

Part 11: Pediatric Basic Life Support and Cardiopulmonary Resuscitation Quality: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

Atkins DL, Berger S, *et al.*

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Part 12: Pediatric Advanced Life Support: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care.

de Caen AR, Berg MD, *et al.*

Circulation. 2015 Nov 3; 132(18 Suppl 2):S526-42

This must-read paper is a publication of The American Heart Association's (AHA) updated guidelines on paediatric Basic Life Support and Paediatric Advanced Life Support.

Regarding pre-arrest care, medical emergency teams and Paediatric Early Warning Scores are handled. The implications for fluid management, in the light of the FEAST trial results, are discussed. The role of atropine prior to emergency intubation of critically ill children is updated. On intra-arrest care, the place of ECMO in children with underlying cardiac disease is discussed. ETCO₂ monitoring to guide evaluation of chest compression quality is mentioned. Shock doses are discussed and special mention is made of lignocaine that has been shown to improve ROSC rates compared to amiodarone in shock-resistant shockable rhythms. For post-arrest care, evidence-based recommendations are made regarding temperature management as well as oxygen, CO₂, and BP targets.

In-hospital cardiac arrest survival-to-discharge continues to improve, mostly with favourable neurological outcomes. Separate guidelines for a lone rescuer and for 2 or more rescuers have been developed, the former incorporating a note to activate emergency response systems via mobile phone. Commencing resuscitation with compressions (C), as opposed to airway (A), is suggested in an attempt to improve bystander CPR rates by minimising complexity via a universal algorithm. Compression rates and depths are discussed as well as the role for compression-only CPR.

<http://www.ncbi.nlm.nih.gov/pubmed/26472999>

<http://www.ncbi.nlm.nih.gov/pubmed/26473000>

Infective Endocarditis in Childhood: 2015 Update: A Scientific Statement From the American Heart Association.

Baltimore RS, Gewitz M, *et al.*

Circulation. 2015 Oct 13;132(15):1487-515

The American Heart Association (AHA) has published a scientific statement on infective endocarditis (IE) in childhood. Prophylaxis for IE is one of the aspects covered in this paper.

NICE guidelines in the UK recommend eliminating prophylactic antibiotic drugs under any circumstance and since NICE guidelines have been implemented there has been no change in the incidence of IE in the UK. The AHA has not gone as far as NICE and still recommends that prophylactic antibiotics may be considered in highest-risk groups (e.g. previous IE, prosthetic valve repair, unrepaired cyanotic congenital heart disease, repaired congenital heart disease with prosthetic material during the first 6 months after the procedure).

The underlying evidence base falls short in providing adequate answers but what is known is extensively discussed. The 3 main factors that are thought to affect the development of IE are incidence, duration and magnitude of bacteraemia. Questions regarding the role of systemic antibiotics in affecting these 3 factors remain unanswered. The incidence of bacteraemia due to everyday activities is thought to far exceed that due to dental procedures and epidemiological data shows that only ≈20% of IE cases are preceded by an invasive procedure. An emphasis away from antibiotic prophylaxis rather towards maintenance of good oral hygiene is encouraged. Kids, brush your teeth and stop eating sweets.

<http://www.ncbi.nlm.nih.gov/pubmed/26373317>

Neurodevelopmental outcome at 2 years of age after general anaesthesia and awake-regional anaesthesia in infancy (GAS): an international multicentre, randomised controlled trial.

Davidson AJ, Disma N, *et al.*

Lancet. 2015 Oct 23. pii: S0140-6736(15)00608-X

Cohort studies, with inherent weakness of evidence, have previously suggested an association between early childhood exposure to general anaesthetic agents and subsequent neurodevelopmental outcomes. Notwithstanding several confounding factors, no randomised controlled trial has previously been performed to assess this link. Enter the GAS study. A secondary outcome of this multicentre, prospective study was to assess neurodevelopmental outcomes at 2 years old. 722 infants up to 60 weeks postconceptual age were randomised into either an awake-regional or general anaesthesia group for hernia surgery, two years after which they were assessed by psychologists and paediatricians. They found equivalence in means for 4 of the 5 scores measured. Only the social-emotional score did not show compelling equivalence. The authors conclude that exposure to an average of just under 1 hour of sevoflurane did not cause unfavourable neurodevelopmental outcomes at 2 years.

<http://www.ncbi.nlm.nih.gov/pubmed/26507180>

The European Society of Regional Anaesthesia and Pain Therapy and the American Society of Regional Anesthesia and Pain Medicine Joint Committee Practice Advisory on Controversial Topics in Pediatric Regional Anesthesia.

Ivani G, Suresh S, *et al.*

Reg Anesth Pain Med. 2015 Sep-Oct;40(5):526-32

Some aspects of paediatric regional anaesthesia (PRA) remain contentious, so an ASRA and ESRA joint committee practice advisory was formed to explore 4 controversial areas of PRA. A lack of high-level evidence exists but useful currently-valid guidelines have been produced. The following is a brief synopsis of the guidelines on the controversies:

- (1) PRA under GA or deep sedation has acceptable safety levels and should be considered the standard of care. Serious complications can very rarely still occur.
- (2) Adrenaline-containing test doses influence anaesthetised children differently to awake adults due to resting heart rate differences and the blunting of cardiovascular responses by GA drugs. A negative test dose is reassuring, though does not rule out intravascular injection. Local anaesthetic should always be injected slowly, in aliquots, and while watching for ECG changes (e.g. T wave changes).
- (3) Risk exists with both loss of resistance to air (pneumocephalus, venous air embolism, incomplete analgesia, nerve root compression) as well as saline (dilute LA, detection of dural puncture, reduction in CBF). Both techniques are acceptable when injected volumes are kept to a minimum.
- (4) There is no evidence that compartment syndrome is increased by nerve blocks, nor that its diagnosis is delayed. Recommendations include, amongst others, that $\leq 0.25\%$ solution should be used for single-shot blocks and $\leq 0.1\%$ should be used for continuous infusions.

<http://www.ncbi.nlm.nih.gov/pubmed/26192549>

The prevalence of pain at home and its consequences in children following two types of short stay surgery: a multicenter observational cohort study.

Williams G, Bell G, *et al.*

Paediatr Anaesth. 2015 Dec;25(12):1254-63

After discharge from hospital, little evidence exists regarding the burden of paediatric pain at home. This multicentre, observational, cohort study recruited children from 8 paediatric centres in the UK. Children undergoing orchidopexy (open or laparoscopic) or tonsillectomy ± adenoidectomy (T's ± A's) were eligible. A research nurse telephoned the parents postoperatively and followed a structured questionnaire.

For T's ± A's, moderate or severe pain decreased from 62% at D2 to 25% at D8-14. For orchidopexy the corresponding values were 24% to 0%. For T's ± A's the most common behavioural disturbances were eating disturbances, a clingy child, and easily upset child. These were present in 58%, 34%, and 33% on D2 respectively. For orchidopexy, eating disturbances, trouble sleeping and easily upset occurred in 24%, 11%, and 11% on D2. 45% visited the GP or A&E postoperatively, 87% of which were pain-related. In addition, 25% contacted healthcare services by telephone, of which 66% were pain-related calls. A median of 2 days was taken off work by parents and the median number of school days missed was 5.

<http://www.ncbi.nlm.nih.gov/pubmed/26406603>

The Effect of Systemic Magnesium on Postsurgical Pain in Children Undergoing Tonsillectomies: A Double-Blinded, Randomized, Placebo-Controlled Trial.

Benzon HA, Shah RD, *et al.*

Anesth Analg. 2015 Dec;121(6):1627-31

Tonsillectomies in children are painful, so the hunt is on for any agent that is simple to administer and can reduce the hurt. Enter magnesium, an NMDA antagonist that has been shown numerous times to be effective in adults as an agent to reduce postsurgical pain. Sadly in children's tonsillectomies magnesium does not seem to be the panacea for which we've been searching. This paper describes a 60 patient randomised controlled trial comparing magnesium (30 mg/kg over 15 minutes then 10 mg/kg per hour) to saline. PACU pain scores and morphine consumption were no different in the two groups. The search continues.

<http://www.ncbi.nlm.nih.gov/pubmed/26501831>

Stridor in Neonates After Using the Microcuff® and Uncuffed Tracheal Tubes: A Retrospective Review.

Sathyamoorthy M, Lerman J, *et al.*

Anesth Analg. 2015 Nov;121(5):1321-4

Do Microcuff tubes in neonates cause more stridor post-extubation than uncuffed endotracheal tubes on NICU? This retrospective study of 324 neonates found they do with 17.2% incidence of stridor compared to 7.5% for uncuffed tubes. The study has limitations, for example that 90% of the Microcuff tubes were placed in premature and low-birth neonates (not recommended) and that cuff pressures weren't monitored. The cuffed versus uncuffed debate continues.

<http://www.ncbi.nlm.nih.gov/pubmed/26273745>

Use of the new McGrath(®) MAC size-1 paediatric videolaryngoscope.

Ross M, Baxter A.

Anaesthesia. 2015 Oct;70(10):1217-8

This correspondence letter introduces the idea of using a MAC 1 blade of the McGrath videolaryngoscope in neonates. Anecdotally it is claimed to facilitate intubation by magnifying the view of the laryngeal inlet. The example graphical view obtained in a 2.4kg neonate does instil a sense of optimism for this piece of equipment.

<http://www.ncbi.nlm.nih.gov/pubmed/26372876>

Perioperative hospital mortality at a tertiary paediatric institution.

de Bruin L, Pasma W, *et al.*

Br J Anaesth. 2015 Oct;115(4):608-15

This retrospective analysis of almost 50 000 anaesthetics at a Paediatric Tertiary Centre in Utrecht, Netherlands, looked at postoperative in hospital mortality at 1 day and 30 days following paediatric anaesthesia. Cases of death were assessed by a panel to ascertain whether or not anaesthesia or surgery contributed to death. Overall 1 in every 763 cases resulted in death at day 1 and 1 in every 240 cases at day 30. Anaesthesia at least partially contributed to death in 1.1 per 10 000 cases within 30 days. High-risk groups were found to be neonates and infants, ASA 3 to 4 status, emergencies and cardiothoracic surgery.

<http://www.ncbi.nlm.nih.gov/pubmed/26385669>

A systematic review and meta-analysis of acute severe complications of pediatric anesthesia.

Mir Ghassemi A, Neira V, *et al.*

Paediatr Anaesth. 2015 Nov;25(11):1093-102

What mishaps occur in paediatric anaesthesia and what are the incidences? This is the question that the study authors have tried to answer with this systematic review and meta-analysis. Notwithstanding heterogeneity of data and inadequate definitions of complications in the studies on which the review is based, the findings are useful as a basis for preoperative discussions, implementing guidelines and further research.

The most common acute severe complications found were airway and breathing problems, followed by cardiovascular events. Desaturation (2.4%) and bradycardia (0.5%) were the most common monitoring changes. Specific diagnoses included most commonly difficult bag-mask ventilation (6.6%), airway obstruction (2.2%) and laryngospasm (0.9%). The figures present the findings graphically, though one really needs to read the fine print to appreciate the complexity and limitations of the review.

<http://www.ncbi.nlm.nih.gov/pubmed/26392306>

Anaesthesia for the paediatric outpatient.

Jöhr M, Berger TM.

Curr Opin Anaesthesiol. 2015 Dec;28(6):623-30

This thought-provoking, evidence backed-up opinion largely describes paediatric day case anaesthesia at a centre in Switzerland. It does challenge us to think about what we do and why we do it and has some interesting ideas that one may be able to incorporate into UK practice.

Notable points that might strike up debate

Ex-prem infants are excluded from day surgery until 55 weeks postconceptual age in Lucerne (not 60 as is more customary in the UK).

Whether or not preoperative investigations should include pregnancy tests for girls, an ECG looking for long QT, or sickle cell tests.

Considering a midazolam premed for a 6 month old

Rectal midazolam

Whether you'd ever proceed with surgery without a cannula

Never using desflurane because of respiratory event risks

NSAIDs causing postoperative tonsillectomy bleeding

Do you endeavour to prevent postoperative agitation?

Follow up phone calls to all patients the day after surgery

<http://www.ncbi.nlm.nih.gov/pubmed/26308518>

Hemodynamic response to ketamine in children with pulmonary hypertension.

Friesen RH, Twite MD, *et al.*

Paediatr Anaesth. 2016 Jan;26(1):102-8. Epub 2015 Nov 13.

Can ketamine be safely used in children with pulmonary hypertension? This prospective 34 patient study suggests so. The authors managed to convince an ethics committee to agree to a study on children with known pulmonary hypertension undergoing cardiac catheterisation under midazolam, remifentanil and rocuronium. Ketamine at 2mg/kg was administered during the procedure and caused only a clinically negligible 2 mmHg rise in mean pulmonary artery pressure.

<http://www.ncbi.nlm.nih.gov/pubmed/26564806>

Autism spectrum disorder (ASD) and its perioperative management.

Taghizadeh N, Davidson A, *et al.*

Paediatr Anaesth. 2015 Nov;25(11):1076-84

This review of autism spectrum disorder (the other “ASD”) covers a wide range of aspects. Medications for autism can negatively impact anaesthesia, particularly highlighting clozapine. Premeds are discussed, though don't fully address the issue of the child who refuses oral medications. Restraint is discussed and intra- and post-operative best practice ideas are covered. Well worth a read before your next paediatric dental list.

<http://www.ncbi.nlm.nih.gov/pubmed/26248302>

The state of UK pediatric anesthesia: a survey of National Health Service activity.

Sury MR, Arumainathan R, *et al.*

Paediatr Anaesth. 2015 Nov;25(11):1085-92

This paper presents data collected for the 2013 NAP5 Audit, focussing on paediatric anaesthesia activity (caseload and practice) in the UK. Just over 2500 cases were surveyed, from which we have interesting findings such as that 41% of cases are undertaken in district general hospitals. Almost 500 000 children are anaesthetised annually. Surgical speciality, ASA status, age group, case urgency, seniority level of supervising anaesthetist and location in hospital are all discussed, as are anaesthetic techniques according to age. 80% of infants received sevoflurane as induction agent and 73% of school aged children were induced with propofol. Propofol was used for maintenance of GA in 3.5%. Muscle relaxants were utilised in 25% and an endotracheal tube in 35%. Lots of interesting statistics that can be used, for example, to predict the ages and number of children a DGH anaesthetist might expect to be involved with annually.

<http://www.ncbi.nlm.nih.gov/pubmed/26372493>