SPAN - Oral Presentation Abstracts:

Front of neck access in paediatric practice- A survey of SPAN members
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Introduction and Aims
Front of neck access (FoNA) is a controversial subject in paediatric anaesthesia. Extremes of size, varying anatomy and low incidence of true "can't intubate, can't oxygenate" (CICO) makes it difficult to apply one solution to all patients. As in adult anaesthesia, a consensus has never been reached on 'best' technique. This survey asked anaesthetists to describe past experience of CICO requiring management by FoNA. NAP 4 recommends; training in cricothyroidotomy and an emphasis on early, clear decision-making in airway management. We asked what methods participants would use for FoNA should they encounter it, what equipment is available in their hospital, and what training is offered.

Methods
In March 2014, all members of the Scottish Paediatric Anaesthetic Network (SPAN) were invited to complete an online survey. The questions were mainly multiple choice format with additional opportunity for free-text.

Results
Of 42 total responses, 37 were consultants. There were 4 incidences of FoNA. If confronted in the future with the need for FoNA, 52% would choose cannula cricothyroidotomy and 31% surgical cricothyroidotomy. 17% stated they would not attempt FoNA under any circumstances.

Of those who chose cannula cricothyroidotomy, 64% stated they would subsequently oxygenate with a self-assembled device rather than a commercial device designed for purpose. Of those who chose surgical cricothyroidotomy, most (65%) chose a selection of separate instruments rather than pre-packaged kit designed for purpose. 94% were comfortable they could locate the necessary equipment in theatre, but a significant proportion did not know what was available in ITU (18%), HDU (47%) or Accident and Emergency (35%). Only 15% of respondents worked in departments that ran teaching sessions specifically including simulated CICO, and 47% stated there was no training available.

Discussion & Conclusion
Despite being rare, "Can't Intubate, Can't Oxygenate" does arise, as may the neeed for FoNA and the results may be catastrophic if management is not timely. The results suggest that anaesthetists are prepared in terms of what equipment to ask for and use in this situation and are also familiar with equipment in their theatre suite, but less so in outlying sites, where airway management may perhaps be more difficult. A proportion of anaesthetists have no access to training equipment, raising the concern that anaesthetists may be unfamiliar with equipment necessary for managing CICO. Although this survey focuses on FONA, it remains essential for all centres to keep basic airway skills up to date to potentially avoid CICO and to give forethought to potential future management.

References

1. 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.

Post-operative opioid analgesia for children
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Introduction and aims
Following recent MRHA restriction of codeine use [1] our hospital has introduced Oramorph as the post-operative opioid of choice for children both in-hospital and for take home analgesia. We were keen to gauge what colleagues are doing in centres throughout Scotland and compare it to our own experiences.

Methods
A survey was distributed via SurveyMonkey to members of the Scottish Paediatric Anaesthetic Network (SPAN) distribution list questioning: changes in practice of post-operative opioid analgesia use for children, opinions on efficacy, dosing regimes for in-hospital and take home opioids (particularly for post-tonsillectomy children) and provision of information leaflets regarding post-operative analgesia regimes.

Results
There were survey returns from anaesthetists working within 11 of the 14 NHS health boards in Scotland. 44% (33/75) of the SPAN distribution list members responded to the survey request. 78.8% (26/33) of respondents had changed their practice since the recent MHRA statement. Of those whose practice had not changed, most had not used codeine previously. Previous first choice of post-operative oral opioid had been codeine for 84.6% (22/26) with the remainder using Dihydrocodeine and Oramorph. New first choice is Oramorph for 84.6% (22/26) and Dihydrocodeine for the remainder. Of those using Oramorph currently 77.3% (17/22) ranked it as similar to or better than their previous choice. 19.2% (5/26) of respondents felt unable to comment due to lack of current information regarding analgesic efficacy at home. The majority (72.7%, 16/22) use Oramorph within the range 100-300micrograms/kg (min: 20micrograms/kg 3 hourly; max: 500micrograms/kg 4 hourly). Take home doses of Oramorph ranged from 3 to 10 doses and did not exceed 200 micrograms/kg. 43.4% provided no take home opioids routinely to post-operative tonsillectomy patients under 12 years without obstructive sleep apnoea (OSA), rising to 58.6% for children with OSA. Take home dosing for those with OSA tended towards the lower end of the range at 100 micrograms/kg. 45.2% of respondents were providing information leaflets on their current post-operative analgesic regime.

Discussion
The recent MHRA statement has resulted in a significant change in practice, with codeine no longer used as a first-line post-operative analgesia in children throughout Scotland. Nearly all respondents have switched oral opioid analgesia to Oramorph both in-hospital and as take home, with a small minority using Dihydrocodeine. Less than half are currently providing specific take home analgesia information leaflets, though these may be in progress. There are clear opportunities for further audit and research on the efficacy and side effects associated with opioid use and potential for collaboration under SPAN auspices to share practice and evaluate the transition to Oramorph.

References
1. MHRA. Codeine: restricted use as analgesic in children and adolescents after European
2. safety review. *Drug Safety Update* June 2013. vol 6, issue 11

Does presenting to a district general hospital have an impact on the mortality of children admitted to intensive care?

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Introduction and aims

In 2012 a total of 1381 patients were admitted to Scotland's two Paediatric Intensive Care Units (PICUs). In 15.2% of cases (211) the patient was transferred from another hospital to PICU. [1] The mortality benefits associated with the use of specialist paediatric retrieval teams and centralisation of PICU services have been discussed in the literature. [2,3] We sought to establish if presenting to our institution (a District General Hospital (DGH)) prior to being transferred to PICU impacted upon patient mortality.

Methods

All patient's transferred between July 2011 and July 2013 were retrospectively identified using data held by the Consultant with responsibility for paediatric retrieval at our institution. Demographic, transfer and mortality data were collected from the case notes of all patients identified as were data required to calculate patients' Paediatric Index of Mortality 2 (PIM2) scores.

Results

Thirty-five patients were transferred during the period studied. The mean patient age was 6.1 years. Mean time from admission to transfer was 24.6 hours. Of the 13 patients transferred from our institution's Critical Care Unit the median time spent in the unit was 3.5 hours (1-18). The mean percentage mortality as predicted by the PIM2 tool was 7.5% suggesting an expected number of deaths within the study population of 2.6. Of the study population two patients died giving an observed mortality rate of 5.7%. This equates to a standardised mortality ratio (SMR) of 0.76.

Discussion

Whilst we acknowledge the modest sample size and the well documented limitations of retrospective research methodology, our data and its analysis suggest that the observed mortality among patients presenting to our institution and then transferred to PICU is not higher than predicted by the well validated [4] PIM2 tool. An SMR of 0.76 also compares favourably with the overall SMRs of Scotland's two PICUs for the period 2010-2012 (0.84 and 0.98), as reported by the Paediatric Intensive Care Audit Network. [1] We suggest that further work is needed to assess whether these findings are replicated in children transferred from other DGHs throughout Scotland.

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[1] Paediatric Intensive Care Audit Network National Report for Scotland 2010 - 2012 (published January 2014): Universities of Leeds and Leicester.

[2] J. Britto, S. Nadel, I. Maconochie, M. Levin, P. Habibi. Morbidity and severity of illness during interhospital transfer: impact of a specialised paediatric retrieval team. *BMJ.* 311(7009): 836–839 (1995).

[3] Pearson G, Shann F, Barry P et al. Should paediatric intensive care be centralised? Trent versus Victoria. *Lancet*. 349(9060): 1213-7 (1997).

[4] Slater A, Shann F. The suitability of the Pediatric Index of Mortality (PIM), PIM2, the Pediatric Risk of Mortality (PRISM), and PRISM III for monitoring the quality of pediatric intensive care in Australia and New Zealand. *Pediatr Crit Care Med*. 5(5): 447-54 (2004).

Systematic review and meta-analysis of published animal studies of in vivo animal models of anaesthetic effects on the developing brain in neonates

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Introduction and Aim:

Preclinical studies have report anaesthesia-induced neurodegeneration and developmental delays, in neonatal animal, however clinical data in humans is limited (Sanders *et al.* 2013). Based on the animal findings the US FDA has recommendation that elective surgery in children under 3 years be avoid. UK bodies have not made changes to clinical guidance, however practitioners have adopted precautionary measures in their practice (Morton. 2011).

There is growing awareness of shortcomings in the conduct and reporting of animal research, which may lead to under- or over-estimations of effects (Sena *et al.* 2007). If recommendations are to be based on data derived from preclinical studies it is important to understand the validity of this literature.

The aim of this study was to identify all *in vivo* studies investigating the effects of general anaesthesia on the developing brain in neonatal animals, and to assess the internal validity of these experiments.

Method:

We systematically searched "PubMed", "Embase" and "Web of Science – Core Collection" to identify all *in vivo* studies reporting the impact of clinically used general anaesthetics on the developing brain. Two independent reviewers screened each abstract according to pre-specified inclusion and exclusion criteria. We assessed the quality of included studies against a modified version of the CAMARADES quality checklist (MacLeod *et al.* 2004).

Results:

7,526 studies were identified, of which 89 studies met inclusion criteria and were included in this systematic review, Of these 56 were rat studies (2472 animals). 26 were mouse studies (1509 animals) and 7 Rhesus macaque studies (84 animals).

58% of the studies reported random allocation to group and 39% reported blinded outcome assessment. 5% concealed treatment allocation and 3% reported a sample size calculation.

Discussion and Conclusion:

The studies included in this systematic review suggest exposure to general anaesthesia is harmful to the developing brain. However, our data highlights limitations in the internal validity and statistical power of these preclinical studies. As such the results they report should be interpreted with caution.

We will further assess this data using meta-analysis to pool the extent of anaesthesia-induced neurodegeneration and developmental delays in neonatal animals, as well as meta-regression, which will allow us to provide empirical evidence of the impact of study quality.

This approach will give insight into the quality of the animal studies underpinning current recommendations.

References:

Morton N, 2011 Anaesthesia and the Developing Brain. Association of Paediatric Anaesthetists of Great Britain and Ireland.

Macleod MR, *et al.* 2004 Pooling of animal experimental data reveals influence of study design and publication bias. Stroke. **35(5)**:1203-8.

Sanders RD *et al.*. 2013 Impact of anaesthetics and surgery on neurodevelopment: an update. *Britisj J Ana* **110(1):**52-72

Sena E *et al.* 2007 How can we improve the pre-clinical development of drugs for stroke? *Trends Neurosci* **30(9):**433:9

Audit of the Incidence of Emergence Delirium following general anaesthesia for paediatric surgery in Ninewells Hospital

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Introduction and aims

Emergence delirium (ED) is a recognized complication following general anaesthesia, more common in children than adults. The condition is usually self-limiting (15-20 mins) but can result in harm to the child or delayed discharge in the short-term, and can follow a protracted course with disturbed sleep and temperament for two weeks[1]. Awareness of the risk of ED and strategies to reduce its risk, therefore, should be of concern to those delivering paediatric peri-operative care. Accordingly, we sought to investigate the incidence of ED as it occurs in Ninewells Hospital and to allow recovery staff and ward staff to be alert in detecting signs of ED.

Methods

The Watcha Scale, a 5-point (0-4) scoring system, has been shown to be a sensitive indicator for ED where children score 3 or 4 points [2]. Over eight days all children undergoing surgery at Ninewells Hospital were assessed for the presence of ED in recovery immediately following emergence, and 30 minutes after returning to the ward. As well as scoring children for ED, patient demographics and anaesthetic techniques were recorded.

Results

Forty-three surgical cases were assessed for signs of ED. Eight children (19%) had Watcha Scores of 3 or 4 in recovery and were likely to have ED. Three children continued to show signs of ED 30 minutes after leaving recovery. All those displaying ED were below 5 years old and had received volatile anaesthetic. Half of those with delirium had received opioids. Total Intravenous Anaesthesia (TIVA) was used in only 7% of cases.

Discussion and conclusion

This audit shows the local incidence of ED in Ninewells is approximately 1 in 5 children in recovery, and persists in 1 in 15. It confirms that pre-school children form the core of the “at risk” group. Further reading shows that anxious children with poor adaptability are at increased risk, as are those undergoing ENT and Ophthalmology procedures. These children at risk of ED can be identified pre-operatively. Anaesthetic technique is a modifiable risk factor that can contribute to or reduce the risk of ED. Benzodiazepines, Barbiturates, Atropine, and Droperidol (BBAD) have been shown to increase the risk of ED and should be avoided. Avoidance of volatile agents and a TIVA (Propofol +/- opioid infusion) technique have been shown to reduce the incidence of ED. In summary, pre-school children

for ENT or Ophthalmology procedures should be actively identified and preferably managed with a TIVA technique, avoiding BBAD drugs. TIVA is currently employed in the minority (7%) of cases in Ninewells due to unfamiliarity and the pressures of teaching established volatile techniques to juniors. In order to reduce the incidence of ED, a culture shift in practice from volatile anaesthetic to TIVA in the "at-risk" group of children should occur. There are two responses to this audit. Firstly, raising awareness of ED and the use of the Watcha Scale locally by displaying our results. Secondly, the use of TIVA will be targeted at the at-risk group followed by a re-audit to establish the incidence of delirium following the change in practice.

References

[1] Paediatric Emergence Delirium. Reduque L, Verghese S. Contin Edu Anaesth Crit Care Pain (2013) 13 (2): 39-41

[2] Watcha Scale

Behaviour	**Score**
Asleep	0
Calm	1
Crying, but can be consoled	2
Crying, but cannot be consoled	3
Agitated and thrashing around	4