Short title: Anaesthesia in children

1. Purpose

The overall objectives of this guideline are to:

1.1 Support good practice and promote the provision of safe and high-quality anaesthesia care to all children, in all locations. Such care should take into consideration the emotional, cultural and social needs of children at the various stages of development.

1.2 Provide guidance regarding the provision of anaesthesia services for children to anaesthetists and healthcare providers who configure these services.

The key issues addressed in this guideline include:

- Principles to define scope of clinical practice for anaesthesia providers.
- Education, training and maintenance of competence for practitioners providing anaesthesia care to children.
- Principles to guide patient selection, choice of location for care and staffing requirements for individual circumstances.
- Description of the necessary resources recommended for the provision of paediatric anaesthesia services.
- Planned, and emergency anaesthesia care of children.

2. Scope

2.1 This guideline is intended to apply to:

2.1.1 All children including neonates, infants and adolescents undergoing anaesthesia, as defined below.

2.1.2 All anaesthetists and anaesthesia departments providing care to children.

2.1.3 All healthcare facilities and settings where anaesthesia services may be provided to children.

2.2 Issues that are outside the scope of this guideline:

2.2.1 Clinical guidelines that specify how healthcare professionals should care for individual patients.

2.2.2 Precise descriptions of models of care as these may differ between individual facilities in the context of providing services to children that are appropriate for that environment.

2.2.3 National-level issues such as how a health territory or geographical region should configure its services for delivery to children.

2.2.4 Provision of paediatric services other than anaesthesia.

2.2.5 Issues relating to research.

3. Background

Paediatric anaesthesia is an area of practice in which the Australian and New Zealand College of Anaesthetists (ANZCA or the "college") requires specific training and experience as part of obtaining fellowship. The spectrum of paediatrics ranges from neonates to adolescents and there are major physical, developmental and psychological changes along this spectrum. While the term "children" is used in this document interchangeably with the term "paediatric" it is recognised that the latter term is broader as it includes adolescents and babies. The provision of safe care will be dependent on the physical and physiological clinical state of the patient, which may require additional specific anaesthesia expertise, as well as availability of facilities, staff and equipment commensurate with patient needs.

4. Definitions[1]

Anaesthesia refers to general anaesthesia, sedation, neuraxial, and regional anaesthesia/analgesia or any combination of these forms of anaesthesia.

Anaesthetist: a registered specialist anaesthetist or registered medical practitioner who provides anaesthesia services working within their scope of clinical practice.

Credentialling is the formal process used to verify the qualifications, experience and professional standing of practitioners for the purpose of forming a view about their competence, performance and professional suitability to provide safe, high-quality healthcare services within specific organisational environments.

Critically Ill Paediatric Patient: sick or injured child with actual or impending respiratory failure, circulatory failure or neurological failure or a child with a medical or surgical condition that requires immediate resuscitation and stabilisation.

Emergency surgery: surgery that, in the opinion of the treating clinician, cannot be delayed.

Healthcare facility: hospitals, clinics and licensed office-based facilities where anaesthesia is performed.

Infant: child aged 1 to 12 months.

Neonate: child aged less than 28 days (for ex-premature babies, use expected date of delivery plus 28 days).

Paediatric patient: neonate, infant, child and adolescent

Planned surgery: surgery that can be performed with advanced planning.

Post menstrual age: gestational age plus post-natal age in weeks.

Premature infant: child born before 37 weeks gestation.

Scope of Clinical Practice: the extent of an individual anaesthetist's clinical practice within a particular organisation. It is determined for the individual anaesthetist based upon his or her credentials, competence, performance and professional suitability, the needs of the organisation and its ability to support his or her clinical practice (see *PS02(A) Position statement on credentialling and defining the scope of clinical practice in anaesthesia*). Scope of practice can change over time with factors such as currency of practice or introduction of new technologies. It can also change between institutions depending on the capability of the institution.

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[1] Refer ANZCA Document Framework Policy Appendix 2: Glossary of terms available here.

5. Principles to define the scope of paediatric clinical practice for anaesthesia providers

5.1 Credentialling is the responsibility of the health service organisation where the anaesthetist practices.

5.2 The scope of clinical practice for anaesthetists is determined by:

5.2.1 Their qualifications, education, training and currency of practice. Anaesthetists who care for children should have completed an ANZCA recognised training program that includes anaesthesia for children, and ensure their competency in anaesthesia and resuscitation is fit for purpose.

5.2.2 The service requirements and the capability of the organisation. The healthcare service should have clearly delineated service requirements and provide the necessary support services and qualified staff to support safe care.

5.3 Defining scope of clinical practice

5.3.1 The scope of clinical practice will have limitations based on patient age, ASA status or co-morbidity, type of surgery and urgency of care.

5.3.2 Anaesthetists should have clearly defined age thresholds for caring for children undergoing planned surgery that reflect their training, experience and currency of practice and skills.

5.3.3 Anaesthetists providing care for planned surgery for children with significant comorbidity should ensure that they have completed the necessary training, and demonstrate currency of practice and skill.

5.3.4 Anaesthetists providing care for planned surgery for children should be familiar with the anaesthesia implications of any intended surgical procedure, including intraoperative and postoperative course and potential perioperative complications.

5.3.5 Patient age should not be used as a barrier to the delivery of quality care, especially in the emergency setting where delays from patient transfer could increase the overall risk to the patient. Suitable and adequately resourced delivery of care close to home should ideally be supported where there is no benefit from patient transfer.

5.3.6 Occasionally urgent care needs to be delivered to children whose age, comorbidity or procedure type falls outside any individual anaesthetist's scope of practice for planned care. In the interest of achieving the best outcome for the child, the clinical team will need to adapt and utilise available resources, including any established local protocols, and, where relevant, distant resources such as expert advice should be sought.

6. Training and education

6.1 The ANZCA training program expects graduates to have the knowledge and skills required to independently provide anaesthesia and sedation for children over 2 years of age without significant co-morbidities, undergoing surgery of moderate complexity.

6.2 Anaesthetists caring for medically complex children or children undergoing major surgery require additional training and education. Such training is recommended for:

- Neonatal and infant surgery.

- Neurosurgery.
- Cardiothoracic surgery.
- Major plastic surgery.
- Complex airway surgery.

6.3 Anaesthetists providing planned or emergency care to children should ensure that they regularly update their advanced life support skills specific to paediatric patients.

6.4 Anaesthetists should have knowledge of current legislative requirements pertaining to the provision of care for children including:

- Consent.
- Child protection.
- The rights of the child.
- Police clearance in accordance with local requirements.

7. Maintenance of competence

7.1 All ANZCA fellows must undertake Continuing Professional Development (CPD) as it is both a condition of fellowship and a requirement for registration by both the MCNZ and MBA[2].
It is expected that anaesthetists providing anaesthesia care to children ensure that they maintain the necessary skills and competence.

7.2 Maintaining current practice may take several forms and will vary depending on the paediatric case mix, geographical location and out of-hours responsibilities for the management of paediatric emergencies. It may involve the following:

- Regular paediatric case load.
- Pairing up of anaesthetists when caring for children that are young, medically complex or undergoing any procedure that is infrequently performed.
- Scenario-based training that ideally would be multidisciplinary.
- Paediatric refresher courses and conferences.
- Visits to centres with a higher paediatric caseload.

7.3 Individuals with responsibilities for paediatric resuscitation and stabilisation should ensure that they remain current in these areas. They should have regular exposure to educational opportunities in these areas as part of their CPD.

7.4 Regional centres should support the efforts of anaesthetists seeking to maintain skills in paediatric anaesthesia by establishing networks and arrangements to facilitate maintenance of skills and currency of practice. In addition, there should be support for anaesthetists to attend conferences/meetings relevant to their scope of practice.

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[2] In Australia refer to the Health Practitioner Regulation National Law (s128 Cth) and in New Zealand refer to the Health Practitioners Competence Assurance Act 2003 (s41).

7.5 Anaesthetists should participate in ongoing education and up-skilling for the multidisciplinary team involved in the perioperative care of children and their carers.

7.6 Anaesthetists should be able to demonstrate evidence of relevant paediatric CPD in their ANZCA CPD portfolio or equivalent for review by the institution's credentialling authority.

8. Location for care and patient selection

8.1 Location of care

8.1.1 Children should be cared for as close to their home, family or carers and social supports as possible. It is the responsibility of the regional health service to provide equity of access to safe, excellent and culturally sensitive care for all children including those from remote, underprivileged and Indigenous communities.

8.1.2 Hospitals with the highest level of paediatric expertise should take leadership in establishing guidelines for determining location of care within each region or network, in consultation with regional facilities. Where regions do not include dedicated paediatric hospitals, or tertiary hospitals providing high level paediatric care, a relationship with the nearest paediatric hospital needs to be established, and recognised in the guidelines of the non-paediatric facility.

8.1.3 Each facility should ensure that all members of multidisciplinary teams involved in providing care before, during and after anaesthesia have undertaken the necessary training.

8.1.4 Complexity of surgical procedures and their potential complications should be considered when determining location of care.

8.2 Patient Selection

There is evidence that some patient groups have better outcomes when care is provided at centres with greater volume of practice or greater staff expertise. The following patient groups should be considered:

8.2.1 Patients undergoing:

- Cardiovascular and thoracic procedures.
- Neuroanaesthesia.
- Airway surgery such as bronchoscopy, tonsillectomy, laser airway surgery, cleft lip and palate surgery and pharyngoplasty.

8.2.2 Procedures requiring:

- Postoperative neonatal or paediatric HDU or ICU.
- Complex postoperative pain management.

8.2.3 Age groups:

- Neonates.
- Ex-premature babies.
- Infants.

8.2.4 Comorbidities:

- Congenital heart disease
- Significant non-cardiac congenital abnormalities.
- Limitations to cardiovascular function.
- Limitations to respiratory function.
- ASA 3, ASA 4 and ASA 5.

8.2.5 Any decision to proceed with anaesthesia for a child in any particular circumstance will depend on multiple factors known to contribute to risk such as patient age, co-morbidity, type of surgery and time frame. For further guidance on factors that contribute to risk please refer to section 9 of the background paper; “Stratifying Risk”.

8.3 Local guidelines should be developed that consider the following:

8.3.1 Clinical triggers for determining need for patient referral to a higher-level centre for care. The clinical triggers should consider potential delays in achieving definitive treatment for time critical procedures.

8.3.2 The care of children presenting with major trauma.

8.3.3 The care of neonates related to births from co-located obstetric services.

8.3.4 The level of paediatric anaesthesia expertise required to deliver services.

8.3.5 Where to seek advice in the event of concerns about a particular patient or circumstance.

9. Equipment and resources

9.1 Theatre Environment and Post Anaesthesia Care Unit (PACU)

9.1.1 Induction areas should be non-threatening, child-friendly and should allow parental or carer attendance, with measures in place for their support and well-being.

9.1.2 Ideally children should be separated from, and not managed directly alongside adults throughout the patient care pathway. Where complete physical separation is not possible, alternate strategies should be considered.

9.1.3 Operating suite climate control and equipment, designed to meet the special needs of small children (neonates, infants, and toddlers), must be operational and available to ensure that body temperature is maintained throughout the perioperative period.

9.1.4 Paediatric patients should be “recovered” in a dedicated area within the PACU as outlined in *PS04(A) Position statement on the post-anaesthesia care unit*.

9.1.5 Parents and carers should be allowed ready access to the PACU, if this is not feasible, children should be reunited with their parents or carers as soon as possible.

9.2 Equipment

9.2.1 A range of anaesthesia equipment, which complies with *PS55(A) Position statement on minimum facilities for safe administration of anaesthesia in operating suites and other anaesthetising locations*, and is specific for the needs of all children, should be readily available in all areas where children are anaesthetised and recovered.

9.2.2 Such equipment should be suitable for the expected range of ages and sizes of patients. Equipment should be well maintained and should include the following:

- Airway management equipment including masks, oropharyngeal airways, nasopharyngeal airways, supraglottic airway devices, endotracheal tubes, laryngoscopes, suction and equipment for the paediatric difficult airway. Refer to *PG56(A) Guideline on equipment to manage difficult airways* for further details.
- Breathing systems commensurate with compliance and dead space considerations.
- Equipment for automatic ventilation of the lungs with accurate time and pressure control, ability to provide positive end-expiratory pressure and adaptable across a wide range of patient sizes.
- Monitoring equipment as specified in *PG18(A) Guideline on monitoring during anaesthesia*, particularly carbon dioxide monitors and pulse oximeters.
- Blood-pressure cuffs of multiple and appropriate sizes.
- Vascular-access equipment, including intra-osseous needle.
- Devices to allow rapid and accurate fluid and drug delivery.
- Infusion devices for administration of total intravenous anaesthesia including syringe drivers equipped with algorithms for paediatric Target Controlled Infusion.
- Equipment that monitors and minimises patient heat loss including temperature probes and thermometers, fluid warming equipment and patient warming devices
- Ultrasound devices.
- Invasive haemodynamic monitoring for more complex cases.

9.2.3 Point of care testing for haemoglobin and glucose, and easy access to pathology services for electrolyte monitoring should be available.

9.2.4 It is strongly recommended that resuscitation drugs and equipment including defibrillators suitable for the age and size of the patient are readily available in locations where children are anaesthetised.

9.2.5 Intravenous fluids along with guidelines for intravenous fluid use in paediatric patients should be available.

9.3 Staffing

9.3.1 Anaesthetists trained and experienced in the perioperative care of children, are required to be responsible for the entire duration of anaesthesia.

9.3.2 Assistants to the anaesthetist, with skills and competencies in the perioperative care of children as outlined in *PS08(A) Position statement on the assistant for the anaesthetist* are required to be available for the entire duration of anaesthesia.

9.3.3 For higher risk cases consideration should be given to having a second anaesthetist with training and experience in the perioperative care of children.

9.3.4 Additional staff members with training in paediatric life support should be present in the operating theatre complex.

9.3.5 There should be an agreed policy on the level of trainee supervision (1-4) depending on the complexity of the case and patient. The supervising anaesthetist should be clearly identified and be trained and experienced in the perioperative care of children.

9.3.6 In the PACU, children should be recovered by nursing staff who have currency in paediatric experience including resuscitation skills. All children should be observed on a one-to-one basis until they have regained control of their airway, have stable observations, and are awake.

9.3.7 Staffing numbers may need to be increased for complex or unstable cases irrespective of whether they occur during normal hours or after hours.

9.3.8 There should be an established system for access to consultation with pediatricians and paediatric allied health services.

9.3.9 There should be a nominated lead for provision of anaesthesia care to children. The nominated lead should oversee the maintenance and availability of the equipment and resources required to care adequately for children in the perioperative period, and ensure staff maintain a level of continuing professional development suitable for the caseload undertaken at the healthcare facility.

9.4 Facilities and support services

9.4.1 Pre-anaesthesia consultations should occur in areas with facilities catering for the needs of children as outlined in *PG07(A) Guideline on pre-anaesthesia consultation and patient preparation*. The pre-anaesthesia consultation is important in ensuring an adequate understanding of patient, family or carer and procedural needs in addition to providing instructions, including fasting requirements (*PG07(A)* Appendix).

9.4.2 Patient weight should be recorded prior to anaesthesia care.

9.4.3 Arrangements should be in place to enable at least one parent or carer to stay with children who require overnight admission to hospital.

9.4.4 Diagnostic and pathology services, including the delivery of blood products, should meet the requirements of the paediatric case mix undertaken.

9.4.5 There should be pharmacy staff available with clinical knowledge to provide advice on the management of drugs in children.

9.4.6 There should be awareness that the paediatric population is at greater risk of drug errors. Local systems should be in place to minimise and report prescription and drug-administration errors.

9.4.7 Analgesia guidance applicable to children should be readily available, including protocols for pain scoring using age-appropriate, validated tools. There should be written protocols regarding weight-related dosing of opioid and non-opioid medication.

10. Day stay procedures (DSP), emergency surgery and care of the critically ill paediatric patient

10.1 Day Stay Procedures (DSPs)

10.1.1 The standards of care for DSPs are identified in *PG15(POM) Guideline for the perioperative care of patients selected for day stay procedures* apply.

10.1.2 Pre-arranged pathways should be in place for management of patients who do not meet discharge criteria after their planned DSP. This may involve ongoing care within the institution or transfer to another institution.

10.1.3 Determination of the age limit for day surgery will depend on the available facilities, the experience of staff and the medical condition of the child.

10.1.4 Well children with minimal comorbidities classified as ASA I or ASA II would normally be suitable for day stay procedures.

10.1.5 Children with complex needs may be managed as same day discharge provided that their condition is stable with minimal cardiorespiratory disturbance.

10.1.6 Ex-preterm infants at risk of postoperative apnoea should not be considered for same day discharge unless they are medically fit and have reached a postmenstrual age of 54 weeks. Risks should be discussed with parents or carers on an individual basis.[3]

10.1.7 Term infants should not be considered for same day discharge unless they are medically fit and have reached a postmenstrual age of 46 weeks. Risks should be discussed with parents or carers on an individual basis.[4]

10.1.8 Good quality, accessible information should be provided preoperatively to parents, carers, and children including information on fasting and what to do if the child becomes unwell.

10.1.9 Discharge criteria following DSPs should be clearly documented.

10.1.10 Discharge advice should be detailed and carefully worded to facilitate ongoing care by parents or carers.

10.1.11 Opioid analgesia should be used judiciously in children undergoing DSPs. The need to prescribe opioid medications on discharge should be carefully considered. If it is deemed necessary, the prescription should be limited and accompanied by education of the parents and carers, and follow-up with the child's general practitioner.

10.1.12 Where paediatric patients are discharged after any form of short stay procedure, it is recommended that transit back to their normal residence is by car. There should be two responsible adults in the vehicle; one to supervise the paediatric patient and the other the dedicated driver.

10.2 Emergency Surgery

10.2.1 Emergency surgery in children should, where possible, take place only in hospitals that have paediatric inpatient facilities and provide planned paediatric surgical care.

10.2.2 The same principles outlined for planned surgery apply.

10.2.3 Each facility should have its own age threshold based on available surgical, anaesthetic, paediatric and nursing expertise. These age thresholds may be different to those for planned surgery.

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[3] For further explanation refer to the accompanying background paper item 14.4
[4] For further explanation refer to the accompanying background paper item 14.5

10.2.4 Patient selection for emergency surgery should take into consideration the following factors on a case-by-case basis:

- Type of surgery.
- Surgical urgency.
- Surgical site.
- Patient comorbidity.
- Provisions for postoperative care.

10.3 The critically ill paediatric patient

The following recommendations apply to all hospitals caring for paediatric patients and where planned surgery or emergency surgery occur.

10.3.1 Each hospital should have guidelines in place for the recognition of both the critically ill paediatric patient and the deteriorating paediatric patient.

10.3.2 Each hospital should have guidelines in place for resuscitation and stabilisation of critically ill paediatric patients with the support of a designated 'tertiary' care facility if required.

10.3.3 Each hospital should have pathways in place for the referral and transfer of critically ill paediatric patients.

10.3.4 A team-based approach to resuscitation, stabilisation and transfer of critically ill paediatric patients should be emphasised.

10.3.5 Anaesthetists may be involved in several aspects of the care of critically ill paediatric patients including:

- Resuscitation.
- Stabilisation.
- Emergency surgery.
- Transfer.

10.3.6 Staff without recent paediatric experience or training may be able to contribute transferable skills (for example expertise with ultrasound to assist line placement or echocardiography skills) as part of the multidisciplinary team. Such contributions should be supported by healthcare facilities and local protocols are the responsibility of the health service organisation where the anaesthetist practices.

This document is accompanied by a background paper (PG29(A)BP) which provides more detailed information regarding the rationale and interpretation of the Guideline.

Related ANZCA documents

ANZCA Anaesthesia training program curriculum v1.12. Section 3.9 Paediatric Anaesthesia. ANZCA; Dec 2023. Available from: https://www.anzca.edu.au/resources/all-handbooks-and-curriculums/anzca-anaesthesia-training-program-curriculum Accessed 13 March 2024.

PS02(A) Position statement on credentialling and defining the scope of clinical practice in anaesthesia

PG03(A) Guideline for the management of major regional analgesia

PS04(A)	Position statement on the post-anaesthesia care unit
PG06(A)	Guideline on the anaesthesia record
PG07(A)	Guideline on pre-anaesthesia consultation and patient preparation
PS08(A)	Position statement on the assistant for the anaesthetist
PG09(G)	Guideline on procedural sedation
PG15(POM)	Guideline for the perioperative care of patients selected for day stay procedures
PG18(A)	Guideline on monitoring during anaesthesia
PS26(A)	Position statement on informed consent for anaesthesia or sedation
PG41(G)	Guideline on acute pain management
PS45(G)	Position statement on patients' rights to pain management and associated responsibilities
PS55(A)	Position statement on minimum facilities for safe administration of anaesthesia in operating suites and other anaesthetising locations
PS59(A)	Position statement on roles in anaesthesia and perioperative care

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