little evidence available regarding NIV compliance and the factors that affect this. Accurate compliance data from individual ventilators is readily available and gives a new opportunity to explore this further. The aim of this research was to describe and analyse adherence with NIV among established patients and determine if this was significantly affected by age, gender, diagnosis, time since commencement, apnoea-hypopnoea index (AHI), mean daily usage, leak or pressure.

**Methods** Ventilator download-data from sleep study databases and electronic patient-notes were retrospectively reviewed. Patients aged 0–18, established on NIV with between 30–182 days of available data were included. Adherence, defined as percentage of nights with ≥4 h use, was compared by diagnosis, gender and age and correlated with the above factors.

**Results** 102 children were included, 67% were male and median age was 13 years (range 0.25–18). The mean adherence for all patients was 64.2%. There was a strong positive correlation between mean daily usage and compliance (r = 0.74). Children with Down's syndrome had a mean adherence of 37.9%, considerably lower than in other diagnoses including obstructive sleep apnoea (62.3%), craniofacial conditions (61.7%), neuromuscular disease (64.7%) and conditions with central hypopnoeas (80.5%). Gender and presence of leak did not affect adherence and no correlation between adherence and ventilator pressure (r = 0.30), age (r = 0.05) or AHI (r = 0.08) was demonstrated.

**Conclusion** It is clear from the few correlations found that patients are heterogeneous and the challenges multifactorial. A better understanding of adherence levels in individual patients can now enable us to have open discussions with families to address challenges they face with the use of NIV. Children with Down's syndrome are normally carefully selected prior to establishment of NIV because of known difficulties with treatment. Despite this, they are still the group with poorest adherence, highlighting the need for novel approaches to improve this. Ongoing use of NIV does suggest that although adherence is far from perfect, patients must gain some clinical benefit and the levels of adherence truly required to reduce long term complications is still not known.

## G380(P) HYPONATREMIA – CEREBRAL SALT WASTING

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10.1136/archdischild-2015-308599.335

**Setting** PICU

Consultant and PICU registrar

**Problem** 4 year old child transferred to PICU after space occupying lesion cranial surgery. On day 2 post operatively was noted to have very high urine output with falling serum sodium. His urine output was very variable and ranged from 3 ml/kg/hour to 17 ml/kg/hour. He had very high urinary sodium content.

**Clinical context**

- Falling sodium
- High urine output
- Low plasma osmolality

**Assessment of problem and analysis of its causes**

- Hyponatremia in Patients with Neurologic Disorders
- Inappropriate secretion of antidiuretic hormone (SIADH)
- Cerebral salt wasting (CSW) syndrome

The distinction between these two conditions is important because their treatments are different. It is not possible to distinguish CSW from SIADH based on serum and urine laboratory findings alone, because their associated abnormalities are identical. For this reason, accurate determination of the patient's volume status is the key to differentiating these syndromes.

Fundamental difference between the two processes is extracellular fluid volume status. Patients with CSW have hypovolemia compared with patients with SIADH, who have euvolemic or mild extra cellular fluid expansion.

The mainstay of therapy for CSW is replacement of the sodium and water that is lost as a result of pathologic natriuresis and diuresis. This is in direct contrast to the treatment of SIADH, the crux of which is free water restriction.

CVP-directed treatment of hyponatremia and volume status in such patients is effective.

Intervention New guidelines for cerebral salt wasting introduced in PICU guidelines.

**Lessons learnt** Consider CSW in children with low sodium and high urine output, measure volume status, in PICU setting with CVP measurement

## G381(P) IMMUNOPROTECTIVE EFFECTS OF INCHALED NITRIC OXIDE IN NEWBORNS WITH RESPIRATORY DISEASES ON MECHANICALLY VENTILATION

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10.1136/archdischild-2015-308599.336

**Introduction** This study presents the results of the influence of inhaled nitric oxide (iNO) on the immune system of infants with respiratory diseases on mechanically ventilation (MV).

**Purpose** Decrease neonatal mortality.

**Materials and methods** In a controlled, randomised, blinded clinical trial 37 newborns with respiratory diseases on MV were included. In group I 20 patients received iNO (10 ppm, 24 h; "Pulmonox mini", "Messer II NO Therapeutics", Austria). Newborns in group II (n = 17) did not receive iNO. On admission and at 3–5 days, subpopulations of lymphocytes were studied by the one-parameter immunophenotyping using reagents company Immunotech Beckman Coulter (USA): CD3, CD4, CD8, CD14, CD19, CD34, CD56, CD69, CD71, CD95 monoclonal antibody, the relative content of lymphocytes in apoptosis using AnneksinV + labelled FITK and propidium iodide (PL+), labelled with PE (Saltag, USA). The statistical power of the study was 80% ($\alpha \leq 0.05$).

**Results** In group I an increase of mature monocytes ($CD14^+$) to 23.1 ± 0.8% ($p < 0.05$) was observed on 3–5 days. The relative content of CD69 was reduced to 3.8 ± 0.21%, and in lymphocytes in apoptosis to 7.12 ± 0.46% (AnnexinV-$FITC^+PI$), and to 0.79 ± 0.07% (AnnexinV-$FITC^+PI^+$, $p < 0.001$). Duration of MV was 4.1 ± 1.4 days in group I and 18 ± 3.4 in group II. All newborns in group I survived and had no septic complications. None of the patients showed clinical or laboratory evidence of adverse effects of iNO. In group II 7 newborns died, 5 developed neonatal sepsis.

**Conclusion** Inhaled NO in mechanically ventilated newborns increased the relative content of mature macrophages and decreased the number of lymphocytes in apoptosis. Most importantly, the incidence of sepsis and fatal outcome was reduced in iNO-treated newborns.

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## G382(P) MIND THE GAP! ELEVATED ANIONS SECONDARY TO PARACETAMOL AND SEPSIS

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10.1136/archdischild-2015-308599.337

**Aim** Metabolic acidosis is a common finding in children presenting with sepsis. Hypovolaemia and hypoxia are the common causes for this derangement but sometimes there are other culprits. We aim to highlight the significance of correlating the anion gap with the biochemical picture and, when there are discrepancies, look for alterative diagnoses. An unusual case of transient pyroglutamic aciduria, presenting during an episode of severe sepsis and paracetamol use, will be used to outline the importance of examining the anion gap.

**Methods** We illustrate the case of a 15 month old girl who presented with an 11 day history of diarrhoea and vomiting. She presented to the emergency department in a state of decreased consciousness. She was found to be hypotensive, hypoglycaemic and have a profound metabolic acidosis. She required mechanical ventilation and fluid resuscitation. Despite these interventions, she continued to have a profound metabolic acidosis with a very high anion gap (30.5). The levels of lactate and ketones were insufficient to explain the clinical picture.

**Results** Metabolic investigations for the child were instigated. Whilst a majority of these were normal, examination of the patient's organic acid profile revealed large peaks of pyroglutamic acid (5-oxoproline) and paracetamol. Termination of paracetamol use, administration of N-acetylcysteine to replenish the glutathione stores and haemofiltration caused resolution of the patient's acidaemia. Subsequent testing of the infants urine revealed no further evidence of pyroglutamate.

**Conclusions** Pyroglutamic aciduria (5-oxoprolinuria) is usually reported in children in the context of inherited errors of metabolism. The transient form that we describe here, whilst reported in the adult population, has rarely been described in children. Various pharmaceutical interventions, most commonly paracetamol, in combination with severe sepsis have been linked with this transient phenomenon. When the lactate and ketone levels don't correlate with the anion gap, it is important to pursue further diagnostic testing as illustrated by this case. In addition, scrutiny of the child's medication may give a clue to the diagnosis.

## G383(P) TAKING A CHILD HOME TO DIE: THE CHALLENGES OF DISCHARGING A PATIENT HOME FOR PALLIATIVE CARE FROM THE PAEDIATRIC INTENSIVE CARE UNIT

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10.1136/archdischild-2015-308599.338

The nature of paediatric intensive care medicine is such that when the battle with a disease process cannot be won, focus needs to be placed on achieving a dignified death. If the situation permits, families will often opt for a peaceful passing away in familiar surroundings, at home or in a hospice. We focus on the common practical considerations that need to be addressed in order to facilitate the return home; as well the necessary planning to conform to legal requirements following a child's expected death outside the hospital setting.

We look into what medications might be needed for symptom control and what the challenges of prescribing these in the community might be. We shall also look into the importance of assessing the home environment and social support in advance, as well as what the logistics of transporting the patient out of hospital are. Furthermore we touch upon who needs to be involved in the on-going medical care of the child, as well as possible contingency plans, should the child survive at home.

Finally we shall explore what the role of the intensive care physician is in facilitating what is required by law; including confirmation of death, discussions with the coroner, and transport to the mortuary. Good, advance planning enables clinicians to minimise the invasion of the family's privacy during these delicate moments, and helps make a child's death as dignified as possible.

## G384(P) A QUALITY IMPROVEMENT (QI) PROJECT TO INCREASE THE NUMBER OF VENTILATED DAYS BETWEEN UNPLANNED EXTUBATIONS WITHIN PAEDIATRIC INTENSIVE CARE – USING REAL TIME STATISTICAL MONITORING

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10.1136/archdischild-2015-308599.339

**Aims** Unplanned extubation is an important quality issue. Quality surveillance showed that we were not achieving national targets for the number of ventilated days between unplanned extubations. A QI project was launched with the primary aim of increasing the number of ventilated days between unplanned extubations.

QI literature directed at unplanned extubations have used statistical methodology that detects significance at the end of a fixed time period. This does not allow continuous quality monitoring. "G type" charts are a type of statistical quality control chart that exhibit improved sensitivity over conventional statistical approaches when dealing with rare events.

**Methods** A Root cause analysis showed us that most unplanned extubations were secondary to the endotracheal tube (ETT) slipping through loose tapes in lightly sedated patients. A series of interventions (Table 1) were implemented. Following intervention implementation we performed continuous monitoring using a "g-type" chart (Figure 1).

**Abstract G384(P) Table 1** Intervention

| | |
|---|---|
| **ETT fixation** | • After the first full wrap on the ETT continue spiralling the tape up by two further revolutions.<br>• Introduction of a standard operating procedure (SOP). |
| **Sedation/ Feeding** | • Routine cessation of feeds between 6 am and the ward round to ensure starvation coincides with stopping sedation for planned extubations.<br>• A review of our sedation guideline. |
| **Training** | • Regular training sessions on the SOP for ETT fixation. |

**Results** The mean number of ventilated days between unplanned extubations increased from 1 per 40.8 days to 1 per 250 days. G-chart 1 clearly illustrates that the mean number of ventilated