

Are We There Yet?

A review of organisational and clinical aspects of children's surgery



NCEPOD

SUMMARY

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A review of organisational and clinical aspects of children's surgery

A report by the National Confidential Enquiry into Patient Outcome and Death (2011)

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Introduction

The delivery of surgical services for children in the United Kingdom has changed in the last 20 years. Since the first NCEPOD report about standards for the surgical and anaesthetic care of children¹ there have been a number of other documents with both direct and indirect effects on the totality of care for children in the health service including the National Service Framework for children²; the Healthcare Commission's 'Improving Services for Children in Hospital'³; the Every Child Matters programme⁴; the Children's Plan⁵; the NHS Next Stage Review⁶; the joint Department for Children Schools and Families/Department of Health⁷ strategy for children and young people; Sir Ian Kennedy's report on children's services⁸; and a report by the Royal College of Paediatrics and Child Health⁹. As a result there has been both clinical and organisational change to health care provision for children. These include specialisation and centralisation of children's services, and modifications of staff training. There is direct evidence that there has been a reduction in the number of DGH's providing children's surgery. Even so the majority of operations are still undertaken in this setting¹⁰.

Twenty-one years ago the first NCEPOD report which reviewed deaths in children within 30 days of surgery¹ showed that there were deficiencies in the skills of health care professionals who cared for surgical children and in the facilities available. This was thought to be especially so in District General and Single Specialty Hospitals. Recommendations were made that surgeons and anaesthetists should not undertake occasional paediatric practice and that consultants who have responsibility for children need to maintain their competence in the management of children. The 1999 NCEPOD report,

'*Extremes of Age*', recommended a regional approach to the organisation of paediatric surgical services¹¹. These recommendations along with others have resulted in considerable debate on the best model for children's surgery in the UK both in terms of skills of health care professional and the appropriate facilities¹²⁻¹⁴.

There has been a decline in the number of children who have surgery performed in District General Hospitals (DGHs) from more than 410,000 children under 18 years in 1994/1995 to 325,000 in 2004/2005. This is a complex situation and some of this reduction reflects changes in practice (e.g. general reduction in ear, nose and throat procedures). However, there has been an increase in referrals to tertiary centres, particularly in the areas of general and also orthopaedic surgery without any shift of resources¹. Whilst in principle this may encourage greater paediatric specialisation and concentration of expertise there is a perception amongst some clinicians and anecdotal evidence that this has been detrimental to children's surgical services in DGHs¹⁵. There is a concern regarding the deskilling of surgeons and anaesthetists in DGHs who care for children which may limit their ability to manage critically ill children who present at their hospital¹⁶. The development of clinically managed networks for children's surgical and anaesthetic care has been recommended as a solution to this problem¹⁷⁻²⁰ but as yet has not been fully implemented. There is a risk of reaching a tipping point in the surgical and anaesthetic care of children in DGHs and several professional bodies have been calling for an urgent national review of paediatric surgical and anaesthetic services.

INTRODUCTION

Whilst there have been national reviews of some subspecialty paediatric surgical services such as cardiac²¹ and neurosurgical services²², there has been no similar review of those paediatric surgical services which provide the majority of care to children in the UK.

With these factors in mind, this study aims to provide valuable data on the current state of paediatric surgical and anaesthetic practice which can be used to inform and provide recommendations for those planning the future direction of surgical and anaesthetic services for children.

Method and data returns

Aims

To explore remediable factors in the processes of care of children aged 17 and younger, including neonates, who died prior to discharge and within 30 days of emergency or elective surgery.

The aims were to look in detail at: 1. The organisational structure of services provided and 2. The quality of care received by individuals.

Expert group

A multidisciplinary group comprising consultants from surgery and anaesthetics (both paediatric general and cardiac), intensive care, nursing, a representative from the Centre for Maternal and Child Enquiries, a lay representative and a scientific advisor contributed to the design of the study and reviewed the findings.

Objectives

The Expert Group identified objectives that would address the overall aim of the study and these will be addressed throughout the following chapters:

- Organisational structure of care
- Pre-operative care and admission
- Inter-hospital transfer
- Networks of care
- The seniority of clinicians
- Multidisciplinary team working (including the involvement of paediatric medicine)
- Delays in surgery
- Anaesthetic and surgical techniques
- Acute pain management
- Critical care
- Comorbidities
- Consent

Hospital participation - organisational data and peer review data

All National Health Service hospitals in England, Wales and Northern Ireland as well as hospitals in the independent sector and public hospitals in the Isle of Man, Guernsey and Jersey were expected to participate if they undertook surgery in children aged 17 and younger.

Within each hospital, a named contact, referred to as the NCEPOD Local Reporter, acted as a link between NCEPOD and the hospital staff, facilitating case identification, dissemination of questionnaires and data collation.

Population

Organisational data: All hospitals undertaking surgery in children were asked to return an organisational questionnaire.

Peer review data: All patients aged 17 years and younger, who died within 30 days of a surgical procedure (defined by the giving of a general or regional anaesthetic) between 1st April 2008 and 31st March 2010 were included in the study. For the purposes of the study, this also included patients who underwent interventional procedures or radiology either in the operating theatre or elsewhere. Throughout the report the term 'operation' refers to both surgery and interventional procedures.

Exclusions - Peer review data

1. A number of procedures were excluded where performed in isolation (See Appendix 4 on the website);
2. Patients undergoing surgery without the use of general or regional anaesthesia;
3. Patients transferred alive to another Trust following surgery, who subsequently died.

Organisational questionnaire

Data on a hospital by hospital was basis collected to provide information on the facilities provided at all hospitals that undertook surgery in children irrespective of whether cases were included in the peer review aspect of the report. Data collected concerned networks of care, arrangements for the transfer of patients, critical care facilities, hospital facilities, acute pain management, pre-admission facilities, surgical facilities, and audit. Respondents were asked to categorise their hospital type. However, there were some inconsistencies in this designation, e.g. a hospital selecting both University Teaching Hospital and Specialist Tertiary Paediatric Centre and when a respondent categorised their hospital to be in more than one category it was allocated to the most appropriate category based on existing data on hospital types^{11,18}. The fact that some respondents did not know how to define their hospital's purpose suggests that clearer definitions, or clearer communication of existing definitions is required. To ensure consistency with other similar datasets further cross-checking was undertaken to ensure robust categorisation for the purpose of analysis.

The organisational questionnaire was sent to the Local Reporter for completion in collaboration with the relevant specialties. The Medical Director was also asked to contribute where appropriate.

Case ascertainment - peer review data

Cases were identified using OPCS codes. The NCEPOD Local Reporter identified all patients who died within their hospital(s) during the study period, within 30 days of the primary surgical procedure. The information requested for each case included the details of the surgeon and anaesthetist who carried out the procedure. All cases identified to NCEPOD with an included OPCS code were included in the study. Data concerning the type of anaesthetic administered was also requested but since this was not routinely recorded it was rarely available.

Clinical questionnaires and case notes

Two questionnaires were used to collect data for the peer review aspect of this study, a surgical questionnaire and an anaesthetic questionnaire per case included.

Surgical and anaesthetic questionnaire

The surgical questionnaire was sent to the surgeon who carried out the primary procedure of the patient's final admission. The anaesthetic questionnaire was sent to the anaesthetist who was responsible for the patient during the primary procedure of the final admission. These questionnaires covered all aspects of patient care from admission, to specific information around the procedure, to death. As the anticipated sample size was small, the number of questionnaires was not limited per surgeon. Where a surgeon or anaesthetist had more than one questionnaire to complete, extra time was given. These questionnaires were either sent directly to the surgeon or via the Local Reporter for dissemination, depending on the Trust's preference. It was also suggested that anaesthetists and surgeons liaised closely with neonatal/paediatric intensive care unit colleagues to answer some of the questions.

Case notes

For each case, the following case note extracts were requested to enable peer review:

- Inpatient and outpatient annotations from pre-admission (birth where applicable) to death;
- Integrated care pathways;
- Nursing notes;
- Drug charts;
- Imaging reports;
- Paediatric Intensive Care/Special Care Baby Unit charts;

- Fluid balance charts;
- Operation notes;
- Notes from multidisciplinary team meetings;
- Consent forms;
- Pathology results;
- Haematology and biochemistry results;
- Incident report form and details of outcome;
- Discharge summary;
- Operation notes;
- Anaesthetic charts;
- Pre-anaesthetic or pre-admission protocols/ checklists;
- Recovery room records;
- Do Not Attempt Resuscitation documentation;
- Post mortem report.

Advisor groups

A multidisciplinary group of Advisors was recruited to review the case notes and associated questionnaires. The group of Advisors comprised: paediatric general/urological surgeons, paediatric cardiac surgeons, paediatric otolaryngology surgeons, paediatric orthopaedic surgeons, paediatric neurosurgeons, paediatric cardiologists, specialist and non-specialist paediatric anaesthetists, paediatricians, neonatologists, emergency medicine physicians, paediatric intensivists, paediatric radiologists, and children's nurses.

All questionnaires and case notes were anonymised by the non-clinical staff at NCEPOD who removed all patient, clinician and hospital identifiers. The Clinical Co-ordinators at NCEPOD, and the Advisors had no access to such identifiers.

After being anonymised each case was reviewed by one Advisor within a multidisciplinary group. At regular intervals throughout each meeting, the chair (an NCEPOD Clinical Co-ordinator) allowed a period of discussion for each Advisor to summarise their cases and ask for opinions from other specialties or raise aspects of a case for discussion.

The grading system below was used by the Advisors to grade the overall care each patient received.

Good practice – a standard that you would accept for yourself, your trainees and your institution
Room for improvement – aspects of **clinical** care that could have been better
Room for improvement – aspects of **organisational** care that could have been better
Room for improvement – aspects of both **clinical and organisational** care that could have been better
Less than satisfactory – several aspects of **clinical and/or organisational** care that were well below satisfactory
Insufficient data – insufficient information submitted to assess the quality of care

Quality and confidentiality

Each case was given a unique NCEPOD number so that cases could not easily be linked to a hospital.

The data from all questionnaires received were electronically scanned into a preset database. Prior to any analysis taking place, the data were cleaned to ensure that there were no duplicate records and that erroneous data had been entered during scanning. Any fields in an individual record that contained spurious data that could not be validated were removed.

Data analysis

The qualitative data collected from the Advisors' opinions and free text answers in the clinician questionnaires were coded, where applicable, according to content to allow quantitative analysis. The data were reviewed by NCEPOD Clinical Co-ordinators and Clinical Researchers to identify the nature and frequency of recurring themes. Case studies have been used to illustrate particular themes.

All data were analysed using Microsoft Access and Excel by the research staff at NCEPOD. The findings of the report were reviewed by the Expert Group, Advisors and the NCEPOD Steering Group prior to publication.

Data returns

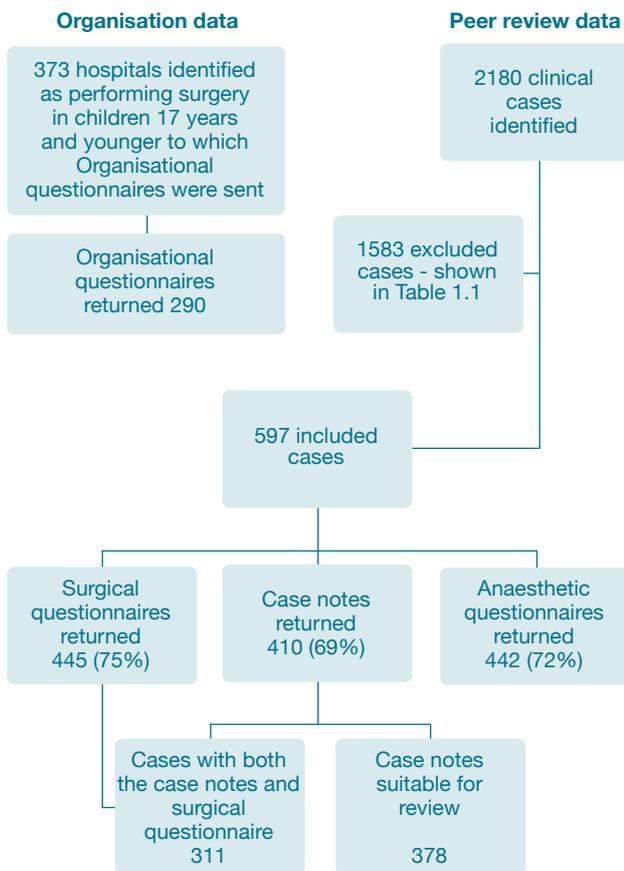


Figure 1.1 The data returns for the study

Over the two year period 2180 cases were reported, of which 1583 were excluded. The main reasons for exclusion are presented in Table 1.1.

Table 1.1 Reasons for exclusions

Reason for exclusion of case	Total
Excluded as the operation code was not included in the study	1154
Death not within 30 days	287
Did not undergo a procedure	64
Did not have an anaesthetic	55
Reason not recorded	18
Discharged alive	5
Total	1583

In a number of cases questionnaires were returned unanswered to NCEPOD or problems with regard to questionnaire completion were notified to the office; the most common reasons for this were case notes being lost or difficulty in retrieving case notes, and the consultant in charge of the patient at the time of their surgery no longer being at the hospital. The returns for the study are summarised in Figure 1.1.

It should be noted that case note retrieval proved much more difficult in this study compared to previous NCEPOD reports. The NCEPOD staff committed considerable time and effort to this but several Trusts were unable to locate the clinical records. Thus not all hospitals are adhering to relevant NHS information governance standards²³.

Overall assessment of care

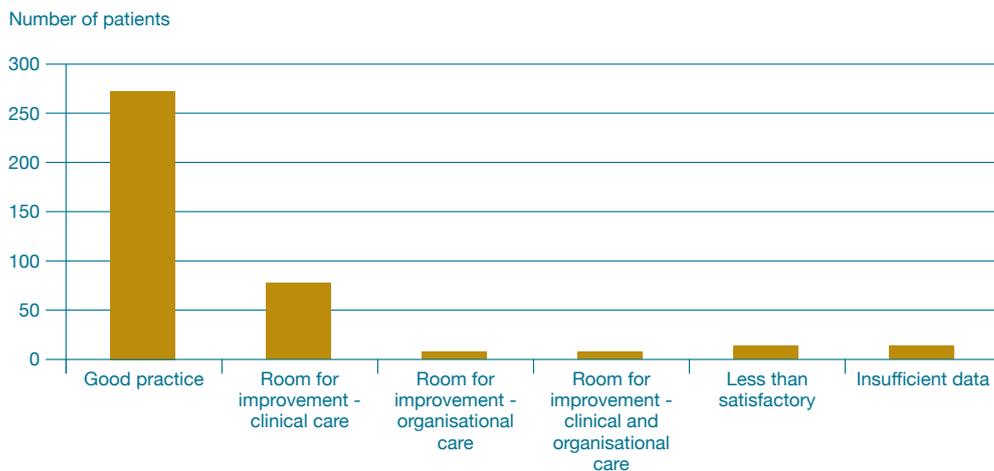


Figure 3.3 Overall assessment of care - Advisors' opinion

Overall assessment of care

After reviewing all aspects of care provided (not outcome) of 378 cases, Advisors were asked to provide an overall quality of care assessment of the case, based on a five point scale. As Figure 3.3 shows 71% of cases reviewed were judged by the Advisors as good care; demonstrating that there is a high level of good quality care, on both a clinical and organisational level, being delivered to children undergoing surgery. This is likely to reflect the fact that the majority of the sample described came from specialist centres.

In 20% of the sample there was believed to be room for improvement in clinical care, 2% in organisational care, and 2% in both clinical and organisational care. Three percent of patients (11) were deemed to have received care which was less than satisfactory.

In a further 3% (11 cases) Advisors did not have enough information in the case notes provided to make a valid assessment.

Key findings and recommendations

Key Findings - Organisation of Care

Surgical workload

Thirty two hospitals from which an organisational questionnaire was returned were unable to provide important data on the number of operations undertaken in children.

Clinical networks for children's surgery

Less than half of NHS hospitals in which surgery in children was undertaken stated that they were part of a surgical clinical network for children and there was uneven distribution of hospitals included in networks between health regions in England, Wales and Northern Ireland.

Few surgical clinical networks for children included paediatric anaesthesia.

More than half of hospitals that were in surgical clinical networks had no specific funding and many did not include elements that would suggest effective functioning; such as leadership, education, clinical care policies, multidisciplinary team meetings, clinical governance and accountability arrangements.

Transfer of children

93% (266/285) of hospitals had a policy for the transfer of children to another hospital. However many of these policies did not include staffing arrangements for the transfer or family support during the transfer.

Team working

Not all hospitals had comprehensive operational policies on surgery and anaesthesia for children as recommended by various national bodies^{17,18}.

Clinical governance and audit

53% (147/276) of hospitals that undertake surgery in children reported that they held clinical audit and morbidity and mortality meetings for children although

these may not have included children discussed in wider departmental audit meetings.

Pre-operative assessment of elective paediatric surgical patients

80% (228/284) of hospitals that undertook surgery in children had pre-admission assessment clinics for children, however, only 56% (149/267) provided written information for children and parents about anaesthesia.

Theatre scheduling for children

Despite national recommendations stating that surgery on children should be undertaken either on children only operating theatre lists and where this is not feasible have a segregated time slot on adult lists, some hospitals mix children and adults in no particular order within operating lists^{2,17,41}.

Nine hospitals that had a large case load for children's surgery did not have dedicated children's operating theatres.

There was considerable variation for the provision of non-elective surgery for children both in hours and out of hours.

In 35% (99/282) of hospitals, children were recovered following surgery and anaesthesia in a Recovery area which was not separated from adults. This is contrary to national recommendations^{2,17}.

Hospital facilities for children

In 36% (101/281) of hospitals children of all ages were mixed together on a children's ward with no special provision for older children and adolescents. This goes against recommendations of the National Strategic Framework for Children which states that older children and adolescents should be grouped together in separate bays on the paediatric ward or on separate adolescent wards to help meet their social needs².

Specialised staff for the care of children

Six hospitals undertook surgery on a separate site remote from the paediatric inpatient beds without any paediatric medical support (doctors with specific training for the care of children).

In 10% (23/223) of hospitals trainees from an adult only surgical specialty provided medical cover for inpatient children.

In 8% (23/275) of hospitals that undertook surgery in children there was not at least one children's registered nurse per shift on non critical care wards. This does not comply with national standards^{43,44}.

There was considerable variation in the level of appropriate child orientated competencies of peri-operative nurses and operation department practitioners between hospitals that undertook surgery in children.

Management of the sick child

In 18.5% (51/276) of hospitals that undertook surgery in children there was no policy for the identification and management of the seriously ill child.

Some hospitals that undertook surgery in children did not have the minimum measures in place to provide for the child that might require cardiopulmonary resuscitation. These include a resuscitation policy that includes children and on-site resuscitation teams that include staff with advanced training in paediatric life support.

Paediatric acute pain management

Not all hospitals that undertake surgery in children had the necessary measures in place to provide effective pain control following surgery. In many hospitals there was lack of consultants and specialist acute pain nurses with sessional commitments for acute pain management and a paucity of protocols and educational programmes in the management of post operative pain.

Recommendations - Organisation of Care

Surgical workload

All hospitals that undertake surgery in children must have the necessary information systems in place to determine the number of patients that are treated within their hospital for monitoring, clinical governance and financial purposes. *(Trust Chief Executives)*

Clinical networks for children's surgery

There is a need for a national Department of Health review of children's surgical services in the UK to ensure that there is comprehensive and integrated delivery of care which is effective, safe and provides a high quality patient experience. *(Department of Health and Devolved Administration Governments)*

National NHS commissioning organisations including the devolved administrations need to adopt existing recommendations for the creation of formal clinical networks for children's surgical services. These need to provide a high quality child focused experience which is safe and effective and meets the needs of the child^{8,18,26,27}. *(National Commissioners)*

Transfer of children

All hospitals that admit children should have a comprehensive transfer policy that is compliant with Department of Health and Paediatric Intensive Care Society guidance and should include; elective and emergency transfers, staffing levels for the transfer, communication procedures, family support, equipment provision and transport arrangements. *(Medical Directors)*

Team working

All hospitals that provide surgery for children should have clear operational policies regarding who can operate on and anaesthetise children for elective and emergency surgery, taking into account on-going clinical experience, the age of the child, the complexity of surgery and any co-morbidities. These policies may differ between surgical specialities. *(Medical Directors)*

Clinical governance and audit

All hospitals that undertake surgery in children must hold regular multidisciplinary audit and morbidity and mortality meetings that include children and should collect information on clinical outcomes related to the surgical care of children. *(Medical Directors)*

Pre-operative assessment of elective paediatric surgical patients

Hospitals in which surgery in children is undertaken should provide written information for children and parents about anaesthesia. Good examples are available from the Royal College of Anaesthetists website^{39,40}. *(Clinical Directors in Anaesthesia)*

Theatre scheduling for children

Hospitals that have a large case load for children's surgery should consider using dedicated children's operating theatres. *(Clinical Directors in Surgery and Anaesthesia and Medical Directors)*

Hospitals in which a substantial number of emergency children's surgical cases are undertaken should consider creating a dedicated daytime emergency operating list for children or ensure they take priority on mixed aged emergency operating lists. *(Clinical Directors in Surgery and Anaesthesia and Medical Directors)*

Specialised staff for the care of children

Children admitted for surgery whether as an inpatient or an outpatient must have immediate access to paediatric medical support and be cared for on a ward staffed by appropriate numbers of children trained nurses. *(Clinical Directors)*

There is a need for those professional organisations representing peri-operative nursing and operating department practitioners to create specific standards and competencies for staff that care for children while in the operating theatre department. *(British Anaesthetic and Recovery Nurses Association, College Operating Department Practitioners, Association for Perioperative Practice, Royal College of Nursing)*

Management of the sick child

All hospitals that admit children as an inpatient must have a policy for the identification and management of the seriously ill child. This should include Track & Trigger and a process for escalating care to senior clinicians. The National Institute for Health and Clinical Excellence needs to develop guidance for the recognition of and response to the seriously ill child in hospital. *(Medical Directors, National Institute for Health and Clinical Excellence)*

All hospitals that admit children must have a resuscitation policy that includes children. This should include the presence of onsite paediatric resuscitation teams that includes health care professionals who have advanced training in paediatric resuscitation. *(Medical Directors and Resuscitation Leads)*

Paediatric acute pain management

Existing guidelines on the provision of acute pain management for children should be followed by all hospitals that undertake surgery in children^{2,17,58,59}. *(Medical Directors)*

Key Findings - Peri-operative care

Overall quality of care in the majority of patients was good (71%), with room for improvement in aspects of care in 26%. In 11 cases (2.9%) care was less than satisfactory.

Inter-hospital transfer

Most babies and children in this study were admitted as an emergency and were transferred to another hospital prior to surgery taking place.

Delays in transfer occurred in 34/176 cases. In 7/23 where an opinion could be made this was believed to affect outcome. In 91/159 cases where it could be determined it took more than six hours from the time of decision to transfer to being received in a centre where surgery took place.

Documentation of transfer events/detail and time of admission is poor within paediatric medical records.

Pre-operative care

Pre-operative investigation and preparation were generally performed in a full and timely manner.

There was a frequent requirement for both basic radiology (216 investigations) and more complex investigation/interventions (268 episodes) in the patients in this study.

Delays in surgical referral and diagnosis, and senior review were relatively unusual, but there were a few cases of both delay and undue haste in the decision to operate some of which affected outcome.

MDT meetings prior to surgery were performed in just over a third of this population. Where this was not the case senior clinician involvement of an appropriate level was generally apparent. However documentation of this involvement was lacking in 58/185 cases.

Consent and information for patients & parents

Consent was not always taken by surgeons who were fully conversant with the operation performed and documentation of seniority was poor.

Risk of death was often not formally noted or quantified during the consent process or documented in discussions with patient/parents and carers.

Even in retrospect surgeons and Advisors had difficulty quantifying risk.

Surgical care

The majority (297/348) of operations were performed by consultant surgeons. 51/348 were performed by other grades and where this was the case it was considered inappropriate in 4/51 cases.

The Advisors considered that an appropriate operation had been performed in 348/362 cases. When this was not the case the outcome may have been affected in 5/14 operations.

Anaesthetic care

There was a good level of cover by consultant anaesthetists (269/289) where this was known.

In only 10/317 procedures did the Advisors consider that the anaesthetic technique was inappropriate. This may have affected the outcome in four children. Overall the provision of anaesthetic services seems to have been very satisfactory.

Postoperative care

In the main the level of care (Levels 1, 2 and 3) provided postoperatively was appropriate.

Complications were common (254/368). In 22/254 instances the Advisors were of the opinion that management was sub-optimal and definitely affected the outcome in 8/10 children in whom it was possible to make a judgement. However given the range of specialties involved in the care of these children there did not appear to be a common theme upon which to base recommendations for reducing this incidence.

End of life care

End-of-life care planning was absent in at least 50% of children in whom it would have been appropriate.

Following the death of at least 36 children there was no discussion between the surgical team and the parents. Poor documentation prevented the assessment of this in a further 76 deaths.

Documentation that confirmed that the death was discussed at a morbidity and mortality meeting was only present in the case notes of 126/378 children although such information may have been recorded elsewhere.

There were many other instances of poor documentation that need to be addressed including name and grade of both surgeon and anaesthetist, end of life care planning and discussions with parents after death.

Recommendations - Peri-operative care

Inter-hospital transfer

National standards, including documentation for the transfer of all surgical patients, irrespective of whether they require intensive care need to be developed by regional networks. *(Network Leads)*

Hospital teams working in both specialist and non specialist centres should be in a state of readiness for transfer of babies and children requiring emergency surgery, and be prepared to provide high level and timely support for these transfers. Surgical emergencies may require rapid triage, simultaneous with resuscitation and communication with tertiary care providers. *(Medical Directors and Clinical Directors)*

When a decision to transfer a patient for (less urgent) surgical care has been made, this should be expedited. Transfer method and personnel should be agreed in advance. *(Clinical Directors)*

Pre-operative care

Expertise in paediatric radiology is an essential adjunct to the running of a service for children requiring surgery.

Multidisciplinary team meetings for complex cases should be undertaken pre-operatively except when this is predicated by the urgency of the case. Documentation of inter-professional discussions is essential even if written in retrospect. *(Medical Directors and Clinical Directors)*

Consent and information for patients & parents

Consent by a senior clinician, ideally the one performing the operation should be normal practice in paediatrics, as in other areas of medicine and surgery. Documentation of grade confirms that this process has occurred. This is already a national recommendation. *(Medical Directors and Clinical Directors)*

In surgery which is high risk due to co-morbidity and/or anticipated surgical or anaesthetic difficulty, there should be clear documentation of discussions with parents and carers in the medical notes. Risk of death must be formally noted, even if difficult to quantify exactly. *(Consultants)*

End of life care

National guidance should be developed for children that require end-of-life care after surgery. *(Department of Health, Royal Colleges, appropriate specialist societies)*

Clinicians must ensure that appropriate records are made in the medical notes of all discussions that take place with a child's parents or relatives after death. In addition it is mandatory that the name and grade of clinicians involved at all stages of care are clearly recorded in the medical notes and on anaesthetic and operation records. *(Guidelines from Royal Colleges/specialist societies and Medical Directors)*

Confirmation that a death has been discussed at a morbidity and mortality meeting is required. This should comprise a written record of the conclusions of that discussion in the medical notes. *(Medical Directors)*

Key Findings - Specific care reviews

Necrotising enterocolitis

There was a delay in surgical referral in 9/101 babies with NEC perhaps reflecting the difficulties in both diagnosis and decision-making in respect of surgical intervention. In a further nine babies there was a delay in transfer to the hospital where surgery was performed.

Although consent was generally obtained by an appropriately experienced surgeon, documentation of the risk of death either on the consent form or in the medical notes was poor. The latter was a factor that was also noted in babies where the Advisors considered that there was “Room for improvement in clinical care”

Consultant surgeons performed the majority (93/103) operations in these babies.

Congenital cardiac surgery

Obtaining consent (including documentation of the risk of mortality) and surgery was almost always performed by a consultant surgeon.

The level of care for children with congenital heart disease was generally good and reflected that of the study as a whole.

Neurosurgery/Trauma

Important delays occurred in both investigation and transfer in a number of cases.

The level of care overall was less satisfactory for neurosurgical cases than in the remainder of the study.

Recommendations - Specific care reviews

Necrotising enterocolitis

Medical notes for babies with NEC require careful audit to ensure that the views and decisions of all members of the multi-disciplinary team are accurately recorded. (*Medical Directors*)

This survey and the advice from our specialist Advisors have highlighted the difficulties in decision-making during both medical management and the decision to operate in babies with NEC. A national database of all babies with NEC might facilitate this aspect of care and generate data upon which to base further research. (*Department of Health, Specialist Societies*)

Neurosurgery

Urgent completion of the “Safe and Sustainable Review of Children’s Neurosurgical Services” is required with implementation of the appropriate pathways of care that this is likely to recommend. This should be followed by a further audit to ensure compliance with national standards and models of care for all children requiring neurosurgery.

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