Section 9: Paediatric services

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Preoperative parent and patient information

Dr O Bagshaw

Why do this audit?
Parents demonstrate a high incidence of anxiety prior to their child’s surgery. Both patients and parents may be concerned about the trip to theatre, the anaesthetic, possible complications, and postoperative pain. Adequate preoperative information and preparation will help answer these questions. Parental participation in aspects of anaesthesia decision-making increases parental satisfaction with the care their children receive. Older children can identify their information needs, but often these aren’t provided.

Best practice: research evidence or authoritative opinion
The preoperative psychological preparation of the family and child is important. Preoperative information in the form of booklets, videotapes, educational programmes, or through telephone consultation or pre-admission clinics, has been shown to reduce anxiety, answer questions, raise issues for discussion and avoid unnecessary investigations or cancellation. There is also evidence that explaining the risks of anaesthesia gives parents a better understanding of what is involved, without actually raising anxiety levels or influencing their decision to proceed with the proposed surgery.

Good practice advice in preparation and use of written patient information should be followed.

Suggested indicators
% parents who were sent preoperative information by post.
% parents who received preoperative information.
% parents/patients who found the information satisfactory.
% parents who attempted to contact the hospital for advice about the anaesthetic, that were able to get the advice they sought.
% parents/patients assessed and counselled by an anaesthetist preoperatively on the ward and given the opportunity to ask questions.
% parents/patients who rated this interview satisfactory.

Proposed standard or target for best practice
All the above indicators should be true in 100% cases, except those that received postal preoperative information, which should be 95%.

Suggested data to be collected
Parents/patients should be briefly questioned postoperatively by an auditor who is independent of the anaesthetist. Did they receive instructions and information before admission? Did it tell them what they wanted to know? Did they attempt to contact the hospital for advice and if so were they successful? Did they see an anaesthetist preoperatively? Was appropriate information given? Did they have an opportunity to ask questions and were these answered satisfactorily? You may wish to make a list of what you consider to be minimum elements of this interview and ask which were included. If cancellation occurred, or non-attendance, was this for a reason that might have been avoided if proper information had been given?
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Common reasons for failure to reach standards

- Administrative failure in sending out preoperative information.
- No mechanism for dealing with telephone enquiries from parents.
- Poor understanding of written or spoken English, and failure by staff to make arrangements to deal with this.
- Failure of parents and patient to attend pre-admission clinic.
- Failure of anaesthetist to visit patient on the ward preoperatively or inadequate visit.
- Parents not present when child assessed by the anaesthetist.

Related audits

1.1 – Patient information about anaesthesia

References

### Consent
**Dr M A Stokes, Dr I Barker**

#### Why do this audit?
The process by which consent for surgery to children was obtained should be documented. Separate consent for anaesthesia is not mandatory in the UK, but most parents or the mature child might expect specific discussion of the proposed method of induction, regional blockade (including caudals), suppositories, blood transfusion and invasive monitoring. Discussion should be documented.

#### Best practice: research evidence or authoritative opinion
Minors over 16 have authority to consent to medical treatment\(^1\)\(^2\) and, by convention, parents and legal guardians consent for younger children, acting in the child’s best interests and on the advice of doctors. Legislation recognises emerging competence whereby a child may achieve sufficient understanding and maturity to make a wise choice in his/her own interests.\(^3\)\(^4\) Although difficult to distinguish between assent and true consent, the law supports parents and doctors who override a dissenting child for urgent or essential treatment. In practice a child must demonstrate a greater maturity and understanding to refuse medical treatment than to agree to it.\(^5\) There is practical advice for clinicians faced with children who refuse emergency or elective treatment.\(^6\)\(^7\) The Association of Anaesthetists has also produced guidance on this information and consent for anaesthesia.\(^8\)

#### Suggested indicators
- % of children having a consent form before surgery, signed by a person with legal authority.
- % of cases where a special anaesthetic technique is planned where consent is documented.

#### Proposed standard or target for best practice
100% of children should have a consent form before surgery, signed by a person with legal authority.

In 80% of cases where these techniques occur, there should be written evidence of specific consent to epidurals, other regional blocks (including caudals), analgesic suppository insertion, blood transfusion, and invasive monitoring. A note on the anaesthetic record that these had been discussed would be acceptable.

#### Suggested data to be collected
As above, from the anaesthetic record and the consent form.

If consent appears to be absent, reasons for this.

#### Common reasons for failure to reach standards
- Design of anaesthetic record may not encourage documentation.
- Standard consent form does not include space for child to sign.
- Parents absent.
- Anaesthetist judges specific consent to be unnecessary.
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Related audits

1.2 – Consent to anaesthesia

References


3. Gillick V. West Norfolk and Wisbech Area Health Authority [1985] 3 All ER 402 HL.


Staffing for paediatric anaesthetic services

Dr N R Bennett, Dr I Barker

Why do this audit?
Children undergo anaesthesia in almost all hospitals. The NCEPOD report of 1989 looked at all deaths within 30 days of surgery in children under 10 years of age over a 1 year period. A number of ‘avoidable deaths’ were identified. It has also been reported that the incidence of perioperative cardiac arrest is higher in infants than older children. This audit addresses three areas of concern: the status of the anaesthetist responsible for anaesthetising children; availability of staff trained in paediatric resuscitation; and staffing levels on wards where children are nursed.

Best practice: research evidence or authoritative opinion
There has been debate about the roles of the district general hospital and the specialist centre in the perioperative management of children. There has been a trend towards centralisation of anaesthesia services for the young, those requiring more complex surgery, some emergency work and children with significant co-morbidity. Nevertheless many children will still require access to anaesthetic services at most district general hospitals, either for elective and emergency procedures, or for initial resuscitation/stabilisation if they are very seriously ill. There are guidelines on training in paediatric anaesthesia that define the competencies required for those intending to specialise in paediatric anaesthesia. However, those who intend to become general anaesthetists are expected, as a minimum, to have acquired basic core competencies in paediatric anaesthesia by completion of their training. There are a number of authoritative documents that specify the facilities, levels of experience, seniority, supervision and staffing for children’s anaesthetic services.

Suggested indicators
% of children anaesthetised by practitioners whose experience complies with the suggested standards below.
% of children who are managed in the recovery ward by nursing staff who undergo regular training in paediatric resuscitation.
% of children who have been cared for on a ward with two Registered Sick Childrens Nurse (RSCN) trained nurses on duty throughout their stay.

Proposed standard or target for best practice
100% children under the age of 10 years should be anaesthetised by one of the following:
- A consultant or other non-trainee anaesthetist who has acquired and maintained paediatric competencies appropriate to the individual case. It is expected that anaesthetists with core competencies should be able to manage simple elective procedures in fit children who are ASA 1 or 2 down to at least 5 years of age.
- An experienced SpR with a level of supervision appropriate to their ability and experience. (e.g. direct supervision for a sick premature baby).
- An SHO or junior SpR supervised by a consultant or suitably competent senior SpR in theatre or in the theatre suite for babies and children under 3 years.
- An experienced SHO or junior SpR supervised by a consultant or suitably competent senior SpR in the hospital or at home for older children who are ASA 1 or 2.
- An SHO with < 6 months experience supervised by a consultant in theatre.
100% children should be managed in the postanaesthetic care unit (PACU) by nurses who undergo regular training in paediatric resuscitation.

100% children should be nursed on a ward where at least 2 RSCN trained nurses are on duty for every shift that the child is present.

**Suggested data to be collected**

For every child included in the audit:
- Does the anaesthetist fall into one of the categories above? This will require knowledge of the recent experience of trainee anaesthetists and knowledge about consultant competencies. The auditor will then have to decide whether supervision was appropriate or not.
- When children undergo anaesthesia, is there a nurse on duty in the PACU and an ODP in theatres with appropriate competencies in paediatric resuscitation?
- Did the ward have two RSCN nurses on duty for every shift that the child was present? If not for what proportion of shifts?

**Common reasons for failure to reach standards**

- ‘We’ve always done it this way’.
- Pressure from managers to maintain throughput.
- Failure of communication out of hours.
- Paediatric training and refresher training unavailable for those wishing to do it.

**References**

Preoperative fasting in elective paediatric surgery
Dr T Dorman

Why do this audit?
Adequate preoperative fasting reduces the risk of regurgitation of stomach contents at the time of induction of anaesthesia. This must balance against the risks of prolonged fasting leading to hypoglycaemia, dehydration and patient distress. There are difficulties in planning fasting times due to list changes, unpredictable operating time and patient or parent compliance.\(^1,2\)

Best practice: research evidence or authoritative opinion
Research is confusing. Major studies have shown that there is no increase in risk of aspiration if clear fluids are given up to 2 or 3 h preoperatively against a background of 6 h fasting time for solids and milk.\(^3-6\)

The following practice is suggested for children over the age of 6 months:
- Clear fluids should be given up to and at 2–3 h before induction.
- Solid food or milk should be given to children a minimum of 6 h before induction. In order to prevent excessively long fasting times for food or milk, children on morning lists should be fed at bedtime (as late as possible, and not after 0230 h). Children on afternoon lists should have a light breakfast before 0730 h.

For neonates and babies up to 6 months post-conceptual age:
- Breast milk up to and at 3 h before induction or formula milk up to and at 4 h before induction and water at 2 h before induction.

Suggested indicators
% of children for elective surgery who fit the criteria above.
% lists where the list is held up because a child has been fed.

Proposed standard or target for best practice
100% of parents/patients should be given the correct instructions.
100% children for elective surgery should fit the above criteria.
0% lists should be held up because a child has been fed.

Suggested data to be collected
Instructions given to parents, patient or ward nurses.
Compliance with instructions.
Patient’s age.
Am/pm list and position on the list.
Last oral intake time and what it was.
Actual time of induction.
Time of first intake post operation.
Factors affecting these times, e.g. list changes, unexpected over-running surgery.
Was the list delayed? Postoperative problems, e.g. postoperative nausea and vomiting (PONV).
Paediatric services

Common reasons for failure to reach standards

Changes to lists, cancellations, difficulty judging the timing of the list.

Instructions not given clearly, not understood or just not complied with (parent and patient).

Related audits

1.7 – Preoperative fasting in adults

References


Premedication in pre-school age children

Dr J Morgan-Hughes, Dr C G Stack

Why do this audit?
Induction of anaesthesia may be a stressful experience for pre-school age children and their parents. If the child resists intervention, unnecessary distress may occur. As well as being undesirable in itself, this may also influence the child's attitude to medical care in the future.

Best practice: research evidence or authoritative opinion
Sedative premedication of pre-school age children reduces the frequency of crying and the need for restraint at induction of anaesthesia even when the child is accompanied by a parent and has a topical anaesthetic applied before intravenous induction.\(^1\) Sedative premedication makes post hospital behavioural disturbances less likely even after day surgery.\(^2\) Routine use is probably not justified because there is evidence that it is possible to predict which children are likely to cry.\(^1\) One well researched sedative premedicant for children is oral midazolam 0.5–0.75 mg/kg, administered 30–60 min before induction.\(^2\) It can be used in day case anaesthesia. Other sedatives such as clonidine, 1–5 micrograms/kg, tend to act for longer post-operatively although there is the advantage of additional analgesic effects.\(^4\)

Suggested indicators
\% of children age 1–5 years who do not cry or need restraint at induction.
\% of children age 1–5 years for whom an IV induction is planned who have a topical anaesthetic applied at an appropriate time.

Proposed standard or target for best practice
75% children age 1–5 years should pass through the anaesthetic room without crying or needing restraint.\(^1\)
100% children age 1–5 years should have a topical local anaesthetic applied at an appropriate time before a planned intravenous induction.\(^5\)

Suggested data to be collected
Anaesthetist – name and grade.
Age of patient.
Parent present, and if not why not.
Planned route of induction.
Application of a topical local anaesthetic and when.
Sedative premedication: drug, dose, route, and time relative to induction.
Assessment of child's response to IV insertion and induction.

Common reasons for failure to reach standards
Lack of nursing and medical staff with sufficient paediatric training and experience.
Failure of anaesthetist to judge the need for sedation.
List changes prevent the application of topical local anaesthetic.
Absence of parent or separation at the theatre door.
Related audits

1.8 – Premedication

References


Parent satisfaction with arrangements for being present with their child at induction

Dr J Payne

Why do this audit?

Parental presence at induction is routinely practised in most UK hospitals, in line with Department of Health recommendations that hospitals should ‘agree service specifications which enable parents to comfort children during induction of anaesthesia’. Action for Sick Children stresses the importance of encouraging parents to be present (at the discretion of the anaesthetist) and of providing facilities to enable them to be present. It also points out the need for preparation of parents (including an explanation of their role, when they should leave etc) and for support of parents in the anaesthetic room.

Best practice: research evidence or authoritative opinion

Most recent studies suggest benefits to the child in terms of anxiety reduction, as well as to the parent, with the majority of parents believing that they were of some help to the child and anaesthetist and rating it as a positive experience.

Suggested indicators

% of parents either satisfied or very satisfied with arrangements for being present with their child at induction.

Proposed standard or target for best practice

100% of parents invited to be present with their child at induction should be satisfied with the arrangements made to do so.

Suggested data to be collected

Assessment of satisfaction level using postoperative questionnaire. You may wish to explore this in detail, e.g. satisfaction with preoperative explanation, with waiting arrangements, with actual events in the anaesthetic room, with the support they received afterwards etc.

Reasons for dissatisfaction

Parents feeling unprepared, e.g. unsure of role.
Parents who did not want to attend at induction feeling pressurised to do so.
Parents feeling unsupported in the anaesthetic room.
Parents not being on the ward when the child was collected for theatre, owing to list changes.
References

Use of local and regional blocks in children

Professor A R Wolf, Dr P A Stoddart

Why do this audit?

Children often receive inadequate pain relief. Pain can occur immediately after surgery, before discharge, or at home. A large variety of local blocks can be used but must be applied appropriately and audited to ensure that the chosen block has been part of an effective analgesia treatment plan. In addition, blocks may fail or there may be major or minor complications. This has been highlighted in two recent surveys.

Best practice: research evidence or authoritative opinion

Previous studies have compared opioid analgesia with local techniques, in terms of duration and quality of analgesia, sedation, stress responses, side effects, and safety. The key features to emerge from these studies are firstly that appropriate peripheral blocks may be preferable to central blockade where possible, secondly that blocks must match the specific operations, and thirdly that co-analgesia may be desirable to increase analgesia and reduce individual side effects.

Suggested indicators

- % children with acceptable pain scores both in hospital and at home.
- % children requiring rescue analgesia.
- % children who have side effects, both immediate and delayed.
- % children who appear to have a failed block or a complication.
- % children in whom side effects or pain delay discharge (in day cases).

Proposed standard or target for best practice

- 100% children should have acceptable pain scores at all times.
- The need for rescue analgesia will depend on whether a working block is expected to relieve all pain.
- A target for side effects will depend on the block.
- < 1% children should have a failed block.
- A target for complications will depend on which block is audited.
- < 1% patients should have delayed discharge due to pain or due to side effects of the block.

Suggested data to be collected

- One type of block should be chosen for the audit (e.g. penile block).
- Record type of block, operation, age of child, anaesthetist.
- The block must be formally assessed postoperatively looking for failed blocks and complications.
- A validated pain assessment tool appropriate to the age group and cognition of the child should then be used in hospital and at home for at least 24 h.
- Side effects and the need for rescue analgesia should be noted.
- Collected data should be reviewed by staff at regular intervals to highlight both positive and negative aspects of a particular procedure, and to compare these with experience from other centres.
Paediatric services

Common reasons for failure to reach standards

- Anaesthetist unskilled at performing block.
- ‘Natural’ failure rate of the block.
- Inadequate support staff (mainly nurses experienced in pain management) to assess block and see the need for rescue analgesia promptly.

References

### Temperature control

**Dr C Kirton**

#### Why do this audit?

Thermoregulation is known to be disrupted in the perioperative period, with the paediatric population particularly at risk. The Association of Anaesthetists advises that body temperature monitoring must be available in paediatrics, and used when appropriate. This audit will establish whether warming techniques are being used effectively in children and whether appropriate intraoperative monitoring is being used.

#### Best practice: research evidence or authoritative opinion

Hypothermia is in most cases deleterious, being associated with increased oxygen consumption and shivering, with a decrease in platelet function and consequent blood loss, with the risk of surgical wound infection and with impairment of drug metabolism. Maintenance of normothermia is possible using a variety of warming devices. The forced air blender is particularly effective. The large surface area-mass ratio of infants allows rapid cooling and rewarming, and therefore monitoring is important.

#### Suggested indicators

% children who arrive in the recovery area with tympanic (or axillary) temperature in the range 36–37°C.

#### Proposed standard or target for best practice

100% children should meet the above criteria.

#### Suggested data to be collected

Patient age and weight, operation, duration of anaesthesia, temperature monitoring used intraoperatively, warming methods used, tympanic or axillary temperature on arrival in recovery.

#### Common reasons for failure to reach standards

- Non-availability of warming equipment or monitoring devices.
- Failure to use equipment, perhaps due to lack of awareness of the importance of temperature control.
- Unexpected lengthy duration of surgery.
- Over zealous warming without monitoring.

#### Related audits

2.7 – Temperature management
References


Pain management
Dr J Goddard

Why do this audit?

Pain is experienced by paediatric patients of all ages, especially in the postoperative period. The evidence in paediatric practice that relief of postoperative pain is cost-effective or beneficial to organ function is lacking. Nonetheless pain relief is a basic requirement, which in the hospital environment is entrusted to healthcare professionals. It is essential that this responsibility is discharged safely and effectively.

Best practice: research evidence or authoritative opinion

The principles of treating acute pain in hospital have been well reviewed. Authoritative reports recommend that these principles are best achieved by the establishment of an Acute Pain Service (APS). Data in paediatric practice support these recommendations and confirm that it is the structure and process of an APS that most improves pain relief rather than specific analgesic techniques. The routine assessment and recording of pain is pivotal. It is important that a procedure for pain assessment and recording is developed to suit local circumstances.

Suggested indicators

- % of days when paediatric ward is visited by the acute pain team.
- % of children undergoing surgery who have a complete record of pain scores.
- % of children with unacceptable pain scores in the postoperative period.
- % of children managed as day cases assessed to be in severe pain at home.

Proposed standard or target for best practice

The local APS needs to consider what their targets should be. In particular the method and frequency of pain scoring will be decided. One method is to record a pain score alongside routine observations of temperature, pulse rate etc.

In-patients

On 100% days, a member of the APS should visit all paediatric surgical wards.

100% children undergoing surgery should have a complete record of pain scores.

< 5% children should have an unacceptable pain score at any time. The pain score deemed to be unacceptable needs to be chosen, and will depend on which validated pain assessment tool the team wishes to use.

Day cases

No child should be assessed as being in severe pain on discharge or at home.
Paediatric services

Suggested data to be collected
- Presence/absence of APS and its members.
- Evidence of daily visit by APS member to paediatric surgical wards.
- For each child undergoing surgery: completeness of pain score record.
- Worst pain score each day in all postoperative children, reason and any action taken.
- Pain score on discharge for day cases.
- Parental assessment of pain at home.

Common reasons for failure to reach standards
- Holiday, sickness, other duties (of acute pain team).
- No dedicated acute pain team or no weekend cover.
- Pain scores not considered important, staff too busy.
- Failure to supply appropriate analgesics for use at home, inadequate instructions for parents on analgesic administration.

Related audits
- Section 11 – Acute pain services

References
Perioperative fluid management in children

Dr N Barker

Why do this audit?

Hyponatraemia (plasma sodium < 136 mmol/l) may result from excessive use of hypotonic fluids, especially during the perioperative period when vasopressin levels may be elevated. This can result in hyponatraemic encephalopathy. Administration of glucose during surgery may lead to intraoperative hyperglycaemia which can cause an osmotic diuresis leading to dehydration and electrolyte disturbance. The purpose of this audit is to observe the use of intravenous fluids given to children during the perioperative period and highlight patients at risk of hyponatraemia and hyperglycaemia.

Best practice: research evidence or authoritative opinion

There are a number of concerns and case reports of morbidity associated with hyponatraemia due to water intoxication in the perioperative period.\(^1,2\) Suggestions to help avoid this are to administer isotonic fluids for all replacement fluid and possibly for maintenance in the intraoperative period. Certainly hypotonic fluids should probably not be given at greater than maintenance rates.\(^3,4\)

Hyperglycaemia is best avoided – as well as the osmotic diuresis issues, hyperglycaemia in combination with hypoxic cerebral or spinal cord insult will worsen neurological outcome. If dextrose is avoided, about one-fifth of children will show no change or a rise in blood sugar. However, hypoglycaemia is a very serious complication and certain conditions favour intraoperative glucose administration, e.g. neonates < 48 h of age, poor nutritional status and long operations. When the rate and glucose concentration are taken into account, the glucose content of the solutions providing an acceptable glucose level is approximately 300 mg/kg/h, though this too has been shown to produce hyperglycaemia in longer operations. A glucose infusion at a rate of 120 mg/kg/h is sufficient to maintain an acceptable blood glucose level and prevent lipid mobilisation. Giving 5% dextrose containing solutions at maintenance rates is more likely to cause hyperglycaemia.\(^5\)

Suggested indicators

Replacement should be with normal saline, Hartmann’s solution, colloid or blood where appropriate.

Hypotonic fluids should be reserved for maintenance use.

Dextrose administration should not exceed 300 mg/kg/h.

Proposed standard or target for best practice

100% children should meet the above criteria.

Suggested data to be collected

Name, date of birth, weight, procedure, duration of procedure, estimated blood loss, type and amount of fluid/blood administered intraoperatively, postoperative fluid prescription.
Paediatric services

Common reasons for failure to reach standards

Traditional teaching and practice whereby children have been given hypotonic, dextrose containing fluids routinely during surgery.

Not using isotonic fluids for replacement.

References


