

**Conclusion** We have established an in vitro study of the cystine heterodimer rBAT/b<sup>0</sup>+AT in human PTC which can be used to investigate known and discovered cystinuria mutations, and ultimately facilitate development of novel therapies for this disease.

#### G47 INVESTIGATING NEW BIOMARKERS FOR EARLY DETECTION OF ACUTE KIDNEY INJURY IN PAEDIATRIC INTENSIVE CARE

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Critically ill children and neonates admitted to Intensive Care are at high risk of developing acute kidney injury (AKI) and do so early in the course of their illness. AKI is associated with increased duration of stay in intensive care, short and long term renal impairment, increased mortality, and increased hospital costs. AKI is currently diagnosed when serum creatinine (SCr) levels rise, however there may be a 48 hour delay between renal insult and detectable increase in SCr levels. This can delay diagnosis of AKI and hence potential intervention to mitigate renal damage. New AKI biomarkers can aid early diagnosis in patient groups where there is a timed potential renal insult (eg: cardiac surgery), however their utility has not been assessed in a mixed patient cohort.

We conducted a pilot study for all admissions to PICU at the Royal Manchester Children's Hospital over a 6 month period to identify risk factors for developing AKI and to measure the correlations between SCr and new AKI biomarkers. We defined AKI as eGFR <100 ml/min/1.73m<sup>2</sup> (Schwartz formula calculation). We collected urine and plasma from 50 children (age 16 days-15 years, 46% male) for the measurement of Cystatin C, KIM-1 and NGAL. We observed a 30% incidence of AKI in this cohort and age <12 months was a significant risk factor for AKI. New biomarker analysis correlated with SCr in 93% of cases and preceded the rise by 24-48 hours in 20% of patients. The utility of new biomarkers for early detection was limited by the presence of AKI at study entry.

This investigation demonstrates feasibility of new AKI biomarker testing and in combination with risk stratification, could identify children who need to be protected from secondary renal injury during their inpatient admission.

#### G48 OUTCOME OF ACUTE KIDNEY INJURY MANAGED IN A REGIONAL PAEDIATRIC TERTIARY NEPHROLOGY CENTRE

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**Introduction** Acute kidney injury (AKI), characterised by acute decline in renal function is associated with significant morbidity and mortality in children. This study reviewed the aetiology, treatment modalities and outcome of children with AKI managed in the paediatric nephrology unit at the University hospital of Wales, Cardiff.

**Method** Retrospective analysis of referral practises, aetiology, and management of 38 children with AKI over the last 5 years. Outcomes noted as complete recovery, residual renal injury, renal replacement therapy (RRT) dependency or death. Children primarily treated in intensive care were excluded.

**Result** 34% of the total 38 patients were under 5 years of age. Haemolytic uraemic syndrome (HUS) was the commonest cause

of AKI 18/38 (47.3%) with E coli 0157 accounting for most (15/18). Significant number of these cases required dialysis (10/15). 3 children had atypical HUS, one secondary to pneumococcal infection and other 2 with no known cause despite thorough workup. Obstructive renal failure (5 cases) was second most common and renal function improved following relief of obstruction. Overall, supportive management sufficed in 23/38 cases and 15 received renal replacement therapy (RRT). Most children on dialysis were oliguric (14/15). Peritoneal dialysis was the commonest mode of RRT used. 2 children needed plasma exchange. Outcome was equally favourable irrespective of mode of RRT. At 3 months there were no deaths; 29 (76%) had completely recovered, 5 children had estimated glomerular filtration rate (eGFR) between 40- 60 ml/min/1.73m<sup>2</sup>, 2 had mild to moderate proteinuria and one was hypertensive. One child who remained dialysis dependant with moderate hypertension and proteinuria needed renal transplantation 2 years later. On most recent follow up eGFR had normalised in 2 and improved, between 70-75 ml/min/1.73m<sup>2</sup> in other 3 children. Proteinuria had resolved in one but persisted in the other.

**Discussion** Prognosis following AKI was excellent in children not needing intensive care probably because of lack of multiorgan dysfunction. HUS was the commonest cause of AKI. AKIs with oliguria are more likely to require dialysis and should be referred early to the nephrology team. All cases should have long-term follow up to ensure renal recovery and detect delayed complications.

#### G49 RESILIENCE, POST-TRAUMATIC STRESS, BURNOUT AND COPING IN MEDICAL STAFF ON THE PAEDIATRIC AND NEONATAL INTENSIVE CARE UNIT (P/NICU) – A SURVEY

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**Aims** Working on intensive care (ICU) can be stressful, Adult-ICU studies demonstrate staff burnout and post-traumatic stress disorder, (PTSD) although resilience is associated with a healthier psychological state in ICU nurses. This study aims to determine whether resilience is related to the prevalence of burnout and PTSD symptoms in PICU/NICU staff, and to establish any differences in coping strategies with varying levels of resilience.

**Methods** Workplace questionnaire: demographic data, questions on coping strategies and extracts: (1) **Brief Resilience Scale** 6 items scored on a 5-point scale, higher scores indicate greater resilience) (2) **Trauma Screening Questionnaire** 10 statements answered 'yes' or 'no'. Score of > 6 predicts PTSD (3) **abbreviated Maslach Burnout Inventory** – 3 separate subscales: Emotional Exhaustion (EE)=reduced energy and job enthusiasm, Depersonalization (DP)=cynicism, treatment of patients as inanimate, Personal Accomplishment (PA)= Sense of efficacy and effectiveness.

**Results** 58 respondents (50 female) 32 nurses, 22 doctors, 4 other HCPs. Years qualified: Range 0-32; P/NICU experience: Range 0-28 years.

Mean score for resilience = 3.58 (1.83-5) 1 = lowest level of resilience and 5 = highest.

Mean burnout measure: **PA = 12.5, DP = 2.6 and EE = 8.0** (Scale 'felt this way' 0 = never to 18 = everyday).

All staff admitted to symptoms of emotional exhaustion on some level, 22 experienced some depersonalization. Scores for personal achievement ranged from 2-18.

Higher resilience levels were significantly associated with lower PTSD symptoms ( $r = -0.41$ ,  $p = 0.001$ ).

10 HCPs met criteria suggestive of PTSD, 38 had lower but concerning scores.

Significant negative correlation between resilience and emotional exhaustion ( $r = -0.36$ ,  $p = 0.005$ ) and positive correlation between resilience and personal achievement ( $r = 0.36$ ,  $p = 0.005$ ).

No significant difference in coping strategies across different levels of resilience, only one ('keep professional boundaries') distinguished between higher and lower resilience levels.

**Conclusion** Paediatric and Neonatal ICU staff show concerning levels of psychological trauma. Greater resilience is associated with lower levels of PTSD symptomatology and some measures of burn-out, indicating a better psychological state.

More research is required to investigate the role of different coping strategies, including techniques, which can influence resilience, and how these may be promoted in staff working in this environment to facilitate staff wellbeing and retention.

## G50 ADMISSION OF EX-PREMATURE BABIES TO PICU IN THEIR FIRST TWO YEARS OF LIFE

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**Aim** To assess the proportion of ex-premature babies who go on to be admitted to PICU (Paediatric Intensive Care) in their first 2 years of life, and the way in which their gestation modifies treatment requirements.

**Method** PICANet (National PICU database) admission data were retrieved for all PICU admissions in England and Wales who were under 2 years old between 01/01/2007 and 31/12/2010 with gestation less than 36 weeks. 2007–2008 gestation specific live-birth and neonatal mortality rates for England and Wales have been published by the Office of National Statistics. Data was analysed in Microsoft Excel, with Chi-squared and Kruskal–Wallis tests, with statistical significance at 5% level.

**Result** Birth gestation was recorded for 70% (11559/16680) of the studied PICU admissions.

3.8% of babies born in England and Wales in 2007–2008 were born at less than 36 weeks gestation. 3.2% of these babies went on to be admitted to PICU before their second birthday, comprising 12.4% of all PICU admissions in the under 2s.

Late pre-term babies account for a higher number of PICU admissions overall. (See Figure 1). However, the admission rate, when

expressed as the percentage of those alive at day 28, is higher among extreme pre-term babies. (See Figure 2)

Statistically significant differences between gestational cohorts were seen in the median length of stay (see Figure 3) and median duration of ventilation. No difference in PICU associated mortality was seen.

**Conclusion** A higher percentage of extreme preterm babies than late preterm babies are admitted to PICU in their first 2 years of life. They require longer stays and longer durations of ventilation.

The rising preterm birth rate coupled with increasing survival of extreme preterm babies will have a significant impact on PICU demand.

## G51 ADMISSIONS TO PICU IN ENGLAND AND WALES WITH REFRACTORY CONVULSIVE STATUS EPILEPTICUS: A TWO-YEAR NATIONAL EPIDEMIOLOGICAL STUDY

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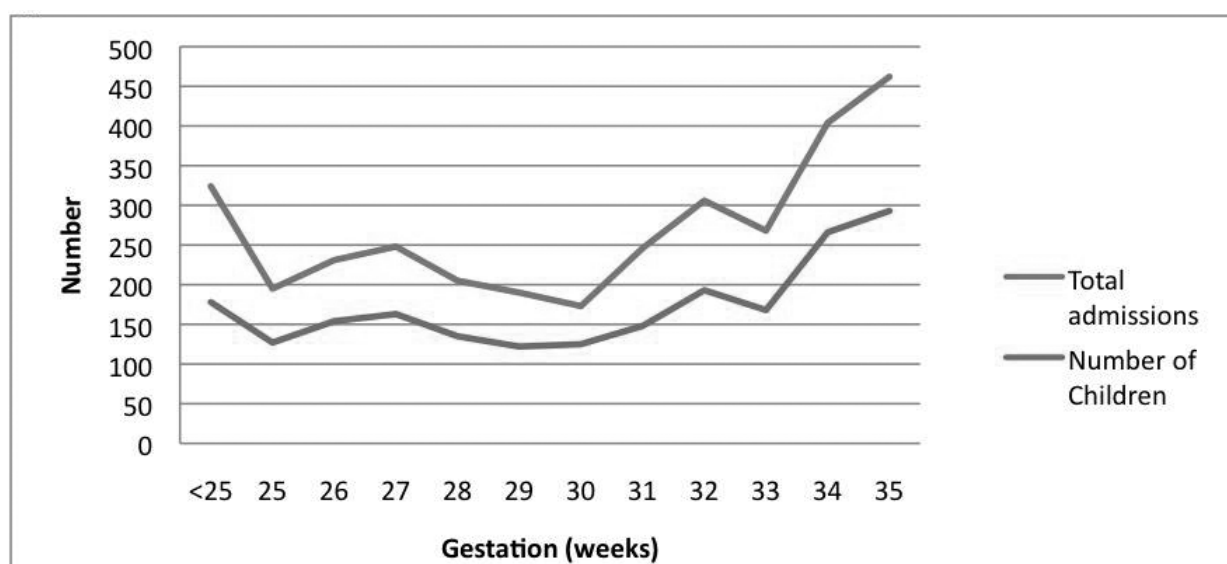
**Aims** To obtain epidemiological data on the prevalence, aetiology, management and outcome of refractory convulsive status epilepticus (RCSE).

**Methods** Data on children admitted with RCSE to eight paediatric intensive care units (PICUs) were collected retrospectively using a standard proforma designed and co-ordinated by PICANet. Data were collected between 31/12/2007 and 31/12/2009.

**Results** Data were collected on 245 (male, 179) patients aged <1 month to 16.5 years (mean 3.8, median 2.8 years). Causes included acute symptomatic (12.4%), remote symptomatic (18.4%), epilepsy-related (22.4%), progressive encephalopathy (5.3%) and febrile (14.7%); no cause was identified in 23.7%.

Thirty nine patients received treatment (midazolam > diazepam) at home and 73 received treatment from paramedics (diazepam > midazolam).

In the Emergency Department (ED), 219 patients (89%) received at least one benzodiazepine dose, 197 (80.4%) received phenytoin and 23 (9.3%) received phenobarbital. Subsequent anticonvulsants



**Abstract G50 Figure 1** Number of ex-premature babies admitted to PICU in the first 2 years of life by gestation.