

Preoperative assessment and preparation for safe paediatric anaesthesia

Matthew Harvey

Tim Geary

Abstract

The delivery of anaesthesia to children and young people provides unique challenges. A careful, systematic approach to assessment and preparation can deliver a positive experience for the child, carers and staff while mitigating potential complications. Preparation for anaesthesia should encompass information gathering, assessment and planning for anatomical, physiological, social and behavioural elements specific to the child and the surgery. Delivery of appropriate information, consent and fasting are also key elements of ensuring positive perioperative outcomes. We consider the common components of preparation for the delivery of safe paediatric anaesthesia.

Keywords Paediatric anaesthesia; perioperative fasting; premedication; preoperative assessment

Royal College of Anaesthetists CPD Matrix: 1C01, 2A03, 2D02, 3D00

Providing anaesthesia for children is both uniquely rewarding and challenging. Consideration of age-dependent characteristics such as anatomical, physiological and behavioural differences is essential. Pharmacological variations mean that drug doses are calculated on surrogate markers such as known (or estimated) weight, age or calculated body surface area, putting children at greater risk of drug errors. Techniques such as regional anaesthesia, sedation or difficult airway management provide their own challenges. The perioperative assessment, induction of anaesthesia and aftercare are notable for the presence of anxious parents or carers. The rapport created by communicating effectively with the child and their carer(s) is a subjective measure of the quality of anaesthetic care and sets the tone for the entire clinical interaction.

Preparation for safe paediatric anaesthesia encompasses information gathering; patient assessment; preparation of the team, equipment and environment; and preparation of the patient and their carer(s) for anaesthesia.

Matthew Harvey *MBChB MRCPCH PGCert* is a Senior Trainee in Paediatric Intensive Care Medicine at the Royal Hospital for Children, Glasgow, UK. He also works for the ScotSTAR paediatric retrieval team. Conflicts of interest: none declared.

Tim Geary *MBChB FRCA FFICM* is a Consultant in Anaesthesia and Intensive Care at University Hospital Crosshouse and Honorary Senior Lecturer at the University of Glasgow, UK. He is also a Consultant in Paediatric Retrieval Medicine with the ScotSTAR service. Conflicts of interest: none declared.

Learning objectives

After reading this article, you should be able to:

- use a methodical approach to assess the paediatric patient requiring anaesthesia
- describe the factors that may complicate paediatric anaesthesia
- discuss the risks associated with paediatric anaesthesia

Information gathering

Most children undergoing anaesthesia are young and do not have significant comorbidities – in the APRICOT study, approximately 50% were less than 5 years of age and 88.8% ASA grade I–II. There is concern, however, that the number of adverse events associated with paediatric anaesthesia has been under-estimated.¹ These complications contribute to perioperative morbidity, prolonged hospital admissions, increased healthcare costs and parental dissatisfaction. Prior to anaesthesia, each child should be assessed thoroughly to identify any indications for preoperative investigations, perioperative admission, postponement or adjustment to the mode of anaesthesia.

Surgical plan

A review of the clinical notes and an understanding of the scheduled procedure(s) before meeting the child will provide a background and highlight potential problems requiring a more detailed history, or elective investigations. The planned surgery will not only dictate the choice of anaesthesia, but also be indicative of the risk for perioperative respiratory or cardiovascular complications, such as laryngospasm in adenotonsillectomy or bradyarrhythmias in ocular surgery.¹

History

The medical history should be thoroughly interrogated to ensure fitness for surgery. Assessment should include past medical history, previous anaesthesia, current medications, allergies, family history and social enquiry. The optimization of chronic diseases may require liaison with paediatric specialist teams. A positive family history may encourage further investigation, for example a history of premature cardiac death in a relative of a child with a heart murmur, or a relative with adverse events related to anaesthesia. The home circumstances can also inform risk assessment. The relative risk of respiratory complications associated with passive smoking is 1.39¹ and a similar increase is seen for children who are smokers.

When assessing a teenager, the history should include enquiry about smoking, alcohol and recreational drug use and where appropriate, sexual activity. Some may prefer to disclose this information confidentially and it might be necessary to take this history in private. For post-pubertal girls, local protocols may mandate a preoperative urine pregnancy test, for which informed verbal consent is required.

Basic measurements

Routine observations including temperature, heart rate, respiratory rate, non-invasive blood pressure and oxygen saturation in

room air must be documented. A small number of children will find this distressing.

All children should have their height and weight measured to allow titration of medications and intravenous fluids, both of which may be dosed by either weight or composite measures (e.g. body surface area, lean body weight, fat free mass). This will also guide selection of equipment and infusion pumps, which may be guided by age, or weight-based algorithms.

Regular medications

Most regular medications can be safely given on the day of surgery, even to the fasted child. Children with diabetes should be listed early and have a specific perioperative glycaemic management plan. Children on oral anticoagulants should have a clearly documented plan of cessation, alternative cover (e.g. systemic heparinization for metallic valves) and reintroduction of their anticoagulants. Most oral antiepileptic drugs (AEDs) can be safely taken on the day of anaesthesia; however, most have an effect long enough that omitting a single dose is unlikely to cause harm. Caution is required as some AEDs can reduce inhalational MAC by up to one third, whereas others may increase intravenous agent requirements. Children on long-term steroids or those with adrenal insufficiency may require additional steroids perioperatively.

Consider non-allergic contraindications to specific drug classes. Depolarizing neuromuscular blocking drugs should be avoided in some conditions which can result in hyperkalaemia after administration such as neurological deficits involving spinal cord injury, peripheral nerve injury or acute muscle wasting. Similarly, excessive potassium release can occur in trauma or burns 24 hours after injury for up to 1–2 years. Malignant hyperthermia is associated with conditions such as central core disease, but may also be triggered by anaesthetic agents in the absence of a comorbid predisposition. Genetic testing is available and where this is unequivocal skeletal muscle biopsy can be performed.

Allergies

The nature of all suspected allergies should be determined, including the precipitant, type and severity of reaction, recurrence, investigations and treatment. Latex is the most common non-drug allergy and is associated with food allergies including kiwi fruit, bananas and avocados. Latex allergy would usually mandate first place on the theatre list and strict precautions by all theatre staff.

Fasting

The risk of aspiration is lower than that quoted in the adult literature and it has been suggested that children should fast from clear fluids for only one hour prior to elective surgery. Fasting times have progressively prolonged, owing to cognitive biases, patient safety initiatives and guidelines based on non-fasted emergency surgery studies, or gastric residual volumes – a poor surrogate for the risk of aspiration. Fasting may be further extended by operative delays, or by parents not wakening their child for fluids overnight. In emergency surgery, heightened concern is valid as children are more prone to gastric paresis secondary to opioids, trauma and pain.

Prolonged fasting induces an anabolic state, with potentially deleterious effects when combined with the neuroendocrine

Preoperative investigations

	Examples	Investigations
Minor	Endoscopy, dental procedures, grommets	No routine pre-operative investigations
Intermediate	Adenotonsillectomy, inguinal hernia repair	No routine pre-operative investigations
Major	Joint reconstruction, laparotomy	FBC, U&E, Urinalysis

Table 1

response to surgery. This ‘double-hit’ model induces glycogenolysis, ketogenesis, release of free fatty acids and transient insulin resistance. This response is a risk factor for postoperative complications and prolonged hospitalization. Non-caloric fluids are inadequate to modulate this response. Preoperative carbohydrate drinks may induce an insulin response, inhibiting the fasted state physiology, but data of their efficacy in children is limited.

Hunger and thirst caused by excessive fasting may contribute to the difficult behaviours encountered in preoperative assessment. Traditional guidelines advocate fasting for 6, 4 and 2 hours for solids, breast milk and clear fluids, respectively. Formula feeds are often considered with solids, as the lower whey:casein ratio prolongs gastric emptying. These conservative practices have been challenged by recent literature showing that children on more liberal fasting regimes (see [Table 2](#)) have increased gastric pH, less risk of hypoglycaemia, reduced glycogenolysis and improved fluid homeostasis. They are also less thirsty, hungry and irritable. A recent series of 10,015 children shows a favourable safety profile, with an incidence of aspiration of 0.03%.² The APAGBI, ESPA and ADARPEF released a consensus document in April 2018 encouraging clear fluids (3 ml/kg) up to 1 hour before surgery.

Investigations

Most children who are systemically well do not require preoperative investigations. For elective cases, a surgical severity score, in conjunction with National Institute for Health and Care Excellence (NICE) guidelines (www.nice.org.uk/guidance/NG45) can guide decision making (see [Table 1](#)). Other investigations are considered in Special circumstances.

Special circumstances:

Anaemia – children with known or suspected anaemia should have a FBC and haematinic (e.g. vitamin B12 and folate) assessment.

Blood transfusion – obtain initial group and save samples in preoperative or preassessment clinics. Transfusion services increasingly require two separate samples, prior to releasing products for non-emergency scenarios.

Cardiothoracic surgery – for cardiothoracic surgery, a chest X-ray and ECG should be reviewed.

Chronic disease – it is advisable to consider a chest X-ray in children with chronic lung disease, cystic fibrosis, congenital heart disease or significant neurodisability.

Download English Version:

<https://daneshyari.com/en/article/8609819>

Download Persian Version:

<https://daneshyari.com/article/8609819>

[Daneshyari.com](https://daneshyari.com)