# **40th APA Annual Scientific Meeting**



# Abstracts of APA & ESPA Cambridge 2013 19<sup>th</sup> - 21<sup>st</sup> June 2013

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Joint meeting with the European Society for Paediatric Anaesthesiology

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operative anaesthetic information given to parents in 'Great Ormond tal'

Members Jeannine Stone<sup>1</sup>, Andrew Wolf<sup>2</sup> Severn Deanery, <sup>2</sup>Bristol Children's Hospital, Bristol, UK

#### Introduction and aims

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'A good humidifier is essential, {in intubated patients} otherwise incrustation of secretions will occur', Lassen, 1952.1

Dry inhaled gases are normally heated and humidified effectively in the nose and oro-pharynx. Endotracheal tubes provide a conduit which bypass this mechanism leading to delivery of dry gas to the trachea. This has been shown to lead to cooling, muco-cilliary dysfunction and sputum retention<sup>2</sup>

Until recently, active humidification was used widely in paediatric anaesthesia. However, while this method remains universal in PICU, anaesthetic practice has changed with the adoption of heat and moisture exchangers (HMEs) and circle anaesthetic systems. Both these methods result in increased humidity of the gas delivered to the trachea, but to varying degrees.<sup>3</sup>

It is unclear what current awareness prevails among anaesthetists about humidification, it's perceived effectiveness, and it's importance as it relates to clinical practice. We therefore aimed to determine current practice, seek opinion from APA members as to whether they feel current methods of humidification are adequate, and if not, whether they felt this could lead to clinically significant effects.

#### Methods

An online survey was sent to all APA members about their practice of paediatric anaesthesia, using both MCQs and free text.

#### Results

- 130 responses
- In children, 95% used HMEs, in neonates, 8% used active humidification, and 4%, no humidification
- 56% cite availability of humidification device as a decisive factor in their choice
- 46% believed HMEs offered inadequate humidification
- 74 people had no experience of active humidification, and of those that had, 75% found this cumbersome
- Others said 'they would worry that it adds additional complexity to often tricky situations'
- 63% of people believed that active humidification would offer additional benefit •
- 22% had experienced short-term complications of HMEs
- 59% agreed there were at least potential long-term health problems associated with inadequate humidification in the peri-operative period

#### Discussion

Results indicate a lack of consensus on whether HMEs offer adequate humidification in the paediatric population, and opinion is also divided on the significance of this in the peri-operative period. There is even less agreement as to what to use as a practical alternative.

#### Conclusion

The heterogeneity of opinion within the APA reflects the lack of specific data in the literature. There is a need to provide clear evidence based guidance for clinicians particularly in terms of postoperative morbidity in vulnerable groups. We believe there is a need for a formal review of the current evidence with initiation of outcome studies outside the immediate anaesthetic period.

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# 20

Pain at home in ambulatory children after dental surgery Adele King<sup>1</sup>, Marta Somaini<sup>2</sup>, Tom Engelhardt<sup>1</sup>, Allison Campbell<sup>1</sup> <sup>1</sup>Royal Aberdeen Childrens Hospital, Aberdeen, UK.<sup>2</sup>Università Milano Bicocca, Milan, Italy

#### Introduction and aim

Pain experienced following dental extractions is distressing for children, parents and caregivers. Pain following hospital discharge appears to be poorly managed and is presumed to be due to a lack of, or poor understanding of post-operative instructions.<sup>1</sup> The goal of this audit was to assess the incidence of immediate and early postoperative pain in children undergoing dental extractions.

#### Methods

This prospective audit was conducted between January and March 2013 in an ambulatory dental unit at a Tertiary Paediatric Hospital. Consecutive children aged 1-16 years, ASA I-II, attending for dental extractions under general anaesthesia were included. The standard hospital care pathway had previously been published.<sup>2</sup> All parents/guardians received written postoperative analgesic recommendations (paracetamol 20mg/kg PO, Q6H and ibuprofen 10mg/kg PO max 3 doses/day for rescue analgesia). Demographic details, number of teeth extracted and intra-operative management was recorded. Post operative pain scores (FLACC score ≤7yrs, NRS >7yrs), analgesic requirements and complications were recorded at awakening, in recovery and before discharge home. A structured telephone interview was used the following day to assess pain scores and analgesic consumption during the first 36 hours postoperatively. The day of returning to school and the quality of post operative sleep were also documented.

#### Results

A total of 72 children were included. 20 children were excluded due to missing data. All but 4 children received gingival infiltration or a nerve block with Lidocaine 2% and adrenaline 1:80,000. Intra-operatively, 74% of children received paracetamol, 10% received paracetamol and ketorolac. 17% received ketorolac and 6% received opioids. The incidence of immediate postoperative pain in hospital was 36 % and 42% at home (41% during the evening, 71% the night after surgery and 55% the morning after). At home, 11% children received no analgesic drugs, 78% of children received intermittent paracetamol, 50% ibuprofen only and 39% a combination of both. Only 7% of the children were given regular analgesia. Eighty three percent of the children slept the whole night following surgery but only 35% attended school/nursery the following day.

#### **Discussions and conclusions**

Forty-two percent of the children experienced postoperative pain at home despite written instructions. The current practice of scheduled appointment and rapid discharge is cost effective but insufficient to guarantee optimal education and peri-operative care. A direct consequence is that postoperative analgesic recommendations are poorly followed. A service re-design is urgently required.

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The Association Of Paediatric Anaesthetists Of Great Britain And Ireland, Anaesthesia 2011

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## MACvoc: A new sub-anaesthetic measurement in neonatal rats

Hannah Gill<sup>1</sup>, Elisa Smit<sup>1</sup>, Marianne Thoresen<sup>1</sup>, Lars Walloe<sup>4</sup>, John Dingley<sup>5</sup> <sup>1</sup>School of Clinical Sciences, St Michael's Hospital, University of Bristol, Bristol, UK, <sup>2</sup>Barts and the London School of Anaesthetics, London, UK, <sup>3</sup>Severn Deanery School of Paediatrics, Southwest, UK, <sup>4</sup>Department of Physiology, University of Oslo, Oslo, Norway, <sup>5</sup>Swansea University Medical School, Swansea, UK

Neonatal rodents are used in experimental models of anaesthetic neurotoxicity. To avoid major derangement of physiological parameters sub-anaesthetic concentrations are used<sup>1,2</sup>. If comparing agents it is paramount to note that equal fractions of MAC are not equipotent (unless it can be shown that the dose response curves for each agent are parallel in that specific sample population)<sup>3</sup>. We describe a new method for measuring a sub-anaesthetic MAC in neonatal rats (MACvoc) where 50% of neonatal rats fail to vocalise when stimulated by cold in a standarised manner. The dose-response curve is described.

All procedures were performed under Home Office license and approval of University of Bristol Animal Ethical Review Panel. Thirty one, nine day old (P9) Wistar rats were exposed to sevoflurane (0 to 1.3%) in individual chambers with metal bases maintained at 35°C. After 1 and 2 hours each chamber was place on a cold mat and when the base reached 25°C a one minute sound recording was made. On removal from the chamber mixed blood pCO<sub>2</sub> from decapitated animals or rectal temperature was measured. Using binary logistic regression, explanatory variables (weight, litter ID, gender, time of day, duration of exposure, sevoflurane concentration) were analysed for significance with the presence or absence of vocalisations (0-100kHz) as the dependent variable. The probability of no vocalisation at different sevoflurane concentrations (the "dose-response" curve) was plotted using logit regression. pCO<sub>2</sub> was compared between three groups of increasing sedation level using one way ANOVA with Tamhane post-hoc test (equal variances were not assumed).

Only sevoflurane concentration was significantly associated with the binary outcome (p=0.000). MACvoc was equal to 1.0% (95% CI 0.86 to 1.09). This held true when recordings at one or two hours were analysed confirming that equilibration of inspired/ target organ partial pressure of sevoflurane was sufficient. The dose-response curve was steep and sigmoid. The mean (SD) rectal temperature of the pups was 32.9 (0.75)°C, consistent with being taken immediately from dam and litter (unpublished). There was an increase in mean (SD) pCO<sub>2</sub> with increasing sedation level, no sevoflurane/vocalising: 50.10 (1.1) mmHq, sevoflurane/vocalising: 55.09 (3.4) mmHq and sevoflurane/no vocalising: 57.79 (3.6) mmHq. The latter group (n=6) was significantly different to the control group (n=3) (p=0.004) and almost significantly different to those receiving sevoflurane and vocalising (n=4) (p=0.098) despite small numbers.

There is a dose-response relationship between inhaling sevoflurane and vocalisation of P9 rats stimulated by cold. MACvoc is a sub-anaesthetic measure (1.0MAC= 3.26%<sup>4</sup>) which may allow more accurate study/ comparison of the effect of inhalational anaesthetics without severe hypercarbia.

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Level 2 and 3 planned and unplanned post-operative admissions and interventions following adenoid and tonsillar surgery in a tertiary referral paediatric centre Myles Cassidy<sup>1</sup>, Graham Bell<sup>2</sup>

<sup>1</sup>BC Children's Hospital, Vancouver, Canada, <sup>2</sup>Royal Hospital for Sick Children, Glasgow, UK

#### Introduction and aims

Adenotonsillectomy is often regarded as a routine intervention in the paediatric population with low risks of complications. It is also well recognised that certain comorbidities and patient characteristics increase the risk of peri-operative complications, particularly respiratory compromise post-operatively. We have analysed our Intensive Care Patient database from 2005-2010 to elucidate the proportion of our patients requiring level 2 or 3 care following adenotonsillecotmy, whether planned or unplanned. Our aim is to assess the complications and interventions required to inform our future practice.

#### Methods

We carried out a retrospective analysis of all admissions to level 2 and 3 care following surgical procedures on the adenoids and/or tonsils using our electronic medical records and ENT surgical database. Recognised 'high risk' characteristics and post-operative interventions were identified.

## Results

146 patients were admitted to level 2 or 3 care post-operatively from a total of 4125 adenoidectomy and/or tonsillectomy cases carried out over a 5 year period (3.5%). Of these 146 admissions, 53 were unplanned (36.3%).

Almost half (45.9%) received no post-operative intervention other than monitoring. 3.4% received less than 4 hours of oxygen therapy via facemask or nasal cannulae: 39% received greater than 4 hrs of oxygen therapy via facemask or nasal cannulae; 23.3% required additional intervention ranging from nasal pharyngeal airway to intubation and ventilation.

## **Discussion and conclusion**

Our analysis reveals relatively few admissions to level 2/3 care compared with other published series<sup>1</sup> Despite this almost half of those admissions required no respiratory intervention. The criteria placing patients at high risk of post-operative complications<sup>2</sup> were prevalent in the patients admitted to level 2/3 care, particularly obstructive sleep symptoms and those less than 15kg. Unfortunately information on those patients admitted to the ENT ward post operatively was not available on our database to provide a comparison.

Of interest no patients were identified as admitted from the ENT ward after deterioration postoperatively.

Our data suggests that many more patients could be safely cared for at ward level, however there remains great difficulty accurately identifying those likely to require intervention.

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Robb PJ, Bew S, Kubba H, Murphy N, Primhak R, Rollin A-M, Tremlett M. 'Tonsillectomy and adenoidectomy in children with sleep related breathing disorders: consensus statement of a UK

## Naloxone admixture for the prevention of opioid-induced pruritus

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## Introduction and aims

Morphine, administered by Continuous Opioid Infusion (COI) or Patient Controlled Analgesia (PCA), is an effective modality for postoperative analgesia, but is associated with opioid-induced pruritus (OIP) [1]. Naloxone administered intravenously at 0.25-1.65 µg/kg/hr reduces OIP, without affecting quality of analgesia or increasing opioid requirements [2]. To avoid potential incompatibility issues, the naloxone must be administered separately to the morphine. This study's aims were to determine, firstly, whether an admixture containing 12 µg naloxone per 1 mg morphine in normal saline is pharmacologically stable and, secondly, whether this admixture, administered via COI/PCA at a range of infusion rates, is effective in the prevention of OIP without attenuation of analgesia or increased opioid utilisation.

#### Methods

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Stability of the morphine/naloxone admixture was analysed using high-performance liquid chromatography. Institutional review board approval was obtained for a clinical trial, which is ongoing. Ninety-five children, aged 8-18, ASA I-III, with normal developmental profile and prescribed COI/PCA morphine for postoperative analgesia, are to be recruited. Following informed consent/assent, subjects have been randomised to receive an infusion containing 1 mg/mL morphine with or without 12 µg/mL naloxone. Incidence and severity of pruritus is assessed every 4 hours using a validated Colour Analogue Scale (CAS). Opioid utilisation, pain and arousal scores and administration of standard protocol anti-pruritic and anti-emetic agents, are recorded until the COI/PCA is discontinued, up to a maximum of 48 hours.

#### Results

Compatibility analysis demonstrated that the morphine/naloxone admixture is stable for 72 hours at room temperature and 30 days with refrigeration [3]. Clinical data have been collected for 82/95 children of median (range) age 14 years (8-18) and weight 56.6 kg (24.3-125.5), following general (n=14), spine (n=20), other orthopaedic (n=41) or urological (n=7) surgery. Subjects have been enrolled in the study for a median (range) of 44 hours (9-48), with overall pain scores of 2.7/10 (0-9). Overall pruritus CAS scores have been median (range) 0.6/10 (0-5), with one or more doses of diphenhydramine administered to 26/82 subjects. Opioid utilisation has been median (range) 31.6 µg/kg/hr (7.4-81.6), corresponding to a potential naloxone dose of 0.38 µg/kg/hr (0.09-0.98). Subjects' group allocation remains blinded until recruitment is completed in April/2013.

#### **Discussion and conclusion**

Naloxone12 µg/mL with 1mg/mL morphine is a stable solution for use in COI/PCA infusions. If unblinding reveals a significant decrease in study subjects' OIP, this would favour the use of this admixture in COI/PCA administration. This strategy has the potential to minimise the use of current antipruritic medications and their side effects, without the need for a separate naloxone infusion, and would significantly improve the guality of paediatric pain management.

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#### Acknowledgement

Canadian Anesthesiologists Society research award

# 76

Incidence of neonatal hyponatraemia in the first 7 days of life Caroline Pruefer, Rosalind Morley, Stephen Greenhough Roval Manchester Children's Hospital, Manchester, UK

#### Introduction

An earlier audit in Royal Manchester Children's Hospital conducted in August 2010 of surgical neonates highlighted clinically significant hyponatraemia in babies receiving 10% dextrose fluid replacement. We decided to repeat this audit in both surgical and medical patients.

#### Δim

To review all neonatal patients admitted to the Neonatal Intensive Care Unit (NICU) over a 3 month period and monitor the incidence of hyponatraemia and relate the serum sodium levels to the prescribed fluid regime.

#### Method

We monitored all patients admitted to NICU between September 2012 and November 2012 who were aged between 0-7 days old. Sodium levels were reviewed both retrospectively and prospectively for the first seven days of life. Sodium levels below 135mmol/l were designated as hyponatraemic. In addition, fluid maintenance regimes and extra fluid requirements were noted. Details of the child's diagnosis, weight and gestational age were also analysed.

#### Results

A total of 119 patient details were collected. Between days 0 and 1, 67 of the 119 (56%) patients received intravenous 10% dextrose as part of their maintenance regime, of whom, 27 (40%) were hyponatraemic.

Hyponatraemia occurred most commonly in the premature and low birth weight, (100% in the 20-25 week gestation, 47%, 26-30 week gestation, 36%, 31-35 week gestation and 48% within the 36-40 week gestation). 22 patients were defined as either extreme low birth weight or very low birth weight (<1.5kg). Of these, 15 (68%) experienced hyponatraemia within the first 7 days of life.

#### Discussion and conclusion

The previous audit confirmed an unacceptable level of hyponatraemia in surgical neonates. It was suggested that non-surgical neonates were a different group and would not exhibit hyponatraemia given 10% Dextrose alone.

This audit demonstrates that hyponatraemia is equally common in medical neonates but surprisingly is most common in the extremely low birth weight babies. The APA guidelines state, "In term neonates during the first 48 hours of life, 10% dextrose should be used as standard". Our results clearly show that within the critical care area, hyponatraemia is prevalent in the first 7 days of life whilst being treated with 10% dextrose even if sodium supplementation was commenced.

We recommend that strong consideration is given to the use of 10% Dextrose with 0.18% saline in neonates in the impending NICE guidelines for fluid management in children and that the current APA quidelines should be revised.

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No conflict of interests declared

www.apagbi.org.uk/sites/apagbi.org.uk/files/

# **PRESENTATIONS** ORAL

# The management of paediatric tracheostomies at a tertiary paediatric hospital

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#### Introduction

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National Guidelines were published for the management of adult tracheostomies in 2012<sup>1</sup> to reduce morbidity and mortality associated with airway emergencies in tracheostomy patients<sup>2, 3,4</sup>. Currently no national guidelines exist for the management of paediatric tracheostomies but are we using the principles outlined by the National Tracheostomy Safety Project (NTSP) for our paediatric population?

#### Aims

- Establish the prevalence of tracheostomies and voluntarily reported tracheostomy clinical 1. incidents at RMCH.
- 2. Are we cohorting our tracheostomy patients?
- 3. Is emergency equipment standardised?
- Is documentation easily available in an emergency? 4.
- 5. Are staff trained to deal with a tracheostomy emergency?

#### Methods

Audit committee approval was obtained. All incidents voluntarily reported involving "tracheostomy" from October 2011-2012. Two point prevalence audits performed in August and December 2012. All wards were visited and data was collected: indication for tracheostomy, type and size of tube, availability of bedside emergency equipment, documentation, and ward training.

#### Results

The prevalence of tracheostomy patients is unknown, as no database currently exists.

32 clinical incidents were reported. Key issues included:

Failure to recognise and manage blocked tracheostomies

Unintentional decannulation

Lack of emergency equipment

Deficient training in emergency management

Failure of communication pathways

The point prevalence audits identified 35 inpatients with tracheostomies. 20% were on nontracheostomy specialist wards. Emergency equipment was non-standardised. Tracheostomy documentation was poor and there is no system to highlight these patients on admission. Training in management of tracheostomy emergencies was sporadic.

## **Discussion and conclusion**

Airway emergencies in the paediatric tracheostomy population are not uncommon. To reduce harm and improve safety, guidelines have been developed for the recognition of red flags and tracheostomy complications. An emergency algorithm has been designed and tested. A multidisciplinary training cascade has been established to support these developments.

We are focusing on pathways for cohorting, bed head signs, standardisation of emergency equipment and mandatory annual training.

A tracheostomy patient database is being established alongside an admission alert system and more robust handover pathways.

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# 122

## The GAS Study: Success rates practicalities and complications of spinal anaesthesia for neonates and infants

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#### Background

The GAS study is a randomised trial designed to compare regional and general anaesthesia in infants. The primary objective of this trial is to determine whether regional and general anaesthesia, given to infants undergoing inquinal hernia repair result in equivalent neurodevelopmental outcomes. Secondary objectives are to describe the frequency and characteristics of apnoea and other complications in the post-operative period.

#### Methods

The study was performed at 27 sites in 7 countries. 722 infants <60 weeks PMA, requiring inguinal hernia repair were randomised to general anaesthesia or regional anaesthesia. All spinal blocks were performed by senior clinicians, but not all these clinicians had a sizeable regular practice of performing spinal block prior to the study. Spinal blocks were carried out as per the clinicians' normal practice; isobaric bupivacaine or levobupivacaine up to 1mg/kg was administered into the subarachnoid space. Depending on clinician preference additional local anaesthetic techniques were used for postoperative analgesia.

The patient's condition and behaviour was recorded regularly intra-operatively and in the early postoperative period up to discharge form hospital. Parents were also contacted about 5 days postoperatively & questioned regarding potential complications of the technique.

#### Preliminary results

Spinal anaesthesia was the predominant choice in the regional group with 339 patients receiving this technique, of these 109 also had a caudal block. For 279 (82%) cases the spinal (+/- caudal) was sufficient on its own for the completion of surgery, in 18(5%) cases some form of additional sedation or brief exposure to sevoflurane was required, and in 42 (12%) cases the block was a complete failure and a full general anaesthetic was required.

On an intention to treat analysis, those patients with just a spinal block spent an average of 50 minutes in theatre, those with a spinal and caudal 71 minutes and those with a general anaesthetic spent 71 minutes in theatre.

#### Conclusion

Spinal anaesthesia offers a practical alternative to general anaesthesia with a good overall success rate. It has a different range of potential perioperative complications and further analysis will define risk groups to guide patient selection.

Note that these data are preliminary and further details will be presented at the meeting including complication rates of spinal anaesthesia and the factors that increased the risk of spinal failure.

#### The GAS Study: Apnoea following general anaesthesia with sevoflurane compared to spinal anaesthesia for infant hernia repair

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#### Introduction

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Guidelines for perioperative management of neonates and ex-prematures having general anaesthesia (GA) are based on literature from the 1980s and 90s demonstrating increased risk of appoea in these babies. Spinal anesthesia is an alternative shown to reduce appoea incidence in this population compared to halothane GA. However a 2003 Cochrane Review stated that the small body of literature examining the benefits of GA with more recently introduced agents e.g. sevoflurane versus spinal anaesthesia did not allow conclusions to be drawn and called for a large randomised controlled trial.

The incidence of post-operative apnoea is a secondary outcome of the GAS study (NCT00756600) which evaluates neurodevelopmental outcomes after anaesthesia and surgery in young infants, comparing sevoflurane GA to awake regional anaesthesia (RA). Recruitment was completed in January 2013 allowing preliminary reporting of early outcomes including apnoea.

#### Methods

This prospective randomised trial recruited infants undergoing inguinal hernia repair at <60 weeks postmenstrual age(PMA). Exclusion criteria included PMA <26 weeks at birth, previous exposure to GA and conditions predisposing to neurodevelopmental problems. After written informed consent from parents an on-line system randomised subjects to GA or RA. The GA group received sevoflurane for induction and maintenance plus caudal or field block, without opioid, benzodiazepine or other anaesthetic adjuncts. The RA group received a spinal and/or caudal block and no sedation. All infants were monitored in the PACU for at least 1 hour, then managed according to departmental guidelines. A significant apnoea was defined as a pause of breathing lasting >15 seconds, or pause >10 seconds if associated with O2 saturation <80% or bradycardia. all within 12 hours of surgery.

#### **Preliminary results**

722 patients were recruited at 27 sites in 7 countries. Complete apnoea data are available for 711 cases: 356 in the GA and 355 in the RA arm. 15%(54) of those randomised to RA received a GA (failed block or protocol violation), an additional 5%(18) required brief inhalational anaesthesia or sedation. With an intention-to-treat analysis apnoea occurred in 4.2% of the GA group and 2.8% of the spinal group (OR: 1.5 (95%CI:0.6 to 3.8), p=0.2. With per protocol analysis apnoea occurred in 4.2% and 1.77% of the groups respectively (OR: 2.4 (95%CI: 0.8 to 8.7), p=0.07). Using a per protocol analysis median time to first appoea was around 15 minutes in the GA and around 6 hours in the RA group.

#### Conclusions

These preliminary data failed to provide evidence that choosing spinal anaesthesia confers any substantial reduction in risk of apnoea; however if there is a successful spinal the risk of subsequent apnoea may be reduced. First apnoea occurs earlier with general anaesthesia.

Funding agencies from each participating country are acknowledged

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#### Theatre efficiency measures improve patient/parent satisfaction Zoe Harclerode, Judith Short

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#### Introduction

As per RCoA recommendations [1], an audit of parent and patient satisfaction with our anaesthesia and operating department services was undertaken during April 2010. The results were very positive. 86% of parents indicated that they were extremely or very satisfied with their child's care. The initiation of an efficiency project coincided with the audit, which aimed to implement improvements to theatre costeffectiveness. A theatre admissions unit (TAU) and theatre escort service were created, along with an improved process for sending for patients. In addition a pager system was introduced for parents. encouraging them to wait away from the wards and theatre department during surgery. We were interested to know how measures to improve efficiency and cost-effectiveness would impact on satisfaction. A re-audit was undertaken in January 2013.

#### Method

The patient satisfaction questionnaire (PSQ) used in 2010, based on previously published examples [2.3]. was modified for the re-audit. 200 paper-based questionnaires were given out to parents by the theatre escorts after their child's anaesthetic induction. Parents were asked to return their completed questionnaires prior to discharge home.

#### Results

The PSQ response rate was 80/200 (40%). 78% of patients were admitted via TAU and 95% of parents rated the new admissions process as excellent, very good or good. 100% of parents felt that their child was well cared for in the anaesthetic room and 97.4% felt well supported themselves, an improvement from 93% and 90.6% previously. 100% of parents were given a pager of whom 94% found this useful. 96% of parents were given an estimate of how long their child would be in theatre which was accurate in 80% of cases. The number of parents waiting on their child's ward has reduced from 77% to 8.8%. The proportion of parents extremely or very satisfied with their child's overall care has increased from 86% to 91%.

#### Discussion

The changes made during the theatre efficiency project were designed mainly to improve productivity. A large component was concerned with improvements in communication between theatres, wards and parents. We were concerned that by increasing efficiency there may be a risk of reducing parent satisfaction. The theatre escort service has allowed continuity of patient care from TAU to the anaesthetic room, and provided support for parents. The pager system allows parents to have the confidence to find refreshments whilst waiting. These, along with the new TAU, have been very well received. We can conclude that measures to improve theatre efficiency have impacted positively on parent satisfaction.

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Amy Thomas<sup>1</sup>, Amit Prasai<sup>2</sup>, Teresa Dorman<sup>1</sup>, Neil Bateman<sup>2</sup>

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#### Introduction

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It is recommended that children with severe Obstructive Sleep Apnoea (OSA) undergo adenotonsillectomy in a tertiary paediatric centre<sup>1</sup>. In Sheffield Children's Hospital they go to the high dependency unit postoperatively.

#### Aims

To evaluate the postoperative complication rate and level of support needed postoperatively. To analyse preoperative risk factors associated with higher complication rates.

#### Methods

Data was gathered retrospectively for all patients admitted to HDU after adenotonsillectomy for OSA in 2011. All airway and respiratory complications and any interventions were recorded. Preoperative data included age, weight, co-morbidity including prematurity, and sleep study results (pulse oximetry nadir and dip index).

#### Results

81 out of 84 patient records were available for analysis.

Mean age = 4.6 years, weight = 22kg. 43% of patients had at least one co-morbidity. Sleep studies results were available for 76 patients. The mean SaO<sub>2</sub> Nadir was 73%. The mean Dip Index was 17.

10 out of 81 patients experienced complications in PACU.

Nine needed intervention. 8 received oxygen administration for desaturation. One patient required reintubation, one a nasopharyngeal airway. The mean sleep study SaO<sub>2</sub> Nadir = 56.6% and Mean Dip Index= 27.3. Most children had at least one comorbidity. 90% of the patients who experienced complications in PACU went on to need interventions on Critical care.

31 patients experienced complications in Critical care.

24 needed intervention. 20 briefly received face mask oxygen for desaturation. One patient required a nasopharyngeal airway, one remained intubated and ventilated, and one already had a nasopharyngeal airway. Mean age in this group was 5.1 years, weight 22kg. The mean sleep study SaO<sub>2</sub> Nadir was 67% and dip index 21.2. All of those requiring Level 2 and 3 care had several comorbid conditions.

#### Discussion

Most complications were desaturations requiring brief administration of oxygen manageable on a Level 1 Dependency Ward, with continuous pulse oximetry.

Three patients required Level 2 and one required Level 3 care. Two Level 2 and the Level 3 patient had the same problems in recovery. All had multiple comorbidities. Complications also appeared more frequent in patients with SaO2 nadirs <70%.

#### Conclusion

This review showed serious complications requiring Level 2/3 support in critical care occurred in 4.9% of patients, all with multiple comorbidities.

Overall, complications requiring intervention, mostly desaturation requiring brief oxygen administration, occurred in 29.6% of patients.

Complications appeared more frequent in patients with SaO2 nadirs <70% and comorbidity. Complications in recovery were an early indication of problems.

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# 28

Comparison of paracetamol doses calculated by age-based and weight-based regimens Jonathan Dean, Jonathan Payne, David Booth Norfolk and Norwich University Hospital, Norwich, UK

#### Introduction and aims

Paracetamol is a simple analgesic that is commonly prescribed for paediatric surgical patients. Studies suggest that the optimum therapeutic plasma paracetamol range for analgesia is between 10-15 mg/l which equates to a dose of around 10-15 mg/kg of lean body weight. MHRA recommendations<sup>1</sup> are that age based dosing regimes are considered safe and effective for administration by parents in the community. However, paracetamol prescribing is traditionally based on patient weight in the hospital setting. This study aims to calculate and compare the doses that a sample of children would theoretically receive based on both their total body weight and their age.

#### Methods

Data were collected from paediatric theatre records at the Norfolk and Norwich University Hospital over the period 2008 to 2012. The age and weight of 1000 children aged between 6 months and 12 years were extracted and entered into a purpose built spreadsheet. Theoretical total daily paracetamol doses were calculated for each patient based on recommended age and weight criteria. Additional calculations expressed the percentage of the dose theoretically received by a child based on age criteria compared with that based on weight.

#### Results

Using 60 mg/kg/day of paracetamol as the most commonly prescribed dose 469 (47%) of the patients would have received less than 80% of this dose and 36 (4%) would have received more than 120%, if the dose was based on age rather than weight. When assuming a 90 mg/kg/day dose as standard, as recommended in the BNFc<sup>2</sup>, 968 (97%) patients would have received less than 80% of this dose if calculated on age rather than weight but just 1 patient would have received more than 120% of the dose.

#### Discussion and conclusion

Age based dosing regimes are simple for parents to follow and when administered correctly are unlikely to cause toxicity<sup>1</sup>. Our results suggest that in a paediatric population, age based regimes will generally provide a significantly lower dose of paracetamol when compared to weight based regimes which may result in inadequate pain control. It must however be acknowledged that our calculations are based on total body mass rather than lean body mass, an important difference in the case of this water soluble drug. Paracetamol is an inexpensive and effective analoesic prescribed regularly in the hospital environment. It is apparent that the disparity in dosing regimes based on age-based and weight-based approaches used in the hospital setting need further review so that guidance can be provided for clinicians to optimise safe and efficacious prescribing.

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#### Introduction and aims

Oral pre-formed endotracheal tubes are used as standard practice in paediatric cleft surgery. Ring, Adair, Elwyn (R.A.E.) endotracheal tubes have been shown to have a 20% incidence of endobronchial intubation,[1] and despite clinical assessment to the contrary, one fifth of paediatric patients will have malpositioned endotracheal tubes.[2] To assess the accuracy of R.A.E. tube positioning, we designed a prospective observational study using fibreoptic assessment of tube placement.

#### Methods

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Following study approval by the local Ethics Committee, thirty patients aged 2 to 42 months undergoing elective cleft surgery were included. After induction of anaesthesia, the patient's head was positioned for operation by the surgeon. Fibreoptic intubation was then performed using a R.A.E. tube. The tube-tip position was measured from the mandibular alveolus to an accuracy of 1mm by a single Consultant Anaesthetist. If the tube was found to be malpositioned, it was moved to the optimal position under endoscopic guidance.

#### Results

R.A.E. tube sizes ranged from 3.0 to 5.0; the modal size was 4.0 (19 patients). Tube-tip positioning was found from 13mm below to 34mm above the carina (range 47mm). In 13 patients (43%) the tube-tip was found to be endobronchial, in 2 patients (7%) the tip was at the carina and in 6 patients (20%) the tip was <5mm above the carina. In 3 patients, the tube-tip was ≥15mm above the carina. The lowest oxygen saturation observed during intubation and fibreoptic measurement was 75% in a single patient - however, this was transitory without complication. In another case, accidental extubation occurred during measurement. There were no other adverse events.

#### **Discussion and conclusion**

Our study demonstrates an even higher incidence of endobronchial placement of R.A.E. tubes than previously shown (43% compared to 20%) [1]; it may be that the positioning of patients for cleft surgery increases this risk. The fact that this type of surgery is lengthy and is performed on very young children with little functional respiratory reserve, makes endobronchial intubation a highly significant event with potentially poor outcome. Given the unpredictability of paediatric anatomy and the vast range of tube-tip positions demonstrated here, the use of the currently available R.A.E. tubes positioned with direct larvngoscopy cannot guarantee optimal tracheal placement. To overcome this and improve patient safety, we would recommend fibreoptic confirmation be used as the gold standard means of assessment of R.A.E. tube placement in paediatric cleft surgery.

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Conflict of Interest: No conflict of interest to declare.

#### Implementation of paediatric pain care-bundle across south-west clinical network of emergency departments and minor injury units

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#### Introduction and aims

Paediatric pain management has become a priority <sup>1, 2</sup>/<sub>2, 3</sub>, yet remains poorly executed <sup>3</sup>. Many paediatric pain assessment tools exist, but are often under-utilised <sup>2, 3</sup>. Our aim was to improve paediatric pain management in Emergency Departments (EDs) and Minor Injury Units (MIUs) through an education programme encouraging greater adherence to existing guidelines. We completed a multi-centre audit of paediatric pain management in 5 EDs and 24 MIUs across the South-West, and examined the data on pain score documentation and appropriate analgesia dosing.

#### Methods

We collected data from EDs and MIUs in Devon and Cornwall before (Phase 1) and after (Phase 2) implementation of a care-bundle incorporating staff education and existing pain assessment tools. Data was collected on patient age and weight, documentation of pain scoring, and analgesia given.

#### Results

After 15 exclusions, there were 1201 patients in Phase 1 and 1098 in Phase 2. There was an overall improvement in documentation of pain scores (20.3% (244/1201) to 63.8% (700/1098)) following intervention (p<0.0001). the greatest improvement in EDs (22.0% (54/245) to 90.7% (225/248), (p<0.0001), vs. MIUs (19.9% (190/956) to 55.9% (475/850)), (p<0.0001). Phase 1 dosing data was insufficiently robust for analysis. In Phase 2, after 68 exclusions, 328 separate doses of analgesia were analysed. Overall, 31.4% (103/328) of doses were for weighed patients. 34% (36/106) of ED doses were in weighed patients vs. 30.2% (67/222) of MIU doses. Doses beyond +/- 10% of British National Formulary (BNF) dose for weight/age were more common in unweighed (40% (90/225)) than weighed patients (35.9% (37/103)), and more common in MIUs (41% (91/222)) than EDs (34% (36/106)). Of more concern, doses beyond +/- 30% of BNF dose were significantly more common in un-weighed (32.4% (73/225)) than weighed children (9.7% (10/103)) (p<0.0001).

#### **Discussion and conclusion**

Post Care-Bundle implementation, a dramatic improvement in documentation of pain scoring was noted. Children were found to be more likely to receive appropriately dosed analgesia if they were weighed, or managed in EDs. EDs continued to out-perform MIUs in terms of pain-score documentation, by an increased margin, possibly due to differing levels of staff education/patient population. Future training should emphasise the importance of weighing patients and appropriate analgesic dosage.

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'Improving services for children in hospital - report of the follow-up to the 2005/6 review' Healthcare

#### A re-audit of caudal analgesia: Information provision and consent for procedure

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#### Introduction

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Caudal analgesia is the single most common regional analgesic technique performed in children and has an excellent safety record. However, to perform the procedure a valid consent must be obtained. Parents should be given adequate information regarding the technique to allow an informed consent<sup>1,2,3</sup>. In view of the recommendations we undertook an audit to review our hospital practice. The audit indicated that 78% of the parents requested written information about the caudal analgesic technique.

#### Method

We developed a patient information leaflet following discussions in the paediatric anaesthetic department and the trust patient advice and liaison service (PALS). Hospital audit committee approval was obtained to re-audit. The department was informed of the availability of the leaflet. Data was collected prospectively and children undergoing elective procedures were included. 22 parents were interviewed and anaesthetic charts were reviewed.

#### Results

Information leaflet is available but is still not given to all parents. For the audit, all the parents were shown the leaflet at the end of the procedure.

88% of parents who received the leaflet at anaesthetic assessment, felt the information was adequate. 69% of parents, who did not receive the leaflet, felt it would have been useful

100% of parents who received it felt the technique was explained adequately as opposed to 69% of parents who did not.

92% of parents who received it felt they understood the side effects and risks compared to 51% of parents who did not receive the leaflet preoperatively.

Overall, the consent was deemed adequate and informed in 87.5% of cases when the leaflet was given, but only 64% when it was not.

59% had documentation of consent for the caudal block. In our previous audit only 38% of charts had documentation of consent.

#### Discussion

On the day of surgery, anaesthetists have limited time to review notes, take a history and discuss analgesia. Our information leaflet facilitates information provision. Guidelines suggest that formal signed consent is not necessary for anaesthesia and anaesthesia - related procedures<sup>1</sup>. However, documentation should still be made in the notes or on the anaesthetic chart that consent has been obtained<sup>1</sup>

#### Conclusion

The information leaflet has been welcomed by parents; the information provided is adequate and has improved the process of informed consent. Documentation of consent on the anaesthetics charts still does not meet GMC<sup>4</sup> or AAGBI<sup>1</sup> standards but has improved since our last audit. This information will be disseminated to increase usage of the leaflet and improve documentation of consent.

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# 69

Paediatric reservoir bags: How easily do they burst? Jocelyn Erskine, Graham Bell, Kevin Jerome Royal Hospital for Sick Children, Glasgow, UK

#### Introduction and Aims

In our institution, we induce anaesthesia using a modified Avre's T piece and change to a circle breathing system after transferring from the anaesthetic room into theatre. The APL valves on our anaesthetic machines (Penlon Prima SP®) have no numerical pressure gauge, making it difficult to assess the position of the valve at a glance. There have been incidents where a patient has been connected to the circle with the APL valve inadvertently closed, with resulting distension of the reservoir bag and transmitted increase in intrapulmonary pressure. In each instance, the bag distension was guickly recognised and the APL valve opened, with no adverse effect on the patient. However, the potential for transmission of high pressures and resulting barotrauma prompted us to conduct a quality control study to investigate just how much pressure a reservoir bag can withstand before bursting.

#### Methods

Pre-used Intersurgical® reservoir bags of 0.5. 1 and 2 litres from a cohort of batch numbers were tested. We used a Penlon Prima SP® anaesthetic machine with a Druck® Digital Pressure Indicator connected to the circle breathing system. The patient end of the breathing system was occluded. The APL valve was fully closed and each bag inflated with an oxygen/air mix. The maximal pressure measured prior to each bag bursting was recorded. We also measured the sound created in decibels (dB) using the Multi Measures (SkyPaw Co. Ltd) App.

No ethical approval was required as the study was entirely non-clinical.

#### Regulte

91 bags were burst (45 0.5L, 39 1L and seven 2L). Pmax and max dB are detailed below as mean (SD [range]).

Bag size (Litres)	Pmax (cmH <sub>2</sub> O)
0.5	48.3 (6.2 [31.0-60.5])
1.0	48.7 (6.3 [35.9-61.5])
2.0	32.1 (5.6 [24.5-39.5])

#### **Discussion and Conclusions**

The reservoir bag acts to protect the patient from excessive pressure within the breathing circuit [1]. The pressure is not limited by the bag bursting or becoming detached but by the bag distending so that the pressure within it actually falls slightly (by Laplace's law) as it distends [2]. The bags we tested burst at pressures generally <60cmH<sub>2</sub>O, and would be unlikely to expose a patient to significant, sustained dangerously high intrapulmonary pressures. The degree of distension the bags attained was so marked that it is inconceivable the bag would distend to anywhere near these pressures without the anaesthetist being aware.

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Max dB 99.5 (2.3 [94-105]) 101 (1.5 [95-101]) 100 (0.7 [99-101])

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#### A case note review of children undergoing anaesthesia with a diagnosis of muscular dystrophy

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#### Background

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Patients with a diagnosis of muscular dystrophy are always a concerning group. Our aim was to assess the pre, intra and post operative management and review morbidity following anaesthesia and surgery.

#### Methods

90 children were highlighted from surgical operating lists with a code of muscular dystrophy during the period of April 2009 until April 2012. From the 90 cases, 45 patients were appropriate to be included for the review.

#### Results

The mean and median age of the patients was 10 and 11 years respectively with a range of 1-17 years. 84% of our patients were male and 15.5 % were female. All patients had been genetically tested for muscular dystrophy, in addition 42% had a muscle biopsy and 4.4% had received neurophysiological studies to aid diagnosis.

#### Pre-operative status of patients

35.5% of patients were part time and 40% full time wheelchair users. The group had a mean weight of 41kg and 8.8% were gastrostomy fed. 8.8% of the patients required non-invasive home ventilation and 28% of patients required cardiac medication.

#### Pre-operative tests

Only 57% of patients had an ECG pre-operatively. 93% had an echocardiogram with 21% of these having an abnormal result. 13% of patients had a cardiac MRI and of these 83% had an abnormal result. 62% of children haad a sleep study and 64% had pulmonary function tests.

#### Intra-operative management

66.6% had an intravenous induction and in 80% anaesthesia was maintained intravenously compared to 33% who underwent a gas induction and 20% who received gas as their maintenance anaesthetic agent.

#### Post-operative management

There were 13 elective postoperative admissions to PICU and no unplanned admissions. 3 (6.6%) children died within 10 days of their surgery, of these, 2 children died within 24 hours, both had intra-operative cardiac arrhythmias which progressed to PEA. The 3<sup>rd</sup> child died 9 days after surgery following a respiratory arrest.

3 more children have since died; 1 with known poor respiratory function died within 2 months of surgery following a post operative pneumonia and respiratory arrest. 2 other children have since died unrelated to their hospital admission.

#### Discussion

These patients are non-ambulatory and likely to have cardio-respiratory dysfunction. A more uniform approach to pre-operative assessment is needed, as it appears that not every child receives the same cardiac or respiratory investigations. It should also be highlighted that negative results do not necessarily rule out cardiorespiratory disease and thus risk. These children are at a high risk of complications from anaesthesia and this should be discussed with the family pre-operatively. Anaesthetic technique remains varied and is a controversial issue.

#### Conclusion

Adequate preoperative assessment, intra and post operative planning should be thorough and well thought out with an emphasis on cardiac and respiratory optimisation and support.

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## A prospective audit of paediatric adenotonsillectomies in a district general hospital

Jithender Kenth<sup>1</sup>, Prakash Krishnan<sup>2</sup>, Gill Martin<sup>2</sup>, Noshin Siddigi<sup>2</sup>, Nidi Thillainayagam<sup>2</sup> <sup>1</sup>City Hospital, Birmingham, UK, <sup>2</sup>Chase Farm Hospital, Enfield, UK

#### Introduction and Aims

In the current NHS climate of fiscal cutbacks and contingency planning there is an increasing momentum for a larger proportion of surgery to be carried out as day cases <sup>1</sup>. Procedures involving the tonsils are common, accounting for 56,795 elective patients (2011-2012), of which 26,943 were between age 0-14 in England alone<sup>2</sup>. The objective of this audit was to evaluate the complication rates of paediatric adenotonsillectomies and ascertain the viability of carrying out these procedures as day cases.

#### Methods

A total of 228 children aged between 2 and 16 years undergoing elective adenotonsillectomy was analysed in a prospective audit. The incidence of haemorrhage, delayed respiratory complications, severe pain requiring additional rescue analgesia and PONV requiring anti-emetic drugs were recorded.

#### Results

The overall major complications were low, with the incidence of haemorrhage and delayed desaturation being 0.44% (1 child) and 0.88% (2 children) respectively. The incidence of severe pain (requiring additional rescue analgesia) occurring 6 hours post-operatively was 6.6%(15 children) and that of PONV(requiring antiemetic) occurring 6 hours post-operatively was 3.3%(7 children).

#### **Discussions and Conclusions**

The audit highlighted that the vast majority patients (98.7%) underwent surgery without serious complications. However minor complications, like pain and PONV may require in-patient facilities. The Department of Health listed tonsillectomies as suitable operations for day-surgery. Exclusion criteria: <3 yr, significant co-morbidity, obstructive sleep apnoea (OSA), and living >1 h drive from the hospital<sup>2,3</sup>. With the advent of paediatric day surgery ENT at certain centres, there has been a resurfacing of anxieties following a recent MHRA alert admonishing the use of codeine containing analgesics. Following three fatalities amongst ultra fast metabolisers of codeine, undergoing tonsillectomies for OSA<sup>4</sup>, provision for opioid-based analgesia should be addressed carefully.

We conclude that Paediatric day stay adenotonsillectomy can safely be performed with strict preoperative criteria, meticulous anaesthetic technique addressing analgesia and PONV, trained day stay unit(DSU)staff, and with in-patient facilities on site. With appropriately selected group of patients, day case adenotonsillectomies can be safe and cost-effective. Above all, patient safety must remain paramount.

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#### Acknowledgements

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Conflict of interests None declared.

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## Oxycodone NCA/PCAs for children: A series of 50

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#### Background and aims

Oxycodone PCAs have been used routinely in adults for over 10 years. However, little has been published regarding oxycodone PCA or NCA use in children. Pharmacokinetic modelling shows that a weight-based dosing regimen for oxycodone can be used without adjustment for age between 6 months and 7 years<sup>(1)</sup> Cambridge University Hospital has been using oxycodone PCA/NCAs in paediatric patients since 2009. We aimed to review the first 50 patients who had oxycodone PCAs or NCAs to evaluate this technique.

#### Methods

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The paediatric pain service has kept a database of patients since February 2009. The notes of patients who had an oxycodone PCA/NCA were reviewed and the following data was collected: age, weight, PCA/NCA settings, duration of use, indications, patient comfort and whether there were any adverse events.

#### Results

Data was collected from 50 patients treated with oxycodone PCA/NCAs who were seen by the paediatric pain service between September 2009 and March 2013. Of these 39 were PCAs and 11 were NCAs.

The indications for the oxycodone PCA/NCAs were mainly for postoperative analgesia, with 4 cases where the PCA/NCA was used in patients being managed for non-postoperative pain. The specialities where oxycodone PCAs/NCAs were used were orthopaedics (35), general surgery (5), oncology (4), thoracic surgery (2), plastic surgery (1) and gynaecological surgery (1).

In the majority (33) of these cases oxycodone was the first-line opioid used for the PCA/NCA. Five of these patients were changed to an oxycodone PCA/NCA due to failure of another modality. Seventeen patients reviewed were changed to an oxycodone PCA/NCA from another type of opioid PCA/NCA. The most common reasons for the opioid swaps were poor analgesia, nausea, vomiting, itching, confusion and agitation.

During the adoption of these PCA/NCAs the concentration and settings used were guite varied. However, in 2011 a pre-printed prescription was introduced, providing recommended initial settings and guidance on the range of settings that may be required.

There were no serious complications. Any side effects attributed to oxycodone were infrequent and it was largely successful when used as a second or third-line opioid. The vast majority of patients had effective analgesia.

#### Conclusions

Oxycodone PCA/NCAs have now been used in more than 50 patients for a range of ages and operations. A standardised pre-printed prescription has promoted safe and consistent prescribing. Oxycodone PCAs and NCAs have been shown to be a safe and effective means of analgesia for a variety of indications, with a low incidence of complications and side effects, making it a suitable alternative opioid.

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## 5

#### Survey on the adequacy of pain relief and presence of postoperative symptoms following discharge in paediatric day surgery

Jacques Diacono, Wei Teo, Shashi Chandrashekaraiah Royal Bolton Hospital, Bolton, UK

#### Introduction and aims

Postoperative symptoms such as pain, nausea and vomiting have been reported to occur frequently in the immediate postoperative period. After day surgery, children often experience these unpleasant and distressing symptoms at home. The aim was to conduct a survey to quantify the incidence and severity of pain following discharge in paediatric day case surgery, the manner in which analoesics were prescribed. and the occurrence of other postoperative symptoms.

#### Methods

The survey was conducted over a six-month period. Children who underwent day surgery in our hospital were included. Parents who agreed to participate in the survey were contacted telephonically on the second post-operative day. A questionnaire was used to ask about their child's symptoms and pain relief.

#### Results

40 children were included in the survey. Their ages ranged from 2 to 15 years, with a mean age of 7.6 years. ASA physical status was 1 in 35 children; the remaining were ASA 2. 37 children underwent ENT surgery, while the remaining three had hernia repair or circumcision. The most common types of surgery were tonsillectomy and insertion of grommets.

15% of children were not discharged home on the day of surgery. The most common reasons were pain or nausea and vomiting. One child required readmission on the day of surgery in view of bleeding. In the first 24 postoperative hours, pain was described as moderate in 15% and severe in 5%, with the rest experiencing mild or no pain. Those with severe pain had undergone tonsillectomy and required overnight stay. During the second postoperative day, 10% experienced moderate pain and none had severe pain. Analgesics were supplied to only 55% for home use. These included paracetamol, ibuprofen and codeine. They were prescribed to be taken regularly in only 30%. Other post-discharge symptoms included nausea, vomiting, sore throat, decreased oral intake and headache.

#### **Discussion and conclusion**

Results have shown that analgesia was not prescribed appropriately in 45% of cases. Some children did not obtain enough pain relief from the medications prescribed, as evidenced by the parental reports of moderate to severe pain after discharge from hospital. Treatment of postoperative pain with regular multimodal analgesia, and better management of nausea and vomiting, may decease the incidence of these distressing symptoms and reduce duration of hospital stay.

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Jackson I, Gandhimani P. Adequacy of postoperative pain relief after discharge. Raising the Standard: A compendium of audit recipes (Second edition 2006). http://www.rcoa.ac.uk/docs/ARB- Childhood obesity in a major teaching hospital: Does it exist?

Richard Jones, Hannah King Queens Medical Centre, Nottingham, UK

#### Introduction and aims

Several reports suggest the incidence of childhood obesity is rising. This is having a large impact on hospital services and public health. Focus on intervention at an earlier stage can help reduce future impacts on national health services. This survey aimed to see whether childhood obesity is evident in the population presenting for general anaesthesia at a major teaching hospital in the East Midlands.

#### Method

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Over a 3-week period at the Queens Medical Centre (QMC), the height, weight, sex and therefore Body Mass Index (BMI) of children presenting for day case and having inpatient surgery were recorded. The children's BMI was calculated using the formula:

#### $BMI = Weight (kg)/Height^2 (m)$

As BMI is age and sex dependent the UK1990 BMI reference chart was used to calculate BMI with the following defined centiles

<2 centile underweight >2 <91 centile healthy >91 centile overweight >98 centile obese

The weight and sex of the child was taken from drug card/admission booklet, whilst the height was measured using a tape measure once the child was anaesthetised.

#### Results

In the inpatient group 18 patients in total.

- 10 healthy (56%)
- 7 underweight (39%)
- 1 overweight (5%)
- 0 obese

#### In the day case group

21 patients in total

- 12 healthy (57%)
- 4 underweight (19%)
- 1 overweight (5%)
- 4 obese (19%)

#### **Discussion and conclusion**

Children presenting for inpatient procedures appear to be healthy or underweight with no obese patients recorded. This could be due to the chronic ill health of many inpatients.

In comparison, those presenting for day case procedures showed an increase in number of obese patients. 24% of day case patients were overweight or obese which is in line with current national obesity figures (~31%). This is likely due to those children presenting for day surgery being more representative of the general population.

In view of the presence of obese children presenting for anaesthesia we recommend that day case patients should have their BMI measured at pre op assessments or on the day of surgery, with a referral or note sent to their GP if they are overweight or obese.

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# 8

Caudal additives survey: Attitudes post walkers et al work in the neonatal rat Adam Revill, Sarah Wimlett Derriford Hospital, Plymouth, Devon, UK

#### Introduction and aims

There is an on going debate in the paediatric anaesthetic community regarding the use of ketamine as an adjunct to caudal anaesthesia. This has been sparked by recent laboratory studies in neonatal rats suggesting spinal cord histological toxicity.

The purpose of this survey was to identify how practice has changed since the publication of this evidence and whether a consensus opinion is emerging regarding the continued use of ketamine.

#### Methods

This survey was approved by the Association of Paediatric Anaesthetists (APA) survey sub-committee and written and designed in conjunction with them. The survey was written on freesurveys.com and sent to all registered members of the APA in March 2012.

#### Results

Of the 700 members surveyed 210 responded which represents a 30% response rate. The majority of responses were from consultants (90%) and 72% work in a specialist paediatric centre. The choice of additive varies between DGHs and specialist centres, with ketamine being used by 36% in a DGH compared to 26% in Specialist centres. Of those who responded 67% use an additive to their single shot caudal, the main reasons for not using an additive include: No benefit over risk, departmental guideline, case mix does not require use, safety concerns regarding neuronal cell apoptosis, or unavailability. Of those that choose to use an adjunct, 27% use Ketamine and 65% use Clonidine. Since 2009 20% have changed from ketamine to clonidine and 7% have stopped using additives. However 60% have not changed their practice. Of these, 30% continue to use ketamine and 58% use clonidine. Of those changing their practice 82% of respondents stated that the most important reason for changing from ketamine to clonidine was laboratory research, the majority citing Walker et als work.

The majority believe more research should be conducted. Suggestions include: repeating the work with other additives, at clinically relevant doses and animal models closer to humans.

#### Discussion and conclusion

In an earlier survey of caudal practice,<sup>2</sup> 37.5% of respondents added ketamine compared to 42.3% using Clonidine. It therefore appears that there has been a further decline in the use of Ketamine as an additive since the publication of Walker et als study on the effect of Intrathecal Ketamine in the neonatal rat. However there are still a significant number of members of the APA that continue to use Ketamine and there is a suggestion that more research needs to be undertaken.

#### Sugammadex for the reversal of long term paralysis in a pre-term neonate

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#### Introduction

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Sugammadex is a modified v-cvclodextrin. It forms a complex with the aminosteroid muscle relaxants rocuronium and vecuronium reducing the amount available to bind at the neuromuscular junction. There is limited data for its use in children less than two. We report a case where sugammadex was used to reverse neuromuscular blockade in a preterm neonate with evidence of persistent paralysis ten days after stopping a vecuronium infusion.

#### Background

Born at 30+5 weeks (1535 grams) the neonate had been ventilated since day 1 of life for respiratory failure. On day 19 she developed acute renal failure due to abdominal compartment syndrome. Drainage of intraabdominal chyle allowed a partial resolution of her renal function. She was diagnosed with intestinal and pulmonary lymphangiectasia. In total she received a vecuronium infusion for 17 days (2mcg/kg/min).Despite 10 days free of vecuronium by day 33 she remained hypotonic, without movement or respiratory effort. She had no acetylcholine receptor antibodies.

#### Results

On day 33 two doses of 4mg/kg of Sugammadex were administered with an almost immediate motor and respiratory response. This response was transient lasting only a few hours. On day 36 electromyography (EMG) and nerve conduction studies were performed demonstrating evidence of residual neuromuscular blockade. EMG showed abnormal repetitive nerve stimulation (left abductor hallucis amplitude decrease 80.9% / area decrease 70.7%) with marked improvement post an 8mg/kg dose of sugammadex (7.4%/14.6%). She was treated with 3mg/kg/day pyridostigmine in 4 daily divided doses until her EMG normalised.

#### Discussion

The clinical response to sugammadex and the results of the nerve conduction studies suggest prolonged paralysis secondary to vecuronium. There is no data on the use of vecuronium in preterm neonates, but it has an increased potency and prolonged duration of action in neonates likely due to the increased proportion of extracellular fluid, lower serum protein, and a greater dependence on renal clearance.

This patient was preterm, had renal failure, and a condition that resulted in a significant increase in extracellular fluid and extensive loss of protein. We believe that this combination of factors resulted in prolonged neuromuscular blockade. Due to limited data sugammadex is not recommended in preterm neonates; however this case report suggests that it is effective and safe. It is unclear why this neonate required a second dose of the drug but her altered physiology may have contributed. Prolonged neuromuscular blockade should be considered as a possible diagnosis in any hypotonic neonate who has received neuromuscular blockade. Sugammadex appears to be a safe treatment for this.

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Parental satisfaction with the anaesthetic induction process in children Claire Biercamp, Susan Jackson

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#### Introduction and aims

In accordance with recommendations from the Royal College of Anaesthetists (1), parental presence during paediatric anaesthetic induction is commonplace in the UK. This is despite findings from a recent review suddesting that only rarely does this reduce child or parental anxiety (2). It is known that parents expect and prefer to be with their child at this stressful time. This cross-sectional study was designed to evaluate the effectiveness of information provided to prepare parents for being present at anaesthetic induction, and to relate this to overall parental satisfaction.

#### Methods

A multiple-choice questionnaire was distributed to the parents or quardians of children attending the paediatric day surgery unit of a large tertiary centre over a 4 week period. The questionnaire enquired about information availability, level of understanding, degree of preparation and satisfaction among parents. Suggestions for service improvement were also addressed. The document was handed out by ward nursing staff once the child was deemed fit for discharge. Parents were asked to complete the forms prior to leaving the ward.

#### Results

62 questionnaires were included for analysis. Following their pre-operative instruction parents reported a good understanding of the induction process, with 53 (85%) being aware of all or all-but-one of the salient features. In general parents felt well prepared for being with their child during anaesthetic induction and they reported satisfaction with the preparation received. Correlation coefficients were used to analyse the data further. The provision of accurate and complete information was related to overall parental satisfaction (r = 0.25, p = 0.05). It was also associated with improved feelings of adequate preparation (r = 0.34, p= 0.05), and improved understanding of the parental role at induction (r = 0.25, p = 0.05).

#### **Discussion and conclusions**

This study revealed that most parents received instruction for being at the anaesthetic induction of their child and the level of retained information was generally good. Parents who received the most complete information felt the most prepared. They were also more satisfied overall than their less well informed counterparts. It is clear that future efforts should focus on improved parental education. The most frequent suggestion for improvement was for written information to be provided on the day of surgery.

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Nick Airey, Rishi Diwan Alder Hev Children's Hospital, Liverpool, Mersevside, UK

#### Introduction and aims

Aim: Compare bilateral paravertebral block (PVB) and patient controlled analgesia (PCA) against thoracic epidural for post-operative pain relief following pectus surgery.

Surgery for pectus deformity is commonly performed in adolescence and is essentially a cosmetic procedure. Surgical complications are rare, however producing good pain relief can be a significant challenge. A thoracic epidural is commonly used for post-operative analgesia, however a recent study<sup>1</sup> has guestioned whether an opioid PCA might provide a more suitable alternative. There are no published studies comparing the combination of a PVB and PCA against a thoracic epidural in patients undergoing pectus surgery.

#### Methods

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Data was collected retrospectively on 102 patients who underwent pectus surgery from 2007 to 2012. Patients were divided into two comparable groups; 86 received an epidural and 16 received a PVB and PCA (PVB group). Data was collected from the pain service database and the patient's notes. Analysis followed the intention-to-treat principle. Microsoft Excel and SPSS statistics software was used to analyse the data. Where appropriate a two-sample independent t-test and Mann-Whitney U test were used to compare the groups.

#### Results

The PVB group had a significantly shorter length of hospital stay (LOS) compared to the epidural group (7.0 vs 5.5 days, p<0.01). There was no significant difference between the resting pain scores in the two groups. PCA usage was lower in the 1st day compared to the 2nd day [23.88 (19.1-28.7) vs 30.69 (23.6-37.8), p=0.11.

Side effects varied between the two groups, nausea and vomiting was reported in 50% of patients in the PVB group and 31% in the epidural group. Complications in the epidural group included 11 (13%) patients who developed Horner's syndrome and 4 (5%) who developed an infection at the epidural site, one of whom developed inflammation of the epidural space.

#### **Discussion and conclusions**

PVB combined with a PCA showed no increase in resting pain scores and may reduce LOS in patients undergoing pectus surgery compared to the standard epidural technique. PVB in combination with a PCA has not been described as an analgesic technique for pectus surgery and these results suggest that it should be considered as an alternative. Patients in the PVB group had fewer serious complications and sideeffects compared to the epidural group. The complications from thoracic epidurals are potentially devastating and in this group of patients do the risks outweigh the questionable benefits?

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Endotracheal cuff pressure measurement at the Evelina Childrens' Hospital Paul Smith. Melanie Bloor. Rachel Deacon

Evelina Childrens' Hospital, London, UK

#### Introduction and aims

Manufacturers of the cuffed endotracheal tubes (ETT) used at the Evelina Childrens' Hospital (ECH) -Mallinckrodt and Microcuff - state that cuff pressure should be monitored and should be below 25cm H20 and 20cm H20 respectively. Weber et al state that cuff pressure should be measured after intubation and should be monitored continuously if nitrous oxide is being used (1). Our primary aim was to compare our current practice to this.

Our secondary aims were to compare the rate of perioperative airway complications at ECH to previously published rates, and to compare complication rates between cuffed and uncuffed ETT at ECH.

#### Methods

Anaesthetists and recovery staff were asked to complete an anonymous guestionnaire for each anaesthetic performed. These were collected over a 5 week period beginning October 2012.

#### Results

203 guestionnaires were completed, a 27% return rate. Cuffed tubes were used in 67 cases (33%) and uncuffed tubes in 79 cases (39%). Cuff pressures were measured in 8 cases (12%). 19 peri-operative airway complications were recorded (4 stridor, 8 hoarse voice, 3 airway obstruction and 4 laryngospasm).

In those aged less than 8 years, 73% of ETTs were uncuffed and 27% cuffed. Pressures were measured in 20%. Incidence of stridor following cuffed ETT was 7.4% and following uncuffed ETT was 2.7%.

#### Discussion and conclusion

Cuff pressures were measured in only 12% of cases, and therefore did not follow manufacturers guidance in 88% cases. At the time of the audit, manometers were not available in every theatre, this has now been addressed.

Our airway complication rate was 9.3%. Although difficult to compare to previously published figures in view of our low return rate, Budic et al reported a rate of 5.7% in 682 children aged up to 14 (2). Our incidence of stridor was 2.8% - this compares to a rate of 2.4-2.9% reported by Khine et al (3). At ECH, in the less than 8 years old group the rate of stridor was higher in the cuffed ETT group (7.4%) compared to the uncuffed ETT group (2.7%). However, this difference did not reach statistical significance, using Fisher's exact test (p= 0.277).

These results have been presented to our anaesthetic department and we plan to introduce a guideline and reaudit.

#### Paediatric sickle cell testing: Current practice of APA members David Golden, Andrew Williams

Whipps Cross Hospital, Leytonstone, Barts Health NHS Trust, London, UK

#### Introduction and aims

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Routine testing of children for sickle cell disease (SCD) in susceptible populations has always been contentious in our opinion. Many children undergo unnecessary sickle testing and may have operations delayed or cancelled because of a lack of a test 'result'.

There is a shortage of practical guidance available to anaesthetists. The AAGBI guideline on Pre-op Assessment and Patient Preparation (January 2010) states "sickle cell testing should be performed in susceptible populations". Individual trusts and anaesthetists interpret this in different ways.

Since 2003, testing at birth has been part of the 'Guthrie' or heel-prick test in high prevalence areas and fully implemented across England by 2006. There are regional differences across the UK.

Our local paediatric sickle cell expert confirmed that prior to the introduction of screening in England the oldest child he had seen presenting with previously undiagnosed SCD was seven years old.

This survey examined current practice amongst paediatric anaesthetists including their drivers for sickle testing.

#### Methods

The survey was conducted using Survey Monkey from December 2011 until March 2012 and was sent to GB and Ireland members of the APAGBI.

Members were asked what their current practice would be for a 4 year old requiring anaesthesia with varying scenarios (see below).

#### Results

340 responses - 90% were Consultants

Divided opinion on need for sickle cell testing prior to surgery

- Elective case (adeno-tonsillectomy) no sickle cell history in family 54.5% happy to proceed without sickle testing
- Emergency case (appendicectomy) no sickle cell history in family rose to 65.7% happy to proceed without sickle testing
- Emergency case with unknown family history only 22.8% happy to proceed without sickle testing
- Emergency case with unknown family history but child was mixed race (at worst sickle trait) 55.6% happy to proceed without sickle testing
- Does Hb change practice? Yes 65% -
- Does Age change practice? Yes 41.3% -
- Does tourniquet use change practice? Yes 61.5% -
- Does Guthrie test factor into decision? Yes 50.2%
- No sickle cell testing guidelines in 55% of departments

#### Discussion and conclusion

The survey had a good response rate and was representative of actual practice.

The divided opinion shows that practice for sickle cell testing throughout the UK varies considerably. The results of the survey prompted discussions with several other sickle cell experts. Their opinions and cases were very interesting and unexpected.

The survey also helped prompt the implementation of our own local 'flow-chart' policy that we think is very practical in the DGH setting.

#### Acknowledgements and conflicts of interest

None declared

#### Urgent infant intubation: Who should be present? An audit of intubation of critically ill infants in district general hospitals (DGH's)

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#### Introduction

Critically ill infants may require intubation as part of stabilisation prior to transfer to PICU. North West and North Wales Transport Service is a Regional Retrieval Team(RRT) commissioned for the stabilisation and retrieval of sick children to PICU in Northwest England and Wales. While studies have looked at adult emergency intubations and pre-hospital intubations in children, there is a paucity of data on emergency intubations of critically ill infants presenting to a DGH. AIMS:

To highlight:

- DGH teams managing intubation of critically ill infants
- Induction agents used
- Frequency of "peri-induction" complications
- Role of the RRT(NWTS)

#### Methods

Retrospective audit of data from retrieval forms in children<1yr intubated in DGH between 1<sup>st</sup>December 2011- 30<sup>th</sup>November 2012, referred to NWTS for transfer.

#### Results

230 infants met the inclusion criteria. 69% were between 1week and 6months of age and weighing 2.5-5kg. Less than 50% infants were intubated by anaesthetists. Anaesthetist was present in the team in only 20% of neonates<1week, 59% infants 1week-6weeks, 56% infants 6weeks-6months, 73% of infants 6months-1yr. Peri-intubation complications were documented in 15%(35) cases. In 16cases, more than 3attempts at intubation was documented, but hypoxia occurred in 9. Hypotension was documented in 16 cases. Induction agents were not well documented in the retrieval forms: morphine and midazolam being the most common, but ketamine with or without fentanyl was also used.

#### Discussion

230/604(40%) children transferred by the RRT were infants <1 year. of which 42% were aged 1week-6weeks. This group with their unique anatomy and physiology pose a significant challenge to the paediatric teams, anaesthetists and adult intensivists who are called upon when they present, critically ill to the DGH. Our data showed that 11% were intubated in extremis. Anaesthetists were present in less than 50% of infant intubations in the DGH. Though this number improved to 73% in infants>6months, it is still lower than that for emergent intubation in older children or adults. RRT was present at intubation in 17% of cases, and facilitated management of difficult airway in 4cases.

We recommend that paediatric teams acknowledge the skills of local anaesthetic teams in airway management, failed intubation strategy and the use of drugs in the management of critically ill infants, with advice from the RRT. To facilitate this anaesthetic teams in the DGH must maintain paediatric skills through regular CME, paediatric simulator work or supernumerary attachments. Our study highlights complex issues surrounding infant intubations in the DGH that are likely to be a national problem. We intend to undertake a prospective study for better documentation and outcome data. RRTs have a pivotal role to play in providing advice and support in these challenging circumstances, including the provision of training through an outreach programme focused on peri-intubation management of critically ill infants.

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#### Introduction

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Recent trends indicate a steady increase in the prevalence of obstructive sleep apnoea (OSA) in children and adolescents. Many times high BMI and OSA overlap or may occur concurrently in the same patient and may indeed potentiate the adverse impact of each other (1). Because these "twin protagonists" are so pervasive, it becomes increasingly likely that children undergoing anaesthesia will have one or both disorders with the implicit potential to increase the risk of perioperative airway complications.

Laryngospasm is a serious adverse event, with 1 in 3 children who develop laryngospasm suffering significant physiological perturbation. Though high BMI and OSA are often cited as risk factors for laryngospasm (2), it is currently unknown whether overweight/obese children with OSA have increased rates of perioperative larvngospasm.

#### Methods

Data for the present report were derived from an earlier prospective observational study, which explored the association of clothing size with adiposity indices in 752 children aged 6-18yr, undergoing elective, noncardiac operations.

Clinical (age, history of snoring, OSA, asthma) and detailed anthropometric data (height, weight, neck circumference, waist circumference) were prospectively collected in all patients. For the present investigation, the patients were classified into two groups (normal and high BMI) based on sex-specific BMI ≥ 85<sup>th</sup> percentile for age. Further stratification based on history of OSA was done to yield two groups: high BMI+OSA and normal BMI /non-OSA. Rates of perioperative laryngospasm were compared between the two groups.

Clinically relevant risk factors were entered into a backward logistic regression model to calculate the odds ratio for laryngospasm in the study subjects.

#### Results

The overall prevalence of high BMI (overweight/obese) was 31.4% while the overall prevalence of OSA history was 15.2%. Laryngospasm occurred in 29 (4%) patients in the operating room while only 2 cases (0.3%) occurred in the PACU.

All the indices of adiposity were significantly higher in the high BMI/OSA patients than their peers (Table 1). Children in the high BMI+OSA group had 8 times higher odds of developing intraoperative laryngospasm (OR = 8.5; 95% CI = 2.9-22.7, p<0.001). After adjusting for several relevant covariates (age, gender, intubation yes/no, induction method), high BMI+OSA remained the most consistent risk factor for intraoperative laryngospasm in this cohort of patients.

#### Conclusion

These results indicate that children with high BMI and incident OSA are at increased risk for intraoperative larvngospasm. Mechanisms underlying these increased risks deserve further elucidation but could include insufficient depth of anaesthesia, increased airway sensitivity and possible sub-clinical airway inflammation in overweight/obese children with incident OSA.

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# 16

## Bilateral rectus sheath blocks: An effective analgesic option for open pyloromyotomy

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#### Introduction and aims

The use of ultrasound for regional anaesthesia is increasing.<sup>1</sup> Ultrasound guided rectus sheath blocks have shown beneficial effects in other midline abdominal procedures however reports on efficacy in open pyloromyotomy are scarce. The aim of this survey was to establish that this technique provided safe and effective analgesia.

#### Methods

Casenotes were reviewed of patients managed by a single consultant anaesthetist for open pyloromyotomy over a 3 year period. All patients received bilateral ultrasound guided rectus sheath blocks prior to incision. Local anaesthetic (levobupivacaine 2.5mg/ml) was deposited under ultrasound guidance (MicroMaxx, 13-16 MHz hockey stick probe) at the posterior rectus sheath using a 1ml syringe and 23 gauge hypodermic needle.

#### Results

25 patients were identified of whom 20 were male. All had a supraumbilical incision. Age range was 2.5 to 12 weeks. Levobupivacaine dose ranged from 0.6-1.9 mgkg<sup>-1</sup> with a mean dose of 1.3 mgkg<sup>-1</sup>. 18 patients received intraoperative intravenous paracetamol. One patient required additional analgesia in the recovery ward, the remainder being pain free and settled. 4 patients required no further analgesia supplementation. Time to first analoesia ranged from 1.5 to 24 hours (mean 7.3, mode 5.0, median 6.0 hours), Postoperative analgesia consisted of paracetamol in 13, paracetamol with codeine in 5 and paracetamol with ibuprofen in 3 patients. The time to first feed was between 4 and 24 hours with a mean of 9.3 hours. 8 patients were discharged within 24 hours, 9 within 48 hours and 5 within 72 hours. 3 patients remained for greater than 4 days postoperatively. Mean length of stay was 2.3 days. No complications were noted.

#### **Discussion and conclusions**

This survey suggests that bilateral rectus sheath blocks are a safe and effective analgesic technique as part of a multimodal regime in infants undergoing open pyloromyotomy. Our data is comparable to that from investigators in Aberdeen.<sup>3</sup>

The time required to establish feeding along with discharge times at our institution is comparable to results from a recent meta-analysis and systematic review.<sup>4</sup>

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#### Audit of emergence delirium in the post anaesthesia recovery unit

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#### Background

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Emergence delirium is defined as a dissociated state of consciousness in which the child is inconsolable. irritable and uncooperative. Although generally self-limiting, it can be severe and result in physical harm to the child, particularly at the site of surgery. By performing this audit we wanted to compare the incidence of emergence delirium in our recovery unit to that published in literature (12-14%)(1). We also wanted to record the incidence in association with various factors such as age, anaesthetic agents used and surgical specialty, which are known to influence the occurrence of emergence delirium.

#### Methods

Data was collected using an audit tool for all children undergoing a general anaesthetic in VCB theatres over a six week period. The anaesthetists in theatre recorded age, surgical procedure, duration of surgery, premedication and maintenance anaesthetic. Recovery staff then measured the pain score using an age appropriate scoring system and paediatric anaesthesia emergence delirium (PAED) score. A PAED score of 10 or more was regarded as significant agitation or delirium. The need for treatment if the child was very agitated was also noted.

#### Results

Total number of cases where data collection was complete was 98. The overall incidence of delirium was 24.4%. As expected the incidence of delirium fell sharply in children over five. Surgical specialties such as craniofacial, ENT and cleft surgery had a particularly high incidence. With regards to anaesthetic agents, the highest incidence was with sevoflurane (25.3%) followed closely by desflurane (23.5%) and only marginally lower with isoflurane (22.2%). Propofol used as an adjunct to sevoflurane showed a high incidence of emergence delirium although it is difficult to derive conclusions as all cases with this combination were ENT procedures. Use of propofol as the sole anaesthetic agent reduced the incidence to 0%. Clinically it is difficult to identify the cause of agitation. By recording the pain scores we aimed to identify if pain was an important contributing factor. 40% children with moderate to severe pain were noted to develop emergence delirium.

#### Conclusions

This audit reveals a high incidence of emergence delirium in our recovery room. In previous studies the use of propofol as an adjunct to sevoflurane has been shown to decrease the incidence of delirium(2). Although we could not demonstrate this in our audit due to limited numbers it would be interesting to study whether this strategy would be useful in children undergoing short ENT procedures such as microlaryngobronchoscopy.

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Digital palpation of endotracheal tube tip as a method of confirming endotracheal tube position in neonates: An open-label, three-armed randomised controlled trial Ashwin R Saboo<sup>1</sup>, Sourabh Dutta<sup>2</sup>, Kushaljit Singh Sodhi<sup>3</sup> <sup>1</sup>University Hospital Southampton, NHS Foundation Trust, Southampton, Hampshire, UK, <sup>2</sup>Neonatal Unit, Department of Pediatrics. Post Graduate Institute of Medical Education and Research (PGIMER). Chandigarh, India,<sup>3</sup> and Department of Radiodiagnosis, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India

#### **Background / Introduction**

Due to the short airways in premature neonates, an accurate position of the endotracheal tube (ETT) after orotracheal intubation, is crucial for adequate mechanical ventilation. After intubation, the incidence of malposition of the tip of the ETT on radiography can be as high as 50%(1). A chest Xray (CXR) to evaluate placement is often not immediately available in the delivery room and clinical examination is unreliable in ascertaining depth of intubation(2). Unlike nomogram based methods, digital palpation offers a direct method to determine the ETT tip position. There is only one randomized control trial (RCT) showing applicability of suprasternal digital palpation technique for ETT tube positioning in neonates(3).

#### Methods

Design: Open-label, RCT. Setting: Level III NICU.

Subjects: All new born babies admitted in NICU requiring intubation. Interventions: Subjects were randomly allocated to one of three groups, wherein IL was determined by (1) weight-based nomogram alone or (2) weight-based nomogram combined with suprasternal palpation of ETT tip performed by specially trained Neonatology fellows or (3) combination of weight-based and suprasternal methods by personnel not specially trained.

Primary Outcome: Rate of malposition of ETT as judged on CXR. The Institute Ethics Committee approved the protocol. We sought permission to obtain deferred consent in cases where there was no time to seek consent, but when time was available for randomization. In other cases, we obtained informed written consent from a parent prior to patient enrolment.

#### Results

57 babies were randomized into group 1(n=15), group 2 (n=20) & group 3 (n=22). The proportion of correct ETT placement was highest in group 2; being 66.7%, 83.3% and 66.7% in groups 1 through 3 respectively (p value = 0.58). No complication was attributable to the palpation technique.

#### Conclusions

Suprasternal palpation shows promise as a simple, safe, teachable method of confirming ETT position in neonates.

## Clonidine in paravertebral blocks for renal surgery

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#### Introduction and aims

Paravertebral blocks are becoming increasingly popular and can provide excellent analgesia following a range of surgeries<sup>1.2</sup>. Clonidine has been shown to prolong the duration of anaesthesia and analgesia of peripheral nerve blockade<sup>3</sup>, but this has not been reported in paediatric paravertebral blocks. The aim of this audit was to assess the effectiveness of single shot paravertebral blocks with 0.25% levobupivicaine and clonidine in paediatric patients undergoing renal surgery.

#### Methods

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19 patients aged 4 months to 15 years undergoing renal surgery were included in a prospective clinical audit that was approved by the local audit committee. Following induction of anaesthesia, all patients had a unilateral paravertebral block inserted at T9/10 and a second block at L2/L3 containing a total of 1ml/kg 0.25% levobupivicaine and 2 micrograms/kg clonidine. They also received 15mg/kg paracetamol IV and 1mg/kg diclofenac IV or PR intra-operatively but no opioid drugs. Post-operatively the patients were given regular paracetamol and regular non-steroidal anti-inflammatory drugs (NSAIDs) (unless contraindicated), with codeine prescribed prn as rescue analgesia. Depending on the age of the child, FLACC or self-reported pain scores were recorded post-operatively, as were sedation scores and the length of time to the first dose of codeine for the first 24 hours post surgery, which was used as a surrogate marker for block duration.

#### Results

The results show that all of the paravertebral blocks provided a degree of intra-operative and post-operative analgesia. The median duration of block was 450 minutes (71/2 hours; range 285-1440mins). The median maximum pain score was 4 (IQR 2-6). 21% of patients did not require any opiate analgesia during the entire perioperative period, and remained comfortable with regular paracetamol with or without a NSAID. 37% required one dose of codeine. 26% required 2 doses, and no child required more than 3 doses of codeine in the first 24 hours post-op. There were no complications associated with placement of the paravertebral blocks.

#### Discussion and conclusion

We have demonstrated that paravertebral blocks with clonidine provide effective analgesia for renal surgery. Single injection paravertebral techniques avoid the complications associated with epidurals or paravertebral catheters, but can still provide good analgesia post-operatively.

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# 27

## The psychological effects of clowns on children admitted to Leicester Royal Infirmary Children's Ward following day case surgery

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#### Introduction and aims

It has long been known that humour and laughter reduces the fears and anxieties of children in hospitals. Clowns and mascots have been increasingly introduced onto paediatric wards. However there is little research into detrimental effects the presence of such figures has upon children. Coulrophobia is a fear of clowns.

75% of children undergoing surgery experience high levels of anxiety and distress during their time in hospital, having psychological and physiological effects lasting up to several days after discharge. The release of stress hormones, can lead to post-operative complications such as delayed wound healing and immunosuppression.

Our project aims to identify if the attendance of clowns/mascots on paediatric wards has detrimental effects on child patients. If so can we alter our practice to improve service and child wellbeing?

#### Methods

An observational study was undertaken at Leicester Royal Infirmary over 4 weeks. Patients attending for minor day case surgery in ENT, Orthopaedics, and General Surgery were interviewed. Data collected included age, sex, and fears relating to various subjects (e.g. Clowns, masks, costumes / mascots, people, Father Christmas, and our Anaesthetic Rooms).

#### Results

We obtained a total of 53 cases (Male = 20, Female = 33). The average age of the children was 8.2. 13% had a fear of people. 30% were afraid of clowns. 20% had a fear of masks and 6% were afraid of costumes. 15% were afraid of Father Christmas. Significantly, 28% of children were afraid of our anaesthetics rooms. 45% had a positive experience, 30% neutral, and 25% negative experience.

#### **Discussion and conclusion**

The presence of clowns/mascots is potentially detrimental to the wellbeing of child patients. In the outside world avoidance tactics can be employed, however within hospitals patients lack the ability to escape. Thus we should consider stopping their attendance.

Consideration into the effects of wearing protective masks in paediatric environments such as Oncology, and trauma theatres.

Anaesthetics rooms are sometimes not child friendly. Either correct decorations or for there to be a dedicated paediatric theatre should be considered. Re-education and the expectations of both parents and children will be addressed.

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#### Conflict of Interest

Nil

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POSTERS



#### Enhanced recovery programme: Is it applicable to children?

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#### Introduction and aims

The principle of enhanced recovery (ER) was developed by Professor Henrik Kehlet and pathways have been used in adults since the early 2000s.

Integrated care pathways take a multi-modal, evidence based approach to optimise patient recovery<sup>1</sup>. We have used the same approach to see if these principles can be applied to children.

#### Method

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Children's Integrated Recovery Pathways (CHIRPS) is the first ER programme for children. It concentrates on the following principles:

- Pre- admission assessmment and preparation
- Minimally invasive procedures and effective pain relief
- Early mobilisation and good communication with community teams to aid timely discharge

Pilot cases (phase 1), have been identified through examining variations in length of stay, volumes of procedures and where focussed improvement of techniques was possible. These cases are: appendicectomy, pyloric stenosis, gastrostomy, spinal fusion, inguinal herniotomy, uilateral tendon repair, ureteric reimplantation, epispadias repair, open pyeloplasty, developmental dislocation of hip.

A multidisciplinary team (MDT) has been used to create the phase 1 pathways. The MDT includes: anaesthetist, lead consultants, play specalists, nurse specialists, ward nurses, physiotherapists and dieticians where appropriate.

#### Results

Initial analysis shows that following the CHIRPS programme there is a percentage decrease in median length of stay (LOS) in some of the pilot cases in phase one. The LOS is compared to the same month from the previous year. The procedures showing a decrease in median LOS are:

Appendicectomy: 13% in January: 9% in February.

Pyloric Stenosis: 14% in December; 44% in January; 44% in February.

Spinal fusion: 4% January; 27% February.

This decrease is not visible in the gastrostomy procedures at the time of analysis. Some months analysed have also been skewed by the number and complexity of cases performed.

Other benefits from this programme include:

- Consistency in both clinician and nursing approach.
- Improved communication both with the child and family; between members of the MDT and community teams.
- Documentation: care pathways have helped standardise the patient journey.
- Development of parent and child information leaflets.

#### **Discussion and conclusion**

Extending the ER principles to children is possible. Funding needs can be identified for equipment and training. Care pathways are now included in our patients notes allowing patient journey to be standardised. Anaesthetists have been able to review the preoperative laboratory investigations requested and techniques used for anaethesia and analgesia<sup>2</sup>. Procedure specific pain algorithms have been developed. There is no conflict of interest.

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Audit of paediatric post-operative vomiting management Jennifer Orr University Of Leeds, Leeds, UK

#### Introduction and aims

POV causes morbidity in children and can lead them to have prolonged stays in hospitals. As well as negatively impacting the child this is also an extra cost to the NHS. The aims of the audit were to determine if at risk patients receive the correct prophylactic antiemetic and whether patients with established POV receive the correct antiemetic treatment according to the Association of Paediatric Anaesthetist (APA) quidelines

#### Method

A data analysis sheet was designed using APA guidelines to establish risk stratification and medical records were searched for any patient ≤ 16 years old who had undergone surgery under general anaesthetic within 3 months at Harrogate District Hospital. 75 patients were randomly selected and reviewed.

#### Results

Patients were divided into 3 groups; high risk (68%), at increased risk (28%) and low risk (4%). The recommended prophylactic antiemetic regime for high risk patients of Ondansetron combined with Dexamethasone was given in 31% patients, for at increased risk patients the recommendation of Ondansetron was given in 29% of patients and for low risk patients the recommendation of no prophylactic antiemetic was given in 67% of patients. 8 of the 75 patients went on to suffer POV and of this 2 received the recommended antiemetic treatment, 5 received no antiemetic treatment and 1 received treatment with an antiemetic not recommended in children.

#### **Discussion and conclusion**

This study highlights the need for both paediatricians and anaesthetists to be more aware of how to classify patients into the correct risk group, the most appropriate way to prevent POV according to risk classification and how to manage established POV. Two flow charts have been produced to make classifying patients into risk groups and the treatment of established POV clearer to try and improve these results.

#### Reference

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Laparoscopic pyloromyotomy: A survey of anaesthetic practice at Mott Children's Hospital, University of Michigan, USA Angela Denner, Ian Lewis

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#### Introduction and aims

Laparoscopic pyloromotomy is a common operation performed in neonates. Careful pre-operative assessment of fluid balance and electrolytes is essential in averting potentially avoidable complications. In addition, inadequate stomach emptying in this population renders these neonates at risk of aspiration. We reviewed 150 cases to determine whether our departmental guidelines for anesthetic management of these cases were being adhered to.

#### Methods

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150 cases of laparoscopic pyloromyotomy were retrospectively identified from our electronic database. The blood results were reviewed to determine the timing of the blood tests in relation to surgery, and whether the electrolyte parameters (Na<sup>+</sup>, K<sup>+</sup>, Cl<sup>-</sup> and HCO<sub>3</sub><sup>-</sup>) fell within the target range. The anaesthetic records were reviewed to determine whether the following were used during anaesthesia 1) pre-induction stomach emptying via oro/nasogastric tube (O/NGT) 2) cricoid pressure 3) suxamethonium 4) opioids 5) nondepolarising neuromuscular blockade (NDNMB) 6) pre-induction atropine. In addition, the patient's weight and primary anaesthetic induction agent were noted.

#### Results

93% of patients had their electrolytes measured within 24 hours prior to surgery. 35% of cases had at least one electrolyte parameter outside of the target range. Pre-induction stomach emptying and cricoid pressure were performed in 70% and 71% of cases respectively (O/NGTs are not routinely in-situ prior to surgery). Suxamethonium was used in 75% of inductions. Opioids and NDNMBs were given in 22% and 63% of cases respectively. 28% of patients received pre-induction atropine.

#### **Discussion and Conclusion**

We found that electrolyte measurement within 24 hours of surgery had been performed in the vast majority of patients. However, 35% of cases had electrolyte values that were outside of our target range. The most common abnormality was a raised CI. We also noted that opioids were given in 22% of cases. Despite the fact that pyloric stenosis is more common in babies born at term, there is still a risk of apnoea, particularly when coupled with alkalosis. We would stress therefore that opioid use should be avoided if at all possible. We would also commend the use of peri-operative muscle relaxation to improve surgical conditions, reduce the risk of mucosal perforation and allow a reduced concentration of inhaled anaesthetic agent. We would also advise considering the use of atropine to obtund vagal reflexes in response to both laryngoscopy and surgical traction of the pylorus.

We identified key areas that could be improved in our department's anaesthetic management of this population. We seek to disseminate our findings and educate our anaesthetic trainees in order to improve practice and patient safety

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#### Anaesthesia for paediatric plastic surgery – Lessons from Africa Danniella Seddon

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#### Introduction

Sierra Leone lies on the West coast of Africa, and is ranked as one of the poorest countries in the world. The population has lived through a violent civil war, which although ended a decade ago, has continuing effects on poverty. The healthcare system is provided by the government, however with the exception of pregnant or breastfeeding women, and children under five this is not a free service. The infant mortality rate is amongst the highest in the world, with 77/1000 not surviving until the age of one. As well as the formal healthcare system, there is also a culture of traditional healers, who are often the first (and only) port of call for the people.

#### Discussion

My visits to Sierra Leone are funded by the British Society for Surgery of the Hand, which allows 4 plastic and orthopaedic teams per year, to travel Makeni, a town in the centre of rural Sierra Leone. The remit of the teams is that at least 50% of the work should be reconstructive upper limb surgery. Prior to arrival in the country, the opportunity of free UK healthcare is advertised on the radio, resulting in an outpatient clinic of about 150 people on day one!

The majority of paediatric injuries are not the result of war, but burns or a visit to the local healer. The older children may have civil war related injuries such as old bullet associated fractures, whipping scars, burns, and the psychiatric injuries that accompany having fought.

Anaesthesia is challenging, with no piped oxygen, an unreliable electricity supply for the concentrator, little or no postoperative analgesia, together with inadequate monitoring. The vapouriser is a drawover diamedica, which was filled with an unknown volatile when we arrived - with both halothane and isoflurane bottles evident - as there was no gas analyser our only choice was having a sniff! Through trial and error we found that the population have a high volume of respiratory secretions and LMAs were not useful, so inhalational anaesthesia, followed by intravenous propofol and intubation became the technique of choice. Having organised an ultrasound machine to take out with us meant that every upper limb patient, and some lower limb had a regional anaesthetic technique. In a situation where no post operative analgesia is available this was an ideal solution in some senses, however it brought with it the problems of consent in a rural setting where the vast majority do not speak English, and the children are not accompanied to theatre with a parent or quardian.

Over all these trips are and continue to be an incredible experience, giving an invaluable learning opportunity in a wonderful environment.



#### Adverse events in children due to residual anaesthetic drugs in IV line- a survey among members of APAGBI

## Kavitha Raghavan

KK Hospital, (Kings College Hospital NHS foundation Trust), Singapore, Singapore

#### Introduction

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Serious adverse events caused by flushing residual anaesthetic drugs in IV lines have been reported <sup>1,2</sup>. A signal alert was issued by National Patient Safety Agency in November 2009 to highlight such patient safety events<sup>3</sup>. This survey was undertaken to capture such adverse events, look for contributing factors and recommend a standard of practice to prevent such adverse events.

#### Methods

An electronic survey questionnaire email link was sent out to the members of the APAGBI. The completed responses were analysed by application of appropriate filters.

#### Results

249 completed questionnaires were returned. 19(7.7%) adverse events due to flushing residual anaesthetic drugs were reported. 8 occurred in recovery, 6 in the ward and 5 in Intensive care/high dependency units. One of them resulted in the patient twitching, two in sedation and the rest in respiratory arrest. No deaths or long term morbidity were reported. Forgetfulness due to distractions was the commonest reason for not flushing IV lines before patient left theatre. Notably, IV 'extension' lines were left attached to the cannula in 15 (78.94%) patients who suffered such an adverse event. Only 6 (33.3%) of these incidents were reported to the National Reporting and Learning System. 11(57.9%) incidents occurred in a combined adult paediatric hospital and 8 (42.1%) in pure paediatric hospitals. 84% of the anaesthetists whose patients suffered an adverse event reported to have changed their practice, mostly by flushing IV lines confirmed/reminded by a witness. 118(48.2%) anaesthetists reported presence of departmental guidelines aimed towards preventing such events.

#### **Conclusions and recommendations**

Forgetfulness due to distractions significantly contributes to accidental omission of routine flushing of IV lines before patient leaves theatre. The use of 'IV extensions' with significant amounts of dead space, seems to be associated with a hidden increase in morbidity due to injection of drug residues in paediatric patients. Pure paediatric hospitals are not immune to such adverse events. National level reporting and hence awareness of such events have been discouragingly low.

Ideally, all the IV extension lines should be removed and all IV cannulae should be witnessed to be flushed before the patient leaves theatre, clearly documented and handed over to the recovery nurse. A 'second witnessed flush' should be performed in recovery and documented in patient's record.

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Prospective audit of intra-operative airway cuff pressure in paediatric patients Vishal Thanawala, Vijay Chikkabbaiah, Purushothaman Sudarshan Queens Medical Centre, Nottingham, Nottinghamshire, UK

#### Introduction

Excessive endotracheal tube (ETT) and larvngeal mask airway (LMA) cuff pressures can cause numerous co-morbidities such as sore throat, nerve injury, neck congestion and airway endothelial damage due to mucosal hypoperfusion and ischaemia [1-3]. RCoA recommendations regarding intra-operative airway cuff pressures are:

- ventilation and prevent a gas leak, ideally this should be  $\leq 25 \text{ cmH}_2\text{O}$ .
- 100% of laryngeal mask airway devices should be inflated to ≤ 60 cmH<sub>2</sub>O.
- 100% of inflation pressures should be recorded on the anaesthetic chart. ٠

#### Methods

Snapshot data collected prospectively over three months from December 2012 - February 2013 in 100 paediatric patients undergoing surgeries under general anaesthesia at Nottingham Children's Hospital. Cuff pressures measured using a hand held manometer within 30 minutes of the airway device being inserted along with a note of estimated duration of surgery and use of Nitrous oxide( $N_20$ ).

#### Results

The cuff pressure had not been recorded in any of the cases by the primary anaesthetist. An ETT was used in 38% and an LMA in 62% cases.

56(90%) patients had LMA cuff pressures greater than the recommended limit of 60 cm H<sub>2</sub>O with N<sub>2</sub>O used in 52 of these patients.

26(68%) patients had ETT cuff pressures greater than the recommended limit of 25 cm H<sub>2</sub>O with N<sub>2</sub>O used in 9 of these patients. Of these 26 patients, 10 had pressure greater than 25 cm H<sub>2</sub>O and estimated duration of surgery greater than 3 hours.

#### Discussion

It is significant to note that 68 % of ETT and 90% of LMA cuff pressures measured in our audit were higher than the recommended limit. This makes for a strong case to make manometers available in every anaesthetic room and measure pressures for every case. We need to educate all the anaesthetists and ODP's about the potential risks and complications of high airway pressures and formulate departmental guidelines. Even a single measurement can help to reduce the number of patients exposed to excessively high airway pressures and the associated potential risks and complications<sup>4</sup>

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100% of endotracheal tubes should be inflated to a minimum pressure to permit positive pressure

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#### Survey of paediatric acute pain services

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#### Introduction and aims

The Royal College of Anaesthetists recommends that children's pain management should be supervised by consultants and specialist nurses. There should be a comprehensive, quality service dedicated to the care of patients, and to education and development of staff.<sup>1</sup> The aim of this project was to survey paediatric pain services in the UK, looking whether there was standardisation of services.

#### Methods

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A 10 part questionnaire was distributed by email to Pain Travelling Club members in UK. Trusts that didn't repsond were followed up with a phone call.

#### Results

#### 35 responses were obtained (81%)

51% were large trusts with over 100 paediatric beds and PICU. All but 3 also had NICU. Of these, 83% had over 15 patients per week seen by the Acute Pain Service (APS). 94% had a daily ward round, with 58% by pain nurse alone. There was a wide variation both in the number of pain nurses (33% had only 1, 44% had over 2), and number of consultants (61% had over 2).

The consultant led pain rounds per week varied from 0 (27%) to 5 (16%). Out of hours cover was primarily by anaesthetic registrar (61%), registrar and pain nurse (27%).

44% of these trusts also had a chronic pain service.

In the smaller trusts, 25% had no dedicated consultant cover, and 58% had no consultant pain rounds. In 18% of the trusts the service was combined with adult pain.

#### **Discussion and conclusion**

There are numerous advantages of an APS, including reducing complications, hospital stay and incidence of chronic pain<sup>1</sup>

The APAGBI has produced evidence-based guidelines for managing post-operative and procedural pain. There is no guideline for what constitutes the 'ideal pain service.' What should be the staff patient ratio? How many ward rounds should be done, and by whom? Our results show a wide variation between different hospitals.

Many of the hospitals said they would like to expand their services and some had an interest in developing chronic pain services, but were limited by financial constraints. Others had just one nurse or consultant, relving on an ad hoc system to cover for leave.

Institutional acknowledgement and desire to change, appropriate staffing, and funding are major obstacles to establishing a pain service<sup>2</sup>

Although we have come a long way from 1999 when 50% trusts did not provide APS for children<sup>3</sup>, it would help to improve the quality of care if there was some standardisation of paediatric pain services across UK.

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- 3. Services for Patients with Pain, Clinical Standards Advisory Group. March 2000

# 37

Paediatric ENT emergencies: An analysis of how paediatric ENT emergencies are managed in District General Hospitals in the North West region Anthony Bradley<sup>2</sup>, Kate Parkins<sup>1</sup>

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#### Introduction

District General Hospitals (DGH) admitting acute paediatric cases will face paediatric ENT emergencies. Such hospitals are required to provide competent and timely supportive care. This may require relying on staff who rarely work with children.

The North West and North Wales Paediatric Transport Service (NWTS) is a specialist retrieval service for critically unwell children requiring Paediatric Intensive Care. It provides a single point of access for DGHs to liaise with tertiary specialists.

#### Aim

To review all ENT referrals to NWTS determining the frequency and cause of airway emergencies. To ascertain DGHs ability to provide emergency airway support and find out the prevalence of difficult airways in this population group. Method

All referrals between November 2010 and March 2012 were reviewed. Cases classified as ENT, known or predicted difficult airway with acute airway compromise or patients with stridor were included. Details of each case were analysed from the records made by the NWTS staff involved.

#### Results

Two thousand, four hundred and eighteen cases were reviewed of which 237 (9.8%) met the inclusion criteria. One hundred and eight patients (45.5%) weighed less than 10kg. The most common cause was a structural ENT issue or complex congenital anatomy seen in 86 (36.3%). Infection accounted for 83 (35.0%). One hundred and twenty seven (53.6%) required intubation. There were three (1.3%) failed intubations of which two were transferred on supraglottic airway devices, one died prior to the arrival of NWTS. Local teams intubated 95 (74.2% of intubations) prior to the arrival of NWTS. "Difficult" airways (Mallampati 2 or greater) were reported in 25 (19.5%) of those that were intubated.

#### Discussion

Local teams seem capable of managing the majority of ENT emergencies in a timely manner although nearly a guarter of intubations were delayed until the arrival of NWTS. The incidence of difficult laryngoscopy in the general paediatric population is unknown. In specific high risk subgroups it has been reported to be as high as 7%, notably less than that seen in the cohort of ENT emergency cases referred to NWTS. This may reflect relative unfamiliarity of the operator to paediatric airways or may be a true reflection of the population assessed. Despite this, the incidence of failed intubation was comparable, approximately 1%. No funding or conflicts of interest declared.

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#### Introduction and aims

Royal Manchester Children's Hospital (RMCH) is one of the major centres for cleft palate (CP) in the UK. This case note review assessed the peri-operative airway complications and requirement for HDU/ICU care over a three year period at RMCH. This poster will also give a brief overview of Pierre Robin Sequence (PRS) and the anaesthetic considerations associated with this condition.

#### Methods

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Retrospective case note review of CP repair operations conducted at RMCH between May 2009 and 2012. The anaesthetic chart, care pathway and formal geneticist assessment, were used to collect data on significant past medical history, intubation grade, intra-operative and post-operative airway problems, where patient was nursed in first 24 hours post-op and total length of stay for statistical analysis. Hospital Episode Statistics (HES) 2007-8 was used for length of stay audit standard.

#### Results

In total 51 children were suitable for inclusion in the study; 39 non-syndromic and 12 syndromic (6 isolated PRS, 2 PRS as part of global syndrome and 4 other syndrome). 5 of 51 were nursed on HDU/ICU postoperatively. All of the admissions were either as a precaution for known symptomatic PRS or cases of preexisting cardiac disease requiring higher level care. None of the non-syndromic CP repairs deteriorated in the peri-operative period to require HDU admission and the 2 PRS HDU admissions were uneventful with prompt discharge to the ward. All were intubation grade I or II. The overall mean length of stay was 3.22 days. Syndromic CP mean stay 3.82days vs. non-syndromic CP mean of 3.05 days p=0.097. Isolated PRS mean stay 4.42days. Audit against HES standard; 49% of all patients and 56.4% non-syndromic CPs stayed ≤2.5 days.

#### **Discussion and conclusion**

RMCH report no serious airway complications in any non-syndromic CP repairs and report the majority of PRS cases have an uneventful anaesthesia and ward recovery. PRS can be a cause of significant airway compromise in early life, however, there is significant mandibular catch up growth and with thorough preoperative assessment, we report the vast majority are suitable for ward care only. Paediatric HDU postoperatively should be reserved for those with significant co-morbidities. Finally, this case note review and length of stay audit highlighted possible areas for length of stay reduction.

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#### Efficient but hungry

Marc Cohen, Rumiko King, Ami Kotecha, Nigel Barker Chelsea & Westminster Hospital NHS Foundation Trust. London. UK

#### Introduction and aims

A service review demonstrated that children booked on emergency lists for minor plastic trauma procedures were consistently postponed for more clinically pressing cases. This leads to extended waits, prolonged starvation and high patient and parental dissatisfaction [1]. To address these issues, 'expedited' lists were introduced allowing these cases to be pre-booked. On average we perform 55 paediatric plastic trauma operations a month. We present our findings on list activity and associated starvation data following establishment of the expedited lists.

#### Method

We carried out a prospective audit over 4 weeks assessing presentation time, theatre booking, waiting times and starvation. All children anaesthetised on the expedited lists were included. A short questionnaire was completed in the anaesthetic room.

#### Results

60 children were anaesthetised and data returned on 41 cases. All children were graded ASA 1 or 2. Median age (range) was 4 years (11 months - 13 years). 90% of children were discharged on initial surgical review and admitted the following day for their procedure. From first presentation, 80% of cases were completed within 24 hours. All cases were completed within 48 hours. Up to 7 children were anaesthetised in any one 4-hour session. Quality review revealed 91% of parents to be 'very satisfied' and 9% 'satisfied' with this service.

Median (range) fasting time was 06:15 (03:12-13:48) hours and 09:12 (05:18-18:18) hours for fluids and solids respectively. Analysis exposed a variety of fasting instructions given to parents. 45% of cases were given incorrect clear fluid fasting instructions and 28% of cases were given incorrect fasting instructions for ingestion of solids.

#### Discussion and conclusion

Pre-booked expedited lists reduce hospital stay, unpredictable waiting times and improve patient experience. We found that all children were operated on the same or next working day after initial surgical assessment. The expedited lists are more dynamic in nature whilst retaining the time constraints of an elective list.

However, there is room for improvement. Parents are still given inappropriate advice about fasting times despite clear hospital and national guidance [2]. Lack of confidence in giving specific fasting times in case of list order change, or possibly lack of knowledge of current guidance, may have contributed to this. We wish to highlight the findings at our centre, as increasing list efficiency has not automatically improved the whole patient experience. We have now focussed our practice to pro-actively address starvation times.

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#### Don't hurt me - Analgesia for children aged 0-5 having major hip surgery Alice Braga, Nicola Williams

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#### Introduction

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Can a district general hospital provide 'best care' for children undergoing lower limb osteotomy surgery without the use of epidural infusion analgesia (EIA)? This was a question posed by the parents of a patient requiring an open reduction procedure for congenital dislocation of the hip (CDH) recently at Gloucester Royal Hospital. A joint statement by the Royal College of Anaesthetists (RCoA) and the Association of Paediatric Anaesthetists (APA) highlighted the complex infrastructure required to deliver a safe and effective epidural service for children, which cannot be supported within a low volume service.

#### Aims

To determine the process and outcomes of care of patients aged 5 years and under undergoing CDH procedures including multi-level and bilateral osteotomy surgery to determine whether satisfactory outcomes can be achieved without EIA.

#### Methods

Retrospective review of case notes of 35 patients from 2006-2011 identified from hospital patient administration system coding. Data collection included: age, sex, weight, surgical details, neuro-axial or regional block, adjuncts, intra & post-operative analgesia, pain scores over first 24 hours (0-3), length of stay and complications.

#### Results

35 patients ranged in age from 0 to 5 years old (mean 1.8 median 2), 94% were female, 7(20%) procedures were closed reductions and the remaining 28 (80%) comprised unilateral pelvic (10), femoral (9) combined pelvic and femoral (5) bilateral femoral (2) and open tenotomy (2). Median length of stay (LOS) was 1 day (range 0-7 days). Median LOS excluding closed reductions was 2 days. For open procedures most patients (19) received preoperative paracetamol and all underwent general anaesthesia and subsequent caudal block with levobupivacaine and ketamine. Those with a caudal catheter (3) received a top up of levobupivacaine at the end of the procedure and the catheter was removed before the spica applied. A variety of other analgesics were used intra and post-operatively. Median pain score was 0, (mean 0.4 range 0-2) during the first 24 hours. The clinical risk department reported no adverse events associated with any of the admissions.

#### Discussion

Caudal block, the most common regional anaesthetic technique in children, is an alternative to EIA, which, alongside simple and intravenous analgesics avoids many of the inherent difficulties in managing patients with EIA. There are arguably advantages to undertaking surgical procedures at local centres provided it can be robustly demonstrated that they are receiving an acceptable standard of care.

#### Conclusions

Pain scores and length of stay for CDH procedures in Gloucester Royal Hospital appear satisfactory using a combination of caudal anaesthesia and multimodal analgesia.

#### References

1. Epidural safety - Joint statement from RCoA and APAGBI 16<sup>th</sup> September 2011 http://www.apagbi.org.uk/sites/default/files/Epidural%20Safety%20Statement%20%28Final%29.pdf

Pain assessment of children across the South West Ambulance Service Trust Ruth Treadgold<sup>1</sup>, Ruth Endacott<sup>2</sup>, Daranee Boon<sup>1</sup>, Simon Courtman<sup>1</sup> <sup>1</sup>Derriford Hospital. Plymouth. UK. <sup>2</sup>Plymouth University. Plymouth. UK

#### Introduction and aims

Children presenting acutely to hospital frequently access healthcare through the ambulance service. The first responder to these children is often a paramedic, and the child will be under their care until reaching hospital. Although pain management in children should be a priority <sup>1, 2</sup>, and many tools exist to facilitate assessment, it remains poorly executed <sup>2,3</sup>. This audit was designed to see if children presenting across the South-West Ambulance Service Trust (SWAST) network were being appropriately assessed and treated for pain.

#### Methods

Data was collected from ambulance records across the SWAST Network. Patient age, documentation of pain score (PS), and analgesia given were noted.

#### Results

1579 records were returned, with only 2 exclusions. 35.3% (565/1577) had a pain score documented. There was a clear trend towards increasing likelihood of pain score documentation with advancing age. Using children under 12 months old as a base-line, odds ratios (OR) with 95% confidence intervals (CI) were calculated for children of every age from 1 to 16 in completed years, e.g. age 4 OR 4.1 CI [2.3, 7.3], age 8 OR 8.1 CI [4, 16.7], age 12 OR 10.7 CI [5.8, 20.3]. 95% CI excluded 1 for all ages except one year olds.

141 children had a pain score of 4 or more, and of these, only 85 (60.3%) received analgesia. 63.5% (83/131) of children aged 4 years or more received analgesia, compared to just 20% (4/10) aged under 4 years. Given the small numbers within individual age groups it is difficult to establish a detailed relationship with age.

#### Conclusion and discussion

Unfortunately, despite the importance of pain management, the majority of children are still not being assessed, with younger children faring worst. Even when children have a pain score documented, over a third of those with moderate/severe pain do not receive any analgesia, again with the youngest children most affected.

There has subsequently been a care bundle instituted, educating health care providers in pain assessment and management in children. It is hoped that this will improve the service we provide to these vulnerable patients, especially the very young.

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#### Anaesthetic technique for adenotonsillectomy in children with severe OSA. An evaluation of practice at Sheffield Childrens' Hospital

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#### Introduction and aims

Children with Obstructive Sleep Apnoea (OSA) are more likely to have airway complications after Adenotonsillectomy<sup>1</sup>

Currently at Sheffield Childrens' Hospital. 29.6% of children had airway and respiratory complications requiring intervention in Critical care.

We aimed to look at anaesthetic technique in relation to complications.

#### Methods

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Anaesthetic charts from all patient having adenotonsillectomy with OSA in 2011 were analysed. Data on post operative airway and respiratory complications were also collected.

Complication rates were compared with Fishers exact test.

#### Results

81 sets of notes were complete. There were sleep study results available for 76 showing obstructive patterns and desaturation.

Only 2 of 81 patients required premedication with midazolam to facilitate inhalational induction. 42 children received an IV induction versus 39 inhalational. Maintenance of anaesthesia was primarily volatile. (isoflurane 46 patients, sevoflurane 33 patients, desflurane 1 patient, TIVA 1 patient). All children had oral endotracheal tubes inserted. 25 received neuromuscular blockade.

Simple analgesics were given to most children, 77% received IV paracetamol, and 26% received a NSAID intraoperatively.

36 children received morphine, 24 fentanyl, 10 remifentanyl (with ketamine), using standard doses. 11 received no opiate analgesia.

31 patients had complications postoperatively in Critical care. 24 required intervention.

In the group receiving morphine 14 desaturated. 8 required oxygen therapy, 1 nasopharyngeal airway insertion and 1 reintubation. In the fentanyl group, 13 desaturated. 8 required oxygen, 1 nasopharyngeal airway and one external CPAP. In the remifentanyl group 4 desaturated and required oxygen. With no opiates 1 desaturated requiring oxygen.

#### Discussion

As in other studies complications were more common when opiates were given intraoperatively<sup>2</sup>. There was no significant difference in complication rate between the short acting opiates fentanyl and remifertanyl when compared to morphine (54%, 40% and 39% respectively). However the complications seen in the remifentanyl group were much less severe than those receiving fentanyl and morphine. Children who did not receive strong analgesia were less likely to have complications (p=0.04). Simple analgesics were not used as often as possible.

#### Conclusion

The use of opiates in this high risk group is common place in our practice. Children who were given opiates had a higher complication rate of 44% compared to 9% in those receiving none intraoperatively (p=0.04).

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Audit of parental satisfaction with the arrangements for the induction of anaesthesia Julie Wakeford, Siobhan Cavanagh, Rohit Juneja, Robert Self Royal Marsden Hospital, London, UK

#### Introduction and aims

The Royal College of Anaesthetists recommends that parents (or carers) should be involved in all aspects of care of their children [1]. Parental presence at induction of anaesthesia is practiced widely across the UK. Despite some suggestion [2] that parental presence alone is the least effective means of decreasing a child's anxiety during the induction of anaesthesia, it is of high importance to the parents [3]. This audit aims to evaluate parental satisfaction with arrangements for being present with their child during induction.

#### Method

Following Audit Committee approval, parents (and children older than 13) were invited to complete an eleven-point questionnaire based on the RCOA audit recipe book [3]. Questionnaires were completed on paediatric oncology lists over five weeks at the Royal Marsden Hospital, Sutton.

#### Results

51 guestionnaires were returned (72% response rate) representing 44 children under 13 years and 7 over 13 years. 100% of parents were either 'satisfied' or 'very satisfied' with the arrangements made for induction of anaesthesia, 86% being very satisfied. Of the 51 respondents, 2 had concerns about being present. 98% of respondents felt informed of what would happen. In the 13-16 age group (n=4), all had a family member present at induction and all would prefer family presence at a future anaesthetic. All over 17's (n=3) also had a family member present, 2 preferring them to be present for future anaesthetics.

#### **Discussion and conclusion**

In the sample responding, we achieved the RCOA audit recipe book standard [4] of 100% parental satisfaction rate with arrangements at induction of anaesthesia. Parents and children were all seen preoperatively by the anaesthetist to allow discussion of the anaesthetic plan and address questions and concerns. Analysis of free text comments in our survey allowed a qualitative assessment of parental and child experience. The children's responses suggested that even older children prefer a family member to be with them at induction of anaesthesia. In conclusion, we have developed a process for the induction of anaesthesia and the provision of relevant information that both parents and children find satisfactory.

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Kain ZN et al. Parental intervention choices for children undergoing repeated surgeries. Anesth

#### A prospective evaluation of problems associated with anaesthetising overweight and obese children in a Tertiary Paediatric Hospital

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#### Introduction

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In 2010, 43 million children under the age of 5 were overweight. In the UK 66% of the adult population are overweight or obese<sup>1</sup>. The UK has one of the highest incidences of severe obesity in the world and it is occurring more frequently, more severely and at a younger age<sup>2</sup>. Obese children are at increased risk of adverse events during anaesthesia, however there are still only relatively small amounts of published data on this subject.

#### Methods

Between February 2012 and February 2013 we prospectively collected data on 90 children who appeared markedly overweight and presented for surgery in our tertiary paediatric centre. Demographic data and details of anaesthetic difficulties during induction, peri-procedure and extubation were recorded as well as any problems in the post anaesthetic care unit (PACU). Change in anaesthetic technique due to increased body mass was also documented.

#### Results

Data was collected on 42 girls and 46 boys. Ages ranged from 4 months to 17 years. Lowest weight was 8.4kg and the highest 146kg. Body Mass Index (BMI) ranged from 17 to 67. Using age adjusted BMI charts, 34% and 57% of the children respectively were either obese or severely obese. 30% of children had other co-morbidities. 40% had problems on induction (difficulties with cannulation - 72%, Airway obstruction - 14%, Desaturation - 17%). 29% of anaesthetists changed their induction technique and 14% altered their maintenance anaesthetic. 31% of children experienced problems in theatre and 13% of anaesthetists reported problems with extubation. Nursing staff in PACU reported problems with 23% of patients (most common prolonged wake up - 48% and desaturation - 24%). 13% of patients required oxygen supplementation for the ward and recovery times were prolonged.

#### Discussion

In our evaluation 91% of the children were either obese or severely obese, both of which have been shown to increase anaesthetic risk. Obesity also presented at an early age. Obesity made cannulation difficult, and led to increased difficulties with maintaining airway patency leading to oxygen desaturation. Anaesthetic techniques required adaptation. Positioning and moving and handling in theatre was noted to be more difficult. Airway problems and desaturation peri-op were felt to be more common. In PACU prolonged wake up and length of stay were an issue, with mean time in PACU 33mins (10-130mins).

#### Conclusion

Children for surgery who are obese or morbidly obese present an anaesthetic challenge. They have a higher risk of complications at all stages of their anaesthetic, and may require multiple adaptive techniques by the theatre and PACU team.

Centres anaesthetising obese children will need strategies in place to safely anaesthetise this group.

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No competing interests. No external funding.

# Perioperative complications and outcomes in children with cerebral palsy (CP) undergoing scoliosis surgery

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#### Introduction

20% of children with CP develop early onset progressive scoliosis, 10% requiring surgery to treat pain, prevent pressure sores, facilitate sitting up in a wheel chair to improve their quality of life. Spinal surgery is challenging because of pre-existing co-morbidities and surgical complexity. The literature has limited information on peri-operative factors affecting outcomes. This retrospective review aims to examine pre and peri-operative factors that might influence post-operative course in patients with CP undergoing spine surgery for scoliosis.

#### Methods

The medical records of children with CP who underwent scoliosis surgery in our hospital from August 2008 to October 2011 were reviewed. Patient demographics, preoperative co-morbidities, peri-operative management and post-operative course were recorded. Complications were classified as either major or minor with respect to the respiratory, cardiovascular, gastrointestinal, neurological and wound infection categories adopted from previous studies<sup>1,2</sup>.

#### Results

14case notes were available to review, 6males and 8females. The mean age and weight was 14yrs(11yrs-19yrs) and 34.2kg(17kg - 54kg), respectively. 7children had 2or more co-morbidities such as recurrent chest infections, pancreatitis, gastro-oesophageal reflux, epilepsy and all but one had moderate to severe cognitive impairment.

9 patients had posterior spinal fusion, 3 sequential anterior release followed by posterior spinal fusion, 1 anterior release and posterior fusion, and 1 patient died following anterior release surgery. The average number of vertebral levels fused was 13.5. The mean pre-operative Cobb angle was 100°. 7(50%)experienced a major complication during the perioperative period. 3 developed severe hypotension intra-operatively with massive blood loss(>3000ml, 60–110ml/kg), and were electively ventilated postoperatively.

One patient developed neurological deficit and another, pancreatitis, both needing re-intubation for IPPV. One with a history of respiratory disease developed a chest infection and another had hypoventilation, requiring non-invasive ventilator support. The child with the pancreatitis died on the third postoperative day following anterior release.

The mean critical care stay was 2.3days and mean hospital stay 14.3days, if the child that developed the neurological deficit was excluded.

#### Discussion

In our series 14 patients with cerebral palsy undergoing spinal surgery 93% were discharged home and 50% experienced no adverse events. One child died from postoperative pancreatitis, which is a recognised complication following scoliosis surgery in CP<sup>3</sup>. The child that developed a neurological deficit had undergone a combined anterior release and posterior spinal fusion as single procedure. We were unable to find a cause for this event.

We consider the following factors as possible predictors of outcome; 2 or more pre-existing co-morbidities and massive intraoperative haemorrhage. There was no correlation between the no of levels fused and the duration of surgery with outcome.

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#### The anaesthetic management of neonates with spina bifida undergoing surgical correction: A retrospective observational study

Nessa Dooley, Nick Eustace, Kim Hunter, Darach Crimmins, Orla McMahon Department of Anaesthesia, Children's University Hospital, Temple Street, Dublin, Ireland

#### Introduction and aims

Children's University Hospital is the National Referral Centre for all Paediatric Neurosurgical patients in the Republic of Ireland. This observational study aim's to discuss our clinical experience with the anaesthesia of neonates undergoing a myelomeningocole repair.

#### Methods

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There were 83 neural tube defect referrals to Temple Street over a 3 year period (from 2009 through to 2011). We excluded 17 patients from our review, 11 who did not require surgical repair and 6 patients who were repaired after the neonatal period. We performed a retrospective review and collected data from the charts of the remaining 66 patients.

#### Results

All neonates were managed in a latex free environment, standard monitoring was instituted and normothermia was maintained. An intravenous induction and maintenance with sevoflurane in a mixture of air and oxygen, was the preferred technique. Neonates were proned, paralysed with a non depolarising muscle relaxant and mechanically ventilated. Invasive monitoring was not routine practice. Paracetamol (20-40mg/kg PR) was given to the majority (87.88%), intra-operative opioids were given to 28 patients (42.42%) and local anaesthetic was infiltrated in 15 patients (22.73%). Cefuroxime 25mg/kg was the antibiotic prophylaxis of choice. The average intra-operative fluid intake was 30ml/kg of compound sodium lactate. A red cell concentrate transfusion (20ml/kg) was given to 6 patients, all of which had a blood loss greater then 15ml/kg. The time for repair ranged from 50-295 minutes (mean 133 minutes). We looked at the usage of intraoperative opioids and whether this caused a delay in time to extubation. The median time to extubation of neonates receiving intra-operative opioids was 15 minutes (interquartile range: 5-37.5 minutes). The median time to extubation of neonates who received no intra-operative opioids was also 15 minutes (interquartile range: 5-20 minutes). Post-operatively, patients were transferred to a surgical ward. Four patients failed to extubate and were transferred to the intensive care unit. There were 48 patients who had a ventriculo-peritoneal shunt inserted (inserted on average at day 10) post myelomeningocoele repair. Of these 46 shunts, there were 25 shunt blockages and 11 shunt infections. There was 1 infant death at 6 months of age who developed post-operative meningitis and ventriculitis, and 1 infant who remains an inpatient. All other neonates were discharged home, on average, at day 18.6 post-operatively. All patients are followed up in Neurosurgical outpatients.

#### Discussion and conclusion

In this review, we discuss our perioperative management of neonates undergoing a myelomeningocoele repair. The biggest issues are maintenance of normothermia, perioperative analgesia and post operative shunt complications

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Fentanyl containing epidural analgesia reduces post-operative pain interventions compared to plain epidural following thoracoscopic pectus bar insertion Zoe Harclerode, Laura Hammon, Teresa Dorman, Ingrid Gooch Sheffield Children's NHS trust. Sheffield. UK

#### Introduction

Surgical correction of congenital anterior chest wall deformities causes significant post-operative pain. Different methods are used to provide post-operative analgesia following thoracoscopic pectus bar insertion (1, 2). This review evaluates the post-operative analgesic techniques and frequency of problems in our department.

#### Method

A retrospective notes review of all patients who underwent thoracoscopic pectus bar insertion between January 2007 and January 2013 was undertaken. Analgesic techniques, post operative pain scores, nausea and vomiting (PONV), complications, unplanned pain reviews and length of stay (LOS) were recorded. Nonparametric tests were used for statistical analysis.

#### Results

A total of 36 pectus bars were inserted for correction of pectus excavatum and carinatum deformities. Age range 7-17 years (mean 14.1). All children had a thoracic epidural placed following induction of general anaesthesia. Postoperative analgesia was provided via continuous epidural infusion with either 0.1% levobupivacaine with 2mcq/ml fentanyl (n=9) or 0.125% levo-bupivacaine with an intravenous morphine PCA (n=27). Regular paracetamol and oral NSAIDS were given, unless contraindicated (n=1). The levo-bupivacaine/PCA group required significantly more pain interventions by the acute pain team, 19/27 patients, compared to the fentanyl/levo-bupivacaine group, 2/9 (p = 0.012). The former often required multiple interventions.

Worst pain scores were consistently higher in the levo-bupivacaine/PCA group throughout the first postoperative 48 hours.

There were no epidural related complications. Mean duration of epidural catheter placement was 95 hours. There was a high overall incidence of PONV during the first 48 hours (80.5%) despite treatment, but no difference between the two groups. Peak incidence (55.9%) was between 0-12 hours after arrival on the ward.

Mean LOS in the High Dependency Unit was 96 hours for the levo-bupivacaine/PCA group and 77.4 hours for the fentanyl group (p = 0.029), although other factors may also affect length of stay. Mean length of hospital stay was 6 days (range 4-8), with no difference between groups.

#### **Discussion and conclusion**

Continuous epidural infusion with a fentanyl/levo-bupivacaine solution results in fewer unplanned pain interventions and improved pain scores, compared to a plain levo-bupivacaine epidural with iv PCA morphine.

There was a high incidence of PONV following this operation. We recommend the use of regular antiemetics for the first 48 hours. Consideration should be given to the use of regular intravenous paracetamol to ensure that systemic absorption is not affected by vomiting.

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#### Modern Medicine: The development of the 'GOSH Guide', a medical app for mobile devices

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#### Introduction

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Trainees have adopted new learning styles, challenging educators to utilise digital mediums to augment the Anaesthetic curriculum.

An international faculty called for health leaders to embrace change and provide leadership to enhance an electronic infrastructure.

The computing and communication power of smartphones, place them at the forefront of this movement. They are also widely used throughout medicine. Study's report that 91% of US doctors use mobile devices,<sup>2</sup>accessing them on average 15 times/day.

Our focus concentrated on the role of smartphones in medical education and as a practical tool, specific to paediatric anaesthesia. We present our experience of producing a smartphone medical app, the 'GOSH Guide'

#### Method

A pocket-book of clinical and drug-administration guidelines was published by the department in 1994. With increasing demand for a digital resource, the 12th edition was developed as an app.

We worked with a well regarded medical app development company, UBQO, who demonstrated the advantages of going digital and developed the conceptual idea of the app as an electronic 'anaesthetic assistant'.

UBQO encouraged a high level of collaboration, which allowed them to translate our medical knowledge & experience into a rapidly evolving set of iterations. Regular installments on our devices ensured our active involvement in the design of the product.

#### Results

The app eclipses and augments our paper guidelines and is a valuable resource for anybody with an interest in paediatric anaesthesia. The app contains a comprehensive list of drugs, equipment and physiological parameters. The user can individually tailor anaesthetics for entire lists.

In emergency scenarios, the app rapidly provides age-appropriate charts for all necessary equipment and drugs. Interactive critical-incident and resuscitation workflows are useful for training and real-life events. Physiological parameters from head-circumference to cardiac indices are all available. These utilities elevate the device above more traditional paper-based tools.

#### Discussion

Producing this app has demonstrated why the future of medical education lies in such innovations. It enables a more efficient clinician, minimises drug errors and promotes up-to-date care. It can save time in an emergency and be used for training purposes.

Continual communication between technology and medical stakeholders is key for successful outcomes. Research has shown, the use of mobile devices is now universal. The app is a natural fit for a modern medical world.

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#### Acknowledgement

We thank University College London for funding, the anaesthetic department; consultants past & present for their contributions and principal pharmacist, Kuan Ooi.

#### Conflict of interest

GOSH anaesthetic department, UBQO and UCLB will benefit financially from app sales.

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Paediatric video-assisted thoracoscopic surgery: One or two lumens? Jessica Longbottom, Vimmi Oshan, Oliver Dearlove Manchester Royal Children's Hospital, Manchester, UK

#### Introduction and aims

Video-assisted thoracoscopic surgery (VATS) is safe and efficient in the treatment of empyema and other pleural pathology with good outcomes<sup>1</sup>

Studies in adult practice suggest that conventional ventilation via a single lumen endotracheal tube (SLET) for VATS gives adequate surgical access, fewer complications and may be associated with shorter anaesthetics, lower intubation costs and shorter hospital stays<sup>2</sup>. However, there are no published trials defining advantages of one lung ventilation (OLV) over conventional ventilation for paediatric thoracoscopic surgery. The majority of younger children are relatively intolerant of OLV and often require conventional ventilation to avoid hypoxaemia.

The purpose of this study was to evaluate the safety and feasibility of conventional ventilation for VATS in paediatric patients.

#### Methods

We retrospectively reviewed all paediatric patients who underwent VATS over a period of three years at our institution. Data collected focussed on airway management and complications such as hypoxaemia, hypercarbia, hyperthermia, blood transfusion and conversion to open thoracotomy.

#### Results

Data was analysed for 24 patients aged 11 months to 15 years with weights ranging from 10 to 65 kilograms. Nineteen cases with empyema underwent decortication, four had pleurodesis, bullectomy or lobectomy for recurrent pneumothoraces and one case underwent bilateral sympathectomy for hyperhydrosis. Twenty patients were ventilated with SLETs (mean age 6.29yrs) while four patients (mean age 13.5yrs) underwent OLV via double lumen tube or SLET with bronchial blocker.

In the SLET group, three cases desaturated to <94%, all resolving with an increase in the fractional inspired oxygen. One case desaturated to <90% and required intrathoracic decompression. Twenty-five percent of those receiving OLV desaturated compared to 15% of those ventilated conventionally. Three-quarters of patients in each group developed hypercarbia with the mean maximal ETCO2 of 7.7KPa and 6.7KPa in conventional ventilation and OLV groups respectively. Two cases were converted to open thoracotomies and four received blood transfusions in the SLET group. Surgical duration was on average 24 minutes greater when patients were ventilated conventionally via SLET.

#### Discussion and conclusion

VATS does not always necessitate OLV when used for simple surgical procedures. Conventional ventilation via SLET may be considered as it avoids the risks of DLT or bronchial blocker placement and OLV. particularly in younger children. Episodes of hypoxaemia are rare and hypercarbia, though common, is modest. Use of SLET for VATS procedure seems to be a safe and effective option in children and calls for more research in this area to establish its use as such.

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#### Parental anxiety and satisfaction for children undergoing general anaesthesia (PASCA)

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#### Introduction and aims

Prior to a child's anaesthetic, the anaesthetist usually provides an explanation of anaesthesia procedures and attempts to address concerns of parents. The use of negative suggestions regarding possible experiences such as pain, or pruritus may be included as part of the explanation. Unfortunately this can potentially increase parental anxiety and influence these experiences in a negative way. Parental anxiety is common [1-3] and can be transmitted indirectly to a child whose subsequent behavior may adversely affect parental satisfaction after the procedure. We aimed to assess the level of preoperative parental anxiety. concerns regarding general anaesthesia and subsequent parental satisfaction with their child's anaesthetic.

#### Methods

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We performed a survey of parents whose children were requiring anaesthesia later that day. We recruited a convenience sample of parents between 20<sup>th</sup> November 2012 and 7<sup>th</sup> January 2013 at the largest tertiary referral centre for paediatric care in South Australia. We recoded baseline demographic data in addition to parental concerns regarding anesthesia risks. Parents also completed an anxiety visual analogue score (VAS) and the Spielberger state anxiety scale [4] The anaesthetist documented the child's behaviour and cooperation at induction. A final survey was completed by the parent to assess their satisfaction with their child's anaesthesia.

#### Results

Of the 99 parents who participated, two children did not proceed to theatre leaving 97 completed surveys. We found the median Spielberger for parent state anxiety was 40 with an interquartile range (IQR) of 31-46.25. The top concerns reported by parents pre-operatively when given a list of specific risks were: Nausea and Vomiting 26 (26.8%), Not waking up 19 (19.6%) / Death 19 (19.6%); Pain 14 (14.4%); Surgical complication 13 (13.4%); Thirst / Hunger 13 (13.4%); Awareness 7(7.2%); and Injection / needles 7(7.2%). There was a high level of parental satisfaction (98%) following their child's anaesthesia

**Discussion and Conclusion** 

Parental satisfaction is high and unlikely to be influenced by preoperative parental anxiety prior to their child's anaesthesia. Further research investigating whether preoperative parental anxiety can be reduced by addressing the specific anaesthesia concerns reported in this study more effectively is required. We would also like to determine whether inadvertent negative suggestions of anaesthesia and surgical experiences is affecting parental anxiety preoperatively and / or adversely affecting the subsequent induction and cooperation of a child during their anaesthesia.

Acknowledgement: We thank staff at the Women's and Children's Hospital for their assistance Conflict of interest: None declared

Funding: Internal

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The prescription and administration of paracetamol in paediatric surgical patients Vanessa Johnston, Joanna Simpson, Louise Oduro-Dominah Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

#### Introduction and aims

In 2010 a MHRA warning and NPSA alert were released regarding the risk of accidental overdose of intravenous paracetamol in children. A National Reporting and Learning System search identified 206 relevant incidents: two associated with severe harm, fourteen moderate harm and the remainder low or no harm. A quarter of these occurred in the operating theatre. We undertook a prospective audit to assess the prescription and administration of paracetamol in paediatric surgical patients within our hospital.

#### Methods

Over a 3-month period data was collected on patients entering paediatric recovery. This included age, weight, dose and route of paracetamol given in theatre, and dose, route and frequency of paracetamol prescribed postoperatively. Data was analysed using Microsoft Excel, and the BNFC recommended dose as reference (+/- 5mg/kg). Results were presented locally, circulated via email and posters distributed to theatres displaying recommended dosing regimes. The audit was then repeated to complete the cycle.

#### Results

Initially data from 91 children was analysed. 63 (69%) were administered paracetamol in theatre. Of these, 90% received the correct dose. 10% of patients were overdosed, with the greatest overdose being 12mg/kg. Of the 91 patients prescribed paracetamol post-operatively, 32% were prescribed an appropriate dose according to the BNF. 10% were overdosed and 58% were under-dosed (maximum overdose 33mg/kg/day, maximum underdose 26mg/kg/day).

Data from 92 children was collected in the repeat audit. 66 (72%) were administered paracetamol in theatre with 91% receiving an appropriate dose. The remaining 9% received a sub-therapeutic dose (greatest underdose 14mg/kg). 89 (97%) were prescribed postoperative paracetamol, an appropriate dose being prescribed in 48%, overdose in 11% and under-dose in 41% (maximum overdose 60mg/kg/day, maximum underdose 34mg/kg/day).

#### **Discussion and conclusion**

Our data suggested the accurate prescription and administration of paracetamol to paediatric surgical patients is suboptimal. Although the information we distributed led to an overall reduction in the number of patients receiving an overdose, a large proportion still received a lower dose than recommended in the BNFC. Further work is necessary to ensure patients receive an appropriate dose of paracetamol for their weight. This is likely to take the form of clinician education, preprinted stickers for drug charts, and laminated dosing charts for theatres.

It would be valuable to assess the accuracy of paracetamol dosing on paediatric wards, and the postoperative pain relief provided by varying doses. It would also be of interest to see if underdosing continued, and how much break through analgesia was being administered.

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## Anaesthetic record keeping for children undergoing general anaesthesia; do we meet the standard?

Laura Wilson, Nicola Campbell Countess of Chester Hospital, Chester, Cheshire, UK **Topic:** Audit/Quality Improvement

#### Introduction and aims

Good Medical Practice Guidelines<sup>1</sup> produced by the GMC state 'in providing care you must keep clear, accurate and legible records, reporting the relevant clinical findings, the decisions made, the information given to patients, and any drugs prescribed or other investigation or treatment'. The Royal College of Anaesthetists and the AAGBI have set out a minimum data set for an anaesthetic record<sup>2</sup>. Guidance for Paediatric Anaesthesia Services<sup>3</sup> from the RCoA state 'children should be anaesthetized by consultants who have regular and relevant paediatric practice sufficient to maintain core competencies. Children may also be anaesthetized by staff or associate specialist anaesthetists, provided they fulfill the same criteria and there is a nominated supervising consultant anaesthetist'.

This audit was conducted to assess the quality of anaesthetic record keeping when children undergo general anaesthesia. Similar audits have been conducted looking at adults undergoing general anaesthesia.

#### Methods

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The anaesthetic records of 100 children undergoing general anaesthesia were assessed prospectively from January - March 2013. A standardized data collection proforma was used; 38 data points were recorded which covered the minimum data set recommended by RCoA and AAGBI.

#### Results

Basic data entry and patient identification achieved 100%, however in 9% of cases the surgeon's name was omitted. Pre-operative assessments were incomplete; the most commonly omitted details were vital signs. 68% recorded an airway assessment. 68% had an explanation of anaesthesia documented. Intra-operatively; airway management and monitoring standards were 100%. However 24% of charts failed to record a machine check had been performed. Post-operatively; recovery advice was given in only 69% of cases.

88% of cases had a consultant present for anaesthesia. If a consultant was not present, the anaesthetic was performed by a SASG; however only a quarter had documented that a consultant had been informed.

#### **Discussion and conclusions**

The quality of record keeping was similar to that of adults undergoing day case general anaesthesia at our hospital.

Paediatric cases are often short procedures and have a high turnover of patients. This may contribute to the sub-optimal record keeping. Documentation of pre-operative vital signs, airway assessment and explanation of anaesthetic was poor.

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## **Conflicts of interest**

None declared

#### Financial support None available

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## Identifying key areas for improving the peri-operative pain management in children

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#### Introduction and aims

Despite the centralisation of paediatric services, an extensive surgical service is still provided to children at their local hospital.

The Association of Paediatric Anaesthesia recently published new recommendations for peri-operative pain management. We audited practice at our local hospital and combined this with analysis of patient pain scores for the first 48 hours post-operatively.

We sought to compare current practice with the guidelines and identify key areas where improvements could be made. We believe simple measures can be employed to support these improvements

#### Methods

Our target population was all children, undergoing all surgical procedures. We collected data prospectively, as a multidisciplinary team: anaesthetists, recovery nurses, and ward staff. A proforma, attached to each patient's notes, was used to gather information on age, weight, surgical procedure, prescribing data from pre-op to take-home, intra-operative analgesia and the use of localanaesthetic.

Pain scores were recorded at 4, 12, 24 and 48 hours post-op. The Wong-Baker scale was employed to standardise pain-scores. Parents were given questionnaires to complete and return in stamped-addressed-envelopes.

#### Results

We achieved and analysed 59 complete data-sets. Ages ranged from 1-15 years (median 6 years). 19% were under 2 years. The majority of cases were plastics or ENT.

Intra-operatively, opioids were administered to 73% of patients, 57% using fentanyl and just 64% received paracetamol.

Local-anaesthesia was used by the surgeon or anaesthetist in 54%. 5 patients had a documented block performed by the anaesthetist, 3 of these were caudals. Post-operatively, 96% were prescribed paracetamol. 90% were prescribed a NSAID. Opioids were prescribed sparingly, with 23% offered codeine and 35% fentanyl or morphine. 49% of paracetamol doses were prescribed at less than 15mg/kg. Ibuprofen dosing varied from 10mg/kg in 20% and 5mg/kg in 80%.

Take-home analgesia, prescribed by the surgical teams reflected the anaesthetist's post-op prescriptions for NSAIDS and paracetamol, including sub optimal dosing. Pain scores were at their lowest in recovery, but highest at 4 and 12 hours post-op.

#### **Discussion and conclusions**

Low pain scores immediately post-op do not reflect subsequent scores up to12 hours. Under dosed paracetamol was common and lead to higher pain scores. Regional blocks, when performed by anaesthetist, improve pain scores compared to surgical application. Incorrect doses are repeated in take-home prescriptions. Pain-scores during the intermediate post-operative period (4-12 hours) could be improved by providing intraoperative local-anaesthetic blocks, or an option for in-patient opiate analgesia. Posters, displaying guidelines for recommended pain-relief options including correct dosing have been produced, intent on improving the quality of post-op pain in these children. I Clegg, C Doherty, P Ashford, C Kelly

Royal Manchester Children's Hospital, Central Manchester University Hospitals NHS Foundation Trust, Manchester. UK

#### Introduction

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The department of health published a review of information technology in healthcare (1). This resulted in the challenge for the National Health Service to become paperless by 2018.

An audit of paper based emergency theatre bookings at Royal Manchester Children's Hospital (RMCH) in June 2012 revealed major flaws. These led to decreased efficiency of the emergency theatre, a negative impact on patient experience and provided no information of CEPOD category and time to operation.

#### Aim

To design a computerized system for booking emergency cases to increase efficiency, productivity and improve patient experience.

#### Methods

Using Microsoft access, a database was created to allow storage of emergency theatre cases. From this a user entry form was developed. The program was beta tested and revised before 'going live' and mandatory elements were embedded. A section of the form was reserved for anaesthetic assessment. Using the individual weight dosages of emergency drugs were automatically calculated for use as a quick reference guide to increase patient safety.

After 2 months, the data were analysed and compared with the previous audit results. User satisfaction was also surveyed.

#### Results

250 cases were analysed and compared with results from the previous audit.

Information	Present on paper system	Present on computerised system
Date	68.3%	100%
Time	61%	100%
Contact number	33.4%	99.6%
Operator	18%	90.8%
Weight	66.8%	100%
CEPOD category	76.6%	99.9%
DOB	93.9%	100%
Hospital number	61%	99.8%
Ward	67.6%	78%
Fasted from	37.6%	90.8%
Accepting anaesthetist	72.4%	95/6%
Operation	98.5%	100%
Consent form	67.8%	91.2%
Correct site form	62.9%	90%

High user satisfaction: >70% rated the system good or excellent.

#### **Discussion/Conclusion**

Compared to the paper based system, a computerised system increased the collection of essential information to over 90% in almost all areas. Several areas had over 100% compliance. This has shown that using technology effectively can improve the service offered and retain high user satisfaction. An area for anaesthetic considerations improved the handover of patients between shifts. Documentary evidence of handover improved compliance with GMC guidance (2) and prevented patients from being seen on multiple occasions by different anaesthetists, improving patient experience and patient safety. We believe this is the first system in the UK to use a computerised system for booking urgent theatre cases. We would encourage other hospitals to trial this system.

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# 71

Emergency paediatric anaesthesia - accessibility of information Georgina Pipe, Sarah Linford, Ian Moppett, Hannah King, James Armstrong Nottingham University Hospitals Trust, Nottinghamshire, UK

#### Introduction

Emergency paediatric situations are stressful for all involved, where errors in calculations can be potentially catastrophic. Anaesthetic trainees are frequently required to anaesthetise paediatric patients in an emergency and need a robust system for obtaining information to ensure patient safety. A recent survey at Nottingham University Hospitals revealed that anaesthetists of all grades were underconfident managing children under 5 years, especially as ASA grade increases. It identified a variety of sources used by clinicians regarding drug doses and protocols, including the children's British National Formulary (cBNF) and smartphone applications. Following this survey, a Paediatric Anaesthetic Emergency Data (PAEDs) handbook was developed from local and national guidelines.

#### Aim

To determine the accuracy and speed of information sources that trainees might use when faced with common paediatric emergencies.

#### Method

Three scenarios from APLS and EPLS teaching material were selected at random by a colleague unrelated to the study. Six pieces of information relevant to each scenario (e.g. weight, drug doses and endotracheal tube size) were identified, forming 18 questions. The two most popular smartphone applications identified by the survey (PaedsED<sup>1</sup> and AnaPaed<sup>2</sup>), the cBNF and trainees inherent knowledge were compared with the new PAEDs handbook. 20 anaesthetic trainees were recruited and timed while they identified the information requested. Four items were rated: time to find data, number of available answers, accuracy and a global rating score.

#### Results

Data from all three scenarios were combined for analysis. The fastest source of information was the trainees own knowledge at 61 (51-83) seconds (median (IQR)), followed by PAEDs handbook 80 (59-110) and PaedsED 84 (65-111). The cBNF was the slowest 138 (113-189) seconds. No source, apart from trainees inherent knowledge, had answers to all the 18 questions, cBNF 8, AnaPaed 14, PAEDs handbook 16 and PaedsED 17. Trainees inherent knowledge was only 66% (50-83.3) accurate. Of the other sources, median accuracy was 100%, but the range was very variable; PaedsED 83.3-100 (IQR), cBNF 66.6-100, AnaPaeds 78.7-100 and PAEDs handbook 80-100, The handbook was rated as the most popular resource (9/10), followed by PaedsED (7/10) and AnaPaed (6/10).

#### Discussion and conclusion

Although fastest, trainees own knowledge was inaccurate, highlighting the need for additional, rapidly accessible, information. The cBNF is less useful in emergency situations due to the limited nature of its information. Of the smartphone applications, PaedsED proved to be fast, accurate and more popular, whilst AnaPaed was accurate but slow to use. The PAEDs handbook was also fast, accurate and the most popular.

In conclusion, the new PAEDs handbook provides rapidly accessible information and strategies for managing emergency situations.

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#### WHO's Checking - Surgical Safety Checks in Vietnam

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#### Introduction and aims

WHO introduced the 'Safe Surgery Saves Lives' campaign<sup>1</sup> in 2007, as a part of 'Global Patient Safety Challenges' initiative. The primary goal of the campaign was to improve perioperative safety of patients all over the world.

We recently visited Vietnam as a part of 'Healing The Children' charity mission and adopted the 'WHO checklist' during the surgeries as our routine practice. Some of the local surgeons, anaesthetists and theatre staff joined us; both to help us and to learn new skills in their respective fields. We noted that there was a conspicuous lack of any checks done by the local hospital teams to prevent errors, that could occur during surgeries eq: Patient identification.

Our objective was to survey the perceptions about the introduction of safety checklist amongst theatre staff participating in the mission.

#### Methods

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This was a prospective, face-to-face interview and a questionnaire based survey. The target group were all the theatre surgical and ancillary staff involved with the care of the patients. We excluded the team from the UK, as we routinely performed the checks. A questionnaire was designed in English & translated to Vietnamese for the benefit of the local staff.

#### Results

The data was analysed in UK using MS Excel software, version 2000. We had a 100% response from the staff which included 9 consultants, 2 Anaesthetic nurses & 1 theatre scrub staff from the local hospital.

Only 58% of the staff in the survey had heard about the WHO checklist. All the participants thought that the checks were useful, but 25% (3/12) of them thought that the checks delayed the start of theatre lists. A vast majority (91.6%) were of the opinion that the checks would improve patient safety in the perioperative period.

Fifty percent of the local participants had not heard about WHO check lists prior to our introduction during the mission. Our colleagues from the USA were familiar with a different format of the checklist, designed by their hospital administration.

50% (6/12) of the participants agreed that the WHO checklist was devised to improve safety of patients, whilst 16% thought it improved quality of care and another 16% were of the opinion that it prevented a wrong patient being operated upon.

Majority (9/12) of the respondents said that they would adopt the checklist in their routine practice in future.

#### Discussion and conclusions

WHO checklists have clearly not vet reached some parts of Vietnam and further training and reinforcement in implementing the safety checks is needed. A great hierarchy in operating theatre environment persists and team briefing is not in vogue at present and the concept has been introduced by our team. There is a need to design a WHO checklist tailored to suit the surgical environment in the local hospital.

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No conflict of interests or funding.

# 74

#### A survey of the awareness of paediatric difficult airway guidelines amongst Welsh anaesthetic trainees

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#### Introduction and aims

The Association of Paediatric Anaesthetists of Great Britain and Ireland (APA) in association with the Difficult Airway Society (DAS) published the paediatric difficult airway guidelines in 2012 targeted at non-specialist anaesthetists.<sup>1,2</sup> Prior to this, paediatric airways were managed according to derivations of adult algorithms. Welsh anaesthetic trainees rotate through a variety of hospitals, many without specialist paediatric anaesthetic services and are often involved in anaesthetising children in these environments. The survey aimed to evaluate awareness of these guidelines. Method:

All Welsh anaesthetic trainees were invited to complete an electronic survey. The questions compared the trainees' knowledge of the adult and paediatric difficult airway guidelines and the availability and ease of access to the paediatric algorithms.

#### Results

131 out of 237 (55%) trainees responded with 69% being ST3 or above. 111 (85%) had anaesthetised a child between 1-8 years of age. All (100%) were aware of and had read the DAS difficult airway algorithm for adults. Only 30 (23%) were aware that there was a specific paediatric difficult airway algorithm and yet only 19 (15%) had read them; all of whom found the guidelines useful. Ninety five (73%) of trainees were unaware of how to access the algorithm but 99% would welcome widespread dissemination and display of the auidelines.

#### Discussions

This survey demonstrates that all Welsh anaesthetic trainees are aware of the DAS adult difficult airway algorithms, yet most were unaware of the existence of specific guidelines for the difficult paediatric airway. The guidelines have been published on the APA and DAS websites since 2012, however, these are niche websites and consequently the guidelines may not be obvious unless searched for specifically by the nonspecialist anaesthetist.

Children present to their nearest hospital in emergencies and many elective procedures still take place in DGH's. Full awareness by all trainees of the adult difficult airway guidelines shows that this awareness could extend to the paediatric difficult airway guidelines.

#### Conclusion

The DAS adult difficult airway guidelines are considered the gold standard of airway management and are well distributed and acknowledged. The existence of the paediatric difficult airway guidelines does not appear to have been disseminated in a similar manner. As a follow-up to the survey; the APA<sup>1</sup> and DAS website<sup>2</sup> link has been circulated in order to improve the knowledge amongst Welsh deanery trainees. Printing and displaying the guidelines in areas where children may be anaesthetised has also been encouraged. Further promotion in mainstream anaesthesia publications is needed to raise awareness throughout the United Kingdom.

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Clinical application of the APA difficult bag-mask ventilation guidelines: A survey of current practice at a large university hospital Sumanna Sankaran, Ratidzo Danha University Hospitals Coventry and Warwickshire, Coventry, UK

#### Introduction and aims

Paediatric airway management can be challenging, especially to non-specialist paediatric anaesthetists. The paediatric airway is substantially different from the adult airway and obstruction leads to rapid desaturation especially in small children (1). Paediatric airway guidelines were traditionally adapted from adult practice, disregarding the significant anatomical and physiological differences in children. The APA (Association of Paediatic Anaesthetists) and DAS (Difficul Airway Society) have now introduced algorithms for the management of the unanticipated difficult airway in children aged 1-8 (2). Our department anaesthetises over 3500 children annually, both in elective and emergency settings. We carried out a survey of senior anaesthetists' awareness and application of the paediatric difficult airway quideline. Our aim was to survey current practice among the anaesthetists in order to adapt the guideline for local use in out trust.

#### Methods

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Senior anaesthetists at University Hospitals Coventry and Warwickshire were invited to take part in a short survey regarding the APA paediatric airway guidelines. They were shown the algorithm for difficult mask ventilation in a paediatric patient and asked to confirm the steps they would follow in their routine clinical practice and comment on those they would not.

#### Results

48 survey forms were returned. 31 (65%) had not read the algorithm on difficult mask ventilation in children. 43 anaesthetists then reviewed the algorithm. Of these, when faced with difficult mask ventilation, most would initially change the facemask (76%) and then change to self- inflating bag (88%). Fewer would change the circuit (44%) or the connector (49%) as suggested by the algorithm. 93% would deepen anaesthesia with propofol as suggested. 71% would not consider inserting a nasopharyngeal airway to improve ventilation, though most would attempt LMA insertion (89%)

#### Discussion and conclusions

Prior to the survey many anaesthetists had not read the algorithm. Despite this, most anaesthetists would follow the key steps suggested by the algorithm when faced with difficult mask ventilation in a child. Some however would change to a self-inflating bag early, without spending valuable time changing the circuit or connector, hence potentially avoiding desaturation. The reluctance of most anaesthetists to insert a nasopharyngeal airway is likely to be due to concerns about potential for bleeding which may worsen an already compromised airway. Following this survey, a few minor changes are being made to modify the algorithm and a simplified, adapted version is being suggested for use in our trust.

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# 77

#### A rose by any other name - Checking blood glucose Stewart Campbell John Radcliffe Hospital, Oxford, UK

Blood sugar is frequently measured in paediatric anaesthetic practice. Although the majority of children are unlikely to require supplementary dextrose perioperatively, consensus guidelines recommend measurement of blood glucose levels if it is not given [1].

Near patient testing of blood sugar is widely available, is minimally invasive and results are rapid. Our facility has ubiquitous access to blood sugar measurement via the Abbott Precision Xceed Pro [2] blood glucose and β-ketone monitor. This provides rapid measurement of blood sugar or blood ketone level using a capillary blood sample and a disposable test strip. These strips are labelled dependent on test substrate, and stored in a transport box with the test meter.

We became aware, through our incident reporting system, of accidental mis-testing with this system. Routine post-surgery testing in our theatre recovery area had revealed apparent very low blood sugar levels, of 0.0 or 0.1 mmol/L. Investigation determined a ketone-measuring test strip had been used inadvertently, and had given an appropriate reading in these otherwise well patients. Consequently, at least one child received oral dextrose therapy, unlikely to result in harm. However, we also identified one slightly more concerning case.

Here, a five year old girl with diabetes mellitus, treated with injectable insulin, was anaesthetised on an afternoon day-case endoscopy list. The anaesthetic and endoscopy proceeded without incident. In recovery, the child's blood sugar level was checked, and recorded as 4.2.

However, the child's mother was concerned about the child's behaviour and checked a sugar level on their own device, the result reading 2.7. This was confirmed on a recheck with our departmental device, also giving a reading of 2.7 mmol. As the child was able to take oral glucose syrup, and her blood sugar rapidly improved, with all subsequent readings being above 5 mmol.

It was noticed that a ketone measuring stick had been opened and presumably used to take the initial postanaesthetic measurement. Despite the colour difference of the packet (purple versus blue) and the labelling both on the packet and the machine's screen, it appears that this reading was misinterpreted as a normal glucose reading rather than an abnormal ketone reading. We rarely measure blood ketone levels in our unit, likely contributing to this error.

Subsequently we have removed ketone measuring sticks from the transport box. They are available from a stores cupboard if specifically needed. This will significantly reduce the risk of a similar error occurring in the future. No further cases of incorrect test strip selection have been reported since this intervention.

We draw attention to this issue in the hope that similar units may avoid confusion in future.

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- https://www.abhottdiabetescare.com/products/hospital/precision-vceed-pro.html

## Paediatric aeromedical retrievals in the Australian Outback

Claire Barker CareFlight, Northern Territory, Australia

#### Introduction and aims

Unwell children in the Australian Northern Territory are initially treated in remote health clinics by nursing staff with limited facilities. If necessary they are transferred to the single tertiary hospital in the state. Often the only timely way to move patients is by air due to vast distances and impassable roads.

The primary objective of this project was to describe the rural paediatric aeromedical population to aid our service organisation and educational priorities. The secondary objective was to identify children requiring high dependency care.

## Methods

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Retrospective case review of patients under 16 years transferred between February 2012 and February 2013. Information collected included age, gestation if newborn, diagnosis, high dependency interventions required and medical team members. Ethical approval was obtained from the Northern Territory Department of Health.

## Results

793 children were transferred with an average age of 4.4 years (range 0 days to 16 years). Nursing staff transferred 644 (81%). As expected respiratory illness (30%), trauma (11%) and gastroenteritis (10%) were the commonest conditions. 30 preterm infants including 7 below 31 weeks gestation were transferred. Diagnoses unlikely to be encountered in the United Kingdom included envenomation from snakes and jellyfish and rheumatic fever and its consequences (joint pain, chorea, post streptococcal glomerulonephritis and cardiac lesions).

25 children required high dependency care, 15 of these on day 0 of life. 24 required respiratory support, 7 central venous access, 4 surfactant, 2 inotropes and 1 chest drains.

#### **Discussion and conclusions**

Paediatric patients make up 20% of the total work of this service; most are not critically ill and are transferred by nursing staff. There are insufficient children with high dependency needs to make a separate paediatric retrieval service economically viable. Flight doctors will spend most of their time treating critically ill adults. However there are some children, particularly neonates, who require high dependency care. Anaesthetists with neonatal experience are ideal for this role. Anyone fancy an outback adventure?

# 79

Perinatal management of the compromised airway by EXIT procedure: A case series Iram Ahmed<sup>1</sup>, Mubeen Khan<sup>1</sup>, Catalina Stendall<sup>2</sup>, Alison Macarthur<sup>1</sup> <sup>1</sup>Mount Sinai Hospital, Toronto, Canada, <sup>2</sup>King's College Hospital, London, UK

#### Introduction

Advances in prenatal imaging have allowed accurate diagnosis of potential airway compromise in the prenatal period, which has led to a shift in the management of the compromised airway. Ex utero intrapartum treatment (EXIT) involves delivering the head and shoulders of the neonate through a caesarean incision. and establishing a secure airway via oro- tracheal or naso- tracheal intubation or tracheostomy during placental perfusion, whilst maintaining uterine relaxation and intrauterine fluid volume. Once the EXIT is complete, the umbilical cord is cut and clamped, and the neonate is fully delivered. We present a case series of 9 EXIT procedures for airway management carried out at our institution from the period of Jan 1999 till April 2011.

#### Method

Following approval from the Research Ethtics Boards of Mount Sinai Hospital and the Hospital for Sick Children, patient databases were scanned for the aforementioned period. Inclusion criteria were infants that either underwent an EXIT procedure or other surgeries whilst on placental support. 67 potential patients were found with the search criteria. Retrospectively charts from 9 patients who required intubation or tracheostomy while on placental support were found.

#### Results

Our series consisted of 9 infants of whom 7 had obstructing neck masses (3 lymphatic malformations, 3 teratomas, 1 venous malformation), one had complete laryngeal atresia (CHAOS) and one had a left sided congenital diaphragmatic hernia. The airway was secured via an oral route in five of these cases. Tracheostomy was preformed in the reminder four cases. Four patients from the series died in the prenatal period despite the fact that an airway was secured at the time of birth. Of the 4 fatalities, 2 died as a direct result of the lesion that prompted the airway intervention due to associated pulmonary sequelae like pulmonary hypoplasia, pulmonary hypertension and haemorrhage. In the other three cases, mortality was a result of concomitant cardiopulmonary comorbidities.

#### Discussion

Our case series highlights the fact that establishing an airway at birth is not the only hurdle to be overcome in these complex cases and that despite this there is a high rate of morbidity/mortality associated with the EXIT procedures. The successful management of these patients in the setting of a compromised perinatal airway depends on multiple factors like comorbidities and complications associated with the procedure.

#### Conclusion

Despite the excellent rate of success in securing an airway in our and other series, children who require such perinatal management still have high rate mortality. Large neck masses that prevent oral intubation and lead to polyhydramnios seem to pose the greatest danger. Despite the high risk to the infants, these procedures tend to be safe from the maternal standpoint.

Use of sugammadex in a child with myotonic dystrophy type 1

Amelia Pickard. Peter Stoddart Bristol Royal Hospital for Children, Bristol, UK

#### Introduction

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Increasing numbers of children with myotonic dystrophy (MD) type 1 are presenting for surgery due to improvements in medical and intensive care. Children require careful anaesthetic management due to the multi-system nature of the disorder.

#### Case presentation

A 14-month-old boy with myotonic dystrophy weighing 7.7Kg was scheduled for percutaneous endoscopic gastrostomy insertion, orchidopexy and dissection of tongue tie. Following inhalational induction, baseline train of four (TOF) responses were obtained using an acceleromyograph. A bolus of rocuronium 6 mg (0.8mg/kg) achieved complete neuromuscular blockade for 80 minutes, and anaesthesia was maintained with sevoflurane. Sugammadex 40mg (5mg/kg) was given and after 26 seconds the TOF ratio was 96%. The TOF ratio then fell to 60% while twitch 1 remained at 48% so a further dose of sugammadex 40mg was given. Thirteen seconds after this twitch 1 reached 90% of baseline and the TOF ratio was 86%. These levels remained stable and the patient was successfully extubated.

#### Discussion

Our patient showed an increased sensitivity to rocuronium with no recovery in neuromuscular function 82 minutes after 0.8mg/kg rocuronium. Expected duration of rocuronium-induced block in children of similar age is 23 min<sup>1</sup>

Variable sensitivity to non depolarizing neuromuscular blocking agents has been described. Reversal of neuromuscular blockade can trigger myotonic episodes and worsen the neuromuscular block<sup>2</sup>. However, elective ventilation of patients until the residual neuromuscular blockade has worn off is a significant risk factor for post-operative respiratory complications in children<sup>3</sup>.

Sugammadex forms tight one-to-one complexes with rocuronium and rapidly terminates neuromuscular blockade. It has been used to good effect in adult patients with MD even in those with a high sensitivity to rocuronium. In our case an initial dose of 5mg/kg was administered following which there was evidence of recurarization, this has also been seen with adult patients with the disorder<sup>4</sup>. Doses need to be individually optimized to avoid this.

This is the first case report of the successful use of sugammadex in a paediatric patient with myotonic dystrophy. Further studies are required to verify these effects and its safety.

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Designing a safer approach to drug preparation in paediatric anaesthesia Priva Khosla<sup>1</sup>, Rachel Evley<sup>2</sup>, Joy Abbott<sup>3</sup>, James Armstrong<sup>3</sup>, Iain Moppett<sup>2</sup> <sup>1</sup>Medical School, University of Nottingham, Nottingham, UK, <sup>2</sup>Division of Anaesthesia and Intensive Care, Nottingham University Hospital, Nottingham, UK, <sup>3</sup>Department of Anaesthesia, Nottingham University Hospital, Nottingham, UK

#### Introduction and aims

Safe administration of drugs during anaesthesia is a complex task with an estimated error rate around one in 200 drug administrations (substitutions, omissions and mislabelling)<sup>12</sup>. Paediatric anaesthesia is potentially complicated by the need to adjust drug doses for the range of patient sizes. Most drugs are currently presented in dilutions and total doses appropriate for adults. Paediatric anaesthetists therefore adopt a variety of approaches to drug preparation - different size syringes, dilutions, limiting volumes. This may represent a risk when more than one anaesthetist is working together or when handing-over care. Some areas, such as paediatric intensive care, have introduced standardised drug preparation schemes with the aim of reducing preparation errors and mismatches of expectations by staff.<sup>3</sup> The aims of this study were to investigate the perceptions and understanding of paediatric anaesthetists in relation to standardisation of drug preparation.

#### Method

Following formal ethical approval, and written, informed consent, a convenience sample of anaesthetists based at Queen's Medical Centre, Nottingham was interviewed with regard to current practice and standardisation. Qualitative research methods were used. Thirteen semi-structured interviews and one focus group, consisting of eight anaesthetists, were carried out. The interviews and focus group were recorded and transcribed and thematically analysed using a qualitative data analysis package.

#### Results

The size of paediatric patients and the location of anaesthetic training contributed considerably to the variation of drug preparation in current practice. Despite varying views on standardisation, the majority of anaesthetists interviewed felt that a standard system could be beneficial when anaesthetists were working together. However, a number of limitations were also put forward, particularly deciding on a standard for drug dilution that everybody would agree and comply with. Finally, improvements for future practice were considered, including a double checking system<sup>4</sup> and minimising distractions during drug preparation.

#### **Discussion and conclusion**

Standardisation was considered to be beneficial for trainees and infrequent paediatric anaesthetists, however, establishing drug dilutions that all paediatric anaesthetists would be willing to adhere to would be very difficult. Introducing standardisation of drug preparation for patients over 12 months of age may be more feasible.

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Setting up a cross-specialty paediatric resuscitation and stabilisation course at Bradford Royal Infirmary

Nicola Mather, Catherine Farrow Bradford Royal Infirmary, Bradford, West Yorkshire, UK

#### Introduction

83

Resuscitating and stabilizing a critically ill child is challenging. Minimal training opportunities exist, with subsequent concern amongst trainees about managing these situations. Recently published 'Standards for the Care of Critically III Children' suggest generic skills that all those involved in the care of sick children should develop<sup>1</sup>.

Bradford Royal Infirmary (BRI) is a busy Teaching Hospital with a significant number of paediatric emergencies. The 'Embrace' Paediatric Critical Care Transfer team transferred 49 children to PICU during 2011. Audit showed this level of intensity continued in 2012, averaging a weekly anaesthetic referral for stabilization of a critically ill child.

Simulation training has a positive impact on Crisis Resource Management in paediatrics<sup>2</sup>. It improves overall performance, specifically leadership, interpersonal and communication skills, vigilance, distribution of workload and assertiveness<sup>3</sup>

#### Methods

In the past year, we have run 3 half-day high fidelity simulation courses at BRI simulation centre using SimBaby<sup>TM</sup>. Faculty is cross-specialty and multidisciplinary. Paediatric, anaesthetic and emergency medicine trainees are invited to attend and given recommended pre-course reading. Based on audit data. four scenarios were developed (sepsis, head injury, acute respiratory failure and status epilepticus). Multidisciplinary video debrief is provided for each scenario, focusing on both clinical and non-technical skills (NTS's).

#### Results

In total 34 candidates have attended. Feedback was universally positive and all strongly agreed scenarios were highly relevant to clinical practice and appropriate to training grade. All said they felt more confident in resuscitating paediatric patients and had a greater understanding of NTS's required for effective teamwork. There was very positive feedback regarding cross-specialty and multidisciplinary involvement.

#### Discussion

Simulation training has a positive impact on the management of emergency scenarios and facilitates development of both technical and NTS's.

This training focuses on NTS's, particularly multi-disciplinary teamwork including leadership, delegation, and situational awareness. It enables paediatric, ED and anaesthetic trainees to work together, with nurses and ODP's in a non-threatening environment to manage challenging and stressful situations. Debrief and feedback also offers advice regarding clinical management.

The next course will include specific skill stations and short tutorials that have been designed in response to feedback highlighting areas of knowledge and skill deficit

This course demonstrates a need for paediatric emergency simulation training. It is the start of establishing regular, formal simulation training in acute paediatric critical care.

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# 84

#### Career intentions of trainees in the Northern Ireland School of Anaesthesia and Northern Ireland School of Paediatrics: Implications for paediatric anaesthesia and paediatric intensive care consultant staffing

Charles Philpott<sup>2</sup>, Darrell Lowry<sup>3</sup>, Jeremy Lyons<sup>1</sup>, R Keith Bailie<sup>1</sup> <sup>1</sup>Royal Belfast Hospital for Sick Children, Belfast, UK,<sup>2</sup>Ulster Hospital, Dundonald, Belfast, UK,<sup>3</sup>Craigavon Area Hospital, Craigavon, UK

#### Introduction and aims

Within Northern Ireland, Paediatric Anaesthesia and PICU are in a state of flux. Changing rotas, new rotas, and retirement planning have implications for the anaesthetic department within the Royal Belfast Hospital for Sick Children (RBHSC). Currently there are two 1:6 rotas for PICU and Theatres/Anaesthesia. There are plans to introduce a third rota delivering a 24-hour transport/retrieval service on a 1:6 basis. The aim of this survey was to establish how many trainees in our region had career intentions towards PICU (including transport) and Paediatric Anaesthesia.

#### Methods

The School of Anaesthesia has an online survey tool set up by one of the trainees. Following an email from the Deputy Head of School, trainees were asked to respond to the survey via the supplied link. To try to exclude any survey bias, the trainees were asked which subspecialty, if any, they were interested in from a list. Information collected included CCT year, subspecialty interest and plans for research/OOPT/ higher specialist training. The School of Paediatrics assesses career intentions annually as part of preparations for the ARCP and was able to provide this information without having to participate in our survey.

#### Results

117 anaesthetic trainees were surveyed. We received 82 responses (70%). Two trainees expressed an interest in PICU, one with a CCT date in 2013, the other in 2019. 24 expressed an interest in paediatric anaesthesia.

One paediatric trainee out of 110 has expressed an interest in PICU, CCT date in 2015.

#### **Discussion and conclusion**

Workforce predictions are notoriously difficult.<sup>1</sup> Consultant staffing in PICU and Paediatric Anaesthesia in Northern Ireland faces a number of unique problems due to its location and history. All PICU consultants in RBHSC have been anaesthetists by training. This was due to the necessity to cover both theatres and PICU when on call. With the increased workload on theatres, due in part to the centralization of paediatric services, we have established two rotas separating PICU from Theatre on call. This enables us to recruit paediatricians as well as anaesthetists for PICU. Our survey results, while encouraging for anaesthesia, are less so for PICU. The interest of paediatric trainees is also disappointing. The small numbers expressing an interest in PICU means that any workforce planning will need to include encouragement of trainees from both disciplines to enter these subspecialties. It would be of interest to ascertain if other regions are facing similar circumstances.

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#### What is the practice today of departments for complicated analgesia after surgery?

Alex Day, Victoria Howell, Rachel Desai, Tony Moriarty Birmingham Childrens Hospital, Birmingham, UK

#### Introduction and aims

85

I know what i do, but what do other trusts do? and what do other members of my department do? We have no data to compare these results with the past, but we can use this data in future to compare any changes in the future. Each surgery can be managed in various ways, but what is the common practice of today? Methods

In order to focus our results, we surveyed the Paediatric Pain Travelling club to determine the common form of analoesia used in 7 procedures, where there is either difficulty in managing children or controversy in management. We wanted one person in each trust to answer on behalf of their pain service to describe their everyday experience of analgesic regimens for the following surgeries; Thoracic Empyema, Nuss Bar, Open Pyeloplasty, Spinal Fusion, Major Bladder surgery, Neonatal Laparotomy and Oesophageal Atresia. We also surveyed to determine the use today of ketamine and Gabapentin in these analgesic regimens as well.

#### **Results and discussion**

We received replies from all 25 trusts that we sent requests to. It is impossible in such a short abstract to describe all our results, so we shall concentrate on a few.

Empyema Surgery.	
Analgesic type	

(% of departments using this method as prime regimen)

opiate infusion (NCA/PCA)	(40)
opiate (NCA/PCA) and ketamine	(3)
epidural infusion	(5)
paravertebral single shot	(15)
intercostal nerve block (single shot)	(11)
combination (Intercostal/paravertebral and pca)	(20)

(intercostal/paravertebral and pca)	(21
parenteral analgesia ( no infusions)	(3)
radiological chest drains (directly placed)	(3)

The question here is, does anyone use epidural surgery, where there is a risk of central sepsis, and are newer, better methods of analgesia (paravertebral blocks) more frequently used? we can also show that larger children's hospitals use more complicated forms of analgesia and smaller ones more commonly use opiate infusions.

#### Oesophageal Atresia.

Here the question is what percentage of departments would use epidural analgesia?, the literature would suggest that those who receive epidural analgesia are significantly less likely to need PICU care. what percentage receive TAP blocks now?

Analgesic type	(% of departments using this method as prime regimen)
opiate infusion (PCA/NCA)	(46)
epidural	(32)
TAP block	(8)
combination, TAP and NCA	(14)

Interestingly, more departments still use opiate infusions rather than epidural infusions, and some are starting to use TAP Blocks.

The rest of the results we can present to the audience, where everyone in the audience will perform some of the surgeries frequently and would be interested in the results. We also have data on our own department. This paper is much better as presentation than poster.

# 87

New guidance, new approach: The airway rescue trolley in paediatric practice Neal Willis, Lawrence Li, Grant Rodney, Barry McGuire Ninewells Hospital and Medical School, Dundee, UK

#### Introduction and aims

Since their inception in 2004, the Difficult Airway Society's guidelines have become established practice. In 2012, The Association of Paediatric Anaesthetists and the Difficult Airway Society published airway guidelines [1] for use in children aged one to eight. Our department has since introduced 'paediatric airway rescue' trolleys stocked with appropriate equipment to implement the new guidelines and to simplify the approach to the difficult paediatric airway.

#### Methods

After introducing 'adult' airway rescue trolleys, we consulted a variety of published resources [1, 2, 3], and decided to mirror this approach for paediatric practice. The trolleys are equipped with key items required for effective oxygenation, ventilation and intubation in the event of a difficult paediatric airway. The priorities for equipment choice were familiarity and simplicity - providing facemasks, basic airway adjuncts, supraglottic airway devices and appropriate equipment for intubation, including intubation aids (stylet and intubating catheter). This reflects the recommended approach of the APA/DAS guideline. As this was implementation of a national guideline, ethical approval was not required.

#### Results

Three trolleys were purchased. One was placed in the paediatric theatre suite, another in the main adult theatre suite, where out-of-hours paediatric anaesthesia takes place, and the third in the paediatric outpatient dental clinic. All are clearly signposted and clearly stored in each area. The trolley has five colourcoded drawers, the first four individually assigned an age and weight value as a guide (clearly displayed on the drawer), and the equipment therein tailored for that age/weight of child. The fifth (bottom) drawer contains selected advanced airway equipment, aiming to cover the 'can't intubate, can't ventilate' scenario, as well as difficult laryngoscopy and intubation (anticipated and unanticipated).

#### **Discussion and conclusion**

Safe management of the difficult airway, both anticipated and unanticipated, is facilitated by using an uncomplicated, step-wise approach of increasing intervention and only using equipment with which we are confident, well-practiced and familiar. Our trolleys embody this ideology and their presence will improve patient safety, facilitate management of the paediatric difficult airway, help to publicise and implement the new APA/DAS guidelines, and stimulate discussion around paediatric airway management.

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## Handy handovers: Establishing a method to ensure safe thorough handovers in recovery

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#### Introduction

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With the increasing interest in maximising patient safety, one highlighted time of vulnerability is the handover period from theatres to the recovery room. The quality of the handover affects the likelihood of risk to the patient in the recovery room and to their returning ward.

We set out trying to clarify the components of a safe patient handover in recovery and to assess how good we were at meeting these already.

#### Methods

In our regional tertiary paediatric hospital, we carry out approximately 4500 general anaesthetics per annum. Our recovery is staffed by 9 full time recovery staff nurses.

A survey was conducted with these nurses to find what they felt were the components of a safe handover. The opinions of the theatre staff providing these handovers were accounted for by the handovers they gave which were recorded in a second survey: an observational study completed by the recovery nurses following the handover, documenting quantitative and qualitative details.

#### Results

9 recovery nurses concluded that the following were vital information they required in a handover:

- Name
- ٠ Age
- Weiaht ٠
- Details of surgery •
- Past Medical History
- Allergies •
- Premedications given •
- Type of anaesthetic given
- Intraoperative analgesia/antiemetics/ fluids
- Plans for postoperative analgesics/antiemetics/fluids.

77 handovers were critiqued. The most frequently omitted demographics were: Weight, Allergy Status, Age and Name of the patient. Other frequently omitted details included plans for postoperative analgesia and fluids, as well as whether premedications had been given. Occasions were coincidentally noted where documentation on anaesthetic charts was inaccurate or poor.

20% of the handovers were felt to be inadequate. The most frequent criticisms were that the handover lacked detail, recovery nurses relied more on the charts than the verbal handover and they were often too distracted with the patient to be able to listen to the handover fully.

#### **Discussion and conclusion**

When the handover of clinical details is inadequate the child is at increased risk.<sup>1</sup> We had 2 examples of avoidable incidents directly related to poor quality handover in this limited study.

As well as focusing on the environment in which handovers are best given, attention needs to be paid to what the necessary components of every handover should be.

We have demonstrated what we feel these components are and how as a theatre team we fall short of this. We have instituted an aide memoir in recovery to facilitate safer handovers and are educating the theatre teams of the dangers in their current handover techniques.

#### References

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# 89

TIVA for airway endoscopy; a review of our clinical experience Sanaulla Syed, Peter Delve Alder Hey children's Hospital, Liverpool, UK

#### Aim and introduction

Inhalational anaesthesia with spontaneous respiration is traditionally used to facilitate airway endoscopy in children. Total Intravenous Anaesthesia using propofol and remifantanil is widely reported as a safe and effective anaesthetic technique for airway endoscopy. In our institution deep inhalational anaesthesia with spontaneously breathing patient is used by majority of anaesthetists for airway endoscopy. Our aim is to evaluate the use of TIVA as an alternative anaesthetic technique for airway endoscopy with the intention of promoting wider use of this technique in our institution.

#### Method

We prospectively studied 37 patients undergoing 42 airway endoscopies and surgery with TIVA as the primary anaesthetic technique. Data was collected over a period of 8 months . A clinical database was created using Microsoft Access software and stored on a secure departmental website. This project was registered as a service evaluation with the clinical audit department and patient confidentiality was strictly ensured.

#### Results

37 patients underwent 42 airway procedures; Rigid bronchoscopy, Microlaryngobronchoscopy, including 7 laser treatments and 7 balloon dilatations. The mean age was 4.05 years (3 months - 14yrs) and mean weight 16.4 Kg (4Kg - 60 Kg), 14 intravenous inductions and 28 inhalational inductions were performed. 16 initial laryngoscopies performed to topicalise the airway with local anaesthetic needed rescue boluses of anaesthetic, propofol was used 15 times and sevoflurane once. During 20 procedures rescue boluses of anaesthetic had to be given, propofol was used 19 times and once sevoflurane.

#### Propofol

Mean induction dose	TCI mode	Non TCI n
Intravenous induction	4.25mcg/	.4mg/Kg
Inhalational induction	3.6mcg/ml	1.5mg/Kg

Mean maintenance dose of propofol 2.9 - 4.7mcg/ml (minimum to maximum)

Remifentanil

0.06 - 0.08mca/Ka/min

#### Discussion

The ability to maintain spontaneous ventilation, haemodynamic stability, prolonged recovery period are some of the concerns associated with this technique. There was no report of any significant problems with haemodynamic status of patients. Laryngospasm was experienced once during laryngoscopy which responded to rescue boluses of propofol. Spontaneous ventilation was maintained during all but one procedure, this patient had a tracheostomy and was manually ventilated throughout the procedure. We asked the operating surgeon to comment on the operative conditions, 12 were graded as very good and 30 satisfactory. In 4 procedures the duration of procedure was graded as being longer than the conventional technique by surgeon specifically with time taken for visualisation of normal cord movement at end of the procedure. We believe the demonstrated safety profile and positive feedback from the operative surgeons will encourage more anaesthetists in our institution to use TIVA as their primary technique of anaesthesia for airway endoscopy and surgery.

#### References

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Induciton dose Maintenance dose

0.05mcg/Kg/min

Non TCI mode

Malherbe S. Total intravenous anesthesia and spontaneous respiration for airway endoscopy in

#### Airway complications in paediatric recovery

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#### Introduction and aims

The 4<sup>th</sup> National Audit Project (NAP4) showed that one third of airway complications occur during emergence or recovery, and that obstruction was the common cause of these events.<sup>[1]</sup> Children are at even greater risk of airway complications than adults<sup>[2]</sup>. The Royal College of Anaesthetists has proposed that less than five percent of patients in the recovery room should require airway support.<sup>[3]</sup> We compared the incidence of airway events in our dedicated paediatric recovery unit to national targets. This was part of a quality improvement project.

#### Methods

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We performed a retrospective analysis of data collected prospectively over a six-month period (Oct 2012-Mar 2013). The data was collected by recovery staff on a proforma and included the occurrence of desaturation <92%, presence of airway obstruction, requirement for simple airway intervention, use of drugs, attendance by an anaesthetist, and requirement for reintubation.

#### Results

A total of 2490 children were admitted to the recovery unit following anaesthesia. There were 23 reported airway problems, an incidence of 0.92%. All of these incidents involved patients desaturating <92%. The majority of these (21/23, 91.3%) were due to obstruction. Sixteen (70%) of the complications followed ENT or Maxillofacial procedures. Intraoperatively, sixteen (70%) children had been intubated, whilst seven (30%) had been managed with a Laryngeal Mask Airway (LMA). All airway complications were successfully managed with simple airway manoeuvres. An anaesthetist was always available when requested (20/23). No child required reintubation.

#### **Discussion and conclusions**

NAP4 showed that diagnosis of airway obstruction, particularly in recovery, was not always prompt, and carried particular risk as an anaesthetist may not be immediately available.<sup>[1]</sup> Both NAP4, and new guidelines published by the Association of Anaesthetists of Great Britain and Ireland (AAGBI) post anaesthetic care unit working party recommend that well trained recovery staff, effective monitoring, and timely medical input can help prevent poor outcomes. They have also suggested that capnography may be useful for timely recognition of airway complications in recovery.<sup>[1,2]</sup> Although our data show that our unit has a rate of airway complications below the nationally proposed targets, we are instituting a programme of teaching for recovery staff. This will include training in airway assessment, performance of practical airway skills and use of monitoring such as capnography. This is in line with the recommendations of NAP4, and the AAGBI.

#### References

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# 92

#### Cochlear implantation in children at Birmingham Children's Hospital: A prospective study of postoperative recovery and analgesic requirements Kate Thomas, Hardeep Chahal Birmingham Children's Hospital, Birmingahm, UK

#### Introduction and aims

Approximately 390 children in England and Wales are born with severe to profound deafness each year<sup>1</sup> Cochlear implantation is recommended as an option for these children and there is an increasing trend towards simultaneous bilateral implantation. Currently all patients at Birmingham Children's Hospital undergoing cochlear implantation are admitted overnight for post-operative care. The aim of this study was to assess the post operative recovery of these patients, in particular pain and analgesia requirements, and the incidence and management of vomiting, with a view to identifying patient groups that would potentially be suitable to cochlear implantation as day case surgery.

#### Methods

Data was collected prospectively between October 2012 to present (ongoing data collection) on all patients undergoing cochlear implantation. The data collected included demographic details, use of intra-operative and post-operative analgesia, time to first oral intake, pain scores and incidence of vomiting during the first 24 hour period post-operatively.

#### Results

A total of 19 patients with mean age of 4.5 years (0.8-16 years) presented for cochlear implantation surgery. 9 of these received a bilateral procedure. All patients received local anaesthetic infiltration at the start of surgery (lignocaine with adrenaline) and in 16 patients levobupivicaine was infiltrated at the end of surgery (84%). 2 patients (11%) required morphine in recovery with no further use of strong opiates in any patients during the first 24-hour period. Regular paracetamol and regular ibuprofen (if tolerated) was prescribed for all patients and 14 patients needed codeine post operatively. Average pain scores were low (0-1.2) with only two patients having a pain score of 2 or above 6 hours or longer since return from recovery. There were no post operative complications and all patients were discharged from hospital the following day.

#### Discussion and conclusion

Despite the length of surgery, recovery from uncomplicated cochlear implantation is well tolerated. Postoperative analoesic requirements can be sufficiently managed with oral paracetamol, ibuprofen and oral codeine phosphate. Selective patients should be considered appropriate to manage as day case procedures.

#### References

1. Cochlear implants for children and adults with severe to profound deafness. National institute for health and clinical excellence technology appraisal guidance 166. Jan 2009.

#### Soya, egg and nut allergy in children: A valid contraindication for the use of Propofol as a procedural sedative?

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#### Aim

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To determine if propofol is safe in children with food allergies.

#### Background

Propofol is a short acting sedative made in an emulsion containing soybean oil and egg lecithin<sup>1</sup> There are occasional reports of possible reactions to propofol in children allergic to egg, sova and/or nuts (ESN.) which has led to the belief that these allergies could be a contraindication for the use of propofol. Current Guidelines from the AAGBI (Association of Anaesthetists of Great Britain and Ireland) and BSACI (British Society of Allergy and Clinical immunology) state that patients with egg allergy or soya allergy should avoid propofol, but there is little or no evidence to support this statement. Propofol is ideal for short procedures such as paediatric endoscopy as it has rapid offset and does not cause any hangover effect resulting in a faster and safer recovery<sup>2</sup> Propofol is used extensively at our tertiary specialist Paediatric Gastroenterology unit where many endoscopies are performed in children with food allergies using propofol anaesthesia so we set about to assess if food allergies were a true contraindication to using this agent.

#### Methods

A retrospective case note review was performed to identify children who had a proven soya, eqg and/or nut allergy and had endoscopic examination using propofol anaesthesia. The nature of the food allergy and specific IgE to foods was noted as well as patient characteristics. Data on the type of anaesthesia and any adverse events during endoscopy were collected from the clinical notes and anaesthetic charts of these patients.

#### Results

We identified 140 children with food allergies (mean age of 7.1 years, median age of 6.3 years, range 0.5-17.8 years) from a two-year period (2011-2012) that fitted our selection criteria. Of these, 8.7% were eqg allergy, 12.8% were soya allergy, 2.7% were nut allergy, and 75.8% had a combination of food allergies. 18.1% were found to have positive specific IgE results to ESN (38.5% egg, 19.2% soya, 3.8% nut and 38.5% mixed.). Propofol use in these children ranged from 1mg/kg (induction dose) to 15mg/kg (total intravenous anaesthesia dose.) There were no allergic reactions whilst using propofol and no children required testing for propofol allergy.

#### Discussion and conclusion

No children with eqg, soya and/or nut allergies had any allergic reactions to propofol. We conclude that the use of propofol for short procedures such as endoscopy is safe and food allergies are not a contraindication for its use as an anaesthetic agent.

#### Reference

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- 2. Smith, 2011

#### Neonatal blood transfusion

Laura Bowes, Aarti Shah, Anuraag Guleria Royal Manchester Children's Hospital, Manchester, UK

#### Introduction and aims

"Neonates who may require several red cell transfusions within a few weeks should be allocated to a 'paedipack' system, where one donation is divided into four to eight small packs that can be used for sequential transfusions over the shelf life of the red cells (five weeks). By this means, the number of donors whose blood is transfused to the neonate is minimised<sup>11</sup>. Currently at RMCH adult blood packs are issued to neonates coming to theatre. Our aim was to ascertain if issuing paedipacks would reduce donor exposure, blood wastage and costs. We further aimed to use this information to revise the blood ordering schedule for neonates requiring surgery by determining the frequency and amount of blood transfused.

#### Methods

Audit committee approval was obtained. A retrospective audit of neonates that came to theatre over a three month period was conducted by reviewing case notes and the blood bank database. Data was collected for the type of operation, number of transfusions, number of donor exposures, and volume of blood given in theatre. Estimated blood wastage (based on an adult unit containing 280mls) was calculated. Cost analysis was performed based on the cost of an adult pack, and the cost of how many paedipacks would be required for an equal volume (allowing for blood lost in the giving set) to be administered. The costs involved were obtained from the National Blood Transfusion Service.

#### Results

A total of 63 procedures were performed over the three month period. Eleven neonates received blood intraoperatively. Surgical procedures included eight laparotomies, one tracheoesophageal fistula, one extensive tissue debridement, and one oesophageal fistula. Blood volumes transfused intraoperatively were between 18mls and 125mls with estimated blood wastage of 155-262mls. Total blood wasted was 2345mls. Eight of the eleven neonates had multiple transfusions. The use of paedipacks would reduce donor exposure by at least one. Cost analysis showed potential savings of £578.16 for the quarter.

#### **Discussion and conclusion**

Intraoperative use of paedipacks would reduce donor exposure by at least one donor in those receiving multiple transfusions reducing the risks of transfusion, transmitted infection<sup>2</sup> and antibody formation. Blood wastage would be reduced and cost savings, though minimal, would also be made; in no circumstances was it less cost effective to use paedipacks. We are in the process of revising the blood ordering schedule for surgical neonates to reduce donor exposure.

#### References

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## Childhood obesity and adverse perioperative respiratory events

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#### Introduction and aims

In England around 3 in 10 children aged 2-15 are overweight or obese (1). Previous studies have demonstrated that obesity is a risk factor for airway related complications (2) but there are few UK based studies. We conducted a prospective observational study at a large university hospital with a mixed general and specialist workload. Our aim was to determine the prevalence of obesity within our paediatric surgical population and to ascertain whether obese children were more likely to have an adverse respiratory event in the perioperative period. We also wanted to assess whether the presence of a paediatric anaesthetist affected the incidence of adverse events.

#### Methods

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After approval from the local ethics committee we aimed to complete an electronic form for all children aged 1-16 years undergoing elective or emergency surgery. Information collected included age, gender, ASA grade, type of surgery, airway device used, grade of laryngoscopy, seniority of anaesthetist managing the airway and whether an adverse respiratory event occurred in theatre or recovery. The events recorded included airway obstruction, desaturation, difficult mask ventilation, unplanned intubation, failed intubation, laryngospasm and bronchospasm. Recovery staff also recorded unplanned admissions to the critical care unit and whether the child required supplemental oxygen upon returning to the ward. Children with a body mass index above the 95th percentile for their age and gender were classified as obese and children above the 85th percentile were classified as overweight.

#### Results

Sufficient data was collected from 2219 anaesthetics. In this population 224 (10.1%) of the children were obese and 162 (7.3%) were overweight. A total of 131 adverse events occurred in 93 anaesthetics. 11 obese children, 10 overweight children and 72 children of normal weight had one or more respiratory event. Multivariable logistic regression did not show obesity to be an independent risk factor for the occurrence of an adverse respiratory event. Independent predictors did however include endotracheal intubation (p 0.002), the presence of co-morbidities (p 0.005) and ENT surgery (p 0.008). In this series fewer complications occurred when children were anaesthetised by a Consultant Paediatric Anaesthetist (p 0.04).

#### Discussion and conclusion

The prevalence of obesity within our surgical population was less than that occurring within the general population. The overall incidence of airway complications was low. This study did not demonstrate an overall increased risk associated with obesity.

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#### On-table-extubation following paediatric cardiac bypass surgery: The recent UK experience Peter Davis<sup>1</sup>, Henry Murdoch<sup>1</sup>, Philip McShane<sup>2</sup>, Andrew Wolf<sup>1</sup>

<sup>1</sup>Paediatric Intensive Care Unit. Bristol Roval Hospital for Children. Bristol. UK.<sup>2</sup>Paediatric Intensive Care Audit Network (PICANet), Paediatric Epidemiology Group, University of Leeds, Leeds, UK

#### Introduction and aims

Early extubation following paediatric cardiac surgery, including on-table-extubation, has been undertaken in North America for many years (1,2,3). Many significant benefits are accorded to this practice, although the evidence for this remains relatively poor (4). Given its potential advantages, we set out to describe the recent UK experience of on-table-extubation following paediatric cardiac bypass surgery.

#### Methods

Data was obtained from the Paediatric Intensive Care Audit Network (PICANet) for the 6-year period of 2006-2011 for children up to 18 years of age. Admissions to paediatric intensive care (PICU) following surgery that underwent cardiac bypass were identified, using the absence of mechanical ventilation in the first hour on PICU as a proxy for on-table-extubation. Data was also obtained in terms of age, gender, primary diagnosis and the procedures undertaken.

#### Results

889 of 14023 PICU admissions who were admitted following cardiac bypass surgery (6.3%) were not ventilated in the first hour of admission. Annual on-table-extubation rates varied between 5% (2011) and 9% (2008), with no evidence of the practice increasing in prevalence over time. The median age of children extubated on the table was 43 months (IQR 16 - 89 months). There was a slight predominance of males undergoing on-table-extubation (52.3% vs. 51.7% of all children undergoing cardiac bypass surgery). The commonest primary diagnosis of children undergoing on-table-extubation was Atrial Septal Defect (275 / 1222 = 20.8%; median age 49 months, iQR 29 - 80) and these admissions constituted 30.8% of all children who were not ventilated on PICU following cardiac bypass. Rates were significantly lower for children with other common diagnoses (Ventricular Septal Defect = 7.1%, Tetralogy of Fallot = 4.3%). For children undergoing Glenn or Fontan operations the rates were 9.1% and 12.5% respectively.

#### **Discussion and conclusions**

On-table-extubation following paediatric cardiac bypass surgery remains uncommon in the UK, even following operations that might show physiological benefit from spontaneous ventilation. Children undergoing closure of atrial septal defect are the most likely to not be ventilated post-operatively, a probable reflection of it being a relatively low risk operation in a slightly older group of children with a comparatively short bypass time.

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#### Implementation of a local guideline for neonatal difficult airway management and a neonatal difficult airway equipment box

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#### Introduction and aims

The unanticipated difficult airway in children is unusual but can cause extreme anxiety (1). This stress may be exacerbated in smaller, younger children with relatively low cardiorespiratory reserves. Following a small number of events in our local institution where the neonatal critical care unit encountered particularly challenging neonatal tracheal intubation in dysmorphic patients, we decided to take a multidisciplinary prospective review at management of the difficult neonatal airway within our organisation in order to optimise patient safety and quality of care in these extreme situations.

#### Methods

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Senior clinicians from neonatal critical care, paediatric anaesthesia and paediatric ENT surgery held several meetings and discussions to plan a guideline for a safe, organised approach to identifying a problem and escalating clinical care including lines of communication to obtain senior and specialised support. It was important for the latter issue to be addressed at a local level. For example, the main clinical area of work for paediatric ENT surgery and anaesthetics (including personnel and specialised equipment) is located a significant distance away from the neonatal critical care unit.

#### Results

A one-sided A4 algorithm was devised, using as much evidence or expert consensus based information available as possible. It has a colour-coded pathway of when and how to request further support including pager/telephone numbers and what specialised equipment may be useful to prepare in advance of specialised help attending.

A separate box of equipment for advanced airway management techniques including supraglottic airways, indirect laryngoscopy, and adjuncts for use in association with fibre-optic techniques has been introduced with training sessions for staff to become familiar with either preparation or use appropriate to skill requirements.

#### **Discussion and conclusion**

We have put in place a local structured process in order to support good practice in the management of the difficult neonatal airway which we had flagged up from local case reporting to be a rare but potentially serious situation in our Trust. The APAGBI has guidelines for young children but only down to one year old (2). The supporting information to these guidelines suggests that guidance is essentially a clinical issue. We have adapted the available information to our local needs and will be auditing future events to allow for further changes.

#### References

- 4th National Audit Project of the Royal College of Anaesthetists, Major complications of airway management in the UK, Report and findings, March 2011
- 2. Unanticipated difficult tracheal intubation - during routine induction of anaesthesia in a child aged 1 to 8 years, Paediatric Airway Guidelines 2012, Association of Paediatric Anaesthetists of Great Britain and Ireland

Conflicts of interest: None

# 102

Postnatal diagnosis of oesophageal atresia using ultrasound Benjamin Fox<sup>1</sup>, Amr Abdelaal<sup>1</sup>, Ahmed Aziz<sup>2</sup>

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#### Introduction

Oesophageal atresia is a relatively common condition involving the embryological development of the oesophagus and trachea. This case report presents a potential method of diagnosing oesophageal atresia using an S-Nerve Sonosite machine. Methods

We report a case of tracheo-oesophageal fistula in a 2.5 Kg full term baby 5 hours old. Following suitable pre-oxygenation 3mg/kg propofol. 2mg/kg suxamethonium and fentanyl 1 mcg/kg was given and the trachea was intubated. Following intubation the surgeon asked the anaesthetist to advance a nasogastric tube in the upper oesophagus. During insertion of the nasogastric tube the linear probe of a Sonosite S-nerve was placed in a transverse orientation in the suprasternal notch.

#### Results

We could easily identify the nasogastric tube in the oesophagus but resistance was encountered to further advancement. When we positioned the probe in a transverse orientation in the left second intercostal space in the midclavicular line we could see the transmitted movement of the tissue but not the nasogastric tube itself.

#### Discussion

When the diagnosis of oesophageal atresia is suspected the passage of a wide calibre feeding tube is warranted. In oesophageal atresia the tube will not pass beyond the 9-10cm mark from the lower alveolar ridge or 10-13 cm from the nares unless it has coiled in the mouth or the proximal oesophageal stump. A plain chest radiograph will confirm that the tube has failed to reach the stomach. We propose that during placment of this tube, the clinican can peform the aforementioned technique without resorting to chest radiography, especially where it is intratracheal or coiled in the mouth.

We present a case of using ultrsound examination to confirm the diagnosis of oespohageal atresia. We propose that this novel technique can be used as as part of a multimodal stragey to diagnose or exclude oesophageal atresia on the ward. We also suggest that our technique can be used to help confirm or exclude placement of routine nasogastric tubes.



## Anaesthetic challenges and management of colonic interposition

## Karmen Kemp<sup>c</sup>

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#### Introduction

Colonic interposition is an oesophageal replacement strategy for children with oesophageal stricture secondary to caustic ingestion and long gap oesophageal atresia.

It is a major surgical intervention with large fluid shifts, major hemodynamic challenges and high analgesic requirements. Postoperative complications are common and of a serious nature. Subsequent surgical procedures present unique challenges for anaesthesia. There is no literature reviewing anaesthetic challenges, techniques and post operative complications in this patient group.

#### Methods

Red Cross Children's Hospital has performed 77 colonic interpositions from 1958-2012. We have reviewed anaesthetic records, intensive care charts and surgical notes on all records obtainable. Preoperative condition, anaesthetic technique, duration of surgery, intraoperative challenges, post operative complications and intensive care course were analyzed. Complications related to repeat anaesthesia following colonic interposition was assessed. Although records were incomplete, we were able to get a thorough overview of the challenges facing this surgical intervention. An effective anaesthetic strategy could be developed.

#### Results

Children in our series were between 1 and 6 years old. Preoperative challenges included associated congenital abnormalities, severe procedure related anxiety, malnutrition, reflux, recurrent chest infections and distorted upper airway anatomy.

Children all received a standard general anaesthetic with central venous access and arterial line for monitoring. Postoperative comfort was best achieved in patients receiving a low thoracic epidural and a superficial cervical block. Additional analoesia included intravenous paracetamol and opioids.

Intraoperative challenges included heamodynamic instability due to fluid shifts, bloodloss and cardiac and vascular compression due to manipulation of thoracic structures inside an enclosed chest cavity.

The most common postoperative complication was pneumothoraces which was mostly anticipated intraoperatively with placement of an intercostal drain. 50% of patients developed pyrexia, 27% had x-ray changes consistent with pneumonia and 4 out of 19 patients had a pleural effusion postoperatively. Other complications encountered were laryngeal nerve palsy (1 of 19), excessive neck swelling prohibiting extubation (1 of 19) and residual metabolic acidosis (2 of 19). All patients were ventilated postoperatively and the average time for ventilation was 2,6 days. Late complications included wound dehiscence and sepsis. TPN was continued for an average of 8.9 days. Average intensive care stay was 7.8 days.

Children commonly require repeat gastroscopy and dilatation. 5 of 19 needed redo procedures to date to augment the anastomosis. Repeat anaesthetic procedures documented a high incidence of bolus regurgitation on induction despite long starvation periods. In one case with a high oesophageal anastomosis, the upper airway anatomy was severely distorted.

#### Conclusion

Anaesthesia for colonic interposition is a high risk procedure that requires thorough preoperative assessment and consideration. Communication with surgical colleagues is mandatory to anticipate intra and postoperative care as expert literature reviews are lacking.

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## Survey of fasting times in children undergoing elective surgery in a District General Hospital

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#### Introduction and aims

Prolonged fasting in children can lead to a less satisfactory perioperative experience and does not increase the risk of aspiration of gastric contents in the normal child <sup>(1,2)</sup>. The survey aims were to assess the fasting times of children presenting for elective surgery, and the reasons given for inadequate or excessive fasting times. A review of the information given to carers of paediatric patients presenting for elective surgery was undertaken, and an assessment made of carers understanding of the reasons for fasting.

#### Methods

Interviews of carers of children presenting for elective operations were carried out on the day of surgery prior to the child going to theatre. Parameters identified included:

- The fasting times told to the carers
- The actual fasting times of the child
- Reasons for excessive fasting times •
- The perceived risk of not fasting ٠
- Satisfaction with the amount of information given

#### Results

In total 99 interviews were conducted. There was an even split between morning and afternoon lists. 49% correctly stated 6 hours as the time advised to fast for solids, (range 6-15 hours, median 6 hours). 73% correctly stated 2 hours as the time advised to fast for clear liquids, (range 0-14, median 2 hours). The median fasting time for solids was 13 hours (range 5-20). 26% of cases had fasted for solids for 6 hours when interviewed. 63% of cases had fasted for 12 hours or more. The median fasting time for clear fluids was 6 hours (range 2-20). 23% of cases had fasted for clear fluids for 2 hours when interviewed. 40% had fasted for 8 hours or more. The most common reasons for fasting for clear fluids for longer than 6 hours were that carers believed it was forbidden, and that their child was not thirsty

The majority of carers appreciated the reason for fasting, and that there was a significant risk associated with not fasting. The majority believed they had received enough information about fasting prior to their child's admission.

#### **Discussion and conclusions**

In our hospital children are being fasted for excessively long periods of time prior to elective surgery, in particular for morning lists. This may indicate a lack of clarity in the verbal or written information provided. It is proposed to update the written information provided to carers, with a change in emphasis. Advice should be given to offer clear fluids to a child 2 hours before admission. The survey will be repeated once these changes are made.

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Documentation of allergy in children prior to an anaesthetic

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#### Introduction and aims

Administration of a drug (especially during an anaesthetic) that a patient is allergic to is a life threatening event, AAGBI and our trust have classed this to be a 'Never Event'. Appropriate patient document of alleroy would add to the steps taken towards prevention of these events in the peri-operative period.

Our aim was to audit the compliance of allergy documentation in children having an anaesthetic in our hospital.

#### Methods

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All theatres and remote location sites in our hospital were included for the audit. Both elective and emergency cases in all these locations were audited. A prospective, questionnaire based, snap-shot data collection method was adopted in this audit. The anaesthetist allocated for the list noted the documentation of allergy in drug charts, patient care plan and any allergy identification tags on patients on their arrival in the anaesthetic room. We also collected data of any critical incidences related to allergy that may have occured during the audit. We randomly allocated a 2 week slot for simultaneous collection of data in all anaesthetic areas of the hospital.

#### Results

A total of 36 completed audit forms were received. Results were analysed using MS office Excel software version 2003. Only two children(Incidence of 6%) had known allergies during the audit period. All the 36 patients arrived to theatres with the required drug charts and care plans.

We were astonished to discover that only 17/36 (48%) had complete documentation of allergy status. There was no documentation of allergy in drug charts or patient care plan in 7/36 (19%) of children arriving in the operating theatres. 19% had their allergy documented, but not signed or dated and 8% arrived with only signature on the charts. There was one child with multiple drug allergies during the audit, but surprisingly no documentation in either drug chart or patient care plan.

#### **Discussion and conclusions**

We were clearly below acceptable standards (100% compliance with allergy documentation as per established guidelines)<sup>1,</sup>

We have recommended that all clinical staff in the hospital involved with patient care to re-familiarise themselves with the trust guidelines. We have also suggested some simple but vital changes to the design of our hospital drug chart, which would enable better visualisation of the documentation and it is being implemented. Complete documentation of allergy will soon be made mandatory part of the pre-operative checklists (accepted by the trust after reviewing the results of our audit) and we have started the process to re-audit once the changes have been implemented.

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Authors did not receive any funding and do not have any conflicts of interests.

Parent satisfaction with anaesthesia care at the Royal National Throat Nose and Ear Hospital Mary Claire Avanis<sup>1</sup>, Catriona Ferguson<sup>2</sup>

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#### Introduction and aims

Patient satisfaction is an increasingly important measure of guality of delivered care in the NHS and in the future will impact on institutional funding [1]. The RNTNE Hospital is the UK's largest ear, nose and throat hospital and provides a dedicated paediatric day surgery service. We conducted a survey to determine the level of satisfaction amongst parents relating to anaesthesia care.

#### Methods

A validated guestionnaire modified to local needs was completed by parents of children receiving a general anaesthetic over a 6 week period [2].

#### Results

51 completed questionnaires were received and analysed. Pre-operative information: 80% of parents received written information about their child's anaesthetic before admission. Of the 20% that did not, 50% would have wanted information. Ward: 100% of parents described the ward as welcoming with sufficient activities to entertain their child. Pre-operative preparation: 98% of parents felt the anaesthetist was friendly towards their child, 100% felt they clearly explained the anaesthetic journey and gave them the opportunity to discuss any concerns. Anaesthetic room: 100% of parents reported that their child was welcomed and made to feel at ease in the anaesthetic room whilst 98% felt that the experience was a stress free as possible. 100% of parents were satisfied with the way their child was looked after as the anaesthetic began and 98% felt the experience reflected what had been previously explained. Postoperative care: 100% of parents were satisfied with the care their child received postoperatively. Efficiency: 76% of parents reported that the waiting time between arrival in hospital and the anaesthetic was 'just right'; 12% thought it was 'too long', 12% thought it was 'too short'. 80% felt that time between their child

waking up and going home was 'just right'. 10% thought it was 'too long', whilst 10% felt it was 'too short'. 98% of children were anaesthetised on the agreed date and time and 100% felt that their child's anaesthetic journey was well organised. 100% would recommend the RNTNE to a friend or family member.

## **Discussion and conclusions**

Satisfaction with the care received was high in all areas examined and parents were complimentary about their experience. Areas for improvement includes: (1) ensuring all parents receive preoperative information (2) minimising waiting times and providing explanations for delays. The future requires repeating such surveys in order to maintain and improve standards, including the child's opinion where possible.

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#### Two anaesthetists experience of rigid bronchoscopy

Julia Taylor, Simon Leach Great Ormond Street Hospital. London. UK

#### Introduction and aims

The authors are both anaesthetic research fellows and are investigators for an international, multicentre clinical trial (UK CRN ID 11524). This study aims to compare the effects of cuffed and uncuffed endotracheal tubes on the paediatric airway following prolonged intubation (>24 hours). As part of this trial we have learnt how to use a rigid bronchoscope (Hopkins rod telescope).

We use a Stortz camera with a portable 7-inch display (8401 ZX), a battery powered light source and age appropriate telescopes.

#### Methods

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We learnt how to perform a bronchoscopy during elective ENT lists under the direct supervision of a consultant. Following approximately 15 - 20 observed cases we commenced scoping independently.

Our patients are anaesthetised, paralysed and positioned on a shoulder roll prior to conventional laryngoscopy. Following the application of Ultrastop antifog solution, the telescope is introduced to obtain video footage from the glottic opening to the carina. If secretions obstruct the view they are removed using a flexible endotracheal tube suction catheter and Magill's forceps. The anaesthetist in charge of the case continually monitors the patient and in the event of desaturation the telescope is immediately removed to allow for oxygenation. Videos are recorded onto a SD card prior to transfer to a secure database.

#### Results

As with all new skills there has been a steep learning curve. Video failure has occurred on seven occasions (6%), either as a complete failure to record or images of such as poor quality that they have been unusable when reviewed. We have referred two cases (1%) to the ENT surgeons. In the first case we could not advance the telescope beyond the vocal cords and tracheal stenosis was subsequently diagnosed on formal MLB. The second child was found to have tracheomalacia. Seven parents (6%) have refused consent and four patients (3%) who consented had their surgery cancelled.

#### **Discussion and conclusion**

Learning how to manipulate a bronchoscope is a logical progression of our skills as "airway" experts. We have overcome several challenges including learning how to scope independently. The lack assistance from scrub staff to prepare and hand you the telescope and press record took some getting used to. The second major difference is the laryngoscope. In theatre a suspension laryngoscope is often used to leave both hands free, however we do not have this luxury. In addition, we must obtain our footage swiftly to ensure minimal disruption to the running of the list.

This skill could obviously be useful as a rescue technique in the difficult airway situation or for removal of foreign bodies where ENT cover is not immediately available. Should this become a core skill for all anaesthetists?

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#### Management of children for dental out-patient anaesthesia (DOPA): A survey of current Scottish practice

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#### Introduction and aims

In 2011, governing bodies from anaesthesia, dentistry and nursing published "Guidelines For The Management Of Children Referred For Dental Extractions Under General Anaesthesia" [1]. We surveyed paediatric anaesthetists across Scotland and compared current practice to recommendations in the document.

#### Methods

A request was sent to members of the Scottish Paediatric Anaesthetic Network to take part in a survey regarding current practice in the participant's hospital, inviting open comments where relevant. Certain key recommendations were chosen for closer scrutiny due to their relevance to anaesthesia.

#### Results

There were 35 survey responses, with representation from nearly every hospital offering DOPA. The response is representative of the DOPA care model available to the majority of Scottish patients. Only 57% of responders stated a 'two-visit' approach to DOPA. Less than half (43%) perform DOPA in a paediatric operating theatre, with most of the remainder making provision for paediatric patients in other areas. 68% have regular access to play specialists, and 77% have access to a registered children's nurse. The majority (88%) routinely use local anaesthetic cream pre-operatively. Analgesia by various routes is mostly nonopioid, but 8% use opioids 'always' and a further 59% use opioids 'sometimes' or 'often'. Intra-operatively, 100% routinely use SpO2, CO2 and agent monitoring, but there is a shortfall in use of non-invasive blood pressure (NIBP) and electrocardiography. In recovery, 100% routinely use SpO2, but not NIBP. 94% stated that discharge criteria for leaving recovery are independent of time passed since procedure/anaesthesia. 20% feel that the standard of care offered to DOPA patients falls below that offered to children having other surgery. Of the 29 responders aware of the guideline, only 6 had used it to implement change in practice.

#### **Discussion and conclusion**

The guideline is designed to promote patient safety, yet not every unit performing DOPA in Scotland conforms to all 25 key recommendations. Despite national guidance, not all units have taken it forward to effect change in practice, with lack of physical space and other resource being given as reasons for this. Varying referral pathways and analgesic regimes countrywide are inevitable, and designed to fit that area's demographic, but standards of care must be consistent for children undergoing all procedures, irrespective of how minor we, as clinicians, deem the procedure. Future work should be focused on bringing current practice in line with this national recommendation, and more importantly, standardising care of children across the board to the highest level.

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POSTERS

#### MEPA FC: Managing emergencies in paediatric anaesthesia for consultants - a new national paediatric simulation course for consultants

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#### Introduction and aims

There has been recent debate as to how consultants who cover children's anaesthetic services in nonspecialist hospitals can maintain their skills and knowledge (1, 2). Following on the success of the Managing Emergencies in Paediatric Anaesthesia (MEPA) national simulation course for trainees, the MEPA collaboration group designed a national course for consultants working in non-specialist hospitals.

#### Methods

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Following an initial meeting of the MEPA collaboration group in February 2010 it was agreed that the course should be mapped to the Royal College of Anaesthetists (RCoA) CPD Level 2 matrix for paediatric anaesthesia to contribute to revalidation (3). Evidence based, peer reviewed simulated scenarios, focused debriefs, presentations and workshops would be used to enhance learning of both non technical and clinical skills with respect to:

assessment/ management of the critically ill child (2D01), peri-operative care (2D02), vascular access (2D03), fluids (2D04), analgesia (2D05) and team working with paediatric intensive care (2D07). The course was successfully piloted at two teaching hospitals, modified accordingly and officially launched in August 2011.

#### Results

Eleven courses have been run at 3 centres in the UK. Forty six candidates completed feedback evaluation forms (including exposure to paediatric emergencies, non technical skills, clinical decision making, the environment as a safe learning place, skill retention, contribution to revalidation, and recommendation to others). All candidates had experienced at least one of the 8 simulated scenarios in clinical practice within the previous year. All respondents agreed/ strongly agreed that the course had increased their confidence in dealing with paediatric emergencies and skill retention and that it positively contributed towards revalidation. There was a 100% response with regard to the course enabling them to better utilise non technical skills. such as leadership, teamwork, communication and situational awareness. All candidates agreed that the simulations and debriefing were conducted in a safe and non-threatening environment and that they would recommend the course to their colleagues.

#### **Discussion and conclusion**

MEPA FC is a national simulation course based on RCoA CPD revalidation matrix that allows consultants/ non-training grade anaesthetists working in non-specialist hospitals to update their skills and knowledge in paediatric anaesthesia and resuscitation of the sick child. Standardised, evidence based, peer reviewed scenarios provide consistency for different centres. Feedback to date has been universally positive. The MEPA FC group encourages uptake of this course in centres throughout the UK.

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# 114

#### A survey of laryngeal topicalisation practice amongst paediatric anaesthetists Mari Roberts

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#### Introduction and aims

Applying topical larvngeal lignocaine is a frequently used technique, often used to prevent coughing<sup>1,2</sup> or other adverse respiratory events<sup>2</sup>. Common practice is to keep a child nil by mouth post topicalization to prevent against aspiration. However, lack of evidence exists as to the duration to which airway reflexes are obtunded, and before oral intake can be recommenced. In addition, a recent large observational audit<sup>2</sup> found a higher incidence of desaturation amongst patients receiving topicalization compared with those who did not, with no difference in larvngospasm or coughing rates. This survey aimed to look at the practice of using lignocaine to topicalize the larvnx amongst paediatric anaesthetists working in a tertiary centre.

#### Methods

All anaesthetists at Great Ormond Street Hospital were asked to complete a questionnaire. Information collected included indications, starvation times post topicalization, dose of lignocaine used and complications.

#### Results

Forty-eight anaesthetists (28 consultants, 20 trainees) completed the questionnaire. Forty-three (90%) used lignocaine to topicalize the larynx in their practice. All anaesthetists kept the child nil by mouth following topicalization. Duration ranged from one to five hours (median 2; IQR 2-3). One anaesthetist altered the duration depending on age. Indications included preventing coughing intraoperatively or postoperatively (37/43), preventing other perioperative respiratory adverse events e.g. laryngospasm (20/43), avoiding the use of neuromuscular blocking agents (13/43), facilitating anaesthesia for microlaryngoscopy surgery and to treat laryngospasm (1/43). Dose used ranged from 1 to 6mg/kg. 74% (32/43) used 3mg/kg or less. Six anaesthetists (14%) reported severe coughing and three (7%) laryngospasm on topicalization. There were no reported complications of aspiration.

#### **Discussion and conclusion**

Children are kept nil by mouth for up to five hours post lignocaine topicalization, which may lead to distress postoperatively. This is likely to reflect the lack of evidence as to the optimum and safe duration. One adult study found that 100mg of topical lignocaine depressed upper airway reflexes for a 100 minutes.<sup>3</sup> No paediatric studies exist and the effect of dose is unknown. Further studies are needed to clarify the optimum duration and to further evaluate the effectiveness of using lignocaine to prevent coughing and other perioperative respiratory events, which are common indications for use.

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Raphael JH, Stanley GD, Langton JA. Effects of topical benzocaine and lignocaine on upper airway

#### Audit of emergency department paediatric airway equipment

Raian Saini. Seth Galton Chelsea and Westminster Hospital. London. UK

#### Introduction and aims

Appropriate airway equipment in resuscitation areas is imperative for the safe provision of emergency care. In arrest scenarios adequately maintained airway equipment should be immediately available with studies highlighting equipment failure as being a reason for delay in up to 18% of arrest calls<sup>1,2</sup>. Our Emergency Department sees more than 33,000 children annually with guidelines stating that arrangements for the immediate care of critically ill children should be in place for any hospital managing children<sup>3</sup>. This study aimed to analyse the availability of appropriate paediatric airway equipment as compared to guidelines. Resuscitation Council UK guidelines for suggested equipment for the management of Paediatric Cardiopulmonary Arrest (0-16) (excluding resuscitation at birth) were used as the standard for the study<sup>4</sup>.

#### Methods

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A prospective audit of the airway trolley in the paediatric resuscitation bay was undertaken compared to the resuscitation council UK standard. These results were presented at the paediatric anaesthetic resuscitation meeting with suggestions for improvement. Post-intervention, airway equipment in the paediatric resuscitation area was re-audited.

#### Results

The initial audit showed availability of 41 of 50 (82%) desirable elements in the paediatric airway trolley when compared to pre-defined standards. Specific deficiencies included the absence of gum elastic bougie sizes 5ch and 10ch. Post presentation of results and subsequent intervention to improve equipment facilitated the fulfilment of 48 of 50 (96%) of desirable elements with the only deficiency being in Adult and Paediatric Pocket masks, consistent with trust protocol.

#### Discussion and conclusion

The audit highlights the initial absence of key components of paediatric airway equipment. Presentation of these results has led to the adequate replenishment of the paediatric airway trolley with equipment vital in the resuscitation of the critically ill child. The audit has encouraged the development of airway equipment guidelines in other trust areas such as the Paediatric HDU which conform to the above standards. Currently there is development of a teaching programme to aid Anaesthetist familiarity with airway equipment location.

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# 116

#### Development of an in-situ high fidelity paediatric simulation program: An anaesthetic-led multidisciplinary project

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#### Introduction

Simulation is recommended to practice unusual and high-risk paediatric scenarios in national policies.<sup>1, 2</sup> High fidelity, in-situ simulation is becoming a popular training tool for its cost- and space-effectiveness. It offers the opportunity for involvement of local teams, hence allowing analysis of system dynamics.<sup>3</sup>

#### Aims

- hospital.

#### Methods

The pilot project was launched in April 2012. The faculty includes two consultant paediatric anaesthetists, one senior theatre nurse and two anaesthetic trainees. The format is a one-hour session in a clinical area involved with routine or emergency paediatric care, during clinical hours, after prior arrangement with the relevant clinical leads. Participation is voluntary. Candidates are allocated to either their usual roles or to observe.

The session includes:

- a) Introduction to the simulated environment and manneouin
- b) Scenario performance
- Debriefing C)
- d) Guidelines refresher

Crisis Resource Management (CRM) principles are followed during the debriefing with no judgement of individual performance. Anonymous feedback forms are distributed to all participants at the end of each session.

#### Results

Even sessions have been run to date - five in operating theatres, one in Recovery and one in the Children's Acute Unit. One session was cancelled due to a concomitant clinical emergency.

71 members of staff have participated thus far (15 doctors, 24 nurses, 18 ODP, 4 support workers, 12 not specified)

Feedback has been rated positive or highly positive for perceived realism, increased confidence in dealing with the scenario, recommendation of scenario to other colleagues and simulation training becoming routine.

System issues highlighted include paediatric emergency trolley setup, familiarisation with emergency equipment and refreshment of specific guidelines.

#### Discussion and conclusions

Our experience confirms that in situ, high fidelity paediatric simulation may reach a considerable number of healthcare professionals in their actual workplace,<sup>4</sup> adding relevance and the potential to identify specific local organizational and training needs.<sup>3</sup> Increased logistical challenges arise when simulation is embedded in clinical times, requiring coordination between different teams and operational flexibility.

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Develop a high-fidelity in-situ paediatric simulation program for the staff of a 1000-bed academic

Involve all clinical areas delivering paediatric care (theatres, paediatric ward, A&E, adult ITU). Obtain participants' feedback and identify areas of improvement in specific local clinical settings.

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#### When are ex-preterm infants old enough for day-case inguinal hernia repair? An international survey of APAGBI members

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#### Introduction

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Conventional practice is for all infants < 60 weeks post-conceptual age (PCA) to be admitted overnight following a surgical repair of inguinal hernia due to risk of post-operative apnoea. However, anaemia and occurrence of apnoea in the recovery room have also been identified as independent predictors of post-op apnoea. In a meta-analysis1, Cote et al noted that the incidence of postoperative apnoea after general anaesthesia was much reduced (<0.5%) in those patients who were not anaemic and those who did not have appoea in the recovery room. Malviva et al2 concurred with Cote's findings that infants >50 weeks PCA could be safely anaesthetized as outpatients provided they had a completely unremarkable anaesthetic and recovery period.

The aim of this survey was to assess whether there was an appetite to change the guidelines for outpatient anaesthesia in expremature infants by stratifying risk. Would identifying those infants with anaemia and apnoea in the recovery room persuade paediatric anaesthetists to change their guidelines for same day discharge?

#### Methods

We conducted a web-based survey of all members of the Association of Paediatric Anaesthetists of Great Britain And Ireland (APAGBI) during May and June 2012.

#### Results

Of the 203 respondents. 52% worked in a tertiary paediatric hospital, 36% in a university teaching hospital and 12% in a district general hospital.

96% of respondents used PCA as the principal criterion to decide whether the infant needed admission overnight. 53% of respondents used PCA 60 weeks, 15% used PCA 52 weeks and 15% used PCA 56 weeks as their cut-off point for overnight admission.

65% do not routinely check pre-operative Haemoglobin

The commonest methods of post-operative apnoea monitoring included continuous pulse oximetry (86%), nursing observations (66%) and appoea mats (60%).

86% respondents felt that acceptable risk for post-operative apnoea should be less than 0.5% for any future study on this subject with almost 40% respondents unwilling to accept any risk greater than zero.

#### Conclusions

The findings of this survey suggest that even if the risk of approved was reduced to below 0.5% by stratifying infants to a low risk group (i.e. no anaemia and no recovery room apnoea) paediatric anaesthetists would be reluctant to change their criteria for same day discharge. Almost half of the respondents would only change their practise if the risk of postoperative apnoea was zero!

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# 120

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#### Aims and background

Nurse controlled analoesia (NCA) is the standard demand-led method of providing post-operative analoesia for patients who are too young or unable to use patient-controlled analgesia. Our aim was to evaluate the safety and efficacy of our institution's NCA regimen in neonates undergoing abdominal surgery.

#### Methods

We conducted a retrospective 3-year audit of neonates (post-conceptual age <44 weeks) who underwent a laparotomy and were extubated at the end of the procedure. Demographic data recorded included gestational age, post-conceptual age, weight, nature and urgency of procedure and the seniority of the operating surgeon. Use of simple analgesics (Paracetamol), regional analgesia (caudal) and intra-operative opioid was also recorded.

Our standard Morphine nurse-controlled analgesia (NCA) regimen consists of a 4 mcg/kg/hour background. 10 mcg/kg bolus and a 20 minute lockout period.

Pain was assessed by a trained neonatal nurse atleast hourly. A bolus was given when the neonate was deemed to be in moderate or severe pain. We measured the total duration of NCA used, the number of hours of background analgesia and the number of boluses used. Any complications due to the technique were recorded from the patient notes and pain data sheet.

#### Results

Data was collected from 88 neonates who fulfilled the afore-mentioned criteria. Background analgesia had to be stopped in 3 (3.4%) neonates due to complications (apnoea in 2 and bradycardia in 1). The background had to be increased to 6 mcg/kg/hr in 2 (2.3%) neonates due to inadequate analgesia. Erythema necessitated a change to Fentanyl NCA in 1 neonate. All other neonates experienced no complications. Morphine requirements were highest (156 mcg/kg/day) in the first 24 hours and decreased to 48 mcg/kg/day by day 2 following surgery. 94% of neonates were converted to oral analgesia by day 3. The average duration of background required was 27 hours (range 1-72 hours). Whilst on a background, an average of 8 boluses (range 0-36) were needed. A further average of 1.2 boluses were required (range 0-10) after stopping of the background. Average duration of NCA usage was 42 hours (range 14-90).

#### Conclusions

A Morphine NCA regimen of 4 mcg/kg/hour background, 10 mcg/kg bolus and 20 minute lockout provided safe and good quality of analgesia in most neonates following a laparotomy. The highest requirement of Morphine is in the first 24 hours followed by a significant reduction (to less than a third) by day 2. A continuous background seemed to be necessary for the first 24 hours post-operatively. NCA was discontinued by 48 hours in almost 75% of neonates.

# An audit of safety and efficacy of nurse controlled analgesia regimen following neonatal laparotomy

## Identification of infants with high exposure to anaesthesia: Preliminary findings

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#### Introduction and aims

Neuro apoptosis in the developing brain of animals is associated with high doses of common anaesthesia agents.1 In humans, strong evidence for a causal relationship may be gained by a randomised controlled trial (RCT) of standard anaesthesia versus a new, as yet unidentified, but potentially safer anaesthetic technique. This survey attempts to determine a group of infants who are at risk of a high anaesthesia exposure and who could therefore, in the future, be considered to take part in a RCT.

#### Methods

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The hospital database was searched for all infants born in 2006 who had had at least one anaesthetic (GA) in the first year of their lives. Permission was granted by the hospital information service and no details of patient identification were analysed. Data captured included age, date of operation, primary diagnosis, procedure performed under GA, length of GA and death. Groups of infants according to age and diagnosis at the first operation were described in terms of number of operations and the total length of exposure to anaesthesia. In these groups the risk of high exposure was calculated.

High exposure was defined as 3 or more GAs, or more than 4 hours of exposure in the first 3 months of life.

#### Results

Of 1452 infants, 645 had anaesthesia in the first 3 m of life, and of these, 83 had 3 or more GAs and 130 had > 4h exposure. In the first month of life 34 infants had ≥ 3 GAs and 82 had > 4h. The 3 largest diagnostic groups in the first 3 months of life were cardiac (n=165), intestinal (n=132) and respiratory (n=93). Within these diagnostic groups, the risks of ≥3GAs were 12, 20 and 16% and the risks of > 4h exposure were 45, 17 and 17% respectively. In infants who had an inquinal hernia repair, eye procedure and metabolic disorder (n = 46, 35 and 20) the risks of  $\geq$  3GAs were 0, 11 and 10% and the risks of >4h exposure were 0, 3 and 5% respectively.

#### **Discussion and conclusion**

Infants with cardiac, intestinal or respiratory diagnoses (according to the database) have the highest risk of high exposure to anaesthesia in the first 3m of life. Analysis of the clinical records is now required to describe anaesthesia exposure and neurological development in more detail. Future enquiry about educational outcome may be justified in infants who have had a high exposure to anaesthesia.

## Conflict of interests

There are no conflict of interests, financial support or funding sources to declare.

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# 123

Anaesthesia for muscle biopsy: A retrospective case series AJ Day, R Marcus, A Tatman

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#### Introduction

Children with suspected neuromuscular disorders are at increased risk of complications from anaesthesia including an estimated risk of malignant hyperthermia (MH) or rhabdomyolysis of <1.09%<sup>1</sup>. The aim of this study was to determine the types of anaesthetic performed in our institution and any adverse events in patients undergoing muscle biopsy.

#### Methods

Since April 2002 anaesthetic data has been collected on an electronic database detailing all aspects of the anaesthetic given and any perioperative anaesthetic events. We performed a retrospective review of 183 patients who underwent a muscle biopsy between 2002 and 2012. We examined the anaesthetic records, muscle biopsy histology and any recorded incidents.

#### Results

Of the 183 patients, 38 biopsy results were unavailable. From the remaining 145 patients, 63 biopsies were described as minimal, nonspecific or normal. Abnormal biopsies were consistent with 14 mitochondrial myopathies, 10 muscular dystrophies (MD), 15 congenital myopathies including 2 minicore and 3 central core, 9 unspecified myopathies and 3 motor neurone disease. 15 biopsies showed neuropathic disorders and 6 metabolic diseases.

In the 72 patients with a positive diagnosis of a neuromuscular disorder, 51.3% had received intravenous induction. Maintenance was with a volatile agent in 79.1%, total intravenous anaesthesia (TIVA) in 15.2% and data was missing in 5.7%. In patients with muscular dystrophy 6 out of 10 patients had received a volatile anaesthetic. In mitochondrial disorders 1 out of 14 patients received TIVA. Of patients with myopathies (including minicore/central core) 18 out of 24 had received a volatile anaesthetic. No patients exhibited signs or symptoms of malignant hyperthermia of rhabdomyolysis.

#### Discussion

The difficulty in anaesthetising children for a muscle biopsy is that the histological diagnosis is almost always unknown pre anaesthetic. Conditions such as King-Denborough syndrome, central core disease and Evans myopathy<sup>1</sup> are associated with MH. Hyperkalaemia and rhabdomyolysis can also develop in Duchenne muscular dystrophy after exposure to volatile agents and it has been recommended that volatile agents should be avoided in these patients<sup>2</sup>. There appears to be an increased risk of propofol infusion syndrome in mitochondrial myopathies but it is still acceptable for short procedures<sup>3</sup>.

#### Conclusions

There were no major perioperative anaesthesia related complications in children undergoing muscle biopsy in our review despite, in a number of cases, the use of anaesthetic techniques that in retrospect may not have been chosen if the histological diagnosis was known in advance.

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Lerman J. Perioperative management of the paediatric patient with coexisting neuromuscular

#### Reported drug events in paediatric anaesthesia: A retrospective analysis over a 10.5 year period AJ Day, R Marcus

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#### Introduction

Drug errors are a major cause of iatrogenic injury to patients. They occur in up to 0.75% of anaesthetics<sup>1</sup>

#### Methods

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Since April 2002 anaesthetic data has been collected on an electronic database detailing all aspects of the anaesthetic and any perioperative anaesthetic events. We define an 'anaesthetic event' as an event that affected, or could have affected, the safety of the patient whist under the care of an anaesthetist. This is a retrospective data analysis of all reported drug and fluid 'events' between 1<sup>st</sup> April 2002 and 31<sup>st</sup> December 2012 in a tertiary paediatric centre.

#### Results

There were 111.334 anaesthetic cases recorded on the database and 120 incidents relating to drug events reported. This represents a drug event rate of 1.07 per 1000 anaesthetics.

#### Wrong Dose

Overdose 53 (repeat 13), Underdose 2, No dose 4. Total 59

#### Wrong Route

Extravasation 38, Wrong route 5. Total 42

#### Wrona Drua

Drugs 8, Fluids 3, Wrong patient 3. Total 14

#### Other 4

Immediate major complications occurred in 8 cases (6.7%) with 1 patient experiencing permanent damage from extravasation injury. Minor complications occurred in 58 cases (48.3%). There were no incidents of awareness or death.

Contributing human factors included 67 occasions of failure to check, 33 drug miscalculations, 28 lack of care/distraction/concentration, 15 inexperience of skill or knowledge, 14 communication issues and 12 errors of judgement. System factors were thought to be involved in 60 cases (50%).

#### Discussion

Dosage errors are common in paediatric practice and accounted for 49.1% of reported drug events in this study. The commonest drug error involved paracetamol with frequent repeat dosing in theatre. Of greater concern were the 4 intravenous paracetamol overdoses of >75mg/kg all in under 1 year olds. The combination of young age, new preparation and a concentration of 10mg/ml seem to be contributory. Recognition of human factors, especially failure to check is important when designing systems to reduce error.

#### Conclusions

There was a low overall incidence of errors. It is within the reported incidence of 0.12 to 7.5 per 1000 anaesthetics<sup>2</sup>. Whilst changes have been made to our practice (e.g. drug labeling, storage, supervision and training), the sporadic nature of drug errors and the reliance on manual checking and system factors makes it difficult to reduce the incidence to zero.

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#### A retrospective study of anaesthetic hazard alerts: A 4-year review in a paediatric tertiary referral hospital

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#### Introduction and aims

Documentation of anaesthetic hazards provides an important resource for alerting anaesthetists when detecting new problems or identifying near misses. Analysing the contributing factors or events can provide invaluable information for highlighting and anticipating future incidents. Learning from mistakes, preventing harm and working as part of a team all form part of the discipline of safety, which is paramount in anaesthetic practice.

#### Methods

Data was collected from our electronic anaesthetic database which records information by voluntary reporting detailing patient demographics, anaesthetic technique and patient hazard alerts. We performed a retrospective review of patients in the database with a documented anaesthetic hazard during a 4-year period between 4<sup>th</sup> November 2008 and 10<sup>th</sup> March 2013.

#### Results

307 children were identified as having an anaesthetic hazard alert. There were 40,766 anaesthetic cases recorded on the database during this time giving an incidence of 0.75%. The most common reason for reporting a hazard was a difficult airway, with 182 patients (59.3%); 35% of these were a grade III intubation and 15% grade IV. Fibreoptic intubation was used in 40 cases. Other recorded hazards were difficult venous access (11.1%), very difficult child (3.6%), known malignant hyperthermia risk (3.6%), anaphylaxis (actual or risk of, 2%) and larvngospasm/bronchospasm (2%), 69 (22.5%) patients were known to have a syndrome, of which the mucopolysaccharidosis disorders and Pierre Robin, were the most common. The majority of hazard alerts were for elective cases (63.3%) with emergency surgery representing 6.7%. 32 patients (10.4%) were admitted to paediatric intensive care post-op, just under half of these admissions were unplanned. There were no reported perioperative deaths.

#### Discussion and conclusion

Our database provides a useful resource for highlighting possible risk factors associated with an increased incidence of perioperative morbidity in paediatric practice. Patients with known difficulties can be more appropriately managed to ensure a safer approach to future anaesthetics. The third NCEPOD report in children showed there was room for improvement in nearly a quarter of reported cases<sup>1</sup>. The Safe anaesthesia liaison group periodically reports incidents relating to anaesthesia<sup>2</sup>, however the introduction of a national reporting scheme specific to paediatric practice would provide an invaluable tool for clinicians working with children. As voluntary reporting generally forms the basis of such data collection, it will always be prone to bias and underreporting. Further clarification on the degree of harm from such hazards and a comparison with the rate of incident reporting forms an important aspect on the quality of the data obtained and should be included in future studies.

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1. Are we there yet? A review of organisational and clinical aspects of children's surgery. A report by

#### Paediatric day-case tonsillectomies

## Jenny Brooke, Dean Frear

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#### Introduction and aims

In 1985 The Royal College of Surgeons of England concluded that adenotonsillar surgery was unsuitable for day-case surgery.<sup>(1)</sup> However, the NHS plan published in 2000 targets 75% of operations to be day-cases<sup>(2)</sup> and there is increasing evidence of the safety of adentonsillar day-case surgery. This has led to more daycase tonsillectomies in both adults and children.

Cambridge University Hospital introduced a protocol for paediatric day-case tonsillectomies in March 2012. This included an exclusion criteria, suggested analgesia and a formal nurse-led follow-up.

This audit aimed to review adherence to the protocol and explore complications, with a view to expanding this programme.

#### Methods

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Patients who had a tonsillectomy between July and December 2012 were selected using Cambridge Hospitals Evaluation Quality System. The patients' notes were reviewed to assess the suitability of day-case surgery, to find any unplanned admissions or readmissions and to see if any other complications were revealed at follow-up. Travelling time was calculated using each patient's address.

#### Results

Between July and December 2012, 83 tonsillectomies were done in children aged under 5, which were excluded, and 84 in children aged 5-15. Of the latter:

- 34 were booked as inpatients
- 50 were booked as day-cases

Many patients were booked as day-cases inappropriately based on either co-morbidities or a travelling time from the hospital of over 30 minutes. Despite 50 patients being booked as day-cases, only 28 tonsillectomies were managed as day-cases. Of these patients:

- 10 were booked as day-cases inappropriately (3 based on co-morbidities and 7 based on travelling time)
- 6 were booked as inpatients and managed as day-cases (4 were managed as day-cases inappropriately based on co-morbidities)

Most inpatient procedures were appropriately booked, with only 4 cases that could potentially have been dav-cases.

On Day 1 follow-up by phone, the majority had no complications but 3 patients required readmission; a secondary bleed, a primary bleed and a patient with pain on post-operative day 2.

#### Conclusions

- Issues were found with incorrect booking of patients as day-cases and half of the patients treated as day-cases did not meet the protocol criteria.
- The incidence of complications post-operatively in day-case patients was small and of the readmissions only 1 could potentially have been prevented by an overnight stay.
- In general, where the protocol was applied correctly it allowed safe selection of paediatric patients for day-case tonsillectomies. Most exclusions were due to age, followed by co-morbidities and travelling time from the hospital. Service expansion should initially focus on accommodating a wider age range of patients.
- Further education of the surgeons may lead to fewer inappropriate bookings.

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#### Audit of current anaesthetic practice for surgical Patent Ductus Arteriosus (PDA) ligation at a single UK centre

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#### Background

Animal studies<sup>1</sup> suggest that exposing the developing brain to certain anaesthetic agents may be harmful. How this influences clinical practice is presently uncertain. We aimed to evaluate current anaesthetic techniques used for neonates undergoing PDA ligation at our institution. Our audit standard was provision of a standard anaesthetic (defined as hypnosis, analgesia and muscle relaxation) for all patients. Additionally cardiovascular stability associated with each technique was observed, as cardiovascular instability may be unavoidable with techniques deemed 'safer' for the developing brain.

#### Methods

This audit was registered with our Trusts Clinical Audit Team and ethical Approval was appropriately waived. We retrospectively reviewed anaesthetic charts of all neonates undergoing PDA ligation as a sole procedure from February to June 2012. Anaesthetic technique and cardiovascular stability (percentage change in mean arterial pressure, MAP, post induction) were analysed.

#### Results

During this period, 37 patients had the procedure, 9 were done in the operating theatre (group 1) and 21 in NICU (group 2), 7 patients were excluded for missing data. All group 1 patients received a volatile anaesthetic, a muscle relaxant and a median fentanyl dose of 4.9 (IQR 3.4 to 7.9). All group 2 patients received 'high dose' fentanyl and a muscle relaxant. Of these, 4 also had ketamine. The median dose of fentanyl with a hypnotic was 9 mcg/kg (IQR 4.6 to 17.25).17/ 21 patients received only fentanyl at a median dose of 20.2mcg/kg (IQR 15.3 to 32.15). The median weight for group 1 patients was 2.79kg (IQR 2.45 to 3.85) and for group 2 patients, 1.02kg (IQR 0.76 to 1.29). Post induction. Group 1 neonates had a median drop in MAP of 20.63% (IQR -37.9 to 0.43). Of Group 2 neonates, those having only fentanyl had a median drop in MAP of 9.97% (IQR -32.52 to 2.32), neonates having ketamine had a median increase of 8.54% (IQR 3.05 to 22.39).

#### Conclusions

Ketamine, although more cardiostable is avoided by most anaesthetists in our NICU in favour of a 'hypnotic free, high dose fentanyl ' anaesthetic. Dose ranges for fentanyl are wide. Limited access to an anaesthetic machine in our NICU likely plays some role in this variation. Presently clinical evidence supporting a particular anaesthetic technique for neonates is sparse. Requirement for analgesia is well established<sup>2</sup>, but requirement for hypnosis has been questioned<sup>3</sup> A clear rationale for anaesthetic technique in these small vulnerable patients is required.

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#### Feasibility and initial results of the implementation of a validated patient satisfaction with paediatric anaesthesia questionnaire

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#### Introduction

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Patient satisfaction is an important measure of the quality of healthcare. Satisfaction with anaesthesia is used as an outcome measure in clinical trials<sup>1</sup> and its measurement is also required to fulfil performance improvement and revalidation agendas for healthcare professionals.<sup>2</sup> Clinical experience tells us that appropriately developed or psychometrically validated instruments are not widely used in paediatric settings.<sup>3</sup> Within paediatric anaesthesia satisfaction measurement is complicated by the parent-child unit, and is an area where an evidence based process for developing satisfaction measures is important.<sup>4</sup> The aim of this project is to measure patient satisfaction and feed back the results to clinicians in order to facilitate quality improvement.

#### Methods

UCLH Research Ethics Committee approved this study as service evaluation. A psychometrically developed and validated written questionnaire<sup>4</sup> was distributed to all elective paediatric patients post-operatively for one month. The guestionnaire measures both the parent (5 guestions) & child's satisfaction (11 guestions) with the anaesthetic experience. The responses were anonymised but the name of the anaesthetist was recorded to facilitate feedback to individual consultants.

#### Results

There were a total of 154 general anaesthetics delivered with a 71% response rate, however, a question addressing whether the 'child had a generally bad experience' had a 15% missing/inaccurate answer response rate. The median score for the overall experience was 10 (range 5-10). Parents judged their child's 'emotional' experience to be good (median 9; range 4-10) with the child's 'fear' being the main concern. The greatest cause of anxiety for the child during the perioperative period was 'fear of pain' (72%).

#### Discussion

This pilot study demonstrates the feasibility and acceptability of this questionnaire measuring paediatric patient and parent satisfaction in a UK population. A potential weakness is that this questionnaire was developed in Italy, which means that cultural and sociodemographic concerns specific to the UK are not necessarily considered. Overall the satisfaction with anaesthetic care was excellent however the main parental concern was the child's 'pre-existing' fear; the main anxiety for children was fear and expectation of pain, demonstrating areas for improvement pre-operatively. Future work will consist of re-wording the questionnaire to clarify parental understanding of questions with poor response rates followed by re-piloting and further validation.

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## Parent satisfaction with arrangements for being present with their child at induction Wint Mon. Vaishali Adiga. Dan Tavlor

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Royal College of Anaesthetists' guidelines for the provision of paediatric anaesthetic services stated that parents should be involved in the care processes and provision should be made for parents to accompany their child to anaesthetic room. [1] Systematic review published in 2008 found that parental presence did not seem to benefit children's and parents' anxiety. [2] In this survey, we sought to find out if parents are satisfied with our department arrangement to provide family centred care.

#### Methods

We gained the permission from the department audit lead to carry out this survey. We distributed postoperative questionnaires on surgical wards over two weeks, 30 parents completed the survey. There are 3 main components in the survey. Firstly we asked age, sex and type of operation. In second part, we focussed on the pre-operative information including the fasting guideline that parents and children received. And the final component of the survey focussed on the parental satisfaction with peri-operative arrangements.

#### Results

Of 30 parents, 28 parents (93%) believed they were given adequate information regarding fasting guidelines. All 30 parents felt they were prepared with information about the procedures in anaesthetic room. And 100% of respondents felt supported in the anaesthetic room and when leaving the theatre complex. All respondents felt it was helpful for them to come to theatre. In the final part of the survey we asked the parents to rate their experience in anaesthetic room and overall peri-operative experience on the scale of 1 to 10 (10 being most satisfied). Average score for experience in anaesthetic room was 9.6 whilst that for overall peri-operative experience was 9.2.

#### Discussion

This survey showed that the majority of parents are satisfied with our department arrangements. However, it also showed that we needed to improve the information regarding fasting times.

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2. Getting the right start. National Service Framework for Children: Standard for Hospital

#### Perioperative paracetamol dosing in normal weight and overweight children

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#### Aims

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To evaluate the dose of oral and intravenous paracetamol administered to normal and overweight children To compare the dose administered to overweight children with that calculated based on ideal body weight

#### Introduction

Childhood obesity is an increasing epidemic. The latest Health Survey for England data show that 30.3% of children aged 2-15 years were overweight or obese (1).

Paracetamol is the analgesic of choice in children. There are cases of children developing liver toxicity who were said to be receiving therapeutic doses of paracetamol. This would suggest that in chronic therapy the therapeutic index in relation to hepatic disease is low (2). There is no guidance on adjusting the dose of paracetamol for overweight children, and the impact on clinical practice is unclear.

#### Methods

The notes of 73 children who had undergone day surgery were reviewed in September 2012. The patient's age, height, weight and sex were recorded. BMI and IBW (BMI @ 50th Centile x Ht (m2)) were calculated. The doses of paracetamol administered intraoperatively and postoperatively were noted.

#### Results

All patients received paracetamol intravenously intraoperatively. 6 patients of one year or less were given 10mg/kg or less, 3 patients were given the maximum dose of 1g. The remaining 64 patients were dosed at between 14 - 16 mg/kg.

53 patients were prescribed oral paracetamol postoperatively. 8 were appropriately prescribed 1g. Of the remaining 45 patients, 10 were prescribed between 14 - 18 mg/kg, less than the correct oral dose for postoperative pain relief of 20 mg/kg.

12 patients were overweight as based on BMI. If calculated on ideal body weight these 12 children received an intravenous dose of between 18 - 20.5 mg/kg and an oral dose of paracetamol of between 16 -20 mg/kg.

#### Conclusion

All patients are receiving intravenous paracetamol intraoperatively. Patients who are not overweight are receiving correct doses.

Overweight children receive doses based on ideal body weight which are up to 23% above the correct dose. This may induce toxicity if repeated doses are administered.

Over 20% of patients are underdosed with oral paracetamol. As a result none of the overweight children receive an overdose based on ideal body weight. However a large number of children maybe receiving a dose of paracetamol that is inadequate to provide optimum pain relief.

Care should be taken with overweight children when prescribing paracetamol. Children who are prescribed paracetamol for a prolonged period have the potential to experience overdose and toxicity. Consideration should be given to dosing these children according to IBW.

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# 133

#### Survey of transitional arrangements for perioperative care in the UK Paul M Rolfe, Liam J Brennan

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#### Introduction and aims

A generation ago, many children with complex medical conditions failed to survive childhood but with advances in medical care many are now surviving into adult life. The consequences for healthcare services of this cohort of paediatric chronic disease surviving into adulthood has been recognised for some time with recommendations for best practice in the transition from paediatric to adult healthcare published in the USA<sup>1</sup> and the UK<sup>2</sup>. Disappointingly there is very little in the literature regarding how perioperative care should be organised and delivered for this group of patients although a recent review has highlighted some of the key issues<sup>3</sup>

With this background we conducted a survey of APA linkpersons to obtain a snapshot of transitional care arrangements for perioperative care in the UK.

#### Methods

After obtaining the approval of the APA surveys committee we invited all UK APA linkpersons to complete an on-line survey of transitional arrangements for children's perioperative care at their hospital. We asked questions focussing on the following areas:

- collaborative working arrangements between paediatric and adult anaesthetists
- whether a local transitional policy for perioperative care exists •
- whether transitional arrangements were felt to be adequate
- Availability of dedicated ward facilities for adolescents

#### Results

We received 49 replies from a total of 142 APA linkpersons (38% response rate). [L1] This consisted of:

- Specialist Tertiary Paediatric Hospitals 18%
  - University Teaching Hospitals 22%
- District General Hospital <500 beds 28% •
- District General Hospital >500 beds 32%
- Single Speciality Hospital 4%

Collaborative working between paediatric and adult anaesthetists was reported by 79% of centres. A specific transitional policy existed in only 5% of hospitals, although transitional arrangements were stated as adequate in 64% of cases.

Results for facilities available to adolescents were as follows:

- Dedicated adolescent/young persons unit 8%
- Dedicated sleeping area on general paediatric ward 9%
- Separate rest/play facilities 19% •
- Separate toilet/washing facilities 16%
- Age appropriate games/books 28%
- Schooling for inpatients 13% ٠

#### Conclusions

- the majority of respondents felt was adequate for their patient's needs.
- worrying lack of dedicated sleeping, recreation and personal care facilities.

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 Although very few UK hospitals have policies in place for transitional care in the perioperative period there is evidence of collaborative working between adult and paediatric anaesthetists which

· Resources for adolescents and young people are generally inadequate in most hospitals with a

1. American Academy of Pediatrics. Consensus statement on healthcare transitions for young adults.

Brennan L J, Rolfe PM. Transition from pediatric to adult health services: the perioperative care

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Providing a safe and efficient general anaesthesia service for paediatric MRI is a challenge<sup>1</sup>. Our institution runs a weekly half-day list attended by several different, but usually single-handed, consultant anaesthetists, Patients are referred from a number of specialties, and interaction with the relevant clinicians on the day is frequently difficult. The anaesthetist usually takes written consent for the procedure, but inadequate documentation can hinder this process. Our MRI suite is separate from the admission ward, and delays often occur with transfers. Emergency requests are common, and have not been dealt with in uniform manner.

Concerns regarding patient safety and the patient experience prompted our guality improvement programme. Following an audit in 2011, we introduced a new booking protocol, arranged dedicated slots in a nurse led pre-assessment clinic and provided an anaesthetic liaison for discussion of emergency cases. In 2012 we re-audited our service, to evaluate both patient safety and list efficiency.

#### Methode

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Over a seventeen-week period (August to December 2012), data was collected prospectively on a pro-forma by the anaesthetist for all children undergoing general anaesthesia.

#### Results

There were 51 cases (44 elective and 7 emergency). 77% of elective cases were pre-assessed, and these cases were associated with fewer errors. The overall error rate fell from 80% to 29%; errors included inaccurate patient lists, incorrect scan requests, additional procedures required but not listed and inadequate notes or documentation. All emergency requests were appropriately discussed.

35% of the lists under-ran (2 patients or less) and delays were common, both with transfer to the MRI suite (27% of cases) and transfer back to the ward (27% of cases). These delays accounted for a mean of 18 min and 12.5 min per case respectively.

#### Discussion

Our results show a reduction in errors associated with the running of the MRI list. The measures we introduced after our first audit have led to increased efficiency, most likely as a result of the introduction of pre-assessment clinics, and from successful co-ordination of emergencies. However, the booking process still needs attention.

We are under pressure to provide all-day lists to meet increasing demand, but our data indicates approximately a third of the lists under-ran. It would seem sensible and more cost-effective to increase the efficiency of our existing service, as we a losing on average of 90 minutes per list. With input from all involved specialties, we will continue to look for other ways to improve.

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## 136

Monitoring of ischemia during cardiopulmonary bypass in paediatrics: Lactic acid - NIRS Daciano Gaona<sup>1</sup>, M<sup>a</sup> Dolores Carceles<sup>1</sup>, Pablo Motta<sup>2</sup>, Beatriz Furones<sup>1</sup>, Fernando Sanz<sup>1</sup>, Raguel Lopez<sup>1</sup>, Ventura Rabadan<sup>1</sup>

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#### Introduction and aim

Paediatric patients may be exposed to cerebral injuries during cardiac surgery, because of important hemodynamic variations, such as acute hypotension and cardiac arrest. Different types of monitors and tissue markers have been proposed for detection this tisular ischemia. Cardiovascular surgery with cardiopulmonary bypass (CPB) and hypothermia are associated with decreased oxygen consumption and cardiac index. Our goal was to describe the relationship of serum lactic acid with cerebral oxygenation in the different phases of CPB in paediatric congenital surgery.

#### Methods

After ethical committee approval and parental informed consent we enrolled 30 patients with congenital heart defects. All underwent CPB under moderate hypothermia (27°C). Cerebral regional oxygenation was monitored with INVOS-OXIMETER monitor (SOMANETICS TM). Two sensors located at cranial frontallateral regions, bilaterally, were used. Four blood samples were collected: T<sub>1</sub> (pre-CPB, normothermia and hemodynamic stable), T<sub>2</sub> y T<sub>3</sub> (27°C, 20min. and 40min., after achieving hypothermia) and T<sub>4</sub> (postoperative, normothermia and hemodynamic stable). Lactic acid levels were obtained by enzymatic method of F. Noll. It used t-Student test (SPSS Chicago), p<0.05.

#### Results

The mean age and weight were 1.53±0.7years (5days-8avers) 8.9±1.58kg(3-20kg). The average time of CPB was 63.8±7.08min. Cross clamping was 25.7±2.97min. There was an increased in lactic acid levels (mM) during surgery and postoperative. There were statistically significat differences (p<0.001), between initials preoperative lactic acid (T1) and posterior samples. No differences between bypass samples were found (T<sub>2</sub> y T<sub>3</sub>). Finally, we observed significant increased lactic acid (p<0.05) after recovery to normothermia. In 40% of the patients lactic acid increased during CPB while the bilateral cerebral rSO<sub>2</sub> decreased. In one patient rSO<sub>2</sub> fall down up to 50% of basal levels, correlating with increased lactic acid levels, hypotension, bleeding and coagulopathy.

#### Conclusions

In our experience, non-invasive cerebral oximetry is useful to detect ischemic episodes during CPB. This brain desaturation is associated with the increased lactic acid levels. Additional comparative studies will be required to see the strength of this association and its relationship with outcome.



#### Is post-thoracotomy pain being managed well in our tertiary referral paediatric hospital?

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#### Background

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Providing adequate and safe analgesia in the peri-operative period for children undergoing thoracic surgery can be challenging. Opioids are the mainstay of treatment, but these are associated with side effects. There has been increasing interest in the use of regional anaesthesia in thoracic anaesthesia, mainly in the use of extra-pleural catheters (EPC) and paravertebral catheters (PVC). An audit was performed in our hospital looking at EPCs and PVCs.

#### Methods

This was a retrospective chart review. The names of all the patients who had either an EPC or PVC inserted over the past three years were obtained.

#### Results

Forty-six children in total received regional anaesthesia for their thoracic surgery over a three year period. They ranged in age from 3 weeks old to 13 years of age.

There were 37 EPCs (80.4%) inserted under direct vision by the surgeons intra-operatively. The remaining 9 children (19.6%) had PVCs inserted by the anaesthetic team. All the blocks had an infusion running post operatively, at a weight appropriate rate. The infusion consisted of 0.125% levobupuvicaine (LB) with no opiate within. Only 2 children (4%) received a bolus of LB together with their background rate, despite all children having this prescribed it. The LB infusion ran on average for 48 hours.

Only 6 children (13%) received no opiate post operatively, the remainder (40 children) being on an opiate (morphine) infusion with doses ranging from 8-40mcg/kg/hr.

There was only one complication noted post operatively. All involved EPCs and all involved a leaking catheter that was removed as a result. There were 4 in total (8.7%). Eight children (17.4%) were further complicated with nausea and vomiting and all had received morphine.

The average pain score (CRIES) post operatively was 2.45. The average pain score for the children that had LB together with morphine was 2.27, whereas those that received only LB without any opiate had a pain score of 4. The average comfort score was similar in both groups with an average of 13.

All children received paracetamol post operatively, with 23 (50%) receiving a non-steroidal analgesics in addition. 26 children (56%) had clonidine.

#### Discussion

This audit shows that we had a low pain score in those patients who received both regional anaesthesia and opiate analgesia post op. No child maxed their 4-hourly LB limit. This would indicate that perhaps we could reduce the patient's opiate consumption by increasing the LB dose in either the infusion or by giving boli together with the infusion. The complication rate associated with the regional anaesthesia techniques were low.

This retrospective audit has shown that a double blind prospective study is warranted in this area comparing regional anaesthesia for post-operative thoracotomy pain with opiate analgesia in the paediatric population.

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The iPad as a distraction device to aid induction of anaesthesia Andrew Dalton, Jason Hardy Ninewells Hospital, Dundee, UK

#### Introduction

Induction of anaesthesia in children can be stressful and upsetting for the child. The use of local anaesthetic cream reduces the response to intravenous cannulation. However children still react to the process despite best efforts to distract them with a combination of pictures/books and verbal reassurance. This is also true with gaseous induction where some children find the application of a facemask distressing.

We decided to audit the response of the children to induction of anaesthesia by this new distraction method.

#### Methods

We aimed to compare the response to IV cannulation and gaseous induction of the traditional method of distraction with our newer iPad technique.

distraction device in use was solely books/pictures. This data described both the conduct of anaesthesia (IV vs gaseous) the ease of IV access, and the behaviour of the child in the anaesthetic room. We repeated the data collection in April 2012, this time using our now standard iPad distraction device.

#### Results

The patient demographics were similar (book group n=116 patients, age 0-5yrs 59 [51%], 5-10yrs 34 [29%], >10yrs 23 [20%] vs iPad group n=127 patients, age 0-5yrs 67 [53%], 5-10yrs 32 [25%], >10yrs 28[22%]). The mode of induction was also comparable (book group 73% intravenous vs iPad group 67%). IV access in awake patients was described as easy in 62/105 patients (59%) in the book group vs 77/91 (85%) in the iPad group (p<0.001). No response to IV cannulation was noted in 68/88 patients (77%) in the book group vs 82/91 (90%) in the iPad group (p=0.039). Smooth inhalational induction was documented in 22/32 patients (69%) in the book group vs 37/42 (88%) in the iPad group (p=0.077). Statistical analysis was performed using Fishers exact test.

#### Discussion

The results show improved compliance in the iPad group for anaesthesia induction. The difference in ease of IV access and the patient not responding to cannula insertion are both statistically significant, while the results for achieving a smooth inhalational induction show a trend towards an improved outcome. This fits with the anecdotal opinion of anaesthetists experienced in both techniques. We feel that for a generation of children now more used to using digital equipment than at any time previously, it makes sense to use a device that they will be both familiar with and enjoy using to improve cooperation with induction of anaesthesia.

#### References

1. Hopkins CS et al. Use of a lignocaine-prilocaine cream to prevent pain at intravenous induction of general anaesthesia in 1-5-year-old children. Anaesthesia 1988; 43: 198-201

- We have recently changed from using books/pictures as the distraction device to games/videos on an iPad.
- This was performed in two parts. We had previous data that had been collected in October 2008 when the

#### Audit of Pre-operative anaesthetic information given to parents in 'Great Ormond Street Hospital'

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#### Introduction

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For any parent their child's operation is a very stressful situation. Anaesthetic information given prior to the operation plays a vital role in reducing anxiety. It also helps parents and children understand what to expect and can avoid unnecessary cancellations. Recent NCEPOD report<sup>1</sup> has also recommended more use of written anaesthetic information.

#### Aim

We wanted to analyse the current practice of pre-operative anaesthetic information given to the patients/parents in our hospital, parental satisfaction and to compare it with the national standards<sup>2</sup>.

#### Methods

To have a good patient mix, audit was carried out in two day admission wards, Cardiac and Day surgery ward, over a period of four weeks. A questionnaire was devised to find out how parents have received the anaesthetic information, was that satisfactory and how would they actually prefer to receive it. It was distributed to the parents by the ward nurses at the time of admission and collected by the recovery nurses at the end of the operation.

#### Results

Total 68 complete forms were analysed. 100% parents had received pre-op anaesthetic information in some form. only 26.4 % received it by post, as compared to national standard of  $95\%^2$ 

100% parents were counselled by the anaesthetist on the day and had an opportunity to ask questions.Parental satisfaction regarding anesthetic discussion was found to be 97%. Overall anaesthetic experience was rated as excellent by 42.6% parents, 30% rated it as very good, 20.5% rated as good and none rated poor.

100% parents could get the information they needed when contacted the hospital pre-operatively. 76.4% parents had access to both mobile phones and internet. 69% parents were aware of hospital website and found it useful but still said it was the least preferred option for the anaesthetic information. Most preferred options found to be the written information by post and by the anaesthetist on the day.

#### **Discussion and conclusion**

Great Ormond Street Hospital provides a very good pre-operative anaesthetic information service especially by anaesthetists. Provision of the anaesthetic information and parental satisfaction meets the national standards in most of the areas. More patients can receive the information by post. As parents have access to mobile phones and internet, their use for fasting instruction reminders and sending website links for surgery specific anaesthetic information can be encouraged. Hospital website can be made more attractive by incorporating some infomative video clips.

Above suggestions were agreed upon at the clinical governance meeting and work has already started in few of these areas with multi professional input.

#### References

- 1. NCEPOD, Reports 2012-2011, Are We There Yet? (2011), P. 41.
- 2. Royal College of Anaesthetist, Raising the Standards: a compendium of audit recipes (p 178-179)

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