively conducted over one day, the 24th June 2010. All prescriptions of 28 pediatric and neonatal intensive care units were included. For each medicine, dosage form, frequency of administration, route of administration and indication were collected. Data were analyzed by using the Vidal[®] dictionary 2010. We have determined for each medicine the reason of the off label: age, posology, route of administration, and indication. Contraindicated medicines were notified.

Results: 282 patients were included: 176 (62%) newborns (82% of them were premature), 64 infants (22, 7%), 64 (10, 3%) children and 13(4, 6%) adolescents. On the whole, 1182 prescriptions were administered, a mean of 4.2 prescriptions for each patient. 176 different medicines were prescribed. 51% of the medicine were off label: 43% were off label for the age; 10.4% for the indication; 5.2% for the dosage and 0.3% for the route of administration. The highest rate of “off label” prescriptions was found in youngest patients. 2% of the prescriptions were contraindicated for the considered patients. 69% of the medicine necessitated a reconditioning to be adapted to a pediatric use.

Conclusion: Too many medicines prescribed extensively in pediatric intensive care unit have not been evaluated. Knowledge concerning pediatric treatment must be improved to ensure safety, efficacy and quality for all drugs prescribed for children's.

271 – ORAL PRESENTATION

AVOIDING WITHDRAWAL SYNDROME AFTER PROLONGED SEDATION IN CRITICALLY ILL CHILDREN

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Objectives: To evaluate the occurrence of withdrawal syndrome after implementation of a sedation weaning protocol for critically ill children exposed to midazolam and/or morphine for ≥ 5 days.

Methods: Two weaning schedules were developed: 1) sedatives ≥ 5 -9 days: IV were weaned by 10% per 8 h; 2) sedatives/opioids ≥ 10 days: IV drugs were weaned by 10% per 24 h and once switched to oral drugs they were tapered off by 10% per 48 h. Patients receiving continuous midazolam and/or morphine for ≥ 5 days (October 2009-October 2010) were included in a prospective observational study. Occurrence of withdrawal syndrome was assessed with the Sophia Observations withdrawal Symptoms-scale (SOS) and was defined as at least two consecutive SOS scores of ≥ 4 within 24 h.

Results: In group 1, Midazolam and/or morphine were administered ($n = 97$) with a median doses of 159 (IQR 90-213) mcg/kg/h and/or 10.9 (IQR 7.8-13.4) mcg/kg/h. In group 2 ($n = 99$) midazolam and/or morphine were administered with a median doses of 206 (IQR 143-296) mcg/kg/h and/or 12.4 (IQR 9.2-17.5) mcg/kg/h. In total, 14

and 35 patients respectively, were observed with withdrawal during weaning. Withdrawal sustained for more than 96 h in 12 (6%) patients (group 2 only). Switching to oral sedation was necessary in 7 and 21 patients respectively, with a median duration of 2 (IQR 2-7) and 8 days (IQR 5-14) during PICU-stay for group 1 and 2, respectively.

Conclusion: Weaning of sedatives with a strict regime is feasible. However, withdrawal syndrome remains a clinically relevant issue, especially in patients sedated for more than 10 days.

272 – POSTER PRESENTATION

USE OF METHADONE IN TREATMENT OF NEONATAL ABSTINENCE SYNDROME: LITERATURE REVIEW

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Background: Substance misuse during pregnancy is widely prevalent in UK. In current practice, substance misusing mothers are maintained on methadone during pregnancy in order to stabilise lifestyle and hence fetal environment. Between 50-80% of babies exposed in utero to illicit substances will need treatment for withdrawal symptoms. Babies with NAS requiring treatment have prolonged hospital stay which interferes with infant-mother bonding, cost implications in terms of neonatal cot days and also increased risk of acquiring nosocomial infection. Methadone is being used in a very small number of neonatal units to treat NAS.

Methods: Literature review of - (i) current available evidence for treatment of babies with Neonatal Abstinence Syndrome (NAS) (ii) pharmacokinetic and dosing information of methadone in treatment of NAS babies

Results: Current popular practice is to treat withdrawal symptoms in babies with oral morphine. Methadone is being used in a very small number of units. Various dosing regimens for methadone are available. Methadone has been approved as a treatment modality for NAS by US Food and Drug Administration and British National Formulary for Children. Methadone has several advantages - oral and parenteral preparations available, good oral bioavailability, longer half life and cheaper. Methadone may reduce the number of neonatal cot days and increase the chances of infant - mother bonding as it can be given in a supervised manner in the community clinics. Minimal literature is available comparing methadone with morphine.

Conclusions: A good quality RCT comparing methadone and morphine is needed.

273 – POSTER PRESENTATION

MEDICINAL PRESCRIPTION AT THE NURSING MOTHER: INCIDENCE AND BENEFIT-RISK FOR THE COUPLE MOTHER-CHILD. EXPERIMENT OF THE MEDICAL NETWORK

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The promotion of breastfeeding is an objective of the National Program Nutrition health. One of the first causes of early weaning is the

medicinal prescription at the mother. The Summaries of the Characteristics of the Product were listed in the dictionary VIDAL, dissuades breastfeeding in 85% of the cases according to a study carried out by the Medical network in 2007. Many of these weaning could be avoided by consulting pharmacological data often underestimated by the healthcare professionals.

Main objective: list the medicinal prescriptions taken by the nursing mother.

Material and method: the questions of the mothers and the healthcare professionals concerning medicines and breastfeeding to the Milk bank of Ile-de-France between January 1st and December 31st, 2009.

Results: the Medical Network was contacted for 666 questions. We classified them by therapeutic class: the antimicrobial (16.2%) in particular antibiotics and Anti-inflammatory (12.4%) are frequently incriminated then Analgesics, antihypertensives, antihistamines and antiepileptics represent approximately 18.4% of the cases. We have estimate if this prescription could be a cause of early weaning and appreciate the concordance between our answer and that in the other sources (American Academy of Paediatrics, T W. Hale). We spotted molecules concerned among most frequently prescribed to engage initiatives with the European agency of the medicine, to facilitate the medicinal prescription at the nursing mother and promote breastfeeding.

Conclusion: as demonstrated by an epidemiological study led by “the motherisk program”, lack of data in this domain carry damage in a strategy of enlightened prescription.

274 – POSTER PRESENTATION

DELIVERING NEONATAL DRUGS RESEARCH: ACCEPTABILITY OF DRIED BLOOD SPOT SAMPLING FOR PHARMACOKINETIC RESEARCH IN PRETERM INFANTS

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Background: Pharmacokinetic (PK) studies are difficult to conduct in neonates, due to the repeated need for blood sampling. A PK study of caffeine was undertaken using dried blood spots (DBS) taken opportunistically during other blood tests. We designed a qualitative study to investigate the acceptability of this novel technique to parents and nurses on the neonatal unit.

Objective: To determine the acceptability of using DBS for pharmacokinetic research in premature infants.

Methods: Nineteen parents, and thirty-one nurses were recruited during the pharmacokinetic study and participated in semi-structured interviews. Interviews were analysed through the constant comparative method.

Results: Parents and nurses felt that research is important to improve outcomes for future neonates, although this was balanced by a need to protect the baby from undue harm or distress. The clinical condition of each baby was deemed important in deciding appropriate sampling volumes and times. Both groups expressed concern that larger sampling volumes would put the baby under additional stress, and lead to more blood transfusions. Opportunistic sampling was viewed positively by parents and nurses, as it avoided further pain to the baby and supported minimal handling. Both parents and nurses felt that using

minimal blood volumes and opportunistic sampling made it easier for parents to consent, and so helped to facilitate successful recruitment.

275 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

WITHDRAWAL SYNDROME AND DELIRIUM IN CHILDREN TREATED WITH EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO); IS THERE A PROBLEM?

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Background: ECMO treatment poses a risk for developing withdrawal syndrome and/or delirium because the patients receive high doses of opioids and sedatives for weeks to months. We aimed to establish incidences of withdrawal syndrome and delirium in ECMO treated children.

Methods: From January 2008 until December 2010, all 116 children (aged ≤ 16) on ECMO treatment (67 neonatal, 49 pediatric ECMO) were evaluated using our Patient Data Management System. When continuous infusions of midazolam and opioids had been administered for at least 5 days, nurses applied the Sophia Observation withdrawal Symptoms-scale (SOS) three times daily or more often when deemed necessary. SOS scores of 4 or higher (score range 0 to 15) are indicative of withdrawal syndrome. The pediatric psychiatrist was consulted in case of suspected delirium.

Results: A total of 4877 SOS scores were obtained in 53 patients. 12.4% of the scores were 4 or higher once or more in 30 patients (26% of all patients). High SOS scores were not related to age group (neonatal vs. pediatric) ($p = 0.80$) or diagnosis group ($p = 0.59$). The diagnosis of delirium was confirmed in seven children (6%), age range 5 months to 16 years.

Conclusions: One quarter of the ECMO treated patients presented with withdrawal symptoms resulting in a longer time to wean medication and therefore a longer PICU stay. The incidence of delirium may be an underestimate because delirium in newborns is difficult to detect. Future studies should focus on the clinical consequences of withdrawal and on strategies to reduce these symptoms.

Medical Topic 19 - General (276–277)

276 – POSTER PRESENTATION

RISK FACTORS FOR NEONATAL MORTALITY IN INTENSIVE CARE AREA OF A SCHOOL-HOSPITAL

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Background and aim: Death in neonatal period is one of the most important health indicators, since it reflect every country quality

attention for maternal-children binomial. For it, study aimed to identified risk factors associated with neonatal mortality in intensive care area of a school-hospital in Mexico.

Methods: Under cases and controls (1:4) design we realized a study with newborns hospitalized in neonatal intensive care unit. Death patients were cases, and those patients showed improvement at discharge were controls. We include children born alive captured during a year, proceeding from gynecological area of medical unit for any reason, across a convenience sampling. Factors were divided in maternal, neonatal and institutional. Data analysis was by crude and adjusted odds ratio.

Results: From 6,108 births in a year, 110 (1.8%) enter to intensive care unit, 19 (17.27%) cases and 91(82.72%) controls. The main risk factors for neonatal death were: neonatal sepsis (OR: 10.3, 95% CI: 4.5-31.7), <1000 g weight and 5 min Apgar <6 (OR: 4.52, 95% CI: 1.3-26.3), and 10 min Silverman-Andersen >3 (OR: 4.27, 95% CI: 2.2-15.5). Not maternal or institutional factors were associated.

Conclusions: The strongest predictors for neonatal death in this neonatal care unit were infection and cardiopulmonary stability evaluations. Relevant maternal-neonatal care vigilance strategies need for identification of babies at risk.

277 – POSTER PRESENTATION

ASSOCIATION OF AIR POLLUTION AND HEMATOLOGIC PARAMETERS IN A POPULATION-BASED SAMPLE OF CHILDREN AND ADOLESCENTS

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Objective: This study aimed to assess the relationship of air pollution and hematologic parameters in a population-based of children and adolescents.

Methods: This cross-sectional study was conducted in 2009-2010 among school students randomly selected from different areas of Isfahan city, the second large and air-polluted city in Iran. The association of air pollutants' levels with hematologic factors was assessed after adjustment for confounding factors.

Results: The study participants consisted of 134 students (48.5% boys) with a mean age of 13.10 ± 2.21 years. While the mean Pollutant Standards Index (PSI) was at moderate level, the mean particulate matter $\leq 10 \mu\text{m}$ (PM₁₀) was more than twice the normal level. Multiple linear regression analysis showed that PSI and most air pollutants, notably PM₁₀, had significant negative relationship with hemoglobin and RBC count, and positive significant relationship with WBC and platelet counts. The odds ratio of elevated WBC increased as the quartiles of PM₁₀, ozone and PSI increased, however these associations reached to significant level only in the highest quartile of PM₁₀ and PSI. The corresponding figures for hemoglobin and RBC were in opposite direction.

Conclusions: The association of air pollutants with hematologic parameters and a possible pro-inflammatory state is highlighted. The presence of these associations with PM₁₀, larger than PM_{2.5} usually considered as harmful, and in a moderate mean PSI level underscores the necessity to re-examine environmental health policies and standards for the pediatric age group. The findings of this study should be confirmed in future longitudinal studies.

Medical Topic 20 - Innovations (278–281)

278 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

EARLY CARDIOTOXICITY EFFECTS OF ANTHRACYCLINE CHEMOTHERAPY IN CHILDREN WITH MALIGNANCIES

I. Begun

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Purpose: Study of cardiac function in children with acute promyelocytic leukemia, osteosarcoma, Hodgkin's disease and to determine of risk factors of early cardiac complications on stages of the anthracycline chemotherapies.

Methods of study: clinical, instrumental, laboratory, statistical. Object of study: the 72 children with acute promyelocytic leukemia, osteosarcoma, Hodgkin's disease receiving treatment on protocols, containing anthracyclines. Subject of study: cardiac function (instrumental and laboratory data).

Results: Determined that cardiac dysfunction frequency on stages of the anthracycline chemotherapies in the children with malignancies forms 21%, but them expression varies from subclinical (diagnosed only by instrumental methods) till to clinical manifestations requiring intensive therapy. During echocardiography monitoring on stages of chemotherapies, containing anthracyclines, in patients were evidences of increasing afterload of the left ventricular and dose dependent change of its contractility. Defined that monitoring of cardiac troponin I during anthracycline chemotherapies can be used for the early diagnostic of cardiac damage. Were established factors of risk of development systolic dysfunctions in patients receiving anthracyclines.

Conclusion: Was developed a strategy of the examination, that includes analysis of the risk factors and monitoring of cardiac function, directed on preventing, revealing and well-timed correction early cardiac dysfunction on stages of the anthracycline chemotherapies. Application: pediatrics, cardiology, oncology, hematology.

279 – ORAL PRESENTATION

AN AUDIT OF OPEN WARD ROUNDS IN A PAEDIATRIC INTENSIVE CARE UNIT

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Objective: Feedback from the Paediatric Intensive Care (PIC) Parent Support group in 2008, expressed dissatisfaction about parents leaving during ward rounds (WR). Parents were upset about the communication gap between them and the physician. Therefore, open ward rounds were introduced. Parental satisfaction increased however staff were uneasy with breaches in confidentiality and reduction in case discussion and teaching time. We have re audited parental and staff views 3 years after open ward round introduction.

Design: Observational study.

Setting: Paediatric intensive care unit with 23 beds. Date February 2011.

Measurements: Satisfaction, Confidentiality, Time spent discussing and teaching,

Parental involvement, Duration of rounds.

Results: A total of 50 staff (majority nurses) and 50 carers (majority mothers) completed the questionnaire. There was an overwhelming parental support of open rounds and division of staff almost by half. The major staff barriers were again perceived breaches in confidentiality and reduction in case discussion and teaching time. 60% of staff felt information was overheard but only 6% of parents admitted to overhearing. Some staff felt discussion improved with parental presence. The parents were unperturbed by staff questioning although felt answers to their questions were short or rushed causing miscommunication.

Conclusions: The study supports open ward rounds. To benefit both staff and parents, it seems reasonable that parental questions should be addressed by the consultant after the ward round where more time can be allocated. Confidentiality, although a major staff issue, is not a parental one. Parents are concentrating only on their own sick child.

280 – POSTER PRESENTATION

DASHBOARDS IN NEONATOLOGY

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Background: The use of clinical dashboards in healthcare is not a new concept, but it is one that has not been widely adopted throughout neonatology in the UK

Methods: The quality improvement project involved the development and implementation of a dashboard into a neonatal unit of a district general hospital in the UK to record performance against local, regional and national standards.

A Selection of Graphs from Our Neonatal Dashboard

Results: The dashboard has played a major role in inducing change within the neonatal unit. Data supplied on occupancy and activity levels was used to form a business case to successfully employ an additional ten neonatal nurses. In this particular instance the use of the dashboard quickly identified problems, induced change and subsequently provided a better standard of patient care.

The dashboard is also used to display results of ongoing audits and track environmental cleanliness scores. The dashboard has proved particularly useful in keeping a record of the uptake of mandatory staff training where it acts as an informal reminder to staff that still need to complete their training.

Conclusions: The dashboard has been successfully integrated into the neonatal unit where it has been a useful tool to monitor performance and induce change.

281 – ORAL PRESENTATION

REDUCTION IN PRESCRIPTION ERRORS ON PAEDIATRIC INTENSIVE CARE WITH ‘ZERO-TOLERANCE PRESCRIBING’

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Background: Prescription errors are frequent on ICUs. Prescribing is perceived as a low status task rather than an essential element of therapy. We describe the impact of an intervention to improve prescriptions and prescription error rates over 36 months

Methods: We altered practice on our tertiary PICU in three stages: Formal consultant review of prescriptions on rounds, requesting error re-writes. Dedicated prescription desks were provided and prescribing elsewhere was forbidden. Interruption of the prescriber at this desk was also forbidden. Daily anonymous feedback from pharmacist was introduced also. These combined interventions were termed ‘Zero-tolerance prescribing’ (ZTP), following a similar approach in Cardiff, UK. Prescription and administration were recorded daily by our pharmacist against 44 criteria, including ‘clinical errors’ (dosage) & non-clinical errors (illegibility). Total errors adjusted for ICU occupancy are presented for the implementation of ZTP.

Results: ZTP has significantly reduced the clinical prescribing and infusion error rates per bed day on PICU, whilst daily feedback significantly reduced non clinical errors.

Prescribing errors - clinical- per bed day

Prescribing errors -non clinical- per bed day

Conclusion: ZTP in this unblinded study demonstrates significant & prolonged reduction in errors. The impact of these changes are potentially highly influenced by local factors but merit consideration on PICU.

Medical Topic 21 - Parent care (282)

282 – POSTER PRESENTATION

THE NEWBORNS AND THEIR HIV MOTHER: AN EXPLORATORY STUDY

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Due to the powerful drug regimens available today, the disease of HIV has acquired a chronic character, with a longer life expectancy. The new medication has made it possible of mothers with HIV, that have a strong natural desire to have children, because they have the possibility of reducing the risk of HIV transmission from mother to child, with combination antiretroviral therapy, caesarean section and formula feeding. To monitor the health status of children born to HIV parents, feasibility project is being performed in a Neonatology Department in a hospital in Rome.

In this exploratory study we will: 1) describe the socio-demographic and health information of 77 children and their HIV families included in the project; 2) describe the care continuity comparing 37 newborns of foreign HIV parents to 40 newborns of Italian HIV parents (use of health services, special tests). Although there are some elements of concern, the data indicate, due to medical progress achieved, women with HIV can now become pregnant with better prospects. However many of the pregnancies are not planned and many women still find HIV infection in pregnancy and despite antiretroviral treatment planning of the child in the first month of life and subsequent monitoring, these mothers often find it difficult to keep track of the follow-up, especially among foreign women, who have to face additional adversity stemming from economic and isolation hardship.

Medical Topic 24 - Renal failure (283–292)

283 – POSTER PRESENTATION

CREATINAEMIA IN ELBW INFANTS: JAFFE VERSUS ENZYMATIC ASSESSMENT IS OF CLINICAL RELEVANCE

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Introduction: Serum creatinine (Scr) reflects glomerular filtration rate to a certain extent in neonates, but also depends on the technique used to quantify Scr [Jaffe colorimetry or enzymatic quantification]. We compared postnatal trends in two consecutive cohorts of ELBW (i.e. <1000 g) neonates before and following the switch in methodology used (Jaffe to enzymatic).

Methods: postnatal Scr (day 1, 2, 3, 4, 5, 6, 7, 14, 21, 28) in a cohort of already reported 151 ELBW cases (Jaffe) [1] was compared to 116 more recently admitted ELBW cases (enzymatic). Data on gestational age (GA), weight and growth restriction (SGA) were also collected. Mann–Whitney U test was used to assess and quantify differences.

Results: Median GA (26 vs 27 weeks), weight (810 vs 825 g) and SGA (29 vs 33%) were similar. Median postnatal Jaffe Scr (0.75, 1, 1.09, 1.08, 0.98, 0.93, 0.87, 0.77, 0.68, 0.61 mg/dl) were significantly higher compared to enzymatic (0.575, 0.85, 0.91, 0.87, 0.81, 0.79, 0.73, 0.55, 0.44, 0.41 mg/dl)(all at least $p < 0.001$). The absolute difference in within-day median values was between 0.14 and 0.24 mg/dl.

Conclusions: the difference between Jaffe and enzymatic assessment of Scr has been confirmed and quantified in ELBW neonates in neonatal life. However, simple conversion from Scr Jaffe to Scr enzymatic based on one single claimed absolute difference as suggested for Scr in adults seems to be inadequate in ELBW neonates.

284 – POSTER PRESENTATION

NEONATAL CREATININE AT BIRTH AND MATERNAL CREATININE AT BIRTH ARE EQUAL, ISN'T IT?

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Objective: Creatinaemia at birth is equal to maternal creatinaemia. This paradigm may also depend on the quantification technique. We compared observations of maternal-neonatal samples in whom Jaffe or compensated Jaffe (maternal) and enzymatic quantification (neonate) were applied.

Methods: Extreme low birth weight infants in two time intervals (2000–2005, cohort 1 and 2007–2010, cohort 2) were included when

paired maternal-neonatal creatinaemia samples were available. In cohort 1, creatinaemia (mothers and neonates) was based on the Jaffe assay. In cohort 2, maternal creatinaemia was based on compensated Jaffe. In neonates, an enzymatic technique was applied. Paired analysis and Bland–Altman were used.

Results: Based on 80 and 52 paired creatinaemia samples, there was no significant difference between maternal ($0.80, 0.41\text{--}1.6\text{ mg dl}^{-1}$) and neonatal creatinaemia ($0.78, 0.31\text{--}1.46\text{ mg dl}^{-1}$) in cohort 1 while a significant difference ($p < 0.001$) between maternal ($0.6, 0.29\text{--}2.24\text{ mg dl}^{-1}$) and neonatal creatinaemia ($0.67, 0.4\text{--}2.2\text{ mg dl}^{-1}$) was observed for cohort 2. Using Bland–Altman, the fit was perfect for cohort 1 (mean diff -0.02 mg dl^{-1}), but not for cohort 2 (-0.08 mg dl^{-1}).

Conclusions: The quantification method affect the paradigm that creatinaemia at birth is similar to maternal creatinaemia. Creatinaemia values in mothers and neonates depend on the method used. Method-specific reference values are needed.

285 – POSTER PRESENTATION

OCULAR AND AUDITORY EVALUATION IN CHILDREN WITH CHRONIC RENAL FAILURE ON HEMODIALYSIS

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Hearing and visual abnormalities are common complications in children with chronic renal failure on hemodialysis.

Aim of the work: Auditory and visual assessment in children with chronic renal failure undergoing hemodialysis and detect possible effect of HD on vision and auditory system.

Subjects and methods: The present study was carried out on 40 children divided into 2 groups.

Group I: Included 20 children with chronic renal failure on regular hemodialysis for 3–4 h trice weekly.

Group II: Included 20 apparently healthy children enrolled as controlled with matched age and sex. All patients and controls were subjected to: 1. Full history taking. 2. Through clinical examination. 3. Laboratory investigations include: serum urea, creatinine and electrolytes. 4. Complete examination of visual and auditory systems. Exclusion criteria: 1. Patients with genetic diseases affect hearing or visual acuity. 2. Patients received ototoxic drugs before examination (aminoglycosides, furosemide). 3. Patients with history of hearing loss, ontological or ophthalmological disease before development of CRF. 4. History of ear trauma, noise exposure, diabetes mellitus.

Results: Our study revealed different ophthalmological abnormalities and variable degrees of hearing loss in patients on hemodialysis.

Conclusion: Periodic assessment of hearing and vision is essential in children with chronic renal failure on hemodialysis for early diagnosis and management of affected children.

286 – POSTER PRESENTATION

PROTEIN LOADING TEST IN WILMS TUMOR SURVIVORS

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Purpose: To evaluate renal functional reserve in Wilms tumor survivors with single kidney

Materials and method: Were evaluated the results of protein loading tests in 25 patients (Wilms tumor survivors with single kidneys (WT)) and 16 healthy children (C). Proteins at acute protein load (PL) given orally (approximately 1 g/kg cooked meat). Renal functional reserve (RFR) estimated in 7–12 (time after nephrectomy 4.5 ± 2.2 years) and 13–18 (time after nephrectomy 7.5 ± 3.4 years) aged groups. The glomerular filtration rate (GRF) was measured by creatinine clearance.

Results: There were no differences in age, body surface area, baseline creatinine and clearance of creatinine between the WT and C groups of children. An average basal level of GRF in 7–12 years in WT was 125% compared with C and 82.6% in 13–18 years (in WT compared with C accordingly). GRF after the PL in 7–12 aged of WT group was $141.32 \pm 10.7\text{ ml/min/1.73 m}^2$ (120.85 ± 5.54 in group C, n.s.), and in WT pts 13–18 aged was $97.92 \pm 6.22\text{ ml/min/1.73 m}^2$ (143.13 ± 6.93 in group C, $p < 0.01$). RFR percentage in WT group aged 7–12 was $16.68 \pm 8.39\%$ ($24.76 \pm 3.47\%$ in group C, n.s.), and in pts 13–18 years - was $14.31 \pm 6.34\%$ ($38.11 \pm 6.98\%$ in group C, $p < 0.05$). Renal functional reserve decreased in ml/min and in % - for WT group 13–18 years compared with control.

Conclusion: We conclude that in 13–18 age group (across 7.5 years after nephrectomy for unilateral Wilms tumor in childhood), there is evidence of decline functional reserve of the remaining kidney

287 – POSTER PRESENTATION

BLACK WATER FEVER RESULTED IN RENAL FAILURE AMONG CONGOLESE CHILDREN

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Background: Black water fever is one of the severe malaria forms described among non immune expatriates who lived for a long time in malaria endemic countries. Autochthon population seemed protected but many cases have been described among them since the change of antimalarial policy in Africa due to the increasing resistance of *Plasmodium falciparum*.

Methods: To describe a profile of black water fever resulting in renal failure, a prospective survey of children with dark urine after a *Plasmodium falciparum* malaria attack was coupled to a documentary study of patients managed 11 years ago in the same health facility.

Results: Sixty-three patients with BWF were included in the study and 42 of them had impaired renal function $<50\text{ ml/min/1.73 m}^2$ assessed by Schwartz formula (66.6%). The mean age of the patients was 8.2 ± 1.73 years. BWF occurred in 13 (20.6%) and 50 (79.4%) patients respectively before the change of antimalarial policy (March 2001) and after this period till December 2007. BWF was associated with quinine ingestion in 51 children (81%) and artemisinin in 11 patients. Urea and creatinine were elevated (mean values: 135.4 ± 88.2 and $3.83 \pm 2.81\text{ mg/dl}$ respectively). Oligo anuria was observed in 44.4%, severe metabolic acidosis in 57.1% and hyponatremia ($<130\text{ meq/l}$) in 30.9%. Fourteen children were died (22.2%) where in 8 of them died before and six after the change of antimalarial policy.

Conclusion: BWF is observed among Congolese children, acute renal failure is the common association observed in those patients and quinine seems to be associated to its pathogenesis.

288 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

RISK FACTORS FOR ACUTE RENAL FAILURE REQUIRING RENAL REPLACEMENT THERAPY AFTER SURGERY FOR CONGENITAL HEART DISEASE IN CHILDREN

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Background and aims: Children who require surgical intervention for congenital heart diseases are at risk of developing renal dysfunction. We have investigated risk factors for acute renal failure following open heart surgery, incidence of this complication, in-hospital mortality, length of stay in paediatric intensive care unit and total in-hospital stay in post-operative period.

Methods: We have identified 139 children who have undergone open heart surgery over a 6 month period between April and October 2009 and obtained data on risk factors.

Results: A total of 12 children (8.6%) developed acute renal failure (ARF), 7 (5%) required renal replacement therapy - peritoneal dialysis or continuous veno-venous hemofiltration. A young age (9.9 ± 17.2 months vs. 41.7 ± 54.1 , $p = 0.043$), perioperative use of nephrotoxic drugs (42.9 vs. 0% , $p < 0.001$), preoperative sepsis (28.6 vs. 2.3% , $p = 0.002$), preoperative ventilation (28.6 vs. 6.1% , $p = 0.081$), longer bypass time (242.7 ± 106.4 min vs. 124.3 ± 72.1 min, $p = 0.002$), and longer aortic cross clamp time (132.1 ± 48 min vs. 74.4 ± 48.1 , $p = 0.007$) were risk factors for ARF requiring renal replacement therapy. Children with ARF spent a significantly longer time in PICU (17.0 ± 5.5 days vs. 3.1 ± 3.0 , $p < 0.001$), had a longer total hospital stay (22.0 ± 8.0 days vs. 8.9 ± 7.1 , $p < 0.001$) and showed increased in-hospital mortality (25 vs. 0% , $p < 0.001$).

Conclusions: Young age, nephrotoxic drugs in perioperative period, preoperative sepsis, preoperative ventilation, longer bypass time and aortic cross clamp time are risk factors for ARF after open heart surgery in children. ARF has a significant bearing on length of PICU and total hospital stay and patient survival.

289 – POSTER PRESENTATION

EXTRARENAL SOFA SCORE AS A PREDICTOR OF THE OUTCOME IN CHILDREN REQUIRING CRRT

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Background and aims: Multiorgan failure (MOF) is one of the major causes of morbidity and mortality in patients with acute kidney injury (AKI). Sequential organ failure assessment (SOFA) score, among various scoring systems of MOF, has been widely used in adults because it is simple, objective and easy to calculate. However, its use in children has been limited because the basal reference level of creatinine differs between children and adults. In addition, recent application of continuous renal replacement therapy (CRRT) may

mitigate the impact of renal component in SOFA score on the outcome. Therefore, we evaluate extrarenal SOFA score (SOFA score excluding renal component) in predicting the outcome in pediatric patients treated with CRRT.

Methods: This retrospective study evaluated 92 consecutive pediatric patients requiring CRRT due to AKI in pediatric intensive care unit between Jan. 2005 and Dec. 2010.

Results: Mean SOFA and extrarenal SOFA score were 10.5 ± 3.7 and 9.6 ± 3.8 , respectively. Overall mortality was 46.7%. Renal component in SOFA score was not significantly associated with mortality. In multivariate analysis, extrarenal SOFA score significantly correlated with the outcome while SOFA score did not. Receiver operating characteristics (ROC) analysis demonstrated that the area under the ROC curve was 0.764 for extrarenal SOFA score and 0.749 for SOFA score.

Conclusions: Extrarenal SOFA score is reliable outcome predictors in critically ill children requiring CRRT.

290 – POSTER PRESENTATION

EVALUATION OF NUTRITIONAL STATUS OF CHILDREN WITH CHRONIC RENAL DISEASE BEFORE AND AFTER NUTRITION

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Malnutrition is a serious and common complication of chronic kidney disease in children. So, early detection of malnutrition in those patients might allow earlier intervention to reduce morbidity and mortality.

Aim of the work: To identify the magnitude of malnutrition in children with chronic renal disease, and to study the effect of early nutrition intervention on nutritional status.

Patients and methods: The study was carried out on 45 children with different chronic renal diseases. 45 healthy children were chosen as controls with age and sex matched.

Methods: All patients and controls were subjected to; 1- Detailed history taking with analysis of dietary intake, 2- Thorough clinical examination with stress on anthropometric measurements, 3-Hematological and biochemical investigations include serum albumin, cholesterol, electrolytes (K, Na, Ca, Po₄) and Hb level.

Results: Our results showed a significant growth retardation in all children with chronic renal diseases and decrease of serum albumin level, most of patients suffered from anemia and Ca deficiency. This study detected that growth and nutritional status in the patients with chronic kidney disease were impaired, and early nutrition intervention improve their nutritional status. Level of socioeconomic stander has an effect on nutritional status, So effective social intervention can affect medical status and treatment outcomes.

291 – POSTER PRESENTATION

ACUTE KIDNEY INJURY IN A NEONATAL INTENSIVE CARE UNIT: THE EXPERIENCE OF A CENTER FROM TURKEY

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Background and aims: To evaluate the clinical characteristics of newborns with acute renal injury (AKI) and to determine risk factors associated with mortality.

Methods: We reviewed the records of 168 neonates with AKI cared for at a single tertiary center between January 2009 and January 2011. Diagnostic criterion was accepted as plasma creatinine level higher than 1.5 mg/dL or rising more than 0.3 mg/dL/day after 48 h of birth, while maternal renal function was normal. Multivariable logistic regression were performed to analyze risk factors for mortality.

Results: One hundred sixth-eight of 2028 neonates (8.4%) fulfilled the inclusion criterion for AKI. The mean gestational age and birth weight of the infants were 33 ± 4.1 weeks and 1959 ± 767 g, respectively. Respiratory distress syndrome (38.1%) was the most common cause of AKI, followed by sepsis (19%), asphyxia (15.5%), dehydration (9.5%), congenital anomalies of urinary tract (7.1%), congenital heart disease (6%) and medications (4.8%). Forty infants (23.8%) with AKI died. Birth weight <1500 g (OR 9.8, 95% CI 3.4–28.4), the presence of mechanical ventilation (OR 8.9, 95% CI 1.7–45.1) and anuria (OR 19.3, 95% CI 5.2–71.1) were the risk factors for mortality in multivariate analysis.

Conclusions: In preterm infants with birth weight <1500 g who needed mechanical ventilation, close monitoring of urinary output may play an important role in terms of mortality in neonatal intensive care units (NICU). Careful monitoring of AKI should be carried out since it may present in nonoliguric form in premature infants. Neonatologists should consider AKI as a potential cause of mortality among neonates admitted to NICU.

292 – ORAL PRESENTATION

ACUTE KIDNEY INJURY IN CHILDREN TREATED WITH EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)

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Background: Most ECMO treated newborns have hemodynamic instabilities. These may lead to acute kidney injury (AKI), in which case the dosage of renally eliminated drugs should be adjusted and nephrotoxic drugs must be avoided. We aimed to characterize the incidence of AKI in newborns receiving ECMO support without standard renal replacement therapy (RRT).

Methods: We retrieved clinical data from computerized patient records (including age, diagnosis, ECMO course, and serum creatinine concentrations) of all neonates on ECMO within our institution, spanning a 13 year period. AKI was defined using the creatinine-based pRIFLE classification. Serum creatinine (SCr) data were reviewed per ECMO day and patients were assigned to the appropriate pRIFLE strata (Risk, Injury, or Failure as 150, 200 or 300% of 50th percentile of SCr for age).

Results: 248 patients were included of whom 68 died (27%). The median age at the start of ECMO therapy was 1.6 days [IQR 1.1 – 2.6]; the median ECMO-duration was 5.8 days [IQR 4.0 – 9.4]. 176 patients (71%) had evidence of AKI, with 77 (43%) qualifying as Risk, 63 (36%) as Injury and 37 (21%) as Failure. Eight patients were treated with RRT to assist in fluid removal. Mortality rate increased with increasing AKI severity (mortality in the patient group classified as Risk was 13%, Injury 30%, and Failure 61%).

Conclusions: More than two-thirds of neonates on ECMO developed acute kidney injury. As AKI during childhood may predispose for chronic kidney disease in adulthood, long-term follow-up of kidney function after ECMO is warranted.

Medical Topic 25 - Liver failure (293–295)

293 – POSTER PRESENTATION

MUSHROOM POISONING IN CRITICALLY ILL CHILDREN

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Aim: To determine the course of liver failure in critically ill patients with mushroom poisoning.

Methods: The patients who were admitted to PICU with diagnosis of acute liver failure due to mushroom poisoning between December 2005 and December 2009 were enrolled retrospectively.

Results: Eleven patients (M/F, 4/7, mean age 6.8 ± 4.2 (1.2–15.5) years) admitted to PICU. ALT value was elevated in ten of the patients at admission and reached a peak within 12 h in 2 cases, at 24 h in 4 cases, at 36 h in 2 cases and at 48 h in 1 case after referral. The peak median ALT value was 6003 (16–9400) U/L. AST value was elevated in 5 of the patients at admission and reached a peak value in 3 cases at 24 h, in 1 case at 36 h and in 1 case at 48 h after referral. The peak median AST value was 6474 (279–11189) U/L. Serum TB value was found >2 mg/dL in 7 cases at admission, and reached a peak value in one case at 12, 24 and 36 h and in 2 cases at 48 h after referral. The peak median TB value was 2.6 (0.6–17.5) mg/dL. PT value was >15 s and INR value was >1.2 in 10 of the patients at admission. The peak median PT and INR values were 39.7 (15.5–85.4) s and 2.9 (1.3–6.1) respectively.

Conclusion: Liver function tests of patients can deteriorate within the first 48 h whereas individual variances are common.

294 – POSTER PRESENTATION

EVOLVING CHANGES IN THERAPEUTIC APPROACH TO NEONATAL HAEMOCHROMATOSIS (NH): A SINGLE CENTRE EXPERIENCE FROM 1996-2011

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Background: NH is a rare, acquired alloimmune disease with acute liver failure and often fatal outcome. A retrospective review of all

patients with NH presenting since 1996 to our centre was performed to compare outcome of antioxidant treatment with novel treatment options.

Methods: Diagnosis of NH was based on evidence of extrahepatic siderosis by histology and/or MRI of endocrine tissue.

Results: Fourteen infants aged 5–40 days (11 boys) were identified. Thirteen patients received antioxidant cocktail, of whom 4 survived without liver transplantation (OLT). One of the children died on the transplant waiting list whereas 3 death were deemed unsuitable transplant candidates. Four patients received OLT within 3 month (3 weeks–3 month) of age, 2 of them died 2 resp. 10 days post-OLT. Two patients were still alive 1 resp. 13 years after OLT. Recent pathophysiological data suggests activation of fetal complement cascade by maternal antibodies. Novel treatment strategies with exchange transfusion and intravenous immunoglobulins (IVIG) have therefore been based on antibody removal and/or blockage of complement mediated liver injury. In 2011 we successfully treated a 7 day old boy with exchange transfusion and IVIG. He survived without OLT and was discharged 5 weeks after therapy.

Conclusions: NH is a live-threatening disorder and presents as neonatal acute liver failure. Rapid diagnosis and management is essential and may lead to improved survival rates even without the need for liver transplantation. We advocate a systematic registry based approach to all children with neonatal liver failure with standardized diagnosis and management.

295 – POSTER PRESENTATION

NEONATAL CHOLESTASIS

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Objectives: This study aimed to provide the analysis of clinical presentation, results of laboratory and imaging investigations as well as clinical outcome of children with cholestasis.

Methods: Infants with neonatal cholestasis referred to Children's Hospital from 2002 to 2007 were participated in the study in a cross-sectional prospective study. Appropriate diagnostic criteria and tests were employed for diagnosis the underlying etiologies of neonatal cholestasis. One year mortality rate was determined.

Results: One hundred twenty one infants, 75 males and 46 females, with the mean age of 58.3 ± 15.3 (14–120) days were enrolled in study. Jaundice (94.2%) and hepatomegaly (66.1%) were the most frequent symptom and signs on admission. Idiopathic neonatal hepatitis (36.4%), extrahepatic biliary atresia (24.8%), metabolic disease (20.7%), intrahepatic ductal paucity (10.7%), intrauterine infection (3.3%) were the most frequent causes of neonatal cholestasis. One year mortality was 5.8%.

Conclusion: There is still not one effective and specific diagnostic method in differentiating between the causes of cholestasis in the newborns and infants. Some potentially important differences in the disease pattern, initial presentation and long-term outcome are suggested from the present study when compared to previous reports from other parts of the world.

Medical Topic 26 - Transplantation and organ donation (296–299)

296 – POSTER PRESENTATION

FIRST PAEDIATRIC EXPERIENCE OF NEAR-INFRARED SPECTROSCOPY (NIRS) AS A CONTINUOUS REAL-TIME MONITORING FOR KIDNEY GRAFT PERFUSION

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NIRS is a non-invasive technique to study tissue oxygenation; our purpose was to investigate its role in monitoring for kidney graft perfusion up to 72 h post-transplantation (Ktx).

Consecutive children undergoing living-related (LR) or deceased-donor (DD) Ktx were prospectively enrolled. The values of renal regional oxygen saturation index (rSvO₂) were correlated with clinical/biochemical markers of adequate renal perfusion (serum creatinine and urinary neutrophil gelatinase-associated lipocalin [NGAL], collected every 12 h for 3 days). Color-Doppler-ultrasonography (CDUS) was performed daily to assess renal perfusion and intrarenal resistive index (RI).

Fifteen children were included, 4 underwent LR-Ktx and 11 DD-Ktx. Median age at Ktx was 9.2 years (1.6–17.8). The IS regimen consisted of prednisone + tacrolimus + MMF. No children experienced delayed graft function. In all patients CDUS showed normal vascularization and RI. Basal rSvO₂ values were lower in DD-Ktx (median 65) than in LR-Ktx (median 85; $p < 0.05$). In all DD-Ktx cases a relative increase of rSvO₂ values from baseline was found after 72 h (median 80; 67–95). During the 72 h post-transplant of NIRS monitoring:

- rSvO₂ values showed correlation with both hourly diuresis ($r=0.7$; $p < 0.05$) and serum creatinine ($r = -0.86$; $p < 0.001$);
- NGAL exhibited a trend of decrease from baseline in DD-Ktx (median 297.35 ng/ml at baseline vs. 35.7 at 72 h), with a significant negative correlation with rSvO₂ ($r = -0.75$; $p < 0.05$). Less significant correlation ($r = -0.36$) was found in LR-Ktx, in which NGAL baseline values were lower (median 85 ng/ml).

Our results suggest that NIRS could become an adequate method for a real-time evaluation of kidney graft perfusion during the first hours after transplantation.

297 – POSTER PRESENTATION

VENO-VEINUS EXTRACORPOREAL MEMBRANE OXYGENATION IN A PEDIATRIC NONINTUBATED PATIENT AS A BRIDGE TO REDO LUNG TRANSPLANTATION

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Veno-venous ECMO has been used as a bridge to lung transplantation. We will describe a case about a 9 year-old boy, who underwent

bilateral lung transplantation 3 years ago due to bronchiolitis obliterans. He was delivered to the Emergency Department giving signs of end-stage pulmonary function related to hypercapnic status [PaCO₂ 120 mmHg]. At that moment he already was on the waiting list. Considering his clinical status, we eventually decided to support him with veno-venous ECMO.

The peculiarity was the use of noninvasive mechanical ventilation carried out with a helmet CPAP during veno-venous ECMO support for 10 days when an organ donor became available and the redo transplantation was performed. Spontaneous ventilation was intentionally maintained in order to decrease the already established pulmonary damage inherited from the previous lung transplantation. We believe that the advantages of this technique include: 1] a better heart–lung interaction (avoiding a raise in the thoracic pressure typically related to the conventional mechanical ventilation), 2] a decreased risk of barotrauma, 3] decreased risk of ventilator-associated pneumonia, 4] a conscious sedation and avoidance of neuromuscular blocking drugs. Disadvantages include: 1] management of psychological support owing to the disease 2] lack of child-tailored device for noninvasive ventilation (i.e. pediatric helmet for CPAP), 3] technical issues related to nurse management of ECMO vascular accesses and ventilatory support devices, 4] management of bleeding in conscious patient.

Conclusion: veno-venous ECMO in spontaneous breathing as a bridge to lung transplantation is feasible even in the pediatric field.

298 – ORAL PRESENTATION

NEONATAL NON-HEART BEATING ORGAN DONATION: IS IT WORTH IT?

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Background and aims: The gap between organ supply and demand is growing every year. The aim of this study is to determine whether neonates could be an infant organ donor population by identifying potential non-heart beating organ donation candidates in a level III NICU.

Methods: Retrospective study of all deaths after withdrawal of life support in neonates of ≥ 37 weeks of gestational age between 2000 and 2010. Exclusion criteria for potential candidates were developed by neonatologists and transplantation surgeons.

Results: During the study period 85 deaths occurred of which 75 were excluded (7 had a weight at death < 2500 g, 34 didn't require mechanical ventilation at the time of withdrawal of life support, 4 had sepsis, 1 had encephalopathy of unknown aetiology, 23 had severe hemodynamic instability, 6 didn't have suitable organs for donation). Of the remaining 10 possible candidates, 7 had a time of warm ischemia less than 2 h and were potential donors of 5 hearts, 12 kidneys, 6 livers and 7 bowels.

Conclusions: Although the number of possible candidates is low (8.2%), neonatal non-heart beating organ donation should be considered. Infants in the waiting list for bowel transplants would benefit the most, since most of them are under 1 year of age with a low weight and, the shortage of donors and the mortality rate among them are rising. However, before implementing any transplantation policy, ethical issues about neonatal organ donation should be well discussed so as to avoid conflicts between palliative care and organ recovery.

299 – ORAL PRESENTATION

RISK FACTORS FOR MORTALITY IN BONE MARROW TRANSPLANT RECIPIENTS IN PICU: INVASIVE VENTILATION REVISITED

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Introduction: Bone marrow transplant (BMT) recipients have a high mortality when admitted to PICU. Mortality is higher in BMT patients with respiratory failure. A retrospective review of BMT patients admitted to PICU was conducted with the objective of identifying factors that might differentiate survivors.

Methods: A search of a PICU database was conducted over a 5 year period. Reason for admission, pre-BMT conditioning, ventilator settings, ventilator days and outcome were collated. The peak Oxygenation Index (OI) was calculated for each of the first 3 days of invasive ventilation.

Results: 44 BMT patients were captured amounting to 59 admissions between 2004 and 2009. 19 of these admissions were intubated. The mortality in intubated patients was 36.8%. All self-ventilating patients survived. None survived > 4 days of invasive ventilation or advanced ventilation. The peak ventilator days was 43. Patients who receive total body irradiation (TBI) and chemotherapy prior to their BMT have a higher mortality than those with chemotherapy alone. Those who received allogeneic BMT had a higher mortality rate than those who received autologous transplants. Mean OI on days 1-3 of invasive ventilation was lower (4.79) in survivors compared to non-survivors (30.73), this was statistically significant ($p = 0.00076$).

Conclusion: The mortality associated with intubated BMT patients is lower than previously reported. Risk factors for mortality in BMT patients admitted to PICU are; invasive ventilation for > 4 days, TBI, allogeneic BMT and advanced respiratory support. OI may be a useful adjunct to clinical decision making in this patient group.

Medical Topic 27 - Education (300–307)

300 – POSTER PRESENTATION

“LOOK WHO’S TALKING”: HOW WELL ARE WE COMMUNICATING WITH PARENTS IN THE NEONATAL UNIT? A PATIENT SURVEY

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Background: Emphasis on communication skills in medicine is increasing. Parental anxiety on the neonatal unit (NICU) is high. Good communication by health care professionals can improve parents' experience at a difficult time.

Objectives: To assess parental attitudes to communication in NICU and identify areas of weakness.

Methods: A structured questionnaire using Likert scales and free text regarding different statements about communication with members of the multidisciplinary team in a tertiary level unit. Confidential questionnaires were posted and handed to parents over a 3 month period at discharge and outpatient visits.

Results: 17/19 (89%) returned anonymous questionnaires in clinic and on discharge. 8/40 (20%) returned the posted questionnaire. Of the 25 respondents: 72% completely agreed that they were satisfied with updates; 50% with adequate frequency of updates; 65% that doctors content was adequate; 80% felt comfortable asking questions. 60% felt that they were updated by the most appropriate member of the team; 85% completely agreed with the statement that “doctors spoke in a way that I could understand”. 28% completely agreed and 33% somewhat agreed that written information was given to back up discussions. 35% expressed a wish for prearranged updates. Some parents raised concerns that conversations occurred by the cotside where others could listen.

Conclusions: Overall satisfaction about communication in NICU is high but our study identified a need for more frequent updates; privacy; written information; psychologist support and addressing of spiritual needs. Training and guidelines should focus on these aspects of communication.

301 – POSTER PRESENTATION

PSYCHOSOCIAL ASSISTANCE DECREASED POSTTRAUMATIC STRESS DISORDER AND DEPRESSION AMONGST PRIMARY AND SECONDARY SCHOOLS STUDENTS IN POST-WAR BOSNIA HERZEGOVINA

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Objective: To estimate whether psychosocial support of the School Project UHD “Priateljice-Friends” positively affect on reducing of posttraumatic consequences in Bosnia-Herzegovina primary and secondary school students, after the war period 1992-1995.

Subjects and Methods: The stratified sample of 336 students, aged of 13.6 ± 1.9 , in primary and secondary schools, involved in psychosocial support, compared with 72 randomly selected peers from the same schools, not involved in this project. Data were collected in December 2005 and in May 2006. The Children Depression Inventory and Index of Children Post-traumatic Reactions were utilized. Statistical analysis involved McNemar’s test, Students’ t test, Chi-square test and Pearsons’ correlation test.

Results: According to DSM, the prevalence of PTSD and depression among students involved in the School Project, significantly reduced from (46.1 to 13.4%; 25.6 to 1.8%, respectively) (McNemar’s test, $P < 0.001$; $P < 0.001$, respectively). In the control group the prevalence of PTSP and depression reduced from (30.5 to 23.6%; 22.2 to 11.1%, respectively), with no significance (McNemar’s test, $P = 0.332$; $P = 0.077$, significantly). Girls had significantly higher prevalence of both PTSD and depression compared to the boys. Age, number of traumatic episodes, and suicidal behavior correlated with the intensity of PTSD symptoms and depression symptoms.

Conclusions: Psychosocial support within the School Project resulted with significant reduction of PTSP and depression amongst involved students compared to controls. Schools and other institutions ought to envisage as many as possible projects to be implemented in schools and out-of-schools in order to assist youth to easier overcome consequences of no favorable war in their development.

302 – POSTER PRESENTATION

INFUSIONMANAGEMENT-WORKSHOP: A NEW DIDACTIC TOOL TO IMPROVE PATIENT’S SAFETY ON THE PICU

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Introduction: Intravenous administration of fluids and drugs is essential in the treatment of critically ill patients. In the last decades the complexity of intravenous drug therapy increased. As a consequence, the correct administration of drugs and fluids is a challenging duty for the staff. Recent clinical trials showed that up to 46% of the treatment errors on intensive care units were related to infusion therapy.

Aim: To develop an infusion-management workshop for physicians, nurses and pharmacists to create an interdisciplinary forum to learn about all features of infusion therapy.

Concept: Based on three interactive hands-on modules and different presentations giving background information and data about recent clinical trials, this course should enable participants to optimize their own infusion regimen and therefore improve patient’s safety.

Module 1: Compatibility in the Catheter: introduction of a computer program for the detection of incompatibilities with practical training and presentation of typical incompatibility reactions.

Module 2: Vascular access: presentation of different central venous catheter types, technique of venous access under sterile conditions, ultrasound and Doppler for venous access, training of intraosseous access with drill and needle.

Module 3: Hardware in Infusion therapy: technical specifications of equipment, handling of in-line Filters to prevent particle infusion, working on complex patient’s scenarios.

Results and conclusion: 18 courses with more than 400 participants indicate the broad acceptance of the new course concept. Post course evaluation reveals a high rate of contentment. The assessment of the evaluation questionnaire underlined the necessity for standards in infusion therapy to increase patient’s safety.

303 – POSTER PRESENTATION

DO I KNOW THE PATH AHEAD? (LOOKING AT THE THOUGHTS OF AN INFANT AFTER DISCHARGE FROM THE NEONATAL UNIT)

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Aim: Neonatal Intensive care has advanced leaps and bounds reducing morbidity and mortality in majority of sick babies. The audit was to assess existing local and national practice in the follow-up of newborns at risk (less than 32 weeks gestation and or under 1500 g). Questionnaires were sent to neonatal units across the UK.

Method of data collection: Answers from questionnaires.

Results: Received 108 questionnaires of which 88 (81%) were from district general and 20 (19%) from tertiary hospitals. 70 (65%) units

surveyed had unit guidelines, 37 (34%) did not and in 1 (1%) there was no reply. Follow up in majority, 59 (50%) occurred at 6 weeks, second follow-up varied with the majority 43 (40%) were followed up between 3–6 months. Subsequently follow up was at 6 months 32 (29%) and 12 months 38 (35%). Majority 76(70%) were discharged at 2 years of age.

107 (99%) of these clinics were consultant led and over 76 (70%) had follow up with other teams which included physiotherapy 46(42.5%) and occupational therapy 55 (50.9%). An assessment tool was used in 82 (75.9%), Bailey 22 (20%), Griffiths 26 (24%). These assessments were performed by consultants/doctors 68 (63%) and community team in 20 (19%) cases at varying periods of time between 1 and 2 years of age.

Conclusion: The absence of national guidelines in the follow up of neonates at risk.

Clear evidence that problems identified and supported early have an impact on the long term development.

Recommendation: National guideline on follow up of neonates at risk.

304 – POSTER PRESENTATION

COMPLIANCE OF PRE-OPERATIVE PRACTICE WITH NICE GUIDELINES: A PROSPECTIVE CASE ADJUSTED AUDIT

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Introduction: Preoperative care of the surgical patients has a major impact on the surgical outcome and is an essential part of a good surgical practice. The aim of the preoperative care is to improve surgical outcome by identifying medical disorders and any other difficulties and, if feasible modify risk factors that might adversely influence the results. The aim of this audit is to measure the compliance of the Trust with NICE recommendations.

Patients and methods: It's a prospective audit. All patients undergoing preoperative assessment in preoperative admission clinic in 1 month were included. Access database and patients notes were used to collect data. Total of 780 tests were carried out. Standards were selected from 'Current Surgical Guidelines' published by NICE in 2003.

Results: The total number of tests carried out in accordance with the guidelines was 384 (49.2%).The total number of tests not carried out in accordance with the guidelines was 229 (29.4%).The total number of tests inappropriately carried out when patients did not meet the pre-op criteria was 89 (11.4%). Therefore the appropriateness of preoperative tests in compliance with the NICE guidelines was 59%.

Conclusion: We suggest teaching sessions for junior doctors as well as for nursing staff, responsible for the preoperative assessment clinics. We also suggest regular auditing of our practice to improve our practice.

305 – POSTER PRESENTATION

DNA DETECTION OF PERIODONTAL PATHOGENS IN THE SALIVA OF NEWBORNS, SIX-MONTH AND TWELVE-MONTH-OLD INFANTS

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Background and aims: Improved genetic diagnostic methods suggest that acquisition of pathogens associated with periodontal diseases occurs earlier than previously appreciated. The presence of these microbes can represent a risk factor for early onset periodontal diseases. The aim of the study was to identify the main known periodontal pathogens in the saliva of newborns and infants.

Methods: 34 three day old healthy newborns, 58 six month old healthy preterm infants and 45 twelve month old healthy infants were randomly selected into study. Before examination of infants, parents gave written consensus. Unstimulated saliva samples from dorsal mucosa of tongue and alveolar mucosa were collected with sterile swab and used for detection of the most important periodontal pathogens (Aggregatibacter actinomycetemcomitans, Porphyromonas gingivalis, Tannerella forsythensis, Treponema denticola, Parvimonas micra, Fusobacterium nucleatum, Prevotella intermedia). Bacterial species were identified using PCR based method (test StomaGene[®], Czech Republic).

Results: The periodontal pathogens (Aggregatibacter actinomycetemcomitans, Prevotella intermedia, Fusobacterium nucleatum) were found in saliva of 2.9% newborns, 63.8% six-month-old preterm infants and of 95.6% twelve-month-old infants.

Conclusions: The periodontal pathogens are rarely detected in newborns' saliva, but they can occur in oral cavity of preterm six-month-old infants. The presence of periodontal microbes in oral cavity of twelve-month-old infants was common finding in our study. Supported by Grant IGA Health Ministry of Czech Republic NS/9732-4.

306 – POSTER PRESENTATION

IMPROVING TEAMWORK BETWEEN OBSTETRICIANS & NEONATOLOGISTS AT THE PRENATAL STAGE BY ESTABLISHING AN ALGORITHM FOR JOINT REVIEW OF CASES AT RISK

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One of the problems that persist in Moldova is that neonatologist involvement is seen as necessary only beginning the time when the child is born. Communication at prenatal stage between obstetricians and neonatologists is less effective, or generally lacking, including when pregnant at risk is already hospitalized. This cause difficulties in anticipation/management of sick newborns. These situations have repercussions both in the health of newborns, as well as staff satisfaction. And subsequent discussions on the evaluation of management errors of intra- and post-natal cases of death are focusing more on "accusations", than on constructive critics.

Through involvement of obstetricians, neonatologists and midwives and using Quality Management instruments was developed a clear protocol and algorithm (clinical criteria relevant to perinatal risk, timely period to involve the neonatologists, place of the couple opinion in order to avoid paternalism in medicine). During "pilot-test" of the protocol (6 months) 152 pregnancies were considered as for perinatal risk group.

Results: 42% of cases included medical decisions taken together; time of examination in common - less 24 h before birth; - active consultation period between 9:00-3:00 p.m. (involving heads of NICU); 65% of involved neonatologist filed “more taken in consideration by their colleagues from obstetrics than before project”. Implementation of such project requires change of attitude and should be based more on team building activities, then only on clinical discussions. There was predominance of obstetricians working together in teams with other specialists than neonatologist, this showing that mother (psychological aspects) and child are seeing separately

307 – POSTER PRESENTATION

SIMULATOR TRAINING IMPROVES BEGINNERS SKILLS IN PEDIATRIC ECHOCARDIOGRAPHY

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Objectives: Although simulator based training is increasingly used in medical training, there is paucity of studies proving its effectiveness. We have studied the effectiveness of our previously described simulator Echo Com for training echocardiography in congenital heart disease (CHD).

Methods: The simulator consists of a life-sized neonatal manikin, an electromagnetic tracking system and a computer application. The application is linked with a data base of 3D echocardiographic data sets of CHD. For the present study we have chosen nine pairs of data-sets with the following diagnoses: VSD, ASD, AVSD, TOF, TGA, ccTGA, TAC, HLHS and normal heart. The first set was presented to 10 beginners in echocardiography without clinical information. Participants were asked to scan the data and come up with a presumed diagnosis. All participants underwent a structured simulator based echocardiography training session by an expert afterwards. After training the study was repeated using different data sets of identical lesions. Pre- and post-training results were compared to evaluate the effectiveness of simulator based training.

Results: Post-training results were significantly better than pre-training results. All participants improved the number of correct diagnoses.

Conclusion: Simulator based training improves beginner's skills in echocardiography in CHD. We have not compared simulator based training with traditional learning like bed-side teaching or lectures. Bed-side teaching however is often impractical for hands-on training in critical lesions.

Nursing Topic 2 - Neonatal respiratory failure (308–309)

308 – POSTER PRESENTATION

INVESTIGATION OF OXYGENATION IN PREMATURE INFANTS UNDER MECHANICAL VENTILATION IN SUPINE AND SIDE LYING POSITIONS

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Aims: This study was conducted to compare hemoglobin oxygen saturation (SPO₂) in two positions of side lying and supine in infants under mechanical ventilation.

Methods: In a clinical trial 32 preterm infants under mechanical ventilation who had inclusion criteria were recruited in a simple convenient method. First they were placed in supine position for 120 min and then in side lying position for 120 min. Their SPO₂ were monitored by pulse oximeter and recorded each minute. Data analysis was done using SPSS (version 15).

Results: Means of SPO₂ in time of 0 were 95.6 2.4 and 95.5 2.4 And in time of 120 were 95 94.8 in supine versus lateral position. There were no significant differences between mean of SPO₂ during 120 min in supine position and also in lateral position.

Conclusion: Side lying position was well tolerated by preterm infants under mechanical ventilation. Therefore, since Side lying position promote midline motor skills development, it is suggested that NICUs' nurses consider this position during changing newborns' position.

Key words: Supine Position, side lying position, mechanical ventilation, newborn, Pulse Oximetry.

309 – POSTER PRESENTATION

WHAT KIND OF KNOWLEDGE DOES THE NURSE NEED TO CARE FOR A NEWBORN INFANT WITH ASPHYXIAL ENCEPHALOPATHY, DURING HYPOTHERMIA TREATMENT?

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Methods: This study is a literature study based on nine original articles which includes 754 newborn infants, reviews, mandatory literature, procedures and other relevant literature. The infants in the study were 36 weeks or more in gestational age, were not to undergo surgical treatment within 3 days, or with major congenital abnormalities.

Results: All the nine studies showed better neurological outcome in the cooled group. Adverse effects are common, but minor and not associated with cooling. Adverse outcomes include lower heart rate, hypertension, sepsis, intraventricular hemorrhage and lower rate of platelet activating factor. Prolonged blood coagulation time and thrombocytopenia is also common. Most of the infants needed mechanical ventilation and some underwent hypoglycemia. Renal failure, skin changes, lower morphine clearance, and increased morphine concentrations are also common adverse effects during hypothermia treatment. Seizures are also seen often.

Conclusions: It is important that the neonatal intensive care nurse is well trained and has exquisite knowledge about the thermal effect on the inner organs. She also needs knowledge about the normal newborn infant and when to act upon the child and when to let the child rest. The studies show that hypothermia is a safe treatment as long as the child is closely monitored and kept under surveillance. The nurse also need a clear ethical and legal foundation.

Nursing Topic 3 - Acute lung failure (310)

310 – ORAL PRESENTATION

LUNG RECRUITMENT BY MANIPULATING PEEP FOLLOWING ENDOTRACHEAL SUCTION IMPROVES END EXPIRATORY LUNG VOLUME AND OXYGENATION

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Objectives: Lung recruitment in mechanically ventilated paediatrics is proposed as a means to minimise Ventilator Induced Lung Injury (VILI). We conducted a RCT with a crossover design to determine the effect of manipulating PEEP on End Expiratory Lung Volume (EELV). **Methodology:** Sixty intubated and mechanically ventilated paediatrics were studied. Two methods of manipulating PEEP were tested after endotracheal suctioning. The first method was a double baseline PEEP manoeuvre for 2 min and the second method was incremental (4 cmH₂O) increases up to 18 cmH₂O and decremental decreases back to baseline PEEP. The impact on EELV was assessed using EIT. EIT measures changes in regional ventilation distribution. Oxygenation was assessed by arterial blood gases. Oxygen delivery was calculated non-invasively, using the USCOM.

Results: There was a significant increase in EELV post the double PEEP manoeuvre ($p = 0.05$). Oxygenation as expressed by the P/F ratio also improved. For those children with 'healthy lungs' oxygenation improved from 377.33(129.39) to 412.57(101.34) $p = 0.37$ following the double PEEP manoeuvre. For those children with Acute Lung Injury (ALI) oxygenation improved significantly from 221.42(46.47) to 239.94(63.84) $p = 0.014$. In children with baseline p/f ratios of ≤ 200 oxygenation improved significantly ($p = 0.04$) only with incremental changes in PEEP.

Conclusion: The double PEEP manoeuvre improved both oxygenation and EELV compared to the control group in all children. Incremental changes in PEEP are more beneficial in terms of oxygenation in those children with ARDS.

Nursing Topic 5 - Non Invasive Ventilation (311)

311 – POSTER PRESENTATION

NON INVASIVE VENTILATION IN INFANTS WITH A NASOPHARYNGEAL TUBE

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Introduction: The use of interfaces in paediatrics to administer non-invasive ventilation (NIV) in infants less than 6 months is limited due to the lack of sizes.

Objectives: Describe the efficacy of the nasopharyngeal tube (NT) as an interface for NIV in infants less than 6 months.

Methods: A prospective study was carried out with patients younger than 6 months who received NIV using the NT between January 2005 and December 2010.

Variables analysed were: disease, type of NIV, type of ventilator and mode, length of NIV and efficacy.

Nursing protocol: NT placement (7 cm) inside the nares and nursing care is described.

Results: There were 166 patients studied. Elective NIV was initiated in 74 patients (44%), rescue postextubation NIV in 17 patients (11%) and elective postextubation NIV in 75 patients (45%). NIV was used more often in patients affected by Bronchiolitis, 95 patients (57%). Servo-i was used in 89% of patients, Giulia 7% and BiPAP Vision 4%. NIV modes employed were A/C P 74%, PS 18%, S/T 8%. Mean time in NIV was 61 ± 54 h (76 h success versus 26 h failure) $p < 0.0001$. The efficacy in patients treated with Bilevel modes using the NT was 74%. Except for tube obstruction, no other complications associated with the use of this interface were observed.

Conclusions: The NT is an effective interface and a viable alternative in infants less than 6 months.

Keeping the NT patent is fundamental for the efficacy of NIV.

Nursing Topic 8 - Congenital heart disease and cardiac surgery (312)

312 – POSTER PRESENTATION

IMPACT OF GIVING OXYGEN TECHNIQUE ON ENDOTRACHEAL SUCTION TO HEMODYNAMIC CHANGES AT CARDIAC SURGERY PATIENT IN PICU HARAPAN KITA INDONESIA

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Background: Post cardiac surgery pediatric patient when admitted to intensive care usually supported with mechanical ventilation to maintain oxygenation and hemodynamic stability. In the special case we keep patients quite longer by put them on deep sedation even paralysed. This situation makes secretions accumulation on respiratory track, that influence oxygenation and hemodynamic stability. Ideally, Nurse has a major role to prevent the patient from instability hemodynamic by giving oxygen on endotracheal suction.

Objectives: The purpose of this study is to analyse the effect of giving oxygen technique on endotracheal suctioning by using manual ventilation compare to mechanical ventilation on endotracheal suction to hemodynamic changes

Methods: Quasi-experimental with control group study using purposive sampling technique involving 60 patients, who divided into 2 groups, control group ($n = 30$) by using manual, and intervention group ($n = 30$) using mechanical ventilation. The incidence of hemodynamic changes evaluated 5 min after providing the procedure.

Results: The incidence of hemodynamic change was statistically significant between the group ($p = 0.009$), OR = 6.053. There is significant relation between giving oxygen by mechanical and manual ventilation on endotracheal suctioning and incidence of hemodynamic changes. It means that responder who wasn't given oxygen by mechanical ventilation on endotracheal suctioning had an opportunity to have hemodynamic changes 6 times risk greater than responder who was given oxygen by mechanical ventilation

Conclusions: Supplemental oxygen with mechanical ventilation on endotracheal suctioning was effective to prevent hemodynamic changes. We strongly suggest to applying mechanical ventilation to give oxygen on endotracheal suctioning can prevent of hemodynamic instability

Nursing Topic 9 - Ethics (313–314)

313 – POSTER PRESENTATION

RELATION BETWEEN CHILD ABUSE BY PARENTS IN CHILDREN WITH CHRONIC ILLNESS AND SOME OF THE DEMOGRAPHICS CHARACTERS

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Objectives: Determine child abuse by parents in Children with chronic illness and its relation with some of the demographics characters.

Methods: This is a descriptive-comparative study. 106 children (11–18 year) with chronic illness (Asthma, epilepsy, leukemia, diabetes...) referred hospitals of Isfahan university of medical science were selected by convenient sampling. A questionnaire including demographic data and child abuse scale consist of questions in 4 domains (neglect, emotional, physical and sexual) used for data collection. The questionnaire validated by content validity and reliability of questionnaires was estimated 0.78 by Cronbach's alpha. Data analysis was done by SPSS and using t test, correlation coefficient Pierson and spearman.

Results: Research findings showed that most of kind child abuse by parents in these patients were: emotional abuse, neglect. Also contained a relation between sex, physical, emotional abuse ($p < 0.05$). A direct relation between age and neglect ($p = 0.002$), also a direct relation between duration of disease and sexual abuse ($p = 0.01$), but there was a reverse relation between number of days of being Absent from school and neglect, physical abuse and total score of abuse ($p < 0.05$). Also result showed that there was a significant relation between neglect and total scores of being abused and father's addiction.

Conclusions: Significant meaningful between demographic characters such as, sex, age and duration of children's illness with child abuse in one side and parent's drug addiction on the other side was found. This reveals that some cultural points in community gives an important role to chronic illness in children to prepare doing abuse.

Keywords: child, abuse, parents, chronic illness

314 – POSTER PRESENTATION

THE EXPERIENCE OF DEATH IN PEDIATRIC CRITICAL CARE NURSES: A SURVEY IN THREE HOSPITALS IN NORTHERN ITALY

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Objectives: The reactions following the death of a child are extremely variable: heterogeneity comes mainly from personal and work experience in addition to the related context. When a child death

occurs in a pediatric critical care ward (emergency room or intensive care), the behavior is even more complex because of the impact of provided resuscitation support and the high complexity of nurse care. **Methods:** To collect and analyse the reactions following a child death within the pediatric critical care nursing staff, a questionnaire was distributed in three large hospitals in Northern Italy: a total of 71 questionnaires correctly filled in were collected (versus 75 distributed).

Results: The survey target covered nurses from a pediatric emergency department in 67.6% ($n = 48$) of cases and pediatric intensive care units in 32.4% ($n = 23$), 52 females (78%) and 15 males (22%) with an average age of 38 years (mean = 38.4 years) and an average of 15 year work experience (mean = 14.2 years). Nurses reported contact with a child death in 73.2% of cases; death cases are more common in the pediatric intensive care units (80.0% of respondents) than in pediatric emergency rooms (69.9% of respondents). The survey also revealed a strong training need for more than 80% of respondents and a general lack of any psychological support service to be activated for mourning re-elaboration.

Conclusion: Nurse training and psychological support are perceived as essential for better management of death in children in critical setting.

Nursing Topic 10 - Infection, systemic inflammation and sepsis (315)

315 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

ACTING BUNDLE FOR ACHIEVING BETTER COMPLIANCE WITH HAND HYGIENE

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Objectives: Compliance with hand hygiene (HH) is widely recognized as the most important factor in preventing transmission of infection to patients in health care settings. It is well known that in Intensive Care Unit (ICU) settings, HH compliance is lower due to increased patient-health care provider interactions, understaffing and overcrowding¹.

Our goal was to measure the impact of a promotion program on HH practice and its effect on nosocomial infection rate in a multidisciplinary Pediatric ICU over 1 year period.

Methods: The acting bundle included: on-line educational software and assessment, presentation of the program in staff meetings, controlling the accessibility and availability of alcohol based hand rub at patient's bedside, appointing a daily hygiene agent within the staff and performing daily surveillance with instantaneous feedback. The compliance rate was calculated by dividing the number of cases adhering with HH before and after an interaction by the total number of interaction opportunities.

Results: Compliance with HH improved from 9.5 to 70.5% 11 months after the bundle implementation. Nurses' compliance was 73% and physicians' compliance was 68%. The rate of nosocomial infection decreased from 2.7 to 1.3 episodes per 100 patient admissions during the study year.

Conclusions: Persistent and designated intervention policy and staff involvement with responsibility sharing are keys to increase compliance of health care workers for HH with a resulting in a successful reduction of nosocomial infection rate.

Reference:

1. Haas JP et al (2007) Measurement of compliance with hand hygiene. *J Hosp Infect* 66(1):6–14.

Nursing Topic 11 - Neuro critical care (316)**316 – POSTER PRESENTATION****INSULIN THERAPY IN CRITICALLY ILL CHILDREN WITH BRAIN DAMAGE**

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Objectives: Tight glucose control in adult patients with severe brain injury is associated with reduced cerebral extracellular glucose availability and increased prevalence of brain energy crisis. Therefore target ranges for blood glucose levels during insulin treatment were set between 6 and 10 mmol/L in our protocol. The aim of this study was to evaluate the feasibility of our nurse driven protocol.

Methods: This retrospective study included all children with (suspected) brain injury admitted between 2008–2011. Definitions: hyperglycemia blood glucose >10 mmol/L, hypoglycemia blood glucose < 2.6 mmol/L. All data are expressed as median and range.

Results: 128 children were admitted and hyperglycemia (12 mmol/L) was present in 20%. 39 children were mechanically ventilated, in 18 of them intracerebral pressure was measured, 18 were hyperglycemic (14 mmol/L, range) and in 12 insulin treatment was given. The age of these children was 50 months (range 2–180). Five of them died within 30 h after admission. The 7 survivors were admitted for 18 days (10–37) on the PICU and treated with insulin for 52 h (range 3–160). Target glucose level were reached after 3 h (1–23). In 4 children during insulin treatment a glucose level <6 mmol/L was measured, hypoglycemia didn't occur.

Conclusions: Only in a subgroup of children with traumatic brain injury insulin treatment was started for hyperglycaemia. In survivors duration of insulin treatment was relatively short compared with length of stay on the PICU. Use of our insulin protocol seems to be done in a safe way.

Nursing Topic 14 - Nutrition (317–319)**317 – ORAL PRESENTATION****EFFECT OF A NURSE DRIVEN, EARLY AND AGGRESSIVE FEEDING REGIMEN ON NUTRITIONAL INTAKE IN CRITICALLY ILL CHILDREN**

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¹Pediatric Intensive Care Unit, ²Department of Clinical Nutrition, Emma Children's Hospital/Academic Medical Center, Amsterdam,

³Department of Endocrinology and Metabolism, Maastricht University Medical Center, Maastricht, The Netherlands

Introduction: Critically ill patients are at risk for inadequate feeding and subsequent increased morbidity. In pediatric critical care,

reported effects of feeding protocols and/or nutritional support teams are contradictory.

Objectives: To measure the effect of a nutritional algorithm and the implementation of a nutritional support team on delivered nutrition during the first 10 days of admission on a tertiary PICU.

Methods: We performed a single center observational study during 2 separate 10 months-periods. Patients with length of stay >3 days and mechanical ventilation were eligible for the study. The nutritional algorithm was based on early nurse-driven enteral feeding. Once a week and on demand, a nutritional support team, consisting of a pediatrician-intensivist, a research nurse, and a clinical dietician, reviewed the nutritional regimen of all patients, and advised the attending clinicians. Endpoints of the study were delivered percentages of predefined goals for energy and macronutrients during the first 10 days of admission.

Results: The percentages of delivered enteral nutrition on day 1 doubled from 40 to 78% ($p < 0.01$), and increased from 60 to 92% on day 2 ($p < 0.01$) without increase of adverse gastro-intestinal events, compared to the control period. More than 85% of nutritional targets were reached on day 3, compared to day 4 before the protocol.

Conclusions: The introduction of an early nutrition protocol, and the institution of a nutritional support team is an effective and safe tool to increase nutrition delivery on a PICU.

318 – ORAL PRESENTATION**MEASUREMENT AND IMPORTANCE PLACED ON GASTRIC RESIDUAL VOLUMES IN FEEDING CRITICALLY ILL CHILDREN**

L. Tume^{1,2}, B. Carter³, L. Latten⁴, A. Darbyshire⁵, PICS-SG Nursing Nutrition Subgroup

¹Children's Nursing Research Unit and PICU, Alder Hey Children's NHS Foundation Trust, ²Liverpool John Moores University, Faculty of Health & Applied Social Science, ³Children's Nursing Research Unit, ⁴Dietetics, ⁵PICU, Alder Hey Children's NHS Foundation Trust, Liverpool, UK

Aims: The aim of this study was to establish the current multidisciplinary knowledge and practices surrounding enteral feeding (EF) in UK and Irish PICUs. One part of this study examined practices around gastric residual volumes (GRV).

Methods: Phase I involved a local survey in one PICU and Phase II involved a cross sectional e-survey (survey monkey) to all PICUs listed in the PICANET database (Winter 2010)

Results: 108 responses from 27 different PICUs across the UK and Ireland, making the overall PICU response rate 90%. The volumes used to identify an 'acceptable' level of gastric aspirate varied markedly among respondents ranging from 3 (47%)–10 ml/kg (11%) for a 5 kg infant. The majority expressed the acceptable level in this age group as percentage of feed given, and this ranged from >25 to >70% of the feed back. Looking at the technical and patient factors that could potentially affect the GRV, clinicians identified some, but not all the factors, the main factor identified was the position of the feeding tube. 19% of staff said high GRVs would make them stop feeds; however 'acceptable' GRV was the top reason (74%) that staff used to determine feed tolerance.

Conclusions: It is clear there is no consensus and no evidence about what is an acceptable level of GRV in critically ill children. Future research should focus on what are acceptable GRVs for different ages and what method is best to quantify a GRV. Practice implications are further nurse and medical education about factors affecting GRV.

319 – POSTER PRESENTATION

A SURVEY UK AND IRISH PICU PROFESSIONALS' KNOWLEDGE AND PRACTICES OF ENTERAL FEEDING IN CRITICALLY ILL CHILDREN

L. Tume^{1,2}, B. Carter³, L. Latten⁴, A. Darbyshire¹, PICS-SG Nursing Nutrition Subgroup

¹PICU, Alder Hey Children's NHS Foundation Trust, ²Faculty of Health & Applied Social Sciences, Liverpool John Moores University, ³Children's Nursing Research Unit, ⁴Dietetics, Alder Hey Children's NHS Foundation Trust, Liverpool, UK

Aims: The aim of this survey was to establish the current multidisciplinary knowledge and practices surrounding enteral feeding (EF) in UK and Irish PICUs.

Methods: Phase I involved a local survey in one PICU (Alder Hey) to pilot and refine the survey (July 2010), Phase II involved a cross sectional e-survey (survey monkey) to all PICUs listed in the PICANET database (Winter 2010).

Results: 108 responses from 27 different PICUs across the UK and Ireland, making the overall PICU response rate 90%. Respondents demonstrated a good mix of the PICU team with: 26% medical staff, 13% dieticians and 61% nursing staff. Most staff (70%) believed that on average children in PICU got less than 60% of their prescribed calorie intake with the top 3 reasons cited as fluid restriction, nurses too slow in starting feeds and frequent fasting for procedures. 76% of respondents said their units had written guidelines for EF, with 85% of clinicians stating they believed these helped improve calorie delivery. The vast majority of units did not have a target time to start EF. The main reason for stopping feeds was the suspicion of NEC, with high gastric aspirates (GA) ranking next. Fasting for 13 common interventions varied both in which procedures children were fasted for and the length of fasting times. There were no significant differences between the three professional groups.

Conclusions: There remain large variations in practice surrounding EF in critically ill children in the UK and Ireland.

Nursing Topic 16 - Resuscitation and emergency medicine (320–324)

320 – POSTER PRESENTATION

NATIONAL SURVEY OF TRANSPORT TEAM INVOLVEMENT IN PALLIATIVE CARE IN THE UK

L. Crabtree, C. Harrison, S. Hands, A. Wolfendens

Embrace Transport Service, Barnsley, UK

Background: Embrace, the first UK combined transport team has received over 3000 referrals and carried out over 2000 transfers in our first year.

Palliative care is an area of growing interest and there are now dedicated Childrens hospices around the UK. Embrace transfer to home or to a local hospice for palliative care and have a dedicated group

looking at Palliative care and pathways for transport.

Aims: UK transport services were contacted to ascertain pathways for moving infants/children with palliative care needs.

- To establish if transport services carried out these requests
- Numbers
- Respiratory support
- Destination
- Other team involvement
- Presence of guidelines/pathways.

Results: 14 teams were contacted and replied-10 Neonatal teams, 4 Paediatric.

3/14 transported to home, 6/14 to hospice but only 2/6 would only move non-ventilated patients to the hospice

The number carried out per year is difficult to establish - most teams had not carried out any but said they would do if asked.

Other teams said these were "rare" requests. 1 team reported 2 transfers.

2 other teams had community involvement prior to transfer and 1 team was working with a hospice to develop their service.

No teams had guidelines although 3 teams used an end of life care pathway and were aiming to develop a guideline

Conclusion: There is variable practice regarding involvement of transport teams in palliative care transfers. There was support from most teams contacted for developing guidelines and more work is needed in this area.

321 – POSTER PRESENTATION

THE ROLE OF EMBRACE TRANSPORT SERVICE IN END OF LIFE CARE DECISIONS

S. Hands, C. Harrison, L. Crabtree, A. Wolfendens

Embrace Transport Service, Barnsley, UK

Background: Embrace, paediatric and neonatal transport service, covering Yorkshire and Humber, carries out over 2000 transfers/year. Palliative care is an area of growing interest. Anecdotal reports suggest that dedicated transport services are becoming involved in decisions regarding end of life care. Transfers can be abandoned after referral due to clinical deterioration or death but the incidence of this and Embrace's involvement is unclear. Aims To identify the number of referrals where a transfer did not occur due to deterioration or death. To evaluate the role of the transport team in these situations Methods All Embrace transfers from April 2010 to March 2011 were included. Our data base was reviewed retrospectively to identify all cases where the patient had been referred but not transferred. Data categorised:

- Neonatal/Paediatric
- Reason transfer did not occur
 - patient died
- pre arrival of team - after team arrived
 - parents decision ICU not appropriate
 - withdrawal of care decision

Results:

Outcome of referral episode

End of life decision

Conclusions: Embrace is involved in end of life decisions having implications for service development/delivery. Transport teams need to work closely with referring and receiving clinicians to optimise these challenging situations

322 – POSTER PRESENTATION**THE ROLE OF EMBRACE TRANSPORT SERVICE IN PALLIATIVE CARE TRANSFERS**

C. Harrison, S. Hands, L. Crabtree, A. Wolfendens

Embrace Transport Service, Barnsley, UK

Background: Embrace, a combined paediatric and neonatal transport service started in November 2009 covering Yorkshire and Humber area. It is the first combined team in the UK. In our first year of operation we received over 3000 referrals and carried out over 2000 transfers. Palliative care is an area of growing interest and there are now dedicated Childrens hospices around the UK- 2 in the region Embrace covers.

Currently there is little evidence of the role of transport teams in the palliative care setting or the demand for this type of transfer.

Aim: To examine the involvement of Embrace in palliative care transfers in Yorkshire and Humber.

Methods: All transfers from November 2009 - March 1st 2010 were included.

Using our transport database, we identified:

- Number of palliative care transfers carried out
- Patient destination.
- Transport team composition.
- Ventilatory requirements
- Parents travelling
- Diagnosis

Results:

- 8 transfers carried out.

2 neonatal and 6 paediatric

- 6 to hospices, 2 to home.
- 3 ventilated, 1 CPAP, 3 no respiratory support.
- 5/8 transfers had 1 or both parents present.
- 5/8 cases had a member of referring team with the patient for continuity.
- Reason for palliative care: 5 chronic conditions with poor prognosis, 1 sepsis, 1 cardiac, 1 post cardiac arrest

Conclusion: Transport teams are playing a vital part in children's end of life pathway moving them to hospice or home and requests for these transfers are increasing with a potential impact on service delivery and development.

323 – POSTER PRESENTATION**IS RESPIRATORY RATE A GOOD PREDICTOR OF DETERIORATION IN PAEDIATRIC PATIENTS?**

G. Sefton, R. McEnaney, L. Tume, M. Horan, PEW Implementation Group

PICU, Alder Hey Children's NHS Foundation Trust, Liverpool, UK

Objective: To evaluate the reference ranges for respiratory rate, across age groups, within a Paediatric Early Warning tool (PEWT). To review the sensitivity and specificity of respiratory rate in predicting deterioration.

Methods: A prospective point prevalence study of in-patients (n = 340) over a nine day period in January 2011. Patients in casualty, day-case, mental health, PICU or palliative care were excluded. Eight trained observers reviewed the vital signs and case notes for 72 h or discharge (whichever arose first). Outcomes reviewed included: incidence of PEWT triggers, medical interventions and Serious Adverse Events (SAE) (including unplanned admissions to HDU or PICU).

Results: 27% of patients triggered the PEWT. Of these, 38 cases (41%) triggered repeatedly. There were 8 unplanned HDU/PICU admissions during this time period, but no cardiac arrest calls. Tachypnoea featured in isolation as an abnormal observation in 78% (n = 336), sets of vital signs which triggered PEWT but only 12% received a clinical intervention. One patient triggering on tachypnoea alone required PICU admission, deterioration was preceded by a distressing procedure. 7% of patients with a persistent tachypnoea (>1 set of vital signs) suffered a SAE. Tachypnoea combined with increased work of breathing was particularly significant.

Conclusion: Reference ranges for PEWTs have largely been selected using consensus opinion. Tachypnoea in isolation poorly predicts potential for deterioration. Tachypnoea combined with tachycardia, desaturation or increased effort of breathing was most useful. Further research is needed to determine appropriate reference ranges for vital signs for sick children.

324 – ORAL PRESENTATION

POINT PREVALENCE STUDY OF PATIENTS TRIGGERING A MODIFIED BRISTOL PAEDIATRIC EARLY WARNING TOOL & THE INCIDENCE OF SIGNIFICANT ADVERSE EVENTS

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PICU, Alder Hey Children's NHS Foundation Trust, Liverpool, UK

Objective: To review the vital signs of in-patients to predict those at risk of deterioration, using a modified Bristol Paediatric Early Warning Tool. To quantify seasonal impact on patients at risk of deterioration. To identify specific characteristics of 'risky' patients.

Methods: A point prevalence study was undertaken in January 2011, and compared to a smaller study undertaken in August 2010. A team of trained observers reviewed vital signs and case notes to detect patients at risk of deterioration. 179 patients (Summer) and 340 patients (Winter) were reviewed. Patients in casualty, day-case, mental health, PICU or palliative care were excluded. Outcomes reviewed included: incidence of PEWT triggers, medical interventions and Serious Adverse Events (SAE).

Results: In Winter 27% of patients triggered the PEWT compared with 20% of patients in the summer. There were significant proportion of HDU patients triggering the PEWT 85% in Winter compared with 66% in Summer. In winter 7/8 unplanned HDU/PICU admissions triggered PEW, compared with 1/2 in Summer. There were no cardiac arrest calls during either study period. Patients less than 1 year of age with identified as risky, particularly those with cardiac defects. In winter, babies with Bronchiolitis had a significant risk of unpredictable deterioration.

Conclusion: There are seasonal variations in the patient populations triggering PEWT, which could impact on workforce planning. Both studies suggest that the single parameter mechanism for triggering PEWT is too sensitive. A stratified process for escalating patients triggering such systems would improve specificity.

Nursing Topic 19 - General (325–341)

325 – POSTER PRESENTATION

MOTHERS' KNOWLEDGE AND PERFORMANCE ABOUT APPLICATION OF SWADDLING

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Application of swaddling lead in decrease restlessness, crying, frequency of insomnia, stress and increase comfort and silence in infants. Despite of these advantages, if swaddling use inappropriately, would result in Dislocation of Hip. In this research we assess the Mothers' knowledge and performance about application of swaddling.

Methodology: This is a descriptive-analytical research. We assess 211 mothers whom have infants 1-24 months with diarrhea. Data gathering tool was a questionnaire with interview. The validity of questionnaire confirmed through experts (Pediatricians, Faculty members in nursing and midwifery, orthopedist) and its reliability gained %91 through Cronach's alpha. Data analyzed by expert through SPSS version 16.00.

Findings: Finding showed that the majority of mothers (%65) have not knowledge about benefits and pitfall of swaddling. % 86 of them knew that it was good for calming babies, sleeping and warming. %16 of them knew that swaddling may lead in dislocation of hip. Educated mothers and housekeepers swaddled their babies less than others. They told that they received information about swaddling from her mothers and relatives and very less from health professionals. Educated mothers told in the interview that they did not receive information about swaddling much from media and doctors (%65). In interviews analysis, found that they were interested in participated in classes about swaddling (%78) to learn the correct swaddling.

Discussion: The plan for promotion of mothers' knowledge suggested through health workshop and practical teaching sessions by professional and governmental official is necessary.

326 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

MORE SPACE, BETTER QUALITY CARE? PARENTS' PERCEPTION OF QUALITY OF CARE PRIOR TO AND AFTER NEONATAL UNIT RELOCATION

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Objectives: Parents' perception of the quality of care their infant receives can be influenced by many factors. This, in turn, impacts on their experience of neonatal care and may be related to outcomes.

Our 20 cot, level 2 NNU was relocated within the maternity block to a newly constructed unit, with neonatal nurseries significantly bigger than the existing unit (198 m² vs 83.1 m²). There was no planned change in staffing, equipment or intensity of unit activity.

We assessed parental perceptions of the quality of care their infants received before & after relocation.

Methods: Randomly selected parents completed an anonymous questionnaire comprising of non-hatched visual analogue scale questions on a variety of aspects of care prior to relocation, including communication, cleanliness and amount of space per patient. This was then repeated 6 months after relocation.

Results: 15 questionnaires were completed in each group, the median gestational age at birth was 35⁺⁴ (IQR 34⁺⁴-40⁺⁰) prior to relocation and 30⁺² (IQR 27⁺²-39⁺⁴) following relocation. 2/15 (13%) of patients prior to relocation had been treated at another NNU compared with 6/15 (40%) of patients following relocation.

There was no statistical significance in any of the areas we assessed including; sufficiently skilled nursing & medical staff, communication between staff and parents, amount of space per patient, cleanliness, equipment quality and overall quality of care.

Conclusion: Contrary to expectations, our study showed increasing the amount of space and refurbishing our unit did not impact on parental perception of the quality of care received by our babies.

327 – ORAL PRESENTATION

PROPHYLAXIS OF PRESSURE ULCERS IN A PAEDIATRIC INTENSIVE CARE UNIT - IMPLEMENTATION OF EVIDENCE BASED PRACTICE

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Introduction: Pressure ulcers are often seen as a problem of adult patients. Nevertheless prevalence of pressure ulcers in general paediatrics in Switzerland is around 28%. In our PICU so far no guidelines for prevention of pressure ulcers exist. No tools for pressure ulcer risk assessment in German are available. These facts led to the presented practice development project.

Methods: A literature search for pressure ulcer risk assessment tools and pressure ulcer prevention in PICU patients was performed in Cochrane Library®, PubMed® and Cinahl®. Articles were reviewed and tested for their applicability in daily clinical routine. Findings from the literature and expert knowledge were the basis for the development of a guideline.

Results: Tools for pressure ulcer risk assessment do exist in English but we considered them either too extensive or insufficient for daily use. Admission to PICU alone is a risk factor for pressure ulcers. We decided to set the assessment tool aside and consider all patients admitted to PICU at risk. Based on expert knowledge we created a flow chart as part of the guidelines: Within 6 h after admission inspection of the skin is performed. Based on this assessment preventative measures and the time point for the next skin assessment are planned.

Conclusion: Care of PICU patients is getting more complex and prevention of pressure ulcers in these patients is often not of high priority. Therefore it is important that PICU nurses are aware of the risk for developing pressure ulcers and they understand preventative measures.

328 – POSTER PRESENTATION

DIFFERENCES IN ACOUSTICAL CHARACTERISTICS OF INFANTS' CRIES WITH COLIC AND HEALTHY CRIES

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The purpose of the research is establishing acoustical data in 14 infants crying (7 healthy infants and 7 sick infants). Infants' cries with colic and seven healthy infants, male and female, age one to three months were recorded by Zoom HD recorder with built-in stereo microphone, in pediatric ambulance in Zagreb. Results of acoustical cry analyses made by the Multi-Dimensional Voice Program (MDVP, Copyright 1990-2000, Kay Elemetrics). Descriptive statistics of acoustical data is obtained by Statistical for Windows, Ver. 5.0. Obtained data showed statistical differences in one parameter: number of unvoiced segments. However, certain differences in obtained

data are exists in parameters: fundamental frequencies and degree of sub-harmonics. Infants with colic generally cry in inconsolable manner. Cries of group of infants with colic have less fundamental frequency variation than in group of healthy infants which confirm generally medical fact about monotonous cry in children with colic. Their cries begin suddenly and rise to higher frequencies than glide to the middle of spectra. Their cry in this research is characterized by less voiceless segments and higher degree of sub-harmonics than in healthy infants. This kind of research may help in establishing acoustical data in differing normal than pathological voices in diagnostic purposes.

329 – POSTER PRESENTATION

HOME MECHANICAL VENTILATION (HMV)

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Importance of home mechanical ventilation (HMV) rise from an increase in the number of paediatric patients dependent on long-term mechanical ventilation. HMV is being increasingly employed to treat patients suffering from chronic respiratory failure for any reason. Home ventilation offers the best option for sick children's psychosocial development, social integration and quality of life for whole family. On the other side problems of paediatric home ventilation are its negative psychosocial impact on family life, limited home care resources, the financial burden, and the fact that the equipment is usually designed for adults. Awareness of the possibilities of long-term ventilation is essential in organising discussion of these therapeutic modalities with chronically ill children and their parents. Because institutional care for this group of patient in not possible outside the PICU in Croatia, from our experience home care is good option for long-term care.

After we establish that child, family and their home are ready for many criteria we start to implement the program. At the same time we coordinate with many other professionals, primary doctor on the first place.

This present study aimed to examine the characteristics and outcomes of 7 children seen in our department. Our experience showed that HMV can be applied successfully in chronic respiratory failure patients in Croatia.

330 – POSTER PRESENTATION-POSTER PRESENTATION

ANALYSIS OF NURSING WORKLOAD AND AVERAGE DAYS OF PATIENT'S STAY IN A CRITICAL CARE UNIT: COMPARISON BETWEEN AGE GROUPS

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Hospital Niguarda Cà Granda, Milan, Italy

Aims: This study was aimed at comparing the nursing workload and the average days of stay of different age groups of patients in ICUs.

Methods: The analysis was undertaken by the Cardiothoracic ICU of Niguarda Ca' Granda Hospital, between April 2008 and March 2009.

It was carried out on adult and elderly patients (operated on for a cardiovascular disease) and on pediatric patients who underwent operations to correct a congenital cardiopathy, both evaluated by means of the NEMS (Nine Equivalents of Nursing Manpower use Score) scale. This scale has been used to measure the nursing workload, to quantify the actual need of nursing professionals and to evaluate the average days of patient's stay.

Results:

Results

	Average age of hospitalization	No of operated children	Average days of stay	Average NEMS points
1-31 days	11.8 ± 5.6 days	14	15.5 ± 14	32.0 ± 4.4
1-12 months	5.5 ± 2.6 months	30	7.9 ± 5.7	28 ± 4.4
1-14 years	4.9 ± 3 years	23	5.4 ± 3.2	27.3 ± 4
14-65 years	52.9 ± 9 years	195	3.2 ± 1.4	26.9 ± 3.7
>65 years	72.9 ± 4	312	4.1 ± 2.4	27.74 ± 3.9
>75 years	78.2 ± 2.3	115	4.1 ± 2.3	27.8 ± 3.8
>80 years	81.8 ± 1.7	29	3.8 ± 1.76	27.5 ± 4

Conclusions: Collected data underline a higher nursing workload and a more conspicuous number of average days of stay necessary to assist young children and elderly people over 75. However, these data pointed out only a statistically significant difference between infants (1-31 days) and the other age groups (NEMS 1-31 days and 14-65 years, $p < 0.001$; NEMS 1-31 days and >65 years, $p < 0.001$).

331 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

IS CRANIAL MOLDING PREVENTABLE IN PREMATURE INFANTS? A SYSTEMATIC LITERATURE REVIEW TO THE EFFECTIVENESS OF INTERVENTIONS

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Background and aims: Cranial molding of preterm infants can result in a number of negative consequences. In the Dutch Neonatal Intensive Care Units (NICU) changing body and head position is used as an intervention to prevent cranial molding. A literature review was conducted to study the effects of interventions to prevent or reduce cranial molding of the preterm infant in NICU.

Methods: A systematic literature review and critical appraisal according to the Cochrane Collaboration assessment criteria was performed.

Results: Eight quantitative intervention studies meeting the inclusion criteria were identified. Most studies used the anterior-posterior biparietal (AP:BP) ratio as measurement of cranial molding. One multi-centred quasi experimental study showed that infants who received regular repositioning had a statistical significant reduction of bilateral head flattening compared to infants who did not receive this

intervention AP:BP ratio 1.35 vs. 1.55 ($p = 0.05$). The interventions used in the other seven studies were pressure relief mattresses, watermattresses or gel pillows. No or no statistical significant effect was found in these studies.

Conclusions: Because literature was restricted, the evidence is poor and limited to one intervention: regular body repositioning. The repositioning has to be studied more extensively to confirm the result as well as to establish the long term and side effects on respiration and motor development. Other interventions have to be studied in well designed studies for their effect.

Acknowledgements: We thank the Dutch Innovation and Research group NICU's for their support.

332 – ORAL PRESENTATION

PERIPHERAL IV-THERAPY IN THE NEWBORN: ROOM FOR IMPROVEMENT

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Objectives: Placement of a peripheral IV's (PIVs) in neonates is considered to be easy and safe. However in premature newborns it may require several attempts and cause complications. The aim of this study was to identify factors that attribute to complications in peripheral IV-therapy. A secondary aim was to evaluate the rate of IV-complications as a rationale for future interventional studies.

Methods: This observational prospective study took place from August 2010 to May 2011. Data were collected for all PIV placements. Patient characteristics, type of professional performing the procedure, location of PIV, fixation method, cannula size were recorded by the caregiving nurse on a case record form for all PIV procedures. All newborns admitted to the neonatal ICU were eligible for the study. Data were entered in SPSS 17.0 for analysis.

Results: Data of 302 insertions were analyzed. The PIVs were in place for a mean of 1.5 days. The mean number of needle sticks required for PIV placement was 2.4. More than half of the PIVs (55.6%) were removed due to extravasations and leakage. Other reasons to remove a PIV were occlusion (9.9%), swelling of the skin (9.4%), and phlebitis (4.4%).

Conclusion: This study shows that there is room for improvement with regard to the number of attempted PIV placements and complications. The constructed CRF can be used to evaluate interventions aimed at improving PIV-related therapy in the premature newborn.

333 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

NICU NURSE CASE MANAGEMENT FROM A BOTTOM-UP PERSPECTIVE

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Objectives: The patients' manifest of the Academic Medical Center (AMC) defined 'nurse case management' as assigning a permanent

nurse to each patient. The ‘nurse case manager’ is responsible and accountable for the continuous guidance of a patient from hospital admission to discharge. The implementation of ‘nurse case management’ on the Neonatal Intensive Care Unit (NICU) resulted in a large variation in operationalization of the concept. Despite several top-down initiated projects and guidelines nurses continually interpreted (professional) responsibilities differently. This caused differences in quality and continuity of provided care. The aim of this project was to study the view of the nursing team concerning nurse case management and to develop interventions needed for the case manager model to be effective.

Methods: Using a ‘normative re-educative strategy’ the project aims to bring about a change in attitude, values and behavior of nurses. From a bottom-up perspective nurses were asked to participate in focus groups and survey feedback sessions in order to come to solutions.

Results: Nursing case management is highly sensitive to deployment of staff, skill mix, competency levels and patient care needs. Training, up-to-date guidelines and structural peer review meetings as well as counseling were selected to help prevent confusion and lack of structure in the future.

Conclusions: In order to successfully accomplish structural changes mentoring members of the nursing team to participate, preserving and developing professional nursing roles, are vital as well as support from the management team. In a future study the effects of choices and actions taken will be evaluated.

334 – POSTER PRESENTATION

HOW USEFUL IS THE BRADEN Q SCORE IN PREDICTING PRESSURE AREAS IN A UK PICU

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Objective: To determine the accuracy of the Braden Q score for the prediction of pressure area development on a UK PICU.

Methods: A retrospective chart review was conducted over a 12 month period in a single centre mixed cardiac and general PICU in the north of England. The Braden Q score in the first 24 h after ICU admission was matched to pressure area development. Device-related pressure areas were excluded. The data was divided into two categories, high risk (Braden Q score <16) and low risk (Braden Q score >16) as per the tool validation (Curley et al. 2003).

Results: There were 1055 PICU admissions and 15 non-device related pressure areas (an incidence of 1.4%). 211 were classed as high risk (<16) and 7 of these developed a pressure area (sensitivity 47%). 823 were classed as lower risk (>16) and 8 developed a pressure area (specificity 80%) This yielded a Positive Predictive Value of 3.3% and a Negative Predictive Value of 99% for the Braden Q score. 21 children had no recorded Braden Q score.

Conclusion: A Braden Q score of <16 is poorly sensitive at predicting the risk of pressure areas, but has a moderate specificity in terms of identifying children at less risk. This suggests the cut off value of 16 needs adjustment.

Reference:

- Curley et al. (2003) Predicting pressure ulcer risk in Pediatric patients: the Braden Q Scale. *Nurs Res* 52(1): 22-33.

335 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

FACTORS INFLUENCING PRESSURE AREA DEVELOPMENT AND OCCURRENCE IN PICU PATIENTS

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Objective: To determine the main factors that surround the development and occurrence of pressure area’s (PAs) in the PICU population.

Methods: A retrospective chart review was conducted over a 12 month period in a single centre mixed cardiac and general PICU in the north of England.

Results: In this 12 month period there were 1055 PICU admissions and 24 pressure areas giving an incidence of 2.2%. Of the 24 PAs, 15 were non-device related and 9 were device related. 8 (33.3%) were cardiac patients and 16 (66.6%) were general PICU patients. The median length of stay of the children who developed PAs was 17.5 days (2-56 total range) compared to the median LOS in PICU of 3 days (IQR 2-6) [1].

The median age was 19 months (range 2 days–18 years), with 66% <12 months of age. There were 6 deaths in these children with PAs, all of whom were patients with non-device related PAs. Table 1 shows the breakdown of pressure areas.

Conclusion: Our incidence of PAs is low in comparison to the US reported incidence of 18% in PICU patients [2]. There are a number factors that increase the risk of pressure area development in the PICU, including longer length of stay and children <6 months of age.

References:

- Draper et al. (2010) PICANET Report 2007-2009 University of Leeds, UK.
- Schindler, C. Mikhailov, T. Fischer. Lukasiewicz, G. Kuhn. Duncan, L (2007) Skin Integrity in Critically Ill and Injured Children American Journal of Critical Care.

336 – POSTER PRESENTATION

ISOLATION NURSING AND LABORATORY TESTING TIMES FOR CHILDREN WITH POTENTIAL H1N1

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Background and aims: Influenza A (H1N1) virus is a subtype of influenza A. In 2009, it was declared a pandemic by the WHO, and was noted to be a particularly dangerous strain for children. There was a comparatively high number of children admitted with respiratory illnesses over winter 2009-10, although the number of cases of H1N1 was not as high as had been feared. Due to the unknown nature of the virus, there were very strict isolation policies which had to be adhered to for possible cases of H1N1.

Methods: Data was collected from all children admitted to our regional Paediatric Intensive Care Unit (PICU) with respiratory illness during the winter months. From this I analysed how many were H1N1 positive and how long the results took to return from the laboratory.

Results: Between November and March 2009–2010 there were 85 children admitted to PICU with respiratory illnesses, of whom 7 (8.2%) tested positive for H1N1. This compares with 27 respiratory children the following year, of whom 2 (7.4%) had H1N1. During the first winter, the median time that the results took to return from the laboratory was 43 h, compared with 51 h the following year.

Conclusions: In order to minimise the effects on isolated children and the workings of the PICU, the results time needs to be shortened. Until bedside testing kits become more refined, emphasis on the need for swift results needs to be communicated to the laboratories.

337 – POSTER PRESENTATION

SEEING RED: THE EFFECTIVENESS OF DRUG TABARDS IN REDUCING INTERRUPTIONS DURING THE DRUG ADMINISTRATION PROCESS

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Introduction: Medication administration errors have been a significant problem on both neonatal & paediatric intensive care units in recent years. **Objectives:** This audit explored whether introducing drug tabards reduced the number of interruptions during the administration process and improved patient care and safety, whilst maintaining a safe working environment.

Methods: A prospective sample of twelve drug episodes during a 3 month period in a tertiary referral neonatal and paediatric intensive care unit were observed, as part of this covert observational study. Staff were observed during the course of the administration process for any interruptions, following the implementation of disposable red drug tabards across both intensive care units. Pre and post intervention data was collated and examined to see if high visibility tabards reduced the numbers of interruptions experienced by nurses during the medication administration process.

Results: Interruptions continued to be problematic during the medication administration process despite the use of high visibility tabards. However, the numbers of recorded interruptions pre intervention were significantly higher - 80% than those analysed following the implementation of the high visibility tabards - 50%.

Conclusions: Our audit demonstrates that interruptions continue to occur irrespective of a change in practice. The audit also demonstrates “buy in” by nursing staff, as 100% of nurses complied with wearing the red drug tabards during the medication administration process. However, further exploration is required into the effectiveness of both drug tabard use and investigation into minimising interruptions in the intensive care setting.

338 – POSTER PRESENTATION

DOES ORAL SUGAR SOLUTION RELIEVE PAIN AMONGST PREMATURE CHILDREN UNDERGOING PAINFUL PROCEDURES?

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Background and aims: Increased focus on pain relief for premature children. In recent years, much research has been done on this

topic. Practice differs between care providers despite validated research.

Varied expressions of pain. Pain is assessed subjectively, and depends on the nurse’s knowledge, experience and acquaintance with the patient. Recommended guidelines for the use of oral glucose solution (OSS) as pain relief to premature and term neonates who undergo repeated painful procedures.

The aim of this investigation was to review current knowledge about the effect of OSS on pain in neonates, and to develop guidelines for the use of OSS in premature and term neonates who undergo painful procedures.

Methods: Using a literature search, we identified 8 clinical quantitative studies investigating the effect of OSS on pain amongst premature and term neonates.

Results: All 8 studies unanimously conclude that OSS given as pain relief prior to acute painful procedures reduces behavioural expressions of pain amongst premature and term neonates. The studies do not document reduced physiological pain responses in response to OSS.

Conclusion: According to the literature, OSS reduces behavioural expressions of pain.

The nurse should be able to consider the individual child; it’s situation and what the child is trying to communicate. The nurse’s competency is decisive in order to comprehensively assess the child’s need for and effect of pain relief such as OSS. We do not know which children will benefit from OSS. Therefore, OSS should be offered to all children, unless contra-indicated.

339 – ORAL PRESENTATION

DOES THE COMFORT BEHAVIOR (COMFORT-B) SCALE DESERVE ITS POPULARITY?

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Introduction: The COMFORT scale was developed in 1992 by psychologist Bruce Ambuel. This scale and an adapted version without physiological items (COMFORT-B scale) are used in PICUs world-wide. We performed three studies in 2009–2011 in our PICU addressing the following questions: (1) Is the COMFORT-B scale valid in infants with Down’s syndrome? (2) Is a 2 min observation really necessary or could we do with a shorter period? (3) What is the sensitivity to change of the scale?

Method: For study 1 we retrieved COMFORT-B scores for 76 infants with Down’s syndrome and 466 infants without Down’s syndrome (age 0 to 36 months) and applied confirmatory factor analysis. For study 2 we compared 236 simultaneous observations of two observers in 80 infants: one based the score on a 2 min observation, the other on a 30 s observation. For study 3 we collected 758 COMFORT-B scores in 185 PICU patients assigned before a pain-reducing intervention and 10 min to 2 h thereafter. Interrater reliability was tested and proven good in all studies.

Results: 1. The COMFORT-B scale had a similar factor structure and cut-off values for pain for infants with and without Down’s syndrome. 2. COMFORT-B scores of 17 or higher (suggesting pain) were assigned to 19% of the patients after 2 min observation and 11% after 30 s observation. 3. Sensitivity to change was excellent with an average decrease of 6 points (score range 6 to 30).

Conclusion: The COMFORT-B scale has excellent psychometric properties and its wide-spread use is well deserved.

340 – POSTER PRESENTATION

UNPLANNED EXTUBATIONS IN A PAEDIATRIC INTENSIVE CARE UNIT

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Objectives: We have recently observed an increase in the number of unplanned extubations (UE's) occurring in our regional Paediatric Intensive Care Unit. A review of these cases was undertaken in an attempt to determine causative factors in order to reduce the incidence.

Methods: Relevant critical incident forms completed between August 2010 and April 2011 were examined. All information relating directly to the events was recorded.

Results: 7 UE's were recorded during this period. 4 of these children required reintubation within 12 h. 3 remained extubated. 3 of the 7 children were undertaking weaning of sedation in preparation for extubation later that day. In 2 of the 7 cases the nurse caring for the child was also caring for another patient. The remaining 5 were being cared for by a nurse whose only responsibility was to that child.

Conclusions: In previous studies, reduced staffing levels with nurses caring for more than one ventilated patient were highlighted as reasons for an increase in UE's [1]. Although we found this to be a possible contributing factor in 2 of the cases, the primary reason, ascertained from the incident forms, appeared to be undersedation. In light of our findings, review of our sedation policy is currently underway.

Reference:

1. Marcin JP et al. (2005) *Pediatric. Crit Care Med* 6(3):254–257.

341 – POSTER PRESENTATION

THE EVALUATION OF STRUCTURED EDUCATION AND COUNSELLING ACTIVITIES TO THE PRIMIPARA MOTHERS

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Background and aims: The postpartum period is a transitional time for mother and baby, emotionally, socially, physiologically. Care in this period is critical not only for survival but also to the future of mothers and newborn babies. Research was planned experimentally to determine the effect of structured education and counseling activities to primipara mothers by nurses on baby care and being a mother during the first 3 months of postpartum period.

Methods: Research was performed on 76 (34 experiment group and 42 control group) primipara mothers in Pediatric Department of Gulhane Military Medical Academy. Data were obtained from these forms; “questionnaire of determining the knowledge level of primipara mothers about baby care”, “what being the parent of a baby is like scale”, “state-trait anxiety inventory” and “satisfaction questionnaire of mothers”.

Results: Results have been determined that education and counseling activities increased knowledge level of mothers in baby care, adaptation for the maternal role, satisfaction of mothers for the nursing care and decreased anxiety level of mothers during postpartum period.

Conclusions: Education and counseling activities should given by nurses in the first year of baby in order to increase knowledge level of

mothers in baby care, to increase satisfaction of mothers for the nursing care, to increase adaptation to the new role and to decrease anxiety level of mothers.

Nursing Topic 20 - Innovations (342–345)

342 – POSTER PRESENTATION

PAIN NOT TO HAVE PAIN: APPLICATION OF LOCAL ANESTHETIC

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The use of the local anesthetic EMLA[®] during painful procedures in children is becoming an increasingly common practice. Some of the techniques used seem to be more widely accepted than others.

This study aimed to compare three techniques of EMLA[®] cream application in terms of the pain during the removal of the protective dressing and the venipuncture (VP) for the child, parents/accompanying persons and nurse.

A prospective, randomized and controlled clinical study was performed in 142 children aged 4–14 years attending the Outpatient Consultation of Medical Specialties and Subspecialties of a Pediatric Hospital and in need of VP.

Of the three techniques used, technique C (basis of a teat and an elastic bandage) was considered painless, whereas the standard technique (waterproof adhesive) was the most painful ($p < 0.05$). The three techniques were effective in preventing pain in VP, and children, parents and nurses were unanimous in their preference for technique C.

It was concluded that technique C is easy and quick to apply, cost-effective and painless for the child, and that it is also the one preferred by parents and nurses. Thus, its use is recommended in this age group.

343 – ORAL PRESENTATION

EDUCATION WITH PLEASURE- HIGH LEVEL OF KNOWLEDGE AND TREATMENT QUALITY

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According to professional books, the accepted practice in medicine is reference to dry facts, without emotions, thus the use of uncommon resources constitutes an “antidote” to regular learning. If the educator can use his imagination and to apply diverse techniques involving various senses and emotions, the trainee would be prevented from getting tired and would succeed better in the process of learning. The results of such learning would be higher than usual (Bradshaw & Lowenstein, 2007).

In the pediatric critical care department in Tel ha-Shomer Medical Centre, new personnel are continuously absorbed - and the successful absorption process is quite necessary here. It was decided to introduce revolutionary changes into the instruction method at the 2011: from then on, all the process will be connected to positive childhood

experiences. Theoretical learning will be performed using a booklet of activities built similarly to children's booklets: with crosswords, mazes, pictures. All the questions in the booklet are based upon recommended literature, according to representative situations in the unit, while many different questions are devoted to the most important subjects, in order to ensure full understanding of the content.

Summary: to raise the motivation for self-learning and eventually to raise the level of knowledge and to improve the treatment quality, a novel instruction method was introduced intended to deepen the knowledge in the simplest way, the way connecting us to our childhood, to the times when learning brought joy, happiness, and the wish to know more.

344 – POSTER PRESENTATION

MULTI-DISCIPLINARY STAFF TRAINING FOR PORTABLE CT SCANNER USE IN PAEDIATRIC INTENSIVE CARE UNIT

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Background: Transport of critically ill, unstable, children off paediatric intensive care (PIC) for urgent head CT is never without risk. A portable CT scanner, the ceretom, was introduced to a regional neuro-critical care lead centre in 2007. We have previously reported the positive impact on patient safety and staffing on the ICU. (1) We aim to describe the development of shared protocols and training for ceretom use.

Methods: Descriptive process review.

Results: Introduction of new equipment to PIC can be challenging, stressful and time consuming. Ceretom initially took significant positioning time to obtain a scan. Evidence was presented repeatedly to all teams of decreased risk of adverse patient events and a robust ceretom user group was developed (radiology, PIC consultant, senior nursing staff) which facilitated creation of shared protocols and risk assessments. Initially separate PIC and radiology team education developed into regular joint scenario training, which now provides practical guidance to all about their role in the provision of a scan. Following this the average time for scan is now 20 min, though the radiographer only needs be present for the actual 5 min scanning time and medical staff are not required. This compares to 1-2 Drs and 2 nurses being off PIC for up to 1 h for standard scans.

Conclusion: CT scans on critically-ill children who are either too unstable to transfer to CT scan, or in whom the level of dependency, e.g. CVVH/ECMO, precludes transfer can now receive safe bedside head CT scans without leaving the PICU.

345 – ORAL PRESENTATION

VIOLATIONS OF NURSING PROTOCOLS: HOW OFTEN AND HOW EASY TO CORRECT?

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Background: The high tech PICU environment carries a risk for errors and complications. To contain this risk, we work hard at

optimizing safety and quality of care on our ward. One of the measures introduced to this aim is application of the Critical Nursing Situation index (CNSI).

The aim of this study was to determine the incidence of protocol violations and how often a protocol violation could be corrected.

Methods: The CNSI scores protocol violations in nine nursing care areas: basic care, circulation, respiration, digestive tract, infection parameters, invasive catheters, care for medication, ECMO and the central nervous system. The CNSI consists of 181 items scored by a trained nurse as: true (protocol violation), not true (=work according to protocol) or not applicable (for the patient under review). We analysed CNSI results obtained in randomly selected patients at the IC-Sophia Children's Hospital in the year 2009.

Results: Fourteen nurses were trained to score the CNSI and interrater reliability was excellent (kappa 0.93 to 0.99). Altogether 238 CNSI forms in 127 patients were filled in. In total 11.7% of the applicable items were scored as a protocol violation. Direct or later correction of the protocol violation was feasible in 53.3% of the 986 violations. In 22.3%, the violation was purposeful due to specific patient situation. The number of protocol violations were not statistically significantly different between high care and intensive care patients ($p = 0.86$).

Conclusion: The CNSI can be a valuable checklist to evaluate work according to protocol.

Nursing Topic 21 - Parent Care (346–350)

346 – ORAL PRESENTATION

PARENTS' KNOWLEDGE AND PERCEPTIONS REGARDING VITAMIN K PROPHYLAXIS FOR NEWBORNS

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Background: There is an increasing trend of parents refusing vitamin K (VK) prophylaxis for their newborn.

Objective: To examine the basic knowledge and perceptions of expecting parents regarding newborn VK prophylaxis.

Methods: We used anonymous questionnaires examining knowledge, perceptions, and cultural and religious barriers in a convenience sample of expecting parents-to-be during tours of the delivery rooms and postpartum units.

Results: The questionnaire was completed by 219 participants; 151 were female, 66 were male. Eighty-five percent reported that they were expecting their first child and most of the women were in the third trimester of their pregnancy. Two-thirds of the participants had an academic degree yet exhibited a low level of knowledge regarding the necessity to provide VK to the newborn (22.5%), the source of the vitamin (15.5%), the action of the vitamin (34%) and the provision options available (29%). Expecting mothers exhibited more knowledge than fathers and many fathers reported "not knowing." Few parents reported positive or negative perceptions towards providing VK. When examining the relationship between the knowledge and perceptions of first-time parents and the rest of the sample, no statistically significant differences were noted. However, more first-time parents reported that they had not yet decided whether they should provide VK once the baby was born ($p < 0.05$).

Conclusion: There is an emerging need to develop educational materials for expecting parents regarding the safety, utility and benefits of providing VK for newborns in order to ensure that parents make an informed decision following the birth of their child.

347 – POSTER PRESENTATION

FAMILY CENTERED CARE IN PICU: A QUALITATIVE STUDY

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Family centered care (FCC) in PICU's is particularly demanding due to the context and the nature of intensive care admissions. A qualitative study was conducted in an Italian pediatric hospital (Ospedale Pediatrico Bambino Gesù) with the objective to understand how is FCC practiced and perceived by all who are involved in the relationship, made by the parents, patients and the institution. Part of this study focused on the intensive care context. Qualitative data was gathered through focus groups with nurses and doctors involved in intensive care, parents and children who had the experience of critical care admissions. A thematic analysis was performed by four independent researchers. The main themes were family presence, communication issues, emotional burden, isolation.

348 – POSTER PRESENTATION

ACTUAL SITUATION OF PARENTING FOR CHILDREN WITH COMBINED VASCULAR MALFORMATIONS

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Objective: The purpose is to find the actual situations of parenting for children with combined vascular malformations. Combined vascular malformation is very rare and congenital diseases, and almost incurable. In Japan, this disease develops at the rate of 1/2,000,000 and the cause of this disease remains unknown, and thus treatment is still under development.

Methods: Subjects were 2 fathers and 3 mothers with children who had combined vascular malformations. We interviewed them about their parenting. For ethical considerations, we explained about the purpose and methods of this study using written papers and obtained their consents.

Results: We found 8 categories on the fathers' parenting and 10 categories on the mothers' parenting. Fathers' 8 categories are 'Confusion by a notice of the disease', 'The life style together with the disease', 'Support of children's independence and relieving children's pain', 'The role of the family', 'Request for teachers' cooperation in the school', 'Expectation for nurses' roles', 'Expectation for medical doctor' and 'The request of social welfare'.

Mothers' 10 categories are 'Efforts to visit the hospital regularly', 'Home training for accepting disease', 'Support of children's independence and relieving children's pain', 'Increasing anxiety about children's future', 'Actual feeling of an advantage for being in hospital', 'Anxiety about human relationships in the hospital', 'The roles in the family', 'Request for teachers' cooperation in the school', 'Expectation for Nurses' roles' and 'The request of social welfare'.

Conclusion: In general, fathers were watching over the children, while mothers were aiming at well discipline for them.

349 – POSTER PRESENTATION

SEVEN YEARS OF A FAMILY LIAISON SERVICE ON ICU. SUCCESSES, FAILURES & PITFALLS. WHAT DOES THE NEXT SEVEN YEARS HOLD?

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In 2003, at Great Ormond Street Hospital for children, 2 teams of Family Liaison Nurses (FLN) were appointed to work on the Neonatal and Paediatric ICU's. Their remit was to support families. We describe how the FLN team has evolved over the last seven years, providing daily support in the ICU and facilitating appropriate referral to the psychosocial team and giving much needed guidance at the time of bereavement. The team at times has been a victim of its own success and we discuss what has been learned from this and what the future holds. Feedback shows that the comprehensive support provided for families in these stressful environments has changed the families' experiences of ICU. The FLN team has developed into a structured service with clear aims and objectives that provides a holistic approach to a families' journey through ICU and beyond.

350 – POSTER PRESENTATION

MOTHERS' WORRIES FOR HOME TRAINING OF THEIR HANDICAPPED CHILDREN

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Objective: Mothers with handicapped children become to possess a feeling of difficulty to take care of them at home as they grow up. The aim of our research is to clarify the mothers' worries for the training of their handicapped children at home.

Methods: The subjects were 454 mothers with handicapped children. We distributed them questionnaires and extracted the replies regarding worries for home training. Then we analyzed them by qualitative descriptive method.

Results: We obtained replies from 303 mothers. The response rate was 66.7%. Handicaps of their children included mental retardation (31%), autism (24%), physically handicap (13%), epilepsy (11%),

cerebral palsy (8%), allergy (3%), congenital heart disease (2%) and others (8%).

We found 5 categories and 15 subcategories as follows;

1. Sense of difficulty of home training; trial and error, difficulty of teaching, sense of fatigue, etc.
2. Reverse effects of home training; confusion about children's reaction, scolding too much when children can't follow mothers' instructions.
3. Troubles of home training; hardness to understand the difference of training between the handicapped children and their siblings, etc.
4. Conflict over home training; Conflict over endurance of children, difficulty to establish the mutual understanding, etc.
5. Doubt about home training; doubt about necessity of home training.

Conclusion: Almost mothers had a feeling of helplessness for home training because of the lack of effective communication with children. We thought that the mother's feeling and the reverse effects lead to the conflict over the home training for handicapped children.

Nursing Topic 22 - Nursing research (351–363)

351 – POSTER PRESENTATION

COMPARATION OF CONGENITAL AND PERINATAL INFECTIONS IN BOSNIA AS INCREASING NUMBER IN LAST DECADE

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Introduction: Congenital and perinatal infections remain a stubborn and major cause of morbidity and mortality in infants throughout the world. The infant can also become infected from the vagina of the mother during birth. A congenital infection is an infection seen in the newborn infant that was acquired transplacentally during the first, second, or early third trimester.

Aims: Intrauterine infection may occur quite early in pregnancy and remain undetected for months.

Methods: Depending on the nature of infection, an appropriate sample is collected for laboratory identification. Authors performed a retrospective case series review at ten years care children's hospitals and public pediatricians offices in Sarajevo.

Results: The incidence of congenital infection in the fetus and newborn infant is relatively high at 1.5% in Bosnia and Herzegovina. The possibility of congenital or perinatal infection in neonates is usually considered because of the diagnosis of, or concern about a specific infection in, a mother during pregnancy that can be transmitted to the neonate or because of clinical findings in the neonate at birth that suggest an infectious cause.

Conclusion: While there are a large number of pathogens that can occasionally be harmful for the unborn child, some are of considerable public health impact, for example rubella, varicella, syphilis, hepatitis B, toxoplasmosis, or infections with cytomegalovirus (CMV) or human immunodeficiency virus (HIV). A more strategy has to be adopted if treatment needs to be given to the mother in order to prevent permanent damage of the child.

352 – POSTER FOR ORAL PRESENTATION AND POSTER PRESENTATION

STAFF EXPERIENCES OF PAIN ASSESSMENT AND MANAGEMENT IN A TERTIARY PICU

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Background/aims: Pain assessment during hospitalisation in children is notoriously difficult due to the differences in emotional and cognitive development of this patient group (RCN, 2009). This task is made more difficult in the Paediatric Intensive Care Unit (PICU) where children are often ventilated and sedated and therefore unable to verbally report pain. The aim was to explore the lived experience of PICU nurses in PICU regarding the assessment and management of pain.

Methods: A focus group of 6 nurses of all grades was conducted and recorded using a semi-structured interview guide. Transcripts were analysed using a phenomenological approach with Colaizzi's 7 procedural steps as a framework.

Results: Pain assessment was felt to be lacking and the value of it diminished due to the lack of an algorithm to guide the process and lack of meaning assigned to the score. The current tool which was used was felt not to reflect pain behaviours and user fatigue was apparent. Staff felt that the pain assessment process needed to be improved, with education and the introduction of an appropriate tool for use in this patient group a priority.

Conclusions: From the discussion it was apparent that Pain assessment needed to be formalised and improved in the PICU. This focus group prompted a review of the literature to identify a suitable pain score for use in the PICU and subsequent development of a new tool which is currently in the testing phase.

353 – ORAL PRESENTATION

PSYCHOMETRIC PROPERTIES OF THE SOPHIA OBSERVATION WITHDRAWAL SYMPTOMS-SCALE (SOS)

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Introduction: The SOS was found valid and reliable to screen for benzodiazepine and opioid withdrawal syndrome in PICU patients. We aimed to establish reliable cutoff scores and to test the scale's sensitivity to change in a large sample.

Methods: Patients were eligible for this prospective observational study if they had received continuous infusion of benzodiazepines and/or opioids for more than 5 days. When doses were being tapered off, patients were repeatedly screened for withdrawal symptoms. Nurses used both the SOS and the Numeric Rating Scale-withdrawal, allowing to determine the cutoff score for the SOS. Sensitivity to change was determined by comparing SOS assessments per patient before and after additional administration of sedatives or opioids to reduce withdrawal symptoms based on a validated algorithm.

Results: A total of 2506 paired SOS and NRS-withdrawal assessments were obtained in 118 children (median age 5.5 months; IQR 0–47 months). The median number of assessment per child was 13 (IQR 6–29) assessments over a median of 5 days (IQR 3–10). A cut-off score of 4 or higher for the SOS; resulted in a sensitivity and specificity of 0.85 and 0.91, respectively, as calculated against a NRS-withdrawal score of 4 or higher. The sensitivity to change was good, as the mean SOS score dropped from 5.9 (SD 1.9) before intervention to 3.4 (SD 2.5) after intervention ($p < 0.0001$).

Conclusions: The SOS shows excellent psychometric properties in PICU patients. Future research is aimed at defining risk factors for the development of withdrawal syndrome in PICU patients.

354 – POSTER PRESENTATION

REORGANIZATION IN LIFE–FATHERS' LIVED EXPERIENCE OF THE THREE YEARS SINCE THEIR VERY PRETERM CHILD WAS BORN

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Background: As more preterm-born children receive life-saving care and survive, more parents live through the Neonatal Intensive Care Unit experience. There has been a large body of research examining the experiences of mothers of preterm-born children, while studies focused exclusively on fathers are sparse, although increasing. Few studies focus on the years after the child's birth.

Aim: To illuminate fathers' lived experience of the three years since their very preterm child was born.

Method: This study is the second part of a longitudinal study following fathers of very preterm children with qualitative interviews. The first interview was conducted one to three months after their child's birth and the second approximately three years later. Open interviews with eight Swedish-speaking fathers were performed and analysed using a hermeneutic phenomenological method.

Findings: The fathers' lived experience was described as a process towards a reorganization in life and they described a journey from past to present time. They had lived through the experience of having a preterm-born child and had adapted to living an ordinary family life. They were now able to believe in a future for the family as a whole. Fundamental themes were: restrictions in life, experiencing empowerment and building a secure base.

Conclusion: The findings reveal that fathers undergo a fragile process in the first years after their very preterm child is born. An increased understanding of their experiences can guide professionals to include fathers' specific needs in the care during and after the hospitalization to a greater extent.

355 – ORAL PRESENTATION

RESEARCH PERSPECTIVES OF VIDEO COMMUNICATION BETWEEN THE NEONATAL UNIT AND THE PARENTS OF PRETERM BORN INFANTS

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Can information and communication technology (ICT) be used as way to support parents of preterm born children after discharge from the neonatal unit? This question was raised when the Neonatal nursing care at home by ICT (NeOHIT) project started. The aim of this presentation is to introduce the NeOHIT project and share some methodological perspectives on the research. The aim is also to present experiences of planning and implementing this ICT project as well as present some of the findings. It was found to be crucial to develop a number of different options of collaboration between the University and the hospital staff and also with the parents. Ethical considerations are of great importance and needed to be considered throughout the whole research process. The importance of developing collaboration between the researchers and the neonatal nurses during the implementation of this ICT research project was found to be of utmost importance. Findings shows that the use of ICT from both parental and staff perspective are supportive and facilitate the communication. This was highly valued by participants living in an area with long distance between the hospital and the families' homes. The development of ICT has after the project resulted in a new standard and is implemented as a new tool and in use at the neonatal unit.

356 – ORAL PRESENTATION

CONDUCTING RESEARCH IN THE CRITICAL CARE SETTING: RISING TO THE CHALLENGE

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Objectives: Conducting research in Paediatric and Neonatal Intensive Care settings (PICU/NICU) present many challenges for the research team. An admission to PICU/NICU is a very stressful time for the family and recruiting and consenting of patients at this time is complex requiring an ethically optimal approach (Golec et al., 2004). This piece of work aims to identify those challenges and some of the strategies to overcome them.

Methods: A structured Reflection process with a group of Paediatric and Neonatal research nurses discussing the challenges of conducting research in a PICU/NICU setting.

Results: Some of the challenges discussed which were pertinent to both areas were issues surrounding consent (when is the best time), burden on the family (too many research projects), incorporating research into clinical staff time, availability of staff trained in good clinical practice, meeting high standards of research practice.

Some of the strategies used for overcoming these challenges were staff training (teaching packages), good communication (logs, working on the unit, visual guides), clinical credibility of the research team, research team presence to ensure good understanding of the patient and family group, monitoring and promoting best practice.

Conclusions: With preparation and the right skill mix within a research team, studies can be run efficiently and effectively and the challenges presented by this complex group of patients can be overcome. User involvement in designing these studies and improving consent during this critical period would further enhance practice.

357 – ORAL PRESENTATION

LEFT LATERAL POSITION INCREASES GASTRIC RESIDUALS IN PRETERM INFANTS IN THE FIRST WEEK OF LIFE

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Background: Changing body position is recommended, but position could influence the occurrence of gastric residuals and impede increase in feeds.

Aim: To investigate the effect of body position on gastric residuals in preterm infants. **Methods.** In a prospective study infants with 28–35 weeks gestational Age, admitted to the neonatal unit in LUMC, were included. According to local guidelines infants were cared in four positions (left lateral position (LLP), right lateral position (RLP), supine (SP), prone position (PP)) every 24 h. On day 4 after birth residuals were noted on 2 occasions during each position. Gastric residual (percentage of feeds) is noted if >5% of gastric feed retained before next feed was given.

Results: Included: 147 infants (mean GA 31.6 (2.2) weeks, birth weight 1630 (540) grams). Residuals occurred more often during LLP (49%) when compared to RLP (39%; $p < 0.05$) and PP (41%; $p < 0.05$), but not SP (48%; ns). The median (IQR) amount of residuals was higher during LLP (66 (21–122) %) compared to RLP (20 (10–50) %; $p < 0.05$), PP (33 (11–78) %; $p < 0.05$) and SP (28 (11–79) %; ns). There was a small negative correlation between gestational age and occurrence of residuals ($r = -0.129$, $p < 0.001$) and amount of residuals ($r = -0.134$, $p < 0.001$).

Conclusion: Preterm infants have more often and larger gastric residuals when lying on LLP.

358 – ORAL PRESENTATION

ATTITUDES OF NEONATAL NURSES TO RESEARCH, AND THEIR ROLE IN THE RESEARCH PROCESS

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Background: Little is known about how nursing staff view their participation in clinical research, especially within neonatal care. It has been suggested that nurses are generally supportive of research,

although participation may be influenced by time pressures, care of their patient, and limited experience of research. We designed a qualitative study to explore these influences.

Objective: To explore neonatal nurses views of clinical research, and their perception of nurses' role in the research process.

Method: Thirty-one nurses from a neonatal service participated in semi-structured interviews, which were analysed through the constant comparative method, assisted by NVivo software.

Results: Nurses are supportive of clinical research, and recognise its importance in delivering the best care to their patients. Despite appreciating the benefits of research involvement, nurses see their primary role as advocates for the babies and their families, promoting clinical care above research. Nurses do not view themselves as involved in research, although they perform supportive tasks (such as collecting samples, recording data), and see this as part of their caring role. In particular, research is seen as an integral part of working in an intensive care unit, although nurses experience challenges in accessing and assimilating research information.

Conclusions: Nurses play an important research role by promoting studies, collecting data, and acting as advocates for their patients. Although research support is seen as an integral part of their role, nurses do not feel engaged with the research process, influencing their level of participation, and thus the success of clinical research projects.

359 – POSTER PRESENTATION

THE DETERMINATION OF INFORMATION NEEDS AND PROBLEMS OF PARENTS OF CHILDREN WITH ANAL FISSURE

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Introduction: Anal fissure is a linear longitudinal defect in the lining of the anal canal extending usually from the dentate line to the anal verge. Anal fissures affect all age groups. The most dominant symptoms are pain and rectal bleeding. Anal fissure is a disease which affects quality of life of patients.

Purpose: The purpose of this study is to determine problems of parents of children with anal fissure and their needs of the education.

Material and method: In this descriptive study, the data were collected in between November 2010–January 2011. The data were collected using a 20-question survey form. The study sampling group is consisted of 25 children with diagnosis of anal fissure, and their parents whose admitted to pediatric surgical outpatient unit. In evaluation of data SPSS.15 was applied.

Results: The 25 patients, included in the study, have 60% pain, 96% strain during stool, 56% have rectal bleeding, 76% cry during stool, 60% postpone the stool. It is determined that 56% of the parents have no information about anal fissure. All of the parents (100%) reported their information needs about the care and the treatment of anal fissure.

Conclusions: In this study, it is determined that there was a lack of information in parents about anal fissure so it can be cause some wrong implications such as noncompliance with diet. It is recommended that parents of anal fissured children should be informed by information booklet, diet programs and compliance with the treatment.

360 – POSTER PRESENTATION

BRINGING PRACTICE TO RESEARCH: REFLECTIVE EXPERIENCE OF BECOMING A PAEDIATRIC RESEARCH NURSE

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Background: In the UK, recommendations by the Department of Health demand evidence based practice both at local and national level (Cummings et al. 2007). This has led to the increasing importance of the research nursing role; a role which is still being universally defined. The role of nurses in research is multi-dimensional, encompassing both translational medicine and traditional nursing values (Spilsbury and Meyer 2001).

Aims:

- (1) Examine experience, feelings and role challenges of two clinical nurses becoming research nurses within the paediatric setting.
- (2) Discuss decisions around role implementation, adaptation, practicalities, and the journey into autonomously functioning research practitioners.

Methods:

- (1) A qualitative reflective account on the experience of two nurses' transitional journey into research nursing.
- (2) Literature review of current ideology and paradigms of the research nurse role.

Conclusions: Both nurses reported initial lack of confidence, acknowledging the challenges of a steep learning curve, difficulty with new "language" and the paradigms surrounding research. Their accounts echo evidence that supportive management is key in the transition from ward-based nurse to research nurse (Weaver and Olsen 2005, Spilsbury et al. 2008). Structured teaching pathways are critical in the building of confidence and knowledge-base in paediatric research nurses. This leads to a understanding of the universal paradigms within research nursing.

361 – POSTER PRESENTATION

COMFORTNEO-SCALE IN NEONATES DURING THERAPEUTIC HYPOTHERMIA AFTER PERINATAL ASPHYXIA: A PILOT-STUDY

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Aims: Determine whether there is a need to study the clinimetric properties and diagnostic quality of the COMFORTneo-scale when used during therapeutic hypothermia after perinatal asphyxia.

Method: A quantitative pilot-study with a retrospective cohort was used. Data were collected from the status of 99 neonates with a gestational age ≥ 36 weeks. Neonates were divided into three groups: asphyxiated with therapeutic hypothermia (AH), asphyxiated (A) and reference group (R). The COMFORTneo score, the first within 6 h postpartum and then every 8 h up to 110 h postpartum (a total of fourteen scores per patient) were examined.

Results: There were 611 different COMFORTneo scores recorded. The median of the COMFORTneo scores varied across time and group, respectively 8-10 (range 6-19) (AH), 7-15 (range 6-16) (A) and 10-12 (range 6-29) (R). A statistical significant difference was seen between the three groups at first measurement ($p = 0.013$), the third ($p = 0.014$), fifth ($p = 0.026$), sixth ($p = 0.012$) and ninth measurement ($p = 0.035$). Mean COMFORTneo scores over the total period of the individual neonates showed no significant differences between groups. Multivariate analysis to correct for the influence of medications and respiratory support on the COMFORTneo score was not possible due to the fact that the assumptions to perform such an analysis were not met.

Conclusion: No firm conclusions can be drawn concerning the validity and reliability of the COMFORTneo-scale as a measurement of stress and comfort in asphyxiated neonates with therapeutic hypothermia. A new cut-off point for stress and comfort as measured with the COMFORTneo-scale for these neonates seems necessary.

362 – ORAL PRESENTATION

THE BURNOUT LEVELS OF NICU NURSES AND ITS EFFECT ON THEIR QUALITY OF LIFE IN NORTH OF TURKEY

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Purpose: The aim of the study was to investigate the burn-out level of NICU nurses and how it affects their quality of life.

Design: The descriptive, cross-sectional study was used with 85 nurses working at the neonatal intensive care units.

Methods: The study was conducted at the NICU of two state hospitals located in the north region of Turkey. Data of the study was gathered using a questionnaire to uncover the demographic and occupational characteristics of the nurses, and face to face interviews via Maslach Burnout Inventory (MBI), and Quality of Life Scale (WHOQOL-BreF).

Findings: The score mean of emotional exhaustion was 14.90 ± 5.53 , the score mean of depersonalization was 3.87 ± 2.77 , and the score mean of personal accomplishment was 11.43 ± 4.63 for the nurses. The study results indicate that nurses experience burn-out at moderate levels in the areas of emotional exhaustion and personal accomplishment, and low levels of depersonalization, which are all sub-scales of burnout. While no relationship was determined between burnout and the sub-scale depersonalization, the quality of life and the sub-scale of environmental surroundings, personal accomplishment and social relationships area, there was a significant negative relationship between all other sub-scales.

Conclusions: The study indicated that nurses experienced moderate burn-out in the sub-scales emotional exhaustion and personal accomplishment. The quality of life decreases as the burn-out levels of nurses increases.

Clinical Relevance: In order to increase the quality of nursing care, burn-out-causing factors in the work place must be determined, and precautions must be taken to minimise them.

363 – POSTER PRESENTATION

CREATIVE NATIONAL STANDARDS FOR CARING OF NEONATAL WHO NEEDS PHOTOTHERAPY IN IRAN

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Objective: Creative National Standards for Caring of Neonatal who Needs Phototherapy in Iran.

Methods: This is a multiple triangulation study done in the nursing and midwifery faculty of medical sciences of Esfahan University. First, international care standards were extracted from the net, of 10 different countries. Second, using Delphi method, these standards were selected by a questionnaire as well as the viewpoints of 42 clinical experts in the country. Their suggestions regarding desirability and applicability of these standards and according to the executive and sociocultural situation in the country were investigated through a descriptive method. Results of this stage were analyzed via descriptive statistics.

Results: In this Study, the majority of the participants (40.5%) had master degree. 45.2% of them were 36–45 years old. In addition, the majority of the participants had practical experience of 2–10 years, generally and 6–10 years, particularly in NICU. Finally, 14 standards related to caring during the phototherapy and according to 97.5–100% desirability rate were achieved.

Discussion: In this study, final standards have been created. The results will be presented on site. Creating nursing standards by experts and deserved people leads to the increase in the quality of nursing care.

Nursing Topic 26 - Transplantation and organ donation (364)

364 – POSTER PRESENTATION

PEDIATRIC LIVER TRANSPLANTATION: PRESENT STATE IN CROATIA

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Liver transplantation (LT) is one of the best examples of how modern medicine can successfully treat pediatric diseases that other ways would be fatal. This is one of the best examples that emphasize the significance of multidisciplinary approach and team work in modern medicine.

Indications for pediatric liver transplantation are: extrahepatic biliary atresia (after unsuccessful Kasai procedure); cholestatic diseases (Byler's disease, Alagille's syndrome, biliary hypoplasia, liver cirrhosis as a consequence of alpha 1-antitrypsine deficiency, fulminant hepatitis regardless of etiology, hepatocellular carcinoma, liver insufficiency as a consequence of autoimmune hepatitis or of unknown etiology.

It is possible to perform LT in a child of any age (and weight) but it is preferred in children after 12 months (more than 10 kg).

Pediatric LT team consists of several medical professionals. Nursing team is extremely important, from nurse LT coordinator, to

specialized nurses in intensive care and gastroenterology units. After LT, children are treated in pediatric intensive care unit (PICU), usually up to 4 weeks, and after that on pediatric gastroenterology ward.

First successful pediatric LT in Croatia was performed in Zagreb in our hospital on 2001. Present state in Croatia 10 years after the first liver transplantation will be presented.

Nursing Topic 27 - Education (365–369)

365 – ORAL PRESENTATION

PAEDIATRIC ECMO TRAINING COURSE FOR NURSING PROFESSIONALS AT ZURICH UNIVERSITY CHILDREN'S HOSPITAL

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Background: Since 2004 the heart surgery intensive care unit of the Zurich University Children's hospital has been offering an ECMO therapy for heart and lung failure.

Due to the steady increase of cases, and also due to transfers from external hospitals for ECMO therapies, more nursing professionals are needed. In the past, our ECMO specialists were all trained in London (GOSH).

Methods: The ECMO specialist team of the heart surgery intensive care unit has developed an ECMO training program in cooperation with the physicians and the cardio technicians of the Zurich University Children's hospital.

The training program was established according to the current ELSO guidelines. The training is divided into a theoretical and a practical part. The theoretical base of the ECMO therapy is taught to the participants in a three-day course, and a first practical handling is rehearsed. Following the course the participants are trained in practice at the patient's bed by experienced ECMO specialists. Based on a portfolio the training process is documented and evaluated at the end and the participants are certified ECMO specialists.

Results: The first training course was successfully accomplished in April 2011 with 12 nursing specialists. The evaluation of the first course revealed a high motivation and commitment of the participants and gave us important hints about the optimization.

Conclusion: The learning process has proved its value for introducing nursing professionals into the highly complex care of children at the ECMO and for planning the learning steps continuously.

366 – ORAL PRESENTATION

MULTI-MODAL TRAINING FOR ADULT ICU NURSES CARING FOR PAEDIATRIC PATIENTS IN A WAR ZONE

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Background and Aims: Many clinical staff deployed in war zones are anxious and uncertain about managing critically injured children

citing lack of training, experience managing child-casualties and lack familiarity with paediatric vital signs, ventilation and drug dosages. Furthermore emotional responses to injured children play an important role.

Whilst children account for 25% of all admissions in deployed ICUs (HARRIS CC, McNICHOLAS JJK. 2009) with severe poly-trauma accounting for 10%, pre-deployment simulation training is largely orientated to adult patients.

Methods: Descriptive study of modern-matron deployment to Camp Bastion, Afghanistan as part of Ministry of Defence/NHS “Support to Operations.” A core group of adult ICU nurses (including JW, DW), and DD formed to address training.

A multi-disciplinary programme of core paediatric-trauma skills, the Bastion Trauma Course (BTC), was developed using multi-modal training with lectures, workshops, demonstrations and casualty simulation (Image 1). BTC was attended by both medical and nursing staff working in Afghanistan.

Results: Feedback was very positive. Staff reported improved confidence and ability to facilitate optimal care for critically injured children. BTC was repeated several times at the request of military personnel.

Conclusions: Despite the pressure of war, training and education remain a high priority for the British Army as children are frequent casualties in war zones. Multi-modal training suited a wide variety of learning styles, and creating realistic casualty scenarios improved the educational experience.

367 – POSTER PRESENTATION

EFFECT OF HOME VISIT ON MORTALITY AND MORBIDITY OF PRETERM NEWBORN

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Introduction: Preterm birth (<37 weeks) leads adverse perinatal outcomes, including neonatal and infant mortality and getting different sick. The aim of this study was to determine the effectiveness of home visit on mortality and morbidity of Preterm newborn.

Method: This is a semi-experimental study in which Preterm newborn with fetal age of less than 37 weeks weighing below 2500 grams were placed in two groups of case (30 neonates) and control (30 neonates) randomly. Home visit was presented to case group for a period of 6 months after discharging from hospital. Control group received hospital routine cares and referred for visiting. Both groups were followed up for a period of 6 months. The samples of both groups were compared with each other from the view point of mortality and hospitalization. Collected data were analyzed using X^2 and independent T test.

Results: The mortality during first six months of life of both groups did not show any difference ($P > 0.05$). However, the number of inpatient cases of neonates and also the number of their disease cases not required to be hospitalized during first six months of life among case group was less than that of control group ($P < 0.05$).

Conclusion: The results of this study indicated that, carrying out home visit by health care givers results in reducing the number of inpatient cases of neonates during first six months of life. Therefore, it is suggested to appoint home visit as a part of health programs to improve neonatal health.

368 – POSTER PRESENTATION

PEDIATRIC NURSING AMBULATORY

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Nursing ambulatory care is today a new area of professional specialization that can enhance integration between secondary and primary care. It can favour early discharge especially for those patients that require continuing specialized home care, due to their clinical condition.

Many parents of patients admitted at Ospedale Pediatrico Bambino Gesù's NICU, after discharge, need to be supported in their child's care and require the education necessary for appropriate home care. To avoid inappropriate re-admissions it was developed a project to create a nursing ambulatory.

The objective is to guarantee continuity of care providing educational sessions on post-natal nursing care appropriate to the child's specific needs, holistic and family centered nursing care. A questionnaire was administered to the parent's of patients admitted in the neonatal department to evaluate their perception of continuity of care and possible solutions.

369 – POSTER PRESENTATION

MOTHERS' KNOWLEDGE AND PERFORMANCE ABOUT DIAPER RASH IN INFANTS WITH DIARRHEA (2011)

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Introduction: Diaper rash is one of the most common skin disorders, occurring in 50% of infants, with 5% having severe rash. In infants with diarrhea and the infants with diapers have seen more and more especially when it may not change every 4-6 h. Due to its complications on skin and anal area, it need to more attention by mothers and caregivers.

Methodology: This is a descriptive-analytical research. We assess 231 mothers whom have infants 6-60 months with diarrhea. Data gathered through a researcher-administered questionnaire and interview by a professional. The validity of questionnaire confirmed through experts (Pediatricians, Faculty members in nursing, health professionals) and its reliability gained %93. Data analyzed by experts through SPSS version 16.00.

Findings: Finding showed that the majority of mothers (%90) have not knowledge about caring of diaper rash after diarrhea. About gaining information about skin care of diaper said we have not more information and knowledge to care it effectively (%76). Analysis of questions about knowledge and performances

highlighted that the mothers' knowledge about care of diaper rash was weak and their performances was weaker. The results after teaching through interview, showed that their knowledge was increased and they said this interview is more effective than others teaching methods.

Discussion: Considering the weak result about knowledge and performance of mothers about diaper rash in infants with diarrhea and its complications, promotion of their knowledge suggested through health workshop and others training meeting by professional and governmental official is necessary.