TRAINEE ABSTRACTS

SCOTTISH PAEDIATRIC ANAESTHESIA NETWORK

Annual Scientific Meeting, Dunkeld

Friday 26th April 2013

The iPad as a distraction device to aid induction of anaesthesia

A Dalton[1], J Hardy[2]

1. StR4, Ninewells Hospital, Dundee.
2. Consultant Anaesthetist, Ninewells Hospital, Dundee.

Abstract type: *audit*
Contact details: *andrewdalton@nhs.net*

Introduction
Induction of anaesthesia in children can be stressful and upsetting for both the patient and their parent/guardian. The use of local anaesthetic cream makes a significant difference to the response to intravenous cannulation.[1]
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.
In Ninewells we have recently changed from using the traditional books/pictures as the distraction device to games/videos on an iPad tablet device. We therefore 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.
This comparison was performed in two parts. We had previous data that had been collected in October 2008 when the 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, including response to intravenous access/inhalational induction as indicated.
We repeated the data collection in April 2012, this time using our now standard iPad distraction device, recording the same parameters as described above.
Ethics approval was not required, as we were not altering our practice for the study, simply auditing our current technique against the previous technique.

Results
The patient numbers and demographics were similar in each group (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% intravenous).
The ease of IV access (in awake patients), response to IV cannulation and response to inhalational induction (as applicable) are shown in Table 1 along with the p value for the difference (calculated by Fishers exact test).

	Book group	iPad group	P value
Ease of IV access	62/105 (59%)	77/91 (85%)	<0.001
No response to IV insertion	68/88 (77%)	82/91 (90%)	0.039
Smooth inhalational induction	22/32 (69%)	37/42 (88%)	0.077

Table 1: Response to anaesthesia induction

Discussion

For a similar group of patients the results show improved compliance in the iPad group irrespective of what technique was used 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 non-statistically significant trend towards an improved outcome. This fits with the anecdotal opinion of anaesthetists in our department 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. Pain-free injection in infants. 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

Pain and postoperative experience at home following discharge after paediatric tonsillectomy

P Docherty[1], S Russell[2], S Krosnar[3]

1. StR6, Edinburgh Royal Infirmary
2. Consultant, Victoria Hospital, Kirkaldy
3. Consultant, Royal Hospital for Sick Children, Edinburgh

Abstract type: *audit*
Contact details: *phildoch@googlemail.com*

Introduction

Tonsillectomy is one of the most frequently performed surgical operations in children and is frequently performed as a day case procedure. Pain levels have been studied in depth in hospital and the evidence concerning pain and experiences following discharge from hospital demonstrate pain is a significant issue post tonsillectomy [1-3]. This has been recognised by other centres, some of which have advocated children are discharged with an opioid prescription to deal with the painful and often prolonged recovery [4]. We undertook a multi-centre prospective audit to investigate the experiences of children and their parents following discharge from hospital.

Methods

Three centres participated during a ten-week period in the summer of 2012. Parents and children were asked to consent to a follow up phone call 2-4 days following discharge and then again at 2 weeks. They were asked to respond to a short structured telephone interview, which included pain levels, parental, and child expectation and primary care consultation rate. Data collected included a full analgesic history from theatre through to discharge and medication and advice upon discharge.

Results

65 patients were included in the study with data obtained from both telephone interviews. A further 11 were recruited but were unable to be contacted for one or both interviews and were not included. Children from 2 centres were discharged with paracetamol and ibuprofen, 1 centre advised parents to procure analgesia themselves. Primary care consultation rate was high at 53% for the 2-week post-operative period, which included either GP or NHS 24 consultation. The vast majority of contacts were for pain or eating and drinking issues related to pain. Pain was worse then parental expectation in 29 (45%) of patients and was described as worse than usual tonsillitis in 35 (54%) of patients. Pain at night was the most common complaint.

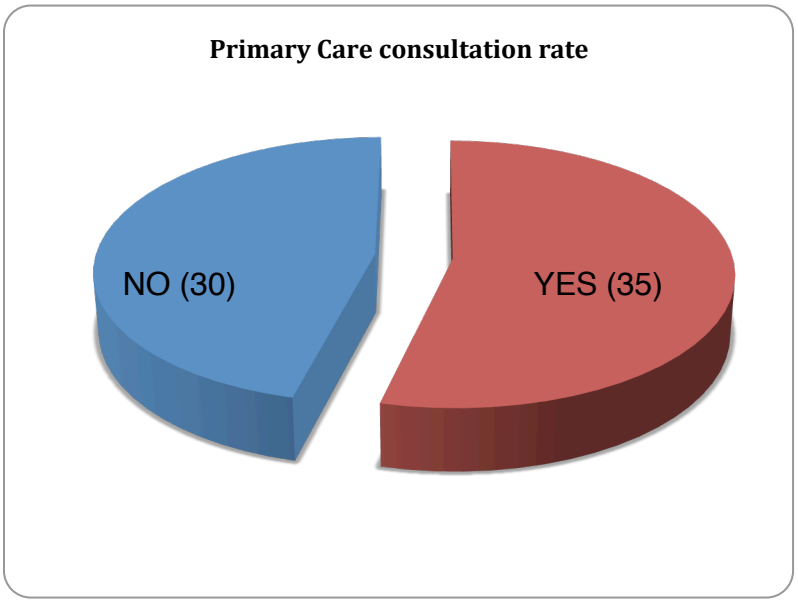

Figure 1 showing primary care consultation rate

Discussion

The audit demonstrated that pain at home remains a considerable issue for both children and parents. It also forms a considerable workload for primary care services. Pain at night represents a formidable burden for parents, particularly in the absence of formal, detailed discharge advice. The difficulties described by the parents in this audit have been investigated elsewhere and strategies including home follow up teams [5] and opioid discharge prescriptions[4] have been recommended. There is general agreement that non-steroidal anti-inflammatories do not increase bleeding risk and may be safely used [6] but our data suggests that in many instances paracetamol and ibuprofen alone is insufficient. There is concern regarding the efficacy of codeine and in response to post-operative deaths in the US the FDA has issued a safety alert [7]. Whilst improved discharge advice and instruction may help a further analgesic may be indicated. However further work is required to determine what, if any, analgesia may be safely and effectively introduced at home to alleviate both child and parental suffering.

References

1. Hamers JP, Abu-Saad HH. Children's pain at home following (adeno) tonsillectomy.
European Journal of Pain. 2002;6(3):213-9.

2. Homer JJ, Swallow J, Semple P. Audit of pain management at home following tonsillectomy in children. Journal of Laryngology and Otology. 2001 Mar;115(3):205-8.

3. Kotiniemi LH, Ryhänen PT, Valanne J, Jokela R, Mustonen A, Poukkula E. Postoperative symptoms at home following day-case surgery in children: a multicentre survey of 551 children. Anaesthesia. 1997 Oct;52(10):963-9.

4. Sutters KA, Holdridge-Zeuner D, Waite S, Paul SM, Savedra MC, Lanier B, Mahoney K, Miaskowski C. A descriptive feasibility study to evaluate scheduled oral analgesic dosing at home for the management of postoperative pain in preschool children following tonsillectomy.
Pain Medicine. 2012 Mar;13(3):472-83.

5. Shah C, Shahab R, Robb P, Roy D. Role of a home care team in paediatric day-case tonsillectomy. Journal of Laryngology and Otology. 2001 Jan;115(1):39-43.

6. Cardwell ME, Siviter G, Smith AF. Nonsteroidal anti-inflammatory drugs and perioperative bleeding in paediatric tonsillectomy. Cochrane Database of Systematic Reviews 2005, Issue 2. Art. No.: CD003591. DOI: 10.1002/14651858.CD003591.pub2.

7. FDA Safety Announcement August 2012.

The impact of an anaesthetic information leaflet for adolescents undergoing general anaesthesia

L.Dubiel[1], O.Lubeigt[2], G.Davies[3], G.Rodney[4]

1. StR7, Department of Anaesthesia, Ninewells Hospital and Medical School, Dundee, DD1 9SY
2. StR6, Wishaw Hospital
3. Consultant, Leeds Teaching Hospital
4. Ninewells Hospital, Dundee

Abstract type: *audit*
Contact details: *l.dubiel@nhs.net*

Introduction

It is reported that up to 80% of adolescents experience significant anxiety at the time of induction of anaesthesia.[1] Provision of printed information about anaesthesia is associated with reduced anxiety levels.[2] In addition, the resultant increase in patient knowledge is linked to greater compliance with treatment overall.[2] Most children want comprehensive information about their procedure and anaesthesia.[3] The Royal College of Anaesthetists and the Association of Paediatric Anaesthetists of Great Britain and Ireland have recently produced age specific information leaflets about general anaesthesia.

Aim

To assess the impact of introducing the RCOA/APAGBI leaflet, "A brief guide for young people" to the existing perioperative information provided to young people in our hospital. Additionally, its effect on perioperative anxiety levels.

Method

We surveyed patients aged between 11-16 years undergoing elective surgery in the Paediatric theatre. The survey was conducted twice - before and after introduction of the new information leaflet. The initial group of patients were provided with the usual perioperative information and asked to complete a questionnaire after their procedure. The second patient group were additionally provided with the RCOA/APAGBI information leaflet prior to their procedure and similarly asked to complete a questionnaire after their procedure. Questionnaires were distributed and collected by ward nursing staff and self-completed. We believed ethics approval was not required for the survey.

Results

28 questionnaires were completed in the pre-leaflet group, and 55 in the post-leaflet group. All patients in both groups were happy with the information received. All patients in the pre-leaflet group thought that the information was delivered at the right level for them to understand whilst 5% in the post leaflet group thought that it was too complicated. 74% of patients who received the new leaflet had all their questions answered compared to 64% of patients who

did not receive the leaflet. Self-reported anxiety levels were lower in the group that received the new leaflet, and a larger percentage acknowledged the new leaflet as a useful resource (33%) compared to the pre-existing leaflet (16%). Areas that patients wished more information about included clothing, fasting times, the process of going to sleep and waking up, post-op pain and complications.

Discussion

Whilst all patients were satisfied with the perioperative information they received, the new leaflet appears to provide patients with a more comprehensive understanding of the entire process, as demonstrated by decreased anxiety levels in the group that received the new leaflet. Whilst written information is useful, information from members of staff was rated highly as a useful source of information. This highlights the importance of the pre-operative anaesthetic visit in answering additional questions and allaying anxiety. The new information leaflet appears to provide more factual information about anaesthesia which may reduce anxiety levels, and is a useful resource to complement the information provided by other sources.

References

1. Fortier MA, Martin SR, Maclaren CJ, Mayes LC, Kain ZN. Preoperative anxiety in adolescents undergoing surgery: a pilot study. Paediatric Anaesthesia 2011;21(9):969-73.

2**.** Lee A, Chui PT, Gin T. Educating Patients About Anesthesia: A Systematic Review of Randomized Controlled Trials of Media-Based Interventions. Anesth Analg 2003;96:1424 –31

Just how easy is it to burst a reservoir bag?

J Erskine[1], G Bell[2] and K. Jerome[3]

1. St5, Glasgow Royal Infirmary, Glasgow, UK.
2. Consultant Anaesthetist, Royal Hospital for Sick Children, Glasgow, UK.
3. Anaesthetic nurse, Royal Hospital for Sick Children, Glasgow, UK.

Abstract type: *research*
Contact: *jocelynerskine@hotmail.com*

Introduction

In our institution, we commonly induce anaesthesia in the anaesthetic room using a modified Ayre's T piece breathing circuit and change to a circle system after transferring 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 in the closed position, with resulting distension of the reservoir bag and transmitted increase in intrapulmonary pressure. This could clearly have catastrophic consequences, particularly in paediatrics. In each instance, the bag distension has been quickly recognised and the APL valve opened, with no adverse effects on the patient.

Following these incidents, we decided to conduct a quality control study to investigate just how much pressure a reservoir bag can withstand before bursting.

Methods

We collected pre-used closed Intersurgical® reservoir bags in 0.5, 1 and 2 litre sizes from a cohort of batch numbers. The experiment was conducted in our theatre complex outwith standard working hours and using a Penlon Prima SP® anaesthetic machine. A Druck® Digital Pressure Indicator was connected to the expiratory limb of the circle breathing system via standard green oxygen tubing. The patient end of the breathing system was occluded. The APL valve was fully closed and each bag inflated with an oxygen/air mix using both flowmeters and oxygen flush (Figure 1). The maximal pressure measured prior to each bag bursting was recorded in millibar and subsequently converted into cmH_2O. We also measured the sound created by the bag bursting in decibels (dB) using the Multi Measures (SkyPaw Co. Ltd) App on an iPhone.

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

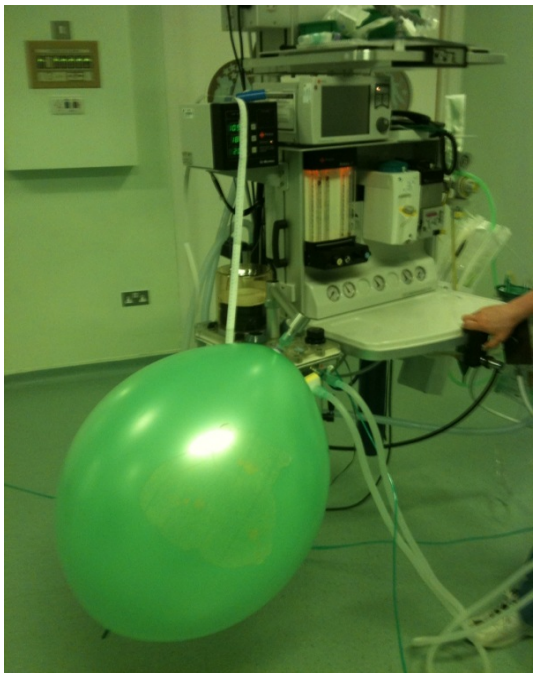

Figure 1. Testing apparatus demonstrating distension of a 1L bag.

Results

A total of 91 bags were burst (45 0.5L, 39 1L and seven 2L). Table 1 illustrates our results.

Bag size (Litres)	Pmax (cmH_2O)	Max dB
0.5	48.3 (6.2 [31.0-60.5])	99.5 (2.3 [94-105])
1	48.7 (6.3 [35.9-61.5])	101 (1.5 [95-101])
2	32.1 (5.6 [24.5-39.5])	100 (0.7 [99-101])

Table 1. Pmax and max dB measured for each bag size. Results are mean (SD [range]).

The bags burst in one of 2 ways. The bag either ripped from its mount/anti-occlusion cage (as it is designed to do) or burst longitudinally outwith the seam line

Discussion

One of the main functions of the reservoir bag is 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 Intersurgical® reservoir bags are made of vulcanised rubber and subjected to a variety of quality assurance checks as per ISO standards, including resistance to tearing and resistance to pressure required to distend the bag. Interestingly, the pressure required to burst the bags is not measured. The bags we tested burst at pressures generally <60cmH_2O, and

would be unlikely to expose a patient to significant, sustained high intrapulmonary pressures. The degree of distension the bags attained prior to bursting was so marked that it is inconceivable the bag would distend to anywhere near these pressures without the anaesthetist (and the rest of the theatre team) being aware.

References

1. Al-Shaikh B and Stacey S. (2007) *Essentials of Anaesthetic Equipment,* 3rd Edition, London: Churchill Livingstone.
2. Newton NI and Adams AP. Excessive airway pressure during anaesthesia. Hazards, effects and prevention. *Anaesthesia* 1978; **33(8)**: 689-99.

Pain At Home In Ambulatory Children After Dental Surgery

King A[1], Somaini M[1, 2], Campbell A[1], Engelhardt T[1]

1. Royal Aberdeen Children's Hospital, Department of Anaesthesiology, Aberdeen, United Kingdom
2. Dipartimento di Medicina Sperimentale. Università Milano Bicocca. Italy

Abstract type: *audit*
Contact: *adele.king@nhs.net*

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.[1] 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.[2] 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.

References:

1. Rony RY et al Pediatrics 2010; 125:e1372- e1378
2. Wilson G, **Engelhardt T**.Paediatr Anaesth. 2012 May; 22(5):442-4.
3. Atan S, et al. Int J Paediatr Dent 2004; 14:9-16.
4. Baygin O, et al. Int J Paediatr Dent. 2011 Jul;21(4):306-13
5. The Association Of Paediatric Anaesthetists Of Great Britain And Ireland. Anaesthesia 2011

A modern technique for anxiolysis in paediatric anaesthesia

Emma Pascall[1]

1. Medical Student, Bristol Medical School and Royal United Hospital, Bath

Abstract type *Survey*
Contact *ep8242@bristol.ac.uk*

Introduction

An estimated 70% of all children exhibit significant stress and anxiety before surgery [1]. Up to 60% of children undergoing surgery may have negative behavioural changes 2 weeks postoperatively including night crying, enuresis, separation anxiety, decreased eating improvement, apathy, withdrawal, and temper tantrums [2, 3]. Anxiety of the child at time of anaesthesia is one of the predictors for this [4]. Currently, there are three major preoperative modalities for the reduction of anxiety in children: behavioral preparation programs of various kinds, parental presence during induction of anesthesia (PPIA), and sedative premedication [5, 6]. Recently, anaesthetists have started using novel techniques to decrease anxiety levels of children preoperatively in the hope to ease anaesthesia and decrease these negative postoperative outcomes. This survey was designed to determine the current views on using iPads in paediatric anaesthesia in both patients and their parents and anaesthetists. This can help to determine if modern techniques are needed for anxiolysis in the anaesthesia of children.

Methods

A survey was sent out to all the anaesthetists in the Royal United Hospital, Bath. In addition a survey was done on patients and their parents scheduled for surgery on 3 separate days. The survey was designed to determine if anaesthetists had used the iPads during paediatric surgeries and if they thought it decreased anxiety and lead to decreased midazolam needed. The patient and parental surveys defined what ages had used it and their views on its use before surgeries by grading the iPad out of 10. Ethics approval was not required as all parents and anaesthetists were anonymised and verbally consented to their results being included.

Results

A total of 12 anaesthetists completed the survey ranging from CT2s to Consultants. 8 had used the iPad in paediatric surgeries and of these 2 scored it 10 out of 10, 1 scored it 9, 3 scored it 8, 1 scored it 7 and 1 scored it 6. Half of the anaesthetists thought it shortened time to anaesthetise the child and most said it was particularly good for children ages 4 years and older and for children with learning difficulties. Although there was positive feedback from the anaesthetists, the majority did not alter the dose of midazolam used, as this is determined before the preoperative room.

Out of the 20 children surveyed of ages from 2 to 13 years, 16 had used the iPad preoperatively, of which all felt it decreased their level of anxiety. The parents of all 16 children ranked the iPad 10 out of 10 and all 20 parents said they thought it should be used for all paediatric anaesthesia.

Discussion

The use of iPads is a novel technique in paediatric anaesthesia to reduce the level of anxiety, which could then reduce negative postoperative outcomes. However, from the results of this survey, patients and their parents value the iPad more than anaesthetists. When considering the patient and parents' views on this technique, it suggests we should be using iPads on all paediatric surgeries to increase the degree of anxiolysis postoperatively. However, it needs to be determined if this will lead to better postoperative outcomes. Further studies should be carried out into the negative postoperative outcomes in children who do and do not use the iPad during anaesthesia to see if results differ between groups.

References

1. Kain ZN, Mayes LC, O'Connor TZ, Cicchetti DV. Preoperative anxiety in children: predictors and outcomes. *Archives of Pediatric and Adolescent Medicine* 1996; **150**: 1238–45
2. Kotiniemi LH, Ryhanen PT, Moilanen IK. Behavioural changes in children following day-case surgery: a 4-week follow-up of 551 children. *Anaesthesia* 1997; **52**: 970–6
3. Kain Z, Mayes L, Caramico L, Hofstadter M. Distress during induction of anesthesia and postoperative behavioral outcomes. *Anesthesia Analgesia* 1999; **88**: 1042–7
4. Kain Z, Sevarino F, Rinder C. The preoperative behavioral stress response: does it exist? *Anesthesiology* 1999; **91**: A742
5. Kain ZN, Sevarino F, Alexander GM, et al. Predictors for postoperative pain in women undergoing surgery: a repeated measures design. Journal of Psychosomatic Research 2000; 49: 417–22
6. Kiecolt-Glaser JK, Page G, Marucha P, et al. Psychological influences on surgical recovery: perspectives from psychoneuroimmunology. *American Psychology* 1998; 53: 1209–18

Paediatric admissions to Intensive Care in a District General Hospital

J. Rae[1]

1. Raigmore Hospital, Inverness, Scotland

Abstract type *audit*
Contact details *john.rae@doctors.org.uk*

Introduction

In geographically isolated District General Hospitals (DGHs) it is necessary to have the capability to care for critically unwell children. In hospitals without dedicated paediatric critical care services this is accomplished within general adult ICUs and raises a number of issues surrounding staffing, equipment and procedures. Standards for Critically Ill Children [1] set out expected standards to be maintained in the DGH setting. Ensuring that both medical and nursing staff are competently trained to manage critically ill children is a crucial part of achieving these standards and is likely to come under increasing scrutiny in the light of recent events within the NHS where standards of patient care have been found to be severely lacking [2]. The small number of paediatric patients passing through such ICUs makes retaining skills challenging. This study aimed to quantify the paediatric workload of the adult Intensive Care Unit in Raigmore Hospital, a 570 bed DGH serving a population of approximately 300 000 in Inverness, Scotland.

Methods

Records of all children admitted to the adult ICU of Raigmore Hospital, Inverness in the 40 months from January 2008 to March 2012 were extracted from the Ward Watcher database. The data was analysed to examine trends in age, diagnosis, length of stay, procedures and discharge destination. No ethical approval was required.

Results

Over the 40 month period studied there were a total of 47 admissions aged 16 and under to ICU. This represents a mean of 14 paediatric admissions per year (range 11-16). The median age of children admitted was 4 years, with a range of 9 days – 16 years. Notably 10/47 children (20%) were aged less than 1 year. The breakdown of admissions by diagnostic type is shown in figure 1, with respiratory / airway problems making up the majority. 72% of children required respiratory support and were intubated and ventilated; 62% had an arterial line inserted; 47% had a central venous line inserted and 2% (1 child) required renal replacement therapy. No patients died. The median length of stay was 9.5 hours with a range of 2 hours to 24 days. 60% of children were retrieved or transferred to tertiary care with 40% discharged to the local paediatric ward or other wards within the hospital. Children discharged to a local destination were significantly older than those transferred to tertiary care.

Primary Diagnosis		Cases
Respiratory	-Airway problem -Asthma -Viral/bacterial chest infection -Croup	3 8 13 1
Sepsis (not otherwise specified)		3
Trauma	-Head injury -Non head trauma	3 4
Neurological (non traumatic)	-Seizures -Meningitis	3 2
Metabolic	-Poisoning -Diabetic keto-acidosis -Renal failure	3 2 1
Cardiac		1

Figure 1. Breakdown of admissions by recorded primary diagnosis

Discussion

Preserving the capacity to resuscitate and stabilise severely ill children is particularly important in a geographically isolated setting such as Inverness where tertiary support is some hours away. Furthermore in the event of an outbreak of infectious disease, such as an H1N1 pandemic, DGHs may be required to provide continuing care for critically ill children with only the youngest and sickest transferred to tertiary care [3]. The need to maintain paediatric facilities in non-tertiary hospitals has been recognised by the Royal College of Surgeons who have issued guidance to increase the number of elective paediatric cases carried out in the DGH setting [4]. It is evident from this review that the exposure to critically unwell children each year in our hospital is of a small volume and this poses significant challenges in maintaining knowledge and technical skills at an acceptable and safe level. There currently exists no formalised or structured method by which medical staff can maintain and update their skills in this challenging area of practice. Possible solutions include encouraging closer links with tertiary centres to develop opportunities for staff to undertake regular updates in paediatric anaesthesia and making more effective use of local elective paediatric lists as an educational tool.

References

[1] Paediatric Intensive Care Society. Standards for the Care of the Critically Ill Children 4th ed. London; Paediatric Intensive Care Society. 2010.

[2] Francis R. Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry. 2013.

[3] Jenkins I, Waldmann C, Taylor B. Critical care for children — 'back to the future'. Journal of the Intensive Care Society 2010;11(3):160.

[4] Royal College of Surgeons – Children's Surgical Forum. General Paediatric Surgery; Guidance for Commissioners. London: Children's Surgical Forum, Royal College of Surgeons of England, 2010.

Management of Children for Dental Out-Patient Anaesthesia (DOPA): A Survey of Current Scottish Practice

G Rodney[1], C Cumming[1] and **N Willis**[2]

1. Consultant, Ninewells Hospital, Dundee, UK
2. StR7, Ninewells Hospital, Dundee, UK

Abstract type *survey*
Contact details *nealwillis@nhs.net*

Introduction
In August 2011, a multidisciplinary team published "Guidelines For The Management Of Children Referred For Dental Extractions Under General Anaesthesia". Their aim was to "develop an evidence-based consensus on the care pathway from referral to discharge for children and young people who are referred for dental extractions under general anaesthesia" [1]. The bodies involved in creating this document include the APAGBI, Royal College of Anaesthetists, AAGBI, the Association of Dental Anaesthetists, British Society of Paediatric Dentistry, Royal College of Nursing and the Faculty of General Dental Practice. The key recommendations of this document are geared towards improving patient experience and satisfaction but most importantly, patient safety.

Methods
In February 2013, a request was sent out to all SPAN members to take part in a short (18 question) survey on surveymonkey.com, enquiring about current practice in the participant's hospital and inviting open comments where applicable. All questions were formulated to compare current practice across Scotland with the key recommendations set out in the document. Certain key recommendations were chosen for closer scrutiny due to their relevance to anaesthetic management. As a survey of current practice designed to stimulate discussion, ethical approval was not sought.

Results
There were 35 responses to the survey. The geographical spread was greater than expected. Only 57% of responders stated a 'two-visit' approach to DOPA, as recommended. Paediatric anaesthetists account for 51% of responders. Less than half (43%) of responders perform DOPA in a paediatric operating theatre, with most of the remainder making special provision for paediatric patients in other areas in line with guidance. 68% have regular access to play specialists in their areas, and 77% have access to a registered children's nurse. A majority (88%) routinely use local anaesthetic cream pre-operatively. In terms of intra-operative monitoring, 100% of responders routinely use SpO2, CO2 and agent monitoring, but there is a shortfall in use of non-invasive blood pressure monitoring (NIBP) and electrocardiography. In recovery, again 100% routinely use SpO2, but not NIBP. 94% of responders stated that discharge criteria are used independent of time to decide on

suitability for discharge from recovery, a recommendation of the working group. 20% feel that the standard of care offered to DOPA patients falls below that offered to children having other surgical procedures. Of 29 responders who were aware of the guidance, 6 had used the document to implement a change in practice.

Discussion

The guideline set out by the working group in August 2011 sets out 25 separate recommendations designed to improve patient care. Our survey can conclude few hard facts: Firstly, practice across the country is varied, and is likely to remain so for the foreseeable future. Secondly, not every unit in the country conforms to all 25 key recommendations and, thirdly, there is still a small group of anaesthetists who feel that the standards of care for DOPA are not comparable to those offered to children undergoing anaesthesia for other procedures. Varying referral pathways and analgesic regimes countrywide are inevitable, and designed to fit the demographic in that area, but standards of care must be consistent for children undergoing all procedures, irrespective of how minor we, as clinicians, feel the procedure may be. 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.

References

1. Guidelines for the management of children referred for dental extractions under general anaesthesia. August 2011. The Association of Paediatric Anaesthetists of Great Britain and Ireland.
http://www.apagbi.org.uk/publications/guidelines-other-organisations-0
(accessed 12/13/2013)

Paediatric weight calculations by trainees in South East Scotland

H. Usher[1], S. Garrioch[2], E. McGregor[3]

1. StR6, Borders General Hospital, Melrose, UK
2. StR3, Royal Hospital for Sick Children, Edinburgh, UK
3. StR5, Borders General Hospital, Melrose, UK

Abstract type: *research*
Contact details: *h.usher@nhs.net*

Introduction

Paediatric resuscitation and ongoing management relies on accurate assessment of a child's weight, for drug dosing, fluid administration and defibrillation. Different formulae can be applied to calculate a child's weight from their age. Recent work has suggested that the formula used in the European Paediatric Life Support Course [(age + 4) x 2 kg] may underestimate weight [1, 2]. We undertook a six month prospective audit of paediatric lists at two hospital sites to compare actual weights with those calculated using the EPLS formula. In addition, we surveyed all anaesthetic trainees in the region, asking which formula they would normally use to calculate a child's weight based on their age.

Methods

We collected data from paediatric lists at a District General Hospital and a tertiary referral Children's Hospital over a total period of six months. We identified the patients' ages and measured weights, and then compared them to their estimated weight using the formula [(age + 4) x 2 kg]. In addition, we sent out a survey to all anaesthetic trainees in South East Scotland using SurveyMonkey®, asking about their level of paediatric experience (both within anaesthetics and other areas). We also asked whether they had attended EPLS, Advanced Paediatric Life Support (ALSG) or Managing Emergencies in Paediatric Anaesthesia courses.

Results

160 patients were included in our study. Mean age was 7 (range 1-16 years). We found that calculating the weights using the formula [(age + 4) x 2] is reasonably accurate until 25 kg or aged less than 8 years and then there is a marked underestimation of weight (Figure 1).

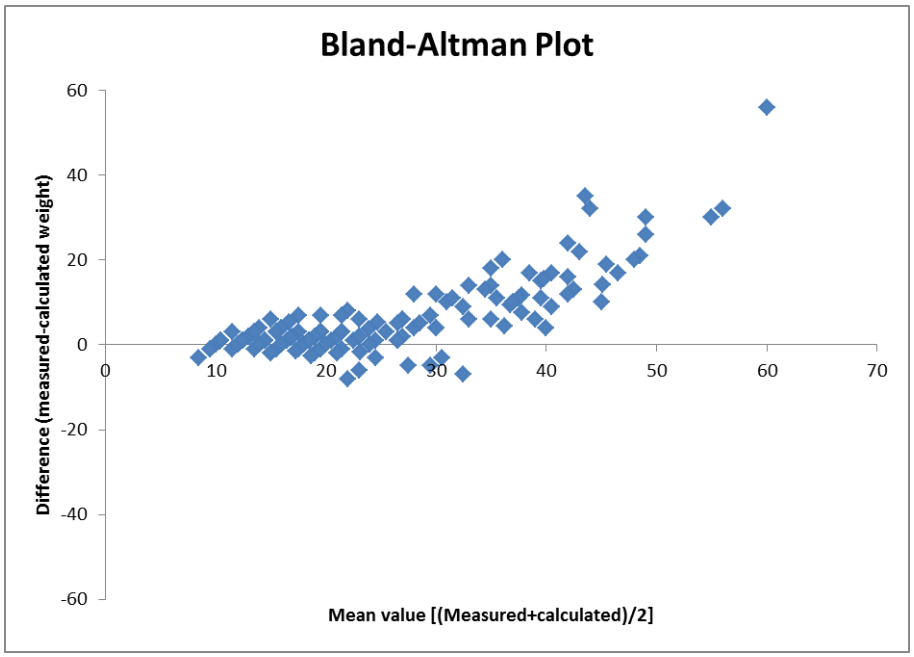

Figure 1. Bland-Altman plot showing good agreement between the predicted weight using the (age + 4) x 2 formula and a child's actual weight if they have a weight less than 25kg.

We found that above the age of eight, the calculated weight using this formula is rarely within 10% of actual weight. However, below five years, the estimated weight is within 10% of actual weight more than 50% of the time. In addition, in our study population, the [(age + 4) x 2] calculation is nearly always within 20% of actual weight for children aged eight or less and is normally an underestimation of weight. 39 trainees responded to our survey, of which 31 (79%) use the formula [(age + 4) x 2]. Four trainees used different formulae. Two of these trainees had undertaken an APLS course, and use their recommendation of different formulae for differing age groups.

Discussion

We found that the formula recommended by the Resuscitation Council, and used by the majority of our trainees, is reasonably accurate for younger children, but underestimates as children get older. However, there are multiple other factors involved, such as height, adipose tissue and lean body mass which affect drug dosing. The advantage of using the formula [(age + 4) x 2] noted by some of our trainees is that it is one formula which is "easy to remember" and does not rely on remembering multiple different formulae for different populations of children. It is also only a slight underestimation of weight for younger children so would result in an effective dose of drugs but would rarely result in a potential overdose. The converse to this is that fluid boluses or DC cardioversion energies may be of too low volume or energy to be effective in older children. This could result in hypovolaemia, increased use of blood products and failure of DC cardioversion as well as under-sizing of tracheal tubes. Would it be better to use a height based method in older children to avoid these problems?

References

1. Luscombe M, Owens B, Burke D. Weight estimation in paediatrics: a comparison of the APLS formula and the formula 'Weight = 3(age)+7'. Emergency Medicine Journal 2011; 28: 590-3.
2. Luscombe M, Owens B. Weight estimation in resuscitation: is the current formula still valid? Archives of Disease in Childhood 2007; 92:412-5

New Guidance, New Approach: The Airway Rescue Trolley in Paediatric Practice

N Willis[1], L Li[2], G Rodney[3] and B McGuire[3]

1. StR7, Ninewells Hospital, Dundee, UK
2. StR4, Ninewells Hospital, Dundee, UK
3. Consultant Anaesthetist, Ninewells Hospital, Dundee, UK

Abstract type *other (implementation of guidance and patient safety initiative)*
Contact *nealwillis@nhs.net*

Introduction

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 out-patient dental clinic. All are clearly signposted and clearly stored in each area. The trolley has five colour-coded drawers, the first four are 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

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.

References

1. Association of Anaesthetists of Great Britain and Ireland. Paediatric Airway Guidelines 2012, 2012. http://www.apagbi.org.uk/publications/apa-guidelines (accessed 27/01/2013).

2. Weiss M, Engelhardt T. Proposal for the management of the unexpected difficult pediatric airway. *Pediatric Anesthesia* 2010; **20**: 454-464

3. Fourth National Audit Project of the Royal College of Anaesthetists and Difficult Airway Society. Major complications of airway management in the United Kingdom. Report and Findings. March 2011. ISBN 978-1-9000936-03-3 Royal College of Anaesthetists. London http://www.rcoa.ac.uk/nap4/ (accessed 24/01/2013).

See www.span.scot.nhs.uk for details of future meetings and abstract submission guidelines.