



The rise and fall of anaesthesia-related neurotoxicity and the immature developing human brain

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This editorial addresses the concern of neurodegeneration of developing brain from exposure of anaesthesia. The authors highlight a few fundamental issues in the previous research which derived 'apoptosis theory'. The original animal studies were not driven by well defined associations between exposure to general anaesthesia and subsequent specific neurocognitive deficits in human infants. It is difficult to translate these animal studies to human like translating brain development stages in animals to humans, anaesthetic management used in animal studies is very different to clinical practice in human. The human brain has a potential for neural plasticity and compensation after major cerebral insults in early life. Considering the fact that the fraction of brain cells that undergo enhanced (95–40) programmed cell death in these studies (animal) in fact is less than 0.1% of the total number of cerebral neurons. It seems very unlikely that this tiny and discrete extra loss of brain cells should be associated with any long term effects later in life. Regardless of everything above, neonates and infants require and need important surgical interventions to be performed without delay. The recent 2-year interim analysis of the GAS study reports that sevoflurane exposure of up to 1 h in infancy (up to 60 weeks post-conceptual age) does not increase the risk of adverse neurodevelopmental outcome.

The effect of age and increasing head-up tilt on pre-oxygenation times in children: a randomised exploratory study

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Pre oxygenation is an important component of safe anaesthetic delivery. Adult studies showed the upright position during pre oxygenation can reduce the desaturation during apnoea. In this randomized exploratory trial 120 children requiring general anaesthesia for elective surgery of ASA 1 or 2 analysed in two age group 1-8 years and 9-16 years. The patients with known cardio respiratory disease, known difficult airway, known upper respiratory tract infection in the past 2 weeks and with acute abdominal pathology were excluded. The primary outcome was to measure the time to adequate pre oxygenation (end tidal oxygen fraction ≥ 0.9) in the groups in supine, 30 and 45 degree head up position. From the start of the first breath with 100% oxygen, the end tidal fraction of oxygen was recorded every 10s till the end tidal fraction of oxygen ≥ 0.9 achieved on the gas



monitor. The median (IQR) time to reach the end point was 80(59-114) s in the younger group and 150 (107-211) s in the older group. The end point was reached in 90% of children in approximately 160 s in the younger group and 271 s in the older group. There was not any statistically significant difference between the three positions within each group to reach the end point. It should be noted that recommended period of 3 min pre oxygenation may be insufficient for many older patients.

Reducing paediatric medication error through quality improvement networks; where evidence meets pragmatism.

Cass H

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The National Patient Safety Agency, estimated an adverse event rate of between 2.1% and 10.8% of hospital admissions for patients aged 0–17. ‘Medication errors’ were the most commonly reported incident type in the paediatric population (17% of incidents in children and 15% in neonates). The age group 0–4 years had the second highest percentage of medication incidents of all age groups. Due to extensive use of unlicensed and/ or off-label drug usage and too common paediatric medication error, medicines pose risk to children. Taking into account both the evidence base and the front-line practicalities, the Paediatric Medicines Safety Board proposed that a pragmatic approach to improvement should be pursued, encompassing the following elements: 1 the development of a medicines safety quality improvement network. The organisations may join this network and share local data on PME, thus enabling more effective evaluation of outcomes. 2. Development and/or sharing of clinical decision support tools. 3. Collation of existing educational resources to reduce duplication and development of any additional educational resources. A quality improvement network supporting these three elements is being developed. It has two parts MedsIQ and Paediatric Care Online UK. MedsIQ brings together tools and improvement projects that have been developed to specifically address the problem of PME and is engaging with other key networks. A rating system allows users to score resources that they use, so that highly rated tools will spread more effectively. The second component, Paediatric Care provides UK quality-assured clinical decision support tools and other important resources in a format that can be crosshyperlinked to quality-assured practice guidance.



Changes in intracuff pressure of cuffed endotracheal tubes while positioning for adenotonsillectomy in children

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Intracuff pressure of cuffed endotracheal tubes can be changed with the change of head and neck position. In this study 84 patients, <18 years of age, undergoing adenotonsillectomy under general anaesthesia were included. Intracuff pressure of endotracheal tube was recorded initially after inflation of cuff and subsequently after neck extension, placement of a shoulder roll, insertion of the Crow-Davis retractor, suspension from a Mayo stand, and positioning for surgery. In 46 patients (54.8%), the intracuff pressure increased from baseline after positioning for adenotonsillectomy. In 12 of these patients (14.3%), the intracuff pressure was >30 cmH₂O. The intracuff pressure decreased in 28 patients (33.3%), while no change was noted in 10 patients (11.9%). Higher intracuff pressure may result in a higher risk of damage to the tracheal mucosa. A decrease in the intracuff pressure can result in an air leak resulting in inadequate ventilation, increased risk of aspiration, and even predispose to airway fire if oxygen-enriched gases are used. Continuous intracuff pressure monitoring or rechecking the intracuff pressure after positioning for adenotonsillectomy may be indicated.

What is new in the European and UK neonatal resuscitation guidance?

J Wyllie, S Ainsworth

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The title of the guidelines has been changed from Resuscitation at Birth to Resuscitation and support of transition at birth to reflect an emphasis on supporting transition to air breathing rather than resuscitation. A delay in the clamping of the cord of at least 1 min from the time of complete delivery of the baby is recommended for all babies when possible.

The newborn baby's temperature should be maintained in the normal range (36.5°C to 37.5°C) unless it is being considered for therapeutic hypothermia. Active steps should be taken to achieve this.

An accurate assessment of heart rate can be made using ECG or pulse oximetry.



Tracheal intubation and suction is no longer routine for any baby born through meconium-stained liquor. Instead the emphasis should be on providing appropriate resuscitative manoeuvres as soon as possible and only intubate the trachea for suction in those infants whose airway is blocked.

Begin the resuscitation of term babies in air and that of preterm babies (<35 weeks gestation) in low concentrations of oxygen (21%–30%). Use pulse oximetry to guide subsequent use of oxygen.

Nasal CPAP may be used during the transition and subsequent respiratory support of spontaneously breathing preterm infants (<30 weeks gestation).

Chest compressions are started when the heart rate remains less than 60/min after five effective inflation breaths and 30 s of effective ventilation. Coordinate compressions and ventilations at a ratio of 3:1.

Where possible brief the team before resuscitation and debrief afterwards. Counsel and communicate with the parents in a timely manner.

Patient-Controlled Analgesia Plus Background Opioid Infusion for Postoperative Pain in Children: A Systematic Review and Meta-Analysis of Randomized Trials.

J Hayes, J Dowling, A Peliowski *et al*

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PCA devices have been shown to provide superior analgesia and greater patient satisfaction compared with intermittent administration. Studies comparing the efficacy of PCA with and without a background infusion for postoperative analgesia in children vary considerably in terms of dosing and methodologic quality, making it difficult for practitioners to derive clinically useful information. The purpose of this meta-analysis was to assess whether the addition of a background infusion to PCA bolus administration of an opioid analgesic is more effective (defined as lower pain scores) than PCA bolus alone in the postoperative population specific to children.

Selected studies were randomized controlled studies comparing PCA bolus with PCA bolus plus background infusion for postoperative analgesia in children aged 0 to 18 years and adolescents aged 13 to 21 years undergoing any form of surgery that used patient-reported pain scores as an outcome measure. Independent assessment of the risk of bias for each outcome and the certainty in the estimates of effect for critically important outcomes (pain scores, nausea and/or vomiting, excessive sedation) using Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology. Subgroup analyses based on dose of background infusion (high versus low dose) and risk of bias (low versus high/unclear) were performed.



There were no significant differences found with respect to pain scores 12 and 24 hours after surgery, opioid consumption, or risk of adverse events with the addition of a background opioid infusion to PCA opioid bolus doses. The quality of the evidence was deemed to be low to very low.

Further high-quality studies are required.

Preoperative bleeding management in pediatric patients

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Perioperative bleeding management can be very challenging in paediatric patients. There are concerns regarding transfusion related morbidity and mortality. Current management approach should focus on correction of anaemia and coagulopathy with blood products transfusion only when clinically indicated and guided by goal directed therapies. Pre-operative blood management strategies should include, schedule surgery at optimal time, early diagnosis and treatment of anaemias, and stimulate erythropoiesis and education of professionals. Intra operatively optimize tissue oxygen delivery and uptake, careful blood pressure management and fluid management avoid haemodilution and acidosis, normothermia, clear haemorrhage management protocol, optimal surgical technique, use of topical haemostatic agents and ant fibrinolytic, POC haemostasis assessment, use of cell salvage and transfusion of appropriate type and volume of products including purified coagulation products and avoid over transfusion. Postoperative goals include, optimisation of cardiac output, oxygen delivery and fluid management, limitation of iatrogenic blood loss, tolerate anaemia and if necessary treatment with iron therapy and stimulate erythropoiesis, use of Vit K for coagulopathy, clear blood transfusion guidelines and consider antifibrinolytics. A detailed understanding of pathophysiology of bleeding and coagulopathy along with goal directed approach is important for safe management of bleeding and coagulopathy during major paediatric surgery.

Systematic literature review with comorbid autism spectrum disorder: a Interventions for paediatric surgery patients

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This systematic review included 11 articles published between 1997 and 2016 to survey perioperative interventions for the autism spectrum disorder (ASD) population. The following practices are highlighted from the available literature: collaboration with caregivers regarding patient management including tailored pre and postoperative approaches, rehearsal and other desensitisation efforts, departure from a sole focus on sedation or restraint of the combative or



uncooperative patient. This review reveals a paucity of research in this particular area. It supports the concepts of tailored perioperative care.

Recovery position significantly associated with a reduced admission rate of children with loss of consciousness

Sebastien Julliand et al

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The response of caregivers to a child with LOC (loss of consciousness) has been poorly investigated. Potential caregivers (parents, teachers) seem to have a poor knowledge of the recovery position (RP). This prospective study was conducted to report the management and diagnoses of LOC in childhood, and to evaluate variables associated with an increased hospital admission rate. 553 children aged between 0 and 18 years of age were included. The most common causes of LOC were seizures (50.3%) and vasovagal syncope (22.4%).

In 26.2% cases RP was performed. The RP was independently associated with a significant decrease in the admission rate (aOR=0.28; 95% CI 0.17 to 0.48; $p<0.0001$).