

The Royal College of Anaesthetists

Raising the Standard:
a compendium of audit recipes
for continuous quality improvement in anaesthesia



3rd edition
2012

Editors
Dr John R Colvin
Dr Carol J Peden



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We also wish to acknowledge a considerable debt of gratitude to all the contributors to the first and second editions. It is testament to the foresight of the editors of the first edition that, 12 years on, their original strapline 'continuous quality improvement in anaesthesia' is now more generally recognised in the application of the emerging science of improvement across all branches of medicine as outlined in the foreword by Dr Carol Haraden, of the Institute of Healthcare Improvement.



Dr John R Colvin
Editors, third edition

Dr Carol J Peden

Foreword

We improve what we measure. We often do not believe that processes and outcomes require improving until we have the data we need to make us change. Data builds will for improvement, allows us to know if we are improving, and to understand the degree of improvement possible with a given change in practice. This book will help clinicians do all of this and more.

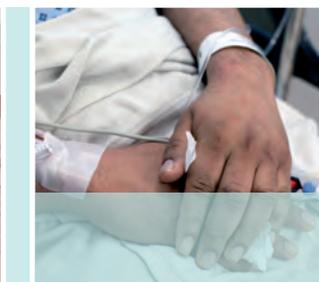
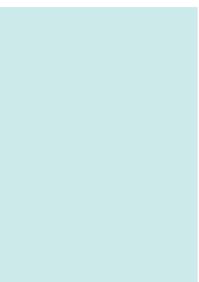
It is no surprise that this book is written by and for anaesthetists, and spear-heads a transition from audit into quality improvement. Anaesthesia was the first medical specialty to champion patient safety as a specific focus. Anaesthetists have a long history of innovation and have led the field in both measurement, and improvement, of clinical practice. From the 1950s through to the 1970s, though reports and data were imperfect, it was believed that anaesthesia care itself caused a high mortality in the region of one to two deaths per 10,000 anaesthetics. In order to improve the outcomes for patients, several actions had to be taken, the first of which was that anaesthetists had to decide that the cost of death and suffering was too high. The courage to look critically at practice and decide that the current outcomes were simply unacceptable was unprecedented. Secondly, anaesthetists had to look beyond the simply personal to the system of practice for answers. Thirdly, they used the data to build the will to embark on a systematic programme of improvement that resulted in a 10 to 20-fold reduction in mortality and catastrophic morbidity for healthy patients undergoing routine anaesthetics. Application of human factors and high reliability concepts to anaesthesia practice promises further gains. This is especially critical now, as technology extends our human capacity in ways that are not yet known or understood.

In the past, audit was used as a measure of the adequacy of a process or the reliability of a desired outcome. Many a medical student or doctor in training, required to do an audit, experienced the fact that audit was frequently used as a measure of the state of a process or outcome at a singular point in time. There was often no expectation of an improvement plan, and little discussion about what the data told them about their work. There are changes afoot that require clinicians to look at data over time to help understand variation – both wanted and unwanted- for the purpose of improvement not judgment. Doctors are increasingly being asked to lead or join improvement teams with the aim of learning, not only how to audit data, but how to improve the associated processes and outcomes.

We need data for research, improvement, and judgement of how we perform compared with the best – all are necessary but none alone are sufficient to ensure that our care is safe. Clinical research continues to create new knowledge at a rate that has thus far surpassed our ability to apply the findings to practice. Improvement science can help us bring those needed new advances to the bedside where they can help patients. This book will help anaesthetists continue their pursuit of ever safer, and ever more effective care for their patients, and ultimately, more rewarding work for themselves.

Dr Carol Haraden PhD

Dr Haraden is a Vice President at the Institute for Healthcare Improvement (IHI), Boston USA. From 2006–2010 she was the National Lead for The Scottish Government Patient Safety programme. She was the External Faculty Lead for IHI for the South West of England Quality and Safety programme from 2009–2012. She continues to mentor and actively support many British doctors, particularly anaesthetists and intensivists, involved in quality and safety work.



Introduction

The Audit Recipe Book has provided a popular manual of audit topics for anaesthetists since the first edition in 2000. The strapline for the past two editions has read 'a compendium for continuous quality improvement in anaesthesia'. The emphasis has been on the provision of audits focused mainly on measurement against defined process standards. Since the publication of the last Recipe Book clinical audit nationally, has demonstrated some very impressive achievements, such as the NAP 3 and 4 audits,^{1,2} and the improvements in patient care driven by the data provided in the national hip fracture database and hip fracture peri-operative network.^{3,4} However, at a local level, enthusiastic clinicians can be frustrated by audit when they realise that identifying less than optimal system performance may create the momentum for change, but may not be enough to alter the workings of a complex system, nor sustain initial improvements that may have been made. This new edition of the Recipe Book seeks to bridge the gap between audit and improvement, by providing anaesthetists with an introduction to the science of improvement⁵ and demonstrating some basic tools which can be used to drive positive patient centred change. A number of anaesthetists and intensivists throughout the UK have now learned improvement methodology, often from participation in one of the national or regional patient safety programmes.^{6,7,8} We have therefore included a number of examples from practising clinicians illustrating how they have identified problems using audit methodology, and then applied simple improvement techniques to achieve change.

Anaesthesia has a long tradition of improving clinical safety and outcome by continuous critical examination of our practice. However, changing the increasingly complex clinical systems in which we work and making those changes last, is a very difficult task. We need to combine our professional knowledge of what is the best evidence in practice with knowledge of how to improve, in order to deliver consistent care for the patients we treat in our hospitals. Improvement science takes into account that context is key in delivering best care; what works best for one patient population in one hospital, may not be relevant in another.⁵ Knowing what is the best care is not enough, we must ensure that delivery is effective.^{6,9} The NCEPOD reports¹⁰ provide ample evidence that delivery of evidence based care is at best inconsistent and at worst woefully inadequate.

Audit is recognised as the cornerstone of clinical governance, strengthened by acceptance of the value of systematic critical and objective examination of practice by clinicians and management alike. The quality of delivery of healthcare can be divided into three domains:¹¹

- D **Structure:** e.g. how many emergency operating theatres are available 24 hours per day?
- D **Process:** e.g. what percentage of the components of the ventilator bundle are delivered reliably
- D **Outcome:** e.g. what is your hospital's 30 day mortality for ruptured aortic aneurysm?

Much audit has been process based; many of the audits in the 2006 Edition assess adherence to process measures. Although we still have this emphasis, we would urge anaesthetists undertaking a process-based audit to always consider the question, how will this improve care for my patients? The NHS White Paper 'Equity and Excellence: Liberating the NHS'¹² demands a 'relentless focus on clinical outcomes'. It states that success will be measured, not through bureaucratic process targets, but against results that really matter to patients... such as survival rates. Darzi's NHS plan 'High Quality Care for all'¹³ describes the NHS as 'safe, effective and personal', and therefore audit should evaluate care against one of these three domains. These principles are also the central focus of the key Scottish Health Policy 'The Quality Strategy' which is currently being implemented by three Ambition Delivery Groups for Safe, Effective and Person-Centred Care.¹⁴

The Compendium is now in two sections. The first section is an updated version of the Audit Recipe Book. The second section includes some simple guides to basic improvement techniques, based mainly on the PDSA cycle developed by Associates in Improvement¹⁵ and taught by the Institute for Healthcare Improvement.¹⁶ Most of the UK safety and quality programmes such as the Safer Patients Initiative, the Lead in Patient Safety programme, the Scottish, Welsh and Southern safety programmes use this methodology,^{6,7,8} and therefore

that is the one we have chosen to demonstrate. We do acknowledge that other techniques such as Lean and Six Sigma¹⁷ may be in use in some centres and familiar to some colleagues, but while we have referenced them there is not scope in the Recipe Book to provide an extensive discussion of different approaches. We have chosen to illustrate a few common topics with improvement projects undertaken by anaesthetists and illustrated with run charts and multiple PDSA cycles. Where appropriate, we have linked these examples with audits in the Recipe section. We chose not to change the whole format of this successful book, but to introduce the topic of improvement more gradually; maybe by the next edition audit and quality improvement will be so inexorably linked that both sections will seamlessly merge!

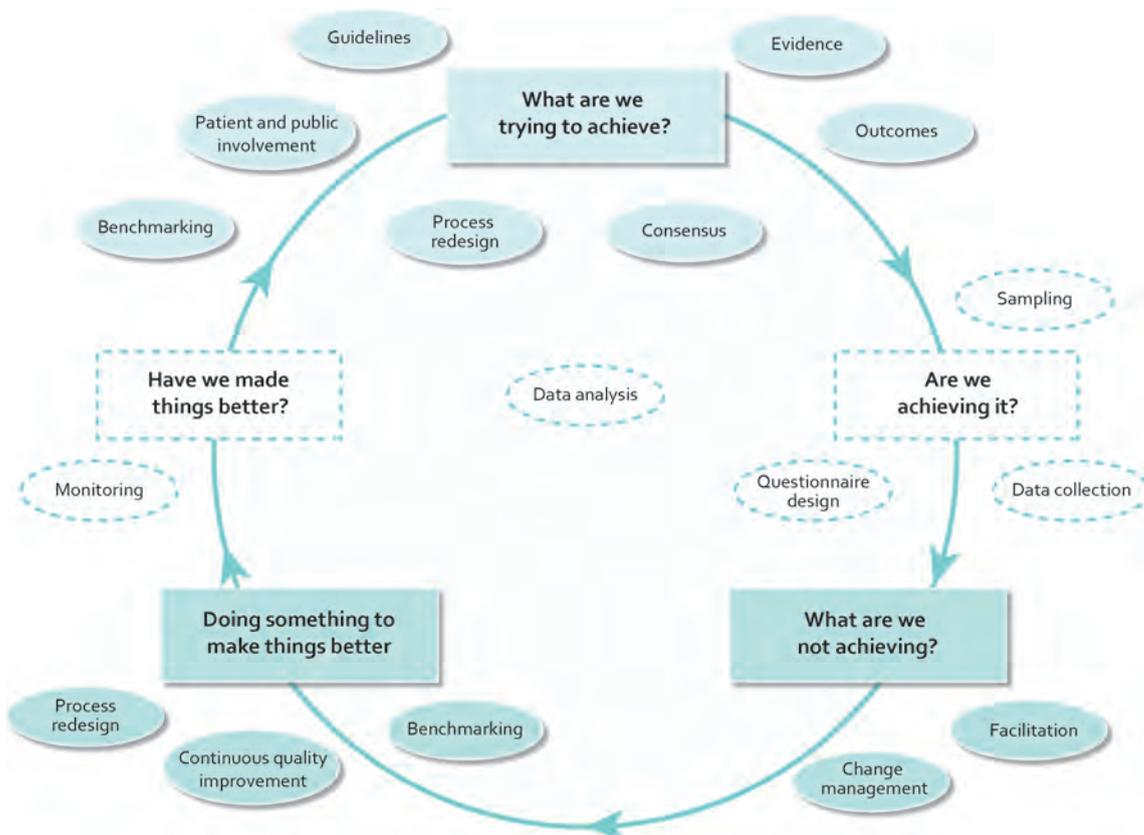
What is clinical audit?

Clinical audit has been variously defined over the years. This appears to be a well-accepted and relevant definition endorsed by the National Institute for Clinical Excellence (NICE) and others:

*'Clinical audit is a quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria and the implementation of change. Aspects of the structure, process and outcomes of care are selected and systematically evaluated against explicit criteria. Where indicated changes are implemented at an individual, team or service level and further monitoring is used to confirm improvement in healthcare delivery.'*¹⁸

The NICE publication 'Best Practice in Clinical Audit'¹⁸ clearly sets out the challenge to universally implement good quality audit and is worthwhile reading for those involved in audit on all levels. Essentially this involves an increased emphasis in the value of clinical audit, recognising that it is a key tool to changing practice and that it requires a supportive environment and use of appropriate methods. As we noted earlier, clinical audit particularly, has had some marked successes in recent years. The NAP 3 and 4 Audits^{1,2} have examined important areas of our clinical practice and highlighted areas for improvement. In surgery, following the Bristol Enquiry,¹⁹ the Society of Cardiothoracic Surgeons²⁰ has relentlessly driven up standards by the publication of outcome results by hospital and individual surgeon, and identification and investigation of mortality that are

Figure 1: The clinical audit cycle. From: Principles for best practice in clinical audit¹⁸



higher than expected. This methodology has been applied to all operations undertaken since 2006 and has been associated with a more than 50% improvement in risk-adjusted mortality. The improvement in outcomes has not only saved lives but reduced costs, and engendered a cultural change, putting patients at the centre of care delivery. Creating a multidisciplinary link between surgery and anaesthesia, the interest in outcomes in emergency surgery has driven contribution to the emergency laparotomy network,²¹ publication of emergency laparotomy data from multiple centres and the funding of the first anaesthesia driven Healthcare Quality Improvement Partnership (HQIP) audit for emergency laparotomy.

What is quality improvement and how does it differ from clinical audit?

Quality improvement is a formal approach to the analysis of performance, and then the use of systematic efforts to improve it. Improvement comes from the application of knowledge and a thorough understanding of the system you are trying to improve. The Model for Improvement^{15,16} has five key points (see Figure 2).

- D Knowing why or what you need to improve (audit will have provided this information).
- D Having a feedback mechanism to identify if improvement has happened (closing the audit loop).
- D Developing a change that will lead to improvement.
- D Testing a change before implementation, this may lead to multiple cycles of further change.
- D Knowing when you have an effective change that will lead to an improvement.

Doctors have not traditionally been taught how to achieve change; and techniques widely used in industry, based on the work of Deming from which the Model for Improvement and most other improvement techniques derive, have only recently been introduced into healthcare.²² The quality improvement section provides some examples of the successful use of this technique to drive change. It is important to remember however, that improvement can result from learning from failure and so testing what works and learning what does not, is central to this methodology.

The process of audit, quality improvement and the role of the Audit Compendium

At its simplest level audit involves systematic collection and analysis of data to drive change in clinical practice. This may be manifest at several levels from the large national audit projects described, through structured hospital and departmental audit programmes, to individuals carrying out single projects. Perhaps the simplest form of cyclical examination of practice and change uses the PDSA (plan-do-study-act) methodology to drive small steps of change in practice at a very local level.^{15,16} Whilst all these approaches are valid, the strengths and weaknesses of each have to be recognised. Large national audits may be comprehensive, well constructed and authoritative but locally may suffer from lack of ownership and an understanding of how to drive change identified by the audit, into widespread practice. The use of small stepwise changes in practice via application of PDSA cycles may be seen as a very basic level of audit. The principles of this methodology of change management are well described by the Institute of Health Care Improvement.¹⁶ This process is increasingly recognised as a powerful and effective driver for change though its requirement for very local ownership and application may make widespread uniform applications difficult. However, the learning from small PDSA cycles can be accelerated by shared learning in collaborative working, an approach used with success in the national and regional patient safety programmes. In between these extremes lie single audit topics and the use of structured Departmental audit programmes.

It is the intended place of this Audit Compendium to facilitate and strengthen the link between audit and quality improvement:

- D Individual topics have been chosen to reflect key areas of practice, relating to quality of service, which are relevant to most departments. In this Edition we have attempted to prioritise clinical topics, though recognise also the value of organisational/departmental issues and their impact on overall service provision and quality of care.
- D Individual sections or themes may be used as a basis for developing a structured programme of audit across all sub-specialty areas of anaesthesia practice. Each section has been constructed by a theme editor who has recognised expertise in their area of practice. Individual topics have been chosen to reflect typical aspects of the theme and are written by authors with a proven track record. In developing such a structured programme, Departments may care to consider which of the topics are core, requiring regular investigation at specified time intervals, and those which are perhaps of more 'one-off' or occasional relevance.

Figure 2: Model for Improvement.
 Reproduced from 'The Improvement Guide'.¹⁵

- D An important related function of the Compendium is to encourage and enhance training in audit and quality improvement by providing trainees with a source of material to stimulate their training in this key area of practice. Evidence of training and participation in the assessment and improvement of patient care and service provision is a vital part of training in anaesthesia. This volume should provide a useful starting point to stimulate trainees' interest across many subspecialty areas.

Getting started

We would encourage clinicians to consider the domains of quality: safe, effective and personal, and to choose a balance of audits for assessing the quality of care using structure, process and outcome measures for a departmental programme or personal portfolio that reflect all the different components of patient care.

One way to consider how to choose a topic is to look at your environment. What poses a risk to patient safety? How could you improve that risk? What processes do not work well? What are your ideas for improving them? What is inefficient and wastes resources that could be used for better patient care (this can include your time which could usefully be redeployed elsewhere).

- D Look for circumstances or a process where the quality of performance is important. Choose a topic relevant to this process, and modify it to suit your needs if necessary. If you can't find one, then write one using the same format.
- D Topics, extra material and the blank template can be accessed and printed directly from the website.

How can we make audit and quality improvement as effective as possible?

- D Make sure that there is a realistic potential for improvement, and that the end result is likely to justify the investment of time and effort involved.
- D Make sure that you have the necessary will, political support, and muscle to act upon what you find.
- D To have a realistic chance of driving improvement choose to examine an area of practice where you have influence, e.g. the use of nerve stimulators to reverse muscle relaxation, is likely to be easier to influence as an anaesthetist than the quality of consent by the surgical team.
- D Make sure that the issue either occurs relatively frequently, or is of significance when it does occur. This will help to get results that matter.
- D Discuss your proposed standards or targets with your colleagues so as to ensure that they are realistic and achievable.

Data collection

- D Consider sample size. While we have discussed the success of very large scale audits, local audit should consider what sample size is really needed to rapidly identify a problem and to begin the improvement process.



- D The sample size for audit should be small enough to allow for rapid data acquisition but large enough to be representative.²³ If the data acquisition time is too long, interest will be lost and data completeness will often suffer; e.g. for an audit of the adequacy of intra-operative fluid documentation consider examining a small sample, such as ten sets of notes. If a problem is found in the majority of cases there is clear room for improvement and energy can be directed into changing how fluid recording is done, rather than auditing a large number of notes, which will take longer and result in the same finding.
- D Prepare a method of collection of data that does not require undue additional work from your colleagues. Remember that in an atmosphere of staff shortage and pressure of work, others may not be as interested in your audit as you are. Any paperwork should be simple and self-explanatory. Wherever possible aim to take data from existing charts (such as pain scores, temperature or theatre records) rather than expect colleagues to fill in extra forms.
- D Once under way, monitor the quality of the data frequently and ensure that collection is going smoothly by visiting the wards or the recovery room, or dropping in on the operating list. Thank everyone involved. Provide feedback as to how many cases you have monitored, and how many are left to go.

Moving towards action

- D When you have all your data, analyse it and discuss it with colleagues. Discuss reasons for failure to meet standards or targets. If targets have been met, consider whether they might be tightened.
- D For a major audit invite all interested parties, such as ward, theatre, finance or administrative staff to an audit meeting. This is the place to make recommendations for improvement and set a timescale for review. A well-attended audit meeting with time for discussion from a wide range of perspectives, is very valuable. However, small tests of change can be performed in a more dynamic way and small meetings may be adequate until changes are well tested and ready for implementation.
- D Identify the changes required for improvement using the model for improvement:
 - ◆ What are we trying to accomplish and by when?
 - ◆ How will we know that a change is an improvement?
 - ◆ What change can we make that will result in an improvement?
- D Start to make small tests of change and continuously evaluate success or failure until your changes are stable and ready for implementation.
- D Ensure that the majority of time in a meeting is not spent on describing the problem, positive patient-centred change requires time for solutions.

Revalidation and quality improvement

For the purposes of revalidation, the GMC has stated that doctors will need to demonstrate that they regularly participate in activities that review and evaluate the quality of their work.²⁴ To help meet this requirement the College suggests that, over the course of a 5-year revalidation cycle, anaesthetists should participate in at least one departmental audit throughout a full audit cycle.²⁵ Participation should adhere to the standards and principles outlined in the Audit Recipe Book. Anaesthetists will also need to provide details of this participation in their appraisal and revalidation portfolio, as well as any personal reflection and evaluation of the process and results, and finally, any planned actions to implement change or meet professional development needs that came out of the audit.²⁶

Patient and relative participation

Patient experience and patient-centred care²⁷ should be a cornerstone of the modern NHS and as such we would encourage the use of, and further development of patient and family experience audits. The limitations and pitfalls associated with collection and interpretation of patient satisfaction data are increasingly recognised.²⁸ Conversely the high value of specific information relating to patient experience is also recognised and we would encourage the use of such data including PROMS (patient reported outcome measures) in any service evaluation.²⁸ We are grateful to representatives of the RCA Patient Liaison Group who provide discussion of these aspects documented in this book. We would expect this to be of use in the execution of many of the included topics and in the future design of new audits.

The future, and how far we have come!

In the last introduction we stated: 'the editors of the first edition had a vision that providing standard structured audits may facilitate regional or national audit initiatives... this has not yet happened at a national level to any great extent...'. Of course since then Anaesthetic Audit has been very successful, providing excellent outcome data (NAP3) and driving change such as the need for capnography in all areas where patients are intubated (NAP4), and the urgent need for improved care for patients undergoing emergency surgery through the hip fracture database and emergency laparotomy network. Anaesthetists have also always been a major force in critical incident reporting and we would very much encourage continued reporting as part of audit and risk management. Whenever possible this should be done locally (to ensure learning within your own organisation) as well as to the national bodies supported by the Royal College of Anaesthetists. Developments in IT and electronic data management should be utilised to assist audit especially outcome-based audit. We would encourage all anaesthetists to use the methods in this book and the basic template to create their own topics or adapt topics to their own particular needs. If these are of general applicability we would also encourage you to submit them to us (auditrecipes@rcoa.ac.uk) for consideration in our next update, and will publish them on the website. The hip fracture database and emergency laparotomy network have demonstrated the power of audit and the use by large numbers of us of standardised data collection. We can now learn from comparisons of practice on a grand scale. We would encourage readers to consider other audits, which may be found in this book, which could be used on a large scale to create the same momentum for change in important areas of patient care, if enough data is collected. Our next major step as a specialty with a proven track record in audit and patient safety will be to improve patient care by reducing variation in outcome.

We hope the third edition of this Audit and Quality improvement Compendium will continue to be a useful reference source to specialist and trainee anaesthetists across the breadth of our specialty.

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Editors, third edition



References

- 1 NAP4: Major complications of airway management in the UK. Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists. RCoA, London March 2011 (<http://www.rcoa.ac.uk/nap4>).
- 2 NAP3: Major complications of neuraxial block in the United Kingdom. Report and findings of the 3rd National Audit Project of The Royal College of Anaesthetists. RCoA, London January 2009 (<http://www.rcoa.ac.uk/nap3>).
- 3 The National Hip Fracture Database (<http://www.nhfd.co.uk/> accessed 29 February 2012).
- 4 The hip fracture perioperative network (<http://www.networks.nhs.uk/nhs-networks/hip-fracture-anaesthesia> accessed 29 February 2012).
- 5 Berwick DM. The Science of Improvement. *JAMA* 2008;**299**:1182–1184.
- 6 Scottish Patient Safety programme (<http://www.scottishpatientsafetyprogramme.scot.nhs.uk/programme> accessed 29 February 2012).
- 7 Patient Safety First (<http://www.patientsafetyfirst.nhs.uk/content.aspx?path=/> accessed 29 February 2012).
- 8 The Health Foundation Regional Patient Safety Programmes (<http://www.health.org.uk/areas-of-work/programmes/working-with-strategic-health-authorities> accessed 29 February 2012).
- 9 Woolf SH, Johnson RE. The break-even point. When medical advances are less important than improving the fidelity with which they are delivered. *Ann Fam Med* 2005;**3**:545–552.
- 10 National confidential enquiry into patient outcome and death (<http://www.ncepod.org.uk> accessed 29 February 2012).
- 11 Donabedian A. Evaluating the quality of medical care. *Millbank Memorial Fund Quarterly* 1966;**XLIV**:166–206.
- 12 Equity and excellence: Liberating the NHS. White Paper. DH, London July 2010 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_117353).
- 13 High quality care for all: NHS next stage review final report. DH, London June 2008 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_085825).
- 14 NHS Scotland Quality Strategy – putting people at the heart of our NHS. May 2010 (<http://www.scotland.gov.uk/Publications/2010/05/10102307/0> accessed 29 February 2012).
- 15 Langley GJ et al. The Improvement Guide (2nd Edition). *Jossey-Bass*, San Francisco 2009.
- 16 Institute for Healthcare Improvement (IHI) Plan-Do-Study-Act (PDSA) Worksheet ([http://www.ihl.org/IHI/Topics/Improvement/ImprovementMethods/Tools/Plan-Do-Study-Act+\(PDSA\)+Worksheet.htm](http://www.ihl.org/IHI/Topics/Improvement/ImprovementMethods/Tools/Plan-Do-Study-Act+(PDSA)+Worksheet.htm) accessed 29 February 2012).
- 17 Quality Improvement (http://en.wikipedia.org/wiki/Quality_management#Quality_improvement accessed 29 February 2012).
- 18 Principles for best practice in clinical audit. NICE, London March 2002 (<http://www.nice.org.uk/media/796/23/BestPracticeClinicalAudit.pdf>).
- 19 The inquiry into the management of care of children receiving complex heart surgery at the Bristol Royal Infirmary. July 2001. (<http://www.bristol-inquiry.org.uk/> accessed 29 February 2012).
- 20 Maintaining patients' trust: modern medical professionalism 2011. *The Society for Cardiothoracic Surgery in Great Britain and Ireland*, March 2011 (http://www.scts.org/_userfiles/resources/634420268996790965_SCTS_Professionalism_FINAL.pdf).
- 21 Emergency laparotomy network (<http://www.networks.nhs.uk/nhs-networks/emergency-laparotomy-network> accessed 29 February 2012).
- 22 Peden CJ, Rooney KD. The Science of Improvement. *J Intens Care Soc* 2009;**10**(4):260–265 (<http://journal.ics.ac.uk/pdf/1004260.pdf>).
- 23 Copeland G. A Practical handbook for clinical audit. Guidance published by the Clinical Governance Support Team. *NHS Clinical Governance Support Team*, March 2005 (http://www.wales.nhs.uk/sites3/Documents/501/Practical_Clinical_Audit_Handbook_v1_1.pdf).
- 24 Supporting information for appraisal and revalidation. *General Medical Council* (http://www.gmc-uk.org/Supporting_information100212.pdf_47783371.pdf).
- 25 Supporting information for appraisal and revalidation: guidance for doctors in anaesthesia, intensive care and pain medicine. RCoA, London 2012 (<http://www.rcoa.ac.uk/node/1951>).
- 26 Brennan L, Liu D. Quality improvement activities and revalidation. *RCoA Bulletin* 2012;**74**:16-18 (<http://www.rcoa.ac.uk/node/6286>).
- 27 Barry MJ, Edgman-Levitan S. Shared decision making – the pinnacle of patient-centred care. *New Engl J Med* 2012;**366**:780–781.
- 28 Healthcare Commission and Picker Institute About the Advice Centre for the NHS Patient Survey Programme (<http://www.nhssurveys.org/>).

Quality improvement in a reducing budget environment

Perspective from the RCoA Patient Liaison Group

Ensuring consistent best practice tailored to individual need

The current Health and Social Care Bill¹ and Scottish Government Healthcare Quality Strategy² recognise that patients want to receive consistent safe high quality care wherever they are treated and however they present – as an emergency admission, an elective surgical patient or as a regular hospital attendee with a chronic condition. Patients rightly expect that decisions about their care are made in partnership with themselves ‘no decision about me without me’,³ and expect care to be tailored to suit their individual need. National initiatives to drive developments in person-centred care include the DH (England) Shared-Decision Making project⁴ and the Scottish Healthcare Quality Strategy.⁵ Each patient is also entitled to expect that having been admitted to hospital they will not be made sicker and that they can expect to get better without unnecessary complications.

However to do this, a gap needs to be closed in some clinical areas between best practice and common practice. Whilst an innovative new drug may often be readily taken up across the board, effective operational and systematic change can seem slower to implement nationally on an even basis. There are clearly areas of excellence within the hospital system but distressingly also pockets of substandard care and procedure. For example, several of the Care Quality Commission’s (CQC) recent reports⁶ highlighted a lack of basic hydration and nutrition in some elderly patients. It is also worrying to continue to observe the variation between hospital trusts on reducing hospital standardised mortality rates (HSMRs).⁷

We are also concerned that whilst some parts of the system may have highly specialised skills and teams delivering highest standards of care, others in the NHS do not know when to call upon them. For example, a rapid response team within a hospital can save the lives of patients in immediate distress but staff who are not members of the specialist team must also know when and how to access and mobilise them.

It is heartening to observe the success of system-wide operational changes such as the zero-tolerance approach to hospital-acquired infections. Patients and the wider public feel part of this operational change. They now expect to see and use antibacterial hand gel when they enter a hospital or unit and feel increasingly confident to ask clinicians and other staff if they have washed their hands before examining them.

Whilst it may seem easy to justify introducing care bundles into a high-risk environment such as an ICU, as patients, we would also strongly encourage bundle-type procedures for other healthcare areas such as management of venous thromboembolism, sepsis and acute stroke. NICE Guidelines, ‘expert’ pathways and many other protocols of care increasingly exist for many clinical scenarios and situations but the checklists seem to be a mixture of essential, evidence-based imperatives merged with ‘preferable’ ones, not necessarily linked to research evidence. Guidelines alone do not make for consistent practice. The value of Improvement Science in driving consistent application of best practice is increasingly recognised.

Reducing waste, variation and harm – access to information

It is known that the number and costs of claims associated with medical errors across the UK are rapidly increasing year on year. Indeed in the year 2010–2011, expenditure in this area was estimated to be at record levels, exceeding £900m.⁸ We are all concerned to see a reduction in this financial burden thereby releasing elements of these funds for expenditure on treatments and improvements within the NHS.

In today's 'high technology' society, it would seem wholly reasonable to expect that members of the public and those within the healthcare industry would be able to have ready access to accurate, up-to-date information providing details of the numbers, costs and types of errors occurring. Locating such information is however, often extremely difficult.⁹

At the beginning of the 21st century two publications from groups of international health experts, identified major problems associated with incomplete and poor data quality related to medical errors both in the UK and in the USA. The UK Department of Health (DH) report 'An Organisation with a Memory'¹⁰ and 'To Err is Human'¹¹ that had been commissioned in the USA by the Institute of Medicine, found that such data as was available was often inaccessible, inaccurate and unreliable.

'To Err is Human', makes the shocking claim that 'More people die in a given year as a result of medical errors than from motor vehicle accidents...'. In addition it was estimated that around 10% of patients entering hospital are at risk of incurring an adverse medical event. These studies caused great public anxiety and political concern resulting in major international efforts being taken to make the healthcare industry safer.

Whilst patient safety has markedly improved and the volume of information related to medical errors has increased over the last ten years, the accuracy,¹² accessibility and usefulness of that data still needs much improvement. Those Government funded internet sites that do publish statistics, often present their data in bulk format, making little attempt to summarise it or to present the data as intelligent information that would be useful to members of the public and others.

It has been shown¹³ that the adoption of bundles, (supported by the Plan-Do-Study-Act approach, developed initially for use in quality management within the industrial sector)¹⁴ frequently results in improvements in patient care and treatment costs. The ability to deliver a robust business case to make such changes may be hindered and underused as the raw data required to support a detailed argument are often either unavailable or of questionable value.

As patients, it seems clear that a reduction in medical errors together with the delivery of cost savings (operating in parallel with quality improvements) based on sound financial arguments are necessary in today's economic environment. Even modest reductions in the cost of errors would release significant resources to contribute to improvements.

The Government has in a recent paper promised that patients will be able to access the data they require through an 'Information Revolution'¹⁵ and we look forward to being in a position to make more informed choices in the future. We also perceive that an extension of Patient Related Outcome Measures (PROMs) to other areas of healthcare has the potential to support future improvements in healthcare and to contribute to reducing treatment costs.

Healthcare and the 'postcode lottery'

While improvements in the patient experience should manifest themselves because of enhanced consistency of care and data gathering, it is important from the person-centered point of view that clinical audits take on board the elements of location and multiculturalism that define the United Kingdom as an inclusive society.

Geography is important. Patient care in the Scottish Highlands and Islands may be delivered differently from those of patients living and working in the Capital. Ambitious clinical auditors will wish to build sufficient latitude into both the design and analysis of their schemes to incorporate the variety of patient experiences, requirements and aspirations.

Practitioners and patients alike have become more and more aware of the differences of delivery of services across the four countries that form the United Kingdom. With four governments, four Chief Medical Officers of Health and four separate hierarchies, it is inevitable that different geographical areas will have different priorities. The result will be variations in the method and quality of the delivery of service. It therefore becomes more and more relevant to produce rigorous schemes of audit to agreed national best practice standards that will help to consistently provide a high quality service to all, no matter where patient care is delivered.

Successfully recognising the multicultural nature of our society is a mark of excellence in any attempt to raise standards of patient care and, concomitantly, patient satisfaction. There is no one-size-fits-all solution.

Communication with patients and their relatives needs to be understandable, appropriate and empathic within all cultural, religious and social contexts. It is clear from past editions of the compendium that anaesthetists are, by and large, very aware of the need for good communication skills and the need to continuously examine and improve practice. We look forward to the positive impact of this new edition, particularly of the increased emphasis on using audit to drive meaningful change through modern Quality Improvement Science.

References

- 1 <http://services.parliament.uk/bills/2010-11/healthandsocialcare.html> accessed 20 July 2011.
- 2 The Healthcare Quality Strategy for NHSScotland (<http://www.scotland.gov.uk/Publications/2010/05/10102307/0> accessed 16 April 2012).
- 3 Shared Decision Making (<http://www.rightcare.nhs.uk/index.php/programme/> accessed 16 April 2012).
- 4 Shared Decision Making (<http://www.rightcare.nhs.uk/index.php/shared-decision-making/> accessed 16 April 2012).
- 5 The Healthcare Quality Strategy for NHSScotland (<http://www.scotland.gov.uk/Publications/2010/05/10102307/2> accessed 16 April 2012).
- 6 Care Quality Commission. Report on Dignity and Nutrition for Older People (<http://www.cqc.org.uk/public-reports-surveys-and-reviews/themes-inspections/dignity-and-nutrition-older-people>).
- 7 <http://www.drforsterhealth.co.uk>, 2010 accessed 31 July 2011.
- 8 NHS Litigation Authority – Report and Accounts 2010-2011 – *The Stationery Office* ISBN 9780102972511
- 9 Patient Safety: Cost implications of adverse health events. NES Patient Safety Multidisciplinary Steering Group, November 2010 (<http://www.nes.scot.nhs.uk/media/6472/PS%20Cost%20Briefing%20Paper.pdf>).
- 10 An Organisation with a Memory. Report of an expert group chaired by the Chief Medical Officer. *DH*, London 2000 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4065083).
- 11 Kohn LT, Corrigan JM, Donaldson M S (Eds). *To Err is Human*. Institute of Medicine. *National Academy Press*, Washington DC, 1999.
- 12 House of Commons Health Committee. Sixth Report of Session 2008–2009. *The Stationery Office*, London 2009
- 13 Institute of Healthcare Improvement 'Improvement Guide' (<http://www.ihl.org/knowledge/Pages/Publications/ImprovementGuidePracticalApproachEnhancingOrganizationalPerformance.aspx> accessed 16 April 2012).
- 14 W E Deming. *Out of the Crisis*. *MIT Press*, 2000.
- 15 Equity and Excellence: Liberating the NHS. Department of Health White Paper. *DH*, London July 2010 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_117353).

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Patient Liaison Group
Audit Compendium Review Group





A

Quality improvement in anaesthesia

Edited by Dr Carol Peden



Quality improvement in anaesthesia

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1. The science and history of improvement

Dr K D Rooney

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As anaesthetists, we find ourselves firmly at the centre of the quality and safety agenda. Patient safety is core to all aspects of the College's training, education and standards for anaesthesia. Our strong history of nurturing a safety culture, learning from mistakes, preventing harm and working as part of a multidisciplinary team all contribute to the disciplines of safety and anaesthesia.

The cause of The Patient Safety First Campaign¹ was to make patient safety a top priority and to create a mindset of 'no avoidable death and no avoidable harm'. The campaign ethos was, 'by the service, for the service', with frontline NHS staff being both the face of the campaign and leading locally driven change. There were five clinical interventions, namely; leadership for safety, reducing harm in peri-operative care, reducing harm from high risk medications, reducing harm from deterioration and reducing harm in critical care. The first intervention recognises the importance of strong leadership to foster a safety culture and as anaesthetists, we frequently lead service provision and the multidisciplinary team. The next two interventions have directly impacted on us and our patients, with the implementation of the Surgical Safety Checklist, 'wrong site' block prevention and the introduction of non-Luer type connections for the administration of intrathecal drugs. The last two interventions directly involve Intensive Care, with processes aimed at reducing ventilator associated pneumonia and central venous catheter-related blood-stream infections, and process reliability utilised to ensure early warning scores are recorded. Consequently, bundles, processes and checklists are all now terms, which are familiar to practising anaesthetists. Many of these concepts arise from Improvement Science.

For those of us trained in medical research based on the testing of hypotheses with randomised controlled trials (RCTs), we may struggle to understand where this translational science comes and question its scientific basis. However, many of the improvement and measurement techniques now being introduced into healthcare have been widely used in industry, agriculture and aviation for decades. This article introduces some of the concepts of improvement science and provides the interested reader with further references.

The 'father' of improvement science is William Edwards Deming (1900–1993) an American mathematician, statistician and business consultant.² He is credited with improving industrial production in the US during the Second World War, although perhaps better known internationally for his work in Japan from the 1950s onwards. He taught Japanese top management how to improve service, quality, product testing, and sales with a variety of methods including the application of statistical control methods. He was mentored by Walter Shewhart (a statistician at Bell laboratories) who had developed the concept of statistical control of processes using control charts and the ideas of special and common cause variation. Deming is regarded as having had more impact upon Japanese industry than any other individual of non-Japanese heritage. Later in his career in the mid 1980s he is credited for transforming Ford Motor Company, from failure to the most profitable American car manufacturer at that time. The then Ford Chairman said: 'We are moving toward building a quality culture at Ford and the many changes that have been taking place here have their roots directly in Dr Deming's teachings.'

Deming's work shows that the processes used in improvement science are not only firmly based on statistical science, but have also been tested and shown to work successfully to improve many different complex processes.

In addition to statistical process control methods, Deming used a technique which he called 'profound knowledge' to examine a system to see where it could be improved. This process involved four parts:

- 1 Appreciation of a system
- 2 Knowledge of variation: a key to understanding the use of run charts and control charts
- 3 Theory of knowledge – i.e. the concepts explaining knowledge and the limits of what can be known
- 4 Knowledge of psychology.

All of these components interact much like a Venn diagram and a process cannot be improved upon without consideration of each part. For instance the way the individuals in an operating theatre behave, and the culture of that theatre is integral to understanding how to make that particular operating theatre safer. To improve quality

in anaesthesia and its related sub-specialties we must understand how our processes vary under normal (or common cause) circumstances, only then can we clearly identify an abnormal variation or problem.

In general, as anaesthetists, we concentrate on changing technical aspects of care, such as a new drug or a new piece of equipment, rather than the organisational aspects. These same technical innovations often prove frustrating, with the realisation that promising innovations make little or no differences to our patients' outcome, or that the evidence on which they were based is not as robust as first promised.^{3,4} Changing how the operating theatre environment actually functions when caring for patients may provide a much greater opportunity for improvement than changing technical aspects – such as which cardiac output monitor to use or the use of a new drug.⁵

We cannot improve something until we really understand it. To understand how we can make peri-operative care safer, more effective and more person centred, we must closely examine the Operating Theatre micro-systems using the 'lens of profound knowledge'. A system is defined as 'an interdependent group of items, people, or processes working together towards a common purpose ... the common purpose aligns the parts of the system, while interdependence considers the relationships and interactions among them. Interaction is amongst people, processes and equipment. Interdependence means that multiple measures are needed to understand the performance of a system'.⁶

The first step, therefore to improving a system is to examine it closely, by defining boundaries, including temporal components and to understand successes and defects within the system. Subsequent chapters will explain how to improve organisational aspects of care with corresponding examples.

The science of improvement should not threaten evidence-based medicine. To the contrary, it should complement it making it easier for the practising anaesthetist to make changes that will result in safer, more effective, efficient, equitable, timely and person-centred peri-operative care.⁷

References

- 1 <http://www.patientsafetyfirst.nhs.uk/Content.aspx?path=/interventions/>
- 2 http://en.wikipedia.org/wiki/W._Edwards_Deming
- 3 Kellum JA, Uchino S. International Differences in the treatment of sepsis. Are they justified? *J Am Med Assoc* 2009;**301**:2496–2497.
- 4 Finfer S et al. NICE-SUGAR Study Investigators. Intensive versus conventional glucose control in critically ill patients. *N Engl J Med*. 2009;**360**(13):1283–1297.
- 5 Clemmer TP et al. Results of a collaborative quality improvement program on outcomes and costs in a tertiary critical care unit. *Crit Care Med* 1999;**27**:1768–1774.
- 6 Langley GJ et al. *The Improvement Guide: A practical approach to enhancing organizational performance.* Jossey-Bass, San Francisco 2009.
- 7 Peden CJ, Rooney KD. The Science of Improvement as it relates to quality and safety in the ICU. *J Intens Care Soc* 2009;**10**(4):260–265 (journal.ics.ac.uk/pdf/1004260.pdf).

2.

Making improvement happen

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So you've done your audit, and identified problems; how do you now make improvement happen? The traditional method has been through education and telling people to do better. While providing information and training is always necessary and beneficial, on its own it is not enough to achieve change in the complex systems in which we work in healthcare.

'Every system is perfectly designed to get the results it gets' (Paul Batalden IHI), the only way to get real change is to change the system; to do this you need 'will, ideas and execution'.¹

- D You must have the will to make the system better – this may be because you have identified poor performance or outcome through audit or patient experience
- D You must have ideas about how you could change things for the better
- D You must have skills to make it happen – execution

The model for improvement

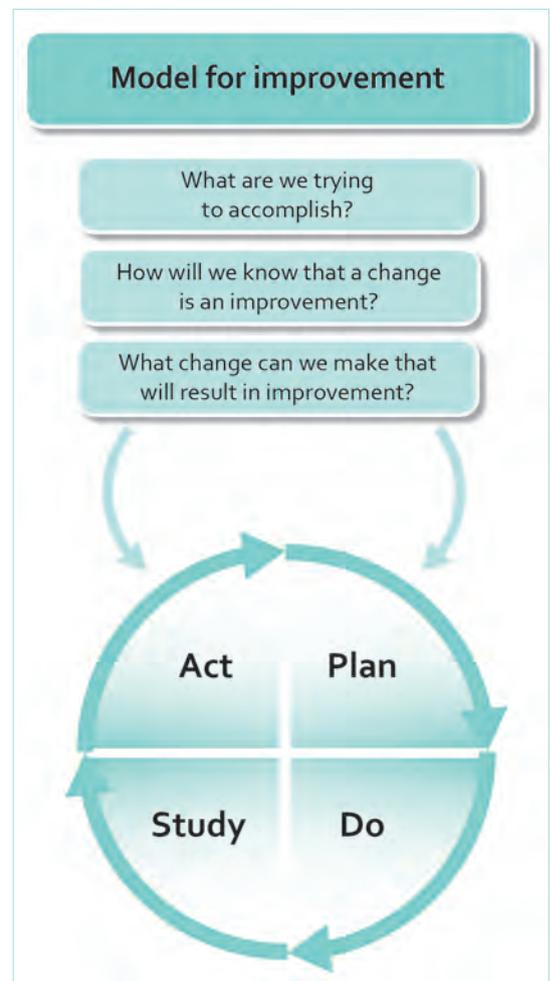
The model for improvement is the foundation tool used in improvement science developed by the Associates in Process Improvement² and derived from the work of Shewhart and Deming (see Figure 1).³ Other improvement models exist such as Lean, Six Sigma, DMAIC (define, measure, analyse, improve, control); it is more important to understand that the use of a structured approach will help to drive improvement, than which actual model you use. In this book we have chosen to discuss the simple plan-do-study-act (PDSA) cycle which uses small, rapid cycle changes designed to test, measure impact and test again.² This method uses small frequent samples to drive change in a much faster and more proactive manner than the traditional audit cycle. Anaesthetists and intensivists whose units have participated in one of the UK safety programmes such as the Safer Patients Initiative network⁴ and the Scottish Patient Safety Programme⁵ have used this technique. The three questions central to applying this improvement method² are:

- D What are we trying to accomplish?
- D How will we know that a change is an improvement?
- D What changes can we make that will result in an improvement?

The first question, 'what are we trying to accomplish', gives us our aim, e.g. we wish to improve outcome for patients undergoing emergency laparotomy. Our aim statement should be as defined as ambitious but achievable and it is worth spending time on this. In the example 'improve care for patients undergoing emergency laparotomy', consider what will be measured as an improvement and at what time point? Do we want to improve care for all types of laparotomy or only non-trauma laparotomy? Consider a different statement, e.g. 'improve mortality at 30 days for patients undergoing non-trauma emergency

Figure 1

Model for improvement, reproduced from 'The Improvement Guide'.² This material is reproduced with permission of (Wiley-Liss, Inc, Wiley Publishing Inc, a subsidiary of) John Wiley & Sons, Inc.



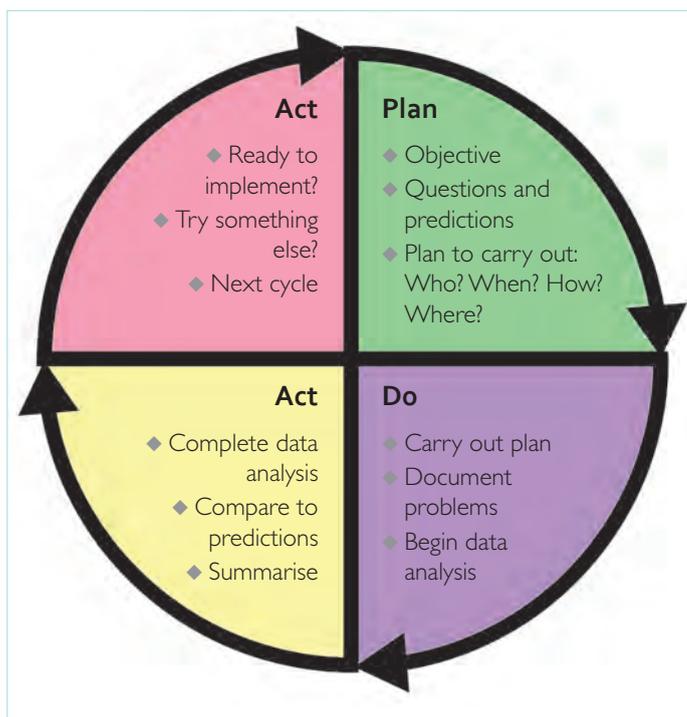
laparotomy'; this is clearer but still vague. How much improvement do we want: a 1% reduction in mortality or a 50% reduction? When do we want to see this improvement: next week or in 10 years? A clear aim statement will provide an idea of how much and by when. We should set bold aims, not totally unrealistic aims, but ones which will stretch us, in this case we are trying to save lives and so a 1% improvement is not good enough. A good aim statement for this project then becomes:

D 'We aim to reduce 30 day mortality for patients undergoing non-trauma emergency laparotomy by 20% by September 1st 2013.'

The second question is 'how will we know that a change is an improvement?' For this we will need **measures**. In the example above we have a clear **outcome measure**: a reduction in 30 day mortality. To achieve that, as part of our improvement project we will need some **process measures**. Process measures will measure what we believe we can do to improve outcome, e.g. reduce the time from admission to theatre (process measure: time from admission to theatre) and increase use of cardiac output monitoring during emergency laparotomy (process measure: percentage of patients in whom a cardiac output monitor was used during laparotomy). Whenever we are changing a system we must consider how our changes impact on other parts of the system. We therefore need **balancing measures**. For example, if we prioritise emergency laparotomy patients for the emergency theatre do we adversely impact another group of patients?

Once we have our measures we can start developing our ideas for change.⁶ As you have done an audit or want to try an improvement project you already have a good idea of what outcome you want to change; but how do you do that and where can you make improvements? First of all think critically about the system, perhaps you can process map the patient experience or make a flowchart and consider where you as an anaesthetist can most effect a change. Do you know of other units that have better outcomes – what is it that they do differently? What guidelines or research evidence is there that could be done better in your hospital? Have you considered what it feels like to be a patient in this process – what would make their experience better? With ideas generated in this way you can start to develop a change concept. If your audit showed that only 30% of patients had arterial lines for their emergency surgery and this appeared to be highly variable, you may develop a change concept aimed at reducing the variation in care for patients undergoing emergency laparotomy. A reduction in variation of care is one of the key reasons that enhanced recovery has been so successful.

Figure 2
Developing and testing a change.



Once you have a theory and/or ideas you can now start to test them. Remember 'all improvement will require change, but not all change will result in improvement'.² Let us say as that part of your change package you want every emergency laparotomy patient to have a blood gas performed in the anaesthetic room to measure lactate and base deficit. To achieve this you plan to inform that theatre team and put up a poster in the anaesthetic room. Obviously if you are a trainee you will need to have discussed this and to have senior support for this type of project.

Start on the plan-do-study-act (PDSA) cycle. **Plan** to put a poster in the emergency theatre and inform the team. **Do** this and study what happens. Start to test on a small scale, e.g. only in one operating theatre on one day. Start your testing with a team who are enthusiastic about your idea. If all patients get a blood gas at the right time, start testing on a few days. You may then find that the process becomes less reliable, therefore

study why it is now unreliable. You may find that it does not get done at night because there are no porters to take the blood gas for analysis. **Study:** how do you get round that? What have you learned about your change idea? **Act:** develop a new idea to deal with this challenge and test again. The cycle goes on, testing theories about what will work and learning from what does not work (Figure 2). If it works during a weekday night, does it work on a weekend night? Do not assume your process is reliable until you know it works with different teams and at different times of the day and night. It must work without you being there to drive it.

Some examples of PDSA cycles are given in the next two sections. They illustrate how difficult it can be to achieve reliable implementation of apparently simple processes such as keeping the patient warm. The references provide sources of further reading and examples.

Finally, while this may appear to be an apparently new concept, it differs very little from the concept of differential diagnosis and treatment plan practised in the art of medicine and anaesthesia. For example, your patient is tachycardic with a normal intra-operative blood pressure in theatre. Your theory is that the patient has insufficient anaesthesia and analgesia. Your **plan** is to increase the delivered amount of inhalational anaesthetic and to give a bolus of opiates. **Do:** you increase the depth on inhalational anaesthetic to 1 MAC and titrate incremental boluses of opioid. **Study:** The patient remains tachycardic but is now becoming hypotensive, despite your treatment. **Act:** You now believe the patient to be inadequately resuscitated and your new theory is to give a fluid challenge. A new PDSA cycle now starts with this new theory from your previous testing.

References.

- 1 Institute for Healthcare Improvement (<http://www.ihl.org>).
- 2 Langley GJ et al. *The Improvement Guide: A practical approach to enhancing organizational performance.* Jossey-Bass, San Francisco 2009.
- 3 Peden CJ, Rooney KD. The Science of Improvement as it relates to quality and safety in the ICU. *J Intens Care Soc* 2009;**10**(4):260–265 ([journal.ics.ac.uk/pdf/1004260.pdf](http://journals.ics.ac.uk/pdf/1004260.pdf)).
- 4 Patient Safety First Interventions (<http://www.patientsafetyfirst.nhs.uk/Content.aspx?path=/interventions/> – accessed May 2012).
- 5 Scottish Patient Safety Programme (<http://www.scottishpatientsafetyprogramme.scot.nhs.uk/programme/resources> – accessed May 2012).
- 6 Lloyd R. *Quality Health Care: A Guide to Developing and Using Indicators.* Jones and Bartlett Publishers Sudbury, MA 2004.

3.

From audit to action

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Completing an audit is only the beginning

The Healthcare Quality Improvement Partnership defines clinical audit as 'a quality improvement cycle' that involves 'taking action to bring practice in line with (agreed and proven) standards' in order to improve quality of care and health outcomes.¹ While it can be relatively simple to perform an initial audit, taking the next step and improving care quality is much harder.

Identifying the area for improvement

The first step is in identifying what you want to change. Trainees often have insight into variations in practice across a region and may have seen examples of practices that work well and could be adopted more widely. Other sources of ideas for quality improvement projects might come from NICE guidance, Royal College or professional society guidelines, or the findings of confidential enquiries such as NCEPOD. As an example, the use of capnography for out-of-theatre intubation (OOTI) has been recommended in the report of the 4th National Audit Project of the Royal College of Anaesthetists,² and is endorsed by statements from the AAGBI and the Intensive Care Society.³

Evidence and expert opinion

Any quality improvement project requires evidence that compliance will improve outcomes. This might come from randomised controlled trials, smaller non-randomised studies or even expert opinion and guidance from bodies such as NICE, as described above. In our example, we found evidence that implementation of an intubation bundle including capnography use reduced the rate of adverse events associated with intubation on the Intensive Care Unit.⁴

Identifying current practice

The next step is an audit of current practice. Without this step it is hard to motivate people to change their practice. Co-ordinating an audit across a region can be hard but again trainees can hold the key to this. Where formal audit networks exist they are ideally suited for this, but in their absence informal networks of trainees or consultants work just as well. However, it is vital to ensure that within each trust the appropriate audit registration procedures are followed and that each department is aware of the process from the outset.

In the Severn region, a group of trainees from a variety of base specialties with an interest in ICU set up a network called RTIC Severn (Regional Trainees in Intensive Care). This group included representatives working at all of the trusts in the region and made it possible to co-ordinate our activity across a much wider area. One representative trainee from each trust was given the responsibility of leading the audit process within that trust and of getting the approval of the local anaesthetic and critical care department.

We performed a region-wide prospective audit of OOTI practice, which identified wide variation in the use of capnography between trusts, and also identified other areas where improvements could be made. The dispersed nature of the RTIC Severn group made it easy to perform the same audit at multiple sites simultaneously. The nominated trainee at each trust was responsible for optimising data capture and quality, although the methods they used were left up to them.⁵

An intervention to improve practice

In general, simply exhorting people to 'do better' is not effective at increasing quality. It is more effective to introduce processes with the quality interventions you seek to introduce built-in. The development of standardised processes can empower junior doctors, nurses and other staff to demand certain standards of care

that they might otherwise not be aware of, or might feel they could not ask for. One example of this is the use of the WHO surgical safety checklist to empower theatre staff to require surgeons to engage in a pre-theatre safety brief. In our example, we decided that an intubation checklist would allow us to standardise intubation practice regionally and to prompt trainees to request safety equipment, such as capnography, prior to commencing intubation.

Development using PDSA cycles

Once a new process has been designed it is important that it works in the environment that it will be used in. If staff can not understand the rationale for new processes they may feel that they are being imposed on them for no reason. Using plan-do-study-act (PDSA) cycles as described by the Institute for Health Improvement (see relevant sections of this book) allows users to design the process so that it makes their life easier, while retaining the quality improvement effect. They also then 'own' the process and will be much more likely to use it than a process that has been imposed on them from above.

In our example, the intubation checklist went through several iterations in a single centre before reaching a consensus version that was ready for wider trials.

Motivating people to change

Once you have a working process you can start to spread it out within your region. Again, your network is invaluable here and there are many ways to encourage people to take up your intervention. Presentation of the original audit, revealing differences in practice across a region together with the evidence supporting your intervention, is a powerful tool. Where capital investment is required then it is important to look at cost-effectiveness data, in order to present a robust business case for investment. Some quality improvement projects may attract CQUIN (Commissioning for Quality and Innovation) payments.

Our audit data was presented both to individual departments and regionally, and has now been published.⁵ All the hospitals in our region were involved in developing the checklist, which is now in use both in anaesthesia/ICU and emergency departments throughout the Severn region. The checklist featured as an appendix to the NAP-4 report and we are now expanding our network further afield, both in other regions of the UK and internationally.

Documenting your success

The process of quality improvement is ongoing and it is important audit practice to ensure compliance. Where specific quality indicators have been identified, it is useful to document an improvement in these to encourage people to continue to engage with the process. Finally, you should continue to survey your practice over time to ensure that standards do not slip and to demonstrate the effectiveness of your intervention.

This article has been written on behalf of the RTIC Severn group. This is a group of junior doctors with an interest in intensive care medicine and patient safety. Involved in this project were: Andrea Binks, Tim Bowles, Hamish Breach, Michelle Chopra, Sara Cook, Nick Dennison, James Dunn, Dan Freshwater-Turner, Miguel Garcia-Rodriguez, Gareth Gibbon, Subbu Halder, Clare Hommers, Katie Howells, Rob Jackson, Andrew Jacques, Dom Janssen, Abby Lind, Nina Reeve, Kieron Rooney, Sarah Sanders and Anoushka Winton.

References

- 1 <http://www.hqip.org.uk> accessed March 27, 2012.
- 2 NAP4: Major complications of airway management in the UK. Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists. RCoA, London March 2011 (<http://www.rcoa.ac.uk/nap4>).
- 3 Association of Anaesthetists of Great Britain and Ireland Statement on use of Capnography outside operating theatres. AAGBI, London 2011 (http://www.aagbi.org/sites/default/files/Capnographyaagbio90711AJH%5B1%5D_o.pdf).
- 4 Jaber S et al. An intervention to decrease complications related to endotracheal intubation in the intensive care unit: a prospective, multiple-center study. *Intens Care Med* 2010;**36**:248–255.
- 5 Bowles TM, Freshwater-Turner DA, Janssen DJ, Peden CJ. Prospective multi-centre study of clinical practice and adverse events during out-of-theatre tracheal intubation. *Br J Anaesth* 2011;**107**(5):687–692.

4. Improvement basics: driver diagrams

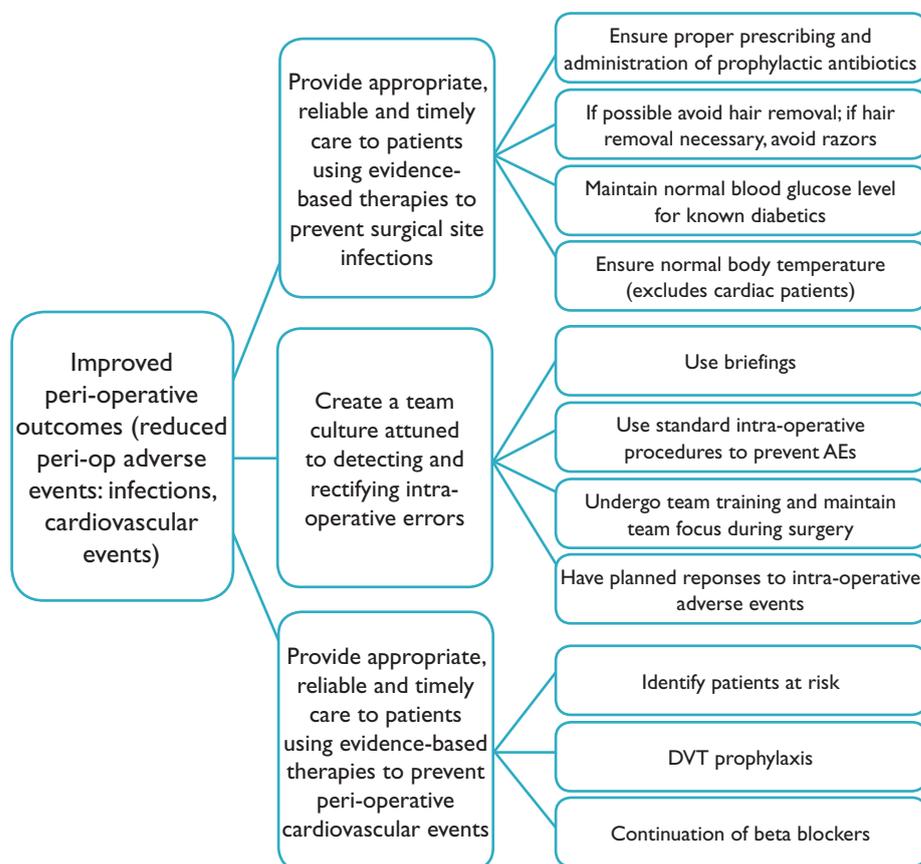
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Quality improvement uses a structured approach to change, and aims to improve reliability of healthcare delivery. If we want to improve care for a particular patient group or condition then we need to set a clear aim as discussed in section: 'Making improvement happen'. We then need to formulate change concepts and to develop a change package to understand how best to deliver the improvement. A driver diagram can be used to illustrate the aim and to link the primary drivers, the key areas that can be worked on to 'drive' change, to achieve the desired outcomes. The primary drivers are then linked to secondary drivers, the specific change concepts that can be used to create projects that can be worked on to realise the desired outcome. Figure 1 shows an example as used in one of the national safety programmes.¹

Figure 1.

Driver diagram for peri-operative care as used in the Scottish Patient Safety programme.



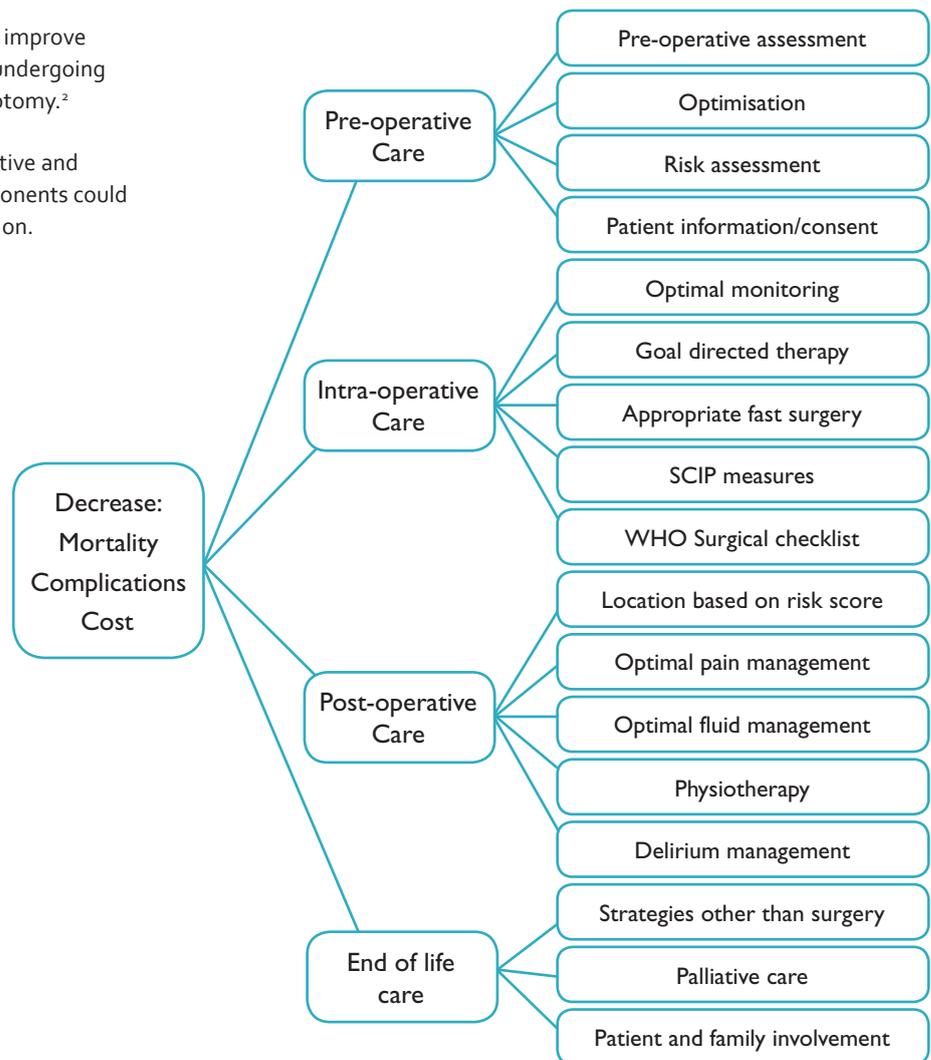
You can develop a driver diagram to assist with your own improvement project. Specify your goals in the lefthand box of the driver. For example, I created a driver diagram to improve care for patients undergoing emergency laparotomy.² The goals are to decrease mortality, complications and cost. To achieve those goals we will need to work on the primary driver areas: pre-operative care, intra-operative care, post-operative care and end of life care. If you were a surgeon working on this project you may want to add another driver, such as, to improve screening for bowel cancer. Remember, that it is best to work on areas where you can have most impact. Therefore as an anaesthetist, I may want to develop secondary driver components to develop projects to work on the intra-operative care driver. For my diagram I chose to add the intra-operative projects shown, but you could add others, such as presence of a senior team for this surgery.

Try developing a driver diagram for a project area you are interested in. This way of thinking can be very helpful to demonstrate the number of areas you can work on to get improvement for your goal. When you have done your driver diagram pick a secondary component to work on, remember to pick an area where you can influence change, and start working with enthusiasts who will support your change ideas.

Figure 2

Driver diagram to improve care for patients undergoing emergency laparotomy.²

This is not exhaustive and many other components could be added to work on.



References.

- 1 <http://www.scottishpatientsafetyprogramme.scot.nhs.uk/docs/presentations/PerioperativeCareDriverDiagram.pdf>
- 2 Peden CJ. Emergency surgery in the elderly patient: a quality improvement approach. *Anaesthesia* 2011;**66**:440–445.

5. Improvement basics: bundles to improve reliable delivery of care

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The ventilator bundle and the central line bundle are all familiar to anaesthetists and intensivists; but how do you create a bundle and what are the principles behind a bundle?

A 'bundle' is a group of interventions for a given disease that, when implemented together, may result in better outcomes than if implemented individually. A bundle does not have to include every process related to that area of care – it is designed to improve delivery of related aspects of care to the patient. The use of a small number of evidence-based interventions and the collection of data based on their delivery, leads to the recognition that it is really hard to deliver 3–5 components of care 95% of the time. Most teams when they start measuring will find their performance for bundle delivery is between 20 and 60%. If you deliver each component of a five element bundle at 90%, then $5 \times 90\%$ means you are delivering an overall performance for this bundle of 59%. Use of a bundle promotes awareness that the team must work together to get all the components delivered reliably, and to use improvement methods to redesign care processes.¹ Examples are: the use of multidisciplinary rounds and daily goals to reinforce bundle compliance, e.g. planning the sedation hold for a ventilated patient.

These are the features of bundle design:¹

- D The bundle ideally has 3–5 actions agreed upon by clinicians (any more interventions will reduce reliability, as explained above, e.g. seven elements \times 90% delivery = 48%).
- D The steps are all necessary and each step must be performed to achieve success.
- D The multidisciplinary team develops the bundle.
- D Elements should be descriptive rather than prescriptive, e.g. DVT prophylaxis on the ventilator bundle does not define what the prophylaxis should be.
- D Each step is individually based on level 1 evidence if at all possible.
- D Each step should be clear-cut and all-or-nothing. The answer to completion of the step can only be 'yes' or 'no'. For example in the ventilator bundle: was the sedation stopped this morning? The answer has to be yes or no.
- D The bundle must take place in the same time and space continuum; for example the central line bundle takes place during a single episode of line insertion, and assessment of the ventilator bundle is made during the ward round.
- D There should be no controversy about each step. The bundle is about how to deliver best care, not what the care should be.

As delivery of the bundle components reaches more than 95% reliability, teams can consider what other components would improve care. As delivery of the care bundle improves teams should see a parallel improvement in related outcomes, e.g. increased reliable implementation of the central line insertion bundle, should correspond with a decrease in central line bloodstream infections.

Studies indicate that, by using care bundles as part of a comprehensive improvement strategy, clinical outcomes improve.^{1,2,3} Part of the problem with the adoption of care bundles can be the lack of agreement on which measures to monitor. This does not detract from the value of a bundle if it is accepted that bundles are not the 'answer' to the problem, they are just one tool that can be used in the design of services within an environment of continual improvement. The goal is to ensure that evidence-based care is reliably delivered every time it is needed.⁴

The success of the central line bundle in the US, after Pronovost and colleagues demonstrated that an intervention including care bundles used in 103 ICUs decreased infection rates by up to 66%, led to the state-wide implementation of the bundle in Michigan.^{2,3} Teamwork and communication were identified as key to the improvements seen.³

Designing your own bundle:¹

- D Agree on a set of elements to initially test against a small number of records to understand the baseline (if all elements are very low individually reconsideration may be needed)
- D Test with a small sample to identify the barriers to each of the elements in terms of measurement and practicality of implementation
- D When practical elements are identified move to testing in a single unit or clinical area
- D If clinicians do not choose the individual element about 80% of the time, as you 'scale up' reconsider or reformat the element
- D Design the bundle with the aim of achieving 95% reliability.

You can also use bundles to create customised protocols and pathways specific to your hospital. For example, the Surviving Sepsis campaign suggests that the 'Severe Sepsis Bundles' are designed to allow teams to follow the timing, sequence, and goals of the individual elements of care, to achieve the goal of a 25 percent reduction in mortality from severe sepsis.⁵ Individual hospitals should use the bundles to develop their own pathways incorporating the bundle elements with the understanding that all of the elements in the bundles must be used and the addition of other strategies not found in the bundles is not recommended.

References:

- 1 Resar R et al. Using Care Bundles to Improve Health Care Quality. IHI Innovation Series white paper. *Institute for Healthcare Improvement* Cambridge, MA 2012 (<http://www.IHI.org>).
- 2 Pronovost PJ et al. An intervention to decrease catheter related bloodstream infections in the ICU. *New Engl J Med* 2006;**355**:2725–2732.
- 3 Lipitz-Snyderman A et al. Impact of a statewide intensive care unit quality improvement initiative on hospital mortality and length of stay: retrospective comparative analysis. *Br Med J* 2011;**342**:d219.
- 4 Lachman P, Yuen S. Using care bundles to prevent infection in neonatal and paediatric ICUs. *Curr Opin Infect Dis* 2009;**22**:224–228.
- 5 <http://www.survivingsepsis.org/Bundles/Pages/default.asp>

6. How do you know a change is an improvement?

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Data collection is part of all audits. The collected data are often presented in summary format either as a single numerical figure or as two numbers before and after an event. Whenever two numbers are compared they are likely to be different. Anything that is measured will be found to vary over time. Summarising data in aggregate blocks removes the vital clues that exist in plotting data on a graph in time series. Plotting each data point over time allows construction of a run chart; a simple but powerful tool for examining whether a change has occurred.¹

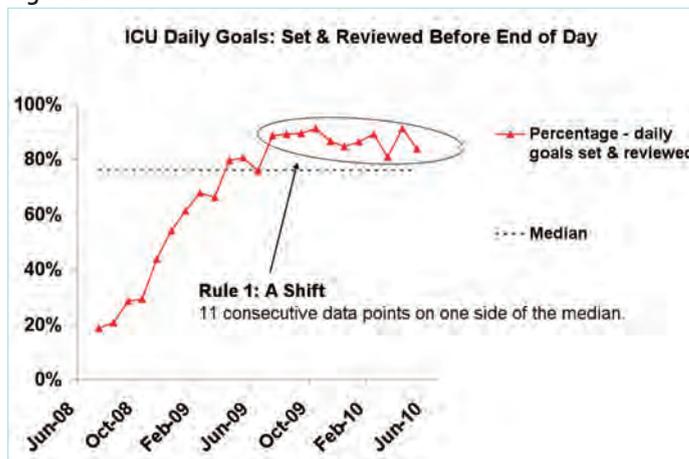
How to construct a run chart

Plot time on the x-axis and the measurement on the y-axis. Enter your data. Once the data are plotted calculate and create a central line using the median (the middle value). Using the median as the centre line has two advantages: it is the point at which half the data points lie above and below the centre line, and it is also resistant to the effects of extreme outliers. All spreadsheet programmes will have a command for this.

How do you know a change is an improvement using a run chart?

Often when we look at data we can over react to the data and apply subjective rules to affirm whether a 'shift' has occurred or whether a 'trend' is present. There are specific rules that can be applied to a run chart to determine whether a non-random change has occurred. This first three of these are based on the laws of probability.

Figure 1 A shift



Rule 1: A Shift

A shift has occurred when six or more data points lie on the same side of the median (Figure 1). This can be either above or below the median. When counting data points some may lie on the median, these do not contribute to a run, ignore these data points and continue counting.

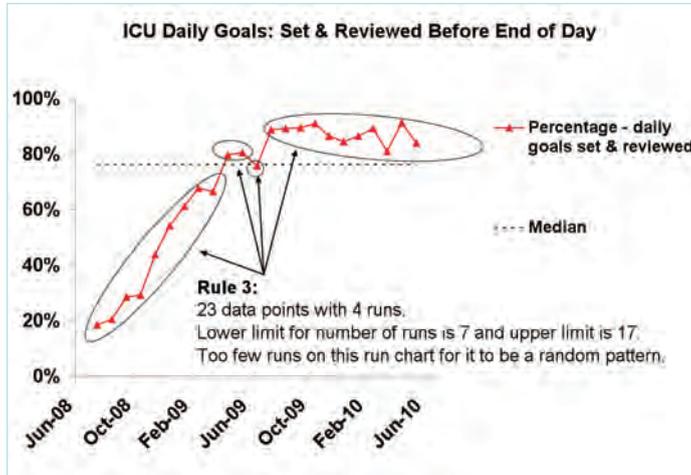
Figure 2 A trend



Rule 2: A Trend

A trend has occurred when there are five consecutive data points either increasing or decreasing in sequence (Figure 2). Trends can cross the median. If any consecutive data points are equal only count the first data point, ignore any repeating values, and continue counting.

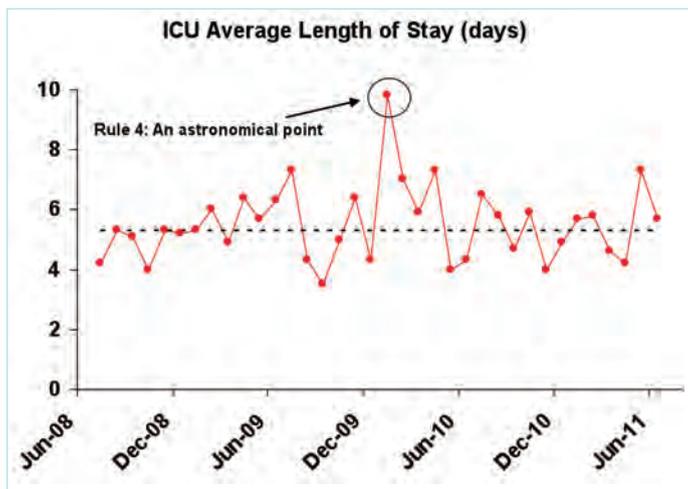
Figure 3 Number of runs



Rule 3: Number of runs

A run is a series of data points on one side of the median. A data point or points that lie on the median do not interrupt a run. The number of runs can be simply calculated by counting the number of times the line connecting the data points crosses the median, then add one. If the data in the time series are random, the median should be crossed a certain number of times given the number of observations made (Figure 3). A table exists that compares the number of data points and the expected range of how often the median should be crossed,² this allows us to determine if there are too few or too many runs.

Figure 4 Astronomical point



Rule 4: An Astronomical Point

This rule aids detection of unusually small or large numbers. All run charts will have a lowest and highest data point; an astronomical point is blatantly different from the rest of the data points and is something that anyone looking at the chart would agree with (Figure 4).

Using run charts

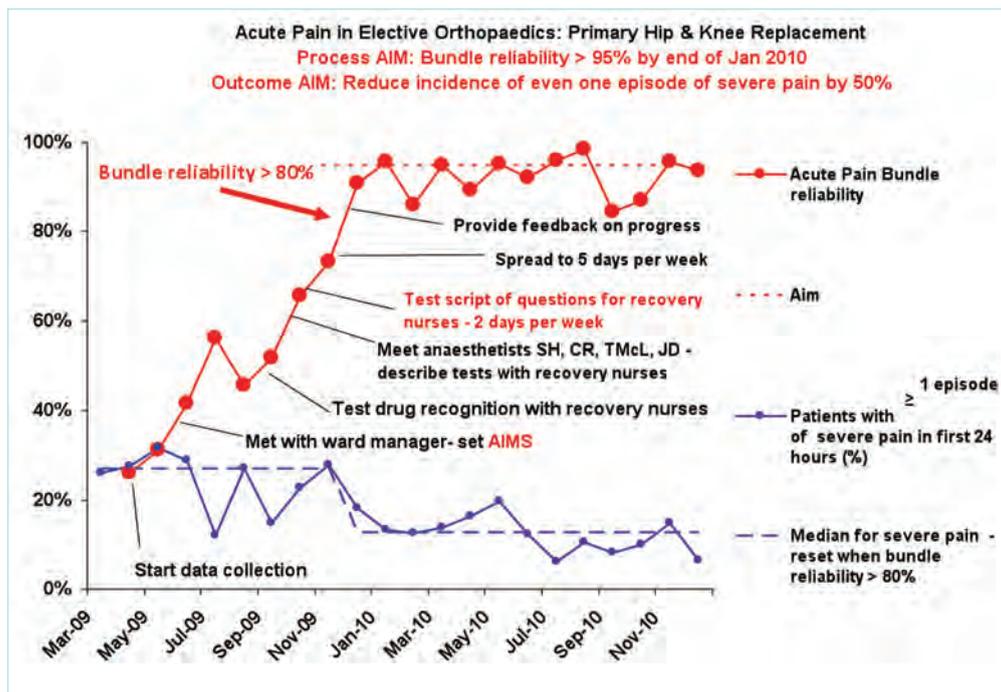
Run charts can be constructed once there are ten data points. When initial baseline data shows random variation, the median can be calculated and then projected into the future on the chart. Data acquired later in the improvement project will not affect this median that can be used for comparison. This allows for non-random changes in the data to be detected clearly.

There are three important uses for a run chart. Firstly, a run chart displays measures over time and makes progress visible to those on the team. Secondly, a central tenet of improvement is that all improvement requires change, but not all changes lead to improvement. A run chart and the rules can be used to determine if a change has resulted in an improvement. Annotating the run chart with the times at which changes were made makes this an important use for run charts. Thirdly, the run chart has time-series data, this is particularly useful to help determine if the gains are held after a change has been implemented.

Run charts are good for detecting changes, either an increase or decrease in a measure. Run charts cannot be used to determine if a measure, process or outcome, is stable. This requires the construction of a Shewhart, or control-chart, and requires additional software or a plug-in for the spreadsheet program. For almost all audit projects a run chart will be sufficient. When more than 50% of measures are either 0% or 100%, a reliable median cannot be drawn. In this case a run chart using time between events may be more useful.

Run charts are simple to construct. The simplicity, together with the probability-based run chart rules provide an easy yet powerful method for assessing the impact of changes made. This provides an objective method to determine whether the changes made to the process have led to an improvement that has been sustained over time. When improving a process to improve an outcome, a powerful way to present the data is with both these measures plotted on the same run chart using a secondary y-axis. This provides a powerful display of the linkage between improving a process and improving an outcome (Figure 5).

Figure 5 Linkage between process improvement and outcome improvement



References

- 1 Perla RJ, Provost LP, Murray SK. The run chart: a simple analytical tool for learning from variation in healthcare processes. *BMJ Quality & Safety* 2011;20:46–51.
- 2 Olmstead P. Distribution of sample arrangements for runs up and down. *Ann Math Stat* 1945;17:24–43.

7. A quality improvement project: temperature on arrival in the Post Anaesthetic Care Unit (PACU)

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Aim: to ensure that 95% of all patients arriving in PACU have a temperature of 36 degrees or more within six months of the project start.

Baseline data: start measurement to collect baseline data. Large numbers are not necessary, 20 random samples a month tell us how we are doing.

Method: monthly random review of 20 patients (% per week) by PACU nurses.

Initial results: the nurses did not find this onerous; our initial compliance was 60%.

Continued measurement vital to demonstrate improvements resulting from interventions. Each intervention must be tested initially in a small group of patients with a PDSA cycle to check it leads to an improvement, or to learn why it does not.

Initial actions: Multidisciplinary group established to lead improvements while measurement continued monthly to see impact of practice change. Education on NICE guidelines performed. This led to increased awareness and more measurement to find out which groups of patients were prone to cold. Measurement, started in each of our 3 theatre complexes, of 20 patients per month (60 patients per month).

PDSA test established that temperature was not reliably recorded peri-operatively and various PDSA tests were done to find reliable ways of ensuring that the patients' temperature was always taken at the beginning of the operation. This resulted in a temperature check being added to the 'sign in' of the WHO checklist, leading to very reliable temperature measurement.

The monthly measurement also included details on those who were cold, and revealed that patients having a laparoscopy were often cold, and many of our patients were receiving cold fluids, outside of NICE guidance.

Reliable warming of IV fluids of more than 500ml was established (see PDSA ramp, Figure 1). These measures increased the number of our patients reaching PACU with a temperature of 36 degrees or more from 60-80% over 6 months.

Figure 1 Process change PDSA. Temperature > 36°C in PACU

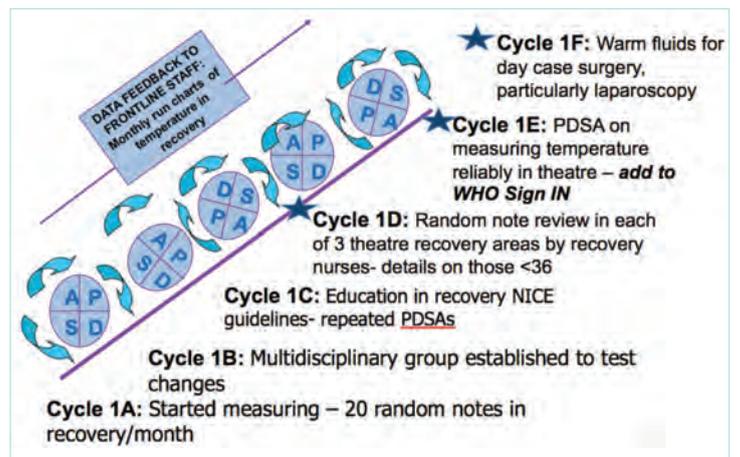


Figure 2 'Stop the Drop' poster

Prevention of Intraoperative Hypothermia
Being cold increases the risk of complications following surgery, e.g. wound infections, cardiac arrhythmias.
Keeping patients warm before coming to the theatre is essential.

'STOP THE DROP'

- Temperature **1 hour** before leaving for theatre
- **If temperature less 36.5**
– extra jumper/blankets/ socks/slippers
- Patients **walk** to theatre if able
- If not walking – **2 blankets**

(NICE guideline 65)

Royal United Hospital Bath **NHS**

Problems: Interestingly, when IV fluid warmers were temporarily unavailable, the monthly data immediately demonstrated the decrease in temperature associated with administration of cold fluids; subsequent poor compliance with fluid warming, was easily reversed by showing the data. Random audits showed reliability of > 80% for the following year. New electronic medical records have allowed us to collect data on all patients. This information has been fed back to all theatres and to each anaesthetist and has allowed more PDSA testing of further improvement cycles. A simple policy of ‘Stop the drop’ in theatre and on the ward was commenced in one operating theatre initially, and on one operating list (see Figure 2).

Ongoing improvement: Continued feedback of monthly data for all patients is ongoing and used to engage staff and demonstrate improvement.

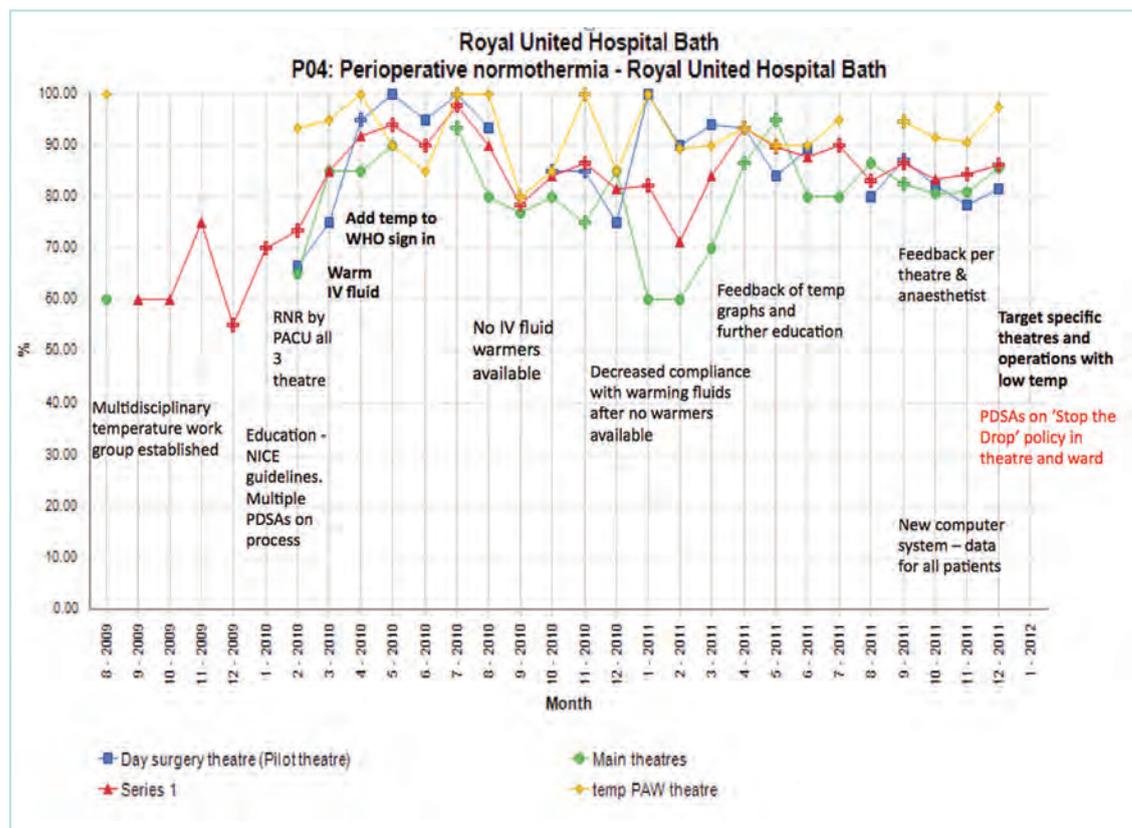
Other more specific measures have been implemented to address other findings from the data, e.g. warming irrigation fluid for shoulder surgery.

The percentage of patients that are warm on arrival in PACU is now displayed in the coffee room every month so that all staff can see the effect of any improvements (see Figure 3).

We continue to work towards a goal of 95% of patients being warm on arrival in PACU.

Figure 3

Run charts from different operating theatres showing slow improvement and documented interventions.



Reference

1 NICE Clinical Guideline 65. Perioperative hypothermia (inadvertent). NICE, London 2008 (<http://www.nice.org.uk/nicemedia/pdf/CG65NICEGuidance.pdf>).

8. A quality improvement project: the productive trauma theatre

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Background

The spiralling costs of the NHS, added to the current economic crises, have made the development of management efficiency strategies paramount. This cost quality relationship is particularly challenging within the theatre environment where capacity and resource constraints have resulted in a supply demand mismatch.¹ With operating room running costs estimated at some £1,200 per hour and in an attempt to tackle this complex problem attention has turned to reducing the wide variety of non-operative activities and delays.^{2,3}

The Royal Alexandra Hospital in Paisley serves a population of over 200,000 and runs the busiest trauma service in Scotland. The diverse throughput of the trauma theatre, added to the ever-increasing demands placed on this emergency service, make managing this important clinical resource exceptionally difficult. Recent imbalances in the trauma service have increasingly resulted in elective theatre cancellations or 24 hr postponements, despite the theatre running 7 days a week. With mounting clinical pressures the Orthopaedic Department raised the possibility of introducing evening trauma sessions as a potential solution, leading to a hierarchical desire to review this highly valued service.

Project aim

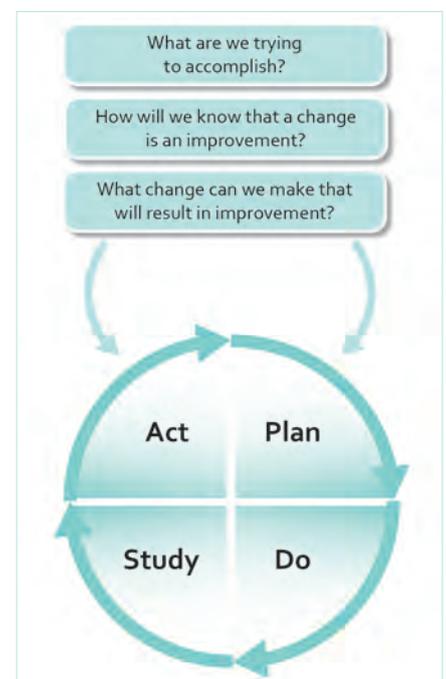
To evaluate the efficacy of the emergency trauma theatre at the Royal Alexandra Hospital and implement changes to the peri-operative patient journey that improves start, finish and turnaround times. Specifically we aimed to improve trauma theatre start time, during the week, by an average of 30 minutes from 09:30 to 09:00 within three months of project commencement.

Project methodology

In accordance with the highlighted 'model for improvement' (Figure 1) a project team was initially established that comprised of NHS operational managers, university staff, orthopaedic surgeons, anaesthetists, orthopaedic nurse specialists, frontline theatre and ward staff.⁴ The team met regularly in person or through online discussion during the study period to problem solve issues and guide implementations. Baseline data analysis (preceding 3 months) of the OPERA theatre management system was undertaken to evaluate theatre efficiency.

Following an initial brainstorming 'non-value added steps' in the current patient journey through the trauma theatre were identified by process mapping.⁵ Several patients were formally shadowed in real-time (around 200 hours) from arrival in A&E, through trauma ward admission to transfer to recovery and the anaesthetic room. All steps, interactions, waiting intervals, transfers and communications experienced during this journey were recorded whether positive or negative as if we were 'walking in their footsteps'.⁶ Time intervals were simultaneously noted allowing the trauma patient care experience to be accurately mapped. Additional information was gained through further ad hoc documentation by the patients throughout their journey, formal questionnaires (patient, family and

Figure 1 The Model for improvement, reproduced from 'The Improvement Guide'.⁴



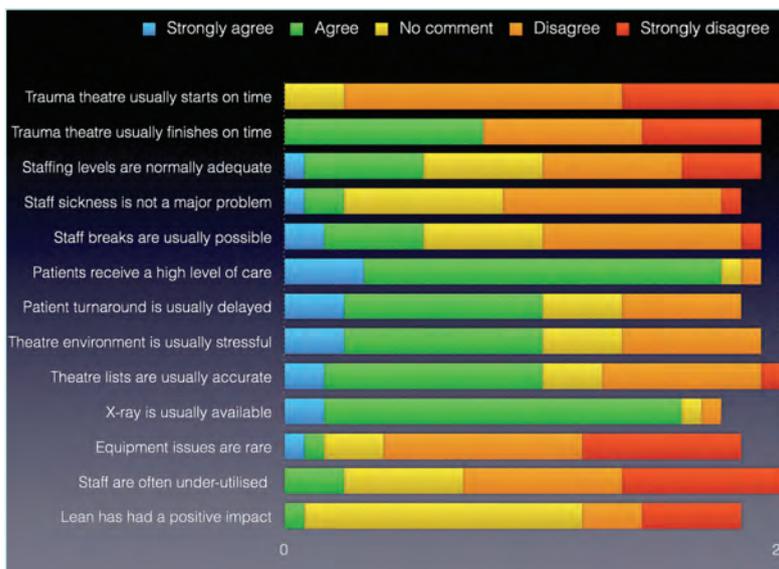
staff), multidisciplinary interviews, pareto and root cause analysis. Specific areas for improvement or inefficiencies highlighted during this process were then utilised to guide service redesign by constructing an 'ideal' trauma patient care experience.

Taking our project aim into careful consideration, implementations (change concepts) to clinical practice were then undertaken by the project team through repeat plan-do-study-act (PDSA) cycles. These change concepts included the provision of a trauma theatre list (highlighting as a minimum the first patient) before 08:00 to theatre reception, the first patient being sent for by theatre reception at 08:00, a dedicated trauma porter, formal documentation of blood results and group and save status in theatre section of the medical notes, surgical team brief sharply at 08:45, common equipment checks to be undertaken overnight and the introduction of a discharge leaflet. Data was collected prospectively on a weekly basis during the study period (3 months) both independently by the project team and from OPERA, the theatre management system.

Project results

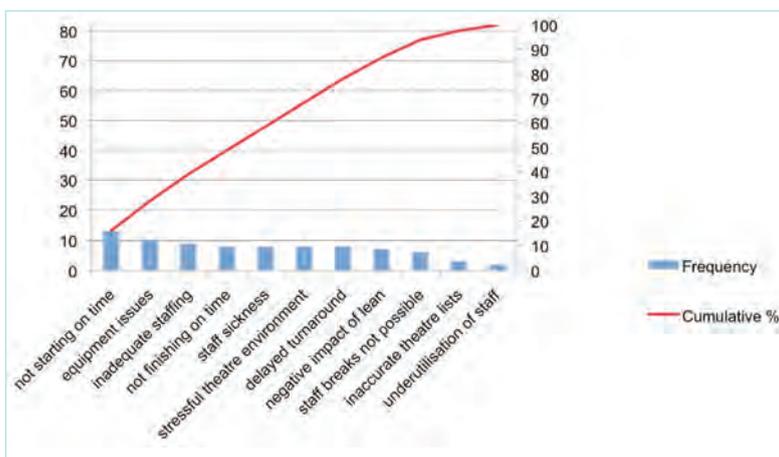
Baseline OPERA analysis of Monday to Friday trauma cases identified an average theatre start time of 09:29 (defined as time first patient enters anaesthetic room), 3.88 cases per day and procedure time of 52.9 minutes.

Figure 2 Overview of trauma theatre staff questionnaire



An initial staff questionnaire used to bring to our attention common issues from their perspective was completed by twenty-five staff (11 doctors, 5 staff nurses, 1 ODP, 4 theatre sisters, 2 auxiliaries and 2 radiologists) of varying durations of employment at the hospital and highlighted theatre start time, equipment and staffing issues as the main areas for concern (Figure 2). Patient process mapping (Table 1) and the resulting pareto chart (Figure 3) was in agreement with staff perceptions further stressing the potential impact of improvements to theatre start time.

Figure 3 Pareto chart



A driver diagram was constructed targeting this aim with developed change concepts trialled through repeat PDSA cycles (Figure 4). Prospective OPERA data analysis at 3 months demonstrated an average theatre start time of 09:11, 4.31 cases per day and procedure time of 53.3 minutes. Overall median trauma theatre start time improved by 16 minutes during the study period as depicted in the run chart and representing a non-random change in trauma service (Figure 5).

Comment

Improvements to the quality of care experienced by patients and family members alike by providing appropriate cost effective expert treatments safely, timely and in a friendly manner should be the objective of every healthcare system. The ever-diverging trend of imbalances in healthcare provision however makes meeting these goals increasingly challenging. Ironically this has resulted in a move towards 'patient-centred care' as a means of cutting costs through elimination of 'waste' and improved clinical efficiencies.

The results of this study demonstrate the potential impact, in a relatively short period of time that a quality improvement project can have in any given multi-disciplinary system. Indeed in as little as 3 months the project team successfully managed to demonstrate a change in service provision with improved average trauma theatre start time and caseload. The power of patient shadowing and subsequent journey mapping to identify potential bottlenecks or inefficiencies across all aspects of the system should be acknowledged and we continue to use this valuable tool.

Taking everything into consideration by far the most challenging aspect of this project was changing the pre-existing mind-set and culture of the healthcare professionals involved. In this regard it became readily apparent at an early stage in this process that clear, two-way communication from top to bottom at all times was key to the successful implementation of change.

While our study was prospective in nature it should be noted that we had no control group for comparison and our results therefore could have reflected other unforeseen changes in practice. In summary this pilot project has triggered a positive process of change within our institution that importantly is applicable to many other similar areas.

Table 1 Example of patient process mapping

Step number	Step	Min minutes	Max minutes
1	Trauma theatre list arrives in reception for 8am		
2	Ward nurse does preoperative checks	4	6
3	Pt changes into gown	4	4
4	Anaesthetist sees pt on ward	2	7
5 Δ	Time taken for porter and nurse to arrive on ward after pt sent for	2	19
6	Pt empties bladder/ catheter bag emptied	2	3
7	Theatre nurse presurgical checks on ward	2	5
8 Δ	Wait for drugs to be administered to pt before theatre	10	10
9 Δ	Time spent looking for forms on ward	1	9
10	Nail varnish removed on ward	3	3
11	Nurse, pt and porter go from ward to theatre reception	2	5
12	Con anaesthetist sees pt in reception	3	3
13 Δ	Nail varnish removal	3	3
14 Δ	Pt waits in reception for surgeon to arrive	29	29
15 Δ β	Delay as other patients having ECG done in reception	19	19
16 Δ	Waiting for anaesthetic nurse check	11	19
17	Anaesthetic nurse preoperative check	1	6
18 Δ	Nurse goes to get theatre gown for pt's parent	2	2
19 Δ	Con surgeon signs consent form in reception	2	3
20	Pt leaves reception and enters anaesthetic room	1	2
21 Δ	Delay as wait for consultant anaesthetist	2	14
22	Anaesthetic time	8	35
23	Time from entering OR until first surgical incision	2	42
24	Total knife to skin time	2	48
25	Transportation from OR to recovery	1	2
26	Handover from anaesthetist to recovery nurse	1	2
27 β	Total time in recovery	37	119
28	Transportation time from recovery back to ward	2	5

Δ = patient waiting β = bottleneck

Figure 4 Example driver diagram

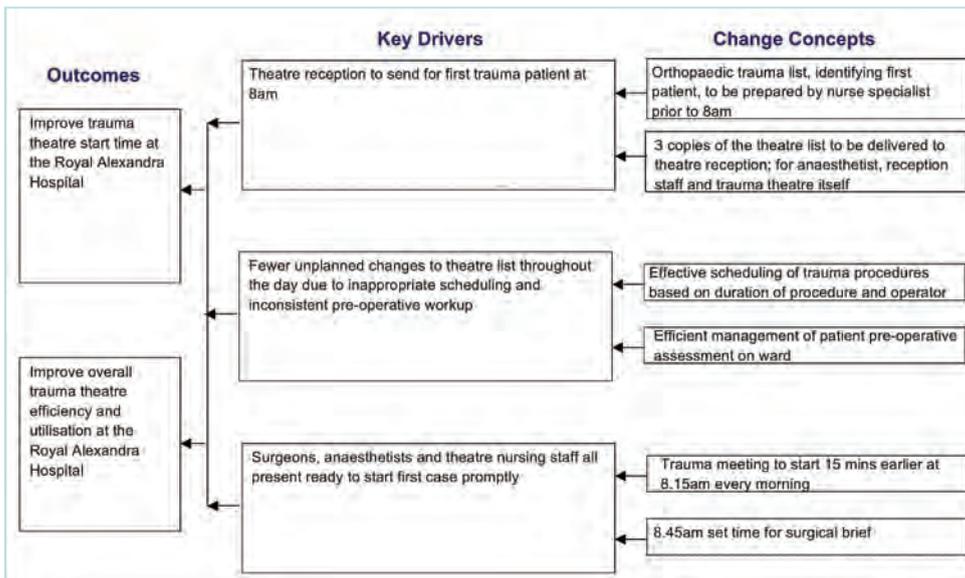
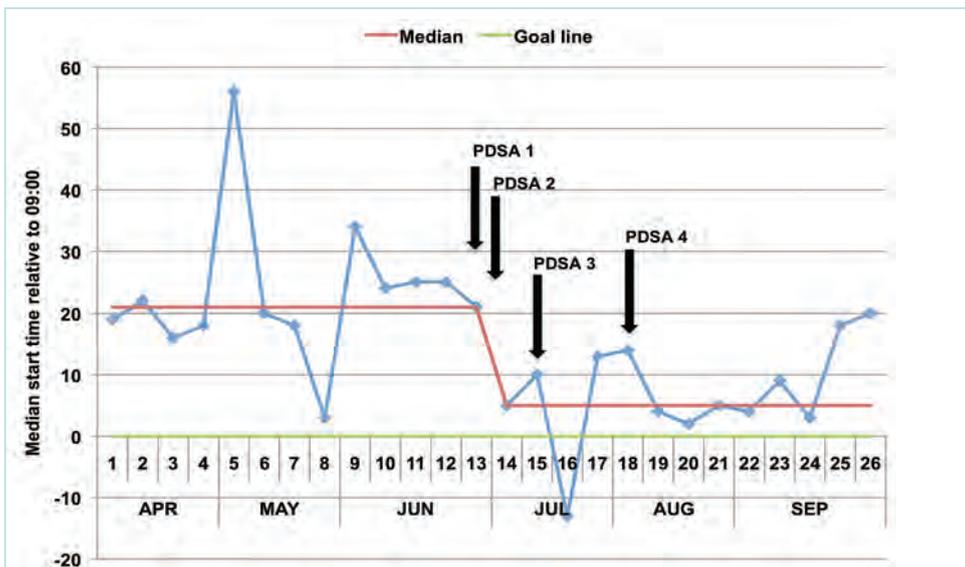


Figure 5 Run chart of theatre start time (relative to 09:00) from baseline (Apr – Jun 2011) through to study period (Jul – Sep 2011)



References

- 1 Sokal SM et al. Maximizing operating room and recovery room capacity in an era of constrained resources. *Ach Surg* 2006;**141**:389–395.
- 2 Harders M et al. Improving operating room efficiency through process redesign. *Surgery* 2006;**140**:509–516.
- 3 NHS Institute for Innovation and Improvement. The Productive Operating Theatre: Improving quality and efficiency in the operating theatre (http://www.institute.nhs.uk/quality_and_value/productivity_series/the_productive_operating_theatre.html).
- 4 Langley GJ et al. The Improvement Guide: A practical approach to enhancing organizational performance. *Jossey-Bass*, San Francisco 2009.
- 5 Trebble T et al. Process mapping the patient journey through health care: an introduction. *Br Med J* 2010;**341**:394–397.
- 6 DiGirola A, Greenhouse P. Patient and family shadowing: creating urgency for change. *J Nurs Adm* 2011;**41**:23–28.

9. Studying patient harm and death to improve care: structured mortality review, global trigger tool and HSMR

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Mortality review is a standard part of any audit and quality improvement programme. While all departments should be reviewing deaths of patients in their care, and in anaesthesia this is most usefully done in conjunction with surgical specialties, there is also much to be learned from using a structured approach to all hospital deaths.^{1,2,3,4,5}

Structured mortality review is:

- D useful for identifying patients where escalation of care should have occurred, or been provided in a more timely manner
- D to enable sharing and categorisation of harm events, and development of themes – such as end of life care
- D to allow trends to be seen over time, e.g. failure to communicate amongst teams
- D to gain information to improve end of life care.

To do a structured mortality review, a standard tool, the mortality matrix is available from the websites of the NHS institute or the Institute for Healthcare Improvement.

Figure 1 Mortality 3 x 2 matrix

Place of death	Intensive Care	HDU	Ward
Admission for terminal care			
Yes	A	B	E
No	C	D	F

Fifty sets of randomly selected notes of patients who have died in a set time period are examined twice a year; e.g. 50 sets of randomly selected notes of patients who died in June and December. The deaths are examined according to a proforma and placed into categories of ICU/HDU admission yes or no, and for terminal care, yes or no (Figure 1). This allows the identification of patients whose care, in the opinion of the auditors, should have been escalated to a higher level.

The final admission of these patients is also analysed using the global trigger tool, a validated widely used tool for measuring patient harm.⁶

From the matrix above the care of patients in category F, for active treatment who did not die in a critical care bed should be examined closely. The matrix also allows examination of issues around the use of critical care beds (categories A and B) and the admission of patients from the community who are at the end of life (category E).

Mortality reviews offer a means of 'saving lives by studying deaths'⁴ and the same themes come up time and again from different hospitals worldwide.^{1,2,3,4,5} The commonest of these are:

- D failure to recognise, record and to react to the deteriorating patient
- D failure to plan
- D failure to communicate
- D hospital acquired infection
- D renal failure
- D post-operative complications.

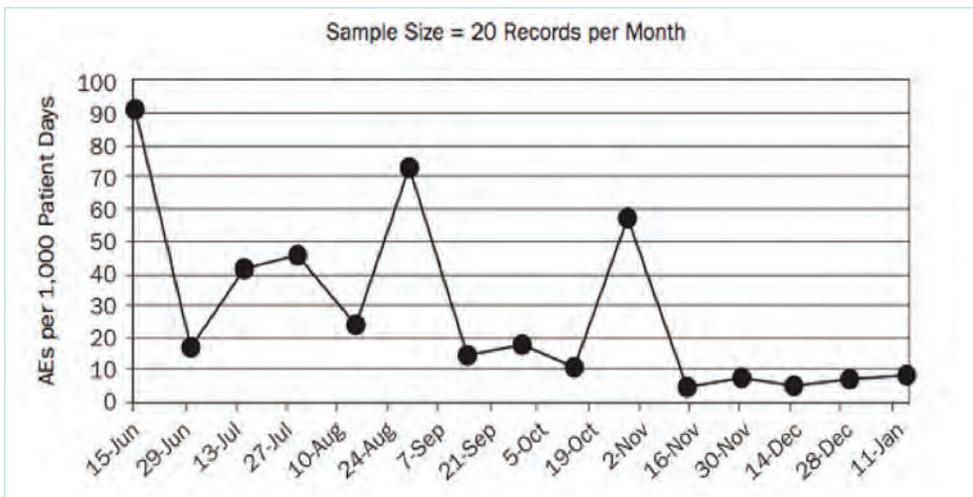
Hospitals can also develop their own standardised mortality review proforma to ensure that data and themes are collated from all deaths. Examples can be found on the web such as that from the Royal Berkshire NHS Trust.⁷

Trigger tools can be used to identify adverse events and areas for improvement by auditing small samples of all patient notes, for all in-patient admissions, not just those who died. Triggers such as the use of naloxone are used to detect potential harm, which in the case of naloxone use would be overdose of opioid. Presence of a trigger does not necessarily mean that the patient came to harm. 'Harm' is classed as something you would not wish to happen to you or to a relative. Harm is divided into categories, the more severe of which are:

- D E: temporary harm and required intervention
- D F: temporary harm to the patient and required initial or prolonged hospitalisation
- D G: permanent patient harm
- D I: patient death.

This method is again used to classify harm into themes as suggested above and to identify areas for improvement. It can also be used to track reduction in harm associated with improvements in the quality and safety of care (see Figure 2). Harm free care can also be assessed using the 'NHS Safety Thermometer'.⁸ For more detailed information on how to use global trigger tools for audit and quality improvement see the websites of the NHS Institute for Improvement and Innovation and the Institute for Healthcare Improvement.^{1,2,9}

Figure 2 A run chart showing reduction in patient harm over time as a patient safety programme is implemented. AE = adverse event. 90 harms per 1,000 patient days is approximately the norm before a programme is in place.



All hospitals in the UK submit data to receive a standardised mortality ratio (HSMR); in English and Welsh hospitals this is done using Dr Foster¹⁰, a company partly owned by the Department of Health and providing statistical support through Imperial College. For common diagnoses and procedures Dr Foster will calculate observed to expected death rates to provide the HSMR and also relative risks for that procedure or diagnosis in your hospital, compared with other hospitals. This can be a source of useful data on which to base an audit or quality improvement project, as this data is already collected by your hospital. The business analysis unit in your hospital should be able to help you with this.

References

- 1 <http://www.institute.nhs.uk/>
- 2 <http://www.ihl.org>
- 3 Whittington J, Simmonds T, Jacobsen D. Reducing Hospital Mortality Rates (Part 2). IHI Innovation Series white paper. *Institute for Healthcare Improvement*, Cambridge, MA 2005.
- 4 Lau H, Litman KC. Saving Lives by studying deaths: using standardised mortality reviews to improve patient safety. *Joint Commission J Qual Patient Safety* 2011;**37**:400–408.
- 5 Behal R, Finn J. Understanding and improving inpatient mortality in academic medical centres. *Academic Med* 2009;**84**:1657–1662.
- 6 Landrigan CP et al. Temporal trends in rates of patient harm resulting from medical care. *N Engl J Med* 2010;**363**:2124–2134.
- 7 <http://www.patientsafetyfederation.nhs.uk/workstreams/reducing-needless-harm-and-death/mortality-review-template.aspx>
- 8 <http://www.ic.nhs.uk/services/nhs-safety-thermometer>
- 9 Griffin FA, Resar RK. IHI Global Trigger Tool for Measuring Adverse Events (Second Edition). IHI Innovation Series white paper. Cambridge, MA: *Institute for Healthcare Improvement*; 2009 (<http://www.IHI.org>).
- 10 <http://www.drfoosterhealth.co.uk/>

10.

Checklists in anaesthesia: key points

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We all use checklists in our daily lives, ranging from the humble shopping list to essential checks when authorising our Paypal payments. Checklists may be presented in different formats and are used in a variety of ways. For instance, the tick box 'tickets, money, passport' helps us remember easily forgotten items during times of distraction, but 'can I see your passport sir?' acts as a barrier that determines further progress. Checklists have been used in industry for many years, and were introduced as a consequence of increasing complexity of procedures and processes, beyond the ability of any one individual to remember. Complexity is part of modern clinical practice – checklists have been shown to improve outcomes in clinical care and are now becoming standard of care in surgical practice.¹

Checklists may be a series of 'read and do' checks, like checking the anaesthetic machine; challenge and response checks to make sure that routine procedures have been completed, or they may be a series of prompts that structure a team briefing or debriefing.² They may be used to address key safety items that are frequently overlooked, to standardise performance of clinical tasks, or to facilitate communication, shared understanding, or handover of essential information within or between clinical teams.

The science behind checklist development is complex, and many lessons have been learnt from industry.² A good checklist should be:

- D evidence-based, trialled and tested before introduction
- D focused to deal with a particular set of issues/tasks
- D should only contain 5–9 items in each section
- D should prompt communication and confirmation of information
- D should be clearly designed, using familiar language and clear fonts.

The WHO Surgical Safety checklist addresses key points in peri-operative care during the sign-in, time-out and sign-out, that if omitted, substantially increases the risk for the patient. The WHO checklist and other surgical checklists have been found to improve surgical morbidity and mortality in a range of settings,^{3,4,5} but the impact of the WHO checklist is crucially dependent on compliance.⁶ Adoption of the checklist improves safety attitudes of theatre teams, and if questioned, clinicians would want a checklist to be used if they were undergoing surgery themselves.⁷ Pre-list briefings and debriefings substantially improve communication in theatre, reduce list inefficiency, wasted equipment and improve morale. The use of the WHO checklist is mandated in England and Wales, and it is recommended that it be combined with briefings and debriefings for maximum impact.

Implementation of a checklist, pre-list briefings and debriefings is a complex process. This requires training, understanding 'why', coaching and feedback. Local champions and leadership are key, with support from senior management in the organisation. Unfortunately, all too often checklists are developed that are lengthy, complex and time consuming, and there is little attention to implementation. Simple measures of completion are useful during introduction, but they should not be the only focus. Simple measures could include:

- D compliance with pre-list briefings (including who was present)
- D compliance with the three key stages of the WHO checklist
- D compliance with individual items on the checklist
- D completion of safety attitude questionnaires by members of the theatre team
- D compliance with key items of care; antibiotic prophylaxis, warming, thromboembolic prophylaxis
- D surgical site infections
- D critical incidents
- D 'glitches' and delays in the theatre list
- D surgical morbidity and mortality

Where now for checklists? Checklists are common in ICU, they are used to facilitate handovers and are included in care bundles to reduce central line infections and ventilator associated infections.¹ Checklists improve performance in anaesthesia crises by facilitating decision-making and ensuring adherence to emergency protocols.⁹ Checklists are here to stay but the challenge will remain:

- D Can we design checklists effectively?
- D Can we adopt and use them effectively?
- D Can we improve clinical care?

References

- 1 Walker IA, Reshamwalla S, Wilson IH. Surgical Safety Checklists: do they improve outcomes? *Br J Anaesth* 2012 (in press).
- 2 Weiser T et al. Perspectives in quality: designing the WHO Surgical Safety Checklist. *Int J Qual Health Care* 2010;**22**:365–370.
- 3 Haynes A et al. A surgical safety checklist to reduce morbidity and mortality in a global population. *New Eng J Med* 2009;**360**:491–499.
- 4 De Vries EN et al. Effect of a comprehensive surgical safety system on patient outcomes. *New Eng J Med* 2010;**363**:1928–1937.
- 5 Neily J et al. Association between implementation of a medical team training programme and surgical mortality. *J Am Med Assoc* 2010;**304**:1693–1700.
- 6 Van Klei WA et al. Effects of the introduction of the WHO 'Surgical Safety Checklist' on in-hospital mortality. *Ann Surg* 2012;**255**:44–49.
- 7 Haynes A et al. Changes in safety attitude and relationship to decreased postoperative morbidity and mortality following implementation of a checklist-based surgical safety intervention. *BMJ Qual Saf* 2011;**20**:102e107.
- 8 Ziewacz JE et al. Crisis checklists for the operating room: development and pilot testing. *J Am Coll Surg* 2011;**213**:212–219.

11. Development of a checklist: the pre-intubation checklist for out-of-theatre intubation

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Why develop a checklist?

As healthcare becomes more complex and outstrips our ability to remember and reliably deliver all critical components of a task, especially when working with different teams and in difficult situations, simple checklists have been designed to improve reliable delivery of key steps. Checklists remind us of minimum essential process components and make them explicit; in addition the use of a checklist instils a discipline of performance as well as verification.¹ The need for, and utility of, a checklist in a particular clinical situation must be tried and tested under a variety of conditions before it is implemented into clinical practice.

The development of a checklist for a critical clinical situation is described below as an example of how an effective checklist was developed, and to serve as a prompt for departments to develop their own checklists.

Why develop this checklist?

Patients may be intubated outside the operating theatre for a variety of reasons. The common factor is that many will be physiologically unstable, and in locations which are not routinely used for airway management. As a result, complications are observed more frequently during out-of-theatre intubation than during airway management in theatre.

Airway management should be performed to the same standard regardless of location, however, guidelines are inconsistently followed outside the operating theatre.² NAP4 has demonstrated harm associated with failure to use capnography during airway management in the Emergency Department and Intensive Care Unit.³ Reasons for the failure to follow guidelines include the absence of skilled assistance, and unfamiliarity with the environment.

We sought to develop a simple, cost-neutral solution to improve use of capnography, and compliance with other guidelines. A checklist was developed to remind staff less familiar with airway management of requirements for intubation, and to act as a prompt for experienced providers working under pressure and in unfamiliar environments.

Best practice: research evidence or authoritative opinion

In 2009, the Association of Anaesthetists of Great Britain and Ireland published a statement recommending that capnography be used in all patients whose tracheas are intubated, or whose airways are maintained with supraglottic airway devices anywhere in the hospital.⁴ In the same year, the Intensive Care Society also published a guideline recommending the use of capnography during tracheal intubation in the Intensive Care Unit.

The Difficult Airway Society has published algorithms for the management of the unexpected difficult airway.⁵ These include the use of, at various stages, a bougie, alternative laryngoscope, LMA or iLMA, and equipment to perform cricothyrotomy. The presence of this equipment should be regarded as mandatory for safe airway management.

In 2010, Jaber et al demonstrated that the rate of severe complications associated with intubation on the Intensive Care Unit could be significantly reduced by the use of an intubation care bundle.⁶ This bundle included:

- D presence of two operators
- D fluid loading pre-intubation (in the absence of cardiogenic pulmonary oedema)
- D preparation of long-term sedation
- D pre-oxygenation with non-invasive positive pressure ventilation
- D use of ketamine or etomidate and suxamethonium during rapid sequence induction

- D confirmation of tracheal tube position with capnography
- D noradrenaline for post-induction diastolic blood pressure < 35mmHg
- D initiating long-term sedation immediately after intubation
- D use of lung protective ventilation.

Checklist development process

We sought to develop a checklist that would:

- D improve compliance with evidence or expert opinion-based guidelines
- D potentially reduce complications associated with out-of-theatre intubation
- D support junior anaesthetic staff in preparation for intubation
- D remind non-expert support staff of their role during induction and intubation
- D be a useful prompt for senior anaesthetic staff
- D not delay emergency induction.

To achieve these aims, our group (RTIC Severn, a group of trainees with an interest in Intensive Care Medicine) developed a draft checklist, and refined it through a series of short PDSA cycles. The initial checklist was trialled by the group at the hospitals in the region. To study the effect of the checklist, feedback was actively sought from both the intubator and assistants, and then fed back to the group. This feedback was collated to plan the next iteration of the checklist. After eleven development cycles, no further significant improvements were suggested, and the checklist was regarded as finished.

To confirm the effectiveness of the checklist, a before and after audit of capnography use during out-of-theatre airway management was conducted. Before introduction of the checklist, capnography was used in 67% out-of-theatre intubations, compared with 100% of intubations when the checklist was used.

The checklist is available at <http://www.saferintubation.com>.

This article has been written on behalf of the RTIC Severn group. This is a group of junior doctors with an interest in intensive care medicine and patient safety. Involved in this project were: Andrea Binks, Tim Bowles, Hamish Breach, Michelle Chopra, Sara Cook, Nick Dennison, James Dunn, Dan Freshwater-Turner, Miguel Garcia-Rodriguez, Gareth Gibbon, Subbu Halder, Clare Hommers, Katie Howells, Rob Jackson, Andrew Jacques, Dom Janssen, Abby Lind, Nina Reeve, Kieron Rooney, Sarah Sanders and Anoushka Winton.

References

- 1 Gawande A. *The Checklist Manifesto*. Profile Books Ltd 2010. London.
- 2 Bowles TM, Freshwater-Turner DA, Janssen DJ, Peden CJ. Prospective multi-centre study of clinical practice and adverse events during out-of-theatre tracheal intubation. *Br J Anaesth* 2011;**107**(5):687–692. [bja/aer251](http://dx.doi.org/10.1093/bja/aer251)
- 3 NAP4: Major complications of airway management in the UK. Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists. RCoA, London March 2011 (<http://www.rcoa.ac.uk/nap4>).
- 4 Association of Anaesthetists of Great Britain and Ireland Statement on use of Capnography outside operating theatres. AAGBI, London 2011 (http://www.aagbi.org/sites/default/files/Capnographyaagbi090711AJH%5B1%5D_o.pdf).
- 5 Henderson JJ et al. Difficult Airway Society guidelines for management of the unanticipated difficult intubation. *Anaesthesia* 2004;**59**:675–694.
- 6 Jaber S et al. An intervention to decrease complications related to endotracheal intubation in the intensive care unit: a prospective, multiple-center study. *Intens Care Med* 2010;**36**:248–255.

12. Quality indicators in peri-operative care

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Introduction

Quality indicators for peri-operative medicine may be considered in the 'structure-process-outcome' format first defined by Donabedian in 1966,¹ and outcome measures may be either subjective or objective. Systematic review has listed quality and safety indicators of relevance to anaesthetists which have been implemented in healthcare systems across the globe² and include:

- D Structure:
 - ◆ nurses having received training in acute pain management.
- D Process:
 - ◆ use of intra-operative warming devices.
 - ◆ measurement of blood glucose levels in diabetic patients in accordance with hospital protocols.
 - ◆ documentation of appropriate antibiotic or thrombo-prophylactic medications.
- D Outcome:
 - ◆ post-operative thrombo-embolism
 - ◆ post-operative 30-day mortality
 - ◆ peri-operative central venous catheter infection rate.

Structure and process indicators

NICE guidance, and a number of reports from NCEPOD, the Department of Health and other organisations have recently highlighted a number of areas in peri-operative medicine where structure and process vary between Trusts and therefore outcome is also affected. These include:

Pre-operative

- D Pre-operative clinic assessment of high risk patients undergoing elective surgery.³
- D Explanation to patients and documentation of estimated peri-operative mortality risk.^{3,4}
- D Avoidance of unnecessary delays to operating on elderly patients.⁵
- D Formal nutritional assessment of elderly patients undergoing surgery.⁵
- D Involvement of consultants in pre-operative planning for all high risk patients (including emergency/out-of-hours cases).^{3,4}
- D Use of ultrasound to insert central venous catheters: <http://www.guidance.nice.org.uk/TA49>.

Intra-operative

- D Consider use of the oesophageal Doppler monitor in patients undergoing high risk major surgery: <http://www.nice.org.uk/guidance/MTG3>.
- D Consultant delivered care for high risk cases.⁴

Post-operative

- D Provision of Level 2 and 3 care for elderly and/or high risk patients undergoing major surgery.^{3,4,5}
- D Provision of and adherence to guidance on the management of peri-operative pain in the elderly.⁵

Outcome measures

Perioperative outcome measures may be divided into subjective (patient reported) and objective, e.g. mortality and morbidity.

Subjective

There is an increasing drive from central government to record and act upon patient reported outcome; these may be considered in the following categories:

- D patient experience, e.g. the annual NHS inpatient survey, which asks patients about their experience of the environment of care including cleanliness, staff approachability and friendliness, quality of explanations given to them, efficiency of transit through the hospital etc.
- D patient satisfaction, e.g. patient perception of their symptom control, e.g. nausea and vomiting, pain, pruritis
- D patient reported change in health-related quality of life, e.g. Patient Reported Outcome Measures such as the Oxford Hip and Knee scores which are now mandated by the Department of Health for all patients undergoing joint replacement in NHS Trusts.

All of these measures may be used as quality indicators in peri-operative medicine. For example, the NHS in-patient survey has questions relating to the quality of information given to patients about anaesthesia, and the quality of pain control. Patient satisfaction with anaesthesia care may be measured with a variety of tools which have been demonstrated in the literature to be valid and reliable indicators of the quality of peri-operative care (see audit 3.11 on patient satisfaction). While it may not seem intuitive that anaesthesia care can contribute to longer term patient reported outcome, there are numerous studies which demonstrate the impact of anaesthesia-related interventions on complication rates, e.g. oesophageal Doppler guided haemodynamic optimisation, timely antibiotic administration, epidural analgesia) and complications have been demonstrated to have an independent effect on long-term outcome.⁶ Therefore, both the measurement of these patient reported indicators, and importantly, the feedback of this information to clinicians, are likely to contribute to improved short and longer term surgical outcome for patients.

Objective

Mortality and morbidity are routinely measured both by administrative means (hospital coding linking into Hospital Episode Statistics data) and often by clinicians (mortality and morbidity meetings, input into national clinical audits such as the National Joint Registry and colorectal cancer audit).

A concern of many clinicians in the routine reporting of such data to facilitate comparative audit between surgical teams and institutions, is concern over risk-adjustment (or the lack of it); that is, teams who routinely undertake higher risk patients, may have worse outcomes, which may be unjustly attributed to poor technical or team performance.

The p-POSSUM scoring system is the most precise predictor openly available and there are a variety of websites, e.g. <http://www.riskprediction.org.uk>, and apps, e.g. 'surgical risk', freely accessible to enable clinicians to calculate the p-POSSUM score. In addition to enabling clinicians to calculate mortality risk in order to aid peri-operative management, routine use of such systems would enable departments to report the predicted risk of the patients receiving care, so that outcomes audit might become more meaningful and reliable.

A number of national clinical audits related to peri-operative care and which measure objective patient outcomes as well as a number of structure and process indicators, are included in the Department of Health's Quality Accounts process. These include the National Hip Fracture Database, the NCEPOD audits, the adult cardiac surgery audit and the soon to begin Emergency Laparotomy Audit. More details of this can be found at the Healthcare Quality Improvement Partnership website (<http://www.hqip.org.uk/national-clinical-audits-for-inclusion-in-quality-accounts/>).

References

- 1 Donabedian A. Evaluating the quality of medical care. *Millbank Memorial Fund Quarterly* 1966;**XLIV**:166–206.
- 2 Haller G et al. Quality and safety indicators in anesthesia: a systematic review. *Anesthesiology* 2009;**110**(5):1158–1175.
- 3 Findlay GP, Goodwin APL, Protopapa K, Smith NCE, Mason M. Knowing the risk: a review of the perioperative care of surgical patients. *NCEPOD*, London 2011 (<http://www.ncepod.org.uk/2011poc.htm>).
- 4 Anderson ID. The Higher Risk General Surgical Patient: towards improved care for a forgotten group. *RCSEng and DH*, London 2011.
- 5 Wilkinson K et al. An age old problem: A review of the care received by elderly patients undergoing surgery. *NCEPOD*, London 2010 (<http://www.ncepod.org.uk/2010eese.htm>).
- 6 Khuri SF et al. Determinants of long-term survival after major surgery and the adverse effect of postoperative complications. *Ann Surg* 2005;**242**(3):326–341.

13. Performance polygon: a method for representing multi-dimensional performance data

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Measurement of healthcare outcome is central to assessing quality and quality improvement. Its importance is increasing as a strategic focus of the Department of Health and for medical revalidation. Although healthcare performance is often presented in a single dimension, e.g. a 'post-operative pain audit', healthcare quality is more complex and often involves several related or conflicting outcomes, e.g. for tonsillectomy measures of quality include time taken for anaesthesia or surgery, time in theatre, blood loss, post-operative nausea and vomiting (PONV), pain, day case rate, hospital episode cost, % readmissions and % re-operations for bleeding, duration of post-operative pain and patient's time off school or work. The surgeon's focus (operative time, bleeding, readmission rate), the anaesthetist's (nausea, pain, day case rate), the theatre manager's (total theatre time, cost), the hospital management's (cost, day-case rate) and the patient's (pain and nausea, readmission rate, time off school or work) may all differ.

Relying on single outcome measures encourages 'silo mentality' and changes in practice intended to improve one outcome, e.g. pain on waking, may adversely impact others, e.g. PONV, time in recovery. When trying to improve one aspect of care, 'balancing measures' should also be recorded to allow unintended consequences to be considered. The use of performance polygons provides a visual prompt to consider a variety of factors which impact on the measurement of the quality of care.

We introduce 'performance polygons' as a form of data representation reflecting the complexity of outcome measures. Examples are shown but we do not intend to define which outcome measures should be used when measuring anaesthesia (or other) quality; the NIAA and RCoA working Group on Quality Measures in Anaesthesia is addressing this.

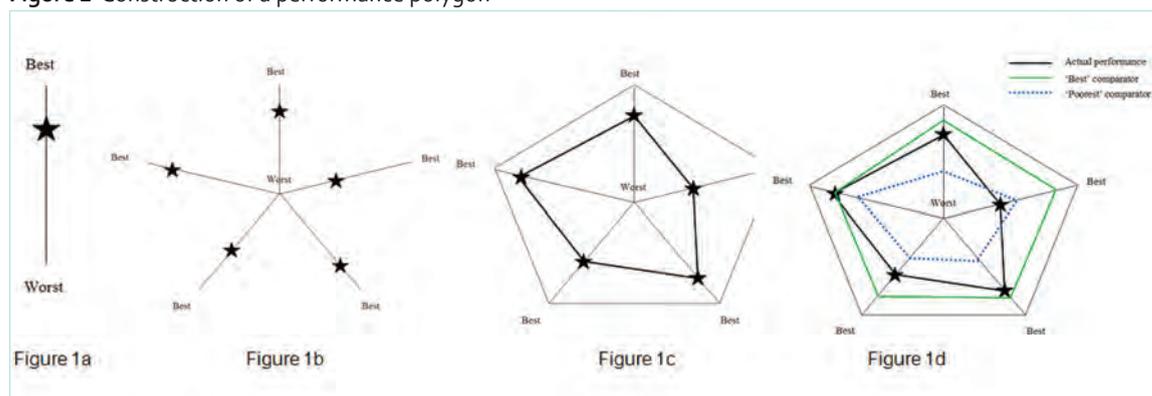
Performance polygons

Performance polygons qualitatively represent multidimensional data making understanding of overall performance easier. They are derived from star charts, first proposed by Georg von Mary's more than 100 years ago.

A performance polygon is constructed as follows (see Figure 1).

- D An outcome measure is plotted on a single line.
- D Additional measures are added as equally spread 'spokes' spreading outwards from same origin (four measures 90°, five measures 72° etc).
- D Performance data is plotted and the points joined forming a 'performance polygon'.
- D Comparator polygons are superimposed as benchmarks.

Figure 1 Construction of a performance polygon



Comparator polygons can be internal, e.g. temporal changes in an individual's multidimensional performance, or external, e.g. pre-defined benchmarks, and may be used to represent the performance of individuals or groups, e.g. theatre team, hospital, whole healthcare organisation.

Examples are given here.

A Comparison with departmental performance.

Figure 2 shows an individual anaesthetist's performance with exemplar outcome measures recorded in recovery. Chosen outcomes are of interest to patients, surgeons, recovery staff, managers and anaesthetists and include measures of anaesthetic skill (regional block success), process variables (adherence with good prescription practice), efficiency measures (turnaround time) and patient-relevant outcomes (pain, PONV): all measures of anaesthetic performance. The comparator polygons here are the 5th and 95th centile of a reference group, (e.g. the whole anaesthetic department).

This anaesthetist's outcomes are a mixture of above average and very good (compared to the reference group), but (s)he slow. Criticism about slow service may be deflected by the high quality of patient-relevant outcomes. The anaesthetist might focus on improved turnover with maintenance of outcomes.

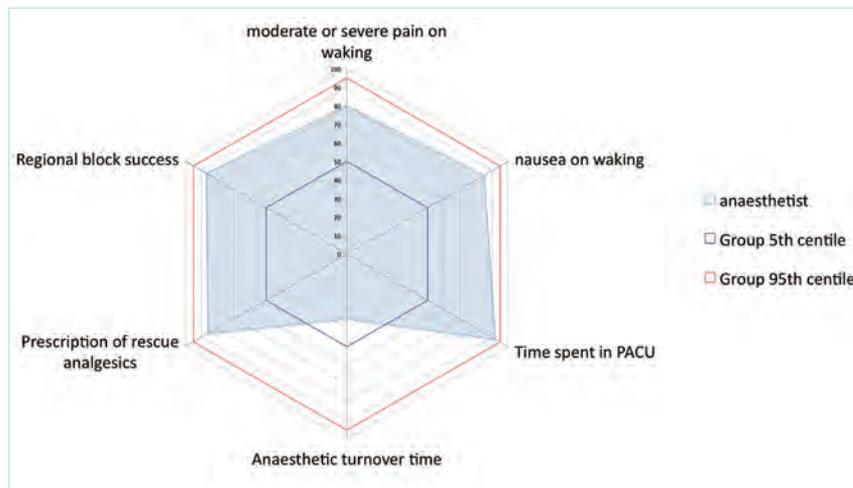


Figure 2 Performance polygon; individual anaesthetist's performance with 95th and 5th centiles as comparator.

B Comparison with own performance.

Figure 3 uses the same outcome measures to compare with historical performance (previous year's best and worst months). A large polygon suggests improved outcomes but at the cost of turnover speed. This anaesthetist has increased use of ultrasound for regional anaesthesia and remains on a learning curve. If scrutinised by a 'pain audit' they would be considered to be performing well, but an 'efficiency audit' might raise concerns. The multidimensional data allows a balanced assessment. Re-plotting after a suitable interval will show whether the good outcomes are maintained with improved speed.

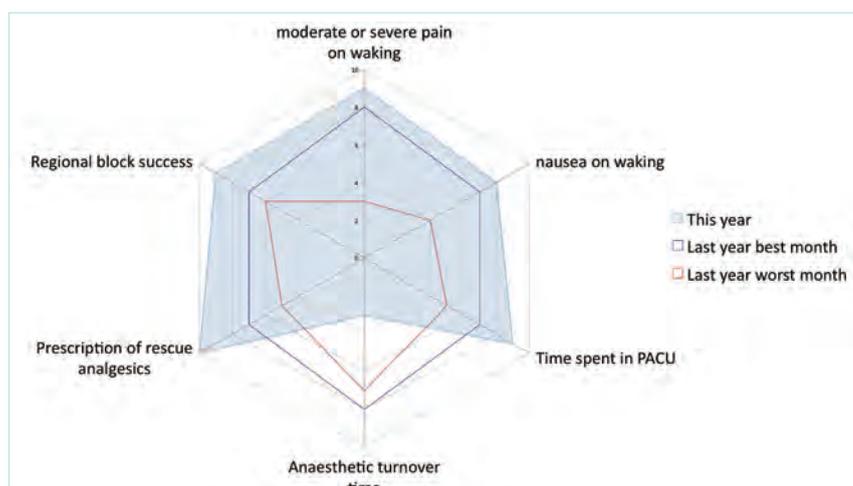


Figure 3 Performance polygon: individual anaesthetist's performance compared to own historical performance.

C 'Rank' as comparator.

In Figure 4 using the same outcome measures departmental ranking is used as comparator for each outcome (9th, 5th and 1st decile). This polygon is small with low scores in several domains indicating overall 'relatively' poor performance. This anaesthetist ranks poorly in their department on most measures but has rapid turnover. Perhaps despite a happy surgeon, the anaesthetist might reflect on a need to slow down and do better!

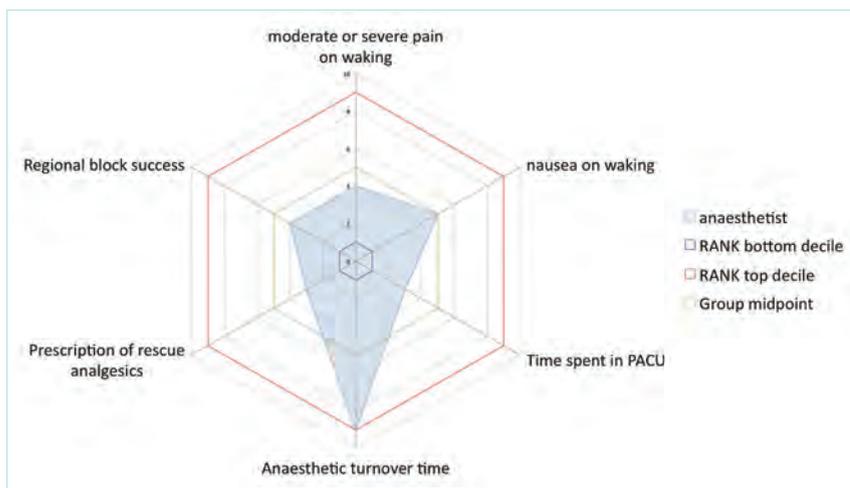


Figure 4 Performance polygon with rank as comparator.

D Comparison with a 'benchmark'.

In Figure 5, the comparators are an upper benchmark of 'good performance' and a lower benchmark of 'unacceptable performance'; perhaps generated from departmental data, published outcome data or consensus opinion. Using external 'benchmarks' overcomes the limitation of using colleagues' performance as a comparator (a whole department may perform well or poorly). Such a polygon might have a role in identifying poor performing trainees or as part of revalidation for trained anaesthetists.

This anaesthetist is quick and generates very comfortable patients who recover slowly with high rates of nausea, compared to the benchmarks. Perhaps this anaesthetist uses excessive amounts of opioids and minimal adjuncts or is not good at, or avoids, regional anaesthesia. A pain audit would rank this anaesthetist highly but recovery staff are unlikely to rate his/her performance as good.

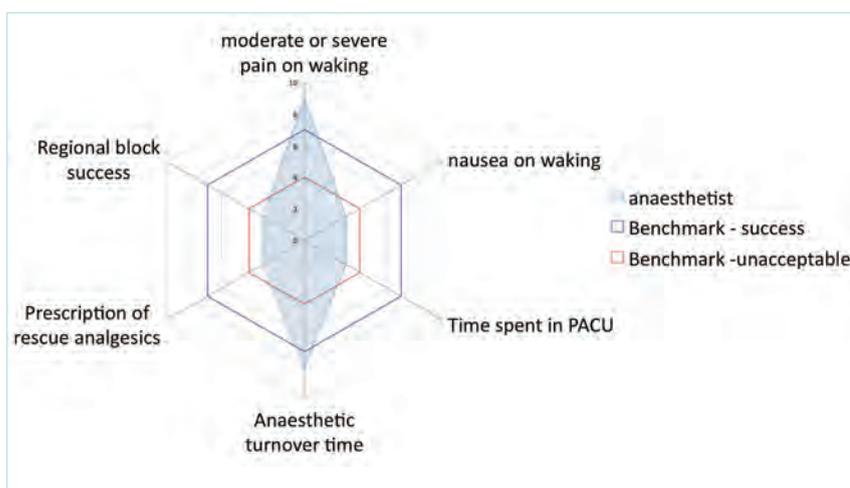


Figure 5 Performance polygon: individual anaesthetist's performance with 'benchmark' comparator.

E Surgical team performance

Performance polygons need not be restricted to anaesthetic practice. Figure 5 shows multidisciplinary multi-dimensional outcomes after knee arthroplasty. The EQ5D measures global well-being in five health-related domains and is used in healthcare outcome studies. The comparator polygons are 95th and 5th centiles and median performance of a reference group: which might be historical data, performance in the neighbouring theatre, a neighbouring trust or nationally acquired data.

All outcome measures are of interest to all team members but individuals may influence some outcomes more than others: anaesthetist (theatre time, time to mobilise and EQ5D score), surgeon (theatre time, complication rate and Oxford knee score), nursing and physiotherapy care (time to mobilise, EQ5D score and length of stay). Managers will be interested in the time in theatre and length of stay and the patient, most importantly, will likely be most interested in EQ5D, length of stay and Oxford knee score. Other outcomes of interest may be added or substituted to creating a polygon with a different focus.

The quality of performance is high, with excellent three month outcome: using the polygonal data the team might address those measures which are closest to the median and turn length of stay from good to excellent.

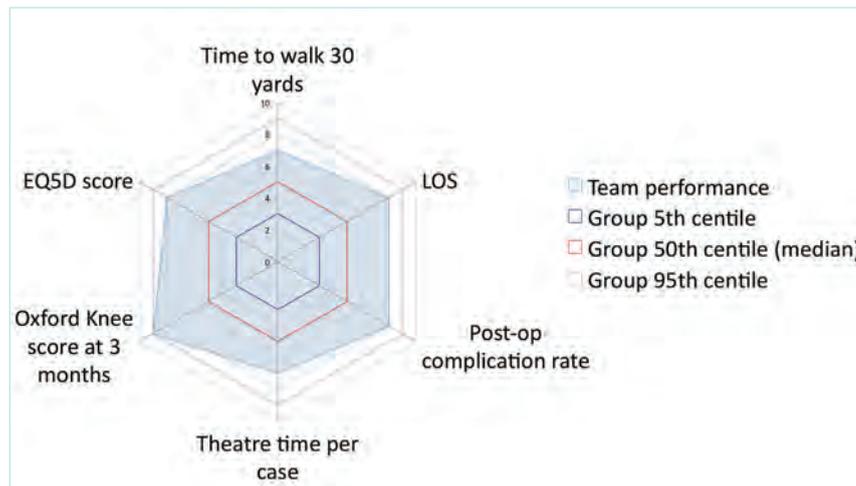


Figure 6 Performance polygon: surgical team performance for total knee arthroplasty.

A performance polygon such as this might be used to compare surgical or anaesthetic practices. For instance during debate about the best surgical or anaesthetic/analgesic method to use for knee arthroplasty a performance polygon might provide a more rounded assessment of the utility of different techniques than the traditional approach of a pain audit. Introduction of an enhanced recovery programme could lead to comparison of performance polygons before and after its introduction: focusing not only on length of stay but also the impact on other measures of quality, allow a balanced assessment.

Comment

Performance polygons might be used in a department as a useful starting point for an appraisal, to examine an individual's performance in the event of a complaint, and for revalidation (capturing data for 4 of the 6 types of supporting information required for revalidation domains: i) colleague multi-source feedback ii) patient multi-source feedback iii) clinical outcomes data iv) evidence of clinical audit and quality improvement). If a database is large enough performance polygons might be used to examine team or individual performance for specific operations to determine perhaps who performs best (so they may educate others) or whether any individual is a lower outlier (so they may learn from others). If used continuously, capturing data from all anaesthetics, performance polygons would become increasingly valid and valuable. Widespread collection of similarly defined data could usefully contribute to national benchmarking; a process already being developed in the USA. Clearly the applicability of performance polygons need not be limited to anaesthesia but is suitable for examining other spheres of medicine. Performance polygons also have a role in representing change such as introduction of new techniques/procedures or in research to show both primary and secondary outcomes. Manipulating comparator polygons and axes length can enhance the value of performance polygons but is beyond the reach of this article.

A final word of caution: the area of the performance polygon may be altered by varying the order in which the outcomes presented and not all outcomes may have the same 'weight': as a result performance polygons are not suitable for quantitative analysis.

Conclusion

Performance polygons are a simple but powerful way to represent data over several domains; they provide a visual representation of data which is easily understood by observers. The use of comparator polygons can enhance their value and transform the polygons from simple graphical displays to a potential driver of change and quality improvement.

Further reading

- D High quality care for all: NHS Next Stage Review final report. Lord A Darzi. *DH*, London June 2008. (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_085825 – accessed 31 May 2011).
- D Equity and excellence: Liberating the NHS. The stationery office. *DH*, London July 2010 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_117353 accessed 23 June 2011.)
- D Moonesinghe SR, Tomlinson AA. Quality improvement and revalidation: two goals, same strategy? *Br J Anaesth* 2011;**106**:447–450.
- D Grocott M. Quality measures in anaesthesia. *RCoA Bulletin* September 2011;**69**:15 (<http://www.rcoa.ac.uk/node/600> accessed 16 October 2011)
- D Macario A et al. Which Clinical Anesthesia Outcomes Are Important to Avoid? The Perspective of Patients. *Anesth Analg* 1999;**89**:652–658.
- D Macario A et al. Which Clinical Anesthesia Outcomes Are Both Common and Important to Avoid? The Perspective of a Panel of Expert Anesthesiologists. *Anesth Analg* 1999;**88**:1085–1091.
- D Myles PS, Williams DL, Hendrata M, Anderson H, Weeks AM. Patient satisfaction after anaesthesia and surgery: results of a prospective survey of 10,811 patients. *Br J Anaesth* 2000;**84**:6–10.
- D Department of Health. Guidance on routine collection of Patient Reported Outcome Measures (PROMs). *DH*, London 2008 (http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalassets/dh_092625.pdf).
- D Department of Health. Liberating the NHS: transparency in outcomes – a framework for the NHS. *DH*, London 2010 (<http://www.dh.gov.uk/en/consultations/liveconsultations/DH-117583>).
- D Tomlinson A, Liu D. Core supporting information requirements for revalidation. *RCoA Bulletin* March 2011;**66**:15–16 (<http://www.rcoa.ac.uk/node/608>).

14.**Publishing your improvement work**Dr M Daniel,¹ Dr A Longmate²

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The definition of audit includes an evaluation of a specific quality or quantity. There are many examples of possible audits in this book. Improvement involves a change for the better, typically of a process or structure leading to improved outcomes. There is much that can be improved in current medical practice. Sharing what we learn from our improvement efforts is an important part of this work.

All improvement work is a social process, and at heart is the requirement for people to change how they do part of their work. This makes it different from research examining whether one drug or intervention is better than another in some dimension. The typical clinical research uses a study protocol which provides much of the foundation for the methods and sets up the results section. In contrast, improvement work often involves more than one change, and subsequent changes are based on learning gained as the work progressed. This difference has often led to difficulties in getting improvement work published, often as it does not fit the traditional structure used in medical journals: Introduction, Methods, Results, and Discussion (IMRaD).

The Standards for QUality Improvement Reporting Excellence (SQIRE: <http://www.squire-statement.org>) guidelines¹ were published in 2008 with the aim of increasing both the quantity of improvement work published and the quality of the published work. The SQIRE guidelines are now used by many journals. These guidelines function in the same way as the Consolidated Standards of Reporting Trials (CONSORT) guidelines for randomised controlled trials. The SQIRE guidelines provide a checklist that would help anyone working on an improvement project frame their work.

There are items on the SQIRE checklist that are worthy of mention in this brief note:

Why did you start?

A good quality improvement paper will describe the information that led to the need to make a change. Do this by first providing a summary of the current knowledge relevant to the topic. Describe the known standard or the current best practice, and how local practice compares with this. This provides a description of the quality gap at the start of the improvement work; it also provides a basis for describing the aim of the improvement project.

What did you do?

Quality improvement work intends to make changes to what is, or was, routine care. Describe what was done, and how these changes were implemented. Include a description of the mechanism by which you thought these changes would have an effect. Changing routine work will be dependent on the characteristics of the setting in which it occurs. SQIRE guidelines make clear that this is an important area to fully describe to enable your reader to determine how a similar approach may work in their own context.

What did you find?

Your data will usually be presented in time series, usually in the form of a run chart. Quality improvement work occurs in the real world, and as such the improvement strategy may change from learning obtained as the data is gathered over time. This is important to record and share. Annotating the run charts to provide a timeline of what changes were made will provide your reader with a true sense of how the work evolved over time. Doing this is more challenging than it sounds. Keep a set of notes as the work progresses, about what you did and what you learned.

The Standards for QUality Improvement Reporting Excellence guidelines provide an excellent resource for designing and writing up an improvement study. The contents of this RCoA document together with ten valuable tips recently provided by an experienced improver² will help you make improvement part of daily work.

Top 10 tips for incorporating scientific quality improvement into everyday work.

Adapted from Goldmann.²

1. Select projects that will really make a major difference to the patients and staff who will participate in them.
2. Set bold clear aims and a timeline for achieving them e.g: 'we will reduce pain scores in patients undergoing knee replacement by 50% by December 31st 2012'.
3. Assemble a multidisciplinary team.
4. Be creative in recruiting experts, e.g. Do you have a colleague with an engineering degree who is good at understanding system improvement?
5. Develop the most rigorous study design possible without disrupting normal work unduly.
6. Do everything possible not to sacrifice data quality and completeness.
7. Use the need to engage in quality improvement for revalidation and CV purposes as a lever to get colleagues engaged.
8. Do not assume that major external funding is necessary to perform credible improvement work.
9. Pay careful attention to the ethics of quality improvement work but design projects that are unlikely to require formal ethics approval.
10. Whenever possible, anticipate possible publication and use the SQUIRE guidelines.

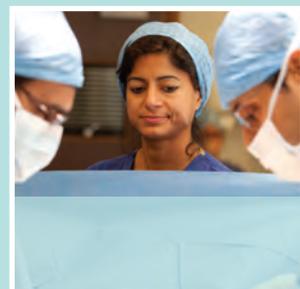
References

- 1 Ogrinc G et al. The SQUIRE (Standards for QQuality Improvement Reporting Excellence) guidelines for quality improvement reporting: explanation and elaboration. *Qual Saf Health Care* 2008;**17 Suppl 1**;i13–i32.
- 2 Goldmann D. Ten tips for incorporating scientific quality improvement into everyday work. *BMJ Quality and Safety* 2011;**20 Suppl 1**i69–i72.



B

Audit recipes for continuous quality improvement in anaesthesia



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1.1

Patient information about anaesthesia

Dr L A White

Why do this audit?

High quality information for patients is now a clear requirement. Written and verbal information should be provided. In 2001 the Department of Health stated that 'in elective treatment, it is not acceptable for the patient to receive no information about anaesthesia until their pre-operative visit from the anaesthetist; at such a late stage the patient will not be in a position genuinely to make a decision about whether to proceed...'¹

Written information materials should be developed by anaesthetists and patients working together.² They should be clearly written in plain English, using and explaining technical words where necessary. They should be evidence based and up to date, and they should include information about side effects and complications. They should be well designed and be available in alternative formats – such as other languages, large print and materials for those with low literacy skills.

Auditors of patient information services must understand a fundamental issue. Patients vary in the amount of information that they want. Our duty is to provide information in an accessible form, but we cannot insist that all patients take up the information service provided. Audits must accommodate this fact.

On the one hand, more than ever before, there is money and support from managers, risk managers and politicians for the use of information materials of all kinds. On the other hand, there are new barriers for anaesthetists in their quest to inform patients fully about what to expect before, during and after their anaesthetic. Nurse-led pre-assessment clinics are increasingly replacing the pre-operative visit and patients may reach the day of surgery without having met their anaesthetist and having received no specific information about what is going to happen to them. They may have been assessed and 'labelled' as fit to proceed, but no one has actually explained what is going to happen, and why. Audits are needed to ensure that there is no erosion of the new trend of providing high quality information for patients who want it.

Best practice: research evidence or authoritative opinion

Best practice in the provision of written information for patients expecting to have an anaesthetic is described in detail in the Royal College of Anaesthetists' book *Raising the Standard: Information for Patients*.² This was published in 2003 following a two-year project which included an extensive consultation process between patients and anaesthetists. The book also explains the importance of verbal information to follow up on the use of leaflets. Numerous references are given.

Suggested indicators

Providing information for patients has a number of stages and any or all of these are open to audit. The stages are outlined below with suggested standards or targets.

Stage 1: ensure high quality and suitability of all written information leaflets for use.

- D % information leaflets to be used that have been evaluated via an approved process. A suitable evaluation tool can be found on the RCoA website. If the RCoA leaflet series is used, or some commercial leaflets, evaluation has already been done. Standard = 100%.
- D % patients in a sample of the proposed distribution group who agree that the information leaflet was helpful/comprehensive/clearly written etc. This would be a small and detailed audit with opportunity for feedback and changes to the proposed leaflet. Suggested target (when process completed and leaflet altered) > 90%.

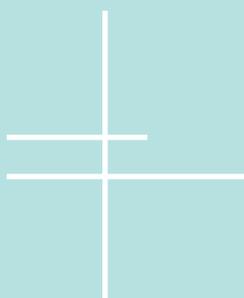
Stage 2: set up distribution of leaflets (who by, and when, in the patient pathway).

- D % patients who received the leaflet at the specified time in their care pathway. Target will depend on the circumstances.

Stage 3: assess whether the leaflet is effective.

- D % patients who are satisfied with the written information that they received. This will include some patients who are satisfied, but never read it. Suggested target > 90%.
- D % patients who can answer questions about material that the leaflet has covered. It may or may not be appropriate to conduct this kind of audit depending on the material covered. Target will depend on the circumstances.

	<p>Stage 4: assess the quality of verbal information.</p> <p>D % patients who are satisfied with the information they received from their anaesthetist. Target = 90%.</p> <p>D % patients who are satisfied with information that they received about anaesthesia from other health professionals before they came to theatre. This might be:</p> <ul style="list-style-type: none"> ◆ pre-assessment nurses ◆ surgical ward nurses ◆ recovery nurses conducting a pre-operative visit ◆ intensive care unit nurses conducting a pre-operative visit when post-operative intensive care is planned ◆ acute pain service nurses talking about plans for post-operative pain control. Target = 90%. <p>D % patients who are satisfied with information that they received from operating department staff on arrival in theatre, in the anaesthetic room, in theatre during the operation (if under local or regional anaesthetic) or in the recovery room. Target = 90%.</p>
Proposed standard or target for best practice	See above.
Suggested data to be collected	This will depend on which audit is planned.
Common reasons for failure to meet standard	<p>D Poor quality, not evaluated information materials.</p> <p>D Failure by staff to understand the principles of producing high quality information leaflets.</p> <p>D No funds to set up a robust distribution service.</p> <p>D Leaflet reaches patient at the wrong point in their care – too early or too late.</p> <p>D Leaflet not suitable for the patients who receive it.</p> <p>D Anaesthetist does not have enough (or any) time allocated for pre-operative visits.</p> <p>D Lack of knowledge in other staff about issues relating to anaesthesia.</p>
Related audits	9.1 – Pre-operative and parent patient information
CPD and Curriculum mapping	<p>CPD matrix code: 2A03</p> <p>Basic curriculum competences: HT_BK_01–04, HT_BS_01–08, CE_BS_01–04, CE_BK_01–05</p> <p>Intermediate curriculum competences: GU_IK_11, GU_IS_01</p>
References	<ol style="list-style-type: none"> 1 Department of Health. Reference guide to consent for examination or treatment (2nd edn). <i>DH</i>, London 2009 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_103643). 2 Raising the Standard: Information for patients. <i>RCOA</i>, London 2003 (http://www.rcoa.ac.uk/node/2136).



1.2

Consent to anaesthesia and choice of technique

Dr E James

Why do this audit?

It is important that patients are involved in discussion about their anaesthetic care in the pre-operative period to allow discussion about the relative risks and benefits of different techniques and also to obtain patient consent for the most appropriate technique for that individual. A satisfactory pre-operative visit also provides patient reassurance and reduces the likelihood of complaints related to lack of consent and poor patient understanding of risks of complications.

Best practice: research evidence or authoritative opinion

It is the anaesthetist's responsibility to provide their patients with relevant and appropriate information to allow a collaborative approach to decisions about anaesthetic techniques and the obtaining of patient consent. The Association of Anaesthetists has produced guidance on obtaining consent for anaesthesia which gives a comprehensive overview of the issues involved.¹ A recent QIS review recommends that all patients are provided with easily understood information on anaesthesia and peri-operative care before admission to hospital.² There is some evidence for benefits of regional or local anaesthesia for specific surgical procedures. Local anaesthesia for cataract surgery is routine. There is no clear benefit of regional anaesthesia vs general anaesthesia in hip fracture surgery.³ Epidural analgesia is of proven benefit for some patients, for example those with significant respiratory disease, but has shown less convincing benefit in other patient groups.⁴

Suggested indicators

A specific procedure could be selected such as spinal or caudal block, insertion of invasive monitoring or thoracic epidural.

A number of aspects could be audited:

- D % of patients with whom discussion of risk and benefits of a particular technique is documented.
- D % of patients seen by anaesthetist carrying out the anaesthetic.
- D % of patients for whom appropriate regional block was considered and reasons for not carrying out the block or failure of effective block are documented.

Alternatively a more general audit of documentation of anaesthetic techniques and material risks discussed could be considered:

- D evidence of CPD related to consent (see CPD/curriculum mapping).
- D knowledge requirements of consent and discussion of risk related to regional anaesthesia in RCoA trainee syllabus (see CPD/curriculum mapping).

Proposed standard or target for best practice

- D 100% of patients should have proposed anaesthetic techniques and associated risks explained and this should be documented on the anaesthetic record.
- D 100% of patients should have a discussion of risks, benefits and choice of anaesthetic technique with the anaesthetist performing the anaesthetic.
- D There should be a satisfactory outcome appropriate to the technique selected, e.g. block success and complication rates should be acceptable taking into account published rates, local factors and nationally accepted targets.

Suggested data to be collected

- D Anaesthetist and procedure.
- D Was patient seen by anaesthetist pre-operatively?
- D Did this anaesthetist then anaesthetise the patient?
- D Was documentation of choice, risks and benefits of alternative techniques recorded satisfactorily?
- D Data on success rates, side effects and complications of the selected anaesthetic technique.

Common reasons for failure to meet standard

- D No pre-operative visit by an anaesthetist.
- D Patient visited by anaesthetist who did not carry out procedure.
- D Inadequate information disclosure during pre-operative visit.
- D Inadequate documentation of pre-operative information.
- D Procedure less successful than expected, e.g. lower success rate or higher incidence of side effects or complications.

CPD/curriculum mapping

CPD matrix code: IF01

Basic curriculum competences: OA_BK_01, OA_BK_11, OA_BK_12, OA_135_06

Intermediate curriculum competence: GU_135_06

References

- 1 Association of Anaesthetists of Great Britain and Ireland. Consent for anaesthesia 2. AAGBI, London 2006 (<http://www.aagbi.org/sites/default/files/consentto6.pdf>).
- 2 NHS Quality Improvement Scotland. Anaesthesia – National Overview Follow up Report. NHS QIS, Edinburgh 2010 (http://www.healthcareimprovementscotland.org/previous_resources/performance_review/anaesthesia_follow-up_reports.aspx).
- 3 SIGN Guideline 111: Management of hip fracture in older people. Scottish Intercollegiate Guidelines Network, June 2009 (<http://www.sign.ac.uk/guidelines/fulltext/111/index.html>).
- 4 Rigg JR et al. MASTER Anaesthesia trial study group. Epidural anaesthesia and analgesia and outcome of major surgery. A randomised trial. *Lancet* 2002;359: 1276–1282.



1.3

Pre-operative assessment clinics

Dr G Hilditch

Why do this audit?

The main reasons for having pre-admission clinics are:

- D to improve patient care by careful pre-operative evaluation of the patient with co-existing disease^{1,2,3}
- D to improve theatre utilisation^{1,2,3}
- D to reduce bed occupancy^{1,2,3}
- D to decrease the incidences of inadequate communication and administration errors.^{1,2,3}

With proper use of pre-admission clinics, there is adequate time to ensure the patient's condition has been optimised to reduce the risk of peri-operative morbidity and mortality and reduce the likelihood that surgery will be cancelled at the time of admission.

Patients can be admitted on the day of surgery reducing the length of stay and enhancing bed occupancy.

Best practice: research evidence or authoritative opinion

Screening and pre-operative assessment is usually carried out by a specially trained multi-disciplinary team with access to a consultant anaesthetist. Appropriately trained nurses can use locally developed protocols to screen and assess patient's fitness for surgery⁴ and thereby minimise late cancellations of operations. Occasionally, surgery will be postponed on the day of surgery by an anaesthetist. This should be reported to the POA lead clinician if protocols have not been followed or are inefficient.⁵ The importance of adequate pre-operative assessment is referred to in the RCoA CPD matrix and 2010 curriculum (see CPD/curriculum mapping).

Suggested indicators

For patients who **attended** the pre-admission clinic:

- D Of those who had their operation postponed by the clinic, % correctly postponed in the opinion of the auditor:
- D Of those who did not have their operation postponed, % who subsequently had their operation postponed due to a problem that could have been noted at the pre-admission clinic, in the opinion of the auditor:
- D Of those who were referred to another specialist for further optimisation, % correctly referred in the opinion of the auditor:

For patients who **did not attend** the pre-admission clinic:

- D % who subsequently had their operation postponed as a result of a factor that could have been noted at the pre-admission clinic, in the opinion of the auditor:

If a surgical service is setting up a pre-admission clinic for the first time:

- D % patients cancelled due to problems that could have been noted by a pre-admission clinic may be compared before and after establishing the clinic.

Proposed standard or target for best practice

The ideal standards are that:

- D 100% postponements by the clinic should be appropriate
- D 0% further postponements should occur in attendees as above
- D 100% of referrals should be appropriate
- D 0% postponements should occur in those not referred as above.

If a service is being set up there should be a significant fall in the number of cancellations due to problems that the clinic could have picked up.

It is not possible at this stage to propose targets, given the relative paucity of the literature.

Suggested data to be collected

The following data should be collected.

- D The number of patients attending the clinic.
- D The reasons for postponement.
- D The reasons for referring to a specialist for further optimisation.

Common reasons for failure to meet standard

- D Inadequate training of nurses staffing the clinic.
- D Factors that nurses are not trained to recognise, e.g. heart murmurs, difficult airway.
- D Factors not included in standard pre-admission clinic guidelines.
- D Failure to review the results of investigations performed by the clinic.

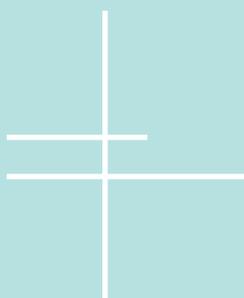
CPD and Curriculum mapping

CPD matrix code: **2A03**

Basic curriculum competences: **HT_BK_01–4, HT_BS_01-08, CE_BS_01–4, CE_BK_01–5**
Intermediate curriculum competences: **GU_IK_11, GU_IS_01**

References

- 1 Conway JB, Goldberg J, Chung F. Preadmission anaesthesia consultation clinic. *Can J Anaesth* 1992;**39**:1051–1057.
- 2 Koay CB, Marks NJ. A nurse-led preadmission clinic for elective ENT surgery: the first 8 months. *Annals Roy Coll Surg Engl* 1996;**78**:15–19.
- 3 Rushforth H et al. Nurse-led paediatric assessment: an equivalence study. *Paediatr Nurs* 2006;**18**:23–29.
- 4 Kinley H et al. Extended scope of nursing practice: a multicentre randomised controlled trial of appropriately trained nurses and pre-registration house officers in pre-operative assessment in elective general surgery. *Health Technol Assess* 2001;**5(20)**:1–87.
- 5 Pre-operative assessment and patient preparation: The role of the anaesthetist 2. *AAGBI*, London 2010 (<http://www.aagbi.org/sites/default/files/preop2010.pdf>).



1.4 Premedication and management of chronic medication

Dr J Crawford

Why do this audit?

Chronic medication: Continuation of long-term drug treatment before and after surgery may be required to prevent destabilisation of chronic conditions. Peri-operative discontinuation of some drugs may lead to withdrawal syndromes.¹ The rate of non-surgical complications increases with the length of time patients are without their regular medicines.² Increased risk of MI and death are associated with peri-operative withdrawal of beta-blockers.³ Continuation of certain other drugs peri-operatively may lead to unwanted side effects that support their discontinuation, or the use of specific management plans (e.g. for warfarin, antiplatelet drugs, diabetic drugs).⁴ Patients will often be given advice at pre-operative clinics without being seen by an anaesthetist. Drugs that are deliberately withheld pre-operatively must be reintroduced safely.

Premedication: Premedication may have beneficial effects on patient anxiety, nausea/vomiting, quality of anaesthetic induction and risks of aspiration. Same-day admission arrangements reduce the opportunities to prescribe premedication in a timely fashion. Admission facilities may preclude the administration of pre-operative sedatives.

Best practice: research evidence or authoritative opinion

Chronic medication: The anaesthetist should receive a written record of a patient's current medication⁵ and be alerted to any significant drugs prescribed on a regular basis. There must be local guidelines that define the management of chronic medication pre- and post-operatively – including while 'Nil by mouth'. This guidance must include advice on the management of cardiac drugs, diabetes drugs, drugs of dependence, antiplatelet drugs/warfarin and non-prescription drugs.

Premedication: Sedative premedication should not be the mainstay of achieving pre-operative anxiolysis in adults. However, sedative premedication should be prescribed, and be correctly administered, when their effects are required. Routine use of drugs suppressing gastric acid is not justified in low risk cases⁶ but mechanisms should exist to allow timely administration in patients at higher risk of aspiration e.g. using Patient Group Directions⁷ (PGD) at pre-operative clinics.

Suggested indicators

Chronic medication:

- D Presence/absence of guidelines as above.
- D % of cases in which the anaesthetist obtains a timely and accurate written record of patients' medications.
- D % adherence to guidelines and specific management plans.

Premedication:

- D % patients in whom PGD was applied correctly/incorrectly.
- D % patients for whom anaesthetist had the opportunity to order a premed when deemed necessary.
- D % patients in whom premed was given/taken correctly at an appropriate time relative to induction of anaesthesia.

Proposed standard or target for best practice

Chronic medication:

- D Presence of chronic medication guidelines as above.
- D 100% elective cases the anaesthetist should receive a timely and accurate written record of patients' medications.
- D 100% adherence to guidelines or documented deviation.

Premedication:

- D 100% patients receiving drug from PGD appropriately.
- D 0% patients receiving drug from PGD inappropriately.
- D 100% of cases the anaesthetist to have opportunity to order sedative premed in cases of significant patient anxiety not alleviated by non-pharmacological means.

Suggested data to be collected**Chronic medication:**

- D Presence/absence of guidelines as above.
- D Rates of adherence to this guidance (pre- and post-operatively)
- D Reasons for failure to follow guidelines should be gathered to inform future practice (e.g. from the 'not-administered' codes on drug prescription sheets).

Premedication:

- D Did anaesthetist have opportunity to prescribe premedication.
- D If premed prescribed, whether given at correct time relative to induction.
- D Missed opportunities to use PGD. Inappropriate drug provision via PGD.

Common reasons for failure to meet standard**Chronic medication:**

- D Lack of local guidelines – or inadequate content.
- D Failure to integrate these guidelines with fasting policies.
- D Failure to involve all relevant health care groups (e.g. GPs, pre-operative assessment, post-operative ward, pharmacy).
- D Variance in practice because of lack of evidence (e.g. ACE inhibitors).

Premedication:

- D Lack of PGD enabling supply of drugs by nurses.
- D Patients admitted after lists have started.
- D Change in list order or time.
- D Same day admission facilities unable to accommodate patients requiring sedative premedication.

Related audits

- 1.7 – Pre-operative fasting in adults
9.3 – Premedication in pre-school age children

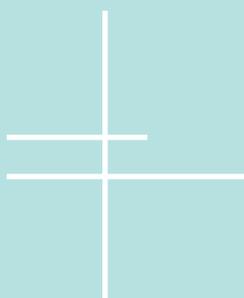
CPD and Curriculum mapping

CPD matrix codes: **1A02, 2A03**

Basic curriculum competences: **OA_BK_08, OA_BS_01, OA_BS_06, PD_BK_01–08, PD_BS_01–03**

References

- 1 Karachalios GN et al. Withdrawal syndrome following cessation of antihypertensive drug therapy. *Int J Clin Pract* 2005;**59**(5):562–570.
- 2 Kennedy JM et al. Polypharmacy in a general surgery unit and consequences of drug withdrawal. *Br J Clin Pharmacol* 2000;**49**(4):353–362.
- 3 Hoeks SE et al. Increase of 1 year mortality after perioperative beta-blocker withdrawal in endovascular and vascular surgery patients. *Eur J Vasc Endovasc Surg* 2007;**33**:13–19.
- 4 Anonymous. Drugs in the peri-operative period: 1 – stopping or continuing drugs around surgery. *Drugs Therapeut Bull* 1999;**37**(8):62–64.
- 5 NHS Quality Improvement Scotland. Anaesthesia – Care before, during and after anaesthesia. *NHSQIS*, Edinburgh July 2003 (http://www.healthcareimprovementscotland.org/previous_resources/standards/anaesthesia.aspx).
- 6 ASA. Practice guidelines for preoperative fasting and the use of pharmacological agents to reduce the risk of pulmonary aspiration. *Anesthesiology* 2011;**114**:495–511.
- 7 Patient Group Directions (<http://www.nelm.nhs.uk/en/Communities/NeLM/PGDs>).



1.5

The pre-operative visit

Dr L A White

Why do this audit?

This audit refers to the visit that should take place after admission to hospital. The opportunity for a satisfactory pre-operative visit is being limited by several modern practices:

1) the need to treat more patients in less time; 2) the practice of admission on the day of surgery; 3) the reduction in pre-operative wait times by admitting patients at times staggered through the day; 4) the effect of budget constraints and the European working time directive which reduces 'doubling up' when two anaesthetists work together on a list.

Operating sessions must be planned to allow time for these essential visits to take place and an audit can show whether this is the case.

Best practice: research evidence or authoritative opinion

Patients for elective and most emergency surgery must be seen by an anaesthetist after admission to hospital and before they arrive in the anaesthetic room.¹ This includes patients who have attended a pre-assessment clinic before admission, even if they have seen an anaesthetist at that clinic. The reasons for this are as follows:

- D **Anaesthetist responsibility and patient safety:** The anaesthetic is the responsibility of the individual anaesthetist who gives it² and they must be given an opportunity to consider the relevant aspects of the case in an environment when it would be reasonable to alter the management of the case; they must ensure that all issues relevant to the safe conduct of anaesthesia have been addressed; they are responsible for ensuring that the patient understands the procedure and any significant risks. There may be some circumstances, particularly in emergency surgery, when the pre-operative visit is carried out by another anaesthetist. A robust clinical handover is required to maintain patient safety, and this must be regarded as 'second best'.
- D **Patient information:** Patients should have received information about anaesthesia and pain relief at the pre-assessment clinic. However many patients arrive with further questions which should be addressed before informed consent is complete.³ The final choice of technique is often still to be decided, hence discussions about the plan for anaesthesia and consent can only be completed on the day of surgery, by discussion between the anaesthetist giving the anaesthetic and the patient.^{4,5}
- D **Patient experience:** Patients generally appreciate an opportunity to meet their own anaesthetist before they enter the theatre suite which helps to reduce anxiety and uncertainty.

Suggested indicators

Visit happening/not happening

- D % elective operations when the patient was seen by an anaesthetist after admission to hospital and before entering the anaesthetic room. Standard = 100%.
- D % elective operations when the patient was seen by their own anaesthetist after admission to hospital. Target = 100%.
- D % emergency operations when the patient was seen by an anaesthetist after admission to hospital, having excluded patients admitted as an extreme emergency, for example collapsed aortic aneurysm repair. Standard = 100%.
- D % emergency operations when the patient was seen by an anaesthetist who subsequently gave the anaesthetic. Target 75%, but where not achieved 100% evidence of robust clinical handover.

Quality of the pre-operative visit (for elective cases)

This data would be best collected using a visual analogue scale without thresholds, marked at each end 'very satisfied' and 'very dissatisfied'.

- D % visits where the patient agrees that conditions were satisfactory for a full conversation:
 - ◆ anaesthetist put patient at ease and gained their trust
 - ◆ patient felt able to ask all questions that he/she had in mind
 - ◆ anaesthetist answered all questions to patient's satisfaction
 - ◆ anaesthetist gave adequate time and did not appear in a rush
 - ◆ venue had suitable privacy.

	<p>D % visits when the anaesthetist agrees that conditions were satisfactory for a full conversation. Elements to be considered are:</p> <ul style="list-style-type: none"> ◆ venue ◆ amount of time spent ◆ arrangements for theatre list to continue or be completed.
<p>Proposed standard or target for best practice</p>	<p>Visit happening/not happening</p> <p>Suggested standards and targets given above.</p> <p>Quality of the pre-operative visit</p> <p>A minimum target that the average visual analogue score should exceed 50% of the distance along the line. If this target is achieved, the aim should be to improve.</p> <p>Any scores of less than 30% of the distance along the line are a cause for concern. In this case reference should be made to the free text sections to find the cause of dissatisfaction.</p>
<p>Suggested data to be collected</p>	<p>Visits happen/do not happen</p> <ul style="list-style-type: none"> D Who performs the visit. D If this anaesthetist not present at induction – method and quality of clinical handover (i.e. verbal, written, both) and anaesthetist satisfaction with that when they meet the patient in the anaesthetic room. D Whether the pre-operative visit revealed an aspect of care that needed to be sorted out before coming to theatre. D If case is cancelled or delayed at the pre-operative visit, the reasons for this and consideration of whether pre-assessment processes were deficient and should be adjusted. <p>Quality of the visit</p> <ul style="list-style-type: none"> D Ensure free text section allows cause of dissatisfaction to be made clear by both parties.
<p>Common reasons for failure to meet standard</p>	<ul style="list-style-type: none"> D Lack of space for day of surgery admission compared to the number of patients. D Lack of privacy in arrangements for pre-operative visit. D Lack of time within the theatre list.
<p>CPD and Curriculum mapping</p>	<p>CPD matrix codes: 2A03</p> <p>Basic curriculum competences: HT_BK_01–04, HT_BS_01–08, CE_BS_01–04, CE_BK_01–05</p> <p>Intermediate curriculum competence: GU_IK_11</p>
<p>References</p>	<ol style="list-style-type: none"> 1 Pre-operative assessment and patient preparation: the role of the anaesthetist 2. <i>AAGBI</i>, London 2010 (http://www.aagbi.org/sites/default/files/preop2010.pdf). 2 Department of Health. Reference guide to consent for examination or treatment (2nd edn). <i>DH</i>, London 2009 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_103643). 3 Greenberg CC et al. Patterns of communication breakdowns resulting in injury to surgical patients. <i>J Am Coll Surg</i> 2007;204:533–540. 4 Ausset S et al. Improvement of information gained from the pre-anaesthetic visit through a quality assurance programme. <i>Br J Anaesth</i> 2002;88:280–284. 5 Lonsdale M, Hutchinson GL. Patients' desire for information about anaesthesia. <i>Anaesthesia</i> 1991;46:410–413.

1.6

Pre-operative airway assessment

Dr B McGuire

Why do this audit?

Difficulty or failure in airway management is a significant factor in much anaesthesia-related morbidity and mortality.^{1,2} NAP4 summarised that poor airway assessment contributed to poor airway outcomes.³

A *difficult airway* exists when an anaesthetist has problems with mask ventilation, intubation or both. Depending on definition and study design (prospective/retrospective; inclusion criteria etc), the incidence of difficult mask ventilation may be around 5%⁴ and the incidence of difficult intubation (using direct laryngoscopy) around 4%.⁵ Fortunately, the incidences of unsuccessful intubation and a 'can't intubate, can't ventilate' (CICV) scenario are considerably lower.

Best practice: research evidence or authoritative opinion

The Royal College of Anaesthetists' guidelines for the provision of anaesthetic services⁶ specifically refer to the importance of airway assessment. It is also referred to in the College CPD matrix and new curriculum (it is a core clinical learning outcome in basic training – see CPD/curriculum mapping).

The WHO surgical safety checklist⁷ includes prediction of a difficult airway in its pre-operative section. Furthermore, the NAP4 Executive Summary³ states as a recommendation that: 'All patients should have an airway assessment performed and recorded before anaesthesia. This involves bedside interactive tests.'

However, we know that these tests have a relatively low positive predictive value, even in combination.⁸ Best practice is likely to involve a combination of history, examination and investigation. Independent predictors of difficult mask ventilation in one study were age > 55 years, BMI > 26 kg/m², lack of dentition, a beard, and a history of snoring.⁴ Limitation of mandibular protrusion appears to be another factor.⁹

Independent predictors of difficult intubation in one study were previous difficult intubation, the presence of airway pathology and symptoms, inter-incisor gap, thyromental distance, Mallampati score and the maximum range of atlanto-occipital movement.¹⁰

Suggested indicators

- D % patients seen by anaesthetist who then gives the anaesthetic.
- D % patients in whom airway was assessed at pre-operative visit.
- D % patients with adequate documentation of airway assessment.
- D % patients with difficulty in ventilation.
- D % patients with difficult intubation.
- D % patients with failed intubation.
- D % patients with CICV scenario.

Proposed standard or target for best practice

- D 100% patients seen by anaesthetist who then gives the anaesthetic.
- D 100% patients having pre-operative airway assessment.
- D 100% patients with documentation of airway assessment.
- D In-patients with an unpredicted difficult airway (either difficulty not anticipated or airway not assessed):
 - ◆ < 5% patients with difficulty in mask ventilation
 - ◆ < 5% patients with difficult intubation
 - ◆ < 0.1% of patients with failed intubation
 - ◆ < 0.01% of patients with CICV scenario.

Suggested data to be collected

Prospective data should include:

- D age, BMI, a history of snoring or obstructive sleep apnoea; edentulous; presence of a beard; extent of mandibular protrusion
- D history of previous difficult intubation, airway pathology and symptoms; measurement of inter-incisor gap, thyromental distance, maximum range of atlanto-occipital movement and Mallampati score
- D number of patients predicted to have difficult ventilation or intubation
- D number of patients with actual difficult ventilation or intubation
- D number of patients with failed airway management
- D morbidity and mortality.

Common reasons for failure to meet standard

- D No or inadequate pre-operative airway assessment.
- D Different anaesthetist performs assessment.
- D Inadequate documentation of assessment.
- D Pre-operative tests fail to predict difficulty or lack of it.
- D Airway management strategy does not reflect assessment.

Related audits

- 8.11 – Airway and intubation problems during general anaesthesia for caesarean section
- 14.7 – Airway management training for novice anaesthetists

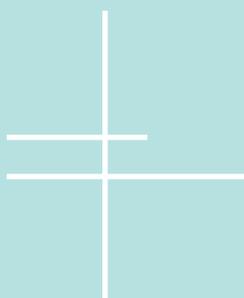
CPD and Curriculum mapping

CPD matrix codes: **IB02, IC01**

Basic curriculum competence: **OA_BK_05**

References

- 1 Gannon K. Mortality associated with anaesthesia. A case review study. *Anaesthesia* 1991;**46**:962–966.
- 2 Domino KB et al. Airway injury during anaesthesia: a closed claims analysis. *Anesthesiology* 1999;**91**:1703–1711.
- 3 NAP4: Major complications of airway management in the UK. Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists. *RCoA*, London March 2011 (<http://www.rcoa.ac.uk/nap4>).
- 4 Langeron O et al. Prediction of difficult mask ventilation. *Anesthesiology* 2000;**92**:1229–1236.
- 5 Williamson JA et al. The Australian Incident Monitoring Study. Difficult intubation: an analysis of 2000 incident reports. *Anaesth Intens Care* 1993;**21**:602–607.
- 6 Guidance on the provision of anaesthetic services for pre-operative care. *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/708>).
- 7 National Patient Safety Agency (NPSA) and National Reporting and Learning System (NRLS) Surgical Safety Checklist (<http://www.nrls.npsa.nhs.uk/resources/clinical-specialty/surgery/?entryid45=59860>).
- 8 Yentis SM. Predicting difficult intubation – worthwhile exercise or pointless ritual. *Anaesthesia* 2002;**57**:105–109.
- 9 Kheterpal S et al. Incidence and predictors of difficult and impossible mask ventilation. *Anesthesiology* 2006;**105**:885–891.
- 10 Arne J et al. Preoperative assessment for difficult intubation in general and ENT surgery: predictive value of a clinical multivariate risk index. *Br J Anaesth* 1998;**80**:140–146.



1.7

Pre-operative fasting in adults

Dr A Smith

Why do this audit?

Patients have traditionally been denied food and drink for six hours before the induction of general anaesthesia, though where this figure originated is not clear. This is likely to reduce the incidence of pulmonary aspiration of gastric contents. For fluids, much attention has been paid to reducing fasting times in children, who become dehydrated and hypoglycaemic more readily, but fluid deprivation is unpleasant for adults too. Shortening the fluid fast may also lead to less anxiety pre-operatively¹ and less nausea and vomiting post-operatively.² The pre-operative preparation of patients, including fasting, is integral to the RCoA CPD matrix and the 2010 curriculum (see CPD/curriculum mapping).

Best practice: research evidence or authoritative opinion

Clear fluids are cleared rapidly from the normal stomach. A Cochrane review of randomized controlled trials has assessed fasting before surgery.³ There was no evidence of difference in volume or pH of gastric contents when a shortened fluid fast was compared with a standard fast. Gastric volumes were nearly identical. Also, opinion has moved away from simply specifying 'safe' periods of fluid fasting to actively encouraging patients to drink. Patients should therefore be encouraged to drink clear fluids up until 2 hours before elective surgery. This applies to people with obesity, gastro-oesophageal reflux and diabetes mellitus but does not include emergency cases.⁴

In addition, operations should not be delayed or postponed if patients are found to be chewing gum or sucking a boiled sweet immediately before the induction of anaesthesia.⁴

Suggested indicators

D % of eligible patients who are permitted to drink in accordance with guidelines.

Proposed standard or target for best practice

D 100% healthy elective adult patients should be allowed to drink water or other clear fluids until 2 hours before the induction of anaesthesia.

Suggested data to be collected

- D Fluid fasting times.
- D Number of patients to whom fluid was given inappropriately.
- D Number of patients denied fluid when it is indicated by the above guidance.
- D Incidence and nature of organisational problems caused by new policy.

Common reasons for failure to meet standard

- D Nurses and patients not aware of policy.
- D Difficulties 'tailoring' fasting times to individual patients rather than all patients on an operating list.
- D Cancellation by those not aware of, or disagreeing with, policy.

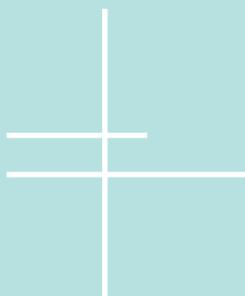
Related audits

9.2 – Pre-operative fasting in elective paediatric surgery

CPD and Curriculum mapping

CPD matrix code: **2A03**

Basic curriculum competence: **OA_BK_04**



References

- 1 Read MS, Vaughan RS. Allowing pre-operative patients to drink: effects on patients' safety and comfort of unlimited oral water until 2 hours before anaesthesia. *Acta Anaesthesiol Scand* 1991;**35**:591–595.
- 2 Smith AF, Vallance H, Slater RM. Shorter preoperative fluid fasts reduce postoperative emesis. *Br Med J* 1997;**314**:1486.
- 3 Brady M, Kinn S, Stuart P. Preoperative fasting for adults to prevent perioperative complications. *Cochrane Database of Systematic Reviews* 2003, Issue 4. Art No: CD004423.
- 4 Smith I et al. Perioperative Fasting in Adults and Children: Guidelines from the European Society of Anaesthesiology. *Euro J Anaesthesiol* 2011;**28(8)**:556–569.



1.8

Thromboprophylaxis

Dr M Cheesman, Dr H McKay, Dr K James

Why do this audit?

Venous thromboembolism (VTE) is a significant cause of mortality, long-term disability and chronic ill-health. In 2005, the House of Commons Health Committee reported that approximately 25,000 patients die each year from preventable hospital acquired VTE.¹ VTE is considered internationally to be a silent killer with fewer than 1 in 10 fatal cases of pulmonary embolism diagnosed before death.²

The cost of treating non-fatal symptomatic VTE and associated long-term disability is around £640 million per year.¹

It is clear from such figures that efforts should be focused on prevention^{1,2,3,4,5,6,7} and VTE has been recognised as a clinical priority for the NHS by the National Quality Board and the NHS Leadership Team. Consequently, VTE was one of two National Commissioning for Quality and Innovation (CQUIN) topics in 2010–2011. The focus has moved on from the introduction of VTE risk assessment in 2010–2011, to that of appropriate prophylaxis during 2011–2012.

Best practice: research evidence or authoritative opinion

In the UK the DoH, the National Institute of Clinical Excellence (NICE) and the Scottish Intercollegiate Guidelines Network (SIGN) and have stated that risk assessment and preventative measures for VTE are major patient safety interventions that must be made to save lives.^{1,2,3,4} These guidance documents have been used as the standard against which assessment of medical and surgical patients, risk stratification and consequent prophylaxis should be based.

Government policy states that every adult patient should undergo an individual risk assessment for VTE on admission to hospital and this should be a systematic and auditable process.⁵ Routine screening for asymptomatic deep vein thrombosis in all patients is not cost-effective.⁴ NICE recommends that pregnant and postnatal women should have a separate risk assessment based on The Royal College of Obstetricians and Gynaecologists' guidelines.⁸

Suggested indicators

- D Patients should be assessed for their risk of both VTE and bleeding within 24 hours of admission.
- D Patients should have appropriate prophylaxis prescribed according to national guidelines.
- D All available methods of prophylaxis should be considered – general measures (mobilisation, hydration), mechanical techniques and pharmacological agents.

Proposed standard or target for best practice

- D 100% of patients should be assessed for their risk of both VTE and bleeding within 24 hours of admission and the assessment outcomes documented (including day cases).
- D 100% of patients should have appropriate prophylaxis prescribed according to national guidelines (excluding local exceptions).
- D 100% of patients should receive their prescribed prophylaxis (unless patient refuses or it is contraindicated).
- D 100% of patients (or carers) receive written guidance and verbal information on VTE.
- D 100% of staff receive CPD/training in relation to VTE.
- D Pharmacological VTE prophylaxis must be tailored appropriately, pre- and post-surgery, in relation to central neuraxial block.

Suggested data to be collected

- D Did the patient have a VTE assessment documented within 24 hours of admission?
- D To which risk category was the patient assigned?
- D Which medication/treatment was prescribed on admission/following assessment?
- D Is the risk assessment outcome in line with national guidance?
- D Did the patient receive the prescribed treatments?
- D Was appropriate discharge VTE prophylaxis prescribed?
- D Are VTE guidelines easily accessible in clinical areas?
- D Evidence of continuing professional development (CPD) relating to VTE prevention.
- D Re-assessment documented at 24 hours after admission and after any major clinical change.

Common reasons for failure to meet standard

- D Lack of education/understanding amongst medical and nursing workforce.
- D Assessment not carried out in timely fashion.
- D Assessment inaccurate.
- D Uncertainty regarding responsibility for assessment of risk (and re-assessment) and prescription of prophylaxis.
- D Assessment not acted upon by medical staff.
- D Failure to apply guidelines.
- D Inappropriate medication/treatment being prescribed.
- D Prescription not administered to patient.
- D Lack of agreement among surgical specialties on management plans.

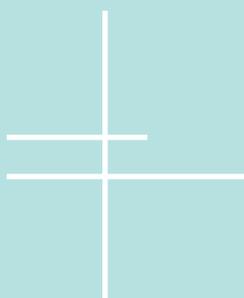
CPD and Curriculum mapping

CPD matrix code: **IE05**

Training curriculum competences: **OA_BK_9, IG_BK_03, PR_IK_09**

References

- 1 The Prevention of Venous Thromboembolism in Hospitalised Patients. House of Commons Health Committee (publication HC99, 2005) (<http://www.publications.parliament.uk/pa/cm200405/cmselect/cmhealth/99/9902.htm>).
- 2 Venous Thromboembolism Prevention: A Patient Safety Priority, Department of Health, June 2009 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_101398).
- 3 National Institute for Health and Clinical Excellence (2010). Venous thromboembolism: reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital (<http://www.nice.org.uk/guidance/CG92>).
- 4 SIGN Guideline 122. Prevention and Management of Venous Thromboembolism. *Scottish Intercollegiate Guidelines Network*, December 2010 (<http://www.sign.ac.uk/pdf/sign122.pdf>).
- 5 Report of the independent expert working group on the prevention of venous thromboembolism in hospitalized patients. *DH*, London March 2007 (<http://www.kingsthorbosiscentre.org.uk/timelinedocs/5.pdf>).
- 6 Government response to the house of commons health committee report on the prevention of venous thromboembolism in hospitalised patients. *HMSO*, 2005 (<http://www.official-documents.gov.uk/document/cm66/6635/6635.pdf>).
- 7 Venous thromboembolism. Costing report implementing NICE guidance. *NICE* 2007 (<http://www.nice.org.uk/nicemedia/live/12695/47234/47234.pdf>).
- 8 Reducing the risk of thrombosis and embolism during pregnancy and the puerperium. Green top guideline No 37a. *RCOG*, London 2009 (<http://www.rcog.org.uk/files/rcog-corp/CTG37aReducingRiskThrombosis.pdf>).



1.9

Pre-operative cross-matching of blood

Dr B J McCreath

Why do this audit?

Cross-matching of blood that is not transfused consumes blood bank resources unnecessarily, increases the blood inventory that must be maintained, and increases the number of units that become outdated. Occasionally, e.g. if a procedure is associated with a risk of sudden massive blood loss, this may be a deliberate policy. More commonly, however, the decision to cross-match blood is based on traditional practice that may be outdated. The importance of appropriate cross-matching blood and strategies to manage blood loss are referred to in the RCoA CPD matrix and the 2010 curriculum (see CPD/curriculum mapping). This audit will identify those operations for which blood is needlessly cross-matched.

Best practice: research evidence or authoritative opinion

The Maximum Surgical Blood Order Schedule (MSBOS) recommends that, for patients with a high likelihood of blood transfusion, the number of units cross-matched be twice the median requirement for that surgical procedure (cross-match-to-transfusion [C:T] ratio of 2:1).¹

It has been suggested that, once the MSBOS has been considered, the introduction of a Patient-Specific Blood Ordering System (PSBOS) that predicts a post-operative haemoglobin (PHb) using the patient's estimated blood volume (EBV: 70ml/kg for man; 80ml/kg for woman), the surgeon-defined anticipated blood loss (BL), and starting haemoglobin (SHb),² may be an additional tool in predicting patients that are at risk of receiving blood transfusions during surgery.

Suggested indicators

- D The C:T ratio for a specific operation.
- D The number of urgent requests for cross-matched blood made during elective surgery that, in the opinion of the auditor, could have been predicted.

Proposed standard or target for best practice

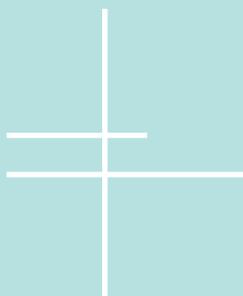
- D The C:T ratio for elective surgery should be no more than 2:1. If greater than this then the procedure should carry a risk of life-threatening haemorrhage.
- D There should be no requirement for emergency cross-matching techniques during elective surgery.

Suggested data to be collected

- D For a specific operation, collect the following data for each patient: weight and sex, operation details including grade of surgeon and any problems, anticipated blood loss, starting and post-operative haemoglobin concentration (Hb), transfusion trigger (Hb), C:T ratio, and discharge Hb.
- D Estimate the PHb using the equation $PHb = SHb \times (EBV - \text{anticipated BL}/EBV)$.
- D When an urgent request for cross-matched blood has been made during elective surgery, the circumstances surrounding the request should be considered. Could the need for blood have been predicted? Would a PSBOS have been helpful?

Common reasons for failure to meet standard

- D Inability of ward-based medical staff to estimate likely blood loss.
- D Inappropriate transfusion policy based on a needlessly high transfusion trigger.
- D Reluctance of a surgeon to begin surgery without blood immediately available when the anticipated blood loss is greater than 1 litre.
- D Inability of a transfusion laboratory to provide a rapid response to urgent requests for cross-matched blood.
- D Resistance to the changing of traditional practice.



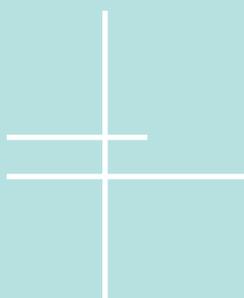
CPD and Curriculum mapping

CPD matrix codes: **2A03, 2A05**

Intermediate Training Curriculum Competence: **GU_IS_03, OR_IK_04**

References

- 1 Friedman BA et al. The maximum surgical blood order schedule and surgical blood use in the United States. *Transfusion* 1976;**16**:380–387.
- 2 Palmer T et al. Reducing unnecessary cross-matching: a patient-specific blood ordering system is more accurate in predicting who will receive a blood transfusion than the maximum blood ordering system. *Anesth Analg* 2003;**96**(2):369–375.



1.10

Protocols for pre-operative investigation

Dr P Doherty

Why do this audit?

The main purpose of pre-operative investigation is to provide additional diagnostic and prognostic information to supplement the clinical history of a patient. The National Institute for Health and Clinical Excellence has issued guidance on when to use routine pre-operative testing in elective surgery.¹ Assessment prior to anaesthesia is the responsibility of the anaesthetist² and local protocols for pre-operative investigations should be designed and implemented by departments of anaesthesia.³ Measurement of compliance to protocol is essential to reduce harm in peri-operative care.⁴ The importance of pre-operative investigation is considered in the RCoA CPD matrix and the 2010 curriculum (see CPD/curriculum mapping).

Best practice: research evidence or authoritative opinion

NICE Guidelines give recommendations on which investigations to perform depending on operation and co-morbidity. These recommendations are currently under review with an updated version due to be published in 2012. Implementation of these guidelines should be audited and reviewed regularly.

Local protocols should be available to all staff involved in the peri-operative care of the patient.

Suggested indicators

- D % patients who are tested in compliance with the guidelines or local protocol.
- D % investigations carried out that were not included within the protocol.
- D Cost-effectiveness of current protocols.
- D % cases delayed or postponed because necessary investigations were not available.
- D % of cases in which additional investigations were requested over local protocol.
- D % results available in notes pre-operatively.
- D % of abnormal results highlighted in anaesthetic records pre-operatively.

Proposed standard or target for best practice

- D Adherence to local protocols for pre-operative assessment.
- D All investigations suggested in the protocol performed.
- D Written reasons for variance from local protocol.
- D All investigations available and documented prior to theatre.
- D Any abnormal results identified and highlighted by anaesthetist pre-operatively.
- D No cases should be delayed or postponed due to absence of a pre-operative investigation.

Suggested data to be collected

- D The total number and percentage of investigations omitted or results unavailable in the notes. The effect of this on theatre time stratified by each theatre list, surgical ward and specific investigation.
- D The impact on theatre time and effect on cost of these omissions.
- D The number and effect on cost of unnecessary pre-operative investigations performed.

Common reasons for failure to meet standard

- D Protocol not widely available, and not publicised.
- D Lack of understanding among staff involved in pre-admission process.
- D Delay in processing or availability of investigations.
- D Late admission of patient.
- D Urgent theatre cases.

CPD and Curriculum mapping

CPD matrix code: **2A03**

Basic Training Curriculum Competence: **OA_BS_04–5**

References

- 1 NICE Clinical Guidelines 3: Preoperative Tests – The use of routine preoperative tests for surgery. NICE, London June 2003 (<http://www.nice.org.uk/page.aspx?o=56818>).
- 2 Guidance on the provision of anaesthetic services for pre-operative care. RCoA, London 2009 (<http://www.rcoa.ac.uk/node/708>).
- 3 Risk management. AAGBI, London 1998 (<http://www.aagbi.org/pdf/27doc.pdf>).
- 4 Patient Safety First: The How To Guide for reducing harm in Perioperative Care. Version 2 September 2009 (<http://www.patientsafetyfirst.nhs.uk/ashx/Asset.ashx?path=/How-to-guides-2008-09-19/periopcareLATEST%206%20Oct.pdf>).



1.11

Pregnancy testing before non-obstetric surgery

Dr S Ford

Why do this audit?

Non-obstetric surgery is estimated to occur in 1–2% of pregnancies and although anaesthesia is generally regarded as safe,¹ avoidance of certain drugs (e.g. NSAIDs) is advised.² Additionally, surgical decision-making and techniques may be altered by a diagnosis of pregnancy, including the use of intra-operative ionising radiation.³

Early pregnancy may be unrecognised or patients may be unaware of its significance and not declare it. It is the responsibility of the healthcare team to determine pregnancy status before surgery. The National Patient Safety Agency (NPSA) has issued an alert about the importance of checking for pregnancy before surgery.⁴

The importance of anaesthesia for non-obstetric surgery during pregnancy is referred to in the RCoA CPD matrix and the 2010 curriculum (see CPD/curriculum mapping).

Best practice: research evidence or authoritative opinion

NICE guidance on pre-operative investigation recommends that all women of childbearing age should be 'asked sensitively whether or not there is any chance they might be pregnant' and that 'a pregnancy test should be performed with the woman's consent if there is any doubt whether she may be pregnant'.⁵

The Royal College of Obstetricians and Gynaecologists states, 'All reasonable steps should be taken to exclude pregnancy before embarking on a surgical procedure'.⁶

Suggested indicators

- D Number of women of childbearing age asked about pregnancy status prior to surgery.
- D Number of women who are unsure of their pregnancy status who are tested for pregnancy.

Proposed standard or target for best practice

- D 100% of women of childbearing age, where practicable, should be asked about their pregnancy status prior to surgery.
- D 100% of women who are unsure about pregnancy should be tested prior to surgery, where practicable.
- D No woman should have a pregnancy test under anaesthesia or during surgery as a result of inadequate pre-operative testing.

Suggested data to be collected

- D Percentage of women of childbearing age asked before surgery whether they might be pregnant (as assessed by anaesthetic record and theatre careplan).
- D Where there is any doubt as to pregnancy status, the percentage of women undergoing a pregnancy test prior to surgery.
- D Number of women exposed to ionising radiation during surgery who were not tested pre-operatively.

Notes:

- D There is no national definition of childbearing age. A sensible age range is 16–45 years.
- D Patients undergoing the following procedures should be excluded from the audit:
 - ◆ obstetric procedures
 - ◆ termination of pregnancy
 - ◆ fertility treatment
 - ◆ evacuation of products of conception
 - ◆ surgical treatment of ectopic pregnancy.

Common reasons for failure to meet standard

- D Lack of pregnancy testing protocol.
- D Lack of awareness of the importance of pregnancy to anaesthetic and surgical decision-making.
- D No space in documentation (either the anaesthetic record or theatre careplan) for pregnancy status.
- D Shortage of pregnancy testing kits.

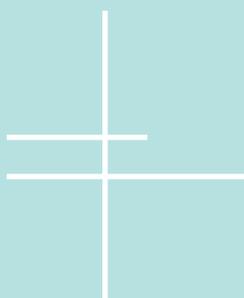
CPD and Curriculum mapping

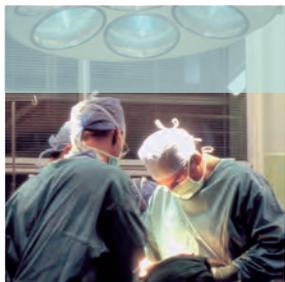
CPD matrix code: **2A03**

Basic Training Curriculum Competence: **OA_BK_03**

References

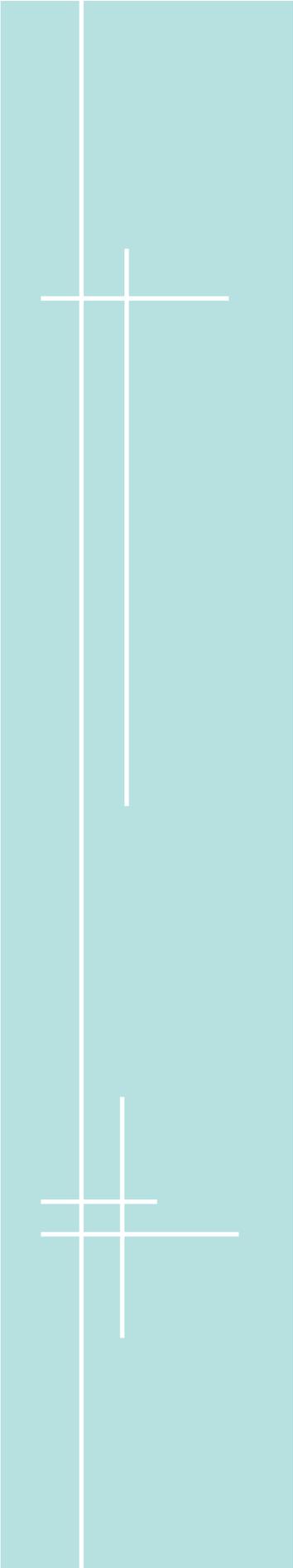
- 1 van de Velde M, de Buck F. Anesthesia for non-obstetric surgery in the pregnant patient. *Minerva Anesthesiol* 2007;**73**:235–240.
- 2 British National Formulary 60. *Royal Pharmaceutical Society*, London 2010.
- 3 Protection of pregnant patients during diagnostic medical exposures to ionising radiation. Advice from the Health Protection Agency, The Royal College of Radiologists and the College of Radiographers. *Health Protection Agency*, London 2009 (<http://www.hpa.org.uk/Publications/Radiation/DocumentsOfTheHPA/RCEogProtectionPregnantPatientsduringDiagnosticRCEg/>).
- 4 Rapid Response Alert NPSA/2010/RRR011: Checking pregnancy before surgery. *NPSA*, London 2010 (<http://www.nrls.npsa.nhs.uk/resources/?EntryId45=73838>).
- 5 NICE Clinical Guidelines 3: Preoperative Tests – The use of routine preoperative tests for surgery. *NICE*, London June 2003 (<http://www.nice.org.uk/page.aspx?o=56818>).
- 6 Obtaining Valid Consent. Clinical Governance Advice Number 6. *RCOG*, London 2008 (<http://www.rcog.org.uk/womens-health/clinical-guidance/obtaining-valid-consent>).





Section 2: Intra-operative care

Edited by Dr Mike Tremlett

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- 2.1 Adequacy and location of advanced airway management equipment**
 - 2.2 Anaesthetic record keeping**
 - 2.3 Check and challenge: Anaphylaxis**
 - 2.4 Secure custody of controlled drugs**
 - 2.5 Deaths in hospital**
 - 2.6 Compliance with the World Health Organization (WHO) Surgical Safety Checklist**
 - 2.7 Peri-operative temperature management**
 - 2.8 Awareness and general anaesthesia**
 - 2.9 Check and challenge: Defibrillation**

2.1

Adequacy and location of advanced airway management equipment

Dr B McGuire

Why do this audit?

Difficulty or failure in airway management is a significant factor in much anaesthesia-related morbidity and mortality.^{1,2} Rapid access to advanced airway equipment is essential for the provision of safe anaesthesia. There is evidence that knowledge among UK anaesthetists of the location and contents of the 'advanced airway set' is poor.³

NAP4 demonstrated a high failure rate of emergency cannula cricothyrotomy – root causes were not determined, but is likely that in some cases there were problems with availability of appropriate equipment and in the familiarity of such devices amongst clinicians. One quarter of NAP4 events occurred in ICU or the ED and an inadequate provision of equipment appeared to be a factor.⁴

Excluding routine airway equipment, the advanced airway set should include equipment for the management of both the anticipated and the unanticipated difficult airway.

Stipulation of the ideal contents of the Advanced Airway (AA) set is difficult as evidence is limited, but certain principles of advanced airway management are generally held in the UK and elsewhere in the world.^{5,6}

Best practice: research evidence or authoritative opinion

The Difficult Airway Society has published guidelines for the management of the unanticipated difficult intubation. The general emphasis is on the key principles of good practice and the stepwise approach to managing difficulty.⁷ The DAS website also has recommended equipment lists to go with its algorithms, although these lists were compiled in 2005.⁸ Essential equipment would include simple airway adjuncts, intubation equipment, supraglottic ventilation devices and an emergency cricothyrotomy oxygenation system.

The RCoA's 'Guidelines for the provision of anaesthetic services' refer to a need for specialist airway equipment and state 'within each theatre suite, there must be at least one portable storage unit with specialised equipment for managing the difficult airway'.⁹

The NAP4 Executive Summary recommended that national standardisation of Advanced Airway trolleys should be given consideration and that each hospital should ensure a minimum level of airway equipment for all sites where airway management may be performed.⁴ There is now a strong argument for standardised 'airway rescue' carts in all areas within a hospital. It may be preferable for these emergency trolleys to be distinct from the 'advanced airway set' which should include a flexible fibroscope.

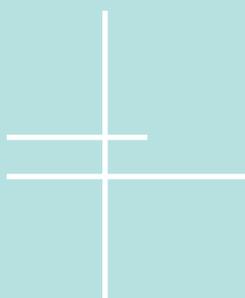
Suggested indicators

- D Existence of a named consultant responsible for the AA set.
- D Immediate availability of an AA set in all areas where anaesthesia is administered, which includes a list of contents and an algorithm flowchart of advanced airway management.
- D Each cart is laid out in a simple, structured manner with labelled drawers and including airway adjuncts, intubation kit, supraglottic ventilation devices and emergency cricothyrotomy kit (including oxygen delivery).
- D There is documentation of regular maintenance and stocking of each AA set.
- D % anaesthetists familiar with the location and contents of the AA set.
- D % anaesthetists with formal training in use of AA set.

Proposed standard or target for best practice

- D A named consultant should be responsible for the AA set.
- D 100% of areas where anaesthesia is administered should have AA set immediately available (portable).
- D 100% AA carts should have a simple layout with labelled drawers, a list of contents and an algorithm flowchart of advanced airway management.
- D 100% AA sets should include airway adjuncts, intubation kit, supraglottic ventilation devices and emergency cricothyrotomy kit.
- D 100% AA sets should include evidence of regular maintenance.
- D 100% of anaesthetists should be familiar with the location and contents of the AA set.
- D 100% anaesthetists should have had training in the use of the equipment in the AA set.

Suggested data to be collected	As above.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D Inadequate provision of AA kit (including resource limitation or lack of prioritisation with regards to the purchase of AA equipment). D Poor layout of AA set contributing to confusion during emergent use. D Lack of agreement as to which equipment and techniques represent best practice. D Inadequate documentation accompanying AA sets. D Lack of a leader to take responsibility for the provision, maintenance and education of advanced airway equipment/techniques. D Lack of facilities for training in advanced airways management.
Related audits	6.1 – Anaesthesia in the Accident and Emergency department
CPD and Curriculum mapping	CPD matrix codes: 1C01, 2A01
References	<ol style="list-style-type: none"> 1 Gannon K. Mortality associated with anaesthesia. A case review study. <i>Anaesthesia</i> 1991;46:962–966. 2 Domino KB et al. Airway injury during anaesthesia: a closed claims analysis. <i>Anesthesiology</i> 1999;91:1703–1711. 3 Green L. Can't intubate, can't ventilate! A survey of knowledge and skills in a large teaching hospital. <i>Eur J Anaesthesiol</i> 2009;26:480–483. 4 NAP4: Major complications of airway management in the UK. Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists. RCoA, London March 2011 (http://www.rcoa.ac.uk/nap4). 5 American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Practice Guidelines for the management of the difficult airway. <i>Anesthesiology</i> 1993;78:597–602. 6 Crosby ET et al. The unanticipated difficult airway with recommendations for management. <i>Can J Anaesth</i> 1998;45:757–776. 7 Henderson JJ et al. Difficult Airway Society guidelines for the management of the unanticipated difficult intubation. <i>Anaesthesia</i> 2004;59:675–684. 8 Recommended equipment for management of unanticipated difficult intubation. Difficult Airway Society, 2005 (http://www.das.uk.com/equipmentlistjuly2005.htm). 9 Guidance on the provision of anaesthesia services for intra-operative care. RCoA, London 2009 (http://www.rcoa.ac.uk/node/709).



2.2

Anaesthetic record keeping

Dr R Bowers, Dr D Booth

Why do this audit?

The peri-operative period is one of the most closely monitored times of a patient's treatment. The documents 'Good Practice'¹ and 'Recommendations for Standards of Monitoring During Anaesthesia and Recovery'² establish the acceptable standards of patient monitoring. The production of a record of relevant peri-operative data is a central role of the anaesthetist, and provides the details of pre-operative assessment, intra-operative management and physiological variables, along with post-operative recovery and discharge.

The record should provide sufficient data to allow comprehension of a sequence of events, the pertinent factors for decisions made, and instructions for a patient's ongoing management.

This data can be used to support local audit, for inter-professional communications (such as handover of care), and to inform future plans for anaesthesia.

A contemporaneous and full record would also be considered more favourably in the event of legal or regulatory proceedings.

Best practice: research evidence or authoritative opinion

'Good Practice' (2006), jointly published by the Royal College of Anaesthetists and the Association for Anaesthetists of Great Britain and Ireland, establishes both the data expected and the requirement for legibility and completeness for anaesthetic charts.¹

Suggested indicators

Percentage of anaesthetic records containing indicators from 'Good Practice'.¹ The full list is not reproduced here and is easily obtained from the Royal College of Anaesthetists website.

Proposed standard or target for best practice

Best practice would consider both:

1 Data completion

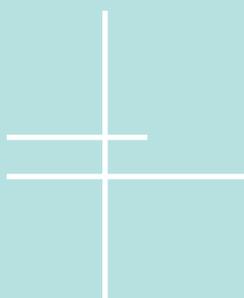
- D 100% record of anaesthetic consent and risks.
- D 100% identification of anaesthetists, patient, surgeons and procedure.
- D 100% completion of pre-operative WHO checklist confirmation.
- D 100% confirmation of anaesthetic equipment check.
- D 100% identification of responsible consultant.
- D 100% record of pre-induction values (where possible).
- D 100% charts state monitoring used.
- D 100% charts meet minimum monitoring standards.
- D 100% charts contain an adequately frequent record of physiological measurements.
- D 100% charts contain post-operative instructions.

2 Legibility

- D 100% charts assessed as legible.
- D 100% charts detail clearly any unanticipated or untoward events and critical incidents.

These targets are by no means complete and serve merely as a list of important points of safety and as an anticipated minimum number of data points. Further indicators from 'Good Practice' and 'Recommendations for Standards of Monitoring During Anaesthesia and Recovery' may be used for completeness, or to emphasise a certain subsection of anaesthetic practice, for instance regional anaesthesia.

Suggested data to be collected	A sample of anaesthetic charts should be assessed from all relevant clinical areas and on several different days of the week. Sample size will depend on levels of clinical activity, but a sufficiently large number should be collected to allow conclusions to be drawn.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> ⓓ Insufficient space or lack of prompts on anaesthetic charts. ⓓ Multiple short procedures with high turnover of patients. ⓓ Lack of appropriate peri-operative pauses to allow safety checks.
Related audits	2.6 – Compliance with the World Health Organization Surgical Safety Checklist
CPD and Curriculum mapping	Training curriculum competence: IO_BS_06, CC_DI_03, CC_DII_08
References	<ol style="list-style-type: none"> 1 Good Practice: A guide for departments of anaesthesia, critical care and pain management. <i>RCoA and AAGBI</i>, London 2006 (http://www.rcoa.ac.uk/node/1470). 2 Recommendations for Standards of Monitoring during Anaesthesia and Recovery (4th Edition). <i>AAGBI</i>, London 2007 (http://www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf).



2.3

Check and challenge: Anaphylaxis

Dr M Allan

Why do this audit?

We should all be able to demonstrate an awareness and competence to manage anaphylaxis/malignant hyperpyrexia and local anaesthetic toxicity in our workplace.

Methodology

On a given week give a brief clinical vignette to staff in their place of work e.g. theatres, labour ward, MRI suite, etc. The vignette should end stating that they now suspect Anaphylaxis. (A range of other conditions including malignant hyperpyrexia or local anaesthetic toxicity may be tested using a similar format.)

The respondent should be asked and timed to:

- D outline treatment strategy
- D locate the appropriate guidelines in the anaesthetic room
- D go to and locate the specific treatment, e.g. Intralipid or Dantrolene (e.g. not just the cupboard or box but the ampule or bag) and return to theatre. (There is no need to bring the drugs back to theatre.)

Best practice: research evidence or authoritative opinion

Multiple publications from the RCoA define the need for a working knowledge of how to manage these emergencies (see CPD and curriculum mapping).¹

Suggested indicators

- D % of the department asked.
- D % whose management correlated with published guidelines.
- D Time taken to find the guidelines.
- D Time taken to locate the drugs.

Proposed standard or target for best practice

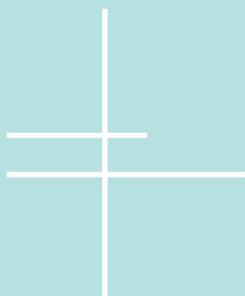
- D 100% of the available department asked.
- D 100% correlate with guidelines.
- D Less than a minute to locate the guidelines.
- D Less than a minute to locate the adrenaline.
- D Less than 3 minutes to locate Intralipid or Dantrolene and return.

Suggested data to be collected

As above.

Common reasons for failure to meet standard

- D The respondent saying that they do not need to know the location of equipment because other members of staff, e.g. ODAs/anaesthetic nurses do. This is unacceptable.
- D Core guidelines being in an unusable location, e.g. filed amongst other documents. Transient staff population.
- D Equipment being moved without informing staff.



Related audits

2.10 – Check and challenge: defibrillation

CPD and Curriculum mapping

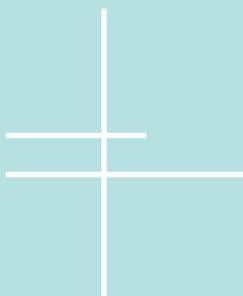
CPD matrix code: **IB01, 2A06**

Basic curriculum competence: **CI_BK_23**

Intermediate curriculum competence: **PR_IK_14**

References

- 1 Guidance for the provision of anaesthesia services for intra-operative care. *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/709>).



2.4

Secure custody of controlled drugs

Dr A Skinner

Why do this audit?

The supply, storage and use of controlled drugs (CDs) is governed by *The Misuse of Drugs Act 1971*, *The Misuse of Drugs Regulations 2001* and *Controlled Drugs (Supervision of Management and Use) Regulations 2006*. The legislation listed above forms part of English law, but minor differences in the devolved nations are unimportant for the purposes of this audit.

Compliance with these regulations reduces the risk of theft or abuse of controlled drugs by staff and others.

Hospitals should ensure compliance with these regulations without preventing timely administration of these drugs when indicated.

Best practice: research evidence or authoritative opinion

The following best practice points are taken from 'Safer management of controlled drugs: a guide to good practice in secondary care'.¹

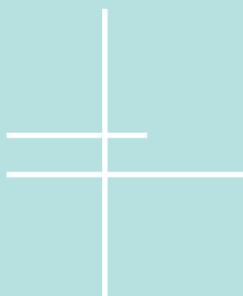
- D CDs should be secured in a cupboard meeting statutory requirements, locked other than for issue, return or replenishment.
- D Keys to this cupboard should be held by an appropriate staff member other than the person who will administer the drugs. Handing keys over for short absences should be avoided as far as possible and the key holder should be available in a timely way and immediately in recovery and similar areas. Secure arrangements should exist for custody of keys not in use and issue and return of keys.
- D A CD register should record doses issued, administered and destroyed against stock levels.
- D CD stock should be reconciled against the CD register regularly, at least at shift changes, ideally whenever the keys change hands.
- D Drugs should only be issued for the current patient, normally only when the patient is in the anaesthetic room or theatre.
- D CDs should only be issued against a signature in the CD register by a practitioner authorised to administer CDs and issued as close as practical to the time of administration.
- D CDs should remain under the direct supervision of this signatory until administered or destroyed.
- D CD doses recorded on the anaesthetic record or the medicines record should be congruent with the doses recorded in the CD register.
- D CD drug ampoules should not be split between different patients.

Suggested indicators

- D Appropriate arrangements for witnessed destruction should exist.
- D Existence of Standard Operating Procedures (SOPs) for custody, issue and destruction of CDs.
- D Availability of SOPs and staff knowledge.
- D Adherence to the SOPs.
- D Timely availability of CDs for administration to patients as indicated.

Proposed standard or target for best practice

- D All units should have SOPs for custody and issue of CDs which should be easily available and all appropriate staff should understand them.
- D Adherence to the SOPs.
- D Timely availability of CDs for administration to patients as indicated.



Suggested data to be collected

- D Reference set of SOPs.
- D Questioning of staff on SOPs.
- D Examination from time to time of CD registers, including examination of CD administration records for random named patients.
- D 'Check and challenge' at suitable points in an operating list or in the recovery areas to see issued drugs are signed for and suitably supervised by the signatory.
- D 'Check and challenge' at suitable points in an operating list or in the recovery areas to see that the key holder is appropriately available to issue CDs for administration.

Common reasons for failure to meet standard

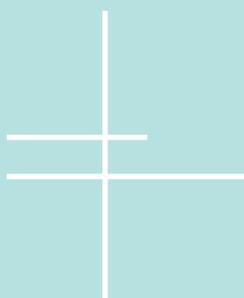
- D Failure of staff to recognise the personal risk of recreational use or the risk of theft.
- D Poor leadership around CD security and toleration of lax practice.
- D Informal growth of personal 'shortcut' practices in teams that work together regularly.
- D Perceived or real pressure to hasten progress through operating lists.
- D Low staffing levels leading to poor arrangements to cover staff breaks.

CPD and Curriculum mapping

Training curriculum competence: **CC_D8_07**

References

- 1 Safer management of controlled drugs: a guide to good practice in secondary care (England). DH, October 2007 (http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_079591.pdf).
- 2 The safe and secure handling of medicines: a team approach (the revised Duthie report). Royal Pharmaceutical Society March 2005 (<http://www.rpharms.com/support-pdfs/safsechandmeds.pdf>).



Deaths in hospital

Dr M Allen

2.5

Why do this audit?

Death is never the intended outcome from surgery. Whilst the risk of death is often run, surgery should only be undertaken in the hope and expectation of a reasonable chance of survival.

It is therefore appropriate to review any case where the outcome is death within a short period of surgery or another significant procedure.

Best practice: research evidence or authoritative opinion

In 1982 a joint venture between surgical and anaesthetic specialties named the Confidential Enquiry into Perioperative Deaths (CEPOD) was initiated, building on an earlier initiative by Lunn and Mushin.¹ This reviewed surgical and anaesthetic practice over one year in three regions. In 1988 the National Confidential Enquiry into Perioperative Deaths (NCEPOD) was established and its first report was published in 1990.

Since then numerous reports² published by NCEPOD have examined various patient sub-groups and procedures. These reports are widely cited as insightful and useful to identify shortcomings in and opportunities to improve patient care.

Although almost all departments take part in these national projects, participation does not mean there is necessarily local ownership or understanding of this highly undesirable outcome. Timely response to specific issues identified is only possible after systemic local examination of these cases. In addition, National Audits may only focus on selective groups of procedures or patient groups (cardiac surgery, maternal deaths for example) and miss local problems.

Reliable estimates are difficult to find but it appears that death within 30 days of an operation is the outcome for less than 1% of patients. This means that the actual task of reviewing all deaths is achievable and practical if the cases can be identified and other impediments overcome.

NCEPOD makes numerous resources available on its website.³

The Scottish Audit of Surgical Mortality (SASM) is a similar voluntary National Audit in Scotland with high participation rate.⁴ This has been run since 1994.

Suggested indicators

Systematic review of patients dying soon after surgery or other significant procedure should be undertaken. This should be led by an appropriate physician and undertaken in co-operation with surgeons or other clinicians deciding upon and carrying out the procedures.

Proposed standard or target for best practice

- D Different hospitals will find different approaches practical.
- D Ideally a robust data set of all patients dying within a specified time after a procedure should be generated and used to review all such patients. Modern information technology (IT) should allow this data to be extracted from the patient information system and theatre management systems. Generally patients dying out of hospital will be marked as deceased on a patient information system within 2–3 months by which time routine processes needing the case record should be concluded.
- D Failing this, patients dying in hospital after surgery could be found in other ways, for example through the mortuary or bereavement services.
- D If this is not practical then systematic review of specific high-risk groups should be undertaken by hand searching of records.

Suggested data to be collected

- D A rapid screening of case records should be undertaken for all deaths discovered.
- D Deaths which seem to the screening reviewer to merit further scrutiny for any reason should be examined by a larger team including all appropriate specialties and professions. Root cause analysis⁵ should be undertaken where significant shortcomings are identified.
- D Consider use of a structured mortality review as discussed in Section A.9.
- D Lessons learned should be collated and disseminated.

Common reasons for failure to meet standard

- D This is a complex project and different hospitals will arrive at different solutions.
- D Review of all deaths is not the impossibly large task it seems. The numbers are smaller than might be expected and the bulk will require no more scrutiny than an initial screening.
- D IT services will be needed if a robust data set is to be generated. Mortuary or bereavement services or other support will be needed if an IT solution is not forthcoming. Support for this project will be needed at high (board) level because of this.
- D Availability of notes of deceased patients is often poor.
- D Notes may not be available if the coroner is involved.

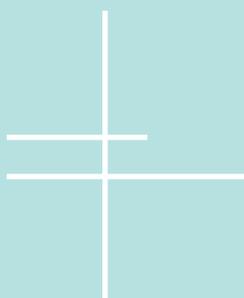
CPD and Curriculum mapping

CPD matrix code: I101

Training curriculum competence: CI_IK_03

References

- 1 Lunn JN, Mushin WW. Mortality associated with anaesthesia. *Nuffield Provincial Hospitals Trust*, London 1982.
- 2 NCEPOD reports (<http://www.ncepod.org.uk/publications.htm>).
- 3 NCEPOD resources (<http://www.ncepod.org.uk/toolkits.htm>).
- 4 Scottish Audit of Surgical Mortality (SASM) (<http://www.sasm.org.uk/index2.htm>).
- 5 Root cause analysis. *National Patient Safety Agency* (<http://www.nrls.npsa.nhs.uk/resources/collections/root-cause-analysis/>).



2.6

Compliance with the World Health Organization (WHO) Surgical Safety Checklist

Dr J Easby

Why do this audit?

In 2008 the World Health Organization (WHO) launched a global patient safety initiative entitled; 'Safe Surgery Saves Lives'.¹ Surgical teams trialled the use of a safety checklist to reduce the number of surgical deaths across the world. Following this initial study, which demonstrated a 36% reduction in post-operative complications,² the NPSA made the checklist a national requirement for hospitals within the UK.³

The checklist identifies a set of surgical standards that can be applied in all operating theatres and aids improved communication and leadership. The core document focuses on correct site surgery, haemorrhage, antibiotic prophylaxis, airway management and allergy.⁴ The NPSA and the NRLS adapted the document for the UK. The document is divided into three stage checks:

- D the 'Sign In' before the induction of anaesthesia
- D 'Time Out' before skin incision
- D 'Sign Out' before the patient leaves the operating room.³

Further checklists for maternity, cataract surgery and radiological procedures have been developed.³

Best practice: research evidence or authoritative opinion

Many trusts in conjunction with local clinical governance procedures have developed local checklists. Moreover, trusts have further adapted their checklists over time as national bodies (e.g. DOH/NPSA/NRLS/NICE) and the Royal Colleges have launched campaigns which seek to prioritise patient safety.

These campaigns include: Patient Safety First Campaign;⁵ Never Events;⁶ Stop Before You Block;⁷ The Productive Operating Theatre;⁸ Prevention And Treatment Of Surgical Site Infection;⁹ Thromboprophylaxis;¹⁰ and Hypothermia.¹¹

Suggested indicators

Audits could include the required NPSA/NRLS checks, or be tailored to suit individual goals, and focus on specific areas, for example NICE guidance.

Organisations are required to:

- D ensure an executive and a clinical lead are identified to drive the implementation of the surgical safety checklist within the organisation
- D ensure the checklist is completed for every patient undergoing a surgical procedure (including local anaesthesia)
- D ensure that the use of the checklist is entered in the clinical notes or electronic record by a registered member of the team.

Each patient checklist should be completed appropriately:

Sign In

- D % patients should confirm his/her identity and the site, procedure and consent should be checked?
- D % surgical sites marked prior to the point of anaesthesia?
- D % anaesthetic machine and medication check complete?
- D % Any risk factors including; allergy, difficult airway, aspiration or major blood loss should be communicated and appropriate plans put in place?

Time Out

- D % team members introduced themselves by name and role?
- D % surgeon, anaesthetist and registered practitioner verbally confirm: patient's name, procedure, site, position and communicate any critical events/concerns?
- D % care bundles for surgical site infection and thromboprophylaxis undertaken?

Sign Out

- D % the name of the procedure been recorded?
- D % confirmed that instruments, swabs and sharps counts are complete (or not applicable)?
- D % specimens been labelled appropriately?
- D % any equipment problems been identified that need to be addressed?
- D % key concerns for recovery and management of this patient are noted?

Proposed standard or target for best practice

Sign In

- D 100% of patients should confirm their identity and the site, procedure and consent should be checked.
- D 100% surgical sites marked prior to the point of anaesthesia (where deemed appropriate).
- D 100% anaesthetic machine and medication check complete.
- D 100% risk factors including; allergy, difficult airway, aspiration or major blood loss should be communicated and appropriate plans put in place.

Time Out

- D 100% team members introduced themselves by name and role.
- D 100% surgeon, anaesthetist and registered practitioner verbally confirm: patient's name, procedure, site, position and communicate any critical events/concerns.
- D 100% care bundles for surgical site infection and thromboprophylaxis undertaken.

Sign Out

- D 100% the name of the procedure been recorded.
- D 100% confirm that instruments, swabs and sharps counts are complete (or not applicable).
- D 100% specimens been labelled appropriately.
- D 100% any equipment problems been identified that need to be addressed.
- D 100% key concerns for recovery and management of this patient are noted.

Suggested data to be collected

As above

Common reasons for failure to meet standard

- D Time pressures.
- D Misinformation and failure of staff to embrace the project.
- D Lack of leadership driving the project.
- D Treating the checklist as a 'tick box' exercise.
- D Poor clinical governance communication.

CPD and Curriculum mapping

CPD matrix codes: No direct links

Training curriculum competence: **CC_D8_O3**

References

- 1 Safe surgery saves lives. *World Health Organisation* (<http://www.who.int/patientsafety/safesurgery/en/>).
- 2 Haynes A et al. A surgical safety checklist to reduce morbidity and mortality in a global population. *N Eng J Med* 2009;**360**(5):491–499.
- 3 WHO Surgical Safety Checklist – adapted for UK practice. National Reporting and Learning System (<http://www.nrls.npsa.nhs.uk/resources/clinical-specialty/surgery/?entryid45=59860>).
- 4 The surgical safety checklist. *World Health Organisation* (http://www.who.int/patientsafety/safesurgery/tools_resources/SSSL_Checklist_finalJuno8.pdf).
- 5 Patient Safety First Campaign (http://www.institute.nhs.uk/images/documents/SaferCare/Perioperative-1.1_17Sept08.pdf).
- 6 Never events (<http://www.nrls.npsa.nhs.uk/resources/collections/never-events/>).
- 7 Stop Before You Block (<http://www.rcoa.ac.uk/node/1470>).
- 8 The Productive Operating Theatre. NHS Institute for Innovation and Improvement (http://www.institute.nhs.uk/quality_and_value/productivity_series/the_productive_operating_theatre.html).
- 9 Prevention and treatment of surgical site infection. NICE Clinical Guideline 74. *NICE*, October 2008 (<http://www.nice.org.uk/CG74>).
- 10 Nice: Thromboprophylaxis: (<http://www.nice.org.uk/guidance/qualitystandards/vtprevention/vtprophylaxis.jsp>).
- 11 Perioperative hypothermia (inadvertent): the management of inadvertent perioperative hypothermia in adults. NICE Clinical Guideline 29. *NICE*, London 2008 (<http://www.nice.org.uk/CG65>).

2.7

Peri-operative temperature management

Dr M Harper

Why do this audit?

Temperature monitoring is essential during induction and maintenance of anaesthesia and should be available during recovery from surgery.¹ Both hypothermia and hyperthermia (including malignant hyperthermia) can complicate anaesthesia.^{2,3}

There are a number of reviews of the adverse effects of inadvertent peri-operative hypothermia (IPH) in the literature. Research has shown that IPH can lead to morbidity including prolonged recovery and hospital stay,⁴ increased blood loss and transfusion and an increased incidence of pressure sores,⁵ wound infections⁶ and morbid cardiac events.⁷ Reducing the incidence of IPH through appropriate peri-operative care can reduce the incidence of these complications.

In hyperthermia the margin between temperatures for normal cellular processes and cell damage from high temperature is very small compared with hypothermia. Hyperthermia can be corrected by cooling.

This audit reflects the recommendations of the NICE guideline 'Perioperative hypothermia (inadvertent): the management of inadvertent perioperative hypothermia in adults'.⁸

Best practice: research evidence or authoritative opinion

It has been shown that when mildly hypothermic volunteers shiver post-anaesthesia, they can regain heat with simple passive re-warming.⁹ However, the anaesthetised patient is unable to shiver and it is unpleasant for the patient in recovery where it can increase oxygen demand and worsen pain. This makes the provision of active warming essential in at-risk patients peri-operatively.

Patients are at higher risk of hypothermia and its consequences if any two of the following apply:

- D ASA grade 2–5 (the risk at 5 is greater than the risk at 2)
- D pre-operative temperature below 36.0°C
- D combined regional and general anaesthesia
- D intermediate or major surgery
- D at risk of cardiac complications
- D extremes of age.

Care should be taken to ensure that patients are adequately covered on the ward and during transfer to the operating theatres. Unless surgery is life or limb saving, patients should be actively warmed to a temperature 36.0°C or above before being anaesthetised. Otherwise, active warming should be initiated in the anaesthetic room for all procedures where the total operative time (from first anaesthetic intervention to arrival in recovery) is greater than 30 minutes. For total operative times less than 30 minutes, only higher risk patients should be actively warmed. All intravenous infusions of greater than 500 ml (and all blood products and irrigation fluids) should be warmed.

Body temperature is as vital a clinical sign as the pulse or blood pressure and should be recorded in the hour prior to the patient coming to theatre. It should be measured throughout the operation and in recovery until such time as it reaches 36.0°C. It should be recorded at the same frequency as other vital sign measurements for the first 24 post-operative hours.

NICE have recently published a guideline on the management of IPH which details appropriate peri-operative thermal management.⁸ Although it recommends the use of forced-air warming, there is some preliminary evidence that other forms of active warming may be equally effective^{10,11} and that combining two methods can improve outcome.¹² In fact NICE have now produced an additional new technology guidance on the use of the Inditherm warming mattress.¹³

The ultimate aim is for all patients to have a core temperature of 36.0 °C or above on arrival in the recovery room.

Suggested indicators

- D Frequency of temperature measurement.
- D Temperature < 36.0°C at any time.
- D Use of body and fluid warming techniques.

Proposed standard or target for best practice**Pre-operative phase**

- D 100% patients should have received written information regarding IPH pre-operatively.
- D 100% patients should have had their risk of IPH and its consequences assessed and documented pre-operatively.
- D 100% patients should have their temperature recorded in the hour prior to their arrival in theatres.

- D 100% patients should have a sheet and two blankets or a duvet for their transfer to theatres and be comfortably warm throughout.
- D 100% patients not scheduled for emergency surgery should have a temperature of 36.0°C or above before the start of anaesthesia.

Intra-operative phase

- D 100% of 'at-risk' patients should have active warming from the first anaesthetic intervention unless febrile.
- D 100% ambient theatre temperature at or above 21°C whilst active warming is being established.
- D 100% intravenous infusions greater than 500 ml and all blood products and irrigation fluids should be warmed.
- D 100% patients should have their temperature recorded every half-hour during anaesthesia.

Post-operative phase

- D **Key outcome: All patients admitted to recovery should have core body temperature of 36.0°C or above.**
- D 100% patients should have their temperature recorded every 15 minutes in recovery until they are ready for discharge to the ward.
- D 100% patients should have their temperature recorded on the ward at same frequency as other vital signs.
- D 100% patients should not be discharged from recovery until their temperature is above 36.0°C.
- D 100% patients whose temperature drops below 36.0°C in recovery or on the ward should receive active warming until this is rectified.

Suggested data to be collected

Refer to NICE Clinical Guideline 65.⁸ (see audit data collection form available on the RCoA website)

Common reasons for failure to meet standard

Failure to follow NICE guidelines in terms of warming patients. This stems in particular from patients not receiving warming from the first anaesthetic intervention to the start of surgery and failure to monitor patients' temperatures in the peri-operative period.

CPD and Curriculum mapping

Training curriculum: **PB_IK_36**

References

- 1 Recommendations for Standards of Monitoring during Anaesthesia and Recovery (4th Edition). AAGBI, London 2007 (<http://www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf>).
- 2 Sessler DI. Perioperative heat balance. *Anesthesiology* 2000;**92**:578–596.
- 3 Harper CM, McNicholas T, Gowrie-Mohan S. Maintaining perioperative normothermia. *BMJ* (Clinical research edn) 2003;**326**:721–722.
- 4 Lenhardt R et al. Mild intraoperative hypothermia prolongs postanesthetic recovery. *Anesthesiology* 1997;**87**:1318–1323.
- 5 Scott EM et al. Effects of warming therapy on pressure ulcers – a randomized trial. *AORN J* 2001;**73**:921–927, 9–33, 36–38.
- 6 Kurz A, Sessler DI, Lenhardt R. Perioperative normothermia to reduce the incidence of surgical-wound infection and shorten hospitalization. Study of Wound Infection and Temperature Group. *New Engl J Med* 1996;**334**:1209–1215.
- 7 Frank SM et al. Perioperative maintenance of normothermia reduces the incidence of morbid cardiac events. A randomized clinical trial. *J Am Med Assoc.* 1997;**277**:1127–1134.
- 8 Perioperative hypothermia (inadvertent): The management of inadvertent perioperative hypothermia in adults. NICE Clinical Guideline 65. NICE London 2008 (<http://www.nice.org.uk/CG65>).
- 9 Deacock S, Holdcroft A. Heat retention using passive systems during anaesthesia: comparison of two plastic wraps, one with reflective properties. *Br J Anaesth* 1997;**79**:766–769.
- 10 Wadhwa A et al. New Circulating-Water Devices Warm More Quickly than Forced-Air in Volunteers. *Anesth Analg* 2007;**105**:1681.
- 11 Harper CM. Is a warming mattress as effective as forced-air warming in preventing peri-operative hypothermia? *Anesthesiology* 2007;**107**:A92.
- 12 Wong PF et al. Randomized clinical trial of perioperative systemic warming in major elective abdominal surgery. *Br J Surg* 2007;**94**:421–426.
- 13 Inditherm patient warming mattress for the prevention of inadvertent hypothermia. NICE Medical Technologies Guidance – MTG7. NICE, August 2011 (<http://www.nice.org.uk/guidance/index.jsp?action=byID&o=13564>).

2.8

Awareness and general anaesthesia

Dr K Girgirah, Dr M Kinsella

Why do this audit?

Patient factual recall of during surgery under general anaesthesia is rare, occurring in 0.15% or less of cases.¹ It may be unpleasant and psychologically damaging, particularly if associated with sensation of pain during surgery.² It can be also financially costly. In the UK, awareness accounts for 0.7% of claims made to the NHS Litigation Authority with a mean settlement of £32,680 incurred.³ In the USA the respective figures from the American Society of Anesthesiologists Closed Claims Project are 2% of claims with a median of \$71,500 for compensation payments.⁴

Cases of brief awake paralysis may occur especially with drug substitution at the start of surgery. This situation is not included in this audit but please refer to audit 12.13: Complications and critical incident reporting.

Best practice: research evidence or authoritative opinion

Using the isolated forearm technique, response to command during surgery varies from 0% in patients anaesthetised with a volatile anaesthetic agent up to 22% having propofol-alfentanil TIVA (total intravenous anaesthesia).⁵ This responsiveness is usually not remembered. As the isolated forearm technique is not used routinely, we depend on the patient remembering a period of intra-operative consciousness in order to gauge the incidence.

Intra-operative awareness with recall (hereafter 'Awareness') during general anaesthesia has been found with an incidence of 0.1–0.2% in large population-based studies. Risk factors include:^{1,2,6,7}

- D Patient factors – paediatric, increased anaesthetic requirement (e.g. drug interaction, alcoholism), patients requiring intentionally light anaesthesia (e.g. major trauma, ASA 4 and 5, obstetric), history of awareness, difficult intubation
- D Type of surgery – e.g. cardiac surgery
- D Inadequate anaesthetic delivery – no volatile anaesthetic, vapouriser or TIVA pump malfunction, intravenous cannula problem during TIVA, lack of expired anaesthetic agent monitoring
- D Neuromuscular blockade.

The usefulness of depth of anaesthesia monitoring is debated. Bispectral index monitoring reduced awareness in high risk patients by 82%.⁸ In contrast, awareness occurred with the same frequency when a depth of anaesthesia monitored group was compared to one with protocol-driven anaesthesia administration using end tidal anaesthetic agent monitoring at 0.7 MAC.⁷

Suggested indicators

- D % of patients with recall of being conscious during surgery.
- D % of patients with recall of disturbing dreams.

Proposed standard or target for best practice

Awareness should occur:

- D < 0.2% during general surgery
- D < 0.4% at caesarean section
- D < 1% during cardiac surgery
- D < 1% during paediatric surgery.

Suggested data to be collected

- D Recommended audit frequency: continuous data collection as part of a quality assurance programme.⁹
- D Incidence of awareness, incidence of dreaming.
- D For cases of definite or probable awareness, the following should be documented.
 - ◆ Time since last case of awareness in the anaesthetic service.
 - ◆ ASA of patient and specific pre-existing patient conditions that may have influenced depth of anaesthesia, type of surgery, induction agent and dose, grade and difficulty of intubation, type of anaesthetic agent (inhalational or intravenous) and use of N₂O, use of muscle relaxant and other drugs (opioids, benzodiazepines).
 - ◆ Use of end tidal anaesthetic agent monitoring and correctly set audible alarm (if not used, details of breathing system, fresh gas flow and vapouriser settings).
 - ◆ Use of a depth of anaesthesia monitor.
 - ◆ Evidence of follow up.⁹

Common reasons for failure to meet standard

- D Perception of the need for a 'light' anaesthetic – patient factors or intra-operative anaesthetic problems; concomitant use of neuromuscular blockade.
- D TIVA equipment or administration problem.⁶
- D Type of surgery.
- D Lack of appropriate end tidal anaesthetic agent monitoring – non-compliance with AAGBI monitoring standards.

Related audits

12.13 – Complications and critical incident reporting.

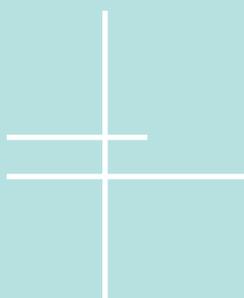
CPD and Curriculum mapping

CPD matrix codes: **1101, 1105**

Training curriculum competence: **PC_IK_22**

References

- 1 Sandin R, Enlund G, Samuelsson P, Lennmarken C. Awareness during anaesthesia: a prospective case study. *Lancet* 2000;**355**:707–711
- 2 Ghoneim MM et al. Awareness during anaesthesia: risk factors, causes and sequelae: a review of reported cases in the literature. *Anesth Analg* 2009;**108**:527–535.
- 3 Mihai R, Scott S, Cook TM. Litigation related to inadequate anaesthesia: an analysis of claims against the NHS in England 1995–2007. *Anaesthesia* 2009;**64**:829–835.
- 4 Kent CD. Awareness during general anaesthesia: ASA Closed Claims Database and Anaesthesia Awareness Registry. *ASA Newsletter* 2010;**74**(2):14–16 (http://depts.washington.edu/asaccp/ASA/Newsletters/asa74_2_14_16.shtml).
- 5 Russell IF, Wang M. Absence of memory for intra-operative information during surgery with total intravenous anaesthesia. *Br J Anaesth* 2001;**86**:196–202.
- 6 Guaranteeing Drug Delivery in Total Intravenous Anaesthesia (TIVA). Safty notice issued by the Safe Anaesthesia Liaison Group of the Royal College of Anaesthetists. *RCoA*, London October 2009 (<http://www.rcoa.ac.uk/node/623>).
- 7 Avidan MS et al. Anaesthesia awareness and the bispectral index. *N Engl J Med* 2008 Mar 13;**358**:1097–1108.
- 8 Myles PS, et al. Bispectral index monitoring to prevent awareness during anaesthesia: the B-Aware randomised controlled trial. *Lancet* 2004;**363**:1757–1763.
- 9 Pollard RJ et al. Intraoperative awareness in a regional medical system: a review of 3 years' data. *Anesthesiology* 2007;**106**:269–274.



2.9

Check and challenge: Defibrillation

Dr I Whitehead

Why do this audit?

All anaesthetists are expected to undertake specific training in resuscitation.¹

Regular updating of resuscitation knowledge is required; this may be by completing a resuscitation course, or by in-house teaching.

Consultant anaesthetists rarely attend cardiac arrest unless they have a critical care role; Anaesthetic trainees are often on resuscitation teams.

Knowledge of the location and contents of the 'resuscitation trolley' in the theatre environment is important.

Best practice: research evidence or authoritative opinion

Experts working under the guidance of the International Liaison Committee on Resuscitation (ILCOR) have recently reviewed the science surrounding resuscitation.²

Standards for the clinical practice and training in CPR were published in 2004 by the Royal College of Anaesthetists, Royal College of Physicians of London, Intensive Care Society, Resuscitation Council (UK).³ This document indicates that staff should undergo regular resuscitation training to a level appropriate for their expected clinical responsibilities and should be updated annually.

Suggested indicators

- D Knowledge of current RC(UK) ALS guidelines.⁴
- D Knowledge of location of resuscitation trolley.
- D Familiarity with defibrillator on resuscitation trolley and how to use it.
- D Date of last ALS update.

Proposed standard or target for best practice

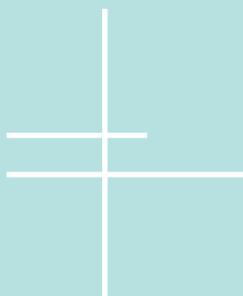
- D 100% of anaesthetists should know the current ALS guidelines.⁴
- D 100% of anaesthetists should know the location of the resuscitation trolleys in the theatre suite.
- D 100% of anaesthetists should be familiar with the layout and contents of the resuscitation trolley.
- D 100% of anaesthetists should know how to operate the defibrillator.
- D 100% anaesthetists should have had an ALS update within the last 12 months.

Suggested data to be collected

- D As above.
- D Reason for failure to attend annual resuscitation training.

Common reasons for failure to meet standard

- D Inadequate time/facilities for training.
- D Resuscitation training not deemed a priority.



Related audits

7.1 – Resuscitation training for anaesthetists
7.3 – Equipment checks

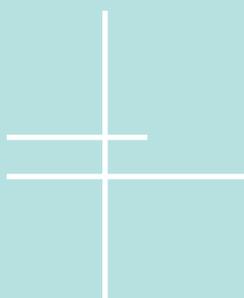
CPD and Curriculum mapping

CPD matrix codes: **1B01-04, 2A06, 2B05, 2B07, 3100**

Training curriculum competence: **RC_BK_17, RC_BS_01–08**

References

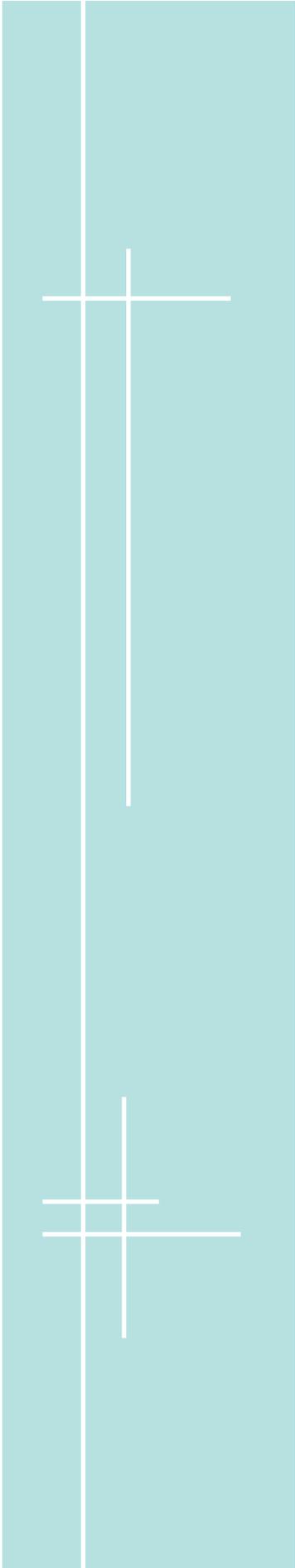
- 1 Guidelines on the provision of anaesthesia services for resuscitation. *RCoA* London 2009 (<http://www.rcoa.ac.uk/node/720>).
- 2 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. *Resuscitation* 2010;**81S**:e1–e25.
- 3 Cardiopulmonary Resuscitation. Standards for clinical practice and training. *RCoA, RCP(London), ICS and RC(UK)*, October 2004 (updated June 2008) (<http://www.rcoa.ac.uk/node/640>).
- 4 Resuscitation Council (UK) Guidelines 2010. *RC(UK)* London October 2010 (<http://www.resus.org.uk/pages/guide.htm>).





Section 3: Post-operative care

Edited by Dr Justin Phillips

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- 3.1 Recovery room staffing and monitoring provision
 - 3.2 Oxygen therapy
 - 3.3 Airway problems
 - 3.4 Hypertension/hypotension in recovery
 - 3.5 Post-operative nausea and vomiting (PONV)
 - 3.6 Record keeping
 - 3.7 Discharge protocols
 - 3.8 Unplanned admissions of elective surgical patients to HDU/ICU
 - 3.9 Post-operative visiting
 - 3.10 Handover of responsibility for patients in the post-anaesthetic care unit (PACU)
 - 3.11 Patient satisfaction with anaesthesia

3.1 Recovery room staffing and monitoring provision

Dr C J Peden, Dr M Lacey

Why do this audit?

Sufficient monitoring and care is of paramount importance for the safe outcome of patients in the immediate post-operative period.¹

For a significant number of patients, recovery from anaesthesia can be a life threatening process; appropriate resources, and prompt intervention by adequately trained staff in the post-anaesthetic care unit (PACU) is vital to ensure a safe outcome for patients.¹

Such standards should also be maintained in any area where anaesthesia is administered including obstetrics, cardiology, X-ray, dental, psychiatric and community hospitals.

Best practice: research evidence or authoritative opinion

Emergence from anaesthesia is potentially hazardous and patients require a high standard of observation until recovery is complete.² Recommendations from the Association of Anaesthetists of Great Britain and Ireland state that the PACU must have sufficient numbers of trained staff available throughout all operating hours, and if an emergency surgical service is run, the PACU must remain open 24 hours.³

No fewer than two nurses should be present if one patient is in the PACU. Any patient unable to maintain their own airway must be nursed continuously on a one to one basis by a nurse who has no other duties. Staffing should be sufficient so this is routine practice, even in peak periods.

A high standard of monitoring is required until the patient has fully recovered from anaesthesia. Clinical observations must be supplemented by pulse oximetry, non-invasive blood pressure (NIBP) and temperature monitoring; an ECG, nerve stimulator, and capnography must be immediately available should they be needed.⁴

Careful records should be maintained, with an increasing move to electronic recording.

Suggested indicators

- D % unconscious patients who are being cared for on a one to one basis.
- D % of staff present in recovery room trained to the recognised standard, audited at different times of day and night.
- D % intubated patients with capnography monitoring.
- D % conscious patients requiring critical care or critical care monitoring cared for in a ratio of one nurse to two patients. This might include patients who are vomiting, patients with uncontrolled pain, and patients who are potentially unstable including those recently admitted following regional anaesthesia.
- D % conscious stable patients who are being cared for by nurses not involved with the patients above, at a nurse to patient ratio that is acceptable in the opinion of the audit team and the nurse in charge of recovery. This might include patients who are ready to leave and are waiting transfer to the ward.
- D % patients admitted to recovery out-of-hours where there are two members of staff present in recovery until discharged.
- D % of patients having monitoring recorded electronically.
- D % of patients having their observations recorded with appropriate frequency.
- D % of patients monitored with non-invasive blood pressure, pulse oximetry and temperature.
- D Ease of attaining further monitoring equipment such as capnography and ECG.
- D Audit should be applied to all areas of the hospital where patients are recovering from anaesthesia, and the adequacy of facilities in outlying areas should be audited on a regular basis.
- D Critical incidents involving patients in PACU should be recorded and reviewed on a monthly basis, with learning points disseminated to all staff caring for anaesthetised patients, and patients recovering from anaesthesia.

Proposed standard or target for best practice

- D All patients recovering from a spinal, epidural or general anaesthesia should be cared for in a specifically designed recovery area with sufficient numbers of staff who are trained to a nationally agreed standard.²
- D 100% of patients recovering from general anaesthesia should be nursed on a one to one basis until fully recovered.

	<ul style="list-style-type: none"> D 100% of intubated patients monitored with capnography until extubated.² D 100% of patients admitted out-of-hours should have no fewer than two members of staff present at all times. D 100% of patients should have non-invasive blood pressure, pulse oximetry and temperature recordings. <p>The above should be met in any area of the hospital where a patient is recovering from anaesthesia.</p>
<p>Suggested data to be collected</p>	<ul style="list-style-type: none"> D Any proposed audit should be discussed with senior recovery room staff. A member of the audit team should visit PACU at random times of the day, particularly during busy periods. Patient dependency and staffing ratios for each patient should be recorded. D Any problems during periods of observation should be noted (e.g. delay in arrival of ward staff to collect patient, patient awaiting ICU bed following unexpected deterioration). D Periods where PACU has to be closed to new admissions due to inadequate staffing levels should be highlighted. D When the audit team visits PACU the following should be collected for each patient: <ul style="list-style-type: none"> ◆ Type of anaesthetic/surgery. ◆ ASA grade. ◆ Special considerations taken by the anaesthetist. ◆ Monitoring assessment completed. ◆ Monitoring in use compared to that indicated by audit. ◆ Frequency of observations and if appropriate. ◆ Reasons for lack of any monitoring or equipment availability.
<p>Common reasons for failure to meet standard</p>	<ul style="list-style-type: none"> D Inadequate staffing levels for the number of patients in recovery. D Lack of understanding by recovery staff of a patient's monitoring needs, and failure by the anaesthetist to communicate this. D Monitoring equipment not available. D Peripheral recovery areas inadequately staffed and resourced.
<p>CPD and Curriculum mapping</p>	<p>Training curriculum competence: PO_BK_02</p>
<p>References</p>	<ol style="list-style-type: none"> 1 Miller, R. Postoperative care. Textbook of Anaesthesia. <i>Churchill Livingstone</i>, 2000. 2 Recommendations for Standards of Monitoring during Anaesthesia and Recovery (4th Edition). <i>AAGBI</i>, London 2007 (http://www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf). 3 The anaesthesia team 3. <i>AAGBI</i>, London 2010 (http://www.aagbi.org/sites/default/files/anaesthesia_team_2010_0.pdf). 4 Association of Anaesthetists of Great Britain and Ireland Statement on use of Capnography outside operating theatres. <i>AAGBI</i>, London 2011 (http://www.aagbi.org/sites/default/files/Capnographyaagbi090711AJH%5B1%5D_0.pdf).



3.2

Oxygen therapy

Dr M Spivey, Dr J Phillips

Why do this audit?

Oxygen therapy is recognised as an important element of post-operative care both in the recovery room and after discharge to the ward.^{1,2,3,4,5} Difficulties in providing adequate oxygen therapy include patient not tolerating or complying with treatment,⁶ nursing mistakes, equipment failure and inadequate communication by the prescribing anaesthetist. It is important to establish the efficacy of this simple therapeutic procedure that may reduce post-operative morbidity and mortality.

Best practice: research evidence or authoritative opinion

Hypoxaemia occurs in the post-operative period both in the recovery room and after discharge of the patient to the ward;³ in NAP4, 45% of the reported patients who had post-operative complications developed profound hypoxia.⁷ Treatment by facemask oxygen is effective in treating hypoxaemia in many cases in the early post-operative period.⁷ Prescription of oxygen can decrease the incidence of hypoxaemia after recovery room discharge. This is important in high-risk patient groups.⁴ The effectiveness of this depends on patient compliance,⁶ nursing care, equipment availability and the prescribing anaesthetist. The 2008 BTS guidelines on oxygen⁸ explicitly state that they do not apply to the post-operative period, but they promote a targeted use of oxygen with monitoring of oxygen saturations and have brought about a widespread change to practice.

Suggested indicators

- D % patients receiving oxygen in the recovery room as described in local guidelines.
- D % patients who, in the opinion of the auditors, might benefit from oxygen therapy on the post-operative ward, who are prescribed it.
- D Of patients who have been prescribed oxygen to be used on the ward post-operatively, % who are using it correctly when visited by the audit team.

Proposed standard or target for best practice

- D 100% patients in recovery should receive oxygen therapy as above.
- D 100% patients who the auditors feel would have benefited from the use of oxygen on the post-operative ward should have been prescribed it.
- D 100% of patients prescribed oxygen should be using it correctly when visited by the audit team.

Suggested data to be collected

- D A policy for the use of oxygen in the recovery room should exist before this audit can be performed. This will require discussion with fellow anaesthetists. Data to collect includes operation, anaesthetic technique, oxygen used before and after waking, criteria for discontinuing oxygen in recovery.
- D Looking for patients who might have benefited from oxygen therapy on the ward may be difficult. A list of indications should be drawn up.¹ The notes of all patients who pass through recovery in a day may be examined. Alternatively a group where pathology is more likely to be found may be chosen. For example:
 - ◆ all ASA 3, 4 or 5 patients;
 - ◆ all patients on urology lists;
 - ◆ all patients having major joint replacements or all vascular surgery patients.
- D If oxygen is prescribed, post recovery room data to be collected will include prescription details, indication, compliance with prescription when ward is visited, reasons for non-compliance.

Common reasons for failure to meet standard

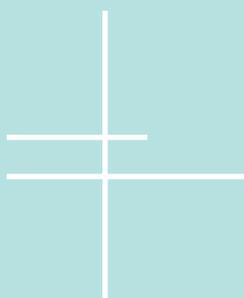
- D Poor patient compliance and failure by anaesthetist to explain importance.
- D Failure of nurses to understand the value of oxygen.
- D Equipment failure.
- D Poor communication by prescribing anaesthetist.

CPD and Curriculum mapping

Training curriculum competences: PO_BK_05, AM_BK_08

References

- 1 Powell JF, Menon DK, Jones JG. The effects of hypoxaemia and recommendations for postoperative oxygen therapy. *Anaesthesia* 1996;**51**:769–772.
- 2 Roe PG, Jones JG. Causes of oxyhaemoglobin saturation instability in the postoperative period. *Br J Anaesth* 1993;**71**:481–487.
- 3 Reeder MK et al. Postoperative hypoxaemia after major abdominal vascular surgery. *Br J Anaesth* 1992;**68**:23–26.
- 4 Rosenberg J et al. Effect of oxygen therapy on late postoperative episodic and constant hypoxaemia. *Br J Anaesth* 1992;**68**:18–22.
- 5 Canet J, Ricos M, Vidal F. Early postoperative arterial oxygen desaturation. Determining factors and response to oxygen therapy. *Anesth Analg* 1990;**69**:890–895.
- 6 Nolan KM et al. Video surveillance of oxygen administration by mask in postoperative patients. *Br J Anaesth* 1992;**69**:194–196.
- 7 Cook TM, Woodall N, Frerk C. Fourth National Audit Project. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: anaesthesia. *Br J Anaesth* 2011;**106**:617–631.
- 8 BTS guideline for emergency oxygen use in adult patients. *Thorax* 2008;**63**:vi1-vi68.



3-3

Airway problems

Dr M Spivey, Dr J Phillips

Why do this audit?

Airway problems such as obstruction occur in the immediate post-operative period and are an immediate threat to patient safety.¹ This may be due to laryngospasm, persisting relaxation of airway muscles, soft tissue oedema, haematoma, vocal cord dysfunction or foreign body. Vigilant patient monitoring during the post-anaesthesia period is important firstly to identify airway problems and secondly to initiate effective management.²

Best practice: research evidence or authoritative opinion

Airway problems are the second most frequent complications after nausea and vomiting. In a large prospective study of 18,473 post-anaesthesia patients, 6.9% required airway support.²

Most interventions were simple and involved manual support of the jaw or insertion of an oral or nasal airway. Only 0.02% of patients needed re-intubation. Other studies show an incidence of airway problems of 2–7%^{3,4,5,6} with a higher incidence following endotracheal intubation compared to the laryngeal mask airway or facemask.⁶ In NAP4, 28% of major airway complications occurred at emergence or in the recovery room. In all of these, airway obstruction was the cause and in 50% there was a delay in the diagnosis.⁷

Suggested indicators

- D Desaturation requiring airway intervention or medication (including O₂ with reservoir).
- D % of patients re-intubated in the recovery room.

Proposed standard or target for best practice

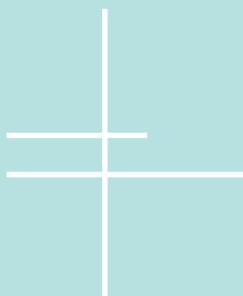
- D < 5% post-operative patients in the recovery room should require airway support by the recovery nurse.
- D < 1% of patients should require re-intubation.

Suggested data to be collected

- D Anaesthetist, ASA status, type of operation and anaesthesia.
- D Conscious state on admission to recovery.
- D Airway problem.
- D Intervention and time of intervention needed.
- D Outcome.

Common reasons for failure to meet standard

- D Patients admitted to recovery ward too early.
- D Surgical or anaesthetic complications.



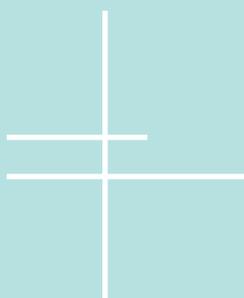
CPD and Curriculum mapping

CPD matrix codes: IC01, IC02, 3A01

Training curriculum competences: PO_BK_04, AM_BS_07, AM_BS_12

References

- 1 Miller KA, Harkin CP, Bailey PL. Postoperative tracheal extubation. *Anesth Analg* 1995;**80**:149–172.
- 2 Hines R et al. Complications occurring in the postanesthesia care unit: a survey. *Anesth Analg* 1992;**74**:503–509.
- 3 Beard K, Jack H, Walker AM. Adverse respiratory events occurring in the recovery room. *Anesthesiology* 1986;**64**:269–272.
- 4 Moller J, Wittrop M, Johansen S. Hypoxemia in the postanesthesia care unit. An observer study. *Anesthesiology* 1990;**73**:890–895.
- 5 Asai T, Koga K, Vaughn RS. Respiratory complications associated with tracheal intubation and extubation. *Br J Anaesth* 1998;**80**:767–775.
- 6 Abdy S. An audit of airway problems in the recovery room. *Anaesthesia* 1999;**54**:372–392.
- 7 Cook TM, Woodall N, Frerk C; Fourth National Audit Project. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: anaesthesia. *Br J Anaesth* 2011;**106**:617–631.



3.4

Hypertension/hypotension in recovery

Dr M Davies

Why do this audit?

Extremes of blood pressure either hypertension or hypotension are associated with adverse outcomes. There are levels of blood pressure and associated co-morbidities that the majority of authors agree require treatment pre-operatively. No elective patient should be operated upon with untreated grade 3 hypertension, i.e. systolic > 180 and diastolic > 110 ^{1,2} or inadequately treated hypertension associated with end organ dysfunction, e.g. the presence of coronary or cerebrovascular disease, impairment of renal function, signs of left ventricular hypertrophy, or heart failure.³ In addition, all causes of secondary hypertension should be investigated and treated before elective surgery e.g. pheochromocytoma or hyperaldosteronism.⁴

Severe peri-operative hypertension is a major threat to hypertensive patients, especially increases of blood pressure in excess of about 20% of the pre-operative value. Consequences of pressure surges include bleeding from vascular suture lines, cerebrovascular haemorrhage, and myocardial ischaemia or infarction. The mortality rate of such events may be as high as 50%.⁵

Post-operative hypotension leading to end organ dysfunction, e.g. decreased urine output < 0.5 mls/kg/hr, decreased level of consciousness, myocardial ischaemia, capillary refill > 2 seconds needs immediate management with fluid +/- vasopressors/inotropes.⁶

Best practice: research evidence or authoritative opinion

- D No patients with untreated grade 3 hypertension, untreated secondary hypertension or inadequately treated hypertension and end organ dysfunction should proceed to elective surgery.
- D Grade 3 hypertensive patients receiving urgent or emergency surgery should not have a rise in pressure of greater than 20% in the peri-operative and post-operative period.
- D No hypertensive patients with end organ dysfunction should have hypotension left untreated.

Suggested indicators

- D % patients with blood pressure recorded pre-operatively.
- D % patients receiving elective surgery despite contraindications.
- D % grade 3 hypertensive patients having urgent or emergency surgery with BP rise $> 20\%$.
- D % hypertensive patients with end organ dysfunction with hypotensive episode not treated within 10 minutes.

Proposed standard or target for best practice

- D 100% patients have their blood pressure recorded pre-operatively.
- D 100% patients have surgery appropriately deferred if they have a hypertensive contraindication.
- D 100% grade 3 hypertensive patients having urgent or emergency surgery do not have a blood pressure rise $> 20\%$.
- D 100% hypotensive patients with end organ dysfunction are treated within 10 minutes.

Suggested data to be collected

- D Pre-operative BP (+/- end organ dysfunction).
- D Elective or emergency classification and operation.
- D Age.
- D Treatment for hypertension prescribed (Yes/No).
- D Time to treatment of hypotension with end organ dysfunction.
- D Grade 3 hypertensive patients having urgent or emergency surgery with hypertensive episodes $> 20\%$ (% of patients).

Common reasons for failure to meet standard

- D Ignorance of standards.
- D Lack of departmental guideline.
- D Inadequate pre-operative assessment.
- D Failure to invasively monitor high risk patients.

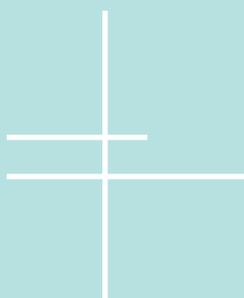
CPD and Curriculum mapping

CPD matrix codes: **2A03, 2A06**

Training curriculum competence: **PO_BK_10**

References

- 1 Eagle KA et al. ACC/AHA guideline update for perioperative cardiovascular evaluation for noncardiac surgery—executive summary. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Update the 1996 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery). *Circulation* 2002;**105**:1257–1267.
- 2 Goldman L, Caldera DL. Risks of general anesthesia and elective operation in the hypertensive patient. *Anesthesiology* 1979;**50**:285–292.
- 3 Nahar T, Devereux RB. Hypertension, cardiac hypertrophy and the effects of anaesthesia. In: Baillière's Clinical Anaesthesiology. *Baillière Tindall*, London 1997;**11**:675–703.
- 4 Howell SJ, Sear JW, Foëx P. Review: hypertension, hypertensive heart disease and perioperative cardiac risk. *Br J Anaesth* 2004;**92**:570–583.
- 5 Foëx P, Sear JW. The surgical hypertensive patient *Contin Educ Anaesth Crit Care Pain* 2004;**4**(5): 139–143.
- 6 Dobbs RE, Parvizi J, Lewallen DG. Perioperative Morbidity and 30-Day Mortality After Intertrochanteric Hip Fractures Treated by Internal Fixation or Arthroplasty. *J Arthroplasty* 2005;**20**(8):963–966.



3-5

Post-operative nausea and vomiting (PONV)

Dr A Kumar, Dr W Brampton

Why do this audit?

PONV remains an unpleasant side effect of anaesthesia and surgery. It unfavourably influences the degree of patient satisfaction and is rated high among anaesthesia outcomes that patients want to avoid.¹ Despite continued attempts at addressing this, PONV remains a difficult problem to prevent. It continues to contribute to patient discomfort and increased resource utilisation. Prevention and management of PONV is one of the components of an enhanced recovery package.

Best practice: research evidence or authoritative opinion

The incidence of PONV depends upon case-mix. Overall, after a general anaesthetic using inhalational agents and opioids without prophylactic anti-emetics, it is around 30%.² Some patients have a higher risk of developing PONV and scoring systems have been developed to estimate risk.^{3,4} Once PONV has developed, a sub-group of patients will suffer 'clinically important' PONV with significantly impaired recovery.⁵ This can be simplified, for audit purposes, to those with a visual analogue severity of nausea score of ≥ 75 mm on a 100mm scale (VAS) or vomiting ≥ 3 times.

It has been demonstrated that targeted administration of PONV prophylaxis to those with increased risk of PONV reduces its incidence.^{6,7} Moderate to high risk patients for PONV are targeted for prophylactic anti-emetics with the largest number of agents given to those at highest risk. However, compliance of anaesthetists to these guidelines remains low.⁸

An alternative strategy would be to administer PONV prophylaxis to all patients irrespective of their risk for developing PONV.⁹

PONV is multifactorial in origin. A multimodal approach that includes pharmacological and non-pharmacological interventions has been found to be effective.^{2,10}

In addition P6 acupuncture has been demonstrated to be of benefit¹¹ as is the use of propofol for anaesthetic maintenance and avoidance of nitrous oxide.^{10,12}

Suggested indicators

- D % patients should be assessed for risk of PONV.
- D % patients receiving PONV prophylaxis as per local guidelines.
- D % patients receiving treatment for PONV as per local guidelines.

Proposed standard or target for best practice

- D A 100% compliance with each indicator is ideal but impossible to achieve. The aim should be to measure the baseline levels of compliance of standards. Then implement locally agreed changes aimed at improvement using PDSA cycle methodology. Compliance should improve towards 100%.
- D Incidence of PONV should be lower than predicted by risk scoring.
- D Incidence of 'clinically important' PONV⁵ should be < 20% of all PONV patients. The incidence of PONV should decrease as compliance with the above standards increase.

Suggested data to be collected

- D Has a pre-operative PONV risk assessment been performed?
- D Were intra-operative anti-emetics given in accordance with local guidelines?
- D What is expected incidence of PONV during the first 24 hrs based upon risk score?
- D What is actual incidence of PONV during the first 24 hrs?
- D How severe was nausea on 100 mm VAS (≥ 75 mm is 'clinically important')?
- D How many times did patient vomit (≥ 3 is 'clinically important')?
- D What anti-emetic treatment was given in the post-operative period?
- D Did the patient feel PONV was well or badly managed and why?
- D Do the anaesthetists know what the PONV guidelines recommend?
- D Do the anaesthetists know the local PONV incidence?

Common reasons for failure to meet standard

Poor compliance with existing PONV guidelines. Reasons including:^{13,14}

- D absence or poor dissemination of local guideline on PONV prophylaxis
- D overly complex guideline that is difficult to apply
- D no individual or team with an interest in reducing incidence of PONV
- D complacency or lack of knowledge amongst anaesthetists about PONV, its impact on patient satisfaction and upon resource utilisation.

Related audits

Delivering enhanced recovery: helping patients to get better after surgery. DH, 2010

(www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_119382.pdf)

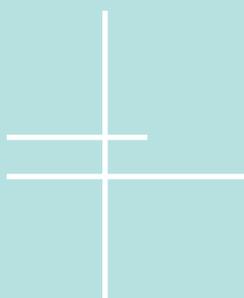
CPD and Curriculum mapping

CPD matrix codes: **IA02, II05, 2A03**

Training curriculum competence: **PO_BS_08**

References

- 1 Myles PS et al. Patient satisfaction after anaesthesia and surgery: results of a prospective survey of 10,811 patients. *Br J Anaesth* 2000;**84**(1):6–10.
- 2 Kranke P, Eberhart LH. Possibilities and limitations in the pharmacological management of postoperative nausea and vomiting. *Eur J Anaesthesiol* 2011;**28**(11):758–765.
- 3 Van Den Bosch JE et al. Assessing the applicability of scoring systems for predicting postoperative nausea and vomiting. *Anaesthesia* 2005;**60**(4):323–331.
- 4 Eberhart LH et al. Evaluation of three risk scores to predict postoperative nausea and vomiting. *Acta Anaesthesiol Scand* 2000;**44**(4):480–488.
- 5 Wengritzky R et al. Development and validation of a postoperative nausea and vomiting intensity scale. *Br J Anaesth* 2010;**104**(2):158–166.
- 6 Pierre S. Risk scores for predicting postoperative nausea and vomiting are clinically useful tools and should be used in every patient: Pro – ‘don’t throw the baby out with the bathwater’. *Eur J Anaesthesiol* 2011;**28**(3):160–163.
- 7 Apfel CC, Roewer N. Risk Assessment of Postoperative Nausea and Vomiting. *Int Anesthesiol Clin* 2003;**41**(4):13–32.
- 8 Kooij FO et al. Decision support increases guideline adherence for prescribing postoperative nausea and vomiting prophylaxis. *Anesth Analg* 2008;**106**(3):893–898.
- 9 Eberhart LH. Risk scores for predicting postoperative nausea and vomiting are clinically useful tools and should be used in every patient: Con – ‘life is really simple, but we insist on making it complicated’. *Eur J Anaesthesiol* 2011;**28**(3):155–159.
- 10 Apfel CC et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. *N Engl J Med* 2004;**350**(24):2441–2451.
- 11 Lee A, Fan Lawrence LTY. Stimulation of the wrist acupuncture point P6 for preventing postoperative nausea and vomiting. Cochrane Database of Systematic Reviews 2009, Issue 2. Art No: CD003281.
- 12 Fernández-Guisasola J et al. Association between nitrous oxide and the incidence of postoperative nausea and vomiting in adults: a systematic review and meta-analysis. *Anaesthesia* 2010;**65**(4):379–387.
- 13 Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients’ care. *Lancet* 2003;**362**(9391):1225–1230.
- 14 Frenzel JC, Kee SS, Ensor JE, Riedel BJ, Ruiz JR. Ongoing provision of individual clinician performance data improves practice behavior. *Anesth Analg* 2010;**111**(2):515–519.



3.6

Record keeping

Dr A Kennedy, Dr C Oliver

Why do this audit?

Good record keeping of the post-operative period is important as it enables effective communication between healthcare professionals, ensuring post-operative orders and prescriptions are followed.

Medical records are not only used for primary, but also for secondary clinical purposes including reporting the activity of hospital services, monitoring the performance of hospitals and research.¹

Poor medical records are not acceptable and can compromise medical care.² They also expose the hospital to an increased risk if there is litigation,² as documentation may be relied upon in medico-legal cases or for diagnoses of complications.

The quality of record keeping is often considered to reflect quality of care.³ As careful monitoring during the post-operative period is essential and you should keep paper or electronic audit trails to demonstrate good management decision-making.⁴

Best practice: research evidence or authoritative opinion

The Health Informatics Unit at the Royal College of Physicians, London, reviewed standards published by the medical Royal Colleges, specialist societies, GMC, medical defence organisations, and in the research literature.

Following wide consultation with the profession, medical records should comply with the generic standards of medical record-keeping published in 'A Clinicians Guide to Record Standards – Part 2: Standards for the structure and content of medical records and communications when patients are admitted to hospital'.⁵

The General Medical Council states: 'You must keep clear, accurate, legible records... and these records must be made at the same time, or soon afterwards.'⁴

The Medical Protection Society states: 'Records that secure continuity of care will be adequate for evidential purposes, in the event of a complaint, claim or disciplinary action. Abbreviations must be unambiguous and universally understood. Any alteration to both written and electronic records should be immediately apparent to avoid any accusation that there has been an attempt to mislead or deceive.'⁶

Suggested indicators

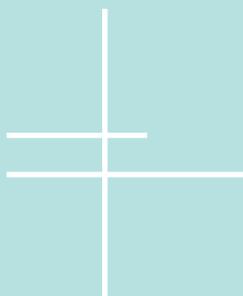
- D % of patients with complete medical record available at all times.
- D % of patient's records with every page that includes patient's name, identification number (NHS number) and location in the hospital.
- D % of records which have a standardised structure and layout.
- D % of records which are viewable in chronological order and reflect continuum of patient care.
- D % of records where every entry is dated, timed (24-hour clock), legible and signed by the person making the entry. The name and designation of the person making the entry should be legibly printed against their signature.

Proposed standard or target for best practice

- D All the above indicators should be true for 100% of patients or records and meet local and national standards on record keeping.

Suggested data to be collected

- D Retrospective audit comparing post-operative patient record keeping with local and national standards.
- D Special attention should be paid to cases which returned to theatre, required unplanned post-operative HDU/ICU admission from recovery or where complications arose.



Common reasons for failure to meet standard

- D Missing medical records.
- D Illegibility of handwritten record and illegibility of signature.
- D Failure to date and sign records.
- D Inaccurate recording of information and insufficient detail.
- D Lack of equipment in recovery (e.g. for invasive monitoring).
- D Inadequate documentation of post-operative instructions from anaesthetist or surgeon.

Related audits

- 2.4 Anaesthetic records
- 3.1 Recovery room staffing and monitoring provision

CPD and Curriculum mapping

CPD matrix codes: **IG01**

Training curriculum competence: **IO_BS_06**

References

- 1 Carpenter I, et al. Medical records and record-keeping standards. *Clin Med* Aug;7(4):328–331.
- 2 Callum KG et al. The 2002 Report of the National Confidential Enquiry into Perioperative Deaths. Section 5 – Postoperative care. *NCEPOD*, London 2002 (<http://www.ncepod.org.uk/pdf/2002/02full.pdf>).
- 3 Utting JE. Pitfalls in anaesthetic practice. *Br J Anaesth* 1987;59:888–890.
- 4 The General Medical Council. Management for Doctors – Keeping Records. *GMC*, London 2006 (http://www.gmc-uk.org/guidance/ethical_guidance/management_for_doctors.asp).
- 5 Health Informatics Department, Royal College of Physicians. A Clinicians Guide to Record Standards – Part 2: Standards for the structure and content of medical records and communications when patients are admitted to hospital. *Academy of Medical Royal Colleges*, London October 2008 (http://www.rcplondon.ac.uk/sites/default/files/clinicians-guide-part-2-standards_o.pdf)
- 6 The Medical Protection Society. Medical Records – An MPS Guide. *MPS* June 2011 (<http://www.medicalprotection.org/uk/booklets/MPS-guide-to-medical-records>).

3-7

Discharge protocols

Dr R E Murphy

Why do this audit?

Discharge from recovery should occur in a timely fashion and to an appropriate destination in order to maintain patient safety and comfort whilst maximising efficient use of services. Discharge protocols are used to assess the fitness of patients to return to the ward or other clinical areas. Regular revision and audit of standards of care, guidelines and protocols are essential in the development and improvement of post-anaesthetic patient care.¹

Best practice: research evidence or authoritative opinion

The importance of post-anaesthesia recovery facilities in ensuring patient safety has been stressed by the Royal College of Anaesthetists (RCoA),¹ the Association of Anaesthetists (AAGBI),² and in reports from the National Confidential Enquiry into Perioperative Deaths.³

The RCoA and AAGBI advise that agreed criteria for discharge of patients from the recovery room to the ward should be in place.^{1,2}

Following a discharge, protocol can assist the nurses (and anaesthetists) to ensure patient safety, comfort (freedom from pain and emesis) and adequacy of documentation. Furthermore, following discharge protocols may improve efficiency of the unit with appropriate and timely discharges; discharge criteria based on the Aldrete's scoring system⁴ have been shown to be associated with a significantly reduced post-anaesthesia care unit (PACU) length of stay in comparison with time-based criteria.⁵

Suggested indicators

- D % patients discharged from recovery to a general ward satisfying post-anaesthesia discharge criteria.
- D % patients not meeting criteria who are reviewed by an anaesthetist prior to discharge.
- D % patients who do not satisfy the criteria who are discharged to a safe destination in the opinion of the auditor: This would usually be an HDU or ICU, but may be a general ward in some circumstances (e.g. a patient with poorly controlled nausea or mild pain despite best efforts).
- D Adequate documentation of fitness for discharge and ongoing care requirements.
- D Time spent in the post-anaesthetic care unit (PACU) despite the patient fulfilling the discharge protocol criteria.

Proposed standard or target for best practice

- D PACU should have a protocol for discharge from recovery.
- D 100% of staff should be aware of and familiar with the discharge protocol.
- D 100% of patients should be assessed using the protocol.
- D 100% of patients meeting the discharge protocol requirements should be discharged from PACU in a timely manner.
- D 100% of patients failing to meet discharge protocol requirements should be reviewed by an anaesthetist.
- D 100% of patients failing to meet discharge protocol should be discharged to an appropriate, safe destination.

Suggested data to be collected

- D Presence of discharge protocol.
- D Staff awareness and familiarity with the locally agreed discharge protocol.
- D Recovery room length of stay.
- D Discharge destination and presence of ongoing plan in notes.
- D Compliance with discharge protocol.
- D Reason(s) for failing to meet discharge criteria.
- D Adequacy of completion of local discharge protocol documentation.
- D Time spent in PACU post patient satisfying discharge protocol criteria.
- D Communication with anaesthetist in PACU.

(Factors which may affect discharge of patients: patient's age and ASA status, procedure, anaesthetist and grade, type of anaesthetic including regional blocks, pain and nausea scores on arrival and discharge from PACU, recovery nurse or person taking responsibility for discharge.)

Common reasons for failure to meet standard

- D Persistent pain.
- D Persistent PONV.
- D Post-PACU destination unable to accept patient in a timely fashion despite patient meeting discharge protocol criteria.
- D Lack of HDU/ICU bed.

Related audits

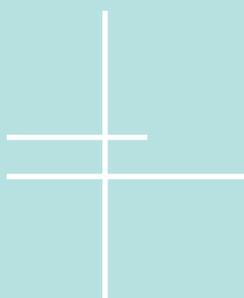
- 3.1 – Recovery room staffing and monitoring provision.
- 3.5 – Post-operative nausea and vomiting (PONV).
- 3.6 – Record keeping.
- 3.8 – Unplanned admission of elective surgical patients to HDU/ICU.
- 11.3 – Pain management in the recovery room.

CPD and Curriculum mapping

Training curriculum competence: PO_BK_13, PO_BS_11

References

- 1 Guidance on the provision of anaesthetic services for postoperative care. RCoA, London 2004 (<http://www.rcoa.ac.uk/node/710>).
- 2 Immediate postanaesthetic recovery. AAGBI, London 2002 (<http://www.aagbi.org/pdf/Postanaes2002.pdf>).
- 3 Campling EA et al. The report of the National Confidential Enquiry into Perioperative Deaths 1993/1994. NCEPOD, London 1996 (<http://www.ncepod.org.uk/>).
- 4 Aldrete JA, Kroulik D. A postoperative recovery score. *Anesth Analg* 1970;49:924–933.
- 5 Troung L, Moran JL, Blum P. Post anaesthesia care unit discharge: a clinical scoring system versus traditional time-based criteria. *Anaesth Intens Care* 2004;32(1):33–42.



3.8

Unplanned admissions of elective surgical patients to HDU/ICU

Dr J F Silsby

Why do this audit?

Anticipation of the requirement for post-operative admission to a critical care area well in advance of surgery helps with resource allocation and with the planning of staffing levels. Unplanned admissions can have a significant impact on the efficient running of a critical care area and may even prompt premature discharge or non-clinical transfer of other patients. Elective surgery should be postponed if the appropriate level of post-operative care is unlikely to be available.

Best practice: research evidence or authoritative opinion

With adequate pre-operative assessment, most post-operative admissions should be anticipated well in advance. An accurate and structured pre-operative consultation should identify the vast majority of patients who will require intensive care.^{1,2} There is little in the literature on the % of elective surgical procedures which result in unplanned HDU/ICU admission. However, we do know from the ICNARC database (December 1995 to July 2005)³ that unplanned surgical admissions after elective surgery comprised 30.8% of HDU/ICU surgical admissions. More recent data from the ICNARC database (1 January 2010 to 31 December 2010)⁴ suggests nationally there has been improvement, with unplanned admissions following elective surgery now comprising 10.7% of surgical admissions.

Suggested indicators

D % admissions to ICU or HDU following elective surgery which are unplanned.

Proposed standard or target for best practice

The number of unplanned admissions should be low. Less than 5% could be taken as a gold standard. Units should audit their own current data before setting a realistic goal. The key would be to see improvement in a unit's starting point.

Suggested data to be collected

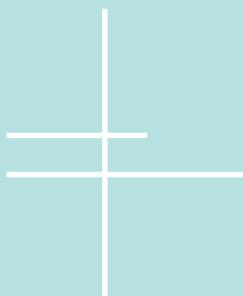
- D Primary reason for unplanned admission (surgical complications/complexity or anaesthetic complications/complexity)
- D Grade of senior surgeon/anaesthetist involved.
- D Time spent in PACU (if any) before HDU admission.
- D Adequacy of pre-operative assessment. Percentage of patients who were reviewed in (preferably) anaesthetist-led pre-operative assessment clinics.
- D Sequelae of unplanned admission; cancellation of other elective cases, premature discharge of HDU patients, non-clinical transfers.⁵

Common reasons for failure to meet standard

- D Inadequate pre-operative assessment by inexperienced and/or junior staff.
- D Surgical failure to communicate or anticipate the extent of the required surgery.
- D Anaesthetist failing to alert ICU/HDU after pre-operative assessment.
- D Surgical or anaesthetic problems resulting from inexperience or avoidable mishap.
- D Unavoidable issues relating to complexity of case (anaesthetic or surgical)

Related audits

4.9 – ICU/HDU admission after emergency surgery.

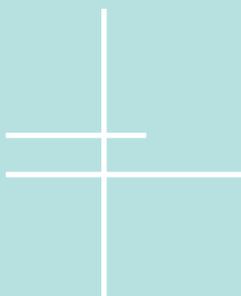


CPD and Curriculum mapping

CPD matrix codes: 2A03, 2C01, 2C03, 2C04, 2C07, 3C00

References

- 1 Varon AJ et al. Preoperative intensive care unit consultations: accurate and effective. *Crit Care Med* 1993;**21**(2):234–239.
- 2 Forrest JB et al. Multi-centre study of General Anesthesia. III. Predictors of Severe Perioperative Adverse Outcomes. *Anesthesiology* 1992;**76**:3–15.
- 3 ICNARC Case Program Database. *ICNARC*, London (<http://www.icnarc.org>).
- 4 Personal request. *ICNARC*, London (<http://www.icnarc.org>).
- 5 Goldfrad C, Rowan K. Consequences of discharges from intensive care at night. *Lancet* 2000;**355**:1138–1142.



3-9

Post-operative visiting

Dr G K Simpson, Dr M B Walburn

Why do this audit?

Post-operative care is an important aspect of an anaesthetist's role,¹ although it has not been previously well defined beyond the immediate post-operative period,² despite being a legal requirement in some countries.³ Therefore post-operative visiting of patients on the ward may be highly variable and depend on the individual anaesthetist. Most early post-operative complications are due to alterations in physiology which anaesthetists are well trained to manage. Adequate pain management may reduce morbidity⁴ and the early transfer of high risk patients to intensive care may reduce mortality.⁵ This audit may demonstrate the requirement for both individual and systemic changes, to ensure the delivery of high quality post-operative care.

Best practice: research evidence or authoritative opinion

College guidance on the provision of anaesthesia services for post-operative care, stipulates groups of patients that should be visited within 24 hours of their operation.⁶ An anaesthetist should consider appropriate local or nationally agreed guidelines when planning an anaesthetic, and ensure arrangements are made for the continuing care of the patient where necessary, including the provision of appropriate post-operative care.⁷ Although an in-hospital post-anaesthetic follow-up of 21,116 patients identified major complications in 0.37% (minor complications 8.15%),⁸ there is a higher incidence of emergencies in ASA 4 patients and those operated on out-of-hours, the outcome for whom, may be improved by an appropriate post-operative review.⁵

Suggested indicators

- D The percentage of patients listed below who are visited post-operatively by an anaesthetist.
- D The percentage of patients listed below who are visited post-operatively by their own anaesthetist:
 - ◆ American Society of Anaesthesiologists (ASA) Physical Status 3, 4 or 5
 - ◆ those receiving epidural or patient controlled analgesia in a general ward
 - ◆ patients discharged from recovery with invasive monitoring *in-situ*
 - ◆ complicated intra-operative course
 - ◆ those for whom a request is made by other medical, nursing or other clinical colleagues
 - ◆ those for whom there is any other appropriate need.

Proposed standard or target for best practice

- D 100% of patients, listed above should be visited by an anaesthetist, within 24 hours of discharge from recovery, ideally by their own anaesthetist.

Suggested data to be collected

The following data to be collected and interpreted over short periods (days, weeks), followed by a cycle of design, implementation, testing, impact measurement and retesting of changes (Plan, do, study, act):

- D Anaesthetist and grade.
- D Day and time of surgery.
- D Patient category (above list).
- D Time from end of surgery and visit.
- D Post-operative interventions initiated.
- D Patient's opinion of the value of visit.
- D Anaesthetist's opinion of value of visit.
- D Reasons for failure to visit.

Consider the following questions:

- D Are there systems in place that ensure post-operative visiting takes place?
- D Are there barriers to post-operative visiting and what are they?
- D Are there variations in practice?
- D Are there variations in knowledge of guidelines, standards, and the importance of post-operative visiting?

Common reasons for failure to meet standard

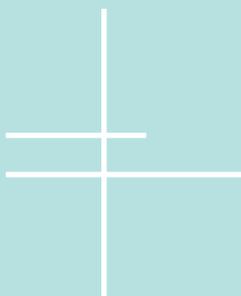
- D Patient already discharged.
- D Excessive workload.
- D Multiple site working.
- D Friday operating lists.
- D On-call duties.
- D Annual/study leave.
- D Attitude of anaesthetist.

CPD and Curriculum mapping

Training curriculum competence: PO_BS_11

References

- 1 Guidance on the (new) 2003 contract and job planning for consultant anaesthetists. *AAGBI*, London 2005 (<http://www.aagbi.org/sites/default/files/jobplanning05.pdf> – under review).
- 2 The anaesthesia team 3. *AAGBI*, London 2010 (http://www.aagbi.org/sites/default/files/anaesthesia_team_2010_0.pdf).
- 3 Zvara DA et al. The importance of the postoperative anaesthetic visit: do repeated visits improve patient satisfaction or physician recognition? *Anesth Analg* 1996;**83**:793–797.
- 4 Rally FE. Postoperative care. *Can J Anaesth* 1996;**43**:759–763.
- 5 Lee A et al. Early postoperative emergencies requiring an intensive care team intervention. *Anaesthesia* 1998;**53**:529–535.
- 6 Guidance on the provision of anaesthesia services for post-operative care (revised 2009) *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/710>).
- 7 The Good Anaesthetist, standards of practice for career grade anaesthetists. *RCoA*, London February 2010 (<http://www.rcoa.ac.uk/node/1955>).
- 8 Burnham M, Craig DB. A post anaesthetic follow-up program. *Can Anaesth Soc J* 1980;**27**:164–168.



3.10

Handover of responsibility for patients in the post-anaesthetic care unit (PACU)

Dr S Chadwick, Dr A Norman

Why do this audit?

Effective handover of a patient's care in the recovery room is essential for the continuity, quality and safety of patient care.

Best practice: research evidence or authoritative opinion

The Association of Anaesthetists guidelines¹ state that 'the anaesthetist must formally hand over care of a patient to a recovery room nurse or other appropriately trained member of staff'.

Much of this is an informal process.² Handover between nurses has been extensively analysed.³ With the introduction of shiftworking patterns there has been some work on handover between doctors⁴ although there is very little published on handover between different professions.⁵ Systems exist for a standardised transfer of information between healthcare professionals.⁶

Suggested indicators

- D Patient details, operation and theatre.
- D Underlying medical disorder.
- D Allergy information.
- D Anaesthetic technique including airway management.
- D Peri-operative course and complications.
- D Appropriate prescription charts available.
- D Post-operative plan documented.
- D Plan for continued invasive monitoring documented.
- D Immediate concerns for the patient.

Proposed standard or target for best practice

- D 100% of handovers should include patient name, operation and theatre.
- D 100% of handovers should include information on the patient's underlying medical disorders.
- D 100% of handovers should include information on a patient's allergies.
- D 100% of handovers should include information on the anaesthetic technique used including airway management.
- D 100% of handovers should have all appropriate prescription charts available including medication, fluids and analgesia.
- D 100% of handovers should have a post-operative plan documented.
- D 100% of handovers should have a plan for continuing invasive monitoring if required.

Suggested data to be collected

Quality of handover assessed by PACU staff using criteria from SBAR system:⁷

S:

- D patient details
- D operation type
- D theatre
- D allergy status.

B:

- D medical background.

A:

- D type of anaesthetic
- D uneventful procedure or any intra-operative complications and management.

R:

- D airway management in PACU
- D prescription charts in use and completeness
- D documented post-operative plan
- D documented plans for continued invasive monitoring if appropriate
- D data collected monthly and fed back to individuals and department. PDSA cycles used to develop a reliable handover process.

Common reasons for failure to meet standard

- D Poor professionalism.
- D Poor compliance to standards.
- D Time constraints.
- D Inadequate staffing levels.
- D Lack of understanding/communication.

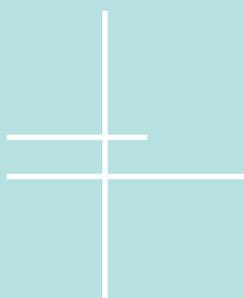
CPD and Curriculum mapping

CPD matrix codes: **II03, II05**

Training curriculum competence: **PO_BS_05**

References

- 1 Immediate postanaesthetic recovery. *AAGBI*, London 2002 (<http://www.aagbi.org/sites/default/files/postanaes02.pdf>).
- 2 Smith AF et al. Interprofessional handover and patient safety in anaesthesia: observational study of handovers in the recovery room. *Br J Anaesth* 2008;**101**(3):332–337.
- 3 Sherlock C. The patient handover: a study of its form, function and efficiency. *Nurs Standard* 1995;**9**:33–36.
- 4 Horn J, Bell MDD Moss E. Handover of responsibility for the anaesthetised patient-opinion and practice. *Anaesthesia* 2004;**59**:658–663.
- 5 Anwari JS. Quality of handover to the postanaesthesia care unit nurse. *Anaesthesia* 2002;**57**:488–493.
- 6 Quality and Service Improvement Tools. *NHS Institute for Innovation and Improvement* (http://www.institute.nhs.uk/option,com_quality_and_service_improvement_tools/Itemid,5015.html).
- 7 Institute for Healthcare Improvement. SBAR: Situation-Background-Assessment-Recommendation (<http://www.ihl.org/explore/SBARCommunicationTechnique/Pages/default.aspx>).



3.11

Patient satisfaction with anaesthesia

Dr R Moonesinghe, Dr S Barnett

Why do this audit?

Patient satisfaction has been highlighted as an outcome which is essential for measuring the quality of healthcare in numerous DH reports.^{1,2} Both the quality improvement drive and revalidation agenda support the use of patient satisfaction to measure performance for departments and/or individual doctors.³

Best practice: research evidence or authoritative opinion

There are a number of psychometrically developed and validated patient satisfaction measures in the literature, which have been shown to be acceptable to patients and which are able to provide useful information on the quality of care. Simply asking a patient if they are 'satisfied' with their care or using a non-psychometrically developed instrument runs the risk of biased results, as patients may be inclined to provide 'positive' answers in order to please staff and avoid negative repercussions.⁴

Suggested indicators

A psychometrically developed and validated questionnaire should ideally be used. One example is provided here⁵ although there are numerous others which measure the patient's perception of either the quality of recovery^{6,7,8} or the overall anaesthetic care.^{5,9}

Proposed standard or target for best practice

Measurement of patient satisfaction at baseline, and then re-auditing to assess if improvement.

Suggested data to be collected**Anaesthesia-related discomfort**

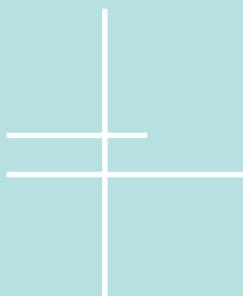
- D Drowsiness
- D Pain at the site of surgery
- D Thirst
- D Hoarseness
- D Sore throat
- D Nausea or vomiting
- D Feeling cold
- D Confusion or disorientation
- D Pain at the site of the anaesthetic injection
- D Shivering

Satisfaction with anaesthesia care

- D Information given by the anaesthetist before the operation
- D Waking up from anaesthesia
- D Pain therapy after surgery
- D Treatment of nausea and vomiting after the operation
- D Care provided by the department of anaesthesia in general

Common reasons for failure to meet standard

No specific standards exist, but misleading results may be obtained using non-validated tools. Poor patient satisfaction with specific areas of anaesthesia care (e.g. pain control).



Related audits

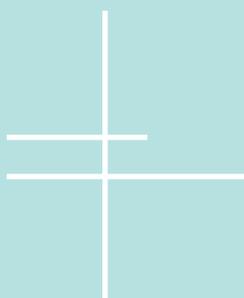
3.5 – Post-operative nausea and vomiting (PONV)
 11.3 – Pain management in the recovery room
 11.8 – Patient satisfaction (pain)

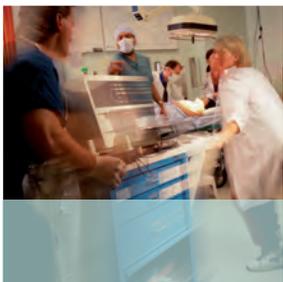
CPD and Curriculum mapping

CPD matrix codes: 1105

References

- 1 Darzi A. High quality care for all: NHS Next Stage Review final report. DH, London June 2008 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_085825).
- 2 Transparency in Outcomes – a framework for the NHS. DH, London 2010 (http://www.dh.gov.uk/en/Consultations/Closedconsultations/DH_117583).
- 3 Moonesinghe SR, Tomlinson AA. Quality improvement and revalidation: two goals, same strategy? *Br J Anaesth* 2011;**106**(4):447–450.
- 4 Fung D, Cohen MM. Measuring patient satisfaction with anesthesia care: a review of current methodology. *Anesth Analg* 1998;**87**(5):1089–1098.
- 5 Bauer M et al. Measuring patient satisfaction with anaesthesia: perioperative questionnaire versus standardised face-to-face interview. *Acta Anaesthesiol Scand* 2001;**45**(1):65–72.
- 6 Myles PS et al. Development and psychometric testing of a quality of recovery score after general anesthesia and surgery in adults. *Anesth Analg* 1999;**88**(1):83–90.
- 7 Myles PS et al. Validity and reliability of a postoperative quality of recovery score: the QoR-40. *Br J Anaesth* 2000;**84**(1):11–15.
- 8 Royse CF et al. Development and feasibility of a scale to assess postoperative recovery: the post-operative quality recovery scale. *Anesthesiology* 2010;**113**(4):892–905.
- 9 Caljouw MA, van BM, Boer F. Patient's satisfaction with perioperative care: development, validation, and application of a questionnaire. *Br J Anaesth* 2008;**100**(5):637–644.





Section 4: Emergency anaesthesia

Edited by Dr Joe Silsby

- 4.1 Level of supervision during out-of-hours and emergency cases
- 4.2 Timing of emergencies on the 24-hour clock
- 4.3 Adequacy of resuscitation before emergency surgery
- 4.4 Management of the emergency laparotomy
- 4.5 Emergency provision of blood and blood products
- 4.6 Management of the morbidly obese patient requiring emergency surgery
- 4.7 Management of patients for fractured neck of femur surgery
- 4.8 Anaesthetic emergencies – drugs and equipment preparedness
- 4.9 ICU/HDU admission after emergency surgery

4.1

Level of supervision during out-of-hours and emergency cases

Dr T Simpson, Dr M Greampet

Why do this audit?

The skills of the anaesthetists should be matched to the patient's needs.^{1,2} Managing high risk patients during out-of-hours by junior anaesthetists is associated with a poor outcome.^{3,4} When dealing with a sick patient, non-consultant anaesthetists should seek appropriate advice and help from the supervising consultant.⁵ In addition, the decision to operate at night should involve a senior anaesthetist.⁶ With the implementation of European Working Time Directive, the time available for training is reduced and this may impact on the trainees' ability to practise independently.⁷

Best practice: research evidence or authoritative opinion

- D Junior anaesthetists (Specialty doctors and trainees) should not anaesthetise
 - ◆ children less than 5 years and/or under 20 kg⁸
 - ◆ ASA 4 or 5 patients
 - ◆ in an isolated environment
 without direct supervision by a consultant or senior StR except for procedures for which they are deemed competent.
- D A trainee is responsible to, and subject to, clinical supervision by a designated consultant at all times.
- D All patients should have a named consultant⁹ and their level of supervision (direct, local and distant) should be clearly documented on the anaesthetic record.⁵
- D Each department should have a local protocol to define when non-consultant anaesthetists should request consultant advice and help.²

Suggested indicators

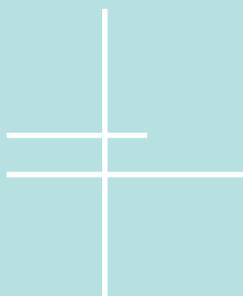
- D % cases of emergency surgery on children less than 5 years and/or under 20 kg where the consultant or senior StR with at least 6 months paediatric experience was present.
- D % cases of ASA 4 or 5 in which consultant or senior StR was present.
- D % cases at night in which consultant or senior StR was present or consulted.
- D % cases involving anaesthesia in remote sites or involving unfamiliar procedures during which consultant or senior StR was present.
- D % anaesthetic records with name of the responsible consultant and the level of supervision.

Proposed standard or target for best practice

- D 100% of emergency paediatric cases (< 5 years and/or < 20 kg) should have a consultant or senior StR with paediatric experience present.
- D 100% of cases of ASA 4 or 5 should have a consultant or senior StR present.
- D 100% of cases started after midnight should fit the NCEPOD definition for urgent or emergency status.
- D A consultant or senior StR should be present or have been consulted in 100% of cases.
- D Auditors may decide to exclude some procedures with which both anaesthetic and surgical trainees are competent, though such exclusions and reasons for them should be explicit.
- D 100% anaesthetic records should include the name of the responsible consultant and the level of supervision.

Suggested data to be collected

For all cases which fall into the above groups; who was the consultant with overall responsibility and what was their level of supervision? The presence/absence of senior anaesthetist and any discussion held with them should be recorded. Was it easy to access the consultant? Did the decision to operate involve a senior anaesthetist?



Common reasons for failure to meet standard

- D Failure of junior anaesthetists to recognise a sick patient.
- D No daytime emergency/routine list time available.
- D No easy access to senior help.
- D Lack of departmental guidelines for management of sick patients and when to contact the supervising consultant for appropriate help and advice.

Related audits

- 4.2 – Timing of emergencies on the 24-hour clock
- 9.3 – Staffing for paediatric anaesthetic services

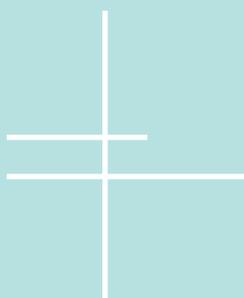
CPD and Curriculum mapping

CPD matrix codes: IH01, 2H02

Training curriculum competences: Annex B pages B-10, B-13

References

- 1 Campling EA, Devlin HB, Lunn JN. The report of the National Confidential Enquiry into Perioperative Deaths 1989. *NCEPOD*, London 1990 (<http://www.ncepod.org.uk/>).
- 2 NHS Quality Improvement Scotland, Anaesthesia Project Group. Anaesthesia – Care before, during and after anaesthesia. *NHS QIS*, Edinburgh July 2003 (<http://www.nhshealthquality.org/nhsqis/files/Anaesthesia.pdf>).
- 3 Campling EA et al. The report of the National Confidential Enquiry into Perioperative Deaths 1992/1993. *NCEPOD*, London 1995 (<http://www.ncepod.org.uk/>).
- 4 Campling EA et al. Who operates when? A report of the National Confidential Enquiry into Perioperative Deaths. *NCEPOD*, London 1997 (<http://www.ncepod.org.uk/>).
- 5 Guidance on the Supervision of Non-Consultant Anaesthetists (<http://www.rcoa.ac.uk/node/1836>).
- 6 WTD – Implications and Practical Suggestions to Achieve Compliance. Joint Royal College of Anaesthetists and Royal College of Surgeons of England Working Time Directive 2009 Project. *RCoA and RCSEng*, London 2009 (<http://www.rcoa.ac.uk/node/2288>).
- 7 Lansdown MRJ, Gray AJG, Treasure T, Layer GT. Appendicectomy: who performs it, when and how? *Ann R Coll Surg Engl* 2006;**88**:530–534.
- 8 Chambers WA. Message from the Honorary Secretary: The named consultant. *Anaesthesia News* 2004;**209**:16.
- 9 McHugh GA and Thoms GMM. Supervision and responsibility: The Royal College of Anaesthetists National Audit Project. *Br J Anaesth* 2005;**95**(2):124–129.
- 10 Curriculum for a CCT in Anaesthetics. 2nd edition Version 1.3, Chapter 6: Clinical supervision. pp 38–40. *RCoA*, London August 2010 (<http://www.rcoa.ac.uk/node/1462>).



4.2

Timing of emergencies on the 24-hour clock

Dr C H Laxton

Why do this audit?

Out-of-hours operating, particularly after midnight, may result in a poorer outcome for patients.¹ Senior surgical and anaesthetic involvement is reduced. There are also implications for training in view of the reduction of junior doctors' hours. NCEPOD has repeatedly suggested that all emergency patients should have prompt access to theatres, critical care facilities and appropriately trained staff, 24 hours per day every day of the year, whereas non-emergency cases should be managed within the standard or extended working day.^{2,3} The British Orthopaedic Association has also recommended that all hospitals have daily, consultant-led trauma lists.⁴

Best practice: research evidence or authoritative opinion

Daytime operating theatres for emergency surgery provide a significant reduction in operations after midnight.^{4,5,6,7} Delays in waiting for theatre are reduced⁶ and patients may be operated on at the clinically most appropriate moment.

Emergency operating lists during the day can allow excellent supervision and, therefore, greater training opportunities.^{4,5,7}

More complex cases are operated on in normal working hours, and operative experience is not diminished.^{4,7}

Suggested indicators

- D % of emergency cases performed between 0800 h and 1800 h.
- D % of emergency cases performed between 1800 h and 2400 h.
- D % of emergency cases performed between 2400 h and 0800 h.
- D % of cases started after midnight which are true emergencies as defined by NCEPOD (immediate life-saving operations, where resuscitation is simultaneous with surgical treatment).²
- D % of cases of urgent or other non-emergency cases as defined by NCEPOD started after midnight with reasons.

Proposed standard or target for best practice

- D The suggested target of best practice should be that 60% or more of emergency cases are standard or target started between 0800 h and 1800 h, with 5% or fewer emergency cases starting between 2400 h and 0800 h for best practice.
- D 100% cases starting after 2400 h should be classified as an 'emergency' as defined by NCEPOD or reasons for variance documented.
- D These targets may be redefined after the initial audit.

Suggested data to be collected

- D Time of the start and finish of all emergency procedures on the 24-hour clock.
- D Surgical specialty.
- D Operation name/code.
- D NCEPOD classification.
- D ASA grade of patient.
- D Reason for the procedure being performed after 1800 h or after 2400 h.
- D Grades of all surgeons and anaesthetists present.

Common reasons for failure to meet standard

- D Decision-making at junior level of surgeon and/or anaesthetist.
- D No daytime emergency theatre.
- D No theatre availability due to lack of theatre staff.
- D Over-running routine lists.
- D No emergency surgeon or anaesthetist available during the day.
- D Emergency theatre list fully booked – if this occurs regularly then more emergency sessions should be planned, or a second emergency theatre allocated.
- D Patients not ready for theatre during a daytime session (e.g. not starved, investigations not ready, not resuscitated)

Related audits

4.1 – Level of supervision during out-of-hours and emergency cases

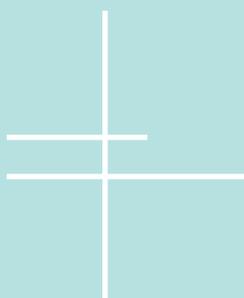
CPD and Curriculum mapping

CPD matrix codes: **1102, 1103, 1105**

Training curriculum competences: **Annex B page B-11**

References

- 1 Buck N, Devlin HB, Lunn JN. Report by the National Confidential Enquiry into Perioperative Deaths. *Nuffield Provincial Hospitals Trust*, London 1988.
- 2 Campling EA et al. Who operates when? A report of the National Confidential Enquiry into Perioperative Deaths. *NCEPOD*, London 1997 (<http://www.ncepod.org.uk/>).
- 3 Cullinane M et al. Who operates when? II. A report of the National Confidential Enquiry into Perioperative Deaths. *NCEPOD*, London 2003 (<http://www.ncepod.org.uk/>).
- 4 Jennings AG et al. Impact of the introduction of a daily trauma list on out-of-hours operating. *Ann Roy Coll Surg*, 1999;**81**:360–361.
- 5 Scriven MW et al. The use and impact of a daily general surgical emergency operating list in a district general hospital: a prospective study. *Ann Roy Coll Surg*, 1995;**77**:117–120.
- 6 Magee TR et al. Theatre delay for general surgical emergencies: a prospective audit. *Ann Roy Coll Surg*, 1995;**77**:121–124.
- 7 Calder FR, Jadhav V, Hale JF. The effect of a dedicated emergency theatre facility on emergency operating patterns. *J Roy Coll Surg Edin*, 1998;**43**:17–19.



4.3 Adequacy of resuscitation before emergency surgery

Dr C J Day

Why do this audit?

The overall mortality of anaesthesia and surgery is low; but this conceals a much higher mortality rate in sub-groups such as urgent and emergency surgery. Tissue hypoperfusion can lead to organ failure with associated increased mortality and length of hospital stay. There is growing acceptance that adequate pre-operative resuscitation of high risk patients will improve outcome.

Best practice: research evidence or authoritative opinion

Significant organ hypoperfusion can exist with little change in heart rate (HR) or blood pressure. Central venous pressure is a poor indicator of intravascular volume. Response (ideally of cardiac output or stroke volume) to a fluid challenge is useful if ongoing fluid losses are small.

Stroke volume variability or systolic pressure variability are good indicators of volume responsiveness in patients without AF, once positive pressure ventilation has been established.

Plasma lactate and SvO₂ (or superior venocaval saturation) are the best indicators of adequate organ perfusion and therefore resuscitation.

If little monitoring has been used, urine output or HR and BP response to induction of anaesthesia may identify gross under-resuscitation.

Suggested indicators

Lactate measurement should be available from the lab if not from a blood gas analyser. A normal or falling lactate would be the best indicator of resuscitation. SvO₂ SVV or SPV once IPPV is established would also be good indicators. Retrospective interpretation of an anaesthetic record by more than one experienced anaesthetist may allow 'response to induction of anaesthesia' or urine output to suggest if resuscitation was inadequate. If this approach is used it might be appropriate to audit adequacy of monitoring as well.

Proposed standard or target for best practice

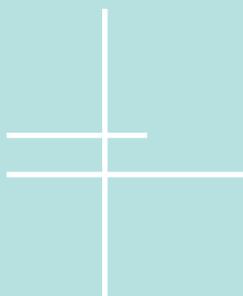
100% of patients should be adequately resuscitated before induction of anaesthesia. In some cases this may not equate with full restoration of circulating volume and tissue perfusion. For emergency patients (NCEPOD class 5) full resuscitation may only be possible or desirable after surgery has started (e.g. ongoing massive haemorrhage). NCEPOD defines emergency operations as immediate life-saving operations, where resuscitation is simultaneous with surgical treatment. Inevitably this will require a judgement to be made, ideally by more than one experienced anaesthetist.

Suggested data to be collected

An initial PDSA (Plan, Do, Study, Act) cycle might look at just lactate, SvO₂ and any oesophageal Doppler or arterial waveform data (whichever is used locally). Feeding this data back may improve monitoring or data recording. A decision can then be made locally either to use the less reliable indicators or concentrate on improved monitoring.

Common reasons for failure to meet standard

- D Inadequate monitoring used either because of unavailability or training in its use.
- D Difficulty interpreting less reliable variables.



Related audits

4.4 – Management of the emergency laparotomy

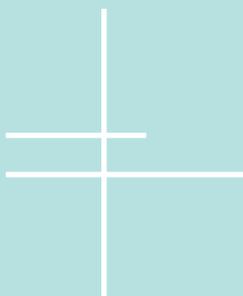
CPD and Curriculum mapping

CPD matrix codes: **2A03, 2A04, 2A05**

Training curriculum competences: **Annex B pages B-10–13, Annex C pages C-22–24, Annex D pages D-17–18**

References

- 1 Michard F et al. Pulse pressure variation: beyond the fluid management of patients with shock. *Critical Care* 2007;**11**:131 (<http://ccforum.com/content/11/3/131>).



4.4

Management of the emergency laparotomy

Dr S S Thon, Dr C A Seller

Why do this audit?

Emergency laparotomies are often carried out on sicker, frailer and more elderly patients (ASA ≥ 3). They are at greater risk of peri-operative complications and higher mortality, than those undergoing elective surgery.^{1,2,3}

Pre-operative care of these patients can be lacking in *timely* input from senior staff, including Care of the Elderly Physicians. Such patients may be inadequately optimised pre-operatively and possibly inappropriately listed.¹ There is disparity in care and outcomes between hospital trusts.

Preparing these patients for surgery may take minutes to hours. They can be very challenging to manage in the peri-operative period. Age, ASA status and the requirement of vasoactive drugs in the post-operative period are significant predictors of survival.^{2,3}

Best practice: research evidence or authoritative opinion

- D Timely access to appropriate and effective surgery by an experienced team following pre-operative resuscitation should be the gold standard. Variance may involve diagnosis delay, inadequate resuscitation and inappropriate patient selection for emergency laparotomy. Senior surgical, anaesthetic and intensive care staff should be involved.
- D Delays in surgery, for the elderly particularly, worsen outcome.¹
- D Pre-operative assessment should include; choice of the most appropriate surgery and use of risk assessment scores in conjunction with ASA status to guide risk stratification.⁴ Surgery duration and small bowel resection has been associated with poorer outcomes.⁵
- D Discussions of risk and patient expectations should be approached from a multidisciplinary perspective. Plans, risks and likely outcomes should be openly discussed with the patient and family. The patient's wishes are paramount. This should be properly documented.
- D Minimum standards of intra-operative monitoring (AAGBI) are essential.⁶ Evidence exists that these reduce peri-operative incidents.⁷
- D Fluid imbalances worsen morbidity and mortality. Appropriate fluid management is needed to lessen intra-operative hypotension and hypoperfusion.⁸ Recent NICE guidelines recommend the use of Cardio Q Oesophageal Doppler (or equivalent technology) in major or high risk surgical patients in which invasive monitoring is considered.⁹
- D Pain is the fifth vital sign and effective analgesia is an important consideration.¹ Epidural analgesia has benefits to the patient in the peri-operative period and can improve post-operative outcome.^{10,11} Some patients are too unstable, or the surgery too urgent to allow epidural use. Other analgesia modalities include trans versus abdominus plane (TAP) blocks, rectus sheath blocks/catheters, local infiltration and patient controlled opioid analgesia/infusions.
- D Peri-operative normothermia aids recovery.⁷ Along with prophylactic antibiotics, high inspired FiO_2 and peri-operative blood glucose control, preventing hypothermia can make a significant difference in surgical wound infection rates.¹² Hypothermia and its sequelae should be avoided.¹³ Post-operative care in the UK has improved in the last decade, with more Level 2 and 3 beds available. However, usage is undersubscribed (37%) when matched with disease severity of patients undergoing emergency laparotomy.¹

Suggested indicators

- D Reasons for surgical delay.
- D % patients deemed adequately resuscitated pre-operatively.
- D % surgery 'out-of-hours'.
- D % patients with invasive monitoring.
- D % patients receiving additional cardiac output monitoring.
- D Strategies for intra-operative hypotension, e.g. fluids, vasoactive drugs.
- D Strategies for peri-operative analgesia, temperature and glycaemic control, timely antibiotic prophylaxis.
- D % patients requiring ICU/HDU care receiving appropriate level of post-operative care.
- D Time spent in PACU prior to discharge to ward.
- D % unplanned ICU/HDU admissions following PACU discharge.
- D Length of stay, 30 day survival.

Proposed standard or target for best practice

- D 100% of patients should undergo emergency laparotomy at an appropriate time following 'appropriate' decision to operate.
- D 100% of patients should have monitoring essential and appropriate for safe conduct of surgery and anaesthetic.
- D 100% of patients ASA \geq 3, should have senior staff directly involved.
- D Hypotension and hypothermia should be treated promptly. Blood glucose levels monitored regularly.
- D Appropriate fluid resuscitation, reversal of muscle relaxation and normal arterial blood gas pH at end of surgery/anaesthesia.
- D Where appropriate, the patient should have an epidural sited for peri-operative analgesia.
- D 100% of ASA \geq 3 must have access to Level 2/3 care if needed.

Suggested data to be collected

- D Patient: age, ASA status, risk assessment score, co-morbidities.
- D Peri-operative values: HR, BP, central venous pressure, core temperatures, haemoglobin, arterial/venous blood gas and lactate, blood glucose level.
- D % patients with invasive cardiovascular monitoring, cardiac output monitor use.
- D Methods for managing peri-operative hypotension.
- D Fluid balance (blood loss, urine output etc).
- D Temperature conservation methods.
- D Adequate reversal of neuromuscular blockade.
- D Analgesia strategies.
- D % use of depth of anaesthesia monitoring.
- D Grades of clinical staff in theatre.
- D Time of surgery.
- D Duration, procedure, pathology.

Common reasons for failure to meet standard

- D Delays to timely surgery.
- D Inadequate pre-operative assessment.
- D Inadequate peri-operative monitoring.
- D Inappropriate decision to operate.
- D Full resuscitation may be possible after procedure, e.g. ruptured AAA.
- D No HDU/ICU capacity.

Related audits

4.3 – Adequacy of resuscitation before emergency surgery

CPD and Curriculum mapping

CPD matrix codes: 1I05, 2A03, 2A04, 2A05, 2G02, 2G03, 2G04, 3A03

Training curriculum competences: Annex B pages B-25–26, Annex C pages C-22–24, Annex D pages D-17–18.

References

- 1 An Age Old Problem: A review of the care received by elderly patients undergoing surgery *NCEPOD*, London November 2010 (<http://www.ncepod.org.uk/2010eese.htm>).
- 2 Cook TM, Day CJE. Hospital mortality after urgent and emergent laparotomy in patients aged 65 and over. Risk and prediction of risk using multiple logistical regression analysis. *Br J Anaesth* 1998;**80**:776–781.
- 3 Ford PNR et al. Determinants of outcome in critically ill octogenarians after surgery: an observational study. *Br J Anaesth* 2007;**99**(6):824–829.
- 4 Rix TE, Bates T. Pre-operative risk scores for the prediction of outcome in elderly people who require emergency surgery. *World J Emerg Surg* 2007;**2**:16.
- 5 Margenthaler JA et al. Risk Factors for Adverse Outcomes following surgery for small bowel obstruction. *Ann Surg* 2006;**243**:456–464.
- 6 Recommendations for standards of monitoring during anaesthesia and recovery (4th edition). *AAGBI*, London March 2007 (<http://www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf>).
- 7 The report of the National Confidential Enquiry into perioperative deaths 1999/2000 *NCEPOD* London 2001 (<http://www.ncepod.org.uk/2001cwo.htm>).
- 8 Grocott MPW, Mythen MG, Gan TJ. Perioperative Fluid Management and Clinical Outcomes in Adults (review). *Anesth Analg* 2005;**100**:1093–1106.
- 9 MTG3 CardioQ-ODM (oesophageal Doppler monitor): guidance. *NICE*, London May 2011 (<http://guidance.nice.org.uk/MTG3>).
- 10 Kehlet H, Holte K. Effect of postoperative analgesia on surgical outcome. *Br J Anaesth* 2001;**87**:62–72.
- 11 Rigg JR et al. Epidural anaesthesia and analgesia and outcome of major surgery: a randomised trial. *Lancet* 2002;**359**:1276–1282.
- 12 Prevention and treatment of surgical site infection. *NICE Clinical Guideline CG74*. *NICE*, London October 2008 (<http://www.nice.org.uk/CG74>).
- 13 Sessler DI. Perioperative heat balance. *Anesthesiology* 2000;**92**:518–596.

4.5

Emergency provision of blood and blood products

Dr T Teare, Dr J Brown

Why do this audit?

Appropriate administration of blood products is essential for the effective management of massive haemorrhage. The process is complex, involving staff across a range of departments in potentially high stress situations. Excessive blood loss can jeopardise the survival of patients in many clinical settings. During the period October 2006 to September 2010, the National Patient Safety Agency (NPSA) was made aware of 11 deaths and 83 incidents where the patient came close to death as a result of delays in the provision of blood in an acute situation.¹ The early recognition of massive blood loss and the institution of effective actions are vital if avoidance of hypovolaemic shock and its consequences are to be avoided. One such action is the rapid provision of blood and blood components. A key element is the effective communication between all staff who will be involved in the provision and transportation of blood. The urgent provision of blood for life threatening haemorrhage requires a rapid focussed approach. Recent lessons from military practice have led to research in the civilian setting and the formulation of expert guidance for protocol-driven management of massive haemorrhage.

Despite recent AAGBI guidelines stating 'hospitals must have a major haemorrhage protocol in place',² many units are yet to introduce this into practice. This audit serves to investigate current local practice and assist development of or improve such a protocol.

The optimum management of the bleeding patient has many aspects of treatment as described in the AAGBI guidelines. However, this audit concentrates on just one: blood product administration.

Best practice: research evidence or authoritative opinion

The standards for this audit have been derived from AAGBI guidelines² and consensus recommendations from the British Committee for Standards in Haematology (BCSH), for administration and monitoring of massive transfusion.³ These standards emphasise a number of key management points, including:

- D recognising and treating significant haemorrhage as a clinical emergency, requiring real-time input from senior doctors including a consultant haematologist
- D timeliness of delivery of blood to patient
- D greater use of FFP and platelets in initial treatment than has been seen traditionally
- D measuring specific physiological and laboratory parameters before, during, and after massive transfusion to reduce the multitude of serious complications that can result
- D all hospitals should develop and continually audit massive haemorrhage protocols.

Suggested indicators

- D % of cases where parameters are measured at baseline and repeated during/after the event: Haemoglobin(Hb), Platelets(Pts), INR, APPT, fibrinogen(fib), pH, Calcium(Ca), Temperature (Temp).
- D % of cases where time to start of blood transfusion is less than 1 hour
- D % achieving targets:
 - ◆ Hb > 8 g/dL
 - ◆ Pts > 75 × 10⁹/L
 - ◆ INR/APPT < 1.5
 - ◆ Fib > 1 g/L
 - ◆ pH > 7.3
 - ◆ Ca > 2.1
 - ◆ Temp > 36°C.
- D % achieving a ratio of fresh frozen plasma to blood units of at least 1:2.
- D % staff aware of major haemorrhage transfusion protocol.

Proposed standard or target for best practice

- D 100% of patients starting blood transfusion within 1 hour of massive haemorrhage declared
- D 100% parameters measured at baseline and repeated.
- D 100% achieving targets for parameters.
- D 100% achieving a ratio of fresh frozen plasma to blood units of at least 1:2.
- D 100% of staff aware of major haemorrhage transfusion protocol.

Suggested data to be collected

- D Number of patients identified as cases of massive haemorrhage (six units of blood or more issued from the same cross-matched sample or within 24 hours).
- D Time to start of first blood transfusion after massive haemorrhage declared
- D Demographics: age, sex.
- D Specialty (e.g. obstetrics).
- D Haemorrhagic pathology (e.g. abdominal aortic aneurysm)
- D 30-day mortality rate.
- D Type and quantity of products transfused (red cells, FFP, platelets, cryoprecipitate, factor vlla).
- D Lowest and highest serum samples during the event: FBC, clotting, fibrinogen, calcium, arterial blood gas (pH/Base excess).
- D Lowest temperature recorded.
- D Number of cases receiving emergency O-negative blood

Common reasons for failure to meet standard

- D Failure of early clinical recognition of massive haemorrhage.
- D Inadequate training and awareness of local protocols.
- D No protocol or protocol too complex.
- D human factors:
 - ◆ poor communication and understanding of urgency (clinical, portering and laboratory staff)
 - ◆ ineffective team working and role definition.

Related audits

- 4.3 – Adequacy of resuscitation before emergency surgery
- 4.4 – Management of the emergency laparotomy

CPD and Curriculum mapping

CPD matrix codes: 1I05, 1E04, 2A05

Training curriculum competences: Annex B pages B-20 (IO_BS_09), B-25 (ES_BK_02), Annex C pages C-24 (GU_IS_03), C-44 (MT_IK_06–07), Annex D pages D-17 (GU_HK_02), D-18 (GU_HS_03)

References

- 1 The transfusion of blood and blood components in an emergency. National Patient Safety Agency Rapid Response Report (NPSA/2010/RRR017). NPSA, London October 2010 (<http://www.nrls.npsa.nhs.uk/resources/type/alerts/?entryid45=83659&q=0%C2%ACblood%C2%AC>).
- 2 Blood transfusion and the anaesthetist: management of massive haemorrhage. AAGBI Safety Guideline. AAGBI, London 2010 (http://www.aagbi.org/sites/default/files/massive_haemorrhage_2010_0.pdf).
- 3 British Committee for Standards in Haematology Writing Group (Stainsby D et al). Guidelines on the management of massive blood loss. *Br J Haematol* 2006;**135**:634–641.



4.6

Management of the morbidly obese patient requiring emergency surgery

Dr N Cota, Dr S Harris, Dr N Kennedy

Why do this audit?

Obesity is a significant problem, and the incidence is increasing worldwide.¹ Bariatric surgery has shown to improve outcomes, and be cost-effective.²

All anaesthetists and theatre staff are likely to have to deal with obese patients requiring emergency surgery for non bariatric surgery. In centres undertaking elective bariatric surgery, potentially also emergency surgery following complications, such as return to theatre for post-operative haemorrhage.

The fourth National Audit Project (NAP4), highlighted airway complications in the obese especially after failed regional techniques.³ This group of patients are at a higher risk of peri-operative complications, and may need ICU/HDU admissions or special nursing care on the wards, with increased length of hospital stay and cost.⁴

The burden of emergency surgery in patients with morbid obesity and significant co-morbidities, adversely affects the peri-operative risk and outcome. Main causes of mortality are pulmonary embolism, myocardial infarction and sepsis-related complications, which are often more difficult to diagnose.⁵

There are scanty evidence-based protocols for the management of emergency surgery in the morbidly obese. The true cost of obesity-related peri-operative complications in the UK is unknown.

Best practice: research evidence or authoritative opinion

The body mass index (BMI) is used to classify morbidly obese patients. BMI > 40 is morbid obesity, > 50 is super obesity and > 70 is mega obesity.

Patients with a BMI > 40 and those with a BMI > 35 and co-morbidities, are candidates for bariatric surgery.⁶

In comparison to the normal population (including smokers), morbidly obese patients have a higher number of cardiometabolic complications like coronary heart disease, hypertension, heart failure and type 2 diabetes. Other complications include obstructive sleep apnoea, non alcoholic steatohepatitis (NASH) and gastro-oesophageal reflux.

The AAGBI have produced guidelines for the peri-operative management of morbidly obese patients requiring elective surgery.⁷ Most of these guidelines are transferable to emergency surgery. Pre-operative assessment and optimisation is a key component in the management of risk, but can be difficult to achieve for emergency surgery. In addition, all patients should have their BMI recorded. They should be managed by senior surgeons and anaesthetists experienced in the care of morbidly obese patients.

Delays in morbidly obese patients coming to theatre, are sometimes linked to manual handling issues and manpower. All trusts should have policies and equipment for dealing with morbidly obese patients.

These patients require special consideration, good planning, early communication and action plans between multidisciplinary teams.

Suggested indicators

- D % of patients with BMI > 40 or > 35 and co-morbidity requiring emergency surgery.
- D Age, sex, BMI, ASA.
- D Surgeons experienced with operating on obese patients.
- D Anaesthetic lead for obesity, obesity competent anaesthetists/ODPs. Imaging facilities for the morbidly obese.
- D Equipment availability—bariatric table/bed (weight limit \geq 250 kg), hover mattress or similar manual handling equipment.
- D Facility for pre-oxygenation in the head up position.
- D Appropriate venous thromboembolic (VTE) prophylaxis for morbidly obese, dose and length of treatment.
- D Recovery facilities appropriate for bariatric patient.
- D % requiring HDU/ICU admission if indicated.
- D length of stay, outcomes – morbidity, mortality.

Proposed standard or target for best practice	<ul style="list-style-type: none"> D 100% patients should have a pre-operative assessment by a senior surgeon. D 100% patients should have a pre-operative assessment by a senior anaesthetist, with advice from anaesthetists with experience of morbidly obese patients if required. D 100% patients should have operation within 24 hours of admission to hospital, preferably between 0800–2400 unless otherwise clinically indicated. D 100% availability of 'obesity packs' (including specific equipment, protocol guidelines and contact numbers) in emergency theatres. D 100% availability of protocols for VTE prophylaxis.
Suggested data to be collected	<ul style="list-style-type: none"> D Patient demographic data including BMI, ASA. D Incidence of OSA, OSA treated/untreated. D Type of surgery, timing of emergency surgery. D Type of manual handling device used (slide sheets/hover mattress). D Number of people required for manual handling. D Grade and specialty of senior surgeon/senior anaesthetist. D Grade of laryngoscopy, position for pre-oxygenation/intubation. D Muscle relaxant used and indication. D Type of surgery – open/laparoscopic. D Type of anaesthetic – GA/regional. D VTE prophylaxis specific to morbidly obese patients peri-operatively. D Post-operative – HDU/ICU/ward. If critical care required reason for admission. D Length of stay.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D Inadequate or unavailable specialist bariatric equipment. D Inadequately trained staff. D No clear local guidance or protocol.
Related audits	<p>4.1 – Level of supervision during out-of-hours and emergency cases 4.2 – Timing of emergencies on the 24-hour clock 4.4 – Management of the emergency laparotomy</p>
CPD and Curriculum mapping	<p>CPD matrix codes: II05, 2A03, 2A07, 3A2I Training curriculum competences: Annex D page D-18 (GU_HS_03)</p>
References	<ol style="list-style-type: none"> 1 Ezzati M et al; Comparative Risk Assessment Collaborating Group. Selected major risk factors and global and regional burden of disease. <i>Lancet</i> 2002;360:1347–1360. 2 Picot J et al. The clinical effectiveness and cost effectiveness of bariatric surgery for obesity. A systematic review and economic evaluation. <i>Health Technol Assess</i> 2009;13(41):1–190,215–357,iii-iv. 3 Cook TM et al. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: Anaesthesia. <i>Br J Anaesth</i> 2011;106(5):617–631. 4 Kakarla VR et al. Are laparoscopic bariatric procedures safe in superobese (BMI \geq50 kg/m²) patients? An NSQIP data analysis. <i>Surg Obes Relat Dis</i> 2011;7(4):452–458. 5 Herrera MF et al. Diseases and problems secondary to massive Obesity. <i>Eur J Gastroenterol Hepatol</i> 1999;11(2):63–67. 6 NICE issued guidance on surgery for morbid obesity. <i>NICE</i>, 2002/041 (http://www.nice.org.uk/newsroom/pressreleases/pressreleasearchive/pressreleases2002/2002_041_nice_issues_guidance_on_surgery_for_morbid_obesity.jsp). 7 Peri-operative management of the morbidly obese patient. <i>AAGBI</i>, London 2007 (http://www.aagbi.org/sites/default/files/Obesity07.pdf).

4.7

Management of patients for fractured neck of femur surgery

Dr C J Day

Why do this audit?

Over 70,000 operations are performed annually for fractured neck of femur. These patients often have significant co-morbidities which may be overt. The mortality rate for this group at one year is 30%, of which one third is directly attributable to the surgery.

Best practice: research evidence or authoritative opinion

Outcome is affected by age and gender but also by co-morbidity, delay to surgery and peri-operative care. There are several good quality guidelines for the peri-operative care of these patients that rely on variable evidence from good quality studies to expert opinion. The most important step is the realisation that outcome can be improved by a systematic approach that increases their priority. In effect, designing a specialised service that encourages efficient preparation for surgery and timely operation by appropriate staff.

Suggested indicators

- D In hospital (and 30 day) mortality.
- D Time to surgery.
- D Cancellation from operating list – and reason why.
- D Pre-operative fasting time.
- D Timing of surgery within standard NCEPOD 'safe operating hours'.
- D Pain scores prior to surgery, and post-operatively.
- D Hospital length of stay (or until 'ready for discharge' depending on perspective).
- D Anaesthesia performed or supervised by an anaesthetist experienced in anaesthesia in older people.
- D Type of anaesthesia.
- D Post-operative oxygen prescription.
- D Compliance with local thromboprophylaxis policy.
- D Major in-hospital complication (MI, pneumonia, LVF etc).

Proposed standard or target for best practice

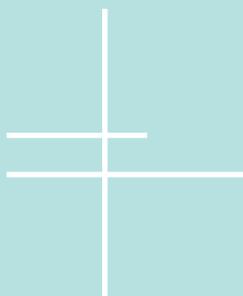
- D Recent specific attention to patients with a fractured neck of femur appears to be reducing mortality.¹ So auditing mortality against published results should be a start for continuing improvement.
- D Patients should be operated on within 48 hours of admission.
- D Fasting time as short as possible (consistent with local policy). There is some evidence that avoiding general anaesthesia might result in less post-operative cognitive complications. This is insufficient to be a strong recommendation but national data suggests an incidence of GA of 40%.

Suggested data to be collected

For a hospital at an early stage in this process, it is likely to be worth spending time planning the whole service (or borrowing a plan from another hospital). However, when undertaking an audit, ideally focus on an aspect of the whole, for repeated PDSA cycles, before moving on to a different aspect.

Common reasons for failure to meet standard

Anaesthetist may seem to have little influence over some of these outcomes. However, liaising with other disciplines and introducing changes in a limited way using a PDSA approach has produced impressive results in some centres.²



Related audits

4.1 – Level of supervision during out-of-hours and emergency cases

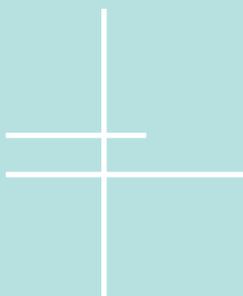
CPD and Curriculum mapping

CPD matrix codes: 1102, 1105, 2A03, 2G01, 3A08, 3A09, 3A10

Training curriculum competences: Annex B page B-59–60, Annex C page C-33–34, Annex D page D-23–24

References

- 1 SIGN Guideline 111. Management of hip fracture in older people. *Scottish Intercollegiate Guidelines Network*, June 2009 (<http://www.sign.ac.uk/guidelines/fulltext/111/index.html>).
- 2 Freeman C et al. Quality improvement for patients with hip fracture: experience from a multi-site audit. *Qual Saf Health Care* 2002;**11**(3):239–245.



4.8

Anaesthetic emergencies – drugs and equipment preparedness

Dr J Leedham, Dr S Patel

Why do this audit?

Routine checks of standard anaesthetic equipment and medications have become integral to safe anaesthesia both in the UK¹ and worldwide. The World Health Organization's Surgical Safety Checklist has bolstered this practice.² Similar preparations for the management of anaesthetic emergencies are required, in order to prevent adverse outcomes. These emergencies are a small but significant cause of morbidity and mortality. They pose unique challenges often requiring a co-ordinated team response. It is fundamental that specific drugs and equipment, along with their protocols of use are readily available. All team members must know their location.

This is salient because of the diverse and often disparate environments within modern NHS hospitals in which anaesthesia is provided. These include A&E, delivery suites, ICU, radiology and psychiatric units. Prompt action should be taken if the specific drugs, equipment or knowledge of their whereabouts is deficient. They must be checked frequently and maintained in a state of readiness for use (see also audit 2.1).³ Performing this audit regularly should help to keep all staff prepared.

Best practice: research evidence or authoritative opinion

Various professional bodies publish management guidelines containing explicit or implicit equipment lists.

These are available online for the following emergencies respectively:

- D Association of Anaesthetists of Great Britain and Ireland (AAGBI): Malignant hyperthermia,⁴ local anaesthetic toxicity,⁵ anaphylaxis⁶ and massive haemorrhage.⁷
- D Difficult Airway Society: Difficult airway.^{8,9}
- D Resuscitation Council (UK): Cardiac arrest.¹⁰

Stipulation of the exact equipments required in each location is influenced by local factors and consensus, however minimum standards have been dictated by the RCoA¹¹ and AAGBI.¹²

Suggested indicators

- D Existence of department lead or trainer for anaesthetic-critical incidents.
- D For each emergency stated above:
 - ◆ immediate availability of relevant drugs and equipments in all areas where anaesthesia is delivered
 - ◆ % anaesthetic team members who know the existence of these emergency drugs and equipments
 - ◆ % anaesthetic team members who know the location of these emergency drugs and equipments.
- D Locum and transitional staff's knowledge compared with permanent staff.

Proposed standard or target for best practice

In all areas where anaesthesia is provided; all relevant staff, both locum and permanent should demonstrate 100% compliance with the proposed indicators.

Suggested data to be collected

- D Data should be collected from each location throughout the hospital where anaesthesia is performed:
 - ◆ % of locations where emergency protocols are clearly displayed or readily available
 - ◆ inspection of current designated emergency equipment and drugs for % compliance with national or local guidelines
 - ◆ % of clinical areas with lists of 'essential' emergency equipment
 - ◆ % of clinical areas with written records of equipment checks
 - ◆ % of clinical areas with evidence of a mechanism for reporting deficiencies and restocking.
- D Anaesthetic team audited to include: anaesthetists, operating department practitioners (ODPs), anaesthetic nurses, recovery nurses and other relevant theatre staff.
- D Questionnaire asking relevant staff what emergency equipment and drugs they think exists, i.e. Dantrolene, Intralipid, difficult airway apparatus, massive haemorrhage equipment and cardiac arrest/defibrillator trolley.
- D Questionnaire asking relevant staff to specify the location if known of the above items.

Common reasons for failure to meet standard

- D Absent or inadequate local policies.
- D Absent or inadequate equipment and drug stores.
- D Failure to communicate information to all relevant team members.
- D Inadequate induction of all team members, e.g. new trainees or locum staff.
- D Lack of familiarity with the contents and location of emergency equipment storage units, e.g. difficult intubation trolley.
- D Failure to adopt uniform layouts of equipment storage units.
- D Failure to replace used or expired emergency drugs or equipment.
- D Misplacement of emergency drugs and equipment from designated area to other locations.
- D Local consensus regarding what equipment is needed in each location is lacking.

Related audits

2.1 – Adequacy and location of advanced airway management equipment

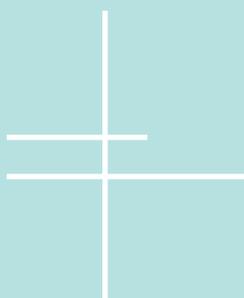
CPD and Curriculum mapping

CPD matrix codes: 1102, 1103, 1105, 1B01–04, 2A06

Training curriculum competences: Annex B pages B-27–31, B-39–42, Annex C pages C-28–30, Annex D page D-19

References

- 1 Checking anaesthetic equipment 3. AAGBI, London 2004 (<http://www.aagbi.org/sites/default/files/checkingo4.pdf>).
- 2 Haynes AB et al. A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population. *N Engl J Med* 2009; **360**:491–499.
- 3 Cook TM et al. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. *Br J Anaesth* 2011; **106**(5):617–631.
- 4 Malignant Hyperthermia Crisis. AAGBI Safety Guideline. AAGBI, London 2011 (<http://www.aagbi.org/sites/default/files/MH%20guideline%20for%20web%20v2.pdf>).
- 5 Management of Severe Local Anaesthetic Toxicity. AAGBI Safety Guideline. AAGBI, London 2010 (http://www.aagbi.org/sites/default/files/la_toxicity_2010_o.pdf).
- 6 Suspected Anaphylactic Reactions Associated with Anaesthesia 4. AAGBI Safety Guideline. AAGBI, London 2009 (http://www.aagbi.org/sites/default/files/anaphylaxis_2009_1.pdf).
- 7 Blood transfusion and the anaesthetist: management of massive haemorrhage. AAGBI Safety Guideline. AAGBI, London 2010 (http://www.aagbi.org/sites/default/files/massive_haemorrhage_2010_o.pdf).
- 8 Henderson JJ et al. Difficult Airway Society guidelines for management of the unanticipated difficult intubation. *Anaesthesia* 2004; **59**:675–694.
- 9 Recommended equipment list for the management of the unanticipated difficult intubation. *Difficult Airway Society*, London July 2005 (<http://www.das.uk.com/equipmentlistjuly2005.htm>).
- 10 Resuscitation Guidelines 2010. *Resuscitation Council (UK)*, October 2010 (<http://www.resus.org.uk/pages/GL2010.pdf>).
- 11 Anaesthetic services in remote sites. RCoA, London March 2011 (<http://www.rcoa.ac.uk/node/637>).
- 12 Good Practice – A guide for departments of anaesthesia, critical care and pain management. RCoA and AAGBI, London 2006 (<http://www.rcoa.ac.uk/node/360>).



4.9

ICU/HDU admission after emergency surgery

Dr J Cole, Dr J Silsby

Why do this audit?

DH statistics show that there is evidence of ICU (level 3) and HDU (level 2) bed shortages in the UK.^{1,2} The reason for the variation in bed availability is multifactorial and is thought to include:

- D seasonal pressures, e.g. H₁N₁ pandemic, influenza
- D delayed discharge from ICU/HDU due to lack of ward beds
- D staffing levels.^{3,4}

Following emergency surgery some patients will benefit from continued care and monitoring in a HDU/ICU environment. Inadequate availability of beds on the HDU/ICU may lead to:

- D delays in admission to HDU/ICU
- D prolonged stay in PACU for level 2 or level 3 care whilst awaiting a bed
- D increased requirement for inter-hospital transfers
- D increase in mortality.⁵

Increasing inter-hospital transfers between ICUs and HDUs supports the theory that there are insufficient beds. DoH statistics reflect the fact that the rate of inter-hospital transfers is higher during the winter months when there is more pressure on beds.⁶

Patients already in HDU/ICU beds may face premature discharge to make beds available. When patients are prematurely discharged (which is more common at night), there is evidence that these patients are at higher risk of a poor outcome.⁷ NICE guidelines recommend that transfers should be avoided between 2200 and 0700 wherever possible. If they do occur then they should be documented as an adverse incident.⁸

Inadequate staffing levels on ICU/HDU may also lead to admission to ICU/HDU where the level of staffing would not meet recommended safe standards.^{3,4}

By analysing the problems contributing to poor bed availability it will allow for a more accurate control of the resources used for maintaining such a service. The effectiveness of critical care service planning, especially with regard to surge (seasonal) planning,⁹ can also be analysed.

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

Patients who are deemed to need continuing care in HDU/ICU should have a bed available to them. Identifying patients who would need level 2 or 3 support following emergency surgery can be done by assessments which include:

- D use of ASA, co-morbidity and surgical procedure¹⁰
- D DoH guidelines¹¹
- D local unit guidelines.

Suggested indicators

The percentage of patients who have had emergency surgery and fit DoH guidelines for HDU/ICU care are:

- D sent to a general ward and are not admitted to HDU/ICU
- D inappropriately retained in recovery or theatre until an HDU/ICU bed is available
- D admitted onto a unit where the staffing levels would be considered inadequate
- D patients who have an inter-hospital transfer simply for continued care and not specifically for escalation of care
- D patients already on ICU/HDU having their level of care downgraded prematurely to facilitate further admissions to ICU/HDU.

Proposed standard or target for best practice

Patients who have had emergency surgery and fit DoH guidelines for HDU/ICU care should meet the following targets.

- D 0% should be sent to a general ward.
- D 0% should be retained in recovery until a bed on ICU/HDU is available.
- D 0% should be transferred to other hospitals unless it is for an escalation of care at a specialist centre.
- D 0% patients should have their level of care downgraded prematurely to facilitate further admissions.
- D 0% should be admitted onto a unit where staffing levels are inappropriate.

Suggested data to be collected

Denied, delayed or inappropriate admission to ICU/HDU can be analysed by collecting data from several sources including PACU, ICU/HDU and local hospital critical incident forms. Information to be collected would include:

- D inter-hospital transfer due to lack of beds
- D patients retained in PACU while awaiting critical care bed
- D premature discharge of ICU/HDU patients at inappropriate times
- D inadequate staffing levels – adverse incidence forms should allow data collection of this information.

Common reasons for failure to meet standard

- D Failure to recognise patients early on who will need level 2 or 3 care; inadequate use of DoH guidelines.
- D Inadequate bed numbers. Seasonal variation will impact on this.
- D Lack of general ward beds to allow timely discharge from ICU/HDU.

CPD and Curriculum mapping

CPD matrix codes: 2C01, 2C02, 2C07

Training curriculum competences: Annex B page B-51–52, Annex C page C-47–48, Annex D page D-35–37

References

- 1 Knowing the Risk: A review of the peri-operative care of surgical patients. A report by the National Confidential Enquiry into Patient Outcome and Death. *NCEPOD*, London 201 (<http://www.ncepod.org.uk/2011poc.htm>).
- 2 Campling EA et al. The Report of the National Confidential Enquiry into Peri-Operative Deaths, 1992/93. *NCEPOD*, London 1995
- 3 BACCN standards for nurse staffing in critical care units. *The British Association of Critical Care Nurses, The Critical Care Networks National Nurse Leads, Royal College of Nursing Critical Care and In-flight Forum*, September 2009 (http://www.baccn.org.uk/downloads/BACCN_Staffing_Standards.pdf).
- 4 Department of Health. Comprehensive Critical Care – A review of adult critical care services. *HMSO*, May 2000.
- 5 Turner M, McFarlane HJ, Krukowski ZH. Prospective study of high dependency care requirements and provision. *J Roy Coll Surg Edin* 1999;44(1):19–23.
- 6 Department of Health. Emergency Activity and critical care capacity. *HMSO*, Monthly Reports (<http://www.dh.gov.uk/en/Publicationsandstatistics/Statistics/Performanceandstatistics/EmergencyActivityandCriticalCareCapacity/index.htm>).
- 7 Goldfrad C, Rowan K. Consequences of discharges from intensive care at night. *Lancet* 2000;355:1138–1142.
- 8 Acutely ill patients in hospital. NICE Clinical Guidelines CG50. NICE, London July 2007 (<http://www.nice.org.uk/CG50>)
- 9 Department of Health. Report of the Swine Flu Critical Care Clinical Group and Key Learning Points for Future Surge Planning. *HMSO*, London July 2010.
- 10 Forrest JB et al. Multicentre study of general anaesthesia III. Predictors of severe perioperative adverse outcomes. *Anesthesiology* 1992;76:3–15.
- 11 Department of Health. Guidelines on admission to and discharge from intensive care and high dependency units. *HMSO*, London 1996.



Section 5: Day surgery services

Edited by Dr Ian Jackson

- 5.1 Patient information for day surgery
- 5.2 Pre-admission assessment
- 5.3 Adequacy of post-operative pain relief after discharge
- 5.4 Day surgery theatre utilisation
- 5.5 Discharge protocols
- 5.6 Unplanned hospital admission after day surgery
- 5.7 Anaesthetic patient reported outcomes in day surgery

5.1

Patient information for day surgery

Dr I R Armstrong

Why do this audit?

The NHS plan of 2000 laid down a commitment to improving patient information and this has been reinforced by groups such as the Picker Institute and the Patient Information Forum.¹ Each of the Royal Colleges has its own Patient Liaison Group.

Best practice: research evidence or authoritative opinion

The NHS Institute for Innovation and Improvement stresses the importance of both verbal and written information and the need to address particular groups of patients such as the young, incapacitated and patients whose first language is not English.² The AAGBI and the British Association of Day Surgery have produced a consensus document on Day Surgery which includes details of patient information, again emphasising the need for timely information given in simple terms in the patient's first language.³ This information needs to include both general information about how the unit works and what to expect, as well as information specific to the proposed procedure.⁴

Suggested indicators

- D Guidelines on the provision of patient information as part of the care pathway.
- D Written general information about how the unit works.
- D Information about fasting, general and regional anaesthesia including any risks involved.
- D Information on post-operative analgesia.
- D The % of procedures carried out as day cases with written information which should include common complications and the expected period of incapacity.
- D The % of this written information with specified review dates.
- D Follow up data about patient expectations and experience.

Proposed standard or target for best practice

- D There should be a protocol detailing the above indicators.
- D 90% of day surgery procedures undertaken should have a procedure specific information pack and all should have a review date.
- D All patient should receive the information at a point which allows adequate time for assimilation and questions to be asked, before the procedure.
- D 95% of patients should have their expectation met on follow up.

Suggested data to be collected

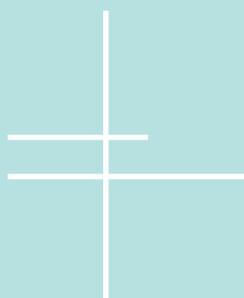
- D Adherence to a protocol within the care pathway for providing information which is both general in nature and procedure specific, with review dates.
- D Follow up questions to patients about their experience, the information provided, their expectations and whether these were met.

Common reasons for failure to meet standard

- D Lack of written information for all procedures.
- D Lack of information for specific patient groups such as young, incapacitated or in languages other than English.
- D No follow up data about the patient experience.

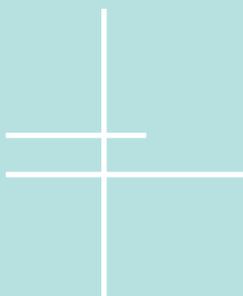
CPD and Curriculum mapping

CPD matrix codes: **1105, 2A03, 2G01**



References

- 1 The NHS Plan: A plan for investment, a plan for reform. *DH*, London 2000 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4002960).
- 2 Quality and service Improvement Tools – Patient Information. *NHS Institute for Innovation and Improvement*, 2008 (http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/patient_information.html).
- 3 AAGBI and BADS. Guidelines on Day Case and Short Stay Surgery. *Anaesthesia* 2011;**66**:417–434.
- 4 Patient Information Toolkit. NHS Brand guidelines 2010 (<http://www.nhsidentity.nhs.uk/tools-and-resources/patient-information>).



5.2

Pre-admission assessment

Dr I Smith

Why do this audit?

Pre-operative assessment is an essential element of a high-quality and efficient day surgery service. This is a two way process in which information is both gathered, to aid medical evaluation and optimisation prior to surgery, and provided, to prepare the patient for the day surgery episode and manage their expectations.^{1,2} Appropriate pre-operative assessment improves the patient's experience, reduces anxiety, provides an opportunity to answer questions and reduces cancellations on the day of surgery.^{1,2,3}

Best practice: research evidence or authoritative opinion

There should be local agreement on which procedures may be performed as day surgery. Day surgery should be the default choice for these procedures, but specific patients may be moved to a short stay or in-patient pathway during the pre-operative assessment. Pre-operative assessment should be performed by trained nurses, supported by consultant anaesthetists;³ the process should be protocol-driven⁴ and structured questionnaires are useful in data collection.⁵ Assessment should be based on social and medical criteria according to recent guidelines,⁵ agreed with the anaesthetic department. Arbitrary cut-offs (such as age and weight) are inappropriate; day surgery should be the norm unless there is a specific contraindication.^{5,6} Pre-operative assessment should be performed in time to correct any abnormalities and allow the patient to be adequately informed and prepared for surgery; provision of a 'one-stop' service on the day of the surgical outpatient appointment is ideal.² While there are advantages to centrally assessing all patients for elective surgery, experts and patients prefer pre-operative assessment for day surgery to be performed by specialist day surgery nurses on the unit where surgery will subsequently take place.⁷

Suggested indicators

- D Existence of an agreed protocol for pre-assessment which has been reviewed in the last two years by a multidisciplinary team.
- D % patients having day surgery under general anaesthesia who have undergone pre-operative assessment according to this protocol at least two weeks prior to admission.
- D % patients having intermediate procedures under local anaesthesia (e.g. inguinal hernia repair) who have undergone pre-operative assessment as above.
- D Of patients who underwent pre-operative assessment, % who have this on the same day as their surgical outpatient appointment (one-stop pre-operative assessment).
- D Of patients who underwent pre-operative assessment, % found to be unsuitable for day surgery at the time of surgery and which could or should have been detected at pre-operative assessment.
- D % patients failing to attend or cancelling within two days of surgery.

Proposed standard or target for best practice

- D Existence of a pre-assessment protocol as above.
- D 100% of both groups of patients described above should have undergone pre-operative assessment at least two weeks prior to surgery according to the agreed protocol.
- D 50% of patients should have had pre-operative assessment on the same day as their surgical out-patient appointment (one-stop service).
- D 0% patients who have undergone pre-operative assessment should have (pre-existing) problems discovered later which make them unsuitable for day surgery.
- D DNA and late cancellation rates should be below 5% and/or show a year-on-year reduction.

Suggested data to be collected

- D Evidence of the protocol and the date of last review by a multidisciplinary group.
- D Date of pre-operative assessment and date of surgery.
- D DNA and late cancellation rate.
- D Where cancellation occurs on the day of surgery, the reasons for this and whether or not it was due to something which could or should have been discovered at pre-operative assessment.

Common reasons for failure to meet standard

- D No protocol for pre-operative assessment, failure to regularly review and update it, failure to apply the protocol.
- D Patients added to the list at too late a stage to attend pre-operative assessment (suggest notify day surgery unit and perform telephone assessment).
- D Protocol applied unevenly between specialities (or even individual consultants within a speciality).
- D Patients admitted to wards not dedicated to day surgery.

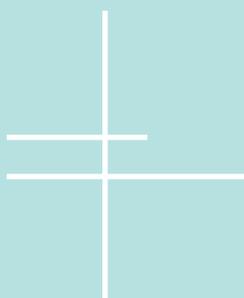
CPD and Curriculum mapping

CPD matrix codes: **2A03, 3A06**

Training curriculum: **Annex B (DS_BK_01), Annex C (DS_IK_03), Annex D (DS_HK+01), Annex (DS_AK_02)**

References

- 1 National good practice guidelines on pre-operative assessment for day surgery. *NHS Modernisation Agency*, 2002.
- 2 Organisational issues in pre-operative assessment for day surgery. *British Association of Day Surgery*, London 2010.
- 3 Pre-operative assessment and patient preparation — the role of the anaesthetist 2. *AAGBI*, London 2010 (<http://www.aagbi.org/sites/default/files/preop2010.pdf>).
- 4 Day surgery — a good practice guide. *NHS Modernisation Agency*, 2004.
- 5 Verma R et al. Day case and short stay surgery: 2. *Anaesthesia* 2011;**66**:417–434 (<http://www.aagbi.org/sites/default/files/Day%20Case%20of%20web.pdf>).
- 6 Ten dilemmas in preoperative assessment for day surgery. *British Association of Day Surgery*, London 2009 (<http://www.bads.co.uk>).
- 7 Lewis S et al. A patient survey to determine how day surgery patients would like preoperative assessment to be conducted. *J One-day Surg* 2009;**19**(2):32–36.



5.3 Adequacy of post-operative pain relief after discharge

Dr S Wasawo

Why do this audit?

There are an increasing number of operations that are deemed suitable for day case and are incentivised as such.^{1,2} The procedures are becoming more complex but it should be remembered that relatively minor procedures can be associated with an inordinate amount of pain. A recent survey has shown that patients are most worried about vomiting followed by pain post-operatively.³ Uncontrolled pain has several adverse reactions that include, in the short term, emotional and physical suffering, sleep disturbance, cardiovascular effects, and decreased mobility which promotes thromboembolism.⁴ In the longer term, post-operative pain can lead to chronic pain and behavioural changes in children that can last up to a year.⁴ It is imperative that we give adequate pain relief to assure patients that going home is a safe and comfortable alternative. Previous observations have noted that patients prefer day case surgery but felt post-operative instruction was inadequate leading to distress.⁵

Best practice: research evidence or authoritative opinion

Pain following surgery remains a problem.³ <5% of patients experiencing severe pain in the 48 hours post-operatively is a generally accepted standard of care. There is evidence that some services have further reduced this to 1% or 2%, this more challenging target may serve to drive improvement towards excellence.

Pain following surgery may be predicted by factors such as pre-operative pain, anticipated post-operative pain by the clinician, pre-operative high expectations of the patient, younger age and fear of short-term consequences of the operation.⁶

Good quality pain relief will result in earlier mobilisation, reducing the 'social cost' in terms of returning to work and reduce intervention by primary care.

Many day surgery units no longer supply free take home medication.

Suggested indicators

- D % patients with written and oral instructions about pain control.
- D % patients with verbal pain score of 'severe' in the first 48 hours.
- D % patients achieving pain score of 'mild' or 'none' after discharge.
- D % patients satisfied with pain management at home.

Proposed standard or target for best practice

- D 100% patients discharged with written and oral instructions regarding pain relief.
- D <5% reporting 'severe' pain on verbal pain score in the first 48 hours after discharge.
- D >85% reporting 'none' or 'mild' pain after discharge.
- D >85% satisfied with management of their pain at home.

Suggested data to be collected

- D Anaesthetist.
- D Operation.
- D Planned anaesthetic (include regional and local used).
- D Written and verbal post-operative analgesia plan.
- D Regular and break through analgesia.
- D At 6, 24 and 48–72 hours:
 - ◆ verbal pain score
 - ◆ if using regular analgesia
 - ◆ effectiveness of analgesia
 - ◆ satisfaction of pain management.

Common reasons for failure to meet standard

- D Failure of patient education – need for regular pain relief.
- D Failure to follow local post-operative analgesic guidelines.
- D Failure to appreciate severity of post-operative pain.
- D Failure to prescribe adequate sufficiently potent take home medication.

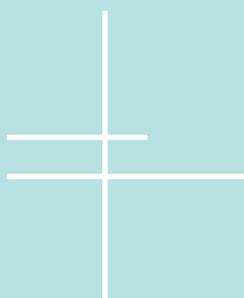
CPD and Curriculum mapping

CPD matrix codes: ID01, 2E01, 3A06

Training curriculum: Annex B pages B-23,(PO_BK_07, PO_BK_13) B-43, B-44 (DS_BK_04, DS_BK_10, DS_BS_03), Annex C page C-20 (DS_IK_01–04)

References

- 1 BADS directory 3rd Edition. British Association of Day Surgery, London June 2009 (<http://www.bads.co.uk>).
- 2 Department of Health Payment by Results (PbR) best practice tariffs 2011–2012.
- 3 Eberhart LHJ et al. Patient preferences for immediate postoperative recovery. *Br J Anaesth* 2002;**89**(5):760–761.
- 4 Post Operative Pain Management – Good Clinical Practice. *European Society of Regional Anaesthesia and Pain Therapy* (<http://www.esraeurope.org/PostoperativePainManagement.pdf>).
- 5 Mooney G, Symonds A. 'They just said come in for a day': patients' experiences of day case surgery. *Primary Health Care Research and Development* 2001;**2**:55–56.
- 6 Gramke et al. Predictive factors of postoperative pain after day-case surgery. *Clin J Pain* 2009;**25**(6):455–460.



5.4

Day surgery theatre utilisation

Dr I R Armstrong

Why do this audit?

Theatre utilisation defined simply as the actual run time as a percentage of the planned session time is used as a performance marker. The limitations of this are now recognised as regular over-runs will indicate a high utilisation but hide the resources and costs incurred in over-runs. Equally, low utilisation may hide failures in other parts of the pathway. Theatre utilisation has to be viewed as part of the overall patient pathway and significant factors which will influence theatre utilisation include bed availability, staffing and cancellations. Day surgery by its nature is currently almost exclusively planned work which is largely predictable in duration. This should allow optimal utilisation of theatre time as part of the pathway taking into account the optimal utilisation of the other pathway resources.

Best practice: research evidence or authoritative opinion

The Audit Commission reviewed theatre utilisation with hospital comparisons, detailed different measures of utilisation and set some targets.¹ Guidance on efficient use of operating theatre time together with further definitions has been set out by the Association of Anaesthetists.² Most recently, the NHS Institute for Innovation and Improvement has launched the Productive Operating Theatre Programme which sets out a number of useful modules aimed at optimising the utilisation of the patient pathway.³

Suggested indicators

- D Theatre utilisation: actual run time as a percentage of planned run time.
- D Late starts, long gaps within lists.
- D Cancellation rates, categorised.

Proposed standard or target for best practice

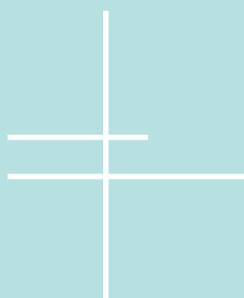
- D Theatre utilisation target of 90%.
- D Theatre utilisation of >100% in less than 10% sessions.
- D Theatre utilisation of <80% in less than 10% sessions.
- D Start time within 15 mins of planned in 100% sessions.

Suggested data to be collected

- D Start and finish times of cases and session.
- D Patient cancellations with reasons: patient, surgical, anaesthetic, equipment.
- D Session cancellations with reasons: staffing availability surgical/anaesthetic/nursing, bed availability or equipment.
- D Training cases/sessions.

Common reasons for failure to meet standard

- D Inappropriate number cases booked for a theatre session.
- D Cancellation on day of surgery: patient, surgical or anaesthetic.
- D Staffing unavailability.
- D Equipment unavailability.
- D Training issues.



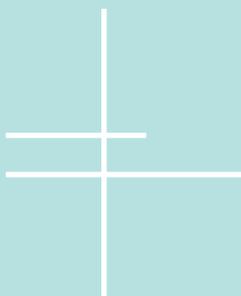
CPD and Curriculum mapping

CPD matrix codes: I102, I105

Training curriculum: Annex E page E-9, E-10

References

- 1 Operating theatres. Review of national findings. *Audit Commission Acute Hospital Portfolio* 2003 (<http://www.audit-commission.gov.uk/nationalstudies/health/other/Pages/operatingtheatres.aspx>).
- 2 Theatre Efficiency Safety, quality of care and optimal use of resources. *AAGBI*, August 2003.
- 3 The Productive Operating Theatre Programme. *NHS Institute for Innovation and Improvement*, 2011 (http://www.institute.nhs.uk/quality_and_value/productivity_series/the_productive_operating_theatre.html).



5-5

Discharge protocols

Dr A Lipp

Why do this audit?

The proper use of agreed discharge criteria is important for safe and effective discharge.

Best practice: research evidence or authoritative opinion

A written discharge policy is recommended for patient comfort, safety and for medico-legal reasons.^{1,2,3} An assessment of the patient's readiness for discharge is essential and following this, discharge by nursing staff is acceptable.^{4,5} Criteria for discharge may vary depending on the procedure and anaesthetic technique used.⁵ All patients should receive written information. This should be procedure specific highlighting the expected outcome of surgery, possible complications and a direct dial telephone number for patients seeking support/advice.^{6,7}

Suggested indicators

- 1 Existence of a protocol for discharge similar to that described in references 2, 3 and 4.
- 2 % of patients who achieve agreed discharge criteria prior to discharge.
- 3 % of patients who agree that their pain was at an acceptable level of control for their own discharge.
- 4 % of patients who have written instructions on discharge.
- 5 % of patients who have a contact telephone number for a health professional on discharge.
- 6 % patients who are satisfied with the arrangements for discharge.
- 7 % patients in whom there is evidence that the discharge home was not satisfactory. This may include use of the contact telephone number for advice or instructions that could have been given prior to discharge, early contact with a community health professional, or readmission.

Proposed standard or target for best practice

- D A protocol should exist as above.
- D Indicators 2 to 6 above should be true for 100% patients.
- D Indicator 7 above should be as low as possible, ideally 0%.

Suggested data to be collected

Data collection as above from the discharge checklist and by telephoning the patients at home 24 hours after discharge. Reasons for use of contact telephone number, contact with health professional or readmission and whether avoidable or unavoidable in the opinion of the auditor.

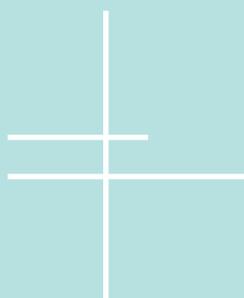
Common reasons for failure to meet standard

- D Failure to adhere to the discharge policy.
- D Inadequate explanation given.
- D Misjudgement of the degree of pain likely to be experienced at home.
- D Failure to realise that social support was not adequate.

CPD and Curriculum mapping

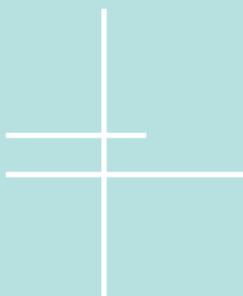
CPD matrix codes: ID01, ID02, I105, 2G04, 2E01, 3A06

Training curriculum: Annex B page B-22–24, B43–44, Annex C page C-20–21, Annex E page E-26–27



References

- 1 Kortilla K. Recovery from outpatient anaesthesia. *Anaesthesia* 1995;**50**(Suppl):22–28.
- 2 Guidance on the provision of anaesthesia services for day surgery. RCoA, London 2009 (<http://www.rcoa.ac.uk/node/764>).
- 3 International Association of Ambulatory Surgery Recommendations. Discharge criteria (<http://www.iaas-med.com/index.php/recommendations/discharge-criteria>).
- 4 Cahill H, Jackson I. Day surgery: principles and nursing practice. *Bailliere Tindall* 1997, pp 182–191.
- 5 Beesley J, Pirie S. National Association of Theatre Nurses standards and recommendations for safe peri-operative practice. *NATN* 2004. Care of the patient in a day care setting, pp 223.
- 6 Nurse Led Discharge. *British Association of Day Surgery*, London May 2009.
- 7 Marshall S and Chung F. Discharge criteria and complications after ambulatory surgery. *Anaesth Analg* 1999;**88**:508–517.



5.6

Unplanned hospital admission after day surgery

Dr M Stocker

Why do this audit?

Unplanned admission after day surgery is inconvenient for patients and their carers. Admission of these patients increases the pressure on acute hospital beds.

With the introduction of best practice tariffs for some day surgery procedures day cases which are admitted may receive a reduced tariff payment.

High unplanned admission rates may reflect sub-optimal practice in a variety of areas, evaluation of this will highlight areas for development.

Some patients may be admitted unnecessarily. Post-admission follow up of these patients may inform more robust discharge criteria and increase confidence in nurse-led discharge.

Identification of high admission rates and subsequent changes in practice will have great benefits for patient care and organisational efficiency.

Best practice: research evidence or authoritative opinion

There should be protocols in place for appropriate patient selection and peri-operative management.^{1,2} Admission and readmission rates³ should be regularly evaluated both globally and for individual procedures and efforts made to take steps to improve these where appropriate. Senior anaesthetic support to the day surgery ward and early intervention will avoid many unplanned admissions.¹ Patients admitted overnight should be evaluated the following day to ascertain whether the admission was necessary.

Suggested indicators

- D Existence of defined medical and social day surgery exclusion criteria.
- D Protocols for management of anaesthesia, analgesia and anti-emesis.
- D Admission rates and reasons globally and by individual procedure.
- D Evidence that admission rates are regularly evaluated.
- D Rates of readmission within 48 hours of discharge (for problem linked with original procedure).

Proposed standard or target for best practice

- D Existence of agreed protocols as above.
- D 100% of patients should meet agreed criteria.
- D There are no standards for unexpected admission, except in urology where the Royal College of Surgeons has suggested readmissions should be < 3%.⁴ Targets should be set locally and continually refined. For consideration:
 - ◆ < 2% unplanned admission rate
 - ◆ < 0.5% readmission after discharge.

Suggested data to be collected

- D Evidence of protocols in place for selection criteria/anaesthesia/seniority of medical staff/discharge criteria.
- D Assessment of patient suitability against protocols.
- D Assessment of clinical practice against protocols.
- D Admission rates, reasons, clinical outcome; opportunities for improvement.
- D Readmission – emergency admission data linked to previous surgical episode.

Common reasons for failure to meet standard

- D Unplanned admission rates are not routinely monitored and hence problem areas remain undetected.
- D No protocol, or protocols not applied – unsuitable patients, procedures, medical/nursing practice.
- D Skill and experience of surgeon and anaesthetist.
- D Poor scheduling resulting in complex patients being operated upon in the afternoon with insufficient time for recovery.
- D Lack of dedicated day surgery unit and staff, day cases using in-patient theatres or wards.⁴

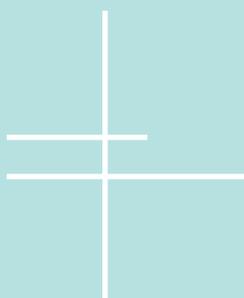
CPD and Curriculum mapping

CPD matrix codes: **ID02, 3A06**

Training curriculum: **Annex B (DS_BK_06), Annex C (DS_IK_03), Annex E (DS_AK_01)**

References

- 1 AAGBI and BADS. Guidelines on Day Case and Short Stay Surgery. *Anaesthesia* 2011;**66**:417–434.
- 2 Pre-operative assessment and patient preparation — the role of the anaesthetist 2. *AAGBI*, London 2010 (<http://www.aagbi.org/sites/default/files/preop2010.pdf>).
- 3 Marshall S and Chung F. Discharge criteria and complications after ambulatory surgery. *Anaesth Analg* 1999;**88**:508–517.
- 4 Crew JP et al. Is day case surgery in urology associated with high admission rates? *Ann Roy Coll Surg Engl* 1997;**79**(6):416–419.



5.7 Anaesthetic patient reported outcomes in day surgery

Dr M Skues

Why do this audit?

Patient satisfaction with both the process and outcomes of anaesthetic care is an increasingly important focus for quality assurance. Patient opinion about their clinician as part of multi-source feedback is regarded as an essential component of the revalidation process, yet the development of specific, robust, discrete and attributable outcome measures for anaesthesia can be difficult. The suggested indicators could also be combined with patient derived opinion and satisfaction with perceived quality of care.¹

Day surgery provides an ideal environment for such a review, as collection of patient-focused data can be facilitated within the course of one working day. Use of this audit can provide confirmation of quality of care provided by departments of anaesthesia within the day surgery pathway, as well as data of potential value for individual anaesthetists to inform their appraisal and revalidation portfolios.

Best practice: research evidence or authoritative opinion

Guidelines for best practice within the various components of the day surgery pathway have been disseminated by the Royal College of Anaesthetists,^{2,5,6} the Association of Anaesthetists of Great Britain and Ireland,³ the NHS Modernisation Agency⁴ and the British Association of Day Surgery.^{3,7}

Suggested indicators

Patient confirmation of:

- D Previous pre-operative assessment as either a face to face or telephone consultation before the day of surgery.
- D Receipt of printed information about anaesthesia and post-operative pain relief.
- D Pre-operative review by an anaesthetist on the day of surgery.
- D Incidence of severe pain or post-operative nausea and vomiting in first stage recovery and their management.
- D Success of regional anaesthesia (if employed for the patient).
- D Post-operative prescription of appropriate analgesia and anti-emetics.
- D Post-operative review by the anaesthetist on the day of surgery.

Proposed standard or target for best practice

- D 'All (100%) patients undergoing operations suitable for day surgery should attend pre-operative assessment.'⁴
- D 'All (100%) patients undergoing elective procedures should be provided with easily understood information covering anaesthesia and post-operative pain relief before admission to hospital.'⁵
- D 'Before undergoing an operation that requires general or regional anaesthesia provided by an anaesthetist all (100%) patients must be met by an anaesthetist, ideally the individual involved with care.'⁵
- D 'All (100%) patients should receive effective control of pain and post-operative nausea and vomiting'.⁶
- D While post-operative review by the anaesthetist is not essential in a day surgery unit where nurse-led discharge has been implemented,⁷ the practice should be encouraged, particularly after the use of regional anaesthesia or chronic pain interventional lists.

Suggested data to be collected

- D Information collected by patient questionnaire immediately prior to discharge, using the criteria cited above.

Common reasons for failure to meet standard

- D Inadequate provision of pre-operative assessment facilities or late booking and changes to operating lists precluding timely appointments.
- D Insufficient provision of printed information related to anaesthetic care.
- D Perceived inadequate time to review patients pre-operatively.
- D Absence of agreed protocols/guidelines for management of post-operative pain and emesis in the day surgery environment.

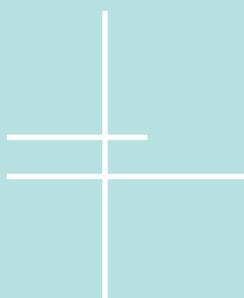
CPD and Curriculum mapping

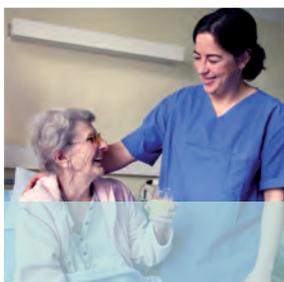
CPD matrix codes: ID02, 2A03, 2E01

Training curriculum: Annex B page B-43 and B-44

References

- 1 Chanthong P, Abrishami A, Wong J, Herrera F, Chung F. Systematic Review of Questionnaires Measuring Patient Satisfaction in Ambulatory Anesthesia. *Anesthesiology* 2009;**110**:1061–1067.
- 2 Guidance on the provision of anaesthesia services for day surgery. RCoA, London 2009 (<http://www.rcoa.ac.uk/node/764>).
- 3 Verma R et al. Day case and short stay surgery: 2. *Anaesthesia* 2011;**66**:417–434 (<http://www.aagbi.org/sites/default/files/Day%20Case%20for%20web.pdf>).
- 4 National Good Practice Guidance on Pre-operative Assessment for Day Surgery 2002. NHS Modernisation Agency.
- 5 Guidance on the provision of anaesthesia services for pre-operative care. RCoA, London 2009 (<http://www.rcoa.ac.uk/node/708>).
- 6 Guidance on the provision of anaesthesia services for post-operative care. RCoA, London 2009 (<http://www.rcoa.ac.uk/node/710>).
- 7 Nurse Led Discharge. *British Association of Day Surgery*, London May 2009.





Section 6: Anaesthesia and sedation outside theatres

Edited by Dr Ian Jackson

- 6.1 Anaesthesia in the emergency department**
- 6.2 Anaesthesia in the radiology department (imaging)**
- 6.3 Anaesthesia for radiotherapy**
- 6.4 Anaesthesia for electroconvulsive therapy (ECT) in ECT clinics**
- 6.5 Anaesthesia for cardioversion**
- 6.6 Endoscopy under sedation**
- 6.7 Use of continuous capnography monitoring outside theatres**

6.1

Anaesthesia in the emergency department

Dr P Oakley

Why do this audit?

In the emergency department (ED), rapid sequence induction of anaesthesia with intubation (RSI) is often required immediately in severely ill or injured patients. Major trauma patients may have uncontrolled bleeding, depressed consciousness and spinal injury. The best choice of drugs and doses for the induction of anaesthesia in this setting is controversial. Further challenges result from the time pressure to achieve rapid definitive diagnosis and emergency intervention.

The 4th National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society (NAP4) highlighted several concerns.¹ Most of the events reported in the ED were complications of RSI. The commonest cause appeared to be poor judgement, but poor planning, inadequate provision of skilled staff and equipment, delayed recognition of events, and lack of or misinterpretation of capnography were all considered to be important.

Best practice: research evidence or authoritative opinion

Previous NCEPOD reports have considered that too many decisions in emergency situations are being made by junior trainees. The need for accountability in providing direct or indirect supervision has been recognised.

A trained assistant should be present whenever anaesthesia is administered in the ED. The equipment immediately available for difficult intubation should be the same as that in the operating theatre. Observations around the time of intubation should be recorded in the same detail as in the operating theatre or ICU.

The safety of etomidate has been questioned in critically ill and injured patients. Ketamine is increasingly recommended in the emergency setting and many clinicians no longer consider it to be contraindicated in head injury. Propofol even in a small, tailored dose for intubation may cause delayed hypotension. Thiopentone in carefully judged doses is still well respected.

The need for RSI in major trauma patients should not be allowed to cause significant delay in achieving rapid diagnostic imaging and emergency control of bleeding. CT scanning is the primary imaging modality, even in many cases with a degree of cardio-respiratory instability. Increasingly, CT scans are carried out immediately or within 30 minutes. Patients requiring emergency haemorrhage control should be in a definitive management area (operating theatre or intervention suite) within 60 minutes of arrival.

Suggested indicators**Governance infrastructure and preparedness**

There should be a nominated consultant anaesthetist responsible for anaesthetic services in the ED with links to the trust's governance programme. There should be regular team practice for RSI and major trauma management, using case scenarios and simulation with debriefing and discussion, at least every 2 months.

Availability of personnel, anaesthetic drugs and equipment

Personnel with competence in RSI, together with trained assistants, should be available 24/7. This may be tested using 'dummy call-in' practices to provide an 'availability snapshot', similar to the testing carried out as major incident practice.

There should be an agreed range of analgesic, sedative and induction drugs, relaxants, reversal agents and resuscitation drugs. There should be checklists of what should be available, together with visible algorithms for difficult airway and major haemorrhage management in the resuscitation room. A dose calculation chart, formula or other algorithm to establish appropriate doses in children should be available and visible. An agreed range of airway and ventilatory equipment should be available with evidence that portable ventilators have been pre-checked. The presence of capnography is especially important.

Documentation and real-time recording of processes

Every ED RSI should be specifically recorded for governance review. A standardised RSI audit form has already been developed. Trauma patients with cardio-respiratory instability or altered conscious level should be scrutinised in detail with particular emphasis on timely interventions.

Detailed objective information for performance improvement may be provided by video analysis of resuscitation room activity. This must be carried out in a carefully managed governance setting.

	<p>Alternatively, supernumerary observers can provide precise time recordings of observations and interventions. Key time intervals can then be used to drive performance improvement, using statistical process control (SPC). In this multidisciplinary environment, it is essential to maintain an atmosphere of openness and support, rather than attributing blame. The ED and anaesthetic staff must feel that they share ownership of the process.</p>
<p>Proposed standard or target for best practice</p>	<p>There should be evidence of the above governance infrastructure and team practice. All ED RSIs and major trauma calls should be subject to formal review. In 100% of ED RSIs, the defined audit form should be completed fully.</p> <p>The anaesthetic trauma team members should be of ST3 grade or above to manage RSI and haemorrhage control in major trauma patients, and should attend within 5 minutes of being called, more than 90% of the time. A trainee anaesthetist should be able to obtain senior advice within 3 minutes or direct practical assistance from a senior colleague within 20 minutes, whenever needed (100%).</p> <p>At least 20% of trainee anaesthetist RSIs in the ED should be supervised directly. In 100% of ED RSIs, a trained assistant should be present for the RSI itself and for subsequent mechanical ventilation, extubation and recovery.</p> <p>Failed intubation should occur less than in 1% of RSI cases.</p> <p>It is strongly recommended that accurate real-time data is recorded to allow discerning review of ED RSI and major trauma resuscitation. Drug and fluid usage, timeliness and appropriate attention to detail can be assessed in multidisciplinary meetings. Suggested recording forms and audit time intervals are shown below. For most of the intervals, there are no agreed targets, but where observed practice has been slow, continuing reduction is an aim in itself – quicker is better, provided that other quality issues are not compromised in the process. SPC charts should be used to underpin PDSA cycles.</p>
<p>Suggested data to be collected</p>	<p>See the Peri-RSI Chart and College RSI Audit Sheet (available on the College website)</p> <p>See the Shocked or Obtunded Major Trauma First Hour Chart (available on the College website)</p>
<p>Common reasons for failure to meet standard</p>	<ul style="list-style-type: none"> D The on-call anaesthetist may be busy elsewhere. Senior colleagues may be busy or not in the hospital. ED nurses are often not trained in assisting the anaesthetist or in managing mechanical ventilation, recovery and extubation. D Lack of systems for multidisciplinary review and poor governance arrangements. D In emergency situations, the focus is on delivering rather than recording care. Information may be lacking or estimated optimistically in retrospect.
<p>CPD and Curriculum mapping</p>	<p>CPD matrix codes: IB04, 2A02</p> <p>Training curriculum: Annex B page B-77–79, Annex C page C-43–45, Annex D page D-31–32</p>
<p>References</p>	<ol style="list-style-type: none"> 1 NAP4: Major complications of airway management in the UK. Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists. <i>RCoA</i>, London March 2011 (http://www.rcoa.ac.uk/nap4). 2 Simpson H, Clancy M. Recording rapid sequence induction: audit training and practice. <i>College of Emergency Medicine</i>, London January 2008 (http://www.collemergencymed.ac.uk/asp/document.asp?ID=3942). 3 Nolan J, Clancy M. Airway management in the emergency department. <i>Br J Anaesth</i> 2002;88:9–11. 4 Regional Networks for Major Trauma. NHS Clinical Advisory Groups Report. <i>DH</i>, September 2010 (http://www.excellence.eastmidlands.nhs.uk/). 5 Blood transfusion and the anaesthetist: management of massive haemorrhage. AAGBI, 2010. In: <i>Anaesthesia</i> 2010;65:1153–1161. 6 Rossaint R et al. Management of bleeding following major trauma: an updated European guideline. <i>Crit Care</i> 2010;14:R52. 7 Standards of practice and guidance for trauma radiology in severely injured patients. <i>Royal College of Radiologists</i>, London 2011 (http://www.rcr.ac.uk/docs/radiology/pdf/BFCR(11)3_trauma.pdf). 8 Trauma: who cares? <i>NCEPOD</i>, 2007 (http://www.ncepod.org.uk/2007report2/Downloads/SIP_report.pdf).

6.2 Anaesthesia in the radiology department (imaging)

Dr H Krovvidi

Why do this audit?

The demand for general anaesthesia for radiological procedures is ever increasing and the procedures done in the radiological suites have become more complex and of prolonged duration.¹

Critically ill patients from HDU/ICU are often required to be transferred to the radiology department for either investigations or for interventional procedures.

The same standards of general anaesthesia as available in operating theatres should be present in these remote locations.

Best practice: research evidence or authoritative opinion

The standards of monitoring during sedation and general anaesthesia are clear.² The recent RCoA¹ document along with AAGBI guidelines³ detail the need for skilled and exclusive assistance for the anaesthetist in the provision of a safe anaesthetic service wherever it is supplied. The guidelines for provision of anaesthetic services in magnetic resonance units have been published by AAGBI.⁴

There should be a nominated consultant responsible for anaesthetic services in radiology and those expected to work there should be familiar with the equipment and any protocols in use.

Suggested indicators

- D A named consultant lead for anaesthetic services in radiology.
- D % cases in which monitoring met the standards set out by the AAGBI.
- D % cases in which a trained anaesthetic assistant was present.
- D % cases in which specialised equipment (for example invasive vascular catheters, rapid infusion devices, blood and fluid warming devices and patient warming devices) was present for appropriate clinical situations.
- D % cases in which the patient was recovered in a appropriate post-anaesthesia care unit.
- D Induction programme includes the areas in radiology where anaesthesia is provided and a review of the equipment used.

Proposed standard or target for best practice

- D All departments that provide anaesthesia in radiology should have a nominated consultant lead.
- D 100% patients should be monitored to at least the minimum standard as set out by the AAGBI.
- D 100% cases should have a trained, dedicated assistant present.
- D 100% cases should have specialised equipment present for the appropriate clinical situation.
- D 100% patients should be recovered in a dedicated post-anaesthesia care unit.
- D All units should include this area in their induction programme.

Suggested data to be collected

- D Does unit have a nominated consultant?
- D Availability of monitors for each patient and measurements recorded.
- D Presence/absence of anaesthetic assistant and status.
- D Availability of a dedicated post-anaesthesia care unit.
- D Presence of specialised equipment for the appropriate clinical situation.
- D Does induction programme include this area?

Common reasons for failure to meet standard

- D Monitoring devices or equipment not available or broken.
- D Personnel limited in number with consequent inability to cope with unexpected demand.
- D Constraints of appropriate space for post-anaesthesia care.
- D Not included in induction programme.

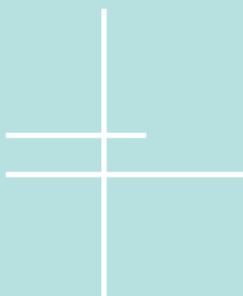
CPD and Curriculum mapping

CPD matrix codes: 2F03, 2A07, 2A10, 3A05

Training curriculum: Annex C page C-23–24

References

- 1 Guidelines for provision of services for anaesthesia in the non-theatre environment. *RCoA*, London 2011 (<http://www.rcoa.ac.uk/node/766>).
- 2 Recommendations for Standards of Monitoring during Anaesthesia and Recovery (4th Edition). *AAGBI*, London 2007 (<http://www.aagbi.org/sites/default/files/standardsofmonitoringo7.pdf>).
- 3 The anaesthesia team 3. *AAGBI*, London 2010 (http://www.aagbi.org/sites/default/files/anaesthesia_team_2010_o.pdf).
- 4 Provision of anaesthetic services in magnetic resonance units. *AAGBI*, London 2002 (<http://www.aagbi.org/sites/default/files/mrio2.pdf>).



6.3

Anaesthesia for radiotherapy

Dr J Gannon

Why do this audit?

Anaesthesia for radiotherapy presents many challenges.^{1,2}

The majority of patients will be infants and young children where inadequate immobilisation can result in treatment failure and tissue damage. Patients requiring fractionated radiotherapy may require multiple daily anaesthetics for up to 6 weeks. Other issues include:

- D the service is often sporadic in nature
- D the location may be unfamiliar and isolated
- D the location and service often not included in the staff induction programme.

All personnel must leave the room during treatment which can cause several difficulties due to the lack of direct patient access. Therefore equipment to facilitate the remote observation of the patient and remote monitoring of vital signs is required.

Other issues include:

- D lighting may be poor
- D lack of permanent anaesthetic equipment, piped gases, scavenging and suction
- D radiotherapy staff unlikely to be of assistance
- D absence of recovery facilities.

Best practice: research evidence or authoritative opinion

There is little published evidence to support guidelines for best practice. However each department should have nominated clinical lead and the RCoA's 'Guidelines for provision of services for anaesthesia in the non-theatre environment' should be followed.³

Suggested recommendations include the following.

- D Intravenous induction via indwelling catheter.
- D Inhalation anaesthesia.
- D Spontaneous ventilation via an LMA.
- D Avoid daily intubations.
- D Lowest safe inspired oxygen concentration using air/oxygen mixture.⁴
- D Nitrous oxide should be avoided in immunosuppressed patients requiring repeat general anaesthesia⁵

Suggested indicators

- D Nominated consultant anaesthetist lead.
- D Patient monitoring to AAGBI standards.
- D Presence of trained dedicated anaesthesia support staff.
- D Presence of trained dedicated recovery staff.
- D Appropriate equipment: anaesthetic machine, suction, scavenging, drugs, resuscitation equipment.
- D Appropriate documentation.

Proposed standard or target for best practice

- D Nominated consultant anaesthetic lead.
- D 100% of anaesthetics delivered by appropriate experienced consultants.
- D 100% of patients monitored to AAGBI standards.⁶
- D 100% of patients to have CCTV monitoring of patient and breathing circuit/reservoir bag.
- D 100% of patients should have video-repeated remote vital signs monitoring.
- D 100% presence of trained dedicated anaesthesia support staff.
- D 100% presence of trained dedicated recovery staff.
- D 100% of cases to have adequate documentation.

Suggested data to be collected

- D Does unit have nominated consultant?
- D Presence of experienced consultant.
- D Availability of monitors for each patient and measurements recorded.
- D Availability of CCTV link
- D Presence/absence of anaesthetic assistant and status.
- D Availability of a dedicated post-anaesthesia care unit.
- D Presence of specialised equipment for the appropriate clinical situation.
- D Does induction programme include this area?

Common reasons for failure to meet standard

- D No clinical lead for service.
- D Lack of consultant anaesthetist due to sporadic nature of the service.
- D Poorly visible CCTV – patient and/or monitoring.
- D Lack of appropriate equipment.
- D Equipment failures.
- D Non availability of trained anaesthetic support and recovery staff.

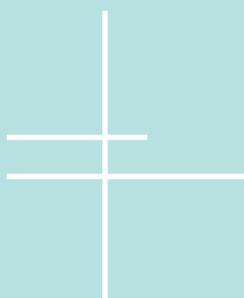
CPD and Curriculum mapping

CPD matrix code: **2A08**

Training curriculum: No direct links

References

- 1 Anaesthetic Services in Remote Sites. RCoA, London March 2011 (<http://www.rcoa.ac.uk/node/637>).
- 2 Harris EA. Sedation and Anesthesia Options for Pediatric Patients in the Radiation Oncology Suite. *Int J Pediatr* Volume 2010, Article ID 87092 (<http://www.hindawi.com/journals/ijped/2010/870921/>).
- 3 Guidelines for provision of services for anaesthesia in the non-theatre environment. RCoA, London 2011 (<http://www.rcoa.ac.uk/node/766>).
- 4 Klein DS, Wilds PR. Pulmonary toxicity of antineoplastic agents: anaesthetic and postoperative complications. *Can Anaesth Soc J* 1983;30:399–405.
- 5 Brodsky JB, Cohen EN. Adverse effects of nitrous oxide. *Med Toxicol* 1986;1(5):362–374.
- 6 Recommendations for Standards of Monitoring during Anaesthesia and Recovery (4th Edition). AAGBI, London 2007 (<http://www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf>).



6.4 Anaesthesia for electroconvulsive therapy (ECT) in ECT clinics

Dr H G W Paw, Dr A K Gopaldaswamy

Why do this audit?

ECT clinics are sited at varying distances from the main hospital site. The standards for the administration, monitoring and management of anaesthesia in ECT clinics should be on par with those applied in the main hospital.¹

Best practice: research evidence or authoritative opinion

NICE guidance on the use of ECT² provides audit criteria for the audit of ECT but does not mention anaesthesia.

Royal College of Psychiatrists ECT Accreditation Service (ECTAS) was established in October 2003 to improve the standards and quality of administration ECT.³ ECTAS membership includes psychiatrists, anaesthetists, nurses and service users. The majority of ECT clinics in the UK now have now accreditation with ECTAS.

Suggested indicators

ECTAS in conjunction with the Royal College of Anaesthetists (RCoA) guidelines and standards has produced ECT anaesthesia standards for the ECT clinics relating to staffing, equipments, emergency drugs, protocols and documentation. All the accredited ECT clinics fulfil these by completing audit tools provided by ECTAS.

Proposed standard or target for best practice

As per ECTAS standards for anaesthesia produced in conjunction with the RCoA and the Association of Anaesthetists of Great Britain and Ireland (AAGBI).

- D Named consultant anaesthetist as the anaesthesia lead clinician for the ECT clinic with dedicated PA time in the job plan.
- D Anaesthetists must have good knowledge of anaesthetic techniques on the conduct and efficacy of ECT.
- D Protocols for ECT anaesthesia and other protocols as per ECTAS standards.⁴
- D Equipments for administration and monitoring as per ECTAS standards.
- D Comply with RCoA and AAGBI standards of clinical monitoring during anaesthesia and recovery.⁵
- D Documentation.

Suggested data to be collected

- D It is a requirement of all ECT clinics to comply with ECTAS standards to have the accreditation. ECTAS provide all the data collection tools, analyse and provide feedback.
 - D 100% compliance with Type I ECTAS standards.
 - D ECT clinics should have a named consultant anaesthetist.
 - D All anaesthetics at remote sites should be given by experienced StR, or more senior grades.
 - D High risk patients (ASA grade 3 and above) should be pre-assessed by a consultant and the optimal location including theatre for ECT should be determined.
 - D All anaesthetists should be supported by a suitably trained ODP.
 - D Standards for monitoring and recovery as stipulated by the AAGBI.
 - D Equipment serviced regularly and recorded.
 - D Revision and update of protocols every 2 years or earlier if required.
 - D Documentation of treatment, monitoring and any problems in the case notes.
-
- D As per ECTAS standards and data collection tools. (Note: ECTAS standards and data collection tools for audits are copyrighted and available to all the ECT clinic member.
 - D Anaesthesia documentation from the case notes.

Common reasons for failure to meet standard

- D Poor anaesthetic documentations in the case notes.
- D Failure to follow the agreed protocols and standards.
- D Lack or inadequate provision of equipment recommended by ECTAS and RCoA⁶ for remote site ECT clinics.
- D Lack of named consultant for ECT.

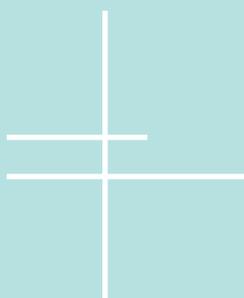
CPD and Curriculum mapping

CPD matrix codes: **IE03, 2A08**

Training curriculum: **Annex C page C-31**

References

- 1 Guidelines for provision of services for anaesthesia in the non-theatre environment. RCoA, London 2011 (<http://www.rcoa.ac.uk/node/766>).
- 2 NICE Technology Appraisal 59: Electroconvulsive therapy (ECT). NICE, London April 2003 (<http://www.nice.org.uk/TA059>).
- 3 The ECT Accreditation Service (ECTAS): Standards for the administration of ECT, 9th edition, December 2011 (<http://www.ectas.org.uk>).
- 4 CR128. The ECT Handbook (2nd edition): The Third Report of the Royal College of Psychiatrists' Special Committee on ECT. RCPsych, London 2005 (<http://www.rcpsych.ac.uk/publications/collegereports/cr/cr128.aspx>).
- 5 Recommendations for standards of monitoring during anaesthesia and recovery (4th edition). AAGBI, London 2007 (<http://www.aagbi.org/publications/guidelines/docs/standardsofmonitoringo7.pdf>).
- 6 Anaesthetic services in remote sites. RCoA, London 2011 (<http://www.rcoa.ac.uk/node/637>).



6.5

Anaesthesia for cardioversion

Dr I Moideen, Dr D Whitaker

Why do this audit?

Cardioversion requires a brief period of general anaesthesia. Most of these are performed electively; however it may also take place as an emergency procedure at remote sites. The patients requiring cardioversion often have multi-system disease and those patients requiring emergency cardioversion will have unstable hemodynamic parameters. The presence of a trained anaesthetist along with support staff and full monitoring facilities are considered mandatory.

Best practice: research evidence or authoritative opinion

Minimum monitoring standards and the need for trained assistance are described by the Association of Anaesthetists.¹ All the patients should be prepared like any other patient for a general anaesthetic. Certain arrhythmias such as atrial fibrillation have high incidence of atrial thrombi² and systemic anticoagulation should be followed as per local or national guidelines.^{3,4} The Assessment of Cardioversion Utilising Transoesophageal Echocardiography (ACUTE) study has reported a 6-month follow up of 1,034 patients having cardioversion for atrial fibrillation; it showed embolic events were up to 2%, haemorrhagic rate up to 7.5%, all cause mortality up to 4% and maintenance of sinus rhythm up to 62%. Using Transoesophageal Echocardiography (TOE) may allow a shorter pre-operative anticoagulation period.⁵ An anterior-posterior electrode position may be more effective than the anterior-lateral position for external cardioversion.⁶ Cardioversion devices using biphasic waveforms have greater efficacy, requiring fewer shocks and lower delivered energy, which also results in less dermal injury than a monophasic shock waveform.⁷ Application of non-steroidal anti-inflammatory cream prior to cardioversion may reduce the incidence and severity of cutaneous burns.⁸

Suggested indicators

- D % cases in which full monitoring as per AAGBI guidelines used.
- D % cases performed with trained anaesthetist.
- D % cases performed with trained anaesthetic assistant.
- D % cases at which resuscitation equipment was checked less than 24 h before, and since any other resuscitation attempt.
- D % cases performed with external pacing equipment.
- D % elective patients who had received anticoagulation as per current guidelines.
- D % of patients with current electrolyte results available.
- D % patients without skin 'burns'.
- D % cases where cardioversion device used biphasic waveform.

Proposed standard or target for best practice

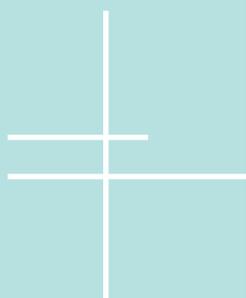
- D All indicators should be true in 100% patients.

Suggested data to be collected

- D As for each indicator.

Common reasons for failure to meet standard

- D Failure to regard full facilities as important.⁹
- D Inadequate staffing or training.
- D Inadequate provision of monitoring.
- D Failure to anticoagulate effectively.
- D Failure to use paddles and pads correctly.
- D Failure to use cardioversion device with biphasic waveform.



CPD and Curriculum mapping

CPD matrix codes: **2A08**

Training curriculum: **Annex B page B-55, Annex C page C-13, C-53**

References

- 1 Recommendations for standards of monitoring during anaesthesia and recovery (4th edition). *AAGBI*, London 2007 (<http://www.aagbi.org/publications/guidelines/docs/standardsofmonitoring07.pdf>).
- 2 Maltagliati A et al. Usefulness of transoesophageal echocardiography before cardioversion in patients with atrial fibrillation and different anticoagulant regimens. *Heart* 2006;**92**:933–938.
- 3 NICE Clinical Guideline 36. Atrial fibrillation: the management of atrial fibrillation. NICE, London December 2011 (<http://www.nice.org.uk/CG36>).
- 4 2011 ACCF/AHA/HRS Focused Updates Incorporated Into the ACC/AHA/ESC 2006 Guidelines for the Management of Patients with Atrial Fibrillation. *J Am Coll Cardiol* 2011;**57**:e101–e198.
- 5 Klein AL et al. ACUTE Steering and Publications Committee for the ACUTE Investigators. Efficacy of transesophageal echocardiography-guided cardioversion of patients with atrial fibrillation at 6 months: a randomized controlled trial. *Am Heart J* 2006;**151**(2):380–389.
- 6 Kirchhof P. MD et al. Anterior-posterior versus anterior-lateral electrode positions for external cardioversion of atrial fibrillation: a randomised trial. *Lancet*, 2002 October 26;**360**(9342):1275–1279.
- 7 Biphasic versus monophasic shock waveform for conversion of atrial fibrillation. The results of an international randomized, double-blind multicenter trial. *J Am Coll Cardiol* 2002;**39**:1956–1963.
- 8 Ambler JJ et al. The effect of topical non-steroidal anti-inflammatory cream on the incidence and severity of cutaneous burns following external DC cardioversion. *Resuscitation* 2005;**65**(2):173–178.
- 9 Guidelines for provision of services for anaesthesia in the non-theatre environment. *RCoA*, London 2011 (<http://www.rcoa.ac.uk/node/766>).

6.6

Endoscopy under sedation

Dr I Jackson

Why do this audit?

Sedation by non-anaesthetists for endoscopy is common. Procedures performed under sedation include bronchoscopy, upper and lower gastrointestinal endoscopy and cystoscopy. Traditionally sedation has been carried out with a benzodiazepine or a mixture of benzodiazepine and opioid, with or without local anaesthetic. However there is increasing interest in the use of propofol. A prospective study of upper gastrointestinal endoscopy has shown a death rate of 1 in 2,000 and a morbidity rate of 1 in 200.¹ More recently, evidence from the Closed Claims database in the USA² reveals that 50% of claims from incidents occurring outside operating theatres are linked to endoscopy procedures. These claims were more likely to be judged as having received substandard care. This morbidity and mortality may be reduced if published guidelines for patient care are followed. Recovery facilities may be less adequate than those found in day surgery units.

Best practice: research evidence or authoritative opinion

The Royal College of Surgeons and the British Society of Gastroenterology have made recommendations for standards of care in endoscopy.^{3,4} An intercollegiate working party has also looked at sedation in adults.⁵ The Royal College of Anaesthetists has also provided guidance.⁶ Patients should complete a simple checklist to identify risk factors prior to sedation. Dedicated intravenous access, monitoring, oxygen supplementation and trained help to look after the patient during and after the procedure are recommended. Recovery facilities should be of similar standard to those in day surgical units. Each hospital should have two nominated consultants (one of whom is an anaesthetist and the other a user of sedation) to collaborate in the provision of safe sedation.

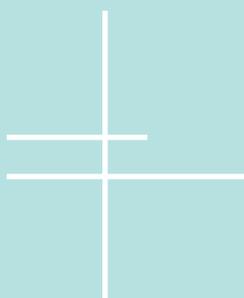
Suggested indicators

- D Lead consultants appointed.
- D Existence of hospital and unit guidelines on the use of sedation.
- D Evidence of regular team training for medical emergencies.
- D Evidence of presence of full resuscitation equipment and drugs.
- D % operators adhering to sedation guidelines.
- D % patients who have undergone an assessment prior to sedation.
- D % patients with:
 - ◆ dedicated intravenous access
 - ◆ continuous monitoring of heart rate, NIBP and SpO₂
 - ◆ supplementary oxygen
 - ◆ continual care during the procedure and recovery from a person trained in resuscitation and unconnected with the actual procedure.
- D % patients requiring the use of reversal agents.
- D % patients where procedure abandoned due to inadequate sedation.
- D % patients with an uncomplicated recovery (without medical intervention in the recovery area and without delayed discharge or admission to a ward).
- D % patients who meet standard criteria for discharge after day case surgery before they are discharged.

Proposed standard or target for best practice

- D All hospitals should have lead consultants appointed.
- D All hospitals should have sedation guidelines (reviewed at least every two years).
- D All units should have evidence of regular (at least annually) team training.
- D All units should have resuscitation equipment and drugs with evidence of regular checking of both.
- D More than 90% of cases should be managed within sedation guidelines.
- D 100% patients should have
 - ◆ dedicated intravenous access
 - ◆ continuous monitoring of heart rate, NIBP and SpO₂
 - ◆ supplementary oxygen
 - ◆ continual care during the procedure and recovery from a person trained in resuscitation and unconnected with the actual procedure.

	<ul style="list-style-type: none"> D 0% patients should require reversal of sedative or opioid. D < 5% of procedures should be abandoned due to inadequate sedation. D 100% patients should have an uncomplicated recovery. D 100% patients should meet standard criteria for discharge after day case surgery before they are discharged. D Admission rate should be under 2%.
Suggested data to be collected	<ul style="list-style-type: none"> D Name of sedation lead clinicians. D Sedation guidelines and when last reviewed. D Evidence of regular team emergency training and date of last session. D Presence of resuscitation equipment and drugs plus checking system. D % patients undergoing an assessment. D Presence of IV cannula, use of supplementary oxygen and monitoring. D Trained help during procedure and recovery. D Use of flumazenil and naloxone. D Events in the recovery period. D Time to fulfil standard discharge criteria. D Number of admissions. D Reason for admission.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D Lack of appreciation of the dangers. D Pressure to carry out large numbers of procedures. D Inadequate staffing of endoscopy units.
CPD and Curriculum mapping	<p>CPD matrix codes: 2A08, 2A10, 3A07</p> <p>Training curriculum: Annex B page B-73–75, Annex C page C-29–30</p>
References	<ol style="list-style-type: none"> 1 Quine MA et al. Prospective audit of upper gastrointestinal endoscopy in two regions of England: safety, staffing and sedation methods. <i>Gut</i> 1995;36:462–467. 2 Robbertze R et al. Closed claims review of anesthesia for procedures outside the operating room. <i>Curr Opin Anaesthesiol</i> 2006;19:436–442. 3 Report of the Working Party on Guidelines for Sedation by Non-Anaesthetists. <i>RCSEng</i>, London 1993. 4 Guidelines on Safety and Sedation for Endoscopic Procedures. <i>BSG</i>, London September 2003. (http://www.bsg.org.uk/clinical-guidelines/endoscopy/guidelines-on-safety-and-sedation-during-endoscopic-procedures.html). 5 Implementing and ensuring Safe Sedation Practice for Healthcare Procedures in adults. Report of a Working Party established by the Royal College of Anaesthetists. <i>RCoA</i>, London November 2001 (http://www.rcoa.ac.uk/node/2270). 6 Guidelines for provision of services for anaesthesia in the non-theatre environment. <i>RCoA</i>, London 2011 (http://www.rcoa.ac.uk/node/766).



6.7

Use of continuous capnography monitoring outside theatres

Dr N O'Keeffe, Dr D Whitaker

Why do this audit?

Capnography has been used in anaesthetic rooms and operating theatres since 1988¹ to prevent harm from accidental oesophageal intubation and other airway management problems. Besides monitoring lung ventilation, capnography can provide safety-critical information about the patient's circulation and metabolism and can aid the diagnosis of low cardiac output states and pulmonary embolism.² Despite these significant contributions to patient safety its use is not universal in clinical areas outside the operating theatre.³

Best practice: research evidence or authoritative opinion

Continuous capnography monitoring outside operating theatres has been recommended by the Association of Anaesthetists⁴ and the American Society of Anesthesiologists.⁵ The National Audit Project on major complications of airway management (NAP4) recommended continuous capnography in Intensive Care Units (ICU), Emergency Departments and Recovery Units.⁶ The Resuscitation Council Guidelines also recommended use of capnography in 2010.⁷

Suggested indicators

- D % ventilated patients in adult ICU in which continuous capnography was used.
- D % ventilated patients in paediatric ICU in which continuous capnography was used.
- D % patients intubated in Emergency Department in which continuous capnography monitoring was used.
- D % patients receiving moderate or deep sedation in which continuous capnography was used
- D % patients with airway devices in recovery in which continuous capnography was used.
- D % patients receiving in hospital CPR in which continuous capnography monitoring was used.
- D % neonates receiving resuscitation in which continuous capnography monitoring was used.

Proposed standard or target for best practice

- D Indicator should be true in 100% of intubated patients in ICU.
- D Indicator should be true in 100% patients intubated in Emergency Department.
- D Indicator should be true in 100% of patients receiving moderate or deep sedation.
- D Indicator should be true on first audit of at least some of the patients the other areas, 20% should then be added to this figure for the next audit and this repeated till 100% is reached.

Suggested data to be collected

- D As for each indicator. This topic could be an opportunity for a multidisciplinary audit with Emergency Department and Resuscitation colleagues.

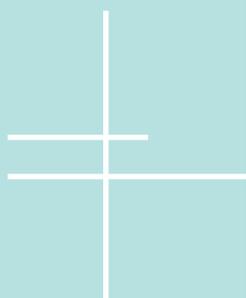
Common reasons for failure to meet standard

- D Failure to have capnography equipment available.
- D Failure to have capnography equipment in working order.
- D Failure to appreciate the value of using capnography equipment.

CPD and Curriculum mapping

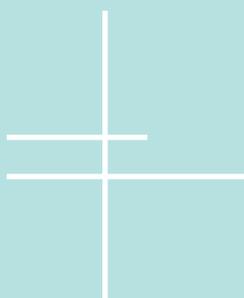
CPD matrix codes: 2A08, 2A10, 2A11, 3A07, 3A11

Training curriculum: Annex B page B-54–55, B-75, B-95, Annex C page C-69, C-31–32



References

- 1 Recommendations for standards of monitoring during anaesthesia and recovery (4th edition). *AAGBI*, London 2007 (<http://www.aagbi.org/publications/guidelines/docs/standardsofmonitoring07.pdf>).
- 2 Gravenstein JS et al. *Capnography*. Cambridge University Press, Cambridge 2011.
- 3 Association of Anaesthetists of Great Britain and Ireland Statement on use of Capnography outside operating theatres. *AAGBI*, London 2011 (http://www.aagbi.org/sites/default/files/Capnographyaagbi090711AJH%5B1%5D_o.pdf).
- 4 Whitaker DK. Time for capnography – everywhere. *Anaesthesia* 2011;**66**:544–549.
- 5 American Society of Anesthesiologists Standards for Basic Anesthetic Monitoring. ASA 2010 (<http://www.asahq.org/~media/For%20Members/documents/Standards%20Guidelines%20Stmts/Basic%20Anesthetic%20Monitoring%202011.ashx>).
- 6 Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists – major complications of airway management in the UK. *RCoA*, London March 2011 (<http://www.rcoa.ac.uk/nap4>).
- 7 Resuscitation Guidelines 2010. *Resuscitation Council (UK)* (<http://www.resus.org.uk/pages/guide.htm>).





Section 7: Resuscitation

Edited by Dr J Nolan

- 7.1 Resuscitation training for anaesthetists**
- 7.2 Prevention of cardiac arrest**
- 7.3 Resuscitation equipment checks**
- 7.4 Inappropriate cardiac arrest calls**
- 7.5 Quality of in-hospital cardiopulmonary resuscitation**
- 7.6 Paediatric resuscitation**
- 7.7 Implementation of therapeutic hypothermia**
- 7.8 Outcome after in-hospital cardiac arrest**

7.1

Resuscitation training for anaesthetists

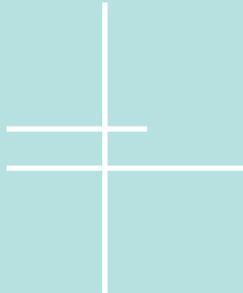
Dr J Soar, Dr J Nolan

Why do this audit?

All anaesthetists should be able to:

- D recognise and treat the patient at risk of cardiac arrest
- D recognise and call for help if cardiac arrest occurs
- D start cardiopulmonary resuscitation (CPR) based on current guidelines and attempt defibrillation if indicated.

Anaesthetists who are involved regularly in resuscitation require greater knowledge of resuscitation and peri-arrest care. Consultant anaesthetists rarely attend cardiac arrests unless they have a critical care role because cardiac arrest during anaesthesia is relatively uncommon.¹ Anaesthetic trainees are often on resuscitation teams although many hospitals do not routinely have an anaesthetic trainee on the resuscitation team. Frequent retraining (theory and practice) is required to maintain CPR skills and knowledge; although the optimal interval for retraining has not been established.^{2,3} Regular updates may be more important for those who are rarely involved in resuscitation. Resuscitation training standards need to be achieved as part of hospital assessments for clinical negligence (e.g. CNST – Clinical Negligence Scheme for Trusts).

Best practice:
research evidence or
authoritative opinion

Training should be relevant to an anaesthetist's clinical responsibilities and expected role, e.g. for different patient groups such as newborn, paediatric, adult, and pregnant patients. Anaesthetists should be able to use the latest guidance to treat conditions that require peri-operative resuscitation such as anaphylaxis, hypoxia, hypovolaemia, and local anaesthetic toxicity.

Experts working under the guidance of the International Liaison Committee on Resuscitation (ILCOR) have recently reviewed the science supporting training in resuscitation.² Several studies have shown a decay in healthcare provider advanced life support (ALS) skills and knowledge after training and retraining from as little as 6 weeks to 2 years. The optimal duration and type of initial training to acquire resuscitation knowledge and skills, and the optimal frequency and type of refresher training required to maintain resuscitation knowledge and skills is not known. Anaesthetists should have annual updates using a variety of methods to acquire and maintain their resuscitation skills and knowledge (e.g. life support courses, simulation training, in-house training, drills in theatre, 'rolling refreshers', e-learning). Resuscitation guidelines are currently updated every five years.⁴ Anaesthetists should ensure they keep up-to-date with guideline changes as part of their continuing professional development.

Suggested indicators

- D % of anaesthetists who have attended an in-house resuscitation update in the last year.
- D % of anaesthetists who are members of a resuscitation team who hold a valid ALS provider certificate (or equivalent courses).

Proposed standard
or target for best
practice

- D 100% anaesthetists should have attended an in-house resuscitation update in the last year.
- D 100% anaesthetists who are members of a resuscitation team should hold a valid ALS provider certificate.

Suggested data to be
collected

For all anaesthetists:

- D indicate whether member of resuscitation team
- D evidence of annual update (in-house training or a national course)
- D indicate whether ever held an ALS provider certificate
- D indicate whether in possession of valid ALS provider certificate
- D reasons for failure to attend annual resuscitation training.

Common reasons for failure to meet standard

- D Insufficient training resources.
- D Insufficient time.
- D Resuscitation training not considered a priority or deemed unnecessary.
- D The need for resuscitation uncommon during routine anaesthesia.
- D Other training courses considered more useful to everyday practice.

Related audits

- 7.2 – Prevention of cardiac arrest
- 7.6 – Paediatric resuscitation practice

See also – National Cardiac Arrest Audit (NCAA). ICNARC (<https://www.icnarc.org/CMS/DisplayContent.aspx?root=AUDIT>)

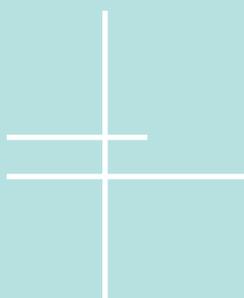
CPD and Curriculum mapping

CPD matrix codes: **IB01, IB03, IB04, 2A06, 2B05, 2B07, 3I00, 3J00**

Training curriculum competences: **RC_BK_01–25, RC_BS_01–11, CI_BK_11, CI_BK_34, RC_IK_01–14, RC_IS_01–07, 1.1–1.3, 5.11**

References

- 1 Saravanan P, Soar J. A survey of resuscitation training needs of senior anaesthetists. *Resuscitation* 2005;**64**:93–96.
- 2 Soar J et al; Education, Implementation, and Teams Chapter Collaborators. Part 12: Education, implementation, and teams: 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. *Resuscitation* 2010;**81** (Suppl 1):e288–330.
- 3 Soar J et al. European Resuscitation Council Guidelines for Resuscitation 2010. Section 9. Principles of education in resuscitation. *Resuscitation* 2010;**81**:1434–1444.
- 4 Nolan JP et al; on behalf of the ERC Guidelines Writing Group. European Resuscitation Council Guidelines for Resuscitation 2010: Section 1. Executive summary. *Resuscitation* 2010;**81**:1219–1276.



7.2

Prevention of cardiac arrest

Professor G B Smith

Why do this audit?

Many in-hospital cardiac arrests appear preventable.^{1,2,3,4,5} Frequently, arrest follows failure to recognise or respond to patient deterioration. Improving the recognition of critical illness and preventing cardiac arrest require a step-wise solution involving staff education, patient monitoring, recognition of patient deterioration, a system to call for help and an effective clinical response.⁶ Failures have been reported in each of these components, resulting in adverse outcomes for patients.^{1,2,3,4,5}

Best practice: research evidence or authoritative opinion

The five-ringed 'Chain of Prevention' can provide a structure for hospitals to design care processes to prevent and detect patient deterioration and cardiac arrest, and can provide a basis for audit and research.^{7,8,9} Improvements to the implementation of the components of the chain,^{5,10,11,12} are logical and may lead to improved patient outcomes.

Suggested indicators

- A Does the hospital have a specific education programme for the recognition and management of the acutely ill patient in the hospital for ward staff, based on competencies defined by the DoH?¹⁰
- B % of ward staff successfully completing such a training programme per three-year cycle.
- C Does the hospital have a specific education programme for the recognition and management of the acutely ill patient in the hospital for staff responding to calls for help, based on competencies defined by the DoH.¹⁰
- D % of responding staff successfully completing such a training programme per three-year cycle.
- E % of staff possessing the agreed levels of competencies relating to the deteriorating patient, as defined by the DoH.¹⁰
- F Does the hospital have a written, immediately available policy that dictates (a) the observations to be recorded at each routine vital sounds observation round, (b) the frequency of observations for a given degree of illness and (c) the response to a given level of patient sickness (including response times), as defined by NICE.¹²
- G % of patients who have a written vital signs plan in their clinical record that identifies the variables to be measured and dictates the frequency of measurement.
- H % of patients whose vital signs measurements occur with the agreed frequency.
- I % of vital signs datasets that include an agreed core dataset of vital signs parameters, as defined by NICE.¹²
- J Does the hospital use either (a) 'calling criteria'¹³ or (b) an early warning score¹⁴ to assist ward staff in the early recognition of patient deterioration for all adult patients outside critical care areas? [Ideally this should be the same throughout the organisation.]
- K Does the hospital use an unambiguous protocol for summoning a response to a deteriorating patient, such as RSVP¹⁵ or SBAR.¹⁶
- L Does the hospital have a specific team (rapid response team) that responds to medical crises other than, but possibly also including, cardiac arrest?
- M % of calls for help where there is documented evidence of a response by the rapid response team.
- N % of calls for help where there is documented evidence of a response by the rapid response team within the time, dictated by the local policy.

Proposed standard or target for best practice

- D In order to confirm that the hospital has the necessary structures in place for the prevention of cardiac arrest, hospitals should aim for compliance with audit criteria A, C, F, J, K and L.
- D There should be 100% compliance for audit criteria B and D, such that all staff should have completed training/refresher training within a three-year cycle.
- D 70% of ward staff, and 100% of responding staff, should possess the agreed levels of competencies relating to the deteriorating patient, as defined by the DoH¹⁰
- D 100% of patients should have a written vital signs plan that identifies the variables to be measured and dictates the frequency of measurement number of patients.
- D 90% of patients' vital signs measurements should occur with the agreed frequency.
- D 90% of vital signs datasets should include an agreed core dataset of vital signs parameters, as defined by NICE.¹²

	<ul style="list-style-type: none"> D 100% of calls for help should be followed by documented evidence of a response by the rapid response team. D 90% of calls for help should be followed by documented evidence of a response by the rapid response team within the time, dictated by the local policy.
<p>Suggested data to be collected</p>	<ul style="list-style-type: none"> D Evidence of educational programmes for staff. D Evidence of vital signs monitoring and escalation policies. D Evidence of vital signs monitoring processes; D Evidence of use of 'calling criteria' or an early warning score. D Evidence of use of an unambiguous protocol for summoning a response to a deteriorating patient. D Evidence of a structured response to patient deterioration.
<p>Common reasons for failure to meet standard</p>	<ul style="list-style-type: none"> D Failure to educate staff. D Inadequate or incomplete patient monitoring. D Absence of a system to assist with the recognition of patient deterioration. D Absence, or failure to use correctly, a common system for communicating patient deterioration and for calling for help. D Absence of a structured clinical response system. D Delayed or inappropriate clinical response.
<p>CPD and Curriculum mapping</p>	<p>CPD matrix codes: 2C01, 2C03</p> <p>Training curriculum: RC_IK_09-I I</p>
<p>References</p>	<ol style="list-style-type: none"> 1 Safer care for the acutely ill patient: learning from serious incidents. <i>NPSA</i>, London 2007 (http://www.nrls.npsa.nhs.uk/resources/?EntryId45=59828). 2 Recognising and responding appropriately to early signs of deterioration in hospitalised patients. <i>NPSA</i>, London 2007 (http://www.nrls.npsa.nhs.uk/resources/?entryid45=59834&q=0%C2%ACdeterioration%C2%AC). 3 Kause J et al. A comparison of antecedents to cardiac arrests, deaths and emergency intensive care admissions in Australia and New Zealand, and the United Kingdom — The ACADEMIA study. <i>Resuscitation</i> 2004;62:275–282. 4 Fuhrmann L et al. Incidence, staff awareness and mortality of patients at risk on general wards. <i>Resuscitation</i> 2008;77:325–330. 5 Hillman K et al. Introduction of the medical emergency team (MET) system: a cluster-randomised controlled trial. <i>Lancet</i> 2005;365:2091–2097. 6 Deakin CD et al. European Resuscitation Council. European Resuscitation Council guidelines for Resuscitation 2010. Section 4. Adult advanced life support. <i>Resuscitation</i> 2010;81:1305–1352. 7 Smith GB. In-hospital cardiac arrest: Is it time for an in-hospital 'chain of prevention'? <i>Resuscitation</i> 2010;81:1209–1211. 8 Immediate Life Support course manual. 3rd edition. <i>Resuscitation Council (UK)</i>, London 2011. 9 Advanced Life Support course manual. 6th edition. <i>Resuscitation Council (UK)</i>, London 2011. 10 Competencies for recognising and responding to acutely ill patients in hospital. <i>DH</i>, London 2009 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_096989). 11 Patient Safety First 'how to guide' for reducing harm from deterioration (http://www.patientsafetyfirst.nhs.uk/Content.aspx?path=/interventions/Deterioration/). 12 Acutely ill patients in hospital. NICE Clinical Guidelines CG50. NICE, London July 2007 (http://www.nice.org.uk/CG50). 13 Smith GB et al. A review, and performance evaluation, of single-parameter 'track and trigger' systems. <i>Resuscitation</i> 2008;79:11–21. 14 Smith GB et al. A review, and performance evaluation, of aggregate weighted 'track and trigger' systems. <i>Resuscitation</i> 2008;77:170–179. 15 Featherstone P, Chalmers T, Smith GB. RSVP: a system for communication of deterioration in hospital patients. <i>Br J Nurs</i> 2008;17:860–864. 16 Thomas CM, Bertram E, Johnson D. The SBAR communication technique: teaching nursing students professional communication skills. <i>Nurse Educ</i> 2009;34:176–180.

7-3

Resuscitation equipment checks

Dr N Sayer, Professor G B Smith

Why do this audit?

For Advanced Life Support to be effective, staff need to know where cardiac arrest equipment is located, and that the equipment is readily available and in good working order.¹ Broken or missing equipment, or equipment failure, are often the cause of delays in instituting cardiopulmonary resuscitation.^{1,2,3,4,5,6} A survey of cardiac arrest trolleys in 2002/2003 found that the equipment available varied considerably from recommended standards.⁷ Defibrillators do also occasionally fail, but many errors are due to poor defibrillator care and maintenance.⁸ Inadequate training and a failure of operators to perform daily checks lead to poor familiarity with the equipment and a failure to identify component failure or damaged devices.⁸

Best practice: research evidence or authoritative opinion

The Resuscitation Council (UK) has a recommended cardiac arrest equipment list for cardiopulmonary resuscitation of both adults,⁹ children¹⁰ and neonates,¹¹ and makes recommendations for other equipment-related issues in its 2004 standards document (updated 2008).¹² Institutions should adopt common cardiac arrest equipment based on these standards and should ensure that regular equipment checks are performed.¹³ In areas where cardiac arrests are relatively uncommon, this system is likely to maintain standards, detect deficiencies or malfunctions, and also provide excellent teaching and training opportunities.

Suggested indicators

- A** % of clinical areas with an up-to-date and immediately available list of 'essential' equipment including spares.
- B** % of clinical areas with a readily available record of equipment checks, which includes the date and time of each individual check, and the person undertaking it.
- C** % of clinical areas with evidence of a mechanism for reporting deficiencies.
- D** For each clinical area, document:
 - ◆ the % of days per month that at least one 'routine' check is documented. The record should document the availability, function and cleanliness of all equipment, and should be dated and timed, and should identify the person undertaking the check.
 - ◆ All disposable equipment must be in date.
 - ◆ The resuscitation trolley should be capable of being moved easily by any member of staff.
 - ◆ % of resuscitation episodes where a post-resuscitation check is documented.
 - ◆ % of reported equipment malfunctions that are corrected within one working day.

Proposed standard or target for best practice

- D** Hospitals should aim for 100% compliance for the first indicators A, B and C.
- D** All clinical areas should check resuscitation equipment at least once per day (high risk areas may elect to undertake such checks at each nursing shift handover).
- D** There should be no missing; partially or completely non-functional; dirty or contaminated equipment.
- D** There should be no out-of-date disposable equipment.
- D** The resuscitation trolley should be capable of being moved easily by all members of staff.
- D** There should be a documented check of resuscitation equipment after 100% resuscitation episodes.
- D** 100% malfunctions or deficiencies should be corrected within one working day.

Suggested data to be collected

- D** Name of clinical area.
- D** Presence of a list of 'essential' equipment.
- D** Record of daily check, which should include a check of function, cleanliness and expiry date where appropriate.
- D** Record of check after resuscitation event.
- D** Record of daily check of the mobility of the resuscitation trolley.
- D** Record of critical incident with evidence of investigation of problem and solution.

Common reasons for failure to meet standard

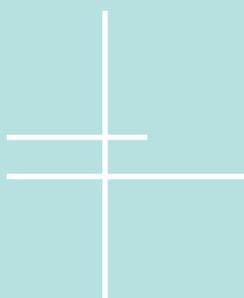
- D Absence of list of 'essential' equipment. There may be a need for a standardised checklist, which should appear on every resuscitation trolley throughout the organisation.
- D Failure of clinical area to identify responsible staff to perform checks.
- D Absence of a process to record and investigate critical incidents, some of which may be related to equipment malfunction.

CPD and Curriculum mapping

CPD matrix code: IB04

References

- 1 National Reporting and Learning System Quarterly data issue 9. Putting patient safety first (England). *NPSA*, London 2009.
- 2 Safer care for the acutely ill patient: learning from serious incidents. *NPSA*, London 2007 (<http://www.nrls.npsa.nhs.uk/resources/?EntryId45=59828>).
- 3 Patient Safety Bulletin 1. Rapid Learning from reported incidents. *NPSA*, London July 2005.
- 4 Airway suction equipment. *NPSA Signal 1309*. *NPSA*, London February 2011 (<http://www.nrls.npsa.nhs.uk/resources/patient-safety-topics/medical-device-equipment/?entryid45=94845>).
- 5 Neonatal Resuscitation. *NPSA Signal 1162 A*. *NPSA*, London February 2010. (<http://www.nrls.npsa.nhs.uk/resources/type/signals/?entryid45=66790>).
- 6 King D et al. Survey of cardiac arrests and cardiac arrest trolleys in a district general hospital. *Br J Clin Prac* 1994;**48**:248–250.
- 7 Hogg I et al. Variations in the provision of resuscitation equipment: survey of acute hospitals. *Postgrad Med J* 2005;**81**:409–410.
- 8 Cummins RO, Chesemore K, White RD. Defibrillator failure. Causes of problems and recommendations for improvement. *J Am Med Assoc* 1991;**264**:1019–1025.
- 9 Recommended minimum equipment for in-hospital adult resuscitation. *Resuscitation Council (UK)*, London October 2004 (<http://www.resus.org.uk/pages/eqiplHAR.htm> accessed 01 September 2011).
- 10 Suggested equipment for the management of paediatric cardiopulmonary arrest (0–16 years) (excluding resuscitation at birth). *Resuscitation Council (UK)* (<http://www.resus.org.uk/pages/PCAequip.htm> accessed 01 September 2011).
- 11 Newborn life support equipment list. Suggested equipment for resuscitation at birth and in the neonatal period in hospitals and birthing centres. *Resuscitation Council (UK)* (<http://www.resus.org.uk/pages/NLSequip.htm> accessed 01 September 2011).
- 12 Cardiopulmonary Resuscitation. Standards for Clinical Practice and Training. *Resuscitation Council (UK)*, London October 2004 (updated June 2008) (<http://www.resus.org.uk/pages/standard.htm>).
- 13 Dyson E, Smith GB. Common faults in resuscitation equipment – guidelines for checking equipment and drugs used in adult cardiopulmonary resuscitation. *Resuscitation* 2002;**55**:137–149.



7.4

Inappropriate cardiac arrest calls

Dr D A Gabbott

Why do this audit?

To assist with the effective implementation of a 'Do Not Attempt Cardiopulmonary Resuscitation' (DNACPR/DNAR) policy that enables patients to be identified for whom resuscitation would be inappropriate.^{1,2,3,4,5}

Best practice: research evidence or authoritative opinion

Inappropriate attempts at resuscitation may produce unnecessary prolongation of an unacceptable quality of life.

Resuscitation attempts which contravene the patient's expressed wishes may constitute an assault.

Resuscitation attempts which are clearly futile are ethically unacceptable.

Suggested indicators

- D Existence of a DNAR/DNACPR policy for the hospital.
- D % of ward-based staff who know where to find it and who have read it.
- D % of cardiac arrest calls made for inappropriate patients.
- D Inappropriate patients/unsuitability is clarified below.

Proposed standard or target for best practice

- D There should be a clear DNAR/DNACPR policy for every hospital admitting acutely ill patients.
- D 100% ward-based staff should have read it.
- D 100% of DNAR/DNACPR decisions:
 - ◆ DNAR form completed
 - ◆ Countersigned by a senior doctor (consultant in charge)
 - ◆ Discussed with patient and/or the relatives or, if inappropriate, the reason for not discussing with patient and/or relatives is documented.
- D 0% cardiac arrest/resuscitation team calls should be made for inappropriate/unsuitable patients e.g:
 - ◆ patients with a DNAR/DNACPR order already in existence in the notes
 - ◆ patients who are mentally competent and who have specifically expressed a wish not to be resuscitated
 - ◆ inappropriate or futile resuscitation in the opinion of the auditor
 - ◆ inappropriate or futile resuscitation in the opinion of the medical and/or ward staff, i.e. DNAR/DNACPR order should have been made but was not.

Suggested data to be collected

- D Presence/absence of a written DNAR/DNACPR policy.
- D Interview of ward-based junior and senior staff to establish if they know how to access it and have read it.
- D Review of DNAR/DNACPR decisions made during the audit period on wards that have been chosen for the audit, by looking at the notes and discussing with medical and ward staff.
- D Analysis of Cardiac Arrest/Resuscitation Team calls during the audit period to assess unsuitability/inappropriate patient.

Common reasons for failure to meet standard

- D Failure to agree a hospital policy or staff to be aware of it.
- D Failure of senior doctor to make and record decision.
- D Failure of senior doctor to appreciate 'futility' of resuscitation efforts.
- D Disagreement between healthcare staff and/or relatives.
- D Ambiguity in effective implementation of DNAR/DNACPR order; i.e. 'only give shocks but no drugs' approach.
- D Variation in personal values and ethical attitude of the senior doctor.
- D Fear of making 'End of Life Decisions'.
- D Fear that making a DNAR/DNACPR order means all care is stopped.

Related audits

7.2 – Prevention of cardiac arrest

7.8 – Outcome after in-hospital cardiac arrest

See also:

- D National care of the dying audit – hospitals 2008/2009. *Marie Curie Palliative Care Institute Liverpool and Royal College of Physicians* (<http://www.mcpcil.org.uk/liverpool-care-pathway/national-care-of-dying-audit.htm>).
- D Cardiac Arrest Procedures. *NCEPOD*, 2012. (<http://www.ncepod.org.uk/cap.htm>).

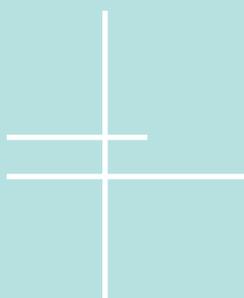
CPD and Curriculum mapping

CPD matrix codes: **IF04, 2C06**

Training curriculum competences: **RC_BK_22–23, 8.1**

References

- 1 Decisions relating to Cardiopulmonary Resuscitation – a joint statement from the British Medical Association, Resuscitation Council (UK) and the Royal College of Nursing. *RCN, RC(UK) and BMA*, London 2007 (<http://www.resus.org.uk/pages/dnar.htm>).
- 2 European Resuscitation Council Guidelines for Resuscitation 2010. Section 10. The ethics of resuscitation and end-of-life decisions. *Resuscitation* 2010;**81**:1445–1451.
- 3 Cardiac Arrest Procedures. *NCEPOD*, London 2012 (<http://www.ncepod.org.uk/cap.htm>).
- 4 Recognising and responding appropriately to early signs of deterioration in hospitalised patients. *NPSA*, London 2007 (<http://www.nrls.npsa.nhs.uk/resources/?entryid45=59834&q=0%C2%ACdeterioration%C2%AC>).
- 5 Treatment and care towards the end of life: good practice in decision making. *GMC*, London 2010 (http://www.gmc-uk.org/guidance/ethical_guidance/end_of_life_care.asp).



7.5

Quality of in-hospital cardiopulmonary resuscitation

Dr J Soar

Why do this audit?

There is evidence that the quality of cardiopulmonary resuscitation (CPR) undertaken in and out of hospital is suboptimal.^{1,2,3,4} This is also the case during training.⁵ Specifically, prolonged interruptions in chest compressions, excessive ventilation rates, and inadequate chest compression rate, depth and leaning are common. The quality of CPR is one of several factors that determines outcome after cardiac arrest.⁶ Poor quality CPR can be addressed by improving training for healthcare providers and providing feedback during training, and where feasible during actual cardiac arrests.⁷ Measurement of CPR quality during training and actual cardiac arrests and feeding back to rescuers during arrests or in subsequent debriefings may improve CPR quality at subsequent cardiac arrests.⁸

Best practice: research evidence or authoritative opinion

The European Resuscitation Council (ERC) has published clinical evidence-based guidelines based on a review of the available evidence.⁶ The guidance emphasises importance of high-quality CPR in determining survival after cardiac arrest. Chest compressions should be delivered at a rate of 100–120 min⁻¹, depth of 5–6 cm, with complete recoil between compressions and minimal interruption to compressions for other interventions (e.g. defibrillation, tracheal intubation). Excessive ventilation rates are common during CPR and reduce coronary perfusion pressure.^{1,4} The ERC guidelines indicate that, once the airway is secured, the ventilation rate during CPR should be 10 min⁻¹. When resuscitating a patient in ventricular fibrillation or pulseless ventricular tachycardia (VF/VT), the delay between stopping chest compressions and delivery of the shock ('the preshock pause') correlates with short-term outcome. Current guidelines recommend that chest compressions continue during defibrillator charging to minimise the preshock pause to a few seconds.⁶

Suggested indicators

Analysis of indicators of quality of CPR is best undertaken during the 2-min periods of chest compressions in the 2010 advanced life support (ALS) algorithm:

- D % of 2-min periods with mean compression rate of 100–120 min⁻¹
- D % of compressions 5–6 cm over 2-min period of CPR
- D % of 2-min periods with ventilation rate 8–12 breaths min⁻¹
- D % of time with no chest compressions during cardiac arrest ('no-flow time')
- D % of intervals > 3 s between stopping chest compressions and shock delivery in VF/VT

Proposed standard or target for best practice

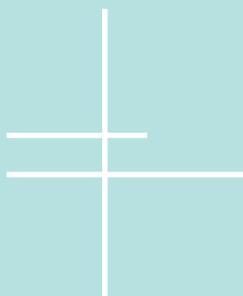
For all cardiac arrests audited:

- D 95%* of 2-min periods with mean compression rate of 100–120 min⁻¹
- D 95%* of compressions 5–6 cm over 2-min period of CPR
- D 95%* of 2-min periods with ventilation rate 8–12 breaths min⁻¹
- D < 20% time with no chest compressions during cardiac arrest.
- D 0% of intervals > 3 s between stopping chest compressions and shock delivery in VF/VT.

* A standard of 95% has been chosen because it is unrealistic to expect 100% for these interventions, but a target of 95% is achievable and emphasises the importance of high-quality CPR.

Suggested data to be collected

Data can be collected by direct observation or taken from defibrillator download data. Modern defibrillators can provide some of this data in real-time.^{1,3} Data for collection include chest compression rate and depth, ventilation rate, no-flow time, and preshock pause.



Common reasons for failure to meet standard

- D Lack of knowledge, training and understanding of current guidelines either at an individual or team level.
- D Chest compressions are often delegated to untrained individuals whilst trained individuals undertake 'advanced tasks' with a prolonged and harmful pause in chest compressions.
- D Need for improved teamwork so that all interruptions in chest compression are planned and minimised.

Related audits

National Cardiac Arrest Audit (NCAA). ICNARC (<http://www.icnarc.org/CMS/DisplayContent.aspx?root=AUDIT>)

CPD and Curriculum mapping

CPD matrix codes: **IB03, IB04**

Training curriculum competences: **RC_BK_01–25, RC_BS_01–11, CI_BK_11, CI_BK_34, I.1–I.3, 5.11**

References

- 1 Abella BS et al. Quality of cardiopulmonary resuscitation during in-hospital cardiac arrest. *J Am Med Assoc* 2005;**293**:305–310.
- 2 Abella BS et al. Chest compression rates during cardiopulmonary resuscitation are suboptimal: a prospective study during in-hospital cardiac arrest. *Circulation* 2005;**111**:428–434.
- 3 Wik L et al. Quality of cardiopulmonary resuscitation during out-of-hospital cardiac arrest. *J Am Med Assoc* 2005;**293**:299–304.
- 4 Aufderheide TP et al. Hyperventilation-induced hypotension during cardiopulmonary resuscitation. *Circulation* 2004;**109**:1960–1965.
- 5 Perkins GD et al. Quality of CPR during advanced resuscitation training. *Resuscitation* 2008;**77**:69–4.
- 6 Nolan JP et al; on behalf of the ERC Guidelines Writing Group. European Resuscitation Council Guidelines for Resuscitation 2010: Section 1. Executive summary. *Resuscitation* 2010;**81**:1219–1276.
- 7 Yeung J et al. The use of CPR feedback/prompt devices during training and CPR performance: A systematic review. *Resuscitation* 2009;**80**:743–751.
- 8 Soar J, Edelson DP, Perkins GD. Delivering high-quality cardiopulmonary resuscitation in-hospital. *Curr Opin Crit Care* 2011;**17**:225–230.



7.6

Paediatric resuscitation

Dr R Bingham

Why do this audit?

Acute paediatric care is increasingly centralised but sick children will present initially to local units, where staff may not have regular experience of acute paediatrics. All hospitals, into which a sick child may be admitted, should have developed systems and be properly equipped to ensure that a deteriorating child is recognised early. Appropriately trained staff should be available to institute treatment to stabilise prior to transfer to a specialist unit, as well as to manage a cardio-respiratory arrest, should it occur.

Best practice: research evidence or authoritative opinion

Reports into the management of acutely ill children have emphasised the importance of having systems to recognise the deteriorating child and staff trained to manage such children available at all times.¹

Systems such as early warning scores² or paediatric emergency teams³ may facilitate this process. Recommendations on levels of resuscitation training suggest that all staff encountering sick children should be trained to recognise the critically ill child and initiate appropriate immediate treatment.¹

Suggested indicators

For clinical areas where children are treated (emergency department, theatres and children's wards)

- D Clear policy on recognition and treatment of critically ill children.
- D % areas with specialised paediatric resuscitation equipment.
- D % days in audit period with a record of paediatric resuscitation equipment check.
- D % staff qualified in recognition of critically ill child (e.g. PILS).
- D % staff in resuscitation team with paediatric advanced life support (EPLS/APLS) training.

Proposed standard or target for best practice

For clinical areas treating children (emergency department, theatres and children's wards)

- D Presence of a policy on recognition and treatment of critically ill children.
- D 100% should have specialist paediatric resuscitation equipment.
- D 100% days should have an adequate record of equipment check.
- D 100% clinical staff should have training in recognition of critically ill child.
- D Resuscitation team should have members with paediatric ALS training at all times.

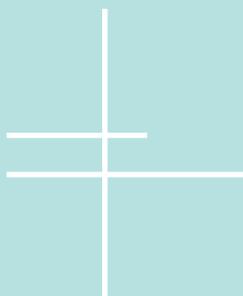
Suggested data to be collected

For each area in which children are treated

- D Presence/absence of a policy on recognition and treatment of critically ill children.
- D Presence of paediatric emergency equipment.
- D Presence of daily record and adequacy of checks performed.
- D Record of staff who have received paediatric life support training (PLS/PILS, EPLS/APLS).

Common reasons for failure to meet standard

- D Absence of policy on management of acutely ill children.
- D Inadequate checking of equipment.
- D Inadequate provision of training and study time to attend courses.
- D Importance of specific paediatric training not appreciated.



Related audits

National Cardiac Arrest Audit (NCAA). ICNARC (<https://www.icnarc.org/CMS/DisplayContent.aspx?root=AUDIT>)

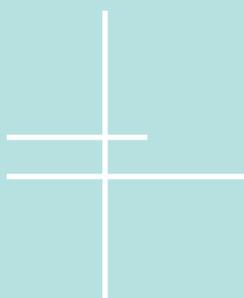
CPD and Curriculum mapping

CPD matrix codes: **1B02, 1B04, 2C01, 2D03, 2D04, 2D07**

Training curriculum competences: **PA_BS_10, RC_IK_01–14, RC_IS_01–07**

References

- 1 The acutely or critically sick or injured child in the district general hospital: A team response. Report of an Inter-collegiate working group. *DH*, London 2006 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_062668).
- 2 Akre M, et al. Sensitivity of the Pediatric Early Warning Score to identify patient deterioration. *Pediatrics* 2010;**125**:e763–e769.
- 3 Tibballs J, Kinny S. Reduction of hospital mortality and of preventable cardiac arrest and death on introduction of a pediatric medical emergency team. *Pediatr Crit Care Med* 2009;**10**:306–312.



7.7

Implementation of therapeutic hypothermia

Dr J Nolan

Why do this audit?

Two randomised clinical trials showed improved outcome in adults remaining comatose after initial resuscitation from out-of-hospital ventricular fibrillation (VF) cardiac arrest, who were cooled within minutes to hours after ROSC.^{1,2} The study patients were cooled to 32–34°C for 12–24 hours. An advisory statement from the International Liaison Committee on Resuscitation (ILCOR)³ recommended the use of mild hypothermia in comatose survivors of out-of-hospital VF cardiac arrest, and this therapy has now been implemented by more than 85% of intensive care units (ICUs) in the United Kingdom.⁴

Best practice: research evidence or authoritative opinion

The 2010 European Resuscitation Council guidelines indicate that unconscious adult patients with spontaneous circulation after out-of-hospital VF cardiac arrest should be cooled to 32–34°C.⁵ Cooling should be started as soon as possible and continued for at least 12–24 hours. There is some evidence that cooling is more effective the earlier it is achieved.⁶ There are animal data and lower-level human data indicating that mild hypothermia might also benefit unconscious adult patients with spontaneous circulation after out-of-hospital cardiac arrest from a non-shockable rhythm, or cardiac arrest in hospital.⁷ The simplest method to initiate cooling is to infuse rapidly 2 litres of cold (4°C) Hartmann's solution or 0.9% sodium chloride.

The patient should be rewarmed slowly (0.25–0.5°C h⁻¹) and hyperthermia avoided. A period of hyperthermia is common in the first 48 hours after cardiac arrest. The risk of a poor neurological outcome increases for each degree of body temperature > 37°C.⁸

Suggested indicators

Retrospective chart review of all patients admitted to the ICU following out-of-hospital VF cardiac arrest. Record:

- D % of comatose patients actively cooled, excluding those with established exclusion criteria (sepsis, pre-existing coagulopathy)
- D % with start of cooling within 1 h of return of spontaneous circulation (ROSC)
- D % achieving target temperature within 4 h
- D % maintained in target range (32–34°C) for at least 12 h
- D % with recorded temperature < 31°C
- D % rewarmed slowly at 0.25–0.5°C h⁻¹
- D % with recorded temperature > 38°C within first 48 h after ROSC.

Proposed standard or target for best practice

For all out-of-hospital VF cardiac arrest patients admitted to ICU without exclusion criteria for therapeutic hypothermia:

- D 100% actively cooled
- D 100% cooling started within 1 h of ROSC
- D 100% achieve target temperature (34°C) within 4 h
- D 100% maintained in target range (32–34°C) for at least 12 h
- D 100% rewarmed slowly at 0.25–0.5°C h⁻¹
- D 0% with recorded temperature < 31°C
- D 0% with recorded temperature > 38°C within first 48 h after ROSC.

Suggested data to be collected

- D Total number of patients admitted comatose to ICU after out-of-hospital VF cardiac arrest.
- D Number actively cooled.
- D Time of ROSC.
- D Time cooling started.
- D Patient temperature for at least the first 48 h.
- D Time target temperature achieved.
- D Duration of active cooling.
- D Rate of rewarming.

Common reasons for failure to meet standard

- D Unaware of the evidence for therapeutic hypothermia.
- D No protocol in place, emergency physicians and critical care staff not trained in the technique; misperception that this therapy increases ICU length of stay and incurs high costs. Failure to use simple techniques (e.g. IV cold fluid and/or ice pack) while awaiting availability of more complex cooling equipment.

Related audits

10.6 – Audit of the results of therapeutic hypothermia after cardiac arrest

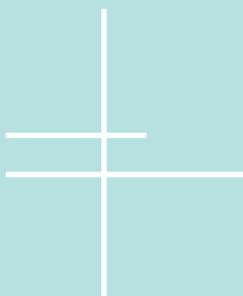
CPD and Curriculum mapping

CPD matrix codes: **1B04, 2C04, 3C00**

Training curriculum competences: **RC_BK_21, 1.3, RC_IK_06, RC_HS_03**

References

- 1 Mild therapeutic hypothermia to improve the neurologic outcome after cardiac arrest. *N Engl J Med* 2002;**346**:549–56.
- 2 Bernard SA et al. Treatment of comatose survivors of out-of-hospital cardiac arrest with induced hypothermia. *N Engl J Med* 2002;**346**:557–563.
- 3 Nolan JP et al. Therapeutic hypothermia after cardiac arrest. An advisory statement by the Advancement Life Support Task Force of the International Liaison Committee on Resuscitation. *Resuscitation* 2003;**57**:231–235.
- 4 Binks AC et al. Therapeutic hypothermia after cardiac arrest – implementation in UK intensive care units. *Anaesthesia* 2010;**65**:260–265.
- 5 Deakin CD et al. European Resuscitation Council Guidelines for Resuscitation 2010 Section 4. Adult advanced life support. *Resuscitation* 2010;**81**:1305–1352.
- 6 Wolff B et al. Early achievement of mild therapeutic hypothermia and the neurologic outcome after cardiac arrest. *Int J Cardiol* 2009;**133**:223–228.
- 7 Walters JH, Morley PT, Nolan JP. The role of hypothermia in post-cardiac arrest patients with return of spontaneous circulation: A systematic review. *Resuscitation* 2011;**82**:508–516.
- 8 Zeiner A et al. Hyperthermia after cardiac arrest is associated with an unfavorable neurologic outcome. *Arch Intern Med* 2001;**161**:2007–2012.



7.8

Outcome after in-hospital cardiac arrest

Dr J Nolan

Why do this audit?

Reported survival rates after in-hospital cardiac arrest are variable.¹ Survival rates can be improved by effective implementation of a DNAR resuscitation policy and by improving the quality of resuscitation (minimal delay starting resuscitation, minimal interruption in chest compressions, rapid defibrillation if the rhythm is shockable). The outcome of all cardiac arrest patients should be audited to enable meaningful targets for improvement, quality assurance, and comparisons between institutions. Contributing data to the UK National Cardiac Arrest Audit (NCAA) will enable benchmarking against the rest of the UK – this necessitates the collection of data relating to the number of hospital admissions (elective, emergency and day cases), which will standardise the denominator.

Best practice: research evidence or authoritative opinion

A recent North American study of almost 52,000 in-hospital arrests documented an overall survival to hospital discharge of 17.6%.² A preliminary report in October 2010 from NCAA documented a survival to hospital discharge of 13.6% but this included specifically only those cases in which a resuscitation team had been called. The presenting cardiac arrest rhythm was VF/VT in 18% of all cases.

Suggested indicators**For all cardiac arrest patients**

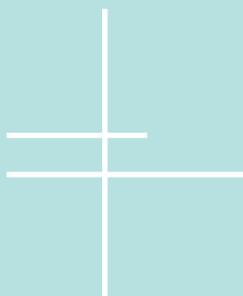
- D % whose initial arrest rhythm was VF/VT.
- D % who have sustained return of spontaneous circulation (ROSC: defined as return of a pulse for more than 20 min).
- D % who survive the event.
- D % who survive to discharge from hospital.
- D Neurological status of those surviving to discharge (documenting cerebral performance category [CPC]).

Proposed standard or target for best practice**For all cardiac arrest patients attended by resuscitation team**

- D Proportion with initial rhythm of VF/VT > 20%.
- D Rate of survival to hospital discharge after VF/VT cardiac arrest is > 40%
- D Overall survival to hospital discharge is > 15%
- D Proportion of survivors capable of independent living (i.e. CPC 1 or 2) is > 90%
- D Standardised data should be collected on 100% of cardiac arrests attended by a resuscitation team.

Suggested data to be collected

- D Date of birth.
- D Sex.
- D Reason for admission.
- D Location of cardiac arrest.
- D Date/time of 2222 call.
- D Presenting rhythm (VF/VT; asystole; pulseless electrical activity; bradycardia with a pulse requiring chest compressions).
- D Sustained ROSC (> 20 min).
- D Date/time of death.
- D Date of hospital discharge.
- D Cerebral performance category at discharge.



Common reasons for failure to meet standard

- D High proportion of inappropriate cardiac arrest calls and futile resuscitation attempts in patients with multiple co-morbidities.
- D Lack of resources to collect high-quality data.

Related audits

- 7.2 – Prevention of cardiac arrest
- 7.4 – Appropriateness of cardiac arrest calls
- 7.5 – Quality of in-hospital cardiopulmonary resuscitation

See also: National Cardiac Arrest Audit (NCAA). ICNARC (<http://www.icnarc.org/CMS/DisplayContent.aspx?root=AUDIT>)

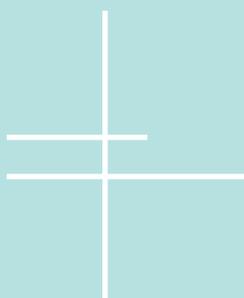
CPD and Curriculum mapping

CPD matrix codes: **IB03, IB04, II02, 2C03**

Training curriculum competences: **RC_BS_11**

References

- 1 Sandroni C et al. In-hospital cardiac arrest: incidence, prognosis and possible measures to improve survival. *Intens Care Med* 2007;**33**:237–245.
- 2 Meaney PA et al. Rhythms and outcomes of adult in-hospital cardiac arrest. *Crit Care Med* 2010;**38**:101–108.





Section 8: Obstetrics

Edited by Dr Mike Kinsella

- 8.1 Adequacy of staffing**
- 8.2 Information about obstetric anaesthesia and analgesia**
- 8.3 Timely anaesthetic involvement in the care of high risk and critically ill women**
- 8.4 Obesity in pregnancy**
- 8.5 Antacid prophylaxis in obstetrics**
- 8.6 Response times for provision of intrapartum analgesia and anaesthesia**
- 8.7 Epidural analgesia during labour**
- 8.8 Caesarean section anaesthesia: technique and failure rate**
- 8.9 Monitoring of obstetric patients in recovery and HDU**
- 8.10 Airway and intubation problems during general anaesthesia for caesarean section**
- 8.11 Pain relief after caesarean section**
- 8.12 Anaesthetic complications and side effects**

8.1

Adequacy of staffing

Dr N Lucas, Dr F Plaat

Why do this audit?

Obstetric anaesthetists are an intrinsic and essential part of the multidisciplinary maternity team and are involved in the care of a significant number of pregnant women.

A recent survey¹ has confirmed an increase in workload for the obstetric anaesthetist as result of:

- D changes in workload: rising birth rate, increased regional anaesthesia rates, the changing nature of the obstetric population, e.g. increasing age, rising levels of obesity, increasing co-morbidity
- D changes in expectations/role: the requirement for the development of new services such as anaesthetic antenatal clinics, maternity high dependency units
- D changes in workforce: the impact of the European Working Time Directive on the working hours of both consultants and trainee doctors.

Best practice: research evidence or authoritative opinion

Successive confidential enquiries into maternal deaths in the UK have stressed the importance of a dedicated obstetric anaesthesia service and the timely involvement of the anaesthetic team in the management of the sick obstetric patient. A study of infant mortality identified staffing issues in a significant number of the anaesthesia-related deaths.² Detailed recommendations have been produced by the Obstetric Anaesthetists' Association, the Association of Anaesthetists of Great Britain and Ireland³ and the Royal College of Anaesthetists.⁴

Suggested indicators

Provision of staff as specified by the AAGBI/OAA:³

- D A basic minimum for dedicated consultant supervision of 50 hours (or more) per week. During working hours this consultant should not have any other duties and be in addition to the duty anaesthetist
- D A duty anaesthetist available immediately 24 hours per day, able to respond to requests for labour analgesia within 30 minutes and appropriately for emergency anaesthesia
- D Separate and dedicated anaesthetic staffing for
 - ◆ elective caesarean sections⁵
 - ◆ other regular components of service delivery such as obstetric anaesthesia antenatal clinics.

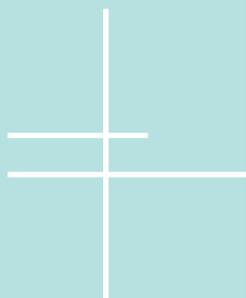
This cover should be provided by an anaesthetist who at the most requires distant supervision.

- D A multidisciplinary resuscitation team for maternal emergencies 24 hours per day.
- D A suitably trained anaesthetic assistant at every theatre procedure who does not have other duties elsewhere in theatre.

% occasions during the audit period that the attending anaesthetist considered that attending the maternity unit was detrimental to the care of a patient elsewhere.

Proposed standard or target for best practice

- D Staffing levels should be as described above.
- D 100% of cases in theatre should have a suitably trained assistant present.
- D On 100% occasions the anaesthetist should attend within an appropriate period of time and without compromising the care of a patient elsewhere.



Suggested data to be collected

- D Nominal staffing levels.
- D Actual staffing levels, including during periods of leave of regular staff:
 - ◆ Consultant
 - ◆ NCCG
 - ◆ Trainee anaesthetists
 - ◆ ODPs.
- D Proportion of duty anaesthetists having documented evidence of having achieved obstetric competencies prior to joining shift system.
- D Details of critical incidents relating to occasions where the anaesthetist had a conflict of responsibility as above, e.g. delay/cancellation of category 4 caesarean section list.

Suggested audit frequency:

- D Staffing levels – yearly
- D Problems of service delivery/critical incidents – continuous (prospective and retrospective).

Common reasons for failure to meet standard

- D Funding and recruitment problems.
- D Reduced trainee numbers
- D Provision of anaesthetic services on multiple sites within the maternity unit itself and the hospital.
- D Exceptional and unpredictable changes in workload.

Related audits

8.6 – Response times for provision of intrapartum analgesia and anaesthesia

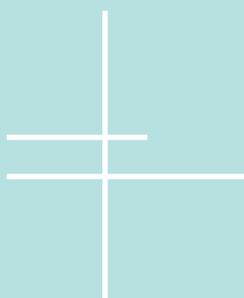
CPD and Curriculum mapping

CPD matrix codes: **1I02, 2B05, 3B00**

Training curriculum competences: **OB_HS_13, OB_AK_04**

References

- 1 OAA/AAGBI survey of obstetric anaesthetic workload (<http://www.oaa-anaes.ac.uk/content.asp?ContentID=467>).
- 2 Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI): 7th Annual Report, 2000. *Maternal and Child Health Research Consortium*, London 2000 (<http://www.cemach.org.uk/getattachment/b858e5e8-862a-4121-9348-b9284d02db1b/7th-Annual-Report.aspx>).
- 3 OAA/AAGBI guidelines for obstetric anaesthetic services – 3rd edition. *AAGBI and OAA*, London, 2012 (<http://www.aagbi.org/publications/publications-guidelines/M/R>)
- 4 Guidance on the provision of Obstetric Anaesthesia Services. *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/717>).
- 5 Clinical Negligence Scheme for Trusts (CNST) Maternity Clinical Risk Management Standards 2012/13.



8.2 Information about obstetric analgesia and anaesthesia

Dr J Middle, Professor M Wee

Why do this audit?

The Changing Childbirth report¹ made explicit the right of women to make informed decisions about their care during pregnancy and childbirth. Changing legal and public expectations demand that we provide evidence-based information, at the appropriate time and in multiple languages to enable women to make these decisions.

Best practice: research evidence or authoritative opinion

When?

Women should have access to information antenatally about all types of analgesia and anaesthesia available.^{2,3} Women in labour should receive this information before consenting to an anaesthetic procedure. Information regarding analgesia and anaesthesia for caesarean section (CS) should be given when CS is booked. Written material should not replace discussion between women and clinicians.⁴

How?

A study in 2003 showed patients receiving the Obstetric Anaesthetists' Association (OAA) leaflet Pain relief in labour, as well as standard booking information, were more knowledgeable than those receiving standard booking information alone.⁵ During labour, patient recall and satisfaction can be improved by using written information about regional anaesthesia.⁶ The Epidural Information Card (EIC) should be used to provide information to women requesting an epidural before the arrival of the anaesthetist as part of the consenting process.^{2,7} The provision of information should be given as early as possible before emergency CS.

Professional interpretation services should be provided for all pregnant women who do not speak English.⁸ Information in multiple languages can be found on the OAA website.⁹

Who by?

Written information on anaesthesia and verbal information from other health professionals may be adequate for some women, but women who wish for more detailed responses should have access to an anaesthetist.¹⁰

How much?

Women should be informed of the level of availability of anaesthesia and regional analgesia in each unit.² Anaesthetists should place emphasis on the process of consent and tailor the process to the circumstances.¹¹ The women should have the opportunity to ask any questions. All information given should be clearly documented.

Suggested indicators

- D % women receiving antenatal education/information on analgesia and anaesthesia.
- D % women receiving written information to reinforce this.
- D Existence of unit information cards to improve knowledge and satisfaction.
- D % non-English speaking women receiving written information on analgesia and anaesthesia in relevant language.
- D % non-English speaking women where an interpreter was available during delivery.
- D % women satisfied with level of information they were given antenatally and during labour.

Proposed standard or target for best practice

- D 95% women to receive education and written information as above.
- D > 75% non-English speaking women receiving written information in relevant language.
- D > 75% cases an interpreter to be available during delivery of non-English speaking women.
- D 100% of units should have a unit information card.
- D A target of > 80% women to be satisfied they were given sufficient information both antenatally and during labour.

Suggested data to be collected

- D Examine notes and epidural/anaesthetic chart for documentation of information given antenatally.
- D Mothers may be seen postpartum to assess what information they were given antenatally and if they felt it was sufficient.
- D Suggested audit frequency – annual

Common reasons for failure to meet standard

- D Non-attendance at antenatal classes.
- D Inadequate availability of patient information leaflets.
- D Inadequate availability of patient information leaflets in foreign languages.
- D Inadequate availability of patient information in other media forms.
- D Insufficient or non-availability of interpreter services.

Related audits

- I.1 – Patient information about anaesthesia
- I.1.2 Patient information on pain management

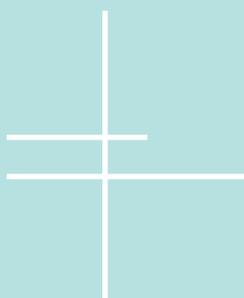
CPD and Curriculum mapping

CPD matrix codes: **2B01–04**

Training curriculum codes: **OB_BS_02, OB_IS_02, OB_HS_10**

References

- 1 Changing Childbirth (The Cumberlege Report). *HMSO*, London, 1993.
- 2 OAA/AAGBI guidelines for obstetric anaesthetic services – 3rd edition. *AAGBI and OAA*, London, 2012 (<http://www.aagbi.org/publications/publications-guidelines/M/R>)
- 3 Jackson GNB. The capacity to consent to epidural analgesia in labour. *Int J Obstet Anesth* 2011;**20**(3):269–270.
- 4 Broaddus BM, Chandrasekhar S. Informed consent in obstetric anaesthesia. *Anesth Analg* 2011;**112**(4):912–915.
- 5 Stewart A et al. Assessment of the effect upon maternal knowledge of an information leaflet about pain relief in labour. *Anaesthesia* 2003;**58**(10):1015–1019.
- 6 White LA et al. Written information about epidural analgesia for women in labour: did it improve knowledge? *Int J Obstet Anesth* 2003;**12**(2):93–97.
- 7 Middle JV, Wee MYK. Informed consent for epidural analgesia: a survey of UK practice. *Anaesthesia* 2009;**64**(2):161–164.
- 8 Centre for Maternal and Child Enquiries (CMACE). Saving Mothers' Lives: reviewing maternal deaths to make motherhood safer: 2006–08. The Eighth Report on Confidential Enquiries into Maternal Deaths in the United Kingdom. *Br J Obs Gynae* 2011;**118**(Suppl 1):1–203.
- 9 Information for mothers. OAA website (<http://www.oaa-anaes.ac.uk/content.asp?ContentID=221>).
- 10 Consent for anaesthesia. *AAGBI*, London 2006 (<http://www.aagbi.org/sites/default/files/consento6.pdf>).
- 11 Siddiqi U, Clark R. Obtaining consent for obstetric anaesthesia. *Anaesth Intens Care Med* 2010;**11**(8):328–329.



8.3

Timely anaesthetic involvement in the care of high risk and critically ill women

Dr S Francis, Dr M Mushambi

Why do this audit?

Team management is essential to good obstetric practice with high risk mothers. The audit may be applied to several areas and we suggest that one of the following is chosen.

- D Women with medical diseases (e.g. cardiac diseases, severe asthma and other respiratory diseases, haematological disorders and neurological diseases)
- D Women with high BMI
- D Women with pregnancy induced hypertension(PIH)
- D Women with significant obstetric haemorrhage
- D Women with sepsis

Best practice: research evidence or authoritative opinion

For two decades, reports of the confidential enquiries into maternal deaths in the United Kingdom have recommended timely anaesthetic involvement. Women with cardiac and other medical disease should be seen in the antenatal anaesthetic clinic and women with significant haemorrhage, PIH, sepsis and high BMI should also receive joint care from an early stage.¹ This is emphasised in several of the top ten recommendations in the latest CMACE report.²

A national study of the most morbidly obese women (BMI > 50 kg/m²) was undertaken through the UK obstetric surveillance system (UKOSS) and these women were found to be at risk of severe morbidities, including pre-eclampsia, gestational diabetes and intensive care unit admission.³

The 2007 CEMACH report recommended the use of obstetric early warning scoring system (MEOWS) to help in the more timely recognition, treatment and referral of women who have, or are developing, a critical illness.¹

Suggested indicators

High risk:

- D All units should have guidelines on referral of patients to the antenatal anaesthetic clinic.
- D % mothers with a medical problem known to the obstetric team who arrived on labour ward having had previous anaesthetic consultation. Cardiac disease, diabetes, severe asthma or other respiratory disease, neurological disease and thrombocytopenia should be included.
- D A particular group may be audited more closely. For example, % cardiac patients who are New York Heart Association grade 2 (NY2) or worse who were seen by an obstetric anaesthetic consultant before labour began. A management plan for delivery should be set out in the notes.
- D % of cases with BMI of more than 40 having had previous anaesthetic consultation.
- D % mothers with significant PIH who were known to the anaesthetist within 1 hr after arrival on the labour ward. A unit policy should exist for criteria for informing the anaesthetist.

Critical illness:

- D % cases where significant obstetric haemorrhage occurred and where the anaesthetist was involved at an early stage in the opinion of the auditor and the anaesthetist. Again, a unit policy should exist, for example 1,000 ml loss and still bleeding.
- D % of cases where MEOWS has been used.
- D % of cases where MEOWS was used appropriately to alert senior involvement
- D % of cases where MEOWS has been used and led to the recognition of critically ill mother and which has resulted in the initiation of multidisciplinary care.

Proposed standard or target for best practice

- D All the above indicators should be true in 95% of the cases.

Suggested data to be collected**High risk (Audit proforma 1):**

- D Presence of guidelines for referral
- D If, when and where woman was seen by anaesthetist
- D Was anaesthetic plan recorded in notes
- D Were there any management or outcome problems related to delays

Critical illness (Audit proforma 2):

- D Presence of guidelines for referral
- D Time of referral and time seen by anaesthetist
- D Were there any management or outcome problems related to delays
- D Appropriate use of MEOWS chart

Common reasons for failure to meet standard

- D Failure to recognise the significance of medical disease.
- D Poor data collection in the antenatal period.
- D Lack of organised route of access to an anaesthetic opinion antenatally.
- D Failure to involve multidisciplinary team at the earliest opportunity including anaesthetists and critical-care staff.
- D Poor communication between staff within the maternity hospital.

Related audits

8.4 – Obesity in pregnancy

CPD and Curriculum mapping

CPD matrix codes: **2B06, 2B05, 2C01, 2C03**

Training curriculum competences:

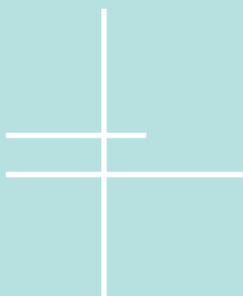
Basic: **OB_BK_05, OB_BK_06, OB_BK_17, OB_BS_11**

Intermediate: **OB_IK_01, OB_IK_08, OB_IS_01, OB_IS_11**

Higher: **OB_HS_01, OB_HS_02, OB_HS_03, OB_HS_06**

References

- 1 Confidential Enquiry into Maternal and Child Health. Saving Mothers' Lives – Reviewing maternal deaths to make motherhood safer 2003–2005. *CEMACH*, London 2007 (http://www.oaa-anaes.ac.uk/assets/managed/editor/File/Reports/2003-2005_saving_mothers_full_report.pdf).
- 2 Centre for Maternal and Child Enquiries (CMACE). Saving Mothers' Lives: reviewing maternal deaths to make motherhood safer: 2006–08. The Eighth Report on Confidential Enquiries into Maternal Deaths in the United Kingdom. *Br J Obs Gynae* 2011;**118**(Suppl 1):1–203 (<http://www.oaa-anaes.ac.uk/assets/managed/editor/File/Reports/2006-2008%20CEMD.pdf>).
- 3 Knight M, Kurinczuk JJ, Spark P, Brocklehurst P, on behalf of the UKOSS. Extreme Obesity in Pregnancy in the United Kingdom. *Obstet Gynaecol* 2010;**115**(5):989–997.



8.4

Obesity in pregnancy

Dr M Mushambi, Dr G Stocks

Why do this audit?

Obesity in pregnancy is defined as a Body Mass Index (BMI) of ≥ 30 Kg/m² at booking. The prevalence of maternal obesity in England has increased from 7% in 1990 to 16% in 2007.¹ A report published in 2010 by the Centre for Maternal and Child Enquiries (CMACE) showed that nearly 5% of pregnant women had a BMI of ≥ 35 , 2% had a BMI of ≥ 40 and 0.29% had a BMI of ≥ 50 .² In 2007, the Confidential Enquiry into Maternal and Child Health (CEMACH) reported that 49% of all the women that died were either overweight or obese.³ Obesity is associated with increased fetal and maternal morbidity including increased rates of caesarean section and postpartum haemorrhage. In addition there is a higher risk of anaesthesia-related complications and mortality.

Best practice: research evidence or authoritative opinion

The CEMACH report highlighted the need for a national clinical guideline for the care of women with obesity in pregnancy and a guideline was published jointly by CMACE and the RCOG in which auditable standards were recommended.⁴ It is recommended that all pregnant women with a booking BMI of ≥ 30 should be provided with accurate and accessible information about the risk associated with obesity in pregnancy and that pregnant women with a booking BMI of ≥ 40 should have an antenatal anaesthetic consultation with an obstetric anaesthetist so that the potential for difficulties with venous access, regional and general anaesthesia can be identified and anticipated.⁴

Suggested indicators

- 1 Maternal height, weight and BMI recorded in the maternity hand held notes.
- 2 Women with a booking BMI ≥ 30 receive information about anaesthesia and analgesia.
- 3 Women with a booking BMI ≥ 40 have an antenatal anaesthetic review and plan.
- 4 The duty anaesthetist should be informed when women with a BMI ≥ 40 are admitted to the labour ward.
- 5 Anaesthesia for women with a booking BMI ≥ 40 who have operative vaginal delivery or caesarean section should be provided by an anaesthetist at Specialty Trainee level 6 or above, or with equivalent experience in a non-training post.
- 6 Women with a BMI ≥ 40 have venous access established in a timely fashion prior to delivery.
- 7 Maternity units have accessible multidisciplinary guidelines for care of pregnant women with a booking BMI ≥ 35 .

Proposed standard or target for best practice

- D The rate of general anaesthesia for caesarean section should be equivalent in women with BMI ≥ 40 compared to the non-obese population (see also audit 8.8).
- D 100% of pregnant women have maternal height, weight and BMI recorded in the maternity hand held notes.
- D 90% of women with a booking BMI ≥ 30 receive information about anaesthesia in pregnancy in the form of a leaflet.
- D 90% of women with a booking BMI ≥ 40 have an antenatal anaesthetic review and a plan in the notes.
- D 90% of women with a BMI ≥ 40 have documentation in the notes stating that the duty anaesthetist was informed of her presence on the labour ward.
- D 90% of operative vaginal deliveries and caesarean sections in women with a booking BMI ≥ 40 were attended by an anaesthetist at Specialty Trainee level 6 or above or with equivalent experience in a non-training post.
- D 90% of women with a BMI ≥ 40 have venous access established in a timely fashion prior to delivery.
- D 100% of maternity units have accessible multidisciplinary guidelines for care of pregnant women with a booking BMI ≥ 35 .
- D % of women with BMI ≥ 40 requiring general anaesthesia for caesarean section should be the same as for non-obese women in the maternity unit.

Suggested data to be collected

Different indicators will require different methods of data collection:

- D **Indicator 1:** non-selected retrospective notes review
- D **Indicator 2:** prospective questioning of mothers with BMI > 30 on admission
- D **Indicators 3–6:** targeted retrospective notes review. Women with BMI > 40 selected from computer system and then a number of case notes reviewed
- D **Indicator 7:** survey of a region
- D **Indicator 8:** longer term audit using annual general anaesthesia data for CS that includes BMI data.

Common reasons for failure to meet standard

The ability to provide antenatal anaesthetic consultation with an obstetric anaesthetist in every patient with a BMI \geq 40 may have significant workload implications and in some units may not be achievable.⁵

The ability to have an anaesthetist at ST6 level or above (or with equivalent experience in a non training post) available for the care of women BMI \geq 40 during labour may not be possible as the anaesthetic staffing structure in the UK often relies on trainees below this level of experience.⁵

Reasons for failure to achieve the auditable standard for % of women with BMI \geq 40 requiring general anaesthesia for caesarean section would be the same as for non-obese parturients.

Related audits

- 8.8 – Caesarean section anaesthesia: technique and failure rate
- 8.3 – Timely anaesthetic involvement in the care of high risk and critically ill women

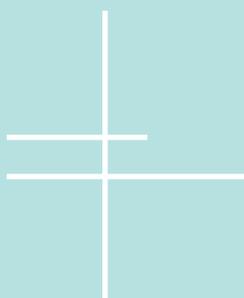
CPD and Curriculum mapping

CPD matrix codes: **1E05, 2B01, 2B03, 3A09, 3B00**

Training curriculum: **OB_BK_17, OB_IK_08, OB_IK_01, OB_IS_01, OB_HS_01, OB_HS_02**

References

- 1 Heslehurst N et al. A nationally representative study of maternal obesity in England, UK: trends in incidence and demographic inequalities in 619,323 births, 1989–2007. *Int J Obesity* 2010;**34(3)**:420–428.
- 2 Centre for Maternal and Child Enquiries (CMACE). Maternal obesity in the UK: Findings from a national project. *CMACE*, London 2010 (http://www.oaa-anaes.ac.uk/assets/managed/editor/File/CMACE/CMACE_Obesity_Report_2010_Final%20for%20printing.pdf).
- 3 Lewis G (Ed). Confidential Enquiry into Maternal and Child Health. Saving Mothers' Lives – Reviewing maternal deaths to make motherhood safer 2003–2005. *CEMACH*, London 2007 (http://www.oaa-anaes.ac.uk/assets/managed/editor/File/Reports/2003-2005_saving_mothers_full_report.pdf).
- 4 Management of women with obesity in pregnancy. *CMACE and RCOG*, London 2010 (http://www.oaa-anaes.ac.uk/assets/managed/editor/File/Reports/2010_CMACE-RCOG_guideline_obesity_in_pregnancy.pdf).
- 5 CMACE Obesity Report: Advice to OAA Members from the OAA Committee (January 2011) (<http://www.oaa-anaes.ac.uk/content.asp?contentid=415>).



8.5

Antacid prophylaxis in obstetrics

Dr K Tambe, Dr J Charlton

Why do this audit?

All pregnant women from the second trimester develop an increased risk of regurgitation of stomach contents. At the time of delivery there is a chance of requiring general anaesthesia, which may often be required in an unstarved woman, and therefore she may have a risk of pulmonary aspiration. Historically this has been a leading cause of maternal deaths directly related to anaesthesia.¹

Starvation and antacid prophylaxis guidelines are common in maternity units, but it is important to achieve a balance between safety and overbearing restrictions on normal labouring women.

There are no nationally-recommended guidelines in this situation, so audit will have to be modelled on local suggestions of best practice. Examples can be found on the Obstetric Anaesthetists' Association website (members-only).

Best practice:
research evidence or
authoritative opinion

H₂-receptor blockers and non-particulate antacid are used for gastric acidity regulation in 98% of units nationally.² They may be used in combination.³

Category 4 (elective) caesarean section (CS):

- D Starvation guidelines can be the same as non-obstetric patients.
- D 98% of units nationally use gastric acidity prophylaxis routinely.²

Category 1–3 (emergency) CS, other operative procedures:

- D A low residue diet during labour increases volume of gastric contents, whereas isotonic drinks prevent ketosis but do not increase volume of gastric contents.⁴ 54% of units routinely give gastric acidity prophylaxis to selected at-risk women and 36% give this to all women.²
- D Women may be assessed to have an increased chance of requiring an operative intervention, or at a greater risk of general anaesthesia should that be necessary, according to pre- or during-labour factors,⁵ e.g:

Pre-labour

- ◆ Previous CS, other uterine scar
- ◆ Twins, breech
- ◆ Diabetes mellitus
- ◆ Pre-eclampsia
- ◆ Morbidly obesity
- ◆ Intrauterine growth retardation, other chronic fetal compromise
- ◆ Previous retained placenta, postpartum haemorrhage
- ◆ History of anaesthetic problems, predicted difficult airway on assessment

During labour

- ◆ Failure to progress, persisting malposition, unengaged fetal head
- ◆ Acute fetal compromise
- ◆ Opioids
- ◆ Haemorrhage

- D 97% of units nationally use gastric acidity prophylaxis routinely for category 1–3 CS.²

Category 1 CS:

Women may present for very urgent surgery without prior preparation. There may be time to give intravenous H₂-receptor antagonist and/or oral antacid before anaesthetic induction.

Category 4 CS:

- D % of women who followed the starvation guidelines; % of women who were prescribed antacid prophylaxis; % who had the prescribed medication.

Category 1–3 CS, other operative procedures:

- D % of labouring women who had a risk assessment of need for dietary restriction and antacid prophylaxis.

Suggested indicators

	<ul style="list-style-type: none"> D % of at-risk women during labour who followed starvation and antacid prophylaxis guidelines. D % of women who have surgery who followed the starvation guidelines. D % of women who were prescribed antacid prophylaxis. D % who had the prescribed medication. <p>Category 1 CS:</p> <ul style="list-style-type: none"> D % of cases who present with no warning period when advance preparations could have been made such as during labour or during other obstetric intervention (external cephalic version, fetal medicine procedure etc).
Proposed standard or target for best practice	<ul style="list-style-type: none"> D 100 % category 4 CS should follow starvation and antacid prophylaxis guidelines. D 100% of category 2–3 CS should be risk assessed into low risk or at-risk of requiring general anaesthesia. D 90% of category 2–3 CS who are at-risk of requiring general anaesthesia should follow starvation and antacid prophylaxis guidelines. D 100 % of obstetric patients who have a general anaesthetic should have drugs to regulate gastric acidity, or the reason why these were not given should be recorded.
Suggested data to be collected	<ul style="list-style-type: none"> D Type of surgery; urgency grade of CS. D Type of anaesthesia. D Non-labouring: period of starvation. D Labouring: type of oral intake, use of opioids. D Presence of at-risk factors. D Prescription of gastric acidity regulators. D Administration of gastric acidity regulators. D Other manoeuvres to reduce aspiration risk, e.g. use of nasogastric tube after general anaesthetic induction. D See audit proforma.⁵
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D No/unclear starvation guidelines for women in labour. D Midwives/obstetricians do not risk assess women for starvation/antacid prophylaxis. D Lack of anaesthetic involvement in management until too close to time of operation.
CPD and Curriculum mapping	<p>CPD matrix codes: 2B02, 2B05</p> <p>Training curriculum: OB_BK_07, OB_BS_02, OB_IK_08, OB_HS_08, OB_HS_11</p>
References	<ol style="list-style-type: none"> 1 Confidential Enquiry into Maternal and Child Health. Why Mothers Die 2000–2002. <i>CEMACH</i>, London 2004 (http://www.hqip.org.uk/assets/NCAPOP-Library/CMACE-Reports/33.-2004-Why-Mothers-Die-2000-2002-The-Sixth-Report-of-the-Confidential-Enquiries-into-Maternal-Deaths-in-the-UK.pdf). 2 Thomas J, Paranjothy S. The national sentinel caesarean section audit report. <i>RCOG Press</i>, London 2001. 3 Paranjothy S et al. Interventions at caesarean section for reducing the risk of aspiration pneumonitis. <i>Cochrane Database of Systematic Reviews</i>, January 2010. Issue 1. Art No: CD004943 (http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004943.pub3/abstract). 4 Caesarean Section. NICE Clinical Guideline 132. <i>NICE</i>, London 2011 (http://publications.nice.org.uk/caesarean-section-cg132). 5 Webster SR, Noblet JM, Lewis NL. Audit of the administration of antacid prophylaxis to high-risk labouring women on delivery suite. <i>Int J Obstet Anesth</i> 2005;14:S24.

8.6

Response times for provision of intrapartum analgesia and anaesthesia

Dr E Pickering, Dr N Lucas

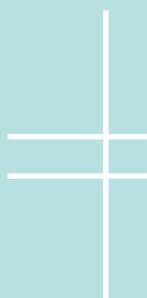
Why do this audit?

When the condition of the mother or baby requires an urgent operative or instrumental delivery it is important that satisfactory arrangements exist for immediate access to an anaesthetist and a staffed operating theatre. Delay may result in unnecessary morbidity and mortality for the mother and or baby.^{1,2}

The urgency of caesarean section (CS) has been classified into four categories:^{3,4} Category 1) Immediate threat to the life of the woman or fetus; Category 2) Maternal or fetal compromise which is not immediately life threatening; Category 3) No maternal or fetal compromise but needs early delivery and Category 4) Delivery timed to suit woman or staff. For this audit only categories 1 and 2 are considered.

In obstetric units where there is a 24-hr anaesthetic service, attendance of the anaesthetist after request for regional analgesia during labour should be within an appropriate period of time, minimising delay and improving patients, experience and satisfaction with care.

Best practice: research evidence or authoritative opinion



Caesarean section

Fetal emergency: The optimal decision to delivery interval (DDI) in the presence of fetal distress remains controversial. The diagnosis of fetal distress in labour is imprecise. The widely quoted '30 minute decision to delivery interval' lacks a firm evidence base. The recently published update to the NICE Caesarean Section guideline states that 30 minutes should be the audit standard for category 1 CS, and 30 and 75 minutes the audit standards for category 2 CS. The guideline recommends that these times should not be used to judge performance in individual cases.⁵

Maternal emergency

Life threatening maternal emergencies such as massive blood loss requires a prompt response time to minimise maternal and fetal morbidity and mortality.^{6,7}

Regional analgesia during labour

Where a 24-hour regional analgesia service is offered, the time from the anaesthetist being informed about an epidural until being able to attend the mother should not normally exceed 30 minutes, and must be within 1 hour except in exceptional circumstances.⁶ Women who require anaesthesia for delivery should take preference over those who request epidural analgesia for labour.

Suggested indicators

- D % CS categories 1 and 2.
- D % CS categories 1 and 2 who have DDI within 30 min.
- D % CS category 2 who have DDI within 75 min.
- D % Women who are attended by the anaesthetist within 30 or 60 minutes of requesting labour regional analgesia.

Proposed standard or target for best practice

- D ≥90% category 1 CS have DDI ≤ 30 min.
- D ≥90% category 2 CS have DDI ≤ 75 min.
- D ≥ 80% of women attended by anaesthetist within 30 minutes of requesting labour regional analgesia.
- D ≥ 90% of women attended by anaesthetist within 60 minutes of requesting labour regional analgesia.

Suggested data to be collected

For CS:

- D Category of urgency.
- D Grade of anaesthetist/supervision.
- D Reason for delivery: maternal/fetal compromise.
- D Time of decision to deliver.
- D Time anaesthetist informed.
- D Time of patient arrival in theatre.

Common reasons for failure to meet standard

Related audits

CPD and Curriculum mapping

References

- D Time anaesthesia commenced.
- D Place anaesthesia commenced (in room if epidural in-situ).
- D Type of anaesthesia: GA, De-novo CSE, De-novo Spinal, Epidural/CSE top-up.
- D Time patient adequately anaesthetised.
- D Time of knife to skin.
- D Time of delivery
- D Apgar Score 1 and 5min.
- D Reasons for any delays.

For labour regional analgesia

- D Grade of anaesthetist.
- D Time anaesthetist informed of request.
- D Time of attendance with mother.
- D Reasons for any delays.

CS:

- D Slow response time from all parties.
- D Lack of communication.
- D Anaesthetist unavailable.
- D Failure to establish regional anaesthesia or inappropriate use of regional anaesthesia.
- D Theatre in use, second theatre not staffed or secondary anaesthetist unavailable.

Labour regional analgesia:

- D Blood results unavailable in women with coagulopathies (e.g. HELLP syndrome).
- D Stage of labour e.g. fully dilated, labour not fully established.
- D Anaesthetist unavailable.
- D Lack of communication.

- 8.9 – Monitoring of obstetric patients in HDU and recovery
8.11 – Pain relief post caesarean section

CPD matrix codes: **2B01–03**

Training curriculum: **OB_BK_04, OB_BK_09, OB_BK_13, OB_BS_04–08, OB_IS_03, OB_HS_04, OB_HS_08**

- 1 Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI). 7th Annual Report. *Maternal and Child Health Research Consortium*, London 2000.
- 2 Confidential Enquiry into Maternal and Child Health. Why Mothers Die 1994–1996. *CEMACH*, London 1998.
- 3 Classification of urgency of caesarean section – a continuum of risk. Good Practice Guide 11. *RCOG and RCoA*, London April 2010 (<http://www.rcog.org.uk/classification-of-urgency-of-caesarean-section-good-practice-11>).
- 4 Lucas DN et al. Urgency of caesarean section: a new classification. *J Roy Soc Med* 2000;**93**:346–350.
- 5 Caesarean Section. NICE Clinical Guideline 132. *NICE*, London 2011 (<http://publications.nice.org.uk/caesarean-section-cg132>).
- 6 OAA/AAGBI guidelines for obstetric anaesthetic services – 3rd edition. *AAGBI and OAA*, London, 2012 (<http://www.aagbi.org/publications/publications-guidelines/M/R>).
- 7 Confidential Enquiry into Maternal and Child Health. Why Mothers Die 2000–2002. *CEMACH*, London 2004 (<http://www.hqip.org.uk/assets/NCAPOP-Library/CMACE-Reports/33.-2004-Why-Mothers-Die-2000-2002-The-Sixth-Report-of-the-Confidential-Enquiries-into-Maternal-Deaths-in-the-UK.pdf>).

8.7

Epidural analgesia during labour

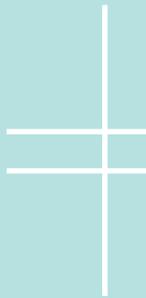
Dr M Purva, Dr M Kinsella

Why do this audit?

Epidural analgesia (EA) is considered to be the gold standard for labour analgesia. The success or failure of EA may be considered in terms of the procedural aspects of insertion, the quality of analgesia during labour or a retrospective satisfaction score of the overall experience. The complication of accidental dural puncture (ADP) is also embedded as a service quality indicator (see audit 8.12).

A composite 'failure' endpoint has been defined that includes several of the above individual factors.¹ This has been used as a training tool.²

Best practice: research evidence or authoritative opinion



There is higher failure rate for epidural analgesia among maternity patients compared to general surgical patients. Reasons include the use of low concentration local anaesthetic, anxiety and anatomical differences.³ Cervical dilatation > 7 cm, history of opioid tolerance, previous failed epidural and trainee anaesthetist increase the risk of inadequate pain relief.⁴

Definitions of failure include: failure to site, high VAS scores 30 minutes after initiation of epidural, resite of ineffective epidural, accidental dural puncture and failure to provide effective anaesthesia if topped up for caesarean section,^{4,5} or a combination of these factors.

The incidence of ADP is 1.0%–1.2%^{5,6} and resiting because of no analgesia or unilateral block is 13.1%.⁶ 7.1% of epidurals were replaced due to failure to work at CS.⁵

A patient satisfaction score of 98% was found even with repeated resiting,⁶ although inadequate pain relief 45 minutes after starting to insert the epidural has been shown to correlate to dissatisfaction.¹

A definition of failure which includes a composite endpoint (any of inadequate pain relief 45 min after placement, ADP, resiting, abandonment, dissatisfaction at follow up) has been assessed. The failure rate using this was 20%.¹

Suggested indicators

- D % of epidurals placed by training and non-training grade doctors in an obstetric unit that are successful (can be split into grades CT2, ST 3–8).
- D % of epidurals providing adequate pain relief 45 min after placement (from start of epidural insertion).
- D % of epidurals resited at any time during labour.
- D % of ADP.
- D % patients satisfied with epidural at follow up visit.
- D % of epidurals successful using a composite endpoint (none of inadequate pain relief 45 min after placement, ADP, resiting, abandonment, dissatisfaction at follow up).

Proposed standard or target for best practice

- D Adequate pain relief 45 min after placement (from start of epidural insertion) ≥ 88%.
- D Epidurals replaced at any point during labour < 15%.
- D ADP rate < 1%.^{5,6}
- D Satisfaction at follow up visit ≥ 98%.⁶
- D Success using composite endpoint ≥ 85%^{1,5,6,7} by grade of anaesthetist:
 - ◆ CT 2 – 78%
 - ◆ ST 3 – 76%
 - ◆ ST 4 – 84%
 - ◆ ST 6 – 80%

Suggested data to be collected

- D Anaesthetist identity/code and grade.
- D Date and time of procedure.
- D Position (lateral vs sitting).
- D BMI; parity; cervical dilation; anatomical factors e.g. scoliosis, previous surgery.

	<ul style="list-style-type: none"> D Following insertion: <ul style="list-style-type: none"> ◆ analgesia within 45 minutes of starting epidural needle insertion, using a definition 'Are you happy with the pain relief?' ◆ ADP ◆ insertion abandoned or sited by another anaesthetist. D At follow up visit: <ul style="list-style-type: none"> ◆ epidural resited during labour ◆ patient satisfaction (excellent, satisfactory, unsatisfactory, no benefit) ◆ headache typical of post-dural puncture headache.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D Operator inexperience/inadequate training.⁶ D High BMI. D Frequent use of sitting position to insert epidural.⁸ D Operator fatigue.⁹ D Epidural migration.¹⁰ D Rapid progression of labour. D Inability to palpate spinous processes.¹¹ D Spinal abnormality.¹²
Related audits	<p>8.3 – Timely anaesthetic involvement in the care of high risk and critically ill women</p> <p>8.6 – Response times for provision of intrapartum analgesia and anaesthesia</p> <p>8.12 – Anaesthetic complications and side-effects</p> <p>11.2 – Patient information on pain management</p>
CPD and Curriculum mapping	<p>CPD matrix codes: 2B01, 2B03, 3B00</p> <p>Training curriculum: OB_BK_11-12, OB_BS_04, OB_IS_03, OB_HS_13</p>
References	<ol style="list-style-type: none"> 1 Thangamuthu A, Purva M, Murgotroyd H. Failure rates of epidural: results from the Cusum project. Abstract presentation ASA meeting 2011. 2 Sivaprakasam J, Purva M. Cusum analysis to assess competence: what failure rate is acceptable? <i>The Clinical Teacher</i> 2010;7:257–261. 3 Collier CB. Why obstetric epidurals fail: a study of epidurograms. <i>Int J Obstet Anesth</i> 1996;5:19–31. 4 Agaram R et al. Inadequate pain relief with labor epidurals: a multivariate analysis of associated factors. <i>Int J Obstet Anesth</i> 2009;18:10–14. 5 Pan PH, Bogard TD, Owen MD. Incidence and characteristics of failures in obstetric neuraxial analgesia and anesthesia: a retrospective analysis of 19,259 deliveries. <i>Int J Obstet Anesth</i> 2004;13:227–233. 6 Eappen S, Blinn A, Segal S. Incidence of epidural catheter replacement in parturients: a retrospective chart review. <i>Int J Obstet Anesth</i> 1998;7:220–225. 7 Crawford JS. Lumbar epidural block in labour: a clinical analysis. <i>Br J Anaesth</i> 1972;44:66–74. 8 Tsen LC. Neuraxial techniques for labor analgesia should be placed in the lateral position. <i>Int J Obstet Anesth</i> 2008;17:146–152. 9 Aya AGM et al. Increased risk of unintentional dural puncture in night-time obstetric epidural anesthesia. <i>Can J Anesth</i> 1999;46:665–669. 10 Bishton IM et al. Factors influencing epidural catheter migration. <i>Anaesthesia</i> 1992;47:610–612. 11 Faitot V et al. An observational study of factors leading to difficulty in resident anaesthesiologists identifying the epidural space in obstetric patients. <i>Int J Obstet Anesth</i> 2011;20:124–127.

8.8 Caesarean section anaesthesia: technique and failure rate

Dr M Purva, Dr I F Russell, Dr M Kinsella

Why do this audit?

There is unequivocal evidence that regional anaesthesia (RA) is safer than general anaesthesia (GA) for caesarean section (CS)¹ and the majority of women now wish to be awake for their CS.

RA has a significant failure rate. This may lead to pain during surgery² or the need for conversion of the RA to GA. The latter exposes the woman to the complications of both anaesthetic methods. There is little data on Category I CS³ but this carries the greatest maternal and fetal risk.

Best practice: research evidence or authoritative opinion

Previous editions of this topic set standards based on two large studies with comprehensive and detailed data on anaesthetic type for CS and failure. Those figures are now somewhat outdated,^{3,4} however the core of that information can be supplemented with data from the National Obstetric Anaesthesia Database (NOAD)⁵ plus other publications.^{6,7}

The rate of RA for CS in the UK was 91% in 2008.⁵ Rates of RA for Cat I CS between 54% and 72% have been found in single units or pooled data.^{5,6,7}

The published data on rate of intraoperative pain at CS are limited but 5% for spinal and 15% for epidural are to be expected.^{6,8}

Data from the NOAD/NPSA project has found a RA to GA conversion rate for spinal anaesthesia of around 1.5% overall, 1% for Cat 4, 2.5% for Cat I–3.⁹

Much published work on RA to GA conversion defines RA as that which is specifically started either for CS or a prior attempt at assisted vaginal delivery. We prefer the more stringent approach of defining cases where regional analgesia was started during labour as having had RA for CS whether used for CS or not. The rationale is that it should be possible to convert effective labour regional analgesia to surgical anaesthesia with good reliability, and this should be attempted in the majority of cases where regional analgesia has already been established (**NB** some units do not routinely top up labour epidurals but perform a spinal instead; to be valid, this alternative approach should lead to the same or lower GA conversion rate as units which practise routine top up of epidurals).

Suggested indicators

- D % CS carried out with RA – divided into Cat 4, Cat I–3, Cat I.
- D % pain during RA – divided into Cat 4, Cat I–3, Cat I.
- D % conversion from RA to GA – divided into Cat 4, Cat I–3, Cat I.

Urgency classification¹⁰

Category 1	Maternal or fetal compromise, immediate threat to life of woman or fetus
Category 2	Maternal or fetal compromise, no immediate threat to life of woman or fetus
Category 3	No maternal or fetal compromise, requires early delivery
Category 4	Delivery at a time to suit the woman and maternity services

Elective = Category 4. Emergency = Category 1–3.

Proposed standard or target for best practice

	Cat 4	Cat I–3	Cat I
CS carried out with RA	> 95%	> 85%	> 50%
Pain during CS	< 5%	< 15%	< 20%
RA to GA conversion	< 1%	< 5%	< 15%

Suggested data to be collected

Basic unit data for annual summary statistics (e.g for NOAD) should include number of CS, urgency category, type of anaesthetic.

- D **PRIMARY GA** includes cases where the patient has not received any other regional technique e.g. epidural or CSE during labour.
- D **PRIMARY RA** includes:
 - ◆ all cases with epidural or CSE during labour; whether topped up for CS or not
 - ◆ attempted RA where a needle is inserted in the patient's back, whether any anaesthetic drugs are given through the needle/catheter or not and whether surgery is carried out under RA or not.
- D Frequency – continuous.
- D Detailed data if non-compliant with standards:
 - ◆ Grade of anaesthetist, surgeon
 - ◆ Indication for primary GA (urgency, maternal preference, fetal indication, RA contraindicated, etc)
 - ◆ Indication for RA to GA conversion (urgency, technical difficulty, raised BMI, maternal request, pain, poor block, fetal reasons, surgical reasons, etc; location of epidural top up and drugs used)
 - ◆ In particular; the data collected should allow units to identify reasons for a low RA rate (or high RA to GA conversion rate) for Category I CS.
- D If the figures for primary GA rate or GA conversion rate in a unit are significantly higher than the standards above, then the use of a quality improvement approach (monthly data analysis and plan-do-study-act cycles) should be considered to remedy the problem.¹¹

Common reasons for failure to meet standard

- D Lack of a dedicated obstetric anaesthetist. Staff inexperience.
- D Poor/slow communication between staff. Obstetric preference for GA because of time constraints or obstetric pathology.
- D High number of 'maternal requests' for GA, especially in ethnic minority women.
- D Misunderstanding/misclassifying urgency. Poor selection of RA type in complex cases.
- D Inappropriate assessment/recording of block.
- D High rate of pain or GA conversion in epidural top up anaesthesia. Management of epidural top up – time and place of commencement, drugs used.

CPD and Curriculum mapping

CPD matrix codes: **2B02–03**

Training curriculum: **OB_BK_09, OB_BK_13, OB_BS_05, OB_BS_06, OB_BS_07, OB_HS_08**

References

- 1 http://www.cemach.org.uk/publications/WMD2000_2002/content.htm.
- 2 Carvalho B et al. Patient preferences for anesthesia outcomes associated with cesarean delivery. *Anesth Analg* 2005;**101**:1182–1187.
- 3 Thomas J, Paranjothy S, Royal College of Obstetricians and Gynaecologists Clinical Effectiveness Support Unit. National Sentinel Caesarean Section Audit Report. RCOG, London 2001 (http://www.rcog.org.uk/files/rcog-corp/uploaded-files/nscs_audit.pdf).
- 4 Shibli KU, Russell IF. A survey of anaesthetic techniques used for caesarean section in the UK in 1997. *Int J Obstet Anesth* 2000;**9**:160–167.
- 5 National Obstetric Anaesthesia Database (<http://www.oaa-anaes.ac.uk/content.asp?ContentID=241>).
- 6 Kinsella, M. A prospective audit of regional anesthesia failure in 5080 Caesarean sections. *Anaesthesia* 2008;**63**:822–832.
- 7 Rafi MA, Arfeen Z, Misra U. Conversion of regional to general anaesthesia at caesarean section: increasing the use of regional anaesthesia through continuous prospective audit. *Int J Obstet Anesth* 2010;**19**:179.
- 8 Arzola AC, Wieczorek PM. Efficacy of low-dose bupivacaine in spinal anaesthesia for Caesarean delivery: systematic review and meta-analysis. *Br J Anaesth* 2011;**107**:308–318.
- 9 Monitoring of adverse outcomes at CS/NOAD (<http://www.oaa-anaes.ac.uk/content.asp?ContentID=448>).
- 10 Classification of urgency of caesarean section – a continuum of risk. GP11 2010 (<http://www.rcog.org.uk/classification-of-urgency-of-caesarean-section-good-practice-11>).
- 11 Peden, CJ. Emergency Surgery in the elderly patient: A quality improvement approach. *Anaesthesia* 2011;**66**:440–445.

8.9 Monitoring of obstetric patients in recovery and HDU

Dr E Pickering, Dr N Lucas

Why do this audit?

The appropriate management of the critically ill parturient, (timely recognition and response) is essential to reduce maternal morbidity and mortality.^{1,2} The most recent Confidential Enquiry into Maternal Death showed that sepsis was the number one direct cause of maternal death and that almost 50% of women who died received substandard care.³

The provision of care for the critically ill parturient has been specified in the joint RCOG/ RCoA document, 'Providing equity of critical and maternity care for the critically ill pregnant or recently pregnant woman'.⁴ The Intensive Care Society has defined levels of care a patient may require.⁵ The provision of Level 2 ("high dependency care") in obstetrics has been a national recommendation for several years. Minimum recovery facilities and HDU facilities have been defined.^{4,6,7,8,9}

Best practice: research evidence or authoritative opinion

Post-operative recovery and HDU standards have been developed by the Association of Anaesthetists of Great Britain and Ireland, Royal College of Anaesthetists, Obstetric Anaesthetists Association, Royal College of Obstetricians and Gynaecologists and NICE.^{4,6,7,8,9}

Suggested indicators

- D Existence of the facilities described below as 'standard' of care in maternity recovery.
- D Existence of facilities described below as 'standard' for HDU care of sick women in antenatal and perinatal period.
- D % women who have the observations below documented on a suitable chart.
- D Existence of protocol for discharge from recovery area.
- D % women who meet the discharge criteria before leaving the area.

Proposed standard or target for best practice

Maternity recovery Areas:

Annual facility survey

- D The facilities provided must be to the same standard as for general recovery facilities.
- D Training undergone by staff must be to the same standard as for general recovery facilities.
- D All staff in the area require training in cardiopulmonary resuscitation.
- D Minimum nursing ratio of 1:1 available 24 hrs.

Prospective or retrospective data collection over one month period

- D > 90% of women should have the following observations documented on a suitable chart at least every 15 minutes for first hour: oxygen saturation, respiratory rate, heart rate and rhythm, blood pressure, temperature, level of consciousness, pain score, sensory level of regional blockade, blood loss from wound, vagina and drain, IV infusions and fluid balance.
- D > 90% women should have observations continuing at 30 min intervals for 2 hrs then hourly thereafter after initial hour of recovery post anaesthesia.
- D > 90% women should meet the discharge criteria as per protocol before leaving the area.

HDU:

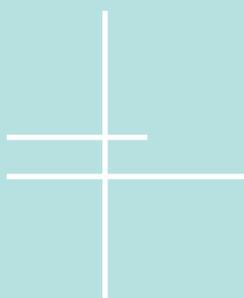
'Providing equity of critical and maternity care for the critically ill pregnant or recently pregnant woman'⁴ has laid out a comprehensive list of auditable standards.

In addition:

Annual facility survey

- D There should be a named consultant anaesthetist and obstetrician responsible for all HDU patients 24 hrs per day.
- D Minimum nursing ratio of 1:2 available 24 hrs.
- D Training of staff should be to the same standard as general HDU nursing staff.
- D Facilities and training for invasive monitoring of systemic and central venous pressures.

	<ul style="list-style-type: none"> D Antenatal fetal monitoring, assessment and facilities to conduct labour should be available. D Staff should be trained in the physiological and pharmacological effects of pregnancy, including cardiopulmonary resuscitation of pregnant women. D For all women with a live infant facilities for breastfeeding (or use of breast pump) should be available. <p>Retrospective or prospective data collection over one month</p> <ul style="list-style-type: none"> D > 90% of women to have the same observations as for post CS documented on a suitable HDU chart. In addition, hourly urine output and fluid balance and intravenous infusions should be recorded.
Suggested data to be collected	<ul style="list-style-type: none"> D Information as above during a nominated audit period. D Critical incident analysis in these areas according to the standards above.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D Inadequate training of staff. D Lack of suitably trained staff. D Lack of equipment. D Failure to realise the importance of the recovery period, changes related to pregnancy and the requirements for the fetus and neonate.
CPD and Curriculum mapping	<p>CPD matrix codes: 2A04, 2B02, 2B03, 2B05, 3A12</p> <p>Curriculum: OB_BK_16, OB_BS_11, OB_BS_12, OB_BK_17, OB_IK_08, OB_HK_01, OB_IS_11, OB_HS_13</p>
References	<ol style="list-style-type: none"> 1 Confidential Enquiry into Maternal and Child Health. Why Mothers Die 2000–2002. <i>CEMACH</i>, London 2004 (http://www.hqip.org.uk/assets/NCAPOP-Library/CMACE-Reports/33.-2004-Why-Mothers-Die-2000-2002-The-Sixth-Report-of-the-Confidential-Enquiries-into-Maternal-Deaths-in-the-UK.pdf). 2 Scottish Confidential Audit of Severe Maternal Morbidity. 6th Annual Report. <i>NHS QIS</i>, Edinburgh 2010. 3 Centre for Maternal and Child Enquiries (CMACE). Saving Mothers' Lives: reviewing maternal deaths to make motherhood safer: 2006–08. The Eighth Report on Confidential Enquiries into Maternal Deaths in the United Kingdom. <i>Br J Obs Gynae</i> 2011;118(Suppl 1):1–203 (http://www.oaa-anaes.ac.uk/assets/_managed/editor/File/Reports/2006-2008%20CEMD.pdf). 4 Providing equity of critical and maternity care for the critically ill pregnant or recently pregnant woman. <i>RCoA and RCOG</i>, London July 2011 (http://www.rcog.org.uk/files/rcog-corp/Prov_Eq_MatandCritCare.pdf). 5 Levels of Critical Care for Adult Patients. Standards and Guidelines. <i>ICS</i>, London 2009. 6 OAA/AAGBI guidelines for obstetric anaesthetic services – 3rd edition. <i>AAGBI and OAA</i>, London, 2012 (http://www.aagbi.org/publications/publications-guidelines/M/R). 7 Recommendations for standards of monitoring during anaesthesia and recovery 4. <i>AAGBI</i>, London 2007 (http://www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf). 8 Immediate postanaesthetic recovery. <i>AAGBI</i>, London 2002 (http://www.aagbi.org/pdf/Postanaes2002.pdf). 9 Caesarean Section. NICE Clinical Guideline 132. <i>NICE</i>, London 2011 (http://publications.nice.org.uk/caesarean-section-cg132).



8.10

Airway and intubation problems during general anaesthesia for caesarean section

Dr S Joy, Dr R Wilson

Why do this audit?

Patients do not die from failure to intubate, but from the consequences of failing to manage the situation¹. This is a core anaesthetic skill which should be rehearsed and assessed regularly.² Current anaesthetic trainees find difficulty gaining experience of this in obstetrics because of the reduced number of caesarean sections (CS) performed under general anaesthesia (GA) and their restricted working hours; many trainees will do one or less GA for CS per year.³

Every GA case for CS can be critically appraised and used in a learning exercise and to inform realistic simulator training and failed intubation drills and protocols. Protocol violation still occurs frequently in real incidents of failed intubation.⁴

Additionally, changing practice in GA for CS, e.g. use of laryngeal mask airway, rocuronium and the increasing age, weight and medical complexity of pregnant women requires continual review to audit local minimum standards of care (where they exist) and to benchmark against national and international data.^{3,5}

Best practice: research evidence or authoritative opinion

A difficult intubation can be defined as immediate abandonment of the initial attempt at intubation, more than one attempt at intubation or based on the subjective opinion of the anaesthetist.⁵

A failed intubation can be defined as the inability to intubate the trachea and subsequent abandonment of intubation as a means of airway management.⁵

Difficulties with intubation occur in 1:30 to 1:100 GA for CS.

Failure to intubate occurs in 1:250 to 1:300 GA for CS.^{5,6,7}

Suggested indicators

- D 100% of GA charts should be reviewed.
- D % GA CS used for teaching.
- D % difficult intubation at CS.
- D % failed intubation at CS.
- D % trainees attending failed intubation drills/simulation during obstetric training block.

Proposed standard or target for best practice

- D Failed intubation incidence should be no more than 1:250.⁵
- D Difficult intubation should be no greater than 1:30.⁵
- D 100% GA for elective CS should be used for teaching GA skills.
- D Simulation-based training should be incorporated in obstetric training modules.^{8,9}

Suggested data to be collected

Case by case:

- D Urgency category of CS, indication.
- D Grade of anaesthetists.
- D Indication for GA.
- D Anaesthetic history of difficult airway.
- D **Pre-operative airway assessment:** dentition, anatomical deformity; Mallampati score; Wilson's score; thyromental distance.
- D **GA technique:** antacid prophylaxis; GA drugs/doses; airway adjuncts used/available; patient positioning; cricoid pressure; monitoring.
- D **Intubation:** grade of laryngoscopy; number of attempts; failed intubation drill used; stomach emptying.
- D **Outcome:** maternal, fetal adverse outcome – temporary or permanent sequelae.

Unit caseload and facilities:

- D Annual number of GA for CS.
- D Induction and competencies for solo obstetric anaesthetic trainees.
- D Presence of competent assistance.
- D Availability of senior supervision on rota.

	<ul style="list-style-type: none"> D Availability of failed intubation fire drills or simulator training. D Difficult airway operating lists, D Written patient information regarding relative safety of different anaesthetic techniques.
<p>Common reasons for failure to meet standard</p>	<ul style="list-style-type: none"> D Trainees and consultants have reduced experience in GA for CS. D Disproportionate number of cases occurs as emergencies out-of-hours, reducing training opportunities. D Poor record keeping and lack of senior review. D Lack of regular failed intubation drill practice on the delivery suite. D Lack of high fidelity simulator workshops to develop skills, teamwork and situational awareness.
<p>CPD and Curriculum mapping</p>	<p>CPD Matrix code: 2B02</p> <p>Training curriculum competences: OB_BS_07, OB_IK_08, OB_HS_08</p>
<p>References</p>	<ol style="list-style-type: none"> 1 Cook TM, Woodall N, Frerk C. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 2: Anaesthesia. <i>Br J Anaesth</i> 2011;106:617–631. 2 CCT in Anaesthetics – Basic level training (Annex B) 2010. <i>RCoA</i>, London 2010 (http://www.rcoa.ac.uk/node/230). 3 Searle R D, Lyons G. Vanishing experience in training for obstetric general anaesthesia: an observational study. <i>Int J Obst Anesth</i> 2008;17:233–237. 4 Rahman K, Jenkins JG. Failed tracheal intubation in obstetrics: no more frequent but still managed badly. <i>Anaesthesia</i> 2005;60:168–171. 5 McDonnell NJ et al. Difficult and failed intubation in obstetric anaesthesia: an observational study of airway management and complications associated with general anaesthesia for caesarean section. <i>Int J Obstet Anesth</i> 2008;17:292–297. 6 Djabatey EA, Barclay PM. Difficult and failed intubation in 3430 obstetric general anaesthetics. <i>Anaesthesia</i> 2009;64:1168–1171. 7 Hawthorne L et al. Failed intubation revisited: 17-year experience in a teaching maternity unit. <i>Br J Anaesth</i> 1996;76:680–684. 8 Lipman S, Carvalho B, Brock-Utne J. The demise of general anaesthesia in obstetrics revisited; prescription for a cure. <i>Int J Obst Anesth</i> 2004;14:2–4.

8.11

Pain relief after caesarean section

Dr N Lucas, Dr E Pickering, Dr F Plaat

Why do this audit?

Adequate pain relief should be provided after caesarean section (CS) to improve patient experience and reduce morbidity. Analgesic drug efficacy is important for patient comfort but this must be balanced against maternal side effects and drug transference to the neonate via breast milk.

Opioids provide good pain relief and can be given by many routes including subarachnoid, epidural, intravenous, intramuscular, subcutaneous and oral. Opioids are unfortunately associated with unwanted side effects, in particular pruritus, sedation, nausea, vomiting and respiratory depression.¹

Pain relief provided by NSAIDs has been shown to reduce opioid requirements. However, this group of drugs also has unwanted side effects.²

Best practice: research evidence or authoritative opinion

There is little definitive evidence about what constitutes appropriate, achievable parameters in best practice for the provision of post-caesarean section analgesia. Difficulty arises as a result of the varying use of visual analogue scores and verbal rating scales to measure pain. There is also evidence that maternal satisfaction is not compromised by less than perfect analgesia. Use of drugs that do not have significant effects on the fetus should be used, particularly in breast-feeding women.

NICE guidelines for caesarean section recommend:³

- D Women should be offered peri-operative subarachnoid diamorphine (0.3–0.4mg) or epidural diamorphine (2.5–5mg) if CS performed by regional anaesthesia.
- D If there are no contraindications, regular NSAIDs should be used as an adjunct to opioid therapy.
- D Women who have received opioids should be monitored for respiratory rate, sedation and pain scores and prescribed an anti-emetic and laxative.

Suggested indicators

- D Use of subarachnoid or epidural opioids.
- D Women who are prescribed regular NSAIDs after CS unless there are contraindications.
- D Pain management plan for women who have severe pain or have contraindications to standard analgesics e.g. indications for continuous epidural analgesia.
- D Documented hourly observations of respiratory rate, sedation and pain intensity scores in those who have received opioids 12 hours for diamorphine and 24 hours for morphine.
- D Data on post-operative day 1 of women who were satisfied with management of pain after CS.

Proposed standard or target for best practice

- D > 95% women to be satisfied with analgesia on day 1 post-caesarean section.
- D 100% women received subarachnoid or epidural opioids if CS performed by regional anaesthesia.
- D Unless contraindicated, 100% women to be prescribed regular NSAIDs.

Suggested data to be collected

- D Observations as above.
- D Patient satisfaction with pain management day 1 post-operatively.
- D Percentage of women given opioids via the subarachnoid or epidural route during or post CS.
- D Percentage of women receiving NSAIDs post CS.
- D Percentage of women requiring opioid PCA post CS.
- D Frequency of side effects.
- D Relevant critical incidents.

Common reasons for failure to meet standard

- D Lack of follow up post-operatively.
- D Staff shortages causing delay in giving analgesia and lack of observations.
- D Lack of explanation to patient about available analgesia.

Related audits

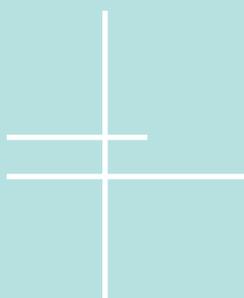
8.9 – Monitoring of the obstetric patient in recovery and high dependency unit

CPD and Curriculum mapping

CPD matrix codes: **ID02, 2B03**

References

- 1 Carvalho B. Respiratory depression after neuraxial opioids in the obstetric setting. *Anaesth Analg* September 2008;**107**:956–961.
- 2 Elia N, Lysakowski C, Tramèr M. Does multimodal analgesia with acetaminophen, nonsteroidal antiinflammatory drugs, or selective cyclooxygenase-2 Inhibitors and Patient-controlled analgesia morphine offer advantages over morphine alone?: Meta-analyses of randomized trials. *Anesthesiology* 2005;**103**(6):1296–1304.
- 3 Caesarean Section. NICE Clinical Guideline 132. *NICE*, London 2011 (<http://publications.nice.org.uk/caesarean-section-cg132>).
- 4 Noblet J, Plaat F. Raising the standard... to unachievable heights? *Anaesthesia* 2009;**65**:87–88.



8.12

Anaesthetic complications and side effects

Dr M Girgis, Professor M Wee

Why do this audit?

Routine follow up after obstetric anaesthesia is recommended. The necessity for assessment of side effects after anaesthesia is self-evident. There are a number of potentially serious complications which can occur after anaesthetic intervention during pregnancy. Some of these may be amenable to treatment and should be recognised and treated promptly.

Best practice: research evidence or authoritative opinion

For regional anaesthesia (RA) – The accidental dural puncture (ADP) rate may vary from 2% in novices or for difficult epidurals to < 0.26% with good technique and supervision.^{1,2} It is accepted that narrow gauge pencil point needles reduce the incidence of post-dural puncture headache (PDPH).^{3,4} Reviews of epidural blood patches (EBP) and other methods for prophylaxis of PDPH show current evidence is insufficient to support their use for prevention of PDPH.^{5,6} EBP remains the gold standard treatment for PDPH, with between 58–75% receiving complete relief after the first blood patch, although the headache returned in 31% and 28% required more than one EBP.^{7,8,9} There are many possible neurological complications after central neuraxial blockade including nerve root damage, spinal haematoma, cauda equina syndrome, meningitis and epidural abscess. The incidence of complications has been quoted as 1:13,000 for neurological complications after spinal blockade and 1:25,000 after epidural blockade.^{10,11} Spinal haematoma after obstetric epidural blockade carried an incidence of 1:200,000¹² and the National Audit Project 3 estimated the rate of permanent harm after central neuraxial block in the obstetric population to be between 1:320,000 (optimistically) and 1:80,000 (pessimistically).¹³

For general anaesthesia (GA) – Incidence of recall of < 0.5% and dreaming < 5% in patients with an inspired isoflurane concentration of 1%;^{14,15} 1:250–1:1250 incidence of failed intubation;^{6,17} 1:10–1:100 incidence of sore throat and post-operative nausea and vomiting (PONV).¹⁸

Suggested indicators

Denominator: Delivery suite caseload, type of anaesthesia provided – split into caesarean section (CS), operating theatre non-CS, labour ward.

- D % of women followed up after receiving an anaesthetic intervention
- D For regional anaesthetic procedures:
 - ◆ % of women having an obstetric epidural who have a dural puncture
 - ◆ % of women who have PDPH after spinal or epidural anaesthesia
 - ◆ % of women receiving EBP
 - ◆ % of women left with long-term (> 6 months duration) neurological complications
 - ◆ % of women followed up after EBP or neurological complications
 - ◆ % of women who are converted to GA due to inadequate regional anaesthesia
- D For general anaesthetic procedures:
 - ◆ % of women who report awareness after GA section
 - ◆ % of difficult airway/failed intubation
 - ◆ % suffering from PONV
 - ◆ % suffering from sore throats

Proposed standard or target for best practice

- D 100% of parturients having an anaesthetic intervention should be followed up.
- D For RA:
 - ◆ < 1% of epidurals should have ADP
 - ◆ < 0.5% of spinal anaesthesia should be followed by severe PDPH
 - ◆ 100% followed up after EBP or neurological complications.
- D For GA:
 - ◆ < 0.4 incidence of recall
 - ◆ < 5% should have dreaming during GA
 - ◆ After failed intubation: 100% should be given Airway Alert Letter (can be obtained from <http://www.das.uk.com/guidelines/downloads.html>) with copy to GP and anaesthetic department
 - ◆ 100% should have warning put in medical notes with adequate explanation.

Suggested data to be collected

- D % of parturients followed up.
- D Total number of epidurals, spinals and GA.
- D Grade of anaesthetist, experience and supervision level.
- D For RA: Number of known ADP, number of PDPH, number of conversion to GA and reason. Gauge and type of needle and number of attempts. Management and outcome of PDPH. % receiving EBP, % who have 2nd EBP, % parturients followed up after EBP and neurological complications.
- D Recommended audit frequency – continuous
- D For GA: Incidence of recall or dreaming when questioned, record of machine check, incidence of PONV and sore throat. Incidence of failed intubations. For cases where awareness has occurred, documentation of induction agents and dosages used, end-tidal concentration of N₂O and volatile agent. Recommended audit frequency – continuous.

Common reasons for failure to meet standard

- D Workload problems leading to poor follow up of patients; early discharge from hospital.
- D Poor supervision of trainees and lack of senior input.
- D Urgency of CS.
- D Lack of training in regional anaesthesia and airway management.
- D Failure to check anaesthetic equipment according to AAGBI guidelines.
- D Poor training in GA for obstetrics.

Related audits

- 8.8 – Caesarean section anaesthesia: technique and failure rate
- 8.10 – Airway and intubation problems during general anaesthesia for caesarean section
- 2.8 – Awareness and general anaesthesia

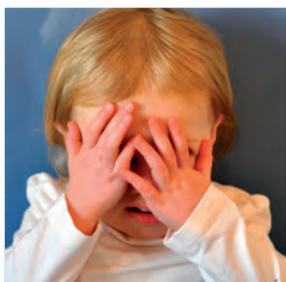
CPD and Curriculum mapping

CPD matrix code: **2B04**

Training curriculum competences: **OB_BK_12, OB_IS_05, OB_HS_13**

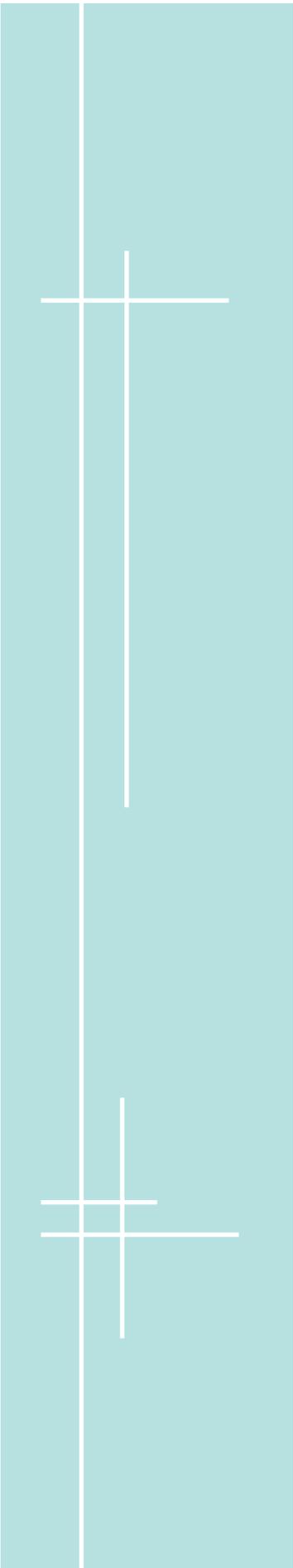
References

- 1 McDonald R, Lyons G. Unintentional dural puncture. *Anaesthesia* 1988;**43**:705.
- 2 Stride PC, Cooper GM. Dural taps revisited. *Anaesthesia* 1993;**48**:247–255.
- 3 Reid J A, Thorburn J. Headache after spinal anaesthesia. *Br J Anaesth* 1991;**67**:674–677.
- 4 Courtney M A, Lambert D H. Neurological sequelae of regional anaesthesia. *Balliré's Clin Anesthesiol* 1992;**6**:632–633.
- 5 Boonmak P, Boonmak S. Epidural blood patching for preventing and treating post-dural puncture headache. *Cochrane Database of Systematic Reviews* 2010.
- 6 Apfel CC et al. Prevention of postdural puncture headache after accidental dural puncture: a quantitative systematic review. *Br J Anaesth* 2010;**105**:255–263.
- 7 Safa-Tisseront V et al. Effectiveness of epidural blood patch in the management of post-dural puncture headache. *Anesthesiol* 2001;**95**:334–339.
- 8 Banks S, Paech M, Gurrin L. An audit of epidural blood patch after accidental dural puncture with a Tuohy needle in obstetric patients. *Int J Obstet Anesth* 2001;**10**:172–176.
- 9 van Kooten F et al. Epidural blood patch in post dural puncture headache: a randomised, observer-blind, controlled clinical trial. *J Neurol Neurosurg Psych* 2008;**79**:553–558.
- 10 Holdcroft A et al. Neurological complications associated with pregnancy. *Br J Anaesth* 1995;**75**:522–526.
- 11 Loo CC, Dahlgren G, Irestedt L. Neurological complications in obstetric regional anaesthesia. *Int J Obstet Anesth* 2000;**9**:99–124.
- 12 Moen V, Dahlgren N, Irestedt L. Severe neurological complications after central neuraxial blockade in Sweden 1990–1999. *Anesthesiol* 2004;**101**:950–959.
- 13 Cook T. Major Complications of Central Neuraxial Block in the UK. Report and findings from the 3rd National Audit Project (NAP3). RCoA, London 2009 (<http://www.rcoa.ac.uk/node/1428>).
- 14 Lyons G, Macdonald R. Awareness during caesarean section. *Anaesthesia* 1991;**46**:62–64.
- 15 McCrerrick A, Evans GH, Thomas TA. Overpressure isoflurane at caesarean section: a study of arterial isoflurane concentrations. *Br J Anaesth* 1994;**72**:122–124.
- 16 Barnardo PD, Jenkins JG. Failed tracheal intubation in obstetrics: a 6-year review in a UK region. *Anaesthesia* 2000;**55**:690–694.
- 17 McKeen DM, George RB, O'Connell CM et al. Difficult and failed intubation: incident rates and maternal, obstetrical, and anaesthetic predictors. *Can J Anaesth* 2011;**58**:514–524.
- 18 Risks associated with having an anesthetic. RCoA, London 2009 (<http://www.rcoa.ac.uk/node/428>).



Section 9: Paediatrics

Edited by Dr Ian Barker

- 
- 9.1 Pre-operative parent and child information
 - 9.2 Pre-operative fasting in elective paediatric surgery
 - 9.3 Premedication in pre-school age children
 - 9.4 Parent satisfaction with arrangements for being present with their child at induction
 - 9.5 Peri-operative temperature control in children
 - 9.6 Post-operative pain management
 - 9.7 Peri-operative fluid audit in children
 - 9.8 Paediatric sedation
 - 9.9 Pain at home after day case surgery in children
 - 9.10 Unplanned hospital admission following paediatric day case surgery
 - 9.11 Care pathways for dental extractions under general anaesthesia in children
 - 9.12 Post-operative vomiting in children

9.1

Pre-operative parent and child information

Dr O Bagshaw

Why do this audit?

Parents and their children demonstrate a high incidence of anxiety prior to surgery.^{1,2} High pre-operative anxiety levels in children have been shown to have an adverse effect on recovery.³ They may be concerned about premedication, the anaesthetic, procedures, possible complications and particularly post-operative pain.^{4,5} Adequate pre-operative information and preparation will help allay these concerns and reduce anxiety.⁶ Participation by parents in aspects of anaesthesia decision-making, such as induction and methods of post-operative analgesia, increases their satisfaction with the care their child receives.⁷ Older children can more readily identify their information needs, but often these are not met.^{5,8}

Best practice: research evidence or authoritative opinion

Pre-operative information in the form of leaflets, 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 and cancellations.^{4,9} 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.⁶ Older children have been shown to want comprehensive information about their surgery.⁵

The Association of Paediatric Anaesthetists and the Royal College of Anaesthetists have produced information leaflets for children of different ages from four years upwards. These can be downloaded via the following link: <http://www.rcoa.ac.uk/childrensinfo>.

Suggested indicators

- D % parents who had access to pre-operative information.
- D % parents who were sent pre-operative information by post.
- D % parents who received pre-operative information.
- D % parents/children who found the information satisfactory.
- D % parents who attempted to contact the hospital for advice about the anaesthetic, and who were able to get the advice they sought.
- D % parents/children assessed and counselled by an anaesthetist pre-operatively on the ward and given an opportunity to ask questions.
- D % parents/children who rated the interview satisfactory.

Proposed standard or target for best practice

- D 90% of parents should receive postal pre-operative information.
- D For all other indicators, the value should be 100%.

Suggested data to be collected

- D Did the parent/child have access to or receive information pre-operatively?
- D Did it tell them what they wanted to know?
- D Did they attempt to contact the hospital for advice and if so, were they successful?
- D Did they see an anaesthetist pre-operatively?
- D Was appropriate information given?
- D Did they have an opportunity to ask questions and if so, were these answered satisfactorily?

These questions should be asked by an auditor who is independent of the anaesthetist.

You may wish to make a list of what you consider to be minimum elements of the pre-anaesthetic interview and ask which were included.

Cancellation or non-attendance should be scrutinised in the context of patient information. Was it related to lack of patient/child information in some way?

Common reasons for failure to meet standard

- D Lack of opportunity to access pre-operative information (no leaflets, no website, no pre-admission etc.)
- D Administrative failure in sending out pre-operative information.
- D No mechanism for dealing with telephone enquiries from parents.
- D Failure of parents/child to attend pre-admission clinic.
- D Failure of anaesthetist to visit patient pre-operatively.
- D Failure of anaesthetist to extract adequate information from the parent/child.
- D Parent not present when child assessed by anaesthetist.

Related audits

I.1 – Patient information about anaesthesia

CPD and Curriculum mapping

CPD matrix codes: **IF01, 2D02**

Training curriculum competences: **PA_BK_02, PA_BK_I7**

References

- 1 Thompson N et al. Preoperative parental anxiety. *Anaesthesia* 1996;**51**:1008–1012.
- 2 Wollin SR et al. Anxiety in children having elective surgery. *J Pediatr Nurs* 2004;**19**:128–132.
- 3 Kain ZN et al. Preoperative anxiety, postoperative pain, and behavioural recovery in young children undergoing surgery. *Pediatrics* 2006;**118**:651–658.
- 4 Wisselo TL et al. Providing parents with information before anaesthesia: what do they really want to know? *Pediatr Anesth* 2004;**14**:299–307.
- 5 Fortier MA et al. Children's desire for perioperative information. *Anesth Analg* 2009;**109**:1085–1090.
- 6 Bellew M et al. The introduction of a paediatric anaesthesia information leaflet: an audit of its impact on parental anxiety and satisfaction. *Paediatr Anaesth* 2002;**12**:124–130.
- 7 Tait AR et al. Parents' preferences for participation in decisions made regarding their child's anaesthetic care. *Paediatr Anaesth* 2001;**11**:283–290.
- 8 Smith L, Callery P. Children's accounts of their preoperative information needs. *J Clin Nurs* 2005;**14**:230–238.
- 9 Kain ZN et al. Parental desire for perioperative information and informed consent: a two-phase study. *Anesth Analg* 1997;**84**:299–306.



9.2 Pre-operative fasting in elective paediatric surgery

Dr T Dorman

Why do this audit?

Adequate pre-operative fasting reduces the risk of regurgitation of stomach contents at the time of induction of anaesthesia. This must be balanced against the risks of prolonged fasting leading to hypoglycaemia, dehydration and distress. There can be difficulties planning fasting times due to list changes, unpredictable operating time and patient or parent compliance.^{1,2}

Because of logistical problems on lists, e.g. cancellations, most fasting guidelines work on the start time of the list so children later on the list will starve longer especially if the list is delayed. It is difficult to fast children to an exact time on the list.

Best practice: research evidence or authoritative opinion

Major studies have shown that there is no increase in risk of aspiration if clear fluids are given up to and at 2 hours pre-operatively against a background of 6 hours fasting time for solids and milk (cow's and formula).^{3,4,5,6}

The following practice is suggested:

Children over the age of 6 months

- D Clear fluids should be given up to and at 2 hours before induction of anaesthesia.
- D Children should be fasted from solids, milk (any type including formula) for 6 hours before induction of anaesthesia. In order to prevent excessively long starvation, children on morning lists should be fed as late as possible the night before (but not after 02.30 for 08.30 start time). Children on an afternoon list should have a light breakfast at 07.30 for a start time of 13.30.

Neonates and babies under the age of 6 months

- D Breast milk up to and at 4 hours before the induction of anaesthesia.
- D Formula milk up to and at 6 hours before the induction of anaesthesia.
- D Clear fluids up to and at 2 hours before the induction of anaesthesia.

Suggested indicators

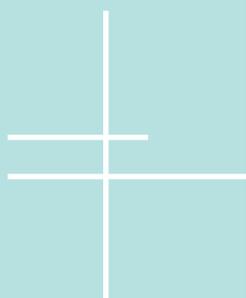
- D % children who fit the criteria above.
- D % of list changes or cancellations because children aren't starved appropriately.

Proposed standard or target for best practice

- D 100% of children for elective surgery should fit with the suggested practice.
- D 100% of parents/children should be given the correct instructions.

Suggested data to be collected

- D Number of patients/parents receiving correct instructions.
- D Compliance, i.e. number following instructions.
- D Last oral intake time and what it was.
- D Time of induction.
- D Factors affecting time of induction, e.g. delays.
- D Time to first intake.
- D Problems on induction, e.g. vomiting, regurgitation etc.
- D Problems post-operatively, e.g. PONV.



Common reasons for failure to meet standard

- D Patients/parents have not received correct instructions.
- D Non compliance with instructions e.g lack of understanding.
- D Logistical problems with lists: delays, cancellations etc.
- D Difficulty predicting the exact time of induction.

Related audits

I.7 – Pre-operative fasting in adults

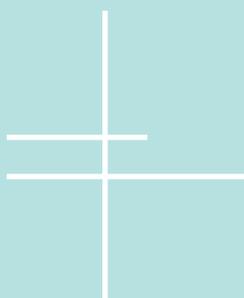
CPD and Curriculum mapping

CPD matrix codes: **IA01 (physiology), 2D06**

Training curriculum competences: **PA_BK_03, PA_IK_03**

References

- 1 Philips S, Daborn AK, Hatch DJ. Pre-operative fasting for paediatric anaesthesia. *Br J Anaesth* 1994;**73**:529–536.
- 2 Veall G, Dorman T. Prolonged Starvation in Paediatrics. *Anaesthesia* 1995;**50**:458–460.
- 3 Schreiner MS, Triewasser A, Keon TP. Ingestion of liquids compared with pre-operative fasting in paediatric outpatients. *Anesthesiology* 1990;**72**:593–597.
- 4 Splinter WM, Stewart JA, Muir JG. Large volumes of apple juice pre-operatively do not affect gastric fluid pH and volume in children. *Can J Anaesth* 1990;**37**:36–39.
- 5 Splinter WM, Schaefer JD, Zunder IH. Clear fluids three hours before surgery does not affect the gastric fluid contents of children. *Can J Anaesth* 1990;**37**:498–501.
- 6 Practice guidelines for pre-operative fasting and the use of pharmacological agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures. An updated report by the American Society of Anaesthesiologists Committee on Standards and Practice Parameters. *Anesthesiology* 2011;**114**(3):495–511 (http://journals.lww.com/anesthesiology/Fulltext/2011/03000/Practice_Guidelines_for_Preoperative_Fasting_and_13.aspx).
- 7 Brady M et al. Pre-operative fasting for preventing pre-operative complications in children *Cochrane Database of Systematic Reviews*, 2009, Issue 4. No: CD005285 (<http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005285.pub2/full>).



9.3

Premedication in pre-school age children

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.³ 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 There is evidence that clonidine (4 micrograms/kg) may be superior to midazolam (0.5mg/kg) in acceptance by the patient, better sedation effect, a higher degree of parental satisfaction and a trend to smoother emergence albeit with a slower, but probably not clinically, significant time to sedation.⁵

Suggested indicators

- D % of children age 1–5 years who do not cry or need restraint at induction.
- D % 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

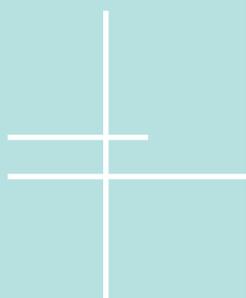
- D 75% children age 1–5 years should pass through the anaesthetic room without crying or needing restraint.¹
- D 100% children age 1–5 years should have a topical local anaesthetic applied at an appropriate time before a planned intravenous induction.

Suggested data to be collected

- D Anaesthetist – name and grade.
- D Age of patient.
- D Parent present, and if not why not.
- D Planned route of induction.
- D Application of a topical local anaesthetic and how long before induction.
- D Sedative premedication: drug, dose, route, and time relative to induction.
- D Assessment of child's response to IV insertion and induction.

Common reasons for failure to meet standard

- D Lack of nursing and medical staff with sufficient paediatric training and experience.
- D Failure of anaesthetist to judge the need for sedation.
- D List changes prevent the application of topical local anaesthetic.
- D Absence of parent or separation at the theatre door.



Related audits

I.8 – Premedication

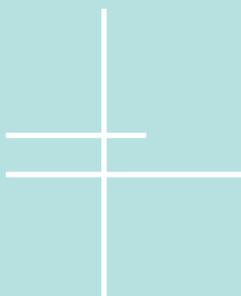
CPD and Curriculum mapping

CPD matrix codes: **2D02, 2D06**

Training curriculum competences: **PA_BK_12**

References

- 1 Page B, Morgan-Hughes JO. Behaviour of small children before induction. The effect of parental presence and EMLA and premedication with triclofos or a placebo. *Anaesthesia* 1990;**45**:821–872.
- 2 McCluskey A, Meakin GH. Oral administration of midazolam as a premedicant for paediatric day-case anaesthesia. *Anaesthesia* 1994;**49**:782–785.
- 3 Hannallah RS, Rosen DA, Rosen KR. Residents' ability to predict children's co-operation with anaesthesia induction. *Anesthesiology* 1985;**63**:502.
- 4 Bergendahl HT et al. Clonidine vs. midazolam as premedication in children undergoing adenotonsillectomy: a prospective, randomised, controlled trial. *Acta Anaesth Scand* 2004;**48**:1292–1300.
- 5 Almenrader N et al. Premedication in children: a comparison of oral midazolam and oral clonidine. *Pediatr Anesth* 2007;**17**:1143–1149.



9.4

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 RCoA recommendations that 'parents should be involved in care processes. Child-centred approach to anaesthesia and surgery should be employed with, as far as possible, provision for parents to accompany children both to the anaesthetic room and into the recovery area'.^{1,2} The Royal College of Surgeons of England similarly expect that 'parents will normally be given the chance to accompany their child in the anaesthetic room'.³

Best practice: research evidence or authoritative opinion

Contrary to popular belief, a recent evidence-based review of 14 studies suggested that only rarely did parental presence reduce child or parent anxiety.⁴ However, another study concluded that 'parents of children who undergo a subsequent surgery prefer to be present during the induction of anaesthesia regardless of the (anxiety-reduction) intervention that was used in the initial surgery'.⁵

Suggested indicators

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

Proposed standard or target for best practice

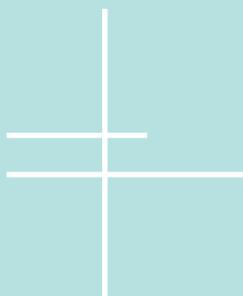
- D Comments from older children/teenagers on parental presence.
- D 100% of parents invited to be present with their child at induction should be satisfied with the arrangements made to do so.

Suggested data to be collected

- D Assessment of satisfaction level using post-operative questionnaire. You may wish to explore this in detail, e.g. satisfaction with pre-operative explanation, with waiting arrangements, with actual events in the anaesthetic room, with the support they received afterwards etc.
- D Reasons for dissatisfaction.

Common reasons for failure to meet standard

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



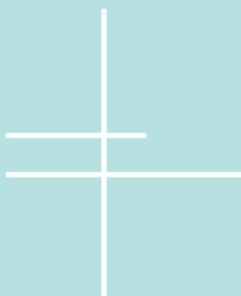
CPD and Curriculum mapping

CPD matrix codes: IF01, 2D02

Training curriculum competences: PA_BK_02, PA_BK_17

References

- 1 Guidelines for the provision of paediatric anaesthetic services. RCoA, London 2011 (<http://www.rcoa.ac.uk/node/714>).
- 2 Getting the right start. National Service Framework for Children: Standard for Hospital Services. DH, London 2003 (<http://www.dh.gov.uk/assetRoot/04/06/72/51/04067251.pdf>).
- 3 Surgery for children: delivering a first class service. RCSEng, London 2007 (<http://www.rcseng.ac.uk/publications/docs/CSF.html>).
- 4 Chundamala J, Wright JG, Kemp SM. An evidence-based review of parental presence during anesthesia induction and parent/child anxiety. *Can J Anaesth* 2009;**6**(1):57–70.
- 5 Kain ZN et al. Parental intervention choices for children undergoing repeated surgeries. *Anesth Analg* 2003;**96**(4):970–975.



9.5

Peri-operative temperature control in children

Dr C Kirton

Why do this audit?

Thermoregulation is known to be disrupted in the peri-operative 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.¹ This audit will establish whether warming techniques are being used effectively in children and whether appropriate intra-operative monitoring is being used.

Best practice: research evidence or authoritative opinion

Hypothermia is in most cases deleterious,² being associated with increased oxygen consumption³ and shivering,⁴ with a decrease in platelet function⁵ and consequent blood loss,⁶ with the risk of surgical wound infection⁷ and with impairment of drug metabolism.⁴ Maintenance of normothermia is possible using a variety of warming devices. Inditherm mattresses and forced air blowers are particularly effective.⁴ The large surface area-mass ratio of infants allows rapid cooling and rewarming, and therefore monitoring is important.

Suggested indicators

D % children who arrive in the recovery area with tympanic (or axillary) temperature in the range 36–37°C.^{6,7}

Proposed standard or target for best practice

D 100% of children should meet the above criteria.

Suggested data to be collected

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

Common reasons for failure to meet standard

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

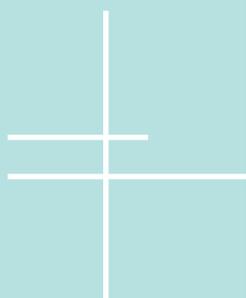
Related audits

2.7 – Peri-operative temperature management

CPD and Curriculum mapping

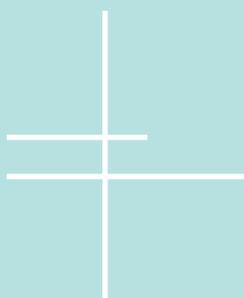
CPD matrix codes: IA01(physiology), 2D02

Training curriculum competences: PA_IK_06, PA_IS_05



References

- 1 Recommendations for standards of monitoring during anaesthesia and recovery. AAGBI, London 2007 (<http://www.aagbi.org/pdf/Absolute.pdf>).
- 2 Leslie K, Sessler DI. Perioperative hypothermia in the high-risk surgical patient (Review). Best practice and research. *Clin Anaesthesiol* 2003;**17**(4):485–498.
- 3 Adamsons K Jr, Gandy GM, James LS. The influence of thermal factors upon oxygen consumption of the new born infant. *J Pediatr* 1965;**66**:495–508.
- 4 Sessler DI. Perioperative thermoregulation and heat balance. *Ann NY Acad Sci* 1997;**813**:757–777.
- 5 Valeric R et al. Hypothermia-induced reversible platelet dysfunction. *Ann Surg* 1987;**205**:175–181.
- 6 Cheney FW. Should normothermia be maintained during major surgery? *J Am Med Assoc* 1997;**277**:1165–1166.
- 7 Kurz A, Sessler DI, Lenhardt R. Perioperative normothermia to reduce the incidence of surgical- wound infection and shorten hospitalization. *New Engl J Med* 1996;**334**:1209–1215.



9.6

Post-operative pain management

Dr J M Goddard

Why do this audit?

Pain is experienced by paediatric patients of all ages,¹ especially in the post-operative period. The evidence in paediatric practice that relief of post-operative pain is cost-effective or beneficial to organ function is lacking. Nonetheless pain relief is a basic humanitarian requirement, which in the hospital environment is entrusted to healthcare professionals.² 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 are well established.³ Authoritative reports recommend that these principles are best achieved by the establishment of an Acute Pain Service (APS).⁴ The evidence base in paediatric practice for specific techniques has been endorsed by several organisations.⁵ Nonetheless, contextual factors – culture, relationships and organisational issues – need to be addressed. Data in paediatric practice confirm that it is the structure and process of an APS that most improves pain relief rather than specific analgesic techniques.⁶ The routine assessment and recording of pain is pivotal; evidence-based guidance should be utilised.^{5,7} A record of pain assessment should be developed to suit local circumstances; incorporation into routine hospital documentation is recommended.⁸ Inclusion of pain assessment in paediatric early warning system documentation should be sought.

Suggested indicators

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

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. It is recommended that pain is considered as the 5th vital sign and recorded alongside routine observations of temperature, pulse rate etc.

In-patients

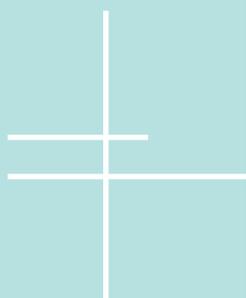
- D On 95% days, a member of the APS should visit all paediatric surgical wards.
- D 95% children undergoing surgery should have a complete record of pain scores.
- D < 5% children should have an unacceptable pain score at any time. The pain score deemed to be unacceptable needs to be chosen, and will depend on which validated pain assessment tool the team wishes to use.

Day cases

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

Suggested data to be collected

- D Presence/absence of APS and its members.
- D Evidence of daily visit by APS member to paediatric surgical wards.
- D For each child undergoing surgery: completeness of pain score record.
- D Worst pain score each day in all post-operative children, reason and any action taken.
- D Qualitative data on patient and parent experiences of pain management.
- D Parental assessment of pain at home.



Common reasons for failure to meet standard

- D Holiday, sickness, other duties (of acute pain team).
- D No dedicated acute pain team or no weekend cover.
- D Pain scores not considered important, staff too busy, no organisational support for pain services.
- D Failure to supply appropriate analgesics for use at home.
- D Inadequate instructions for parents on analgesic administration.

Related audits

- 5.3 – Adequacy of post-operative pain relief after discharge
- 11.1 – Education and training by the acute pain team
- 11.4 – Assessment and documentation in acute pain management
- 11.5 – Efficacy of acute pain management in the post-operative period

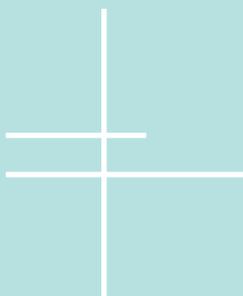
CPD and Curriculum mapping

CPD matrix codes: **ID01, ID02, 2D05**

Training curriculum competences: **PA_BK_07, PA_BK_11, PA_IK_09, PA_IS_07**

References

- 1 Schechter NL, Berde CB, Yaster M. Pain in infants, children, and adolescents, 2nd edn. *Lippincott Williams and Wilkins*, Philadelphia 2003.
- 2 Department of Health. Getting the right start: National service framework for children. Standard for hospital services. *DH*, London 2003.
- 3 McQuay H, Moore A, Justins D. Treating acute pain in hospital. *Br Med J* 1997;**314**:1531–1535.
- 4 Royal College of Surgeons of England and College of Anaesthetists. Report of the Working Party on Pain after Surgery. Commission on the provision of surgical services. *RCSEng*, London 1990.
- 5 Good practice in post-operative and procedural pain management. A guideline from the Association of Paediatric Anaesthetists of Great Britain and Ireland. *Pediatr Anesth* 2008;**18**(suppl 1):1–81.
- 6 Goddard JM, Pickup SE. Post-operative pain in children. Combining audit and a clinical nurse specialist to improve management. *Anaesthesia* 1996;**51**:588–591.
- 7 The recognition and assessment of acute pain in children. *RCN*, London 2009.
- 8 Standards for assessing, measuring and monitoring vital signs in infants, children and young people. *RCN*, London 2011.



9.7

Peri-operative fluid audit in children

Dr N Barker

Why do this audit?

Hyponatraemia (plasma sodium < 135 mmol/L) may result from the use of hypotonic fluids, especially during the peri-operative period when vasopressin levels may be elevated. This can result in hyponatraemic encephalopathy. Administration of glucose during surgery may lead to intra-operative hyperglycaemia which can cause an osmotic diuresis leading to dehydration and electrolyte disturbance; however children at risk of hypoglycaemia should be given dextrose containing fluids. The purpose of this audit is to observe the use of intravenous fluids given to children during the peri-operative period and therefore to check that current guidance is being followed.

Best practice: research evidence or authoritative opinion

There have been a number of concerns and case reports of morbidity associated with hyponatraemia due to water intoxication in the peri-operative period.^{1,2} The NPSA (National Patient Safety Agency) produced a safety alert to reduce the risk of hyponatraemia in children and the APA (Association of Paediatric Anaesthetists of Great Britain and Ireland) produced a consensus guideline on peri-operative fluid management in children.^{3,4}

Suggestions to help avoid hyponatraemia are to administer isotonic fluids for all replacement fluid and possibly for maintenance in the intra-operative period.

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, the majority of children over 1 month will maintain a normal blood sugar. However, hypoglycaemia is a very serious complication and certain conditions favour intra-operative glucose administration: e.g. those on parenteral nutrition or a dextrose containing solution prior to theatre, children of low body weight (< 3 rd centile) or having surgery of more than 3 hours and children having extensive regional anaesthesia.

Suggested indicators

- D Replacement (for deficit and ongoing losses) should be with an isotonic fluid such as Normal Saline, Hartmann's, colloid or blood where appropriate.
- D Hypotonic fluids should be reserved for maintenance use. (Many children will be prescribed isotonic fluids in the peri-operative period.)
- D During surgery, dextrose containing maintenance fluids should be given to children at risk of hypoglycaemia.
- D Monitor plasma glucose if glucose-free solutions are used during surgery where surgery is over 3 hours in duration.
- D Plasma electrolytes should be checked every 24 hrs and a fluid input/output chart used whilst intravenous fluids are being administered in the peri-operative period.

Proposed standard or target for best practice

- D 100% of children receiving intravenous fluids in the peri-operative period should meet the above criteria.

Suggested data to be collected

- D Date of birth.
- D Weight.
- D Procedure, duration of procedure.
- D Estimated blood loss.
- D Type and amount of fluid/blood administered intra-operatively.
- D Post-operative fluid prescription.
- D Whether electrolytes are monitored and fluid balance charts used in the peri-operative period.

Common reasons for failure to meet standard

- D A lack of awareness or dissemination of the recent guidance and safety alerts for the administration of intravenous infusions to children.
- D Inadequate training and supervision for all staff involved in the prescribing, administering and monitoring of intravenous infusions for children.

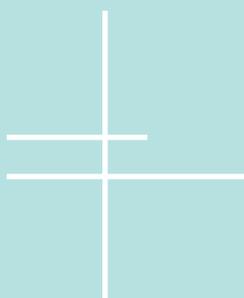
CPD and Curriculum mapping

CPD matrix code: **2D04**

Training curriculum competences: **PA_BK_09, PA_HS_05**

References

- 1 Halberthal M, Halperin ML, Bohn D. Lesson of the week: Acute Hyponatraemia in children admitted to hospital: retrospective analysis of factors contributing to its development and resolution. *Br Med J* 2001;**322**:780–782.
- 2 Arieff AL. Postoperative hyponatraemic encephalopathy following elective surgery in children. *Paediatr Anaesth* 1998;**8**:1–4.
- 3 Reducing the risk of hyponatraemia when administering intravenous infusions to children. *NPSA*, March 2007 (<http://www.nrls.npsa.nhs.uk/resources/?entryid45=59809&q=0%C2%AChyponatraemia%C2%AC>).
- 4 APA Consensus Guideline on Perioperative Fluid Management in Children v1.1. *APAGBI*, London September 2007 (http://www.apagbi.org.uk/sites/apagbi.org.uk/files/Perioperative_Fluid_Management_2007.pdf).



9.8

Paediatric sedation

Dr M Sury, Dr B Lattuca, Dr K Richardson

Why do this audit?

Sedation of children can lead to unintended loss of consciousness. In contrast some sedation techniques may not be effective enough and can lead to patient distress and failure to complete the procedure. Practitioners need to know how to deliver effective sedation and be able to manage the complications of airway obstruction, and cardio-respiratory depression.

Sedation, is usually administered by non-anaesthetists who may not have sufficient training. Ideally, all practitioners of sedation should be trained to deliver effective, procedure specific techniques, and to both prevent and manage the complications.

There are four common different types of procedures: dentistry, painful procedures in the emergency department, gastrointestinal endoscopy and painless imaging.

The hospital or healthcare facility in which sedation is carried out should be properly equipped and staffed. A Sedation Safety Committee or senior clinician should be appointed to oversee and ensure safe and effective practice.

Best practice: research evidence or authoritative opinion

Two recent guidelines have shaped opinion and practice.

- D The SIGN Guideline¹ was useful to advise on safe conscious sedation but did not advise on techniques that caused deep sedation or risked anaesthesia.
- D The NICE Guideline² considered wider practice and advised on the general sedation management of the 'Patient Journey' of children having diagnostic and therapeutic procedures and then also recommended drug techniques that were effective. The principles of training for practitioners using these techniques were recommended.

Suggested indicators

From NICE Guideline 112

- D The existence and adequacy of pre-sedation assessment including a readiness to seek specialist advice.
- D The suitability of sedation for the proposed patients.
- D The appropriateness of the chosen sedation technique.
- D The theoretical and practical training of the person delivering the sedation.
- D The training of sedation personnel in relevant resuscitation techniques.
- D The presence and adequacy of:
 - ◆ Sedation equipment
 - ◆ Resuscitation equipment
 - ◆ Monitoring equipment
 - ◆ Appropriate drugs.
- D The presence of the person delivering sedation and a trained assistant throughout the procedure.
- D Adequate documentation including
 - ◆ Patient/carer information
 - ◆ Consent information
 - ◆ Contemporaneous documentation of the sedation and physiological recordings
 - ◆ The success or otherwise of the sedation including complications, highlighting airway intervention.
- D Suggested (NICE 112) resuscitation training:

	Minimal sedation ^a	Moderate sedation	Deep sedation
All members	Basic	Basic	Basic
At least one member		Intermediate	Advanced

^aincluding sedation with nitrous oxide alone (in oxygen) and conscious sedation in dentistry.

Proposed standard or target for best practice

The target for best outcome should be 100% success with high satisfaction scores for patient, parents and practitioners. There should be no complications. The need for airway intervention depends upon the sedation technique used. Ideally there should be no need for any airway intervention.

The target for best practice should be 100% adherence to the recommendations.

Suggested data to be collected

The outcome, interventions and complications should be recorded.

Outcomes**Primary**

- ▷ Successful completion of diagnostic or therapeutic procedure.

Secondary

- ▷ Behavioural ratings including pain, distress and anxiety.
- ▷ Patient or parent satisfaction.
- ▷ Sedation timing including duration of induction, the procedure, and the recovery.

Complications and interventions

- ▷ Vomiting.
- ▷ Oxygen desaturation.
- ▷ Aspiration.
- ▷ Respiratory intervention, including oral-pharyngeal airway, tracheal intubation, assisted ventilation.
- ▷ Cardiac arrest requiring external cardiac massage or defibrillation.

Common reasons for failure to meet standard

Sedation is

- ▷ generally undertaken by non-anaesthetists who may be concentrating on the procedure rather than the sedation
- ▷ undertaken sporadically and in small numbers
- ▷ carried out by a wide range of personnel and in many settings
- ▷ not perceived as a major safety problem by non-anaesthetists
- ▷ carried out by trainees
- ▷ not carried out using a protocol or agreed standards.

CPD and Curriculum mapping

CPD matrix codes: **2D06, 1A02 (pharmacology)**

Training curriculum competence: **PA_AS_03**

References

- 1 SIGN. Safe sedation of children undergoing diagnostic and therapeutic procedures. A national clinical guideline. Scottish Intercollegiate Guidelines Network. *SIGN*, Edinburgh 2004 (<http://www.sign.ac.uk/guidelines/fulltext/58/index.html>: "SIGN 58: Safe sedation of children undergoing diagnostic and therapeutic procedures has been withdrawn as new evidence has emerged that means the guideline no longer represents best practice. SIGN does not have any plans to produce a new guideline on this topic at present.")
- 2 Sedation for diagnostic and therapeutic procedures in children and young people. NICE Clinical Guideline CG112. *NICE*, London December 2010 (<http://www.nice.org.uk/guidance/CG112>).

9.9

Pain at home after day case surgery in children

Dr G Bell

Why do this audit?

With an increasing amount of surgery joining the list of 'suitable for day case' procedures it is incumbent on anaesthetists charged with the administration of peri-operative pain control to look further than the day surgery discharge lounge when assessing success of their post-operative analgesia regime, especially as their local anaesthetic blocks may wear off through the first post-operative night and outwith direct medical/nursing supervision.

Best practice: research evidence or authoritative opinion

It is well established that the expansion of day surgery has not been mirrored by a corresponding increase in the provision of analgesia at home following surgery.¹

It doesn't seem to be a lack of appropriate guidelines that underlines this problem, but a lack of application of such guidelines.²

Suggested indicators

- D Sleep pattern:
 - ◆ % disturbed
 - ◆ % normal on days 1–3 post-op.
- D Behaviour/mood:
 - ◆ % normal
 - ◆ % upset.
- D Activities:
 - ◆ % normal play resumed
 - ◆ % slight restriction
 - ◆ % considerable self-restriction.
- D Parental perception of child's discomfort:
 - ◆ % mild
 - ◆ % moderate
 - ◆ % severe.
- D % requirement to seek additional healthcare advice/medication, e.g. GP consultation

Proposed standard or target for best practice

- D 100% normal sleep pattern by 3rd post-op night.
- D 100% normal mood by day 3.
- D 100% normal activities by day 3.
- D 0% severe pain – any day
 - ◆ 90% mild or nil by day 2
 - ◆ 100% mild or nil by day 3 (this will be recorded as parental impression of child's pain)
- D 90% not requiring to seek additional healthcare advice for pain.

Suggested data to be collected

- D Age of patient.
- D Surgical procedure.
- D Analgesia dispensed by hospital.
- D Compliance with suggested analgesic regime – and reasons for non-compliance.
- D Precipitating factors for high pain scores.
- D Reasons for seeking additional healthcare advice.

Common reasons for failure to meet standard

- D Extensive or known painful surgery without specific protocols including moderate strength analgesia.
 - Dispensing issues prior to discharge.
- D Unavailability of medication at home.
- D Lack of appropriate written advice from hospital (specifically in an appropriate language – do not exclude non-English=1st language patient families from this audit).

Related audits

11.2 – Patient Information on pain management
11.5 – Efficacy of acute pain management in the post-operative period
11.8 – Patient satisfaction with pain management

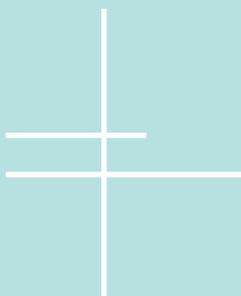
CPD and Curriculum mapping

CPD matrix codes: ID01, ID02, 2D05

Training curriculum competences: PA_BK_07, PA_BK_11, PA_IS_07, DS_BK_05

References

- 1 Wolf AR. Tears at bedtime: a pitfall of extending paediatric day-case surgery without extending analgesia. *Br J Anaesth* 1999;**82**:319–320.
- 2 Fortier MA et al. Paediatric pain after ambulatory surgery: where's the medication? *Paediatrics* 2009;**124**(4):588–595.



9.10

Unplanned hospital admission following paediatric day case surgery

Dr L Brennan

Why do this audit?

Unplanned overnight admission to hospital is stressful and a major inconvenience for children and their families. For healthcare providers it has adverse organisational and financial consequences. Unplanned admission increases the pressures on acute beds and hospitals are obliged to absorb the increased costs of in-patient care. High unplanned admission rates may be due to inadequacies in one or more aspects of the care pathway; patient selection, pre-assessment, peri-operative management, staff experience, as well as the day care facilities, geographical factors and case mix.¹

The Royal College of Anaesthetists and the Royal College of Surgeons of England have recognised unplanned admission rates as an important quality indicator of children's day case surgery in recent reports.^{2,3}

Best practice: research evidence or authoritative opinion

An unplanned admission rate of < 2% from day surgery units with a mixed adult and paediatric practice is suggested as an appropriate benchmark in audit 5.6 (see related audits). Several UK paediatric-only studies have been subsequently published with unplanned rates of 0.5% from a DGH unit and 1.8% from a tertiary children's hospital.^{1,4}

Suggested indicators

- D % children requiring unplanned overnight admission with reasons for this.
- D Existence of patient and procedure selection protocols for paediatric day surgery.
- D Existence of protocols for analgesia and management of emetic symptoms.

Proposed standard or target for best practice

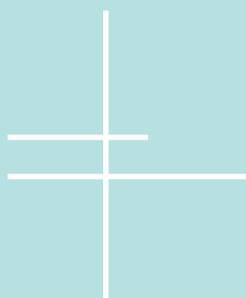
- D 100% of units managing children to have selection criteria and post-operative symptom protocols in place.
- D < 2% unplanned admission rate.

Suggested data to be collected

- D Patient demographics (age, specialty, procedure).
- D Grade of surgeon and anaesthetist.
- D Time of completion of procedure.
- D Reasons for admission:
 - ◆ nausea/vomiting
 - ◆ pain
 - ◆ drowsiness
 - ◆ unexpected surgical extent/difficulty
 - ◆ post-operative surgical complication
 - ◆ anaesthetic complication
 - ◆ inappropriate patient selection
 - ◆ other.

Common reasons for failure to meet standard

- D Medical and nursing staff unskilled in paediatric practice.
- D Lack of dedicated day case unit and staff.
- D No protocols or protocols not applied.
- D Inappropriate anaesthetic techniques.
- D Readmission to hospital following paediatric day surgery (within 48 hours).



Related audits

5.6 – Unplanned post-operative hospital admission after day surgery

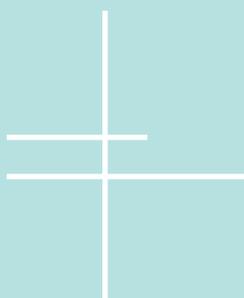
CPD and Curriculum mapping

CPD matrix codes: **2D02, 2D05**

Training curriculum competences: **DS_BK_06**

References

- 1 Blacoe DA, Cuning E, Bell G. Paediatric day-case surgery: an audit of unplanned hospital admission Royal Hospital for Sick Children Glasgow. *Anaesthesia* 2008;**63**:610–615.
- 2 Guidance on the provision of paediatric anaesthesia services. *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/714>).
- 3 Surgery for Children: Delivering a First Class Service. *RCSeng*, London 2007 (<http://www.rcseng.ac.uk/publications/docs/CSF.html>).
- 4 Rees S, Stocker M, Montgomery J. Paediatric outcomes in a DGH day surgery unit. *J One-Day Surg* 2009;**19**(4):92–95.



9.11

Care pathways for dental extractions under general anaesthesia in children

Dr L Adewale

Why do this audit?

In the UK each year over 60,000 children undergo general anaesthesia for dental extractions. Although the facilities and organisation of paediatric dental services vary widely, these children should receive the same standard of care as children undergoing general anaesthesia for any other procedure.

Best practice: research evidence or authoritative opinion

Prior assessment has been shown to improve the patient pathway on the day of the dental extractions. The importance of providing adequate information, with time for this to be considered by both the parent/carer and the child (if appropriate) has also been demonstrated.^{1,2,3}

Children should have access to pre-operative preparation by registered children's nurses and/or play therapists.⁴

Standards for intra-operative monitoring have been outlined by the AAGBI and should be employed regardless of the duration, location or mode of general anaesthesia for dental extractions.⁵

Unless contraindicated, non-steroidal anti-inflammatory drugs and/or paracetamol should be used to provide analgesia for dental extractions under general anaesthesia.⁶

Suggested indicators

- D % children attending for pre-operative assessment and preparation.
- D % parents/carers receiving pre-operative information before the day of the procedure.
- D % children offered pre-operative preparation by registered children's nurses and/or play therapists.
- D % cases in which intra-operative monitoring complies with standards outlined by AAGBI.
- D % children treated with peri-operative paracetamol and/or NSAIDs.

Proposed standard or target for best practice

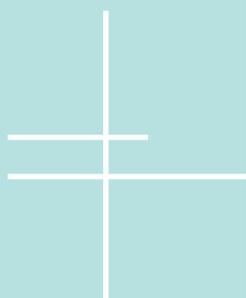
- D All indicators should be true in 100% of patients.

Suggested data to be collected

- D As for each indicator.

Common reasons for failure to meet standard

- D Social or geographical limitations may prevent some patients from attending for a separate pre-operative assessment appointment.
- D Distribution of pre-operative information may be determined by administrative factors.
- D Inadequate pre-operative parent and patient information



CPD and Curriculum mapping

CPD matrix code: **2D02**

Training curriculum competence: **EN_IK_10**

References

- 1 Information for children and young people. *RCoA*, London 2010 (<http://www.rcoa.ac.uk/childrensinfo>).
- 2 Your child's general anaesthetic for dental treatment. *RCoA*, London 2008 (<http://www.rcoa.ac.uk/node/1855>).
- 3 Spencer C, Franck LS. Giving parents written information about children's anaesthesia: Are setting and timing important? *Pediatr Anesth* 2005;**15**:547–553.
- 4 Short J, Malik D. Preoperative assessment and preparation for anaesthesia in children. *Anaesthesia and Intensive Care Medicine* 2009;**10**:489–494
- 5 Recommendations for Standards of Monitoring during Anaesthesia and Recovery (4th Edition). *AAGBI*, London 2007 (<http://www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf>).
- 6 Good practice in postoperative and procedural pain (2nd edition – in press). *APAGBI*, London 2012.

9.12

Post-operative vomiting in children

Dr A Carr, Dr G K Simpson

Why do this audit?

Post-operative vomiting (POV) is approximately twice as frequent in children compared with adults with an incidence of 13–42% in all paediatric patients.^{1,2} It is one of the major causes of parental dissatisfaction after surgery and is the major cause of unanticipated hospital admission after day surgery with resulting increased healthcare costs.^{3,4} Severe POV can result in a range of complications including dehydration, electrolyte imbalance, wound dehiscence and pulmonary aspiration.⁵

Identifying children at high risk of POV is beneficial so prophylactic anti-emetic therapy can be appropriately targeted. In addition, avoiding the indiscriminate use of prophylaxis prevents unnecessary financial costs and reduces risk of adverse drug reactions.⁶

Best practice: research evidence or authoritative opinion

The Association of Paediatric Anaesthetists of Great Britain and Ireland (APAGBI) has produced evidence-based guidelines on the prevention of POV in children⁷ using SIGN methodology.⁸

Risk factors

The main risk factors for POV in children are summarised as:

Patient factors

- D Age > 3 – Risk of POV continues to rise throughout early childhood and into adolescence. (Grade of evidence B)
- D Previous history of POV (B)
- D History of motion sickness (C)
- D Post-pubertal females (D)

Surgical factors

- D Operative procedures under general anaesthesia > 30 minutes (C)
- D Strabismus surgery (A)
- D Tonsillectomy +/- adenoidectomy (A)

Anaesthetic factors

- D Volatile agents – especially in children with other risk factors (A)
- D Opioids – particularly long acting agents in the post-operative period (B)
- D Anticholinesterase drugs (D)
- D Nitrous oxide does not appear to be associated with a high risk of POV in children (C)
- D Peri-operative fluids may reduce POV in children (B)

Recommendations for prevention of POV in children**Children at INCREASED risk of POV**

- D IV ondansetron 0.15mg/kg prophylactically (A)

Children at HIGH risk of POV

- D (Adenotonsillectomy or strabismus surgery) (A)
- D IV ondansetron 0.1–0.15 mg/kg
- D IV dexamethasone 0.15 mg/kg
- D Consider intravenous anaesthesia and alternatives to opioid analgesia in children at high risk of POV. (D)

Recommendations for treatment of established POV in children

- D IV ondansetron 0.15mg/kg – if not already given ondansetron prophylactically. (B)
- D Children who have already been given ondansetron should be given a second anti-emetic from another class, such as IV dexamethasone 0.15mg/kg injected slowly.
- D Overall there is no evidence to support the use of metoclopramide (A), cyclizine (A) or prochlorperazine (D) in children.

Suggested indicators	<ul style="list-style-type: none"> D Children with a documented risk assessment for POV. D Children receiving prophylactic anti-emetics as per APAGBI guidelines: <ul style="list-style-type: none"> ◆ Ondansetron for children at increased risk of POV ◆ Ondansetron & Dexamethasone for children at high risk of POV i.e. those undergoing tonsillectomy ± adenoidectomy or squint surgery. D Children with established PONV treated as per APAGBI guidelines: <ul style="list-style-type: none"> ◆ Ondansetron for children who have not already received prophylactic ondansetron ◆ Dexamethasone for children who have already received prophylactic ondansetron. D Children admitted to hospital due to POV D Children receiving opioid sparing analgesia where appropriate (e.g local/regional anaesthesia, NSAID, paracetamol).
Proposed standard or target for best practice	<ul style="list-style-type: none"> D 100% of children should have a risk assessment for POV. D 100% children should receive prophylactic anti-emetics that follow APAGBI guidelines. D 100% of children with established PONV should be treated as per APAGBI guidelines. D 100% of children should receive balanced analgesia with appropriate consideration of opioid sparing techniques. D 0% children should be admitted to hospital after day-case surgery due to POV
Suggested data to be collected	<ul style="list-style-type: none"> D Evidence of risk assessment for POV. D Knowledge of all of the elements of the APAGBI guidelines. D Incidence and review of unplanned admissions for POV. D Anti-emetic usage for prevention and treatment of POV in children (drugs used and doses administered). D Use of appropriate opioid sparing analgesic techniques.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D Unawareness, or a lack of dissemination and implementation, of APAGBI evidence based recommendations. D Failure to perform a risk assessment for POV. D Under-recognition of POV and failure to follow up. D Delays in treatments due to staff levels. D Underuse of opioid sparing techniques such as local or regional anaesthesia. D Overuse of long acting opioids, particularly in the absence of prophylactic anti-emetics. D Poor documentation.
Related audits	3.5 – Post-operative nausea and vomiting
CPD and Curriculum mapping	CPD matrix code: 2D02 Training curriculum competence: PA_BK_07
References	<ol style="list-style-type: none"> 1 Lerman J. Surgical and patient factors involved in postoperative nausea & vomiting. <i>Br J Anaesth</i> 1992;69(suppl 1):24S–32S. 2 Rose JB, Watcha MF. Postoperative nausea and vomiting in paediatric patients. <i>Br J Anaesth</i> 1999;83(1):104–117. 3 D’Errico C et al. Prolonged recovery stay and unplanned admission of the paediatric surgical outpatient: an observational study. <i>J Clin Anesth</i> 1998;10:482–487. 4 Patel RI, Hannallah RS. Anesthetic complications following pediatric ambulatory surgery. <i>Anesthesiology</i> 1988;69:1009–1012. 5 Olutoye O, Watcha MF. Management of postoperative vomiting in paediatric patients. <i>Int Anaesthesiol Clinics</i> 2003;41(4):99–117. 6 Scuderi PE et al. Anti-emetic prophylaxis does not improve outcomes after outpatient surgery when compared to symptomatic relief. <i>Anesthesiology</i> 1999;90(2):360–371. 7 Guidelines on the prevention of post-operative vomiting in children. APAGBI, London 2009 (http://www.apagbi.org.uk/sites/apagbi.org.uk/files/APA_Guidelines_on_the_Prevention_of_Postoperative_Vomiting_in_Children.pdf). 8 Scottish Intercollegiate Guidelines Network (http://www.sign.ac.uk/methodology/index.html accessed September 2011)



Section 10: Intensive Care Medicine

Edited by Dr Giles Morgan

- 10.1 Estimation of demand for intensive care beds
- 10.2 Discharges and follow up of patients from intensive care between 22:00 and 06:59 hrs
- 10.3 Quality and safety of handover in intensive care
- 10.4 Audit of end of life decisions in intensive care
- 10.5 Perceived benefits of intensive care follow up clinic
- 10.6 Compliance with best practice guidelines for the insertion and care of central venous catheters
- 10.7 Timeliness of antibiotic administration in septic shock
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- 10.9 Audit of inadvertent hypothermia in intensive care patients
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- 10.12 Therapeutic hypothermia after cardiac arrest
- 10.13 Dose of haemofiltration prescribed and administered in critically ill patients
- 10.14 Reducing volume of blood lost through sampling
- 10.15 Compliance with the Department of Health guideline on taking blood cultures
- 10.16 Time taken to insert an arterial line

10.1

Estimation of demand for intensive care beds

Dr P Steed

Why do this audit?

The 2005 report 'Beyond Comprehensive Critical Care' by the Critical Care Stakeholder Forum recommended that 'the need for critical care capacity in both designated critical care areas and on general wards should be evaluated at a local level', using standardised data systems such as ICNARC's Case Mix Programme dataset and regular hospital and network wide point prevalence studies.¹ It reiterated previous recommendations² that the concept of intensive care and high dependency beds be replaced by four levels of patient dependency regardless of the patient's location.³

Best practice: research evidence or authoritative opinion

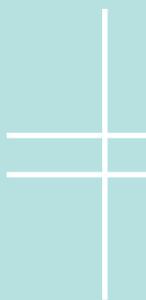
Within the developed world, the UK has one of the smallest proportion of acute hospital beds allocated to critical care.⁴ Many fear that changing patient demographics and increased patient expectations in a time of increasing financial strain and limited resources make bed crises a likely prospect for the near future.

Increases in critical care capacity have slowed (36% increase Jan 2000–July 2005 vs 16% increase July 2005–Jan 2011) and the majority of these new beds have been for patients with Level 2 needs.⁵ Failure to show further improvement in the number of non clinical transfers and rises in cancellation of urgent operations are of concern. Recent work modelling bed occupancy⁶ may help to predict future demand and shape future provision.

Occupancy is highly variable and increasing capacity does not necessarily result in an equivalent fall in occupancy.⁷ It is recommended that critical care occupancy should run at about 70%.⁸ Persistent occupancy of $\geq 70\%$ suggests a unit is too small. Over provision is wasteful but occupancy of $\geq 80\%$ is likely to result in non-clinical transfers and failure to admit in a timely manner with associated morbidity and mortality. Recent recommendations for high risk surgical patients⁹ will undoubtedly impact upon demand.

Outreach teams may be best placed to collect data on patients with Level 2 needs in non critical care locations and 'track and trigger' early warning systems based on physiological parameters should be utilised by ward staff to assist with prompt identification of such patients.¹⁰

Quality of care should be measured objectively. Four of the 20 quality indicators proposed by a recent survey¹¹ fall within the scope of this audit (readmissions, discharges at night, days at 100% occupancy and non-clinical transfers).

Suggested indicators**Level 3 care**

- D Number of patients requiring Level 3 care per day.
- D Occupancy of Level 3 beds.
- D % of appropriate admissions refused due to lack of beds.
- D % of patients discharged prematurely, for non-clinical reasons.
- D % of patients readmitted.
- D % of non-clinical transfers.
- D % of planned admissions whose elective surgery is deferred due to lack of beds.

Level 2 care

- D Number of patients in critical care beds and acute wards fulfilling criteria for Level 2 care.
- D % of appropriate referrals to ICU refused due to lack of beds.
- D Number of deferred elective operations.
- D % of premature discharges from and readmissions to ICU.

Proposed standard or target for best practice**Level 3 care**

- D 100% of patients requiring Level 3 care are in intensive care.
- D Less than 80% bed occupancy in intensive care.
- D 0% appropriate admissions refused.
- D 0% patients prematurely discharged.
- D 0% surgery deferred for non-clinical reasons.
- D Less than 5% readmission rate.
- D 0% non-clinical transfers.

Level 2 care

- D 100% of patients requiring Level 2 care in appropriate beds.
- D 0% of patients requiring Level 3 care in Level 2 beds.
- D 0% appropriate referrals refused.
- D 0% of patients prematurely discharged.
- D Less than 5% readmission rate.

Suggested data to be collected

Data should be collected over a time-frame that reflects seasonal and local variations in demand for critical care. Enquiries should be made to ascertain which data is already regularly collected to avoid duplication. Where possible, bed occupancy can be obtained from the ICNARC Case-mix Programme for participating units. Alternatively, occupancy may be calculated at a specific time on a daily basis (number of occupied beds as a percentage of total/operational bed spaces, taking into account that a lack of nursing staff may limit the number of operational beds).

In the ICU, number of:

- D Critical care bed spaces
- D Operational critical care beds
- D Occupied critical care beds
- D Appropriate patients denied intensive care
- D Planned surgical cases cancelled because of non-availability of critical care beds
- D Patients discharged prematurely
- D Patients discharged at night
- D Non-clinical inter-hospital transfers
- D Patients readmitted to intensive care.

Numbers of patients fulfilling the requirements for Level 2 and 3 critical care in:

- D Intensive care units
- D High dependency units
- D Acute wards.

Common reasons for failure to meet standard

- D Insufficient critical care beds.
- D Insufficient Level 1 beds.
- D Poor bed management.
- D Lack of outreach service.

CPD and Curriculum mapping

CPD matrix code: **2C07**

Training curriculum competence: **Domains and sections: I, I.4**

References

- 1 Quality Critical Care. Beyond Comprehensive Critical Care. A report by the Critical Care Stakeholder Forum. Sep 2005 (http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4121050.pdf).
- 2 Comprehensive critical care. A review of adult critical care services. *DH*, London 2000 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4006585).
- 3 Levels of critical care for adult patients. *Intensive Care Society*, London 2009 (<http://www.ics.ac.uk/>).
- 4 Adhikari NKJ et al. Critical care and the global burden of critical illness in adults. *Lancet* 2010;**376**(9749):1339–1346.
- 5 Critical Care Capacity. Monthly situation reports on cancelled operations and critical care bed capacity. *DH*, London (<http://www.dh.gov.uk/en/Publicationsandstatistics/Statistics/Perfomancedataandstatistics/EmergencyActivityandCriticalCareCapacity/index.htm>).
- 6 Griffiths JD et al. A simulation model of bed occupancy in a critical care unit. *J Simulation* 2010;**4**:52–59.
- 7 Parker A, Wyatt R, Ridley S. Intensive care services; a crisis of increasing expressed demand. *Anaesthesia* 1998;**53**:113–120.
- 8 Standards for intensive care units. *Intensive Care Society*, London 1997 (<http://www.ics.ac.uk/>).
- 9 The Higher Risk General Surgical Patient. *RCSEng and DH*, London 2011 (<http://www.rcseng.ac.uk/publications/docs/higher-risk-surgical-patient/>).
- 10 NICE Clinical Guideline 50. Acutely ill patients in hospital. Recognition of and response to acute illness in adults in hospital *NICE*, London 2007 (<http://www.nice.org.uk/CG50>).
- 11 Standards, Safety and Quality Committee. Quality Indicators (Draft version). *Intensive Care Society*, London (http://www.ics.ac.uk/intensive_care_professional/standards_safety_and_quality).

10.2

Discharges and follow up of patients from intensive care between 22:00 and 06:59 hrs

Dr L Morris, Dr P Sadler

Why do this audit?

Discharge from intensive care, out-of-hours places patients at increased risk of clinical deterioration and constitutes an adverse incident.

Best practice: research evidence or authoritative opinion

Between 2003 and 2007 the incidence of patients being discharged from intensive care units between 22:00 hrs and 06:59 hrs gradually but steadily increased from about 8% to about 10%.¹ This may contribute to poor clinical outcome and an increased risk of readmission to intensive care during the same hospital admission.² NICE guideline CG50, 'Acutely Ill Patients in Hospital'³ recommends that patients should not be discharged from intensive care to a general ward area between the hours of 22:00 and 06:59 hrs and that such events should be recorded as an adverse incident.

Suggested indicators

All patients discharged from intensive care.

Proposed standard or target for best practice

- D 100% of patients to be discharged between 07:00 – 21:59 hrs.
- D 100% of out-of-hours discharges to have completed adverse incident form.
- D 100% review of all discharges by intensive care outreach within six hours of arrival on ward.
- D 100% review of all discharges by ward medical team within six hours of arrival on ward.

Suggested data to be collected

- D Establish time period for completion of the audit.
- D Identify all discharges over the selected time period.
- D Exclude patient deaths on the unit.
- D Record time that patient clinically assessed as being ready for discharge.
- D Record times of patient discharge.
- D Determine whether or not an adverse incident form completed if required.
- D Record time of follow up visit by intensive care outreach.
- D Record time of follow up visit by ward team.

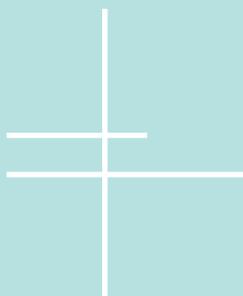
Common reasons for failure to meet standard

- D Poor communications between those involved in the discharge and follow up process.
- D No outreach service at night.
- D Poor understanding of risks.
- D Insufficient intensive care beds to meet demands.

CPD and Curriculum mapping

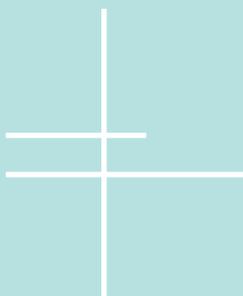
CPD matrix codes: **1101, 1105, 2C07**

Syllabus for the CCT in Intensive Care Medicine: **Domains 7 and 11, Section 6.1**



References

- 1 Welch CA, Harrison DA, Rowan KM. Trends in outcomes from adult general critical care units: potential outcome-based quality indicators other than case-mix adjusted mortality. *J Intens Care Soc* 2009;**3**:220–223.
- 2 Gopal S, Terry L, Corbett C. Association between out of hours discharge from the ICU and subsequent readmission. *Crit Care* 2010;**14**(Supp 1):476.
- 3 NICE Clinical Guideline 50. Acutely ill patients in hospital. Recognition of and response to acute illness in adults in hospital NICE, London 2007 (<http://www.nice.org.uk/CG50>).



10.3

Quality and safety of handover in intensive care

Dr J Rivers, Dr C Peden

Why do this audit?

Handover is an inevitable and essential aspect of caring for critically ill patients whilst working a shift system. Breakdowns in communication are one of the leading causes of patient harm and therefore handover is a key component of safe patient care in the critical care setting.¹ This Audit should be done to ensure that handovers are occurring efficiently and effectively, and that they are accurately transmitting the information required for safe patient care.

Best practice: research evidence or authoritative opinion

Clinical Handover between shifts is necessary to ensure information about patient care is correctly transmitted between incoming and outgoing medical teams. Deficiencies in the handover process can result in potentially dangerous errors in patient management. The information handed over should be accurate, succinct, and sufficient to allow the seamless continuation of care between teams. Inadequate handover carries risks for patients, individual clinicians and the organizations within which they work.^{1,2,3} Current handover practices are often not standardized and are highly variable.⁴

The handover should occur at a designated time in a designated area with clear leadership and without avoidable interruption. Information must be up to date, ideally a standardized proforma and format of presentation should be used to ensure key information is not omitted.⁴

Suggested indicators

- D % of key staff attending and reason for non-attendance
- D % of handovers starting within five minutes of the designated time and reasons for delay
- D % of handovers finishing on time and reasons for over running
- D % of handovers that are interrupted, and reasons for interruption
- D % of relevant information that is handed over: Key components essential for handover should be agreed by all teams and should include current test results, results pending, key medications and ongoing treatment plans as well as current diagnosis and management. Audit should measure the number of key components that are included for each patient at handover:

Proposed standard or target for best practice

- D 100% of key staff attending handover
- D 100% of handovers starting within five minutes of designated time
- D 100% of handovers finishing before a designated time
- D < 10% of handovers interrupted
- D 100% of relevant information handed over

Suggested data to be collected

Design an audit form that includes the domains of information that are required to be handed over. Clinical information could include:

- D name, age, diagnosis
- D reason for admission to ICU
- D history
- D significant recent events
- D current issues
- D daily goals
- D recent test results and tests pending
- D critical medication and any changes
- D ongoing plan for next shift.

Physical properties and human factors may also be recorded⁴ and include:

- D use of safety features such as 'teach back' or 'read-back' when the nurse or team repeats back essential pieces of information to confirm understanding.
- D location
- D start and finish times
- D time for each patient
- D interruptions by bleeps or phones

	<ul style="list-style-type: none"> D Interruptions by other members of staff not involved in handover; D Presence of background conversation D Distracting noise such as suction, fire alarm or TV.³ <p>The auditor, who is not taking part in handover, attends and records the handover on the Audit form. Key members of staff who are not present are noted.</p> <p>After handover the Auditor reviews the patient notes to identify relevant clinical information that was not given in handover. The proportion of relevant clinical information (judged against predefined standards) handed over is thus determined, and omissions that could impact negatively on patient care noted. Events that impair handover are recorded.</p>
<p>Common reasons for failure to meet standard</p>	<ul style="list-style-type: none"> D Failure to standardize and use a structured format, resulting in key information being omitted. D Inadequate time given to handover D Frequent delays D Frequent Interruptions
<p>CPD and Curriculum mapping</p>	<p>CPD matrix codes: 2C07, 1G01, 1I06, 3A13</p> <p>Syllabus for the CCT in Intensive Care Medicine: Domains and sections 11.1, 12.1–12.10</p>
<p>References</p>	<ol style="list-style-type: none"> 1 WHO Collaborating Centre for Patient Safety Solutions. Communication during patient safety handovers. Patient Safety Solutions, vol.1. <i>World Health Organization</i>, Geneva 2007 (http://www.ccforpatientsafety.org/common/pdfs/fpdf/presskit/PS-Solution3.pdf). 2 Safe Handover: Safe patients. Guidance on clinical handover for clinicians and managers. <i>BMA</i>, London 2004 (http://www.bma.org.uk/ap.nsf/content/handover). 3 M N Lyons, T D A Standley, A K Gupta. Quality improvement of doctors' shift-change handover in neuro-critical care. <i>Qual Saf Health Care</i> 2010;19:1–7. 4 How safe are clinical systems? Evidence in brief. <i>The Health Foundation</i> 2011 (http://www.health.org.uk http://www.health.org.uk/publications/evidence-in-brief-how-safe-are-clinical-systems).

10.4

Audit of end of life decisions in intensive care

Dr E McMaster, Dr C Ferguson.

Why do this audit?

We should do this audit to ensure that the complex issues surrounding end of life care for the critically ill are properly addressed.

Best practice: research evidence or authoritative opinion

The Intensive Care Society guideline of 2003¹ refers to several useful publications on the subject of withholding and withdrawing care.^{2,3} In essence, all highlight the following principles: ethically there is no difference between the terms withholding and withdrawing, all care should be delivered in the patient's best interests, treatment should not be continued if it does not benefit the patient, effective communication between patients, their families and those caring for them is of paramount importance, limits of treatment should be identified early in the patient's stay in intensive care, those dealing with these issues should be trained in communications skills, the process of withdrawal should be well documented and the method identified. Having taken all these into account, the final decision to withdraw rests with the consultant in charge of the intensive care unit.

The term, 'futility' may be used when all treatment intended to preserve a patient's life has become ineffective and does not benefit the patient. Under these circumstances death is usually inevitable.

The key role of communication and documentation were emphasised by Lautrette et al.⁴

The audit upon which this recipe is based retrospectively reviewed end of life care in patients in intensive care. The standard set was that there should be a documented discussion with the patient or family regarding withdrawal of treatment in 100% of cases where treatment was withdrawn.

An action plan following the audit made the following recommendations:

- D Decisions regarding treatment limitation and withdrawal should be a managed process beginning early in a patient's stay in intensive care.
- D The formal decision to withdraw must be documented in the casenotes.
- D The reason why this decision was made must be documented.
- D All discussions with the patient or their family must be documented.
- D The method of withdrawal must be documented.
- D Organ donation should be considered by the clinical team and the outcome documented.

Suggested indicators

All patients in intensive care for whom decisions are made to withhold or withdraw treatment directed towards the preservation of life.

Proposed standard or target for best practice

- D Treatment limitations (or absence of treatment limitations) documented in 100% of admissions to intensive care.
- D 100% of discussions with patient regarding end of life care to be documented.
- D 100% of discussions with family regarding end of life care to be documented.
- D Formal decision to withdraw treatment documented in 100% of cases in whom treatment withdrawn.
- D Timing of withdrawal of treatment documented in 100% of cases.
- D Method of withdrawal of treatment documented in 100% of cases.
- D Documented consideration of organ donation by clinical team in 100% of cases.

Suggested data to be collected

- D Documentation of treatment limitations.
- D Discussions with patient.
- D Discussions with family.
- D Formal decision to withdraw.
- D Timing of withdrawal.
- D Method of withdrawal.

Common reasons for failure to meet standard

- D Failure to communicate effectively with the patient and/or their family in the early stages of intensive care admission.
- D Poor documentation.

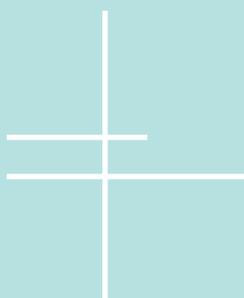
CPD and Curriculum mapping

CPD matrix codes: **IF02, 2C06, 3A13**

Syllabus for the CCT in Intensive Care Medicine: **Domains 8 and 12**

References

- 1 Cohen SL et al. Guidelines for limitation of treatment for adults requiring intensive care. *Intensive Care Society*, London 2003 (http://www.ics.ac.uk/intensive_care_professional/standards_and_guidelines/limitation_of_treatment_2003).
- 2 British Medical Association. Withholding and withdrawing life-prolonging treatments. 2nd edition. *BMJ Books*, London 2001.
- 3 Luce JM, Prendergast TJ. The changing nature of death in the ICU. In: Curtis JR, Rubenfield GD (Eds). *Managing death in the intensive care unit*. Oxford University Press 2001: pp 19–29.
- 4 Lautrette et al. A Communication Strategy and Brochure for Relatives of Patients Dying in the ICU. *New Engl J Med* 2007;**356**:469–478.



10.5

Perceived benefits of intensive care follow up clinic

Dr C Waldmann

Why do this audit?

We should do this audit as part of an assessment of the value of an intensive care follow up clinic to those who attend with a view to improving the lives of patients who survive to be discharged from hospital after critical illness.

Best practice: research evidence or authoritative opinion

About 70% of patients admitted to intensive care in the UK survive to leave hospital.¹ Recovery following intensive care is frequently prolonged, complicated and incomplete. The case for follow up and rehabilitation has been made in publications from the National Audit Commission² and the Department of Health³ and more recently in a NICE Guideline.⁴ Intensive care follow up clinics may have an important role in improving the lives of patients recovering from critical illness through recognition of associated problems and referral to appropriate specialists. The clinic can play a significant role in patients' re-integration into work and family life. On the other hand there is evidence that a supervised, self-help rehabilitation programme may be equally effective.⁵ (This article could be a useful source of ideas for audits relating to quality of life after intensive care).

This audit took the form of a postal survey completed by attendees at the well established intensive care follow up clinic at the Royal Berkshire Hospital.⁶ The clinic offers appointments at 3, 6 and 12 months post discharge from hospital. There was a 96.7% response rate to 204 questionnaires. 93.1% of responders found the clinic beneficial. Being able to discuss problems directly with a consultant, piecing together the story of their illness, sometimes by writing a diary, and being able to understand what had happened to them were important themes in the responses.

Suggested indicators

All patients discharged from hospital following a stay in intensive care.

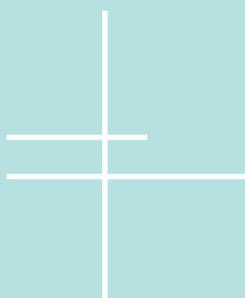
Proposed standard or target for best practice

- D 100% of patients discharged from hospital after critical illness should be offered the opportunity to attend an intensive care follow up clinic at 3, 6 and 12 months.
- D 100% of patients who attend the follow-up clinic should be asked to complete a questionnaire about their perceptions of the clinic.

Suggested data to be collected

This audit included four main questions regarding patients' perceptions of the follow up clinic:

- 1 Did you feel you benefited from attending the follow up clinic?
- 2 Which aspects of care at the clinic did you find beneficial?
 - ◆ Having questions answered
 - ◆ Revisiting the ICU
 - ◆ An opportunity to discuss problems
 - ◆ Helping the ICU staff
 - ◆ Compiling a diary of your ICU stay
 - ◆ Referral to other specialties
 - ◆ Counselling
- 3 If you did not find the clinic beneficial how would you make it more beneficial?
- 4 Would you recommend the follow up clinic to a friend or relative?



Common reasons for failure to meet standard

- ⓓ Intensive care unit does not have a follow up clinic.
- ⓓ Failure to track patient hospital discharge dates.

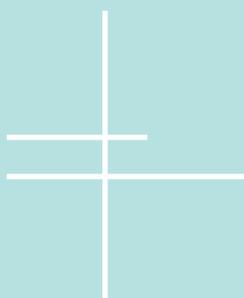
CPD and Curriculum mapping

CPD matrix codes: **1105, 2C07**

Syllabus for the CCT in Intensive Care Medicine: **Domains and section 7.1**

References

- 1 Casemix Programme, ICNARC (Intensive Care National Audit and Research Centre). <http://www.icnarc.org>.
- 2 Critical to Success. The place of efficient and effective critical care services within the acute hospital. *Audit Commission*, London 1999.
- 3 Comprehensive Critical Care. A review of adult critical care services. *DH*, London 2000 (<http://www.doh.gov.uk/nhsexec/compcritcare.htm>).
- 4 NICE Clinical Guideline 83. Rehabilitation after critical illness. *NICE*, London March 2009 (<http://guidance.nice.org.uk/CG83>).
- 5 Cuthbertson BH et al. The PRaCTICaL study of nurse led, intensive care follow-up programmes for improving long term outcomes from critical illness: a pragmatic randomised controlled trial. *Br Med J* 2009;**339**:bmj.b3723.
- 6 Waldmann C, Gager M. Quality rehabilitation and follow-up after critical care. Chapter 4, Critical Care Focus No 15, 'Quality in Critical Care'. Ridley S (Ed). *Intensive Care Society*.



10.6

Compliance with best practice guidelines for the insertion and care of central venous catheters

Ms C Rochester

Why do this audit?

Bloodstream infections associated with the insertion and subsequent care of central venous catheters (CVCs) are a significant cause of morbidity. Implementation of a guideline to support best practice for insertion and ongoing care can reduce the incidence of infective and other complications associated with CVCs.

Best practice: research evidence or authoritative opinion

Bloodstream infections associated with CVC insertion are a major cause of morbidity.¹ The adoption of guidelines for their insertion and ongoing care reduce the risk of infection in intensive care.² The Department of Health commissioned the EPIC group at Thames Valley University to produce a set of guidelines for the prevention of healthcare associated infections (HCAI), in particular catheter-related bloodstream infections.³ The DH initiative, 'Saving Lives: reducing infection' provides an audit tool for assessing the success with which the guideline is implemented.⁴

The main components of the action plan are:

- D implementation of hand hygiene training
- D feedback of audit data to all staff after each audit cycle
- D ongoing assessment of sepsis associated with central venous catheters in conjunction with the department of microbiology
- D plan for re-audit.

Matching Michigan is a quality improvement project based on a model developed in the United States which, over 18 months, saved around 1,500 patient lives. Linking technical interventions of changes in clinical practice and non-technical interventions such as leadership, teamwork and culture change has been shown to reduce central venous catheter bloodstream infections (CVC-BSIs). This quality improvement programme, introduced by the National Patient Safety Agency (NPSA) in 2009 has had high levels of participation across English Intensive Care Units.⁵

Suggested indicators

All patients who have a central venous catheter inserted after admission to intensive care.

Proposed standard or target for best practice

There are two parts to this audit: 1. insertion and 2. ongoing care.

- D 100% of patients who have a central venous catheter inserted while in intensive care should be enrolled to both parts of the audit.
- D Compliance with the guideline components for CVC insertion in 100% of lines.
- D Compliance with the guideline components for CVC ongoing care in 100% of lines.
- D No patient should be enrolled to the first part if their central venous catheter was inserted in a location outside intensive care where observation of the procedure and data collection may be unreliable. However, these patients could be enrolled for the second part as a separate cohort if data pertaining to infection rates is to be collected.

Suggested data to be collected

A comprehensive structured package of standardised data collection tools is available to download through the Matching Michigan project on the NPSA website.⁶

Part one: insertion

Compliance with the following audit components in 100% of lines:

- D Personal protective equipment (PPE)
- D Hand hygiene pre-patient contact
- D Facemask and goggles
- D 2% chlorhexidene skin prep
- D Aseptic technique
- D Hand hygiene post-patient contact
- D Documentation of the procedure.

	<p>Part two: ongoing care</p> <p>Compliance with the following audit components in 100% of lines:</p> <ul style="list-style-type: none"> D Hand hygiene prior to handling the CVC D Site inspected and condition documented D Dressing dry and intact D Aseptic technique when accessing lumens D Connections changed as per unit protocol.
<p>Common reasons for failure to meet standard</p>	<ul style="list-style-type: none"> D Limited awareness of the extent of the problem. D CVCs inserted in emergency situations. D Delay in training new staff. D Lack of supervision.
<p>CPD and Curriculum mapping</p>	<p>CPD matrix codes: 1E01, 2C01, 2C04, 3A13</p> <p>Syllabus for the CCT in Intensive Care Medicine: Domains and sections 5.9, 5.10, 11.2, 11.6</p>
<p>References</p>	<ol style="list-style-type: none"> 1 Smyth ETM. Third prevalence survey of healthcare associated infections in acute hospitals in England 2006. Summary of Preliminary results. <i>Hospital Infection Society</i> 2007 (http://www.his.org.uk). 2 Pronovost P et al. An intervention to decrease catheter related bloodstream infections in the ICU. <i>New Engl J Med</i> 2006;355:2725–2732. 3 Pratt RJ et al. Epic2: National evidence-based guidelines for preventing healthcare associated infections in NHS hospitals in England. <i>J Hosp Infection</i> 2007;65:S1–S64 (http://www.epic.tvu.ac.uk/PDF%20Files/epic2/epic2final.pdf). 4 National Resource for Infection Control (NRIC). Saving Lives – High Impact Interventions. Central venous catheter high impact intervention – insertion. Central venous catheter high impact intervention – ongoing care (http://hcai.dh.gov.uk/files/2011/03/CVC_Insertion_High_Impact_Intervention_090810.xls). 5 Matching Michigan. NPSA, London 2009 (http://www.nrls.npsa.nhs.uk/resources/collections/matching-michigan accessed 5 May 2012). 6 Matching Michigan Data collection tools. NPSA London 2009 (http://www.nrls.npsa.nhs.uk/resources/collections/matching-michigan/?entryid45=65615 accessed 5 May 2012).

10.7 Timeliness of antibiotic administration in septic shock

Dr S Baxter, Dr S Hutchings, Dr T Barnes

Why do this audit?

Duration of hypotension before initiation of effective antimicrobial therapy is a critical determinant of survival in human septic shock. Survival in septic shock is improved if antibiotics are administered early.¹

Best practice: research evidence or authoritative opinion

Kumar's paper showed that survival in septic shock was 79.9% if antibiotics were administered within 1 hour of the patient becoming hypotensive. Each subsequent hour without antibiotics decreases survival by 7.6%. Only 50% of septic shock patients received antibiotics within six hours and the median time to administration of antibiotics was six hours.¹ The surviving sepsis campaign stipulates the administration of antibiotics as soon as possible and preferably within the first hour of recognition of sepsis or septic shock.² This was endorsed by data published subsequently by the surviving sepsis campaign in 2010 which demonstrated a reduction in hospital mortality associated with a number of strategies including taking blood cultures before early administration of antibiotics.³

This audit retrospectively examined the management of patients with suspected septic shock admitted to intensive care over two three month periods before and after the introduction of a sepsis protocol which included a practice guideline and improved microbiology input. Definitions of sepsis, septic shock and hypotension were those of the surviving sepsis campaign.

Suggested indicators

All patients with a diagnosis of suspected septic shock from the following criteria:

- D SEPTIC SHOCK: Sepsis with hypotension despite adequate fluid resuscitation.
- D Sepsis: Presence or assumption of infection and a systemic inflammatory response.
- D Hypotension:
 - MAP < 65mmHg
 - Systolic BP < 90mmHg
 - Systolic BP 40mmHg lower than baseline
 - Persisting despite fluid resuscitation (2L)
 - Lasting more than 1 hour or recurrent

Proposed standard or target for best practice

- D 100% of patients with suspected septic shock should receive antibiotic therapy appropriate to their diagnosis within 1 hour of the onset of hypotension.
- D 100% of patients with suspected septic shock should have blood cultures drawn before administration of antibiotics.

If no culture sensitivities available, empirical antibiotics should be given in accordance with local microbiological guidelines.

Suggested data to be collected

- D Patient diagnosis, time of confirmation of sepsis/septic shock.
- D Time blood cultures taken.
- D Time antibiotics administered.
- D Duration of hypotension before antibiotics administered.
- D Patient location at time of diagnosis.
- D Patient outcome.

Common reasons for failure to meet standard

- D Limited awareness of the problem on general wards.
- D Infrequent measurement of blood pressure.
- D Non-measurement of mean arterial blood pressure.
- D Failure to review potentially septic patients.
- D Indecision regarding appropriate antibiotics.

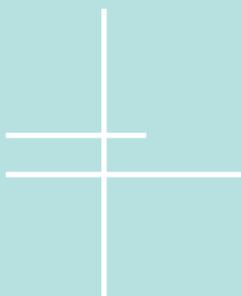
CPD and Curriculum mapping

CPD matrix codes: **1A02, 1E01, 2C03**

Syllabus for the CCT in Intensive Care Medicine: **Domains and sections 1.1, 2.4, 3.9, 4.1, 4.2**

References

- 1 Kumar A et al. Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock. *Crit Care Med* 2006;**34(6)**:1589–1595.
- 2 Dellinger R et al. Surviving sepsis campaign: international guidelines for management of severe sepsis and septic shock. *Crit Care Med* 2008;**36(1)**:296–327.
- 3 Levy MM et al. Surviving sepsis campaign: Results of an international guideline-based performance improvement program targeting severe sepsis. *Crit Care Med* 2010;**38**:367–374.



10.8

Ensuring best practice in patients with severe traumatic brain injury

Dr J Joss, Dr S Crofts

Why do this audit?

Severe Traumatic Brain Injury (TBI) is a major cause of morbidity and mortality and a common reason for admission to ICU.

Evidence for best practice in the management of severe TBI is reviewed and published by the Brain Trauma Foundation¹ and is found within many local policies and guidelines.

Despite the availability of guidelines, work has shown that we lack consistency in the application of best practice.²

Care bundles have been adopted as a means of improving patient outcomes.

Evidence exists that grouping evidence-based interventions together as a bundle results in a more consistent application of best practice.

An audit of the management of patients ventilated for severe TBI using the methodology of applying a 'bundle' would allow an assessment of whether best practice is being applied to those patients.

Best practice: research evidence or authoritative opinion

IHI methodology² should be applied in the creation and adoption of the bundle. The components of the bundle should be locally agreed.

Each patient ventilated for severe TBI should have:

- D A target for PaO₂ defined
- D A range of PaCO₂ defined
- D A temperature range defined
- D A threshold for ICP that would prompt active treatment
- D A defined range for Cerebral Perfusion pressure.

PaO₂: Analysis of research data by the BTF states that PaO₂ < 60mmHg (8kPa) is associated with increased mortality.³ However data does not exist that would define safe thresholds. Units must define what PaO₂ values they wish to target.

PaCO₂: There is evidence that prophylactic hyperventilation should be avoided.³ Evidence for the target range for CO₂ varies with expert opinion. A target of 4.5 kPa would be generally accepted and practised by leading neurocritical care centres.⁴

ICP thresholds: Current data supports 20mmHg to be the upper threshold at which treatment should be initiated to reduce ICP (level II evidence BTF).¹

CPP targets: 60mmHg. There will be no universally correct CPP target and individual targets may be set based on assessment of cerebral autoregulation and other markers of cerebral oxygenation. In the absence of other data it is likely that target CPP should be between 50–70 mmHg.¹

A temperature target should be defined: Temp < 37.5°C. Whilst the role of prophylactic hypothermia remains controversial, expert opinion would support the active maintenance of normothermia as a standard of care.^{1,5}

Suggested indicators

- D Percentage of patients who meet the inclusion criteria (all patients ventilated with a severe traumatic brain injury) in whom all elements of the bundle are applied or actively excluded.

Proposed standard or target for best practice

- D There should be at least 95% compliance in applying or actively excluding all components of the locally agreed care bundle.

Suggested data to be collected

Based on expert opinion and national guidelines individual components may be modified and agreed locally.

These may be easily applied to the patient's records in the form of a sticker and reviewed at the start of each day shift, e.g.:

- D PaO₂ > 11 kPa
- D PaCO₂ 4.5–5 kPa
- D Temperature <37°C
- D Documentation of agreed ICP limits ___20___mmHg
- D Documentation of agreed CPP target ___60___mmHg.
- D Data collection sheet recording compliance with bundle.
- D Run charts to allow real time feedback to clinicians (data collection sheet available on the College website)

Common reasons for failure to meet standard

- D Failure to agree local guidelines.
- D Failure to understand and use PDSA methodology to drive improvement in patient safety.

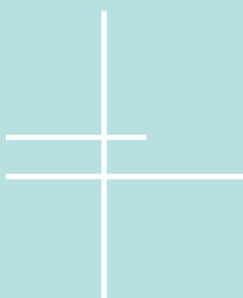
CPD and Curriculum mapping

CPD matrix codes: **Level 2, all domains**

Syllabus for the CCT in Intensive Care Medicine: **Domains and sections: 1, 1.5, 3, 3.6, 6, 6.3, 7, 7.3, 10, 10.1**

References

- 1 Guidelines for the Management of Severe Traumatic Brain injury, 3rd edition. *Brain Trauma Foundation* 2007 (<http://www.braintrauma.org/coma-guidelines/btf-guidelines/>).
- 2 Institute of Healthcare Improvement (<http://www.ihl.org/knowledge/Pages/HowtoImprove/default.aspx>).
- 3 Jones PA et al. Measuring the burden of secondary insults in brain injured patients during intensive care. *J Neurosurg Anesthesiol* 1994;**6**:4–14.
- 4 Hutchison PJ, Kirkpatrick PJ. Acute Head Injury for the Neurologist. *J Neurol Neurosurg Psychiatry* 2002;**73**(supp):i3–i7.
- 5 Helmy A, Vizcaychipi M, Gupta AK. Traumatic Brain Injury: Intensive care management. *Br J Anaesth* 2007;**99**(1):32–42.



10.9

Audit of inadvertent hypothermia in intensive care patients

Dr A Wong, Dr J Masters, Dr G Morgan

Why do this audit?

Inadvertent hypothermia is associated with physiological effects that can lead to adverse outcomes. These include cardiovascular instability, bleeding and wound infection.¹ Inadvertent hypothermia is common.²

Best practice: research evidence or authoritative opinion

A NICE guideline³ defines hypothermia as a core temperature below 36°C. NICE advocates that patients should not be discharged from the operating theatre recovery area to the ward if hypothermic and they should have their temperature monitored on the ward. If found to be hypothermic, forced air warming devices should be applied.

The quoted incidence of inadvertent hypothermia amongst ICU patients is high (>50%).^{1,4,5} Karapillai et al¹ carried out a large retrospective audit of over 5,000 patients and concluded that inadvertent hypothermia amongst ICU patients is not only common but is also associated with increased patient mortality and morbidity. There was an increased incidence of cardiac events, bleeding, wound infection and longer hospital stay.

We conducted a retrospective audit of all patients admitted to the intensive care unit between January and June 2010.² Temperature measurements are routinely recorded on admission to the ICU and throughout their stay. Patients who were being cooled for therapeutic reasons were excluded from the analysis.

Suggested indicators

D All patients admitted to intensive care are at risk of hypothermia.

Proposed standard or target for best practice

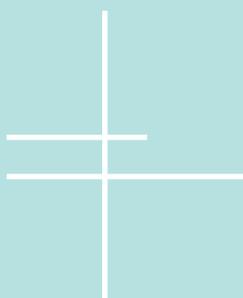
- D 100% of patients admitted to intensive care have their core temperature measured and recorded hourly.
- D 0% of patients are allowed to become inadvertently hypothermic.
- D 100% of patients admitted to intensive care have access to a suitable warming device, preferably a warm air blower.

Suggested data to be collected

- D Core temperature of the patient on admission to intensive care.
- D Core temperature of the patient hourly following admission to intensive care.
- D Temperature of the room in the bed space.
- D Documentation of use of air warming device.

Common reasons for failure to meet standard

- D Lack of awareness that inadvertent hypothermia is a problem.
- D Inability to provide patient warming devices.



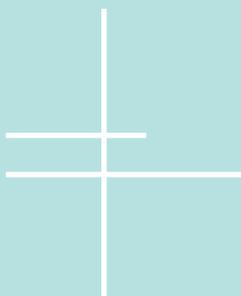
CPD and Curriculum mapping

CPD matrix codes: **IB04, 2C01, 2C03-04, 2F01, 3A13**

Syllabus for the CCT in Intensive Care Medicine: **Domains and sections 6, 7.1**

References

- 1 Karapillai D et al. Inadvertent hypothermia and mortality in postoperative intensive care patients: retrospective audit of 5050 patients. *Anaesthesia* 2009;**64(9)**:968–972.
- 2 Wong A, Masters J, Morgan G. Inadvertent hypothermia on a general intensive care unit – an audit of NICE Guidelines in over 500 patients. Poster presentation. Intensive Care Society State of the Art Meeting 2010.
- 3 NICE Clinical Guideline 65. Perioperative hypothermia (inadvertent). *NICE*, London 2008. (<http://publications.nice.org.uk/inadvertent-perioperative-hypothermia-cg65> accessed 7 May 2012).
- 4 Kongsayreepong S J et al. Predictor of Core Hypothermia and the Surgical Intensive Care Unit. *Anesth Analg* 2003;**96**:826–833.
- 5 Adelha FJ et al. Hypothermia in a surgical intensive care unit. *BMC Anesthesiology* 2005;**5**:7–16.



10.10

Audit of tracheal tube length and tip position in ventilated patients

Dr P McQuillan, Dr G Morgan

Why do this audit?

To ensure consistency of practice in ensuring that tracheal tubes in ventilated patients are correctly sited.

Best practice: research evidence or authoritative opinion

In patients admitted to intensive care ventilated, tracheal tubes may have been inserted cut to an anticipated satisfactory length or uncut. They may have been inserted in a variety of locations in the hospital as planned procedures or as emergencies. Uncut, the tube may be placed in a bronchus. Cut tubes may be too short and risk inadvertent extubation. The method of securing tubes may not be reliable. The chest X-ray is considered the gold standard to assess the correct position of the tip of the tube in the trachea but this may change if the position of the patient is changed. Capnography may ensure that the tube is not in the oesophagus but provides little guidance on accurate placement in the trachea. There is inconsistent opinion as to whether the length of the tube inside the patient should be measured from the teeth or the lips. A literature search produced only one study in adult practice offering guidance on the correct length of tracheal tubes.¹ This study of patients in the operating theatre concluded that the length of tube inserted alone was a satisfactory guide, but was more reliable when combined with auscultation and observation of chest movement. In paediatric practice a number of studies have allowed the development of helpful formulae to estimate the appropriate length of a tracheal tube. Some of the dimensions from older children could be extrapolated to adults.²

In this intensive care unit the length of the tracheal tube inside the patient is measured and recorded. However, an audit of the position of the tip of tracheal tube in adults ventilated in intensive care showed considerable daily variation in the length of the tube from that recorded as correct. Following the audit an action plan was implemented. The main components are identified below as targets for best practice.

Suggested indicators

All adult intubated and ventilated patients in intensive care.

Proposed standard or target for best practice

- D In 100% of male patients, at intubation, the tube length inside the patient measured from the front upper incisors should be 23 cms.
- D In 100% of female patients, at intubation, the tube length inside the patient measured from the front upper incisors should be 21 cms.
- D In 100% of patients the intubating physician should confirm that there is air entry into both lungs using a stethoscope.
- D In 100% of patients the intubating physician should confirm equal movement of both sides of the chest by direct observation.
- D In 100% of patients capnography should be used to confirm that the tube is not in the oesophagus.
- D In 100% of patients a chest radiograph taken at 45° head up tilt should confirm the position of the tip of the tube mid way between the vocal cords and the carina.
- D In 100% of patients the tube length inside the patient measured from the teeth should be recorded during each nursing shift.

Suggested data to be collected

- D Length of tracheal tube inside patient measured from the upper incisors.
- D Confirmation of auscultation of chest.
- D Confirmation of movement of the chest.
- D Confirmation of use of capnography.
- D Confirmation of position of tube on X-ray.

Common reasons for failure to meet standard

- ⓓ Lack of awareness of potential problem.
- ⓓ Failure to complete documentation.

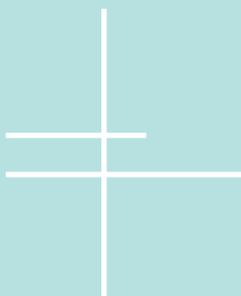
CPD and Curriculum mapping

CPD matrix codes: **1B04, 1C02, 2A06–08, 2A11, 2C01–02, 2C04–05, 2F01, 2F03, 2D07, 3A13**

Syllabus for the CCT in Intensive Care Medicine: **Domains and sections: 3.8, 4.6, 5**

References

- 1 Sitzwohl C et al. Endobronchial intubation detected by insertion depth of endotracheal tube, bilateral auscultation, or observation of chest movements: randomised trial. *Br Med J* 2010;**341**:c5943.
- 2 Morgan GAR, Steward DJ. A preformed paediatric orotracheal tube design based on anatomical measurements. *Can Anaesth Soc J* 1982;**29**(1):9–11.



10.11

Incidence and management of new onset atrial fibrillation in patients admitted to intensive care

Dr R Henderson, Dr K Longman, Dr G Morgan

Why do this audit?

New onset atrial fibrillation (AF) occurs in about 10% of patients admitted to intensive care and may have an adverse effect on a number of outcome measures.^{1,2,3} We should do this audit to assess the incidence of new onset AF in critical illness, its contribution to adverse outcome and to establish an action plan for its recognition and management.

Best practice: research evidence or authoritative opinion

There is no specific best practice for the management of AF in critically ill patients. However, new onset AF is associated with increased severity of illness, increased incidence of sepsis, cardiovascular instability, acute kidney injury and risk of death. Risk factors for the development of AF associated with critical illness include: older age, blunt thoracic trauma, shock, the use of pulmonary artery catheters and previous treatment with calcium channel blockers.² In non-critically ill patients, treatment directed at restoring sinus rhythm shows no benefit over that directed at controlling heart rate.⁴

An agreed local action plan in Portsmouth includes formal documentation of new onset AF and implementation of a plan for investigation and treatment.

Suggested indicators

All patients admitted to intensive care in sinus rhythm who subsequently develop AF.

Proposed standard or target for best practice

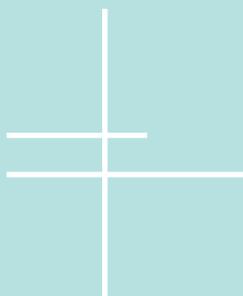
- D Recognition and determination of likely cause of new onset AF in 100% of cases.
- D ECG on admission to intensive care in 100% of cases.
- D Echocardiograph to assess ejection fraction in 100% of cases.
- D Documentation of treatment of rate or rhythm in 100% of cases.
- D Documentation of control of rate or rhythm in 100% of cases.
- D Record of outcome of patients with new onset AF.
- D Explicit arrangements for follow up of AF after discharge from ICU.

Suggested data to be collected

- D ECG of all patients admitted to intensive care.
- D Echocardiograph in patients with new onset AF.
- D Number of patients developing AF while in intensive care.
- D Day of intensive care admission when AF developed.
- D Ejection fraction of patients echoed.
- D % of patients with new onset AF who received specific treatment for rate control.
- D % of patients with new onset AF who received specific treatment for rhythm control.
- D % of patients restored to sinus rhythm.
- D % of patients deemed treated successfully.
- D Outcome in patients with new onset AF in ICU.

Common reasons for failure to meet standard

- D Lack of awareness of the incidence and clinical significance of new onset AF.
- D Failure to specifically record incidence of new onset AF.
- D Lack of consensus regarding treatment options.



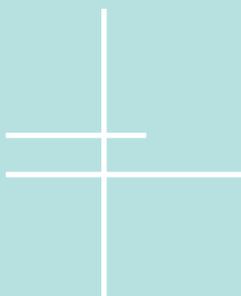
CPD and Curriculum mapping

CPD matrix codes: **2A07, 2C01**

Syllabus for the CCT in Intensive Care Medicine; **Domains and sections: 3.1, 2.1, 2.3, 5.1 I**

References

- 1 Pinski SL. Atrial fibrillation in the surgical intensive care unit: Common but understudied. Editorial. *Crit Care Med* 2004;**32**:3,890.
- 2 Goodman S, Shirov T, Weissman C. Supraventricular Arrhythmias in Intensive Care Unit Patients: short and long-term consequences. *Anesth Analg* 2007;**104**:880–886.
- 3 Segouin P et al. Incidence and risk factors of atrial fibrillation in a surgical intensive care unit. *Crit Care Med* 2004;**32(3)**:722–726.
- 4 Freudenberger RS et al. Comparison of rate versus rhythm control for atrial fibrillation in patients with left ventricular dysfunction (from the AFFIRM study). *Am J Cardiol* 2007;**100(2)**:247–252.



10.12

Therapeutic hypothermia after cardiac arrest

Dr B Harris, Dr D Pogson

Why do this audit?

Therapeutic hypothermia following out-of-hospital cardiac arrest has been shown to reduce mortality and improve clinical outcomes.^{1,2} Practical difficulties associated with therapeutic hypothermia after cardiac arrest include patient selection, starting cooling in other locations such as the emergency or cardiology department and achieving target temperatures during subsequent management. A local guideline was put in place following a review of practice in Portsmouth in 2008³ to standardise the procedure and to set out criteria for selecting patients for treatment. This audit provides the means to assess whether a guideline for the implementation of therapeutic hypothermia is properly implemented and to assess outcome after therapeutic cooling following cardiac arrest.

Best practice: research evidence or authoritative opinion

It was recommended by the International Liaison Committee on Resuscitation in 2003¹ that:

- D Unconscious adult patients with return of spontaneous circulation after out-of-hospital cardiac arrest should be cooled to 32–34°C for 12–24 hrs when the initial rhythm was VF
- D Such cooling may be beneficial for other rhythms or in-hospital cardiac arrest.

Local audit in Portsmouth in 2008 set out criteria for implementing therapeutic cooling and to resolve issues regarding cooling in locations outside intensive care, as well as addressing difficulties in achieving target temperatures using surface cooling.

Suggested indicators

All patients who present having suffered a cardiac arrest from VF.

Inclusion criteria for cooling:

- D Witnessed cardiac arrest in VF/VT of known duration with return of spontaneous circulation in or out of hospital.
- D Unconscious patient with no response to pain or eye opening.
- D Blood pressure of at least 90 mmHg systolic maintained without fluids or inotropes.

Exclusion criteria for cooling:

- D Other cause of coma.
- D Known terminal illness.
- D Valid DNAR (do not attempt resuscitation) status.
- D Pre-existing coagulopathy or haemorrhage.
- D Isolated respiratory arrest with no cardiac arrest.
- D Refractory shock unresponsive to inotropes.
- D Unwitnessed cardiac arrest of unknown duration, PEA or asystolic arrest should be cooled only after discussion with intensive care consultant in charge.

Proposed standard or target for best practice

- D 100% of patients with cardiac arrest where VF is the presenting rhythm should be cooled if they meet the three inclusion criteria.
- D 100% of patients should start their cooling in the emergency or other department.
- D 100% of patients cooled should achieve their target temperature within 4 hrs of cardiac arrest.
- D 100% of patients cooled should achieve target temperatures for a minimum of 12 hours.
- D 0% of patients cooled should have a temperature recorded that is less than 31°C.
- D 0% of patients should have a temperature of more than 38 °C in the 48hrs after return of spontaneous cardiac output.

Suggested data to be collected

- D Time of cardiac arrest.
- D Location of patient at time of cardiac arrest.
- D Rhythm producing cardiac arrest.
- D Duration of interval between cardiac arrest and return of spontaneous circulation.
- D GCS following return of spontaneous circulation.
- D Core temperature at time of arrest and at hourly intervals subsequently.
- D Duration of interval between cardiac arrest and admission to intensive care.
- D Method of cooling before admission to intensive care.
- D Method of cooling in intensive care.
- D GCS at discharge from intensive care.
- D Clinical outcome at discharge from intensive care.

Common reasons for failure to meet standard

- D Use of surface cooling, e.g. ice packs, cold fluids, wet sheets and fans. An intravascular cooling device is more effective.
- D Failure to commence cooling in the emergency department and to ensure it is continued if the patient is transferred to the intensive care unit via another department such as cardiology.

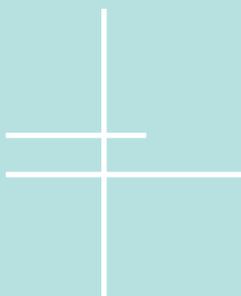
CPD and Curriculum mapping

CPD matrix codes: **IB04, 2A04, 2C04, 2F01**

Syllabus for the CCT in Intensive Care Medicine: **Domains and sections: 1.2–1.4**

References

- 1 Therapeutic hypothermia after cardiac arrest. International liaison committee on resuscitation advisory statement. *Circulation* 2003;**108**:118–121.
- 2 Hypothermia after cardiac arrest study group. Mild therapeutic hypothermia to improve the neurologic outcome after cardiac arrest. *New Engl J Med* 2002;**346**(8):594–556.
- 3 Pogson D. Hypothermia after Cardiac Arrest Clinical Guideline 2008. Department of Critical Care, Queen Alexandra Hospital, Portsmouth, PO6 3LY.



10.13

Dose of haemofiltration prescribed and administered in critically ill patients

Dr R Greer, Dr A Manara

Why do this audit?

The volume of haemofiltration fluid administered may not equate to that prescribed. It may be difficult to assess what proportion of the prescribed filtration dose has actually been administered on a daily basis or over a number of days.

Best practice: research evidence or authoritative opinion

Unpredictable filter failure leads to interruptions in treatment while the machine is reprimed.¹ It is still unclear what the most effective dose of haemofiltration is.² A multi-centre prospective randomised controlled trial showed that, in critically ill patients with renal failure, there was no reduction in mortality when treated with continuous veno-venous haemodiafiltration (CVVHDF) at a dose of 40 ml/kg/hr compared with 25 ml/kg/hr.³ In the unit where this audit was completed, the standard dose was 35 ml/kg/hr.

This audit chose an arbitrary target for haemofiltration of 30 ml/kg/hr and retrospectively reviewed the intensive care charts of 23 patients receiving renal replacement therapy for a total of 170 days. The results of the audit showed that:

- D the mean dose of haemofiltration prescribed was 39.6 ml/kg/hr.
- D the mean dose of haemofiltration achieved was 35.7 ml/kg/hr.
- D the mean dose achieved was 83.6% of that prescribed.
- D the median hours of haemofiltration achieved daily was 16 hrs.

The audit concluded that patients received inadequate filtration on 36% of days but over the total time of filtration most were filtered over the target of 30 ml/kg/hr.

Suggested indicators

All patients receiving renal replacement therapy on the intensive care unit.

Proposed standard or target for best practice

- D An 'ideal' haemofiltration rate of 30 ml/kg/hr should be prescribed in 100% of cases.
- D An 'ideal' haemofiltration rate of 30 ml/kg/hr should be achieved in 75% of cases.
- D A haemofiltration rate of at least 25 ml/kg/hr should be achieved in 100% of cases.
- D Haemofiltration for 16 hrs per day should be achieved in 100% of cases.
- D The main points of the action plan following this audit were to improve the haemofiltration prescription and record and to ensure that the patient's weight was documented.
- D A separate audit of the causes of filtration failure could also be considered.

Suggested data to be collected

- D An audit record should be created.
- D Renal replacement therapy prescription to include:
 - D patient weight
 - D prescribed filtration rate
 - D daily filtration volume prescribed
 - D daily filtration volume achieved
 - D percentage of prescribed achieved
 - D cumulative filtration balance over days.

Common reasons for failure to meet standard

- D Unpredictable malfunction and downtime of filters.
- D Failure to record patient weight.
- D Failure to document prescribed filtration rate.
- D Failure to keep accurate fluid and filtration records.

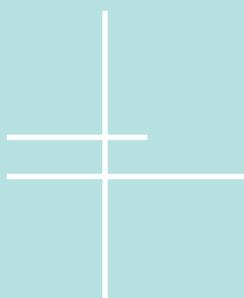
CPD and Curriculum mapping

CPD matrix codes: **1B04, 2C04, 3A13**

Syllabus for the CCT in Intensive Care Medicine: **Domains and sections 3.4, 4.1, 4.7**

References

- 1 Uchino S et al. Continuous is not continuous; the incidence and impact of downtime on uraemic control during continuous veno-venous haemofiltration. *Intens Care Med* 2003;**29**:575–578.
- 2 Bellomo R et al. Intensity of continuous renal replacement therapy in critically ill patients. *N Engl J Med* 2009;**361**:1627–1238.
- 3 Ronco C et al. Effects of different doses in continuous veno-venous haemofiltration on outcomes of acute renal failure; a prospective randomised trial. *Lancet* 2000;**355**:26–30.



10.14

Reducing volume of blood lost through sampling

Dr N Arora, Dr C Lowrie, Dr P Nightingale

Why do this audit?

Because the volume of blood drawn from intensive care patients during the course of their illness may render them anaemic. The requirement for blood transfusion may be associated with adverse outcomes.

Best practice: research evidence or authoritative opinion

It has been evident for many years that repeated blood sampling causes anaemia.¹ More recent studies confirm the high prevalence of anaemia and blood transfusion unrelated to acute bleeding in intensive care patients and an association between blood transfusion and organ failure and mortality.^{2,3}

This audit, completed in Manchester, showed that the mean volume of blood drawn per patient per day was 42.6 ml (19.3–65.0ml) with a mean volume of discard of 14.6 ml (6.0–22.5mls). The audit identified the volumes of blood required for a range of investigations.

Following the audit an action plan was compiled. It was proposed that a reduction in blood taken for tests could be achieved through the introduction of 'non-discard' arterial line sets and by keeping a record of tests requested to avoid duplication. The additional cost of the 'non-discard' sets was offset by savings on syringes, swabs and other disposables.

Suggested indicators

Patients admitted to intensive care.

Proposed standard or target for best practice

- D Documentation of the volume of blood drawn daily for tests in 100% of patients.
- D Documentation of all tests requested to avoid same day duplication in 100% of patients.
- D Non-discard arterial lines to be used in 100% of patients.

Suggested data to be collected

- D Volume of blood drawn from intensive care patients daily.
- D Volume of blood discarded daily.
- D Sequential haemoglobin values.
- D Record of duplicated and unnecessary blood tests.
- D Number of units of blood transfused for anaemia caused by non-acute bleeding.

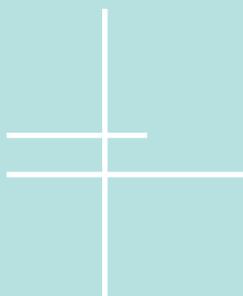
Common reasons for failure to meet standard

- D Lack of awareness of the extent of the problem.
- D Medical and nursing shift patterns and poor communication contributing to duplication of requests for investigations.

CPD and Curriculum mapping

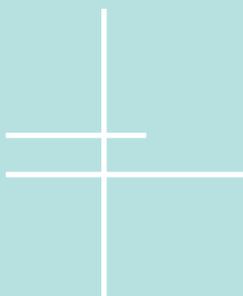
CPD matrix codes: **2C01, 2C07, 3A13**

Syllabus for the CCT in Intensive Care Medicine: **Domains and sections 11.2**



References

- 1 Burnum JF. Medical vampires. *N Engl J Med* 1986;**314**:1250–1251.
- 2 Vincent JL et al. Anemia and Blood Transfusion in Critically Ill Patients. *J Am Med Assoc* 2002;**288**(12):1499–1507.
- 3 Sakr Y et al. Anaemia and blood transfusion in a surgical intensive care unit. *Crit Care* 2010;**14**:R92 (<http://ccforum.com/content/14/3/R92>).



10.15

Compliance with the Department of Health guideline on taking blood cultures

Dr R Butchart, Dr I Welch, Dr J McNicholas

Why do this audit?

Poor technique when taking blood cultures may lead to contamination of samples and an incidence of false positive results estimated to be in the region of 10%. This may complicate and compromise the quality of patient care through the unnecessary or inappropriate prescription of antibiotics. The Department of Health (DH) has produced guidance to establish best practice.¹ We should do this audit to ensure that those taking blood cultures are properly trained in the technique and that the risk of contamination is minimised.

Best practice: research evidence or authoritative opinion

Best practice is set out in the Department of Health publication, 'Taking Blood Cultures, A summary of best practice'¹ which is part of 'Saving Lives: reducing infection'.²

Local implementation of the DH guideline in Portsmouth suggested that it could be simplified in terms of evidence base and ease of use without compromising its valuable purpose. An action plan as a result of the audit included a training programme and compilation of a simplified guideline. Repeated audits should demonstrate improved compliance with the guideline and a reduction in the incidence of reports of likely contamination (false positives) of blood cultures.

Suggested indicators

All patients from whom peripheral blood cultures are taken.

Proposed standard or target for best practice

- D 100% of those taking blood cultures have read the summary of best practice.
- D 100% of those taking blood cultures have been trained in the technique.
- D 100% of blood cultures taken according to DH guideline for best practice.
- D 0% false positive blood cultures reported by microbiology service.

Suggested data to be collected

Phase 1

- D Direct observation of blood culture procedure by auditor and assessment against DH guideline.
- D Enquire whether the operator has read the DH guidelines.

Phase 2

- D Provide guideline and supportive education to all blood culture takers on the unit including recording that they have read and understood the guideline, including demonstrating the technique using a mannequin.
- D Re-observe blood culture procedure, assessing against DH guideline.
- D Enquire whether the blood culture taker has been trained and read the guidelines.

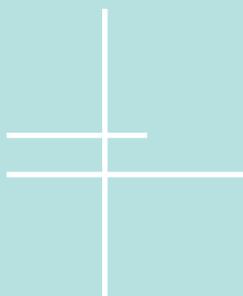
Common reasons for failure to meet standard

- D Failure to record results of blood cultures.
- D Ignorance of the existence of the guidelines.
- D Lack of training in the technique.

CPD and Curriculum mapping

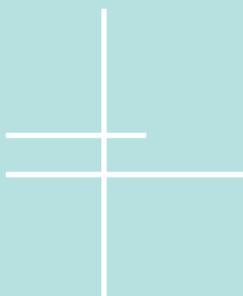
CPD matrix codes: **IE01, 2C03, 3A13**

Syllabus for the CCT in Intensive Care Medicine: **Domains and sections 4.2, 11.2, 11.6**



References

- 1 Taking blood cultures: A summary of best practice. *DH*, London 2007 (http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_078118.pdf accessed 5 May 2012).
- 2 Saving Lives: reducing infection, delivering clean and safe care. *DH*, London 2007 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_124265).



10.16

Time taken to insert an arterial line

Dr G Cooper, Dr K Shelley, Dr A Majekodunmi, Dr G Morgan

Why do this audit?

Trainees sometimes take a long time to successfully insert an arterial cannula (range 2–60mins). Consultants had no information apart from personal experience to suggest a suitable target time or the best cannula in use. Long times for arterial cannula insertion are associated with multiple attempts, patient discomfort, demoralisation among trainees, non-cost effective use of their time and interruption of other aspects of patient care.

Best practice: research evidence or authoritative opinion

A literature search generated no evidence to suggest a reasonable time for arterial cannulation. Authoritative opinion from a cohort of 10 consultants with regular practice of the technique suggested that it should be possible to site an arterial cannula in five minutes.

The audit was conducted in two phases, the first auditing performance before the introduction of a training programme and a purpose designed arterial cannula. During the second phase, all arterial cannulation devices apart from a purpose designed device were removed from stock. Performance of trainees improved between the first and second phases.

Evidence from this audit of practice of insertion of arterial cannulae by trainees concluded that successful cannulation of the radial artery by a trainee could be achieved within 10 minutes in 70% of cases. Success was achieved with one cannula in 53% of cases and using a second in an additional 33%.

Improvement in performance was associated with the introduction of a training programme, stable position of the wrist in an extended position and use of a purpose designed cannula.

The components of the action plan put in place on completion of the audit were:

- D Implementation of a training programme for new trainees.
- D Adoption of a purpose designed cannula.
- D Adoption of a purpose designed pack with adhesive window drape for the radial artery.

Suggested indicators

All patients in intensive care having an arterial line inserted.

Proposed standard or target for best practice

- D A target time of 10 minutes for siting an arterial cannula in the radial artery measured from the time of opening the pack in 100% of cases.
- D Aseptic technique used in 100% of cases.
- D Local anaesthetic infiltrated into insertion site in 100% of cases.
- D Successful cannulation of the radial artery at the wrist at the first attempt in 60% of cases.
- D Successful cannulation of the radial artery at the wrist in two attempts in 75% of cases.
- D Successful cannulation of the radial artery at the wrist using one cannula in 60% of cases.
- D Successful cannulation of the radial artery at the wrist using two cannulae in 90% of cases.

Suggested data to be collected

- D Date and time of procedure.
- D Identity of patient.
- D Use of sterile technique.
- D Use of local anaesthetic.
- D Correct position of wrist.
- D First choice of insertion site: R-radial, L-radial.
- D Type of cannula.
- D Time taken to insert cannula in minutes from skin prep to completion.
- D Number of attempts for successful cannulation.
- D Number of cannulae used.
- D Site of final cannulation.
- D Type of cannula finally inserted.

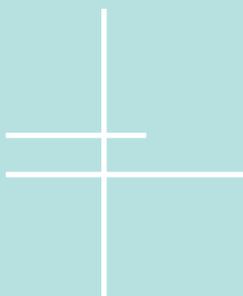
**Common reasons
for failure to meet
standard**

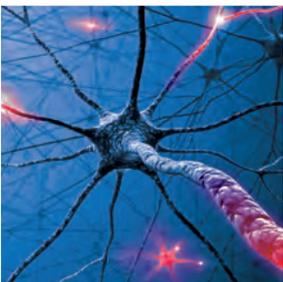
- ⓓ Failure to implement training programme.
- ⓓ Failure to use aseptic technique.
- ⓓ Incorrect choice of cannula.
- ⓓ Failure to position and sterilise wrist.

**CPD and Curriculum
mapping**

CPD matrix codes: **1A03, 2C01–03, 2C07**

Syllabus for the CCT in Intensive Care Medicine: **Domains and sections 1.1, 2.5, 2.7, 3.3, 3.8, 3.9, 4.4, 5.8, 6.2**





Section 11: Pain Medicine

Edited by Dr Andrew Vickers and Dr Kate Grady

- 11.1 Education and training by the in-patient/acute pain team
- 11.2 Provision of written patient information on pain management
- 11.3 Pain management in the recovery room
- 11.4 Assessment and documentation in acute pain management
- 11.5 Efficacy of acute pain management
- 11.6 Safety of acute pain management
- 11.7 Management of non-surgical pain in the adult patient
- 11.8 Patient satisfaction with acute pain management
- 11.9 Naloxone audit in surgical in-patients
- 11.10 High impact interventions – preventing epidural site infection
- 11.11 Acute pain management and the substance-misusing patient
- 11.12 Compliance with RCoA guidelines for managing epidural analgesia
- 11.13 Procurement, maintenance and safety of pumps used in acute pain management
- 11.14 Management of patients with repeat admissions for acute or chronic pain
- 11.15 Availability and resourcing of core chronic pain services
- 11.16 Audit of Pain Management Programmes
- 11.17 Long-term use of opioid analgesia in chronic non-malignant pain
- 11.18 Compliance in the use of oral medication
- 11.19 Lumbar epidural steroid injections – standards, practice and outcomes
- 11.20 Non-medical prescribing for acute and chronic pain patients
- 11.21 Payment by results
- 11.22 Medial branch neurotomy for lumbar facet joint spinal pain
- 11.23 Intrathecal drug delivery in the management of cancer-related pain
- 11.24 Individual performance template for pain medicine anaesthetists

11.1 Education and training by the inpatient/acute pain team

Mrs H Willson, Dr J Quinlan

Why do this audit?

Effective education and training is an important aspect of the In-patient/Acute Pain Service role. This education should be based on best available evidence to prevent patients from suffering harm.¹ The Chief Medical Officer's report 'Pain: breaking through the barrier'² highlighted the inadequacy of current pain management education for healthcare professionals, with effective education and training for all healthcare professionals as a key recommendation. It is important to establish, update and provide this training on a regular basis to maintain competence and improve quality of care.^{3,4}

Best practice: research evidence or authoritative opinion

Regular education and training by In-patient/Acute Pain Teams has a positive effect on professional practice and healthcare outcomes.⁵

Education of medical and nursing staff is essential if more sophisticated forms of analgesia are to be managed safely and effectively.^{3,6}

Suggested indicators

- D Staff education must include a focus on the anticipation and prevention of pain as well an understanding of the complexity of pain management.
- D There is documented evidence of pain assessment and efficacy of pain management strategies.
- D Medical staff have attended a pain management induction tutorial.
- D Nurses have attended a pain management tutorial in the last 3 years.
- D Trained nurses on wards designated to care for patients with advanced analgesic devices (PCA, epidural or nerve infusion) have been passed as competent.
- D Patients with epidural analgesia are cared for on designated wards/departments by qualified nurses with specific training and skills in the care and management of epidural complications. For patients in theatre environments, operating department practitioners (ODP) must also have specific epidural training. Nurses/ODPs who directly care for patients with epidural analgesia have attended education and training in the last 3 years.
- D Patient feedback (satisfaction surveys, complaints) is used to influence education and training programmes.

Proposed standard or target for best practice

- D 100% foundation year 1 and 2 doctors have attended a pain management induction tutorial.
- D 100% healthcare professionals new to the Trust have received information on accessing the In-patient/Acute Pain Team.
- D 100% healthcare professionals new to the Trust have received information on accessing pain management protocols.
- D 66% of nurses/ODPs on wards/departments where epidural infusion is administered have attended training in the last 3 years.
- D 100% of nurses/ODPs caring for patients with advanced analgesic devices have demonstrated competency in specific management.

Suggested data to be collected

- D Number of hospital-wide pain education and training events available for healthcare professionals.
- D Frequency and type of training provided (in-service training sessions, e-learning packages, ward-based tutorials and pain ward rounds) and subjects covered (analgesics, PCA, epidural analgesia, regional blocks; intravenous bolus, subcutaneous and intramuscular algorithms).
- D Attendance records for all training provided.
- D Ward/department attendance records and competency assessment documentation.

Common reasons for failure to meet standard

- D Lack of communication, advertising, or resources to provide training sessions.
- D Lack of study time available for staff to attend training.
- D Lack of mandatory training in induction or preceptorship programmes.
- D Insufficient management focus on training needs.
- D Assessment and documentation, efficacy, and safety of acute pain management. Patient satisfaction with pain management.

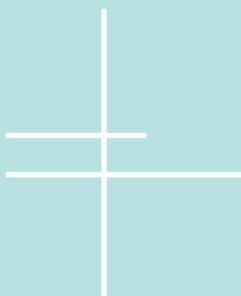
CPD and Curriculum mapping

CPD matrix codes: D01, ID02, 2E01, 2E02

Training curriculum competence: PM_BK_01–08, BS_01–08, PM_IK_01–03, IS_01–05, IO, PM_HK_06, PM_HK_08

References

- 1 <http://www.nmc-uk.org/Nurses-and-midwives/The-code>.
- 2 Pain: breaking through the barrier. In: Chief Medical Officer's Annual Report 2008. DH, London 2008 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/AnnualReports/DH_096206).
- 3 Patient Safety Alert 21: Safer practice with epidurals injections and infusions. NPSA, London 2007 (<http://www.nrls.npsa.nhs.uk/resources/?entryid45=59807&p=12>).
- 4 Best practice in the management of epidural analgesia in the hospital setting. *Faculty of Pain Medicine of the RCoA*, London 2010 (<http://www.rcoa.ac.uk/node/639>).
- 5 Forsetlund L et al. Continuing education meetings and workshops: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews* 2009, Issue 2. Art. No: CD003030.
- 6 Macintyre PE, Schug SA. Acute pain management: a practical guide (3rd edition). *Saunders Elsevier*, Philadelphia 2007.



11.2

Provision of written patient information on pain management

Mrs K Butterworth

Why do this audit?

Successful pain management depends on many factors. One is the understanding by patients of the importance of pain relief particularly following surgery. Other factors include explaining the problems that can arise if pain relief is not effective, the different types of pain relief available and the importance of taking regular analgesia.

Best practice: research evidence or authoritative opinion

Pre-operative education improves patient or carer knowledge of pain and encourages a more positive attitude towards pain relief.¹ Information regarding pain relief in hospital is available from specialist national professional bodies and from many local hospital acute pain services.^{2,3} Information should be general with the option of providing procedure specific information where appropriate.

Written pre-operative information is considered more thorough than verbal and helps promote discussion with the anaesthetist about post-operative pain management options.⁴ Whilst evidence for the benefits of patient education in terms of better pain relief is inconsistent,¹ there is evidence supporting increased patient satisfaction.⁵

The hospital Patient Information Group or equivalent should check locally developed leaflets before the final draft. This is to ensure the use of comprehensible language and answer frequently asked questions. Consideration should be given to providing written material in languages prevalent in the catchment population of individual institutions.

Information about pain relief should be given to patients in pre-operative assessment, antenatal clinics or distributed by admission services. Where possible patients should receive information at an appropriate time and not in the immediate period before surgery.⁶ This gives them time to assimilate the information and allows time to raise questions.

Suggested indicators

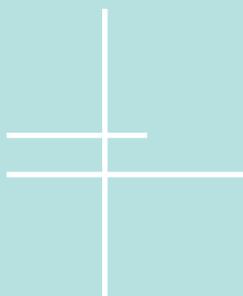
- D % of elective patients receiving written pre-operative information about pain management.
- D % of unplanned admission patients requiring surgery receiving information regarding pain management.
- D % of carers of non-communicative patients receiving pre-operative written information.

Proposed standard or target for best practice

- D 100% elective patients receive pre-operative information.
- D 100% of carers of non-communicative elective patients receive information on pain management.
- D 90% of unplanned admission patients (or carers if non-communicative) receive some information on pain management.

Suggested data to be collected

- D Audit acute pain service (APS) information leaflets are received by all elective patients.
- D Periodic audits to check information is distributed by the pre-operative assessment service or admission office.
- D Audit nurses' knowledge of leaflets, location and contents.
- D Periodically audit the availability of leaflets on surgical wards.
- D Collection of data by anaesthetists and nurses by asking patients or carers if they received written information about pain management.



Common reasons for failure to meet standard

- D Failure of pre-operative nurses and admission staff to provide information leaflets.
- D Failure to inform patients requiring unplanned surgery of pain management options because of time limits.
- D Language difficulties.
- D Some patients do not wish to receive information.

Related audits

I.1 – Patient information about anaesthesia

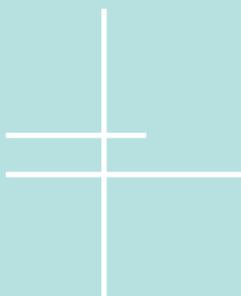
CPD and Curriculum mapping

CPD matrix codes: ID01, ID02, IF01, IF02, IF04

Training curriculum competence: PM_BK_08, PM_IS_10, PM_HK_07–08, PM_HS_04

References

- 1 Australia and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute Pain Management: scientific evidence (3rd Edn). ANZCA, Melbourne 2010.
- 2 Epidurals for pain after surgery. RCoA and AAGBI, London 2008 (<http://www.rcoa.ac.uk/node/1854>).
- 3 Pain relief in labour. OAA, London 2008 (<http://www.oaaformothers.info>).
- 4 Binhas M et al. Impact of written information describing post-operative pain management on patient agreement with proposed treatment. *Eur J Anaesthesiol* 2008;**25(11)**:884–890.
- 5 Sjolting M et al. The impact of pre-operative information on state anxiety, post operative pain and satisfaction with pain management. *Patient Educ Couns* 2003;**51(2)**:169–176.
- 6 Quality and Service Improvement Tools. NHS Institute for Innovation and Improvement (http://www.institute.nhs.uk/option,com_quality_and_service_improvement_tools/Itemid,5015.html).



11.3

Pain management in the recovery room

Mrs F Duncan, Mrs J Marshall

Why do this audit?

Ensuring optimum analgesia in the recovery room is a key stage to ensuring the best long-term outcome for the patient.¹ Pain problems and associated complications will escalate if patients are discharged from recovery with ineffective pain relief. Chronic pain can develop if pain is not treated effectively at the time of surgery.^{2,3} Despite this understanding, a large gap exists between the evidence available to guide practitioners and current practice.¹⁻⁴ Pain continues to be poorly managed in the immediate post-operative period. Ineffective pain relief is the main cause of delayed discharge after day-case surgery.⁵ Failure of pain management in recovery can result in increased patient suffering, and increased calls for help to busy on-call anaesthetists. Optimising pain management in recovery (24 hours a day, 7 days a week) involves measuring a range of process and outcome indicators.

Best practice: research evidence or authoritative opinion

Excellent international guidelines are available to guide practitioners; best practice is described in detail in the third edition of the Australian and New Zealand College document.⁵ The Royal College of Anaesthetists have updated their guidance on the provision of acute pain management and have produced clear statements about requirements for optimal pain relief in the perioperative period.⁶

Pain should be recorded as the 5th vital sign, and evaluated, treated and re-evaluated frequently in recovery. Pain should be measured on movement (dynamic pain assessment). A score of 4 or more on an 11 point (0–10) verbal numerical rating scale is considered a threshold for intervention.⁵ Elderly patients are more likely to under-report pain and have difficulty in quantifying pain. The 2010 NCEPOD review of the care received by elderly patients undergoing surgery makes recommendations for practice and the organisation of pain services.⁷

Optimal pain management in the perioperative period should be planned as part of a surgical enhanced recovery programme. A procedure specific approach to pain relief, modified to the needs of individual patients, is now recommended.¹ Evidence is available for several common procedures on the PROSPECT website.⁸

Best practice guidelines for the management of respiratory depression associated with neuraxial opioid administration have been published by the American Society of Anesthesiologists.⁹

The Pain RADAR website is a very practical resource which was set up to encourage implementation of guidelines at a local level.¹⁰ The 'perioperative plan for high risk patients' is a particularly useful form to download and use for patients with longterm opioid exposure preoperatively.

Suggested indicators**Process**

- D The existence of standardized guidelines and protocols (including discharge protocol) based on national guidance
- D Availability of pain management advice and interventions at all times
- D The existence of an ongoing programme of education for all staff looking after patients in the recovery room and percentage of attendance.
- D Percent of referrals to the Acute Pain Service (and/or on-call anaesthetist) within 4 hours after discharge from recovery

Outcome

- D The percentage of patients who are reviewed by an anaesthetist to manage severe pain because the patient is not responding to a recovery room protocol¹¹

Proposed standard or target for best practice

- D Optimal postoperative pain relief (< 4 on a 0 to 10 scale or at a level acceptable to the patient) is established for >95% of patients before timely discharge from recovery.
- D 100% of patients have analgesia (multimodal when appropriate) prescribed before discharge from recovery.
- D Availability of up-to-date guidelines and protocols.
- D Attendance at mandatory education programmes for all staff involved in the management of patients in recovery.
- D Availability of acute pain management expertise at all times.
- D Evidence of individual anaesthetists auditing their peri-operative pain management practice.

Suggested data to be collected

- D Patient age (decades), gender, emergency/planned surgery.
- D Type of surgery.
- D Identifier of individual anaesthetist.
- D Measurement of pain and side effects as per local protocol.
- D The percentage of patients who are reviewed by an anaesthetist to manage severe pain because the patient is not responding to a recovery room protocol.
- D The percentage of referrals to the Acute Pain Service (and/or on-call anaesthetist) within 4 hours after discharge from recovery.
- D Local indicators decided as part of a quality improvement programme.

Common reasons for failure to meet standard

- D Failure to identify patients with long-term opioid exposure pre-operatively.
- D Failed local or regional block.
- D Inadequate pain assessment – particularly in patients with special needs.
- D Fear of respiratory depression, especially in the elderly.
- D Lack of recovery room protocols leading to inconsistent approach to managing pain and side effects.
- D Lack of multidisciplinary consensus on the importance of pain management.
- D Failure to prescribe multimodal analgesia.
- D Lack of education for nursing and medical staff.
- D Pressures to discharge patients from the recovery room.
- D No feedback on success of quality improvement efforts.
- D Surgical constraints on classes of drugs/techniques allowed.

Related audits

- 1.1 – Patient information about anaesthesia
- 1.4 – Premedication and management of chronic medication
- 3.7 – Discharge protocols
- 13.8 – Delivery, timing and quality of pain training for anaesthetists

CPD and Curriculum mapping

CPD matrix codes: IA02, ID01, ID02, IE03, IF05, IH02, II05, 2E01, 2G04
 Training curriculum competences: PM_BK_01–04, 08, 09, PM_BS_01–08, PM_IK_01, 03, 06, PM_IS_01, 02, 04, 05, 09, 10, PM_HK_01, PM_HS_01, 04, 06

References

- 1 White P, Kehlet H. Improving post-operative pain management. *Anesthesiology* 2010;**112**(1):220–225.
- 2 Niraj G, Rowbotham J. Persistent post-operative pain: where are we now? *Br J Anaesth* 2011;**107**(1):25–29.
- 3 Macrae W. Chronic postsurgical pain: 10 years on *Br J Anaesth* 2008;**101**(1):77–86.
- 4 Global Year against Acute Pain campaign. *International Association for the Study of Pain*, 2010 (<http://www.iasp-pain.org/Content/NavigationMenu/GlobalYearAgainstPain/GlobalYearAgainstAcutePain/default.htm>).
- 5 Australia and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute Pain Management: scientific evidence (3rd Edn). ANZCA, Melbourne 2010 (http://www.nhmrc.gov.au/files_nhmrc/publications/attachments/cp104_3.pdf).
- 6 Guidance on the provision of anaesthesia services for acute pain management. RCoA, London 2010 (<http://www.rcoa.ac.uk/node/712>).
- 7 Elective and Emergency surgery in the elderly: an age old problem. NCEPOD, London 2010 (<http://www.ncepod.org.uk/2010eese.htm>).
- 8 Procedure specific post-operative pain management (PROSPECT) study group (<http://www.postoppain.org/frameset.htm>).
- 9 Practice guidelines for the prevention, detection and management of respiratory depression associated with neuraxial opioid administration. *Anesthesiology* 2009;**110**:218–230.
- 10 The RADAR approach (<http://www.painradar.co.uk/improving-acute-pain-management.aspx>).
- 11 Anaesthesia clinical indicator user manual. The Australian Council on Healthcare Standards 2011 (<http://www.anzca.edu.au/resources/college-publications/books-and-publications/ClinicalIndicators.pdf>).

11.4

Assessment and documentation in acute pain management

Mrs A Dwyer, Dr J Turner, Dr T Johnson

Why do this audit?

Regular clinical assessment is essential in order to inform decisions regarding acute pain management and resulting side effects. Comprehensive and systematic documentations will assure continuity of care.

Scoring levels of pain is only one component of a very wide range of quality assurance methods that ultimately will save time and effort for staff, avoid expensive legal cases for trusts and, most importantly, facilitate the best analgesia for our patients.

The availability and use of documentary systems within acute pain services is an excellent topic for audit.

Best practice: research evidence or authoritative opinion

Effective and safe acute pain services will be able to demonstrate:

- D local treatment protocols defining observations required
- D maintenance of equipment
- D appropriate documentation for charting observations
- D completion of documentation – leads to improved pain control¹
- D competency of staff
- D patient information
- D evidence of reporting, analysing and preventing adverse incidents.

These are all requirements of the NHSLA² and incorporate good medical practice.³

Suggested indicators

Protocols

- D Protocols should be specific to the techniques used and based on the highest level of recent evidence that is available.¹
- D The protocols should be dated and have a date for review. There should be an agreed and unique formal arrangement for recording the directions of the anaesthetist (e.g. minimum acceptable blood pressure) together with contingency recommendations for action.

Charts

- D Clinical data for pain and analgesia and its side effects may be integrated with other observations to avoid duplication but the directions must be explicit. The type and frequency of observations required should be clearly stated. Pain scores should be appropriate to patient culture, language and development and take into account cognitive and emotional states.¹

Other documents

- D A clear, concise operating manual should be available for each piece of equipment that is used (can this be easily located?).
- D Electronic prescribing or adhesive labels and order sheets may be helpful to guide prescription, provide standardised prescribing and avoid prescribing errors (are these available?).
- D Written information can assist patients in understanding post-operative analgesia – there should be evidence that these have been used (ask the patients).
- D Ward staff should be able to demonstrate training and competence with the techniques (have they got evidence of training/certificates?).
- D There should be evidence of and documentation of action regarding adverse incident reports (ask the team leader).

Proposed standard or target for best practice

This audit should confirm that all of the above audit standards are met. It is difficult to justify support for services that do not strive towards this goal.

Suggested data to be collected

- D As above in suggested indicators.

Common reasons for failure to meet standard

- D Lack of leadership.
- D Lack of clear protocols.
- D The protocols are perceived as inappropriate.
- D Poor integration with other hospital teams, e.g. education and training, equipment maintenance, pharmacy or operating department.
- D Failure to record observations may suggest that staff are poorly motivated or resourced to comply.

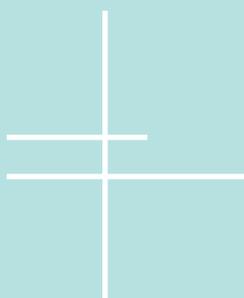
CPD and Curriculum mapping

CPD matrix codes: IA02, ID01, ID02, IF04, IH02, II02, II05

Training curriculum competences: PM_BK_03, 04, 08, 09, PM_BS_01–04, 06, 08, PM_IK_01–03, PM_IS_01–05, 10, PM_HK_01, PM_HS_01, 04, 06

References

- 1 Australia and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute Pain Management: scientific evidence (3rd Edn). ANZCA, Melbourne 2010 (http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/cp104_3.pdf).
- 2 NHSLA and CNST Risk Management Standards 2012-13. Evidence Template Guidelines. (<http://www.nhs.uk/NR/rdonlyres/15C678F9-77E7-4431-BCCC-7F5C57ECoA29/0/Evidencetemplateguidance201213.pdf> accessed 16 April 2012).
- 3 Good medical practice. GMC, London 2006 (http://www.gmc-uk.org/static/documents/content/GMP_0910.pdf).



11.5

Efficacy of acute pain management

Dr T Smith, Sr S Evans

Why do this audit?

Effective management of acute pain has long been recognised as important in improving the post-operative experience, reducing complications and promoting early discharge from hospital.¹ It is an important component of enhanced recovery programmes.² This audit is easy and efficient to do on the daily acute pain ward round using existing ward data and could easily be applied generally or to specific patient groups. Of particular interest would be enhanced recovery patients in colorectal and orthopaedic surgery and elderly patients over 80 years of age.³

Best practice: research evidence or authoritative opinion

Effective pain control relies on recognition of an analgesic need by regular assessment⁴ and appropriate treatment. Regular assessment can be tied in with routine physiological observations. In most patients pain control plans should result in good pain control. Identifying patients in whom that plan has not been entirely effective should lead to improved methods. Patients identified as having moderate or severe pain should have this managed and dealt with. Where this does not occur further investigation is indicated. This audit checks compliance with regular pain assessment, quantifies the prevalence of significant pain, and identifies patients in whom subsequent assessment indicates that the pain was not effectively brought under control.

Suggested indicators

- 1 Incidence of poorly controlled (moderate or severe) pain.
- 2 Persistence of poorly controlled (moderate or severe) pain.

Proposed standard or target for best practice

- D Pain assessment documented every time pulse and BP recorded (100%).
- D Isolated occurrence(s) of moderate or severe pain in a 24 hour period (<5% of patient days).
- D Consecutive occurrence(s) of moderate or severe pain in a 24 hour period (0% of patient days).

Suggested data to be collected

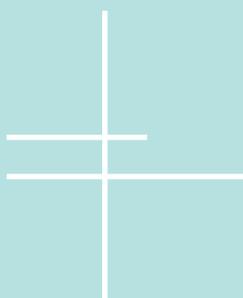
Pain on movement is assessed using the ubiquitous verbal descriptor scale (VDS) as none, mild, moderate or severe. This is routinely recorded on the observation chart. If an institution uses alternative, numerical scales then a number corresponding to the change from 'mild' to 'moderate' or below which pain is considered to be controlled should be identified.

These charts can then be viewed retrospectively coding each day (24 hours from 08.00) as follows:

- D all pain assessments *none* or *mild* – **GOOD** control
- D isolated instance(s) of *moderate* or *severe* pain – **BORDERLINE**
- D two or more **consecutive** instances of *moderate* or *severe* pain – **POOR**.

Common reasons for failure to meet standard

- D Regular analgesia not prescribed/given doctor/nurse/patient.
- D Failure of peripheral or neuraxial nerve blockade.
- D Opiate prescribing errors (infrequent, inadequate dose, and ineffective route of administration).
- D Pain assessment carried out by HCAs unable to independently implement further acute pain management.
- D Failure to utilise provided treatment guidelines.



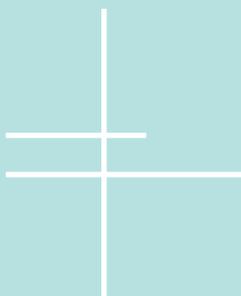
CPD and Curriculum mapping

CPD matrix codes: IA02, ID01, ID02, II05, 2E01

Training curriculum competences: PM_BK_01–04, 08, 09, PM_BS_01–08, PM_IK_01–03, PM_IS_01–05, 10, PM_HK_01, 02, PM_HS_01, 04, 06

References

- 1 Commission on the provision of surgical services. Reports of the working party on pain after surgery. *RCS and RCoA*, London 1990.
- 2 Enhanced Recovery Programme. Quality and Service Improvement Tools. *NHS Institute for Innovation and Improvement* (http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/enhanced_recovery_programme.html).
- 3 Elective and Emergency surgery in the elderly: an age old problem. *NCEPOD*, London 2010 (<http://www.ncepod.org.uk/2010eese.htm>).
- 4 Australia and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute Pain Management: scientific evidence (3rd Edn). *ANZCA*, Melbourne 2010 (http://www.nhmrc.gov.au/files_nhmrc/publications/attachments/cp104_3.pdf).



11.6

Safety of acute pain management

Dr D J Counsell

Why do this audit?

Whilst the complications of epidural and opiate analgesia are well known, changing practice in surgery and anaesthesia presents new analgesic challenges, promotes new analgesic techniques and with these the possibility of new or more frequent complications. In modern practice the evolution of enhanced recovery protocols and wider use of intrathecal/epidural opioids and continuous or repeated local anaesthetic techniques are of particular interest.

Best practice: research evidence or authoritative opinion

The recommendations in 'Pain after Surgery' from 2001¹ remain the backbone of good practice in acute pain management supplemented by further advice on the management of epidurals in the RCoA et al good practice guideline.² Further recommendations on the management of central neuraxial blocks including analgesic use also followed from the RCoA 3rd National Audit Project (NAP 3).³ All recommend constant vigilance for major complications using simple clinical observation tools. NAP 3 also provided a 'worst case' incidence of permanent damage (persisting for > 6 months) due to the use of peri-operative epidural analgesia of around 1 in 6,000.

Suggested indicators

- D Implementation of recommended observations in terms of frequency, sedation scoring, neuromuscular blockade assessment and availability of response protocols.
- D Compliance of staff in performing these observations.
- D Staff awareness and availability of response protocols.
- D Frequency of major complications, in particular opioid induced respiratory depression with novel techniques.
- D Awareness of NAP 3 results for peri-operative epidurals among anaesthetists and the accuracy of complication advice given to patients.

Proposed standard or target for best practice

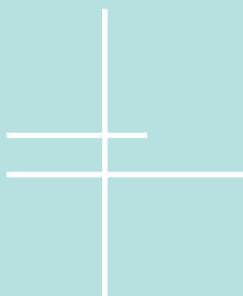
- D All hospitals have appropriate observations in place including assessment of density of neurological block in patients with epidural analgesia *in situ*.
- D 100% compliance with recommended observations including recommended frequency.
- D Lead nurse on all shifts aware of response protocols.
- D All cases of major respiratory depression (i.e. requiring Naloxone) investigated and reported.
- D 100% awareness of NAP 3 results by anaesthetists reflecting in the information given to patients.

Suggested data to be collected

- D Review of current observation practice by acute pain team.
- D Snapshot reviews of observation charts to assess performance and compliance.
- D Questionnaires to assess nursing knowledge regarding protocols and anaesthetist knowledge regarding NAP 3 results.

Common reasons for failure to meet standard

- D Not up to date with current monitoring recommendations.
- D Wards understaffed or too busy to do observations properly.
- D Lack of training for ward staff and ward leaders.
- D Unaware of NAP 3 results.



Related audits

The National In-Patient Pain Survey (NIPPS) Phase 1 is collating data on existing Acute (In-Patient) Pain Services in the UK via an online questionnaire. Phase 2 of the project is to develop a national benchmarking system to include critical incident reporting. Visit nipps.org.uk for more details.

11.9 – Naloxone audit in surgical inpatients

11.10 – High impact interventions – preventing epidural site infection

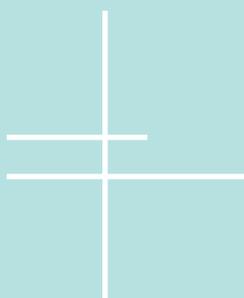
CPD and Curriculum mapping

CPD matrix codes: IA02, ID01, ID02, IF01, IF05, IH02, II01, II02, II05, 2E01

Training curriculum competences: PM_BK_01–04, 08, 09, PM_BS_01–08, PM_IK_01–03, 06, PM_IS_01–05, 10, PM_HK_01, PM_HS_01, 04, 06

References

- 1 Commission on the provision of surgical services. Reports of the working party on pain after surgery. *RCS and RCoA*, London 1990.
- 2 Best practice in the management of epidural analgesia in the hospital setting. *Faculty of Pain Medicine of the RCoA*, London 2010 (<http://www.rcoa.ac.uk/node/639>).
- 3 Cook T. Major Complications of Central Neuraxial Block in the UK. Report and findings from the 3rd National Audit Project (NAP3). *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/1428>).



11.7 Management of non-surgical pain in the adult patient

Dr A P Vickers

Why do this audit?

Effective analgesia is capable of modifying many of the pathophysiological responses to injury, thereby assisting recovery.¹ All patients should have the benefits of effective pain management.

Anaesthetists and the Acute Pain Service (APS) are closely involved in the management of patients with pain after surgery. Acute pain, however, occurs in many other situations including trauma (A&E, orthopaedic ward), ischaemic limbs and pancreatitis (surgical ward), acute back pain (orthopaedic ward), and painful procedures (medical and surgical wards, radiology). Many different departments and specialties will be involved in this broad group, and it may be a challenge to recruit the interest and enthusiasm of these professionals to collect data, apply these standards and introduce corrective measures.

Best practice: research evidence or authoritative opinion

- D Regular assessment of pain leads to improved acute pain management.¹
- D There should be a uniform pain scoring system throughout the hospital.²
- D Staffing levels, their knowledge and skills, and the availability of drugs and equipment should be sufficient to provide safe and effective pain relief for patients with non-surgical acute pain to the same standard as for patients with post-operative pain. The methods used may differ, however, and should be appropriate for the environment. The provision of guidelines may be helpful in this situation.³
- D All healthcare workers have a responsibility to anticipate, monitor and treat pain.²
- D NQAT (Nursing Quality Assessment Tools), a Department of Health initiative aimed at improving standards across hospitals⁴ has included pain management as one of its standards of care.

Suggested indicators

- D % patients with painful conditions who have a completed record of pain scores.
- D % of patients who score moderate or severe pain on more than one consecutive assessment.
- D % of patients with moderate or severe pain who receive analgesia within 15 min of assessment.
- D % of medical and nursing staff who have received education and training in the management of acute pain in the past 12 months.
- D % of wards and clinical departments with current guidelines for managing acute pain relevant to their particular areas.
- D % of patients referred to the Acute Pain Service where simple measures to control pain (e.g. regular paracetamol) had not been implemented.

Proposed standard or target for best practice

The same standards applied locally to post-operative patients should be the target here too.

The following are suggested:

- D 100% patients with acute pain should have a completed record of pain scores.
- D < 5% patients with 2 or more consecutive pain scores of moderate or severe without appropriate interventions.
- D 95% patients requiring treatment should have a reduced pain score within 30 min of treatment. This should be documented on the chart.
- D 95% of staff should have received training in pain management within the past 12 months.
- D 100% of clinical areas should have current relevant guidelines for managing acute pain.

Suggested data to be collected

- D Appropriate data to assess the standards recommended above need to be collected.
- D Continuous collection of data may be unworkable.
- D Specific clinical areas (e.g. A&E) or particular groups of patients (e.g. patients with fractured neck of femur prior to surgery) should be targeted periodically with the intention of covering all areas within a period of 2 years.
- D Review of cases where pain control has failed and feedback to relevant clinical staff.

Common reasons for failure to meet standard

- D A belief that pain is always easy to manage and does not require regular reappraisal.
- D Reluctance to consider pain score as a 'vital sign'.
- D Fears of addiction and toxicity.
- D Low patient expectations.
- D Failure to feedback results of audit to clinical staff.

Related audits

- 11.12 – Accessing chronic pain services for in-patients with pain problems
- 11.13 – Multidisciplinary management of patients with repeat hospital admissions

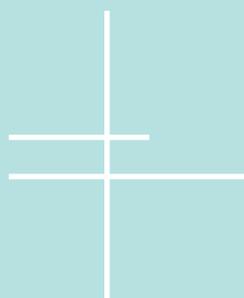
CPD and Curriculum mapping

CPD matrix codes: IA02, ID01, ID02, IF04, IH02, 2E02

Training curriculum competences: PM_BK_01–04, 07–09, PM_BS_01–08, PM_IK_01–03, PM_IS_01–05, IO, PM_HK_02, PM_HS_01, 02, 04, 06

References

- 1 Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute Pain Management: Scientific Evidence (3rd edition). *ANZCA and FPM*, Melbourne, 2010, chapter 11.8 pp 431–437 (http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/cp104_3.pdf).
- 2 Vickers AP et al. Consensus statement on the anticipation and prevention of acute postoperative pain: multidisciplinary RADAR approach. *Curr Med Res Opin* 2009;**25**:2557–2569.
- 3 Best practice in the management of epidural analgesia in the hospital setting. *Faculty of Pain Medicine of the RCoA*, London 2010 (<http://www.rcoa.ac.uk/node/639>).
- 4 NQAT brings together key elements of the Department of Health's 'Essence of Care' standards (http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@ps/documents/digitalasset/dh_119977.pdf) and the Confidence of Care document (<http://www.dhsspsni.gov.uk/cic-pid-version-1.1-jul09-2.pdf>). It is aligned with the Care Quality Commission.



11.8

Patient satisfaction with acute pain management

Dr J Quinlan, Mrs H Willson

Why do this audit?

Patient satisfaction is a valuable measure of outcome of healthcare processes and can be used for continuous quality improvement.¹

Best practice: research evidence or authoritative opinion

Satisfaction and pain ratings are both highly subjective so require a focused assessment of patient experience¹, rather than using a global measure of satisfaction which often produces falsely high scores despite significant pain.^{2,3} However, any problems identified on these global measures should be considered significant.⁴

Increasing ward nurses' knowledge is important in improving patients' pain experiences,⁵ while patient satisfaction with pain management also correlates with received pre-operative information.⁶ The Department of Health's Essence of Care guidelines⁷ suggest working with patients and carers to seek their views, agree a realistic pain management plan and ensure that the plan is understood by all those involved. They also recommend that risks, incidents, complaints and concerns are recorded, monitored and analysed, and the information used to improve patient care.

Suggested indicators

- D Patients are satisfied with the information they received about post-operative pain and proposed pain control method.
- D Patients feel that the hospital staff did everything they could to control pain.
- D Complaints about pain management.

Proposed standard or target for best practice

- D 100% of patients were satisfied (agree or strongly agree) that they had been given relevant information and explanation about their pain control.
- D 100% patients felt that hospital staff did everything they could to control pain.
- D 100% of patients were asked about their pain score.
- D 100% of patients were offered analgesia in response to their pain.
- D 100% of patients were asked about the effectiveness of their pain relief.
- D 100% of patients were asked about any side effects of analgesic drugs.
- D 100% of patients were satisfied with their pain management.

This feedback should be sought every six months.

Suggested data to be collected

- D Patient feedback via patient liaison service (PALS) including complaints, general hospital survey or verbal reports.
- D Written or electronic questionnaires to be completed on the ward as an in-patient, or at home after discharge.
- D Telephone questionnaires after discharge.
- D Suggested RCoA audit form or American Pain Society patient outcome questionnaire.⁸
- D Information on side effects as well as effectiveness of analgesia.
- D Care Quality Commission questionnaires of experience data,⁹ as well as hospital information from Dr Foster.¹⁰

Common reasons for failure to meet standard

- D Inadequate pain education of ward staff.
- D Lack of clinical prioritisation of pain management.
- D Lack of local pain management guidelines.
- D Failure to contact patient by telephone.
- D Failure of patient to return postal questionnaire.
- D Insufficient funds and clerical support to provide telephone or postal follow up.

There is considerable overlap with the patient information, pain education and pain assessment audit recipes.

There are other tools available to optimise data collection and interpretation of patient feedback.^{11,12,13}

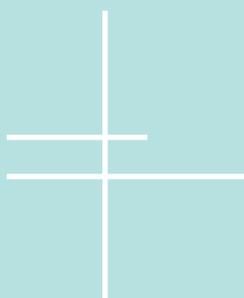
CPD and Curriculum mapping

CPD matrix codes: ID01, ID02, 2E01, 2E02

Training curriculum competences: PM_BK_01–08, BS_01–08, PM_IK_01–03, IS_01–05, IO, PM_HK_08, HS_04, 06

References

- 1 Niemi-Murola L et al. Patient Satisfaction with Postoperative Pain Management – Effect of Preoperative Factors. *Pain Management Nursing* 2007;**8**(3):122–129.
- 2 Salomäki T E et al. Improving the quality of postoperative pain relief. *Eur J Pain* 2000;**4**:367–372.
- 3 Jenkinson C et al. Patients' experiences and satisfaction with health care: results of a questionnaire study of specific aspects of care. *Qual Saf Health Care* 2002;**11**:335–339.
- 4 Haggerty JL. Are measures of patient satisfaction hopelessly flawed? *Br Med J* 2010;**341**:C4783.
- 5 MacLellan, K. Postoperative pain: strategy for improving patient experiences. *J Adv Nurs* 2004;**46**:179–185.
- 6 Sjöling M et al. The impact of preoperative information on state anxiety, postoperative pain and satisfaction with pain management. *Patient Education and Counseling* 2003;**51**(2):169–176.
- 7 Essence of Care 2010. Benchmarks for the Prevention and Management of Pain. DH, London 2010 (http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@ps/documents/digitalasset/dh_119977.pdf)
- 8 Gordon DB et al. Revised American Pain Society patient outcome questionnaire (aps-poq-r) for quality improvement of pain management in hospitalized adults: Preliminary psychometric evaluation. *J Pain* 2010;**11**(11):1172–1186 (see <http://www.ampainsoc.org/library/questionnaire/>).
- 9 Assessing and monitoring the quality of service provision. CQC, London (<http://www.cqc.org.uk/>)
- 10 Dr Foster Report Card 2009/10 (<http://www.drfoosterhealth.co.uk/quality-reports/>).
- 11 Patient Perspectives. Quality and Service Improvement Tools. NHS Institute for Innovation and Improvement (http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/patient_perspectives.html).
- 12 Using patient feedback: a practical toolkit. Picker Institute Europe (<http://www.pickereurope.org/usingpatientfeedback>).
- 13 Improving Patients' Experience: Sharing good practice. Picker Institute Europe, 2002 (<http://www.pickereurope.org/Filestore/Quality/Factsheets/painnewsletternov02.pdf>).



11.9

Naloxone audit in surgical in-patients

Dr D Blackman, Dr T Johnson

Why do this audit?

Monitoring the incidence and investigating the circumstances of naloxone administration is a reliable and efficient means of detecting preventable problems with the processes of opioid administration in a hospital population.

Best practice: research evidence or authoritative opinion

Acute pain management protocols are intended to balance the benefits of satisfactory analgesia against the risk of adverse events. However, substantial clinical experience is necessary to interpret pain and the need for its treatment. Given the high incidence of acute pain, opioid pharmacokinetic and pharmacodynamic variations, wide distribution of patients within hospitals and the high number and turnover of staff involved, it is not surprising that cases of opioid overdose occur.

Opioid toxicity may happen with even the best practice but it is also associated with poor patient selection, lack of or violation of protocols, inadequate supervision, training and experience or related to equipment misuse or failure. When opioid toxicity is detected it is usually promptly and effectively treated with naloxone. This can be seen as a sentinel event that draws attention to the possibility of sub-optimal care.

Examination of naloxone use has previously proved useful in uncovering deficits in structures and processes of care. The incidence of naloxone use is reported to vary between 0.19% and 3.0%, depending on patient population and analgesic technique used, with 0.53% reported for a general adult surgical population.¹

Our own unit has monitored naloxone use in approximately 13,000 patients per year over an eight-year period and the incidence has decreased over time. In 2002 naloxone was administered on 32 occasions (20 of which were clinically appropriate and predominantly in elderly patients with poor renal failure who had received morphine).

In 2010 and following substitution of alternative opioids and a continuing programme of education naloxone was used on only six occasions (three were for appropriate indications).

Suggested indicators

- D % of patients receiving naloxone for appropriate clinical indications during their admission.
- D % of patients receiving naloxone that was not clinically indicated during their admission (analgesia inappropriately reversed).
- D % of naloxone use accounted for.
- D % of cases of naloxone administration that are investigated by the pain team and audited against unit standards. This should be documented along with action taken and follow up completed.

Proposed standard or target for best practice

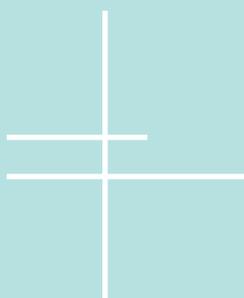
- D 100% of naloxone use should be accounted for and all incidences of its use should be subject to a suitable investigation.
- D The incidence of inappropriate use should be zero or very low.
- D It is not possible to specify a standard for the incidence of naloxone use. The incidence may be high and reveal problems in clinical practice and then fall when they are addressed.

Suggested data to be collected

The biggest challenge is to identify and document naloxone use. Wards can be provided with naloxone in clearly labelled individual packages that contain a brief questionnaire to be completed and returned to the hospital pharmacy after its use. A more comprehensive documentation of events can then be undertaken by the pain team. Useful information might include:

- D date and time of administration
- D patient age
- D respiratory rate and Sedation Score (either GCS or AVPU) at time of administration.
- D type, route and dose of analgesia previously administered
- D general medical condition eg cognitive function, renal failure
- D subsequent management of any opioid toxicity and analgesia
- D evidence of learning needs

	<ul style="list-style-type: none"> D poor documentation or communication D the advent of electronic prescribing in hospitals may result in more reliable identification of naloxone use.
<p>Common reasons for failure to meet standard</p>	<p>These can be divided into when naloxone is used appropriately:</p> <ul style="list-style-type: none"> D lack of appropriate and clear guidelines D lack of experience and staff training. <p>And when it is used inappropriately:</p> <ul style="list-style-type: none"> D Poor knowledge and management of minor opioid side effects such as clinically insignificant sedation, relative bradypnoea and miosis.
<p>CPD and Curriculum mapping</p>	<p>CPD matrix codes: IA02, ID02, IG01, II01, II05, 2E01, 2E02</p> <p>CPD Training curriculum competences: PM_BK_02, 04, 08, 09, PM_BS_01–03, 05, 06, 08, PM_IK_01–03, 06, PM_IS_01–05, 08, 10, PM_HK_02, PM_HS_01, 04</p>
<p>References</p>	<ol style="list-style-type: none"> 1 Gordon DB, Pellino TA. Incidence and characteristics of naloxone use in postoperative pain management: a critical examination of naloxone use as a potential quality measure. <i>Pain Management Nursing</i> 2005;6(1):30–36.



11.10

High impact interventions – preventing epidural site infection

Mr M Howarth, Dr J Turner, Mrs A Dwyer

Why do this audit?

- D To reduce the risk of microbial contamination in everyday practice.¹
- D To prevent the incidence of epidural insertion-related infection.¹
- D To prevent the incidence of epidural site infection.¹

Best practice: research evidence or authoritative opinion

- D Serious neuraxial infections following epidural anaesthesia have previously been reported as rare, however prospective studies have found rates in the range of 0.015–0.05%.
- D Length of catheterisation was associated with increased infection date.^{2,3,4,5}
- D No infections occurred in patients with in dwelling epidural catheters of 2 days or less.⁴
- D Evidence of new onset or worsening back pain even in the absence of fever may indicate epidural space infection requiring prompt investigation.^{4,5,6}
- D The risk of permanent neurological damage in association with epidural analgesia is very low, the incidence is higher where there have been delays in diagnosing an epidural haematoma or abscess.⁶

Suggested indicators

- D **Organisational.** Established In-Patient/Acute Pain Team.⁷ Anaesthetic cover 24/7.⁷ Access to neurosurgical opinion in cord compression suspected.
- D **Protocol.** Evidence of standardised practice for the insertion. Evidence of standardised practice for the management of in dwelling epidural analgesia systems. Standardisation of dressings to allow observation on insertion site.
- D **Documentation.** Standardised documentation of epidural insertion. Standardised documentation to include neurological assessment (e.g ESSAM and Bromage scores^{8,9}) and observation of the epidural insertion site.
- D **Education.** Evidence of training of medical and nursing staff in the management of epidural infusions to prevent and detect infection.¹

Proposed standard or target for best practice

- D There is an established In-Patient/Acute Pain Team with Anaesthetic cover 24/7 and access to neurosurgical opinion in cord compression suspected.
- D 100% should have documentation of insertion of epidural under sterile conditions:
 - ◆ hand hygiene before and after procedure
 - ◆ protective equipment used
 - ◆ aseptic technique (to include chlorhexidine)
 - ◆ number of attempts
 - ◆ inserted in the anaesthetic room?
- D 100% of patients should have an occlusive transparent dressing to allow for surveillance of epidural site deterioration. Evidence of documentation of site observation daily.
- D 100% of patients will have documented evidence of regular neurological assessment.
- D 100% of patients who trigger for suspected epidural infection should be referred to the pain team/anaesthetist on call.
- D No patients will experience permanent neurological damage as a result of epidural analgesia.

Suggested data to be collected

- D Evidence of a protocol based on best practice for the management of in dwelling epidural catheters to minimise infection risk including: Insertion, Observations, Documentation Catheter duration, Management of suspected infection.
- D Evidence of documentation of:
 - ◆ insertion
 - ◆ observation of epidural site/dressing intact
 - ◆ neurological assessment
 - ◆ adverse events to include any breach of the system (filter disconnection, dressing disturbance).
- D Evidence of training in the management of the epidural system including
 - ◆ epidural additional observations: site and neurology
 - ◆ troubleshooting any breaches
 - ◆ escalation of suspected epidural infection
 - ◆ duration of in dwelling epidural catheter.

Common reasons for failure to meet standard

- D Organisation constraints, lack of Acute Pain Team, inadequate provision on monitoring, inadequate guidelines, failure to instigate appropriate training.

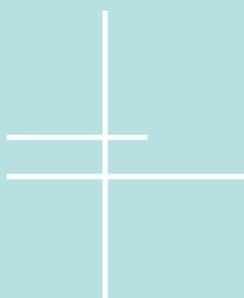
CPD and Curriculum mapping

CPD matrix codes: IA01, ID01–02, IE02, IF01, IF05, IG01, IH01–02, II01, II04–05

Training curriculum competences: PM_BK_03, 08, PM_BS_03, 04, 06, 08, PM_IK_01, PM_IS_01, 02, 04, 10, PM_HK_01, PM_HS_01, 04, 06

References

- 1 High impact interventions – reducing healthcare associated infections. *DH*, London 2009 (<http://www.hcai.dh.gov.uk/whatdoido/high-impact-interventions/>).
- 2 Kindler C et al. Extradural abscess complicating lumbar extradural anaesthesia and analgesia in an obstetric patient. *Acta Anaesthesiol Scand* 1996;**40**(7):858–861.
- 3 Rygnestad T, Borchgrevink PC, Eide E. Postoperative epidural infusion of morphine and bupivacaine is safe on surgical wards. Organisation of the treatment, effects and side-effects in 2000 consecutive patients. *Acta Anaesthesiol Scand* 1997;**41**(7):868–876.
- 4 Wang LP, Hauerberg J, Schmidt JF. Incidence of spinal epidural abscess after epidural analgesia: a national 1-year survey. *Anesthesiology* 1999;**91**(6):1928–1936.
- 5 Cook T. Major Complications of Central Neuraxial Block in the UK. Report and findings from the 3rd National Audit Project (NAP3). *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/1428>).
- 6 Australia and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute Pain Management: scientific evidence (3rd Edn). *ANZCA*, Melbourne 2010 (<http://www.anzca.edu.au/resources/books-and-publications/acutepain.pdf>).
- 7 Best practice in the management of epidural analgesia in the hospital setting. *Faculty of Pain Medicine of the RCoA*, London 2010 (<http://www.rcoa.ac.uk/node/639>).
- 8 Bromage PR. Epidural Analgesia. *Sanders*, Philadelphia 1978.
- 9 Elrazek EA, Scott NB, Vohra A. An epidural scoring scale for arm movements (ESSAM) in patients receiving high thoracic epidural analgesia for coronary artery bypass grafting. *Anaesthesia* 1999;**54**:1097–1109.



11.11

Acute pain management and the substance-misusing patient

Dr A P Vickers, Mrs K Butterworth

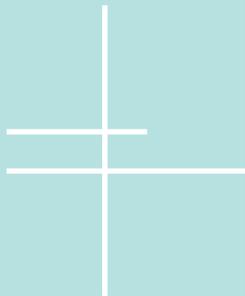
Why do this audit?

The term 'substance abuse disorder' (SAD) includes a number of related clinical situations including the misuse of prescribed medications, the use of illicit drugs, patients participating in maintenance programmes and the 'former misuser' that may include those using drugs such as naltrexone. It has been shown that substance misusers may receive sub-standard acute pain management. There are several reasons for this, including preconceptions about the behaviour of such patients by healthcare staff and possible reluctance by the patients themselves to reveal their problems for fear of being discriminated against.^{1,2} All patients should benefit from safe and effective pain management. At the same time efforts must be made to protect these patients from self-induced harm, e.g. by tampering with opioid PCA or by hoarding medications, and to prevent diversion.

Best practice: research evidence or authoritative opinion

Effective management of acute pain in patients with substance abuse disorder may be complex. There is a need to provide effective analgesia and to prevent withdrawal as well as dealing with possible psychiatric disorders and social problems. A team approach is essential. Appropriate education and written guidance are vital. Many patients will be known to local community drug teams (CDT) and street addicts may accept referral to such services. Close liaison with the CDT and primary care is essential to ensure continuity of care. Establishing an agreed plan of care early in an admission may reduce the risk of conflict between patients and healthcare workers.³

Suggested indicators



- D Local guidelines for managing acute pain in drug addicted patients.
- D Local guidelines for the management of such patients on discharge including liaison with the CDT and GP (to include contact numbers).
- D Availability on all wards of the Department of Health guidelines on clinical management of drug misuse and dependence.⁴
- D Guidance for the management of withdrawal.
- D Guidance for the management of overdose.
- D Guidance for the management of recovering patients.
- D Education programme for medical and nursing staff to include the drugs used to manage addictions, e.g. methadone, Subutex (buprenorphine) and naltrexone.⁵

Proposed standard or target for best practice

- D 100% availability of guidelines.
- D 100% of medical and nursing staff on acute wards should be aware of this material.
- D 100% of patients registered as drug misusers notified to CDT ± GP within 72 hrs of admission.
- D 100% of relevant medical and nursing staff should have received appropriate education within the past 12 months.

Suggested data to be collected

- D Availability of current clinical guidelines.
- D Assessment of staff knowledge about:
 - ◆ managing acute pain in this population
 - ◆ the availability of local guidelines.
- D Confirmation of contact with CDT and patient's key worker from hospital records.
- D Confirmation of maintenance dose and number of doses supplied of methadone, Subutex or naltrexone from CDT or patient's registered pharmacy.

Common reasons for failure to meet standard

- D Failure to appreciate the importance and difficulties of managing acute pain in substance misusing patients.
- D Lack of knowledge.
- D Failure to develop appropriate lines of communication with local drug services.
- D Failure of 'the system' outside normal office hours.

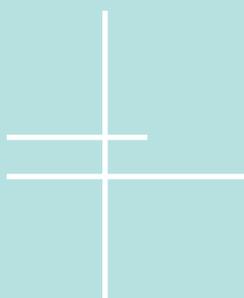
CPD and Curriculum mapping

CPD matrix codes: ID01–02, IE03, IF04, IH02, 2E01–02

Training curriculum competences: PM_BK_01, 02, 04, 07–09, PM_BS_01–08, PM_IK_01–03, 06, 08, PM_IS_01–05, 10, PM_HK_05, 07–09, PM_HS_01, 02, 04, 06

References

- 1 Scimeca M et al. Treatment of pain in methadone-maintained patients. *Mt Sinai J Med* 2000;**5**(6):412–422.
- 2 Australia and New Zealand College of Anaesthetists and Faculty of Pain Medicine. *Acute Pain Management: scientific evidence* (3rd Edn). ANZCA, Melbourne 2010. Chapter 11.8 pp 431–437 (<http://www.anzca.edu.au/resources/books-and-publications/acutepain.pdf>).
- 3 Vickers AP et al. Consensus statement on the anticipation and prevention of acute postoperative pain: multidisciplinary RADAR approach. *Curr Med Res Opin* 2009;**25**:2557–2569.
- 4 Guidelines on clinical management of drug misuse and dependence. *DH*, London 1999 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_104819).
- 5 Vickers AP, Jolly A. Naltrexone and problems in pain management. *BMJ* 2006;**332**(7534):132–133.



11.12

Compliance with RCoA guidelines for managing epidural analgesia

Dr A P Vickers

Why do this audit?

Continuous epidural analgesia can offer excellent pain control following, for example, major intra-abdominal or intra-thoracic surgery. Serious complications can be associated with this technique. Analysis of what is known of such events suggests that a 'systems failure' is often a major factor. The publication in 2010 of guidelines for good practice by the RCoA and other bodies¹ provided Acute Pain Services with a strong foundation for the safe management of this invasive technique.

The National Patient Safety Agency (NPSA) has highlighted the potential risks of having compatibility between devices intended for intravenous use and those for epidural use.² Standards are to be introduced in 2012 and 2013 to address this problem and Acute Pain Services must ensure they are compliant with these as they become operational.

Best practice: research evidence or authoritative opinion

The RCoA publication *Best Practice in the Management of Epidural Analgesia in the Hospital Setting*¹ describes the requirements for good practice under a number of headings that cover the process of delivering safe epidural analgesia.¹ This publication of 2010 updates *Good practice in the management of continuous epidural analgesia in the hospital setting* and includes a chapter on epidural analgesia in children. It draws on a combination of published evidence and expert opinion. Organisational structure is an important aspect in optimising outcome from pain management techniques.³

Suggested indicators

- D Availability for all healthcare staff who are directly involved in acute pain management of the RCoA publication *Best Practice in the Management of Epidural Analgesia in the Hospital Setting*.¹
- D Compliance with the recommendations for good practice. Some of these recommendations are mandatory (e.g. patient selection 3.1 and consent 3.2) but many are advisory and can be adapted for local practice.

Proposed standard or target for best practice

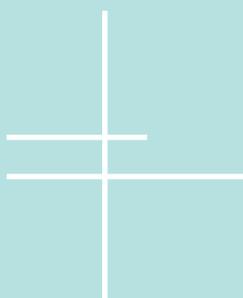
- D 100% availability of the RCoA booklet.
- D 100% compliance with all recommendations.

Suggested data to be collected

- D Spot audits of the process of managing epidural analgesia, e.g. sterility standards during placement of the epidural catheter; documentation of observations, security of drugs for epidural analgesia.
- D Log of staff training.
- D Availability of current material including observation chart, contact numbers, protocols and guidelines and staff knowledge of these and how they would obtain them.

Common reasons for failure to meet standard

- D Inadequate resourcing of Acute Pain Service.
- D Inadequate staffing levels.
- D Frequent changes of staff.
- D Absence of a corporate philosophy of maximising safety and efficacy.



Related audits

11.10 – High impact interventions – Preventing epidural site infection

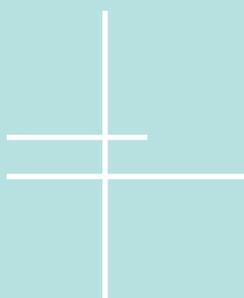
CPD and Curriculum mapping

CPD matrix codes: IE01, IF01, IF05, IH02, II01, II02, II05, 2E01

Training curriculum competences: PM_BK_03, 08, PM_BS_01–06, 08, PM_IS_01, 02, 10, PM_HK_01, PM_HS_01, 04, 06

References

- 1 RCoA, RCN, AAGBI, BPS and ESRA. Best practice in the management of epidural analgesia in the hospital setting. *Faculty of Pain Medicine of the RCoA*, London 2010 (<http://www.rcoa.ac.uk/node/639>).
- 2 Safer spinal (intrathecal), epidural and regional devices. NPSA patient safety alert NPSA/2011/PSA001 (<http://www.nrls.npsa.nhs.uk/resources/?EntryId45=94529>).
- 3 Australia and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute Pain Management: scientific evidence (3rd Edn). ANZCA, Melbourne 2010. Chapter 3 pp 47–56 (<http://www.anzca.edu.au/resources/books-and-publications/acutepain.pdf>).



11.13

Procurement, maintenance and safety of pumps used in acute pain management

Dr S S Tripathi, Mrs G Nixon

Why do this audit?

In the modern practice of acute post-operative pain management, use of epidural and PCA pumps is common. However, adverse incidents related to equipment continue to be reported.¹ It is important to have a clear record of procurement and maintenance of these pumps to ensure continued safety. They should be replaced/updated at regular intervals.²

Best practice: research evidence or authoritative opinion

The equipments used for pain management should be standardised throughout each trust and there should be a rolling contract for maintenance and replacement. They should be specifically programmed with maximum and minimum rates, bolus sizes and lockout locking time.³ Access to these pre-determined programmes should only be to designated staff and there should be security to ensure this.

Suggested indicators

- D Presence of an equipment library for storage of these pumps with access restricted to designated personnel.
- D A nominated person looking after the procurement, maintenance and safety aspect of pumps.
- D % of pumps whose movement throughout the hospital is logged in logbook.
- D % of pumps serviced at regular interval.
- D % of pumps replaced at the end of usage contract.

Proposed standard or target for best practice

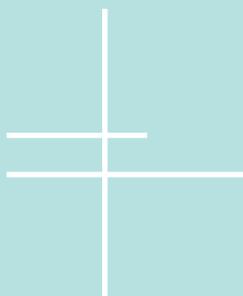
- D 100% pumps should be kept in a specified storage area with a limited access.²
- D 100% of the pumps should be cleaned as per the manufacturer's recommendations.²
- D 100% logging of the movement of the pumps throughout the hospital.
- D 100% of the pumps being serviced and replaced at the suggested time interval.
- D Presence of a nominated person looking after these aspects.
- D 100% of staff using the pumps should be trained in their use and receive updates on an annual basis.³

Suggested data to be collected

- D Number of pumps purchased, serviced and replaced each year.
- D Presence of a dedicated place to store, clean and charge the pumps.
- D How and when the cleaning and maintenance is carried out.
- D Percentage of staff trained in the use of the pumps.
- D Tracking the movement of pumps through the hospital.
- D Any adverse events as a result of the pumps being used.

Common reasons for failure to meet standard

- D Lack of interest in being an equipment lead.
- D Lack of funds.
- D Lack of time to train staff.
- D Lack of a purpose built space to store, clean and charge the pumps.
- D Lack of motivation/education to record the movement of the pumps.



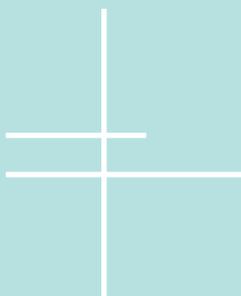
CPD and Curriculum mapping

CPD matrix codes: ID02, I102, I105, 2E01

Training curriculum codes: PM_BK_02, 03, 08, PM_BS_03, 04, PM_IK_01–03, PM_IS_01, 02, 04, I0, PM_HK_01, PM_HS_01, 03–05

References

- 1 Australia and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute Pain Management: scientific evidence (3rd Edn). ANZCA, Melbourne 2010 (<http://www.anzca.edu.au/resources/books-and-publications/acutepain.pdf>).
- 2 Design for patient safety. A guide to the design of electronic infusion devices. NPSA, 2010 (<http://www.nrls.npsa.nhs.uk/resources/?EntryId45=68534>).
- 3 RCoA, RCN, AAGBI, BPS and ESRA. Best practice in the management of epidural analgesia in the hospital setting. *Faculty of Pain Medicine of the RCoA*, London 2010 (<http://www.rcoa.ac.uk/node/639>).



11.14

Management of patients with repeat admissions for acute or chronic pain

Dr R Makin, Sr A Dwyer

Why do this audit?

The Audit Commission (2009) identified the need to avoid unnecessary emergency hospital admissions, not only because of the high and rising costs, but also because of the disruption it causes to the individual admitted, and to elective healthcare, especially in-patient waiting lists.¹

The cost of in-patient care related to back pain was £217.7 million and the cost of day cases was £108.9 million based on 1998 figures.²

In-patients cared for by a consultant from another specialty may receive a considerable amount of care and treatment from the pain management team. This work should be formally recorded and recognised so that appropriate funding for this activity can be allocated.

The Acute Pain Special Interest Group of the British Pain Society have recently launched the National In-Patient Pain survey attempting to develop a national benchmarking system for acute pain services. This represents a more focused approach to the ambitious Essence of Care 2010 'Benchmarks for the prevention and management of pain'.³ Hopefully this audit recipe, which can be performed locally will complement the national project.

Best practice: research evidence or authoritative opinion

The recent RCoA document 'Guidance on the provision of services for Pain Management' recommends close liaison between acute pain management and other services (e.g. chronic pain management, emergency medicine, spinal and neurosurgery, oncology, primary care, palliative care) to enable patients who present acutely and whose symptoms do not resolve to be managed appropriately as an outpatient.^{4,5}

Appreciation of a psychosocial model agreed by patients and clinical staff may reduce distress, frequency of readmissions, unnecessary repeat investigations and reduce length of stay.

The King's Fund (2010) identified the following interventions where there is evidence of a positive effect on reducing emergency hospital admissions.⁶

- D Continuity of care with a GP
- D Self-management
- D Early senior review in A&E
- D Multidisciplinary interventions
- D Integration of primary and secondary care

Applied in the context of pain management this implies development of a more robust patient-centred case management plan agreed with the patient and clinicians involved in their shared care may avoid repeat and inappropriate presentation to out-of-hours emergency services for crisis management.

Suggested indicators

- D Reduce re-admission rates for non surgical pain.
- D Develop resources to manage non acute pain effectively.
- D Reduce length of stay related to acute exacerbations of chronic pain.
- D Development of shared care amongst specialties.
- D Reduction of medication-related adverse events.

Proposed standard or target for best practice

- D Identify prevalence of patients reporting acute on chronic pain requiring unplanned admissions
- D Develop appropriate consistent prescribing practice, and agree goals for medication dose adjustment.⁷
- D Early involvement of multidisciplinary pain team on readmission of complex distressed patients..
- D Agreed shared care planning with patient and clinical teams with a focus on self management.⁵
- D Availability of psychology assessment as an out-patient.
- D Improve patient experience.
- D Reduce distress.
- D Improve signposting to appropriate services.

Suggested data to be collected

- D Number of admissions for non surgical acute on chronic pain exacerbations.
- D Length of stay.
- D Medication use.
- D Costing of admission including investigations.
- D Time spent by Acute Pain team involved in assessment of inpatients.

Common reasons for failure to meet standard

- D Lack of collaboration:
 - ◆ A&E /acute admissions unit
 - ◆ Primary and secondary care.
- D Failure to identify psychosocial yellow flags as drivers for illness behaviour⁸

Related audits

The National Pain Audit (<http://www.nationalpainaudit.org>)
National In-Patient Pain Survey (The British Pain Society)

CPD and Curriculum mapping

CPD matrix codes: IA02, ID01, ID02, IE03, IF04, II02–05, 2E02, 2E03

Training curriculum competences: PM_BK_04–09, PM_BS_01–08 PM_IK_01–04, 06–08, PM_IS_01–06, 08–10, PM_HK_01, 02, 04, 05, 07–09, PM_HS_01–06

References

- 1 More For Less: Are productivity and efficiency improving in the NHS? *Audit Commission*, London 2009 (<http://www.auditcommission.gov.uk>).
- 2 Maniadakis N, Gray A. The economic burden of back pain in the UK. *PAIN* 2000;**84**:95–103.
- 3 Department of Health. Essence of Care 2010: Benchmarks for the Prevention and Management of Pain. *The Stationery Office*, London 2010 <http://www.tso.co.uk>
- 4 Guidance on the provision of anaesthesia services for chronic pain management. *RCoA*, London July 2011 (<http://www.rcoa.ac.uk/node/713>).
- 5 Guidance on the provision of anaesthesia services for acute pain management. *RCoA*, London 2010 (<http://www.rcoa.ac.uk/node/712>).
- 6 Purdy S. Avoiding hospital admissions, what does the research evidence say? *The King's Fund*, December 2010.
- 7 Opioids for persistent pain: good practice. A Consensus Statement Prepared on Behalf of the British Pain Society, the Faculty of Pain Medicine of the Royal College of Anaesthetists, the Royal College of General Practitioners and the Faculty of Addictions of the Royal College of Psychiatrists, January 2010.
- 8 Kendall N et al. Tackling musculoskeletal problems: a guide for clinic and workplace identifying obstacles using the psychosocial flags framework. *The Stationery Office*, London 2009 (<http://www.tsoshop.co.uk/flags>).



11.15

Availability and resourcing of core chronic pain services

Dr V K Jaitly

Why do this audit?

The Clinical Standards Advisory Group report on services for patients with pain made wide-ranging recommendations to Health Authorities, Primary Care Groups and Trusts on the provision of appropriate pain services.¹ In spite of this, eight years later, the limited number of specialist pain clinics around the country are inundated with referrals, and only 14% of people with pain have seen a pain specialist. Systems and infrastructure are not adequate to meet need or demand.²

Best practice: research evidence or authoritative opinion

It has been recommended that a minimum of one whole-time equivalent consultant dedicated to chronic pain management is necessary for each 100,000 population.³

A chronic pain service is delivered in the out-patient clinic, by in-patient ward referrals and in oncology and palliative medicine units. It represents significant consultant workload and designated consultant time for all these aspects must be allocated in job planning.⁴

A chronic pain service will also require specialist nursing personnel, clinical psychology, physiotherapy and occupational therapy staff in addition to secretarial and managerial support with appropriate accommodation.³

Patients with complex chronic pain problems require thorough assessment and multidisciplinary management so time on the initial consultation should be at least 45 min.⁴

The pain service should be provided with up-to-date electronic systems for maintaining patient bookings, medical records, outcome information and other audit data.⁴

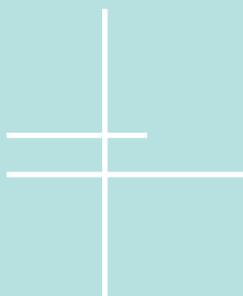
There should be an identifiable budget for the pain service. Purchasing and commissioning organisations should ensure that the multidisciplinary management of patients with chronic pain is specified as part of the contracting process, and recognise that this will require funding of staff, equipment and facilities.⁴

Suggested indicators

- D Staffing of chronic pain service with appropriately trained specialist medical staff, specialist nursing personnel, clinical psychology, physiotherapy and occupational therapy staff.⁴
- D Secretarial and managerial support with appropriate accommodation.³
- D Access to appropriate specialised equipment.
- D Availability of accommodation to house functional restoration programmes and pain management programmes.⁴
- D Access to electronic information and communication systems when speaking to patients and the immediate presence of up-to-date electronic systems for maintaining patient bookings, medical records, outcome information and other audit data.⁴
- D An identifiable budget for the pain service is explicitly specified in the contracting process.⁴

Proposed standard or target for best practice

- D There should be a minimum of one whole-time equivalent consultant dedicated to chronic pain management for each 100,000 population.³
- D Other clinical and support staff levels should meet above referenced standards.
- D Accommodation, provision of specialist clinical equipment and electronic IT systems should meet above referenced standards.
- D 100% new patients should have a minimum appointment time of 45 min.
- D There should be an identifiable budget for the pain service.



Suggested data to be collected

- D Number of consultant sessions allocated for oncology/palliative medicine, in-patient, procedural and out-patient work.
- D Number of consultant sessions allocated for administration and supporting professional activities.
- D Average duration of out-patient new patient consultation times.
- D Survey of members of the chronic pain team to assess if they have access to the resources including accommodation required to run clinics and other sessions.
- D Presence of networked computers in consulting rooms and areas from where phone calls are made to patients.
- D Presence of identifiable budget for pain service.

Common reasons for failure to meet standard

- D Lack of resources.
- D Lack of prioritisation by health boards or other purchasers.
- D Organisational failure.

Related audits

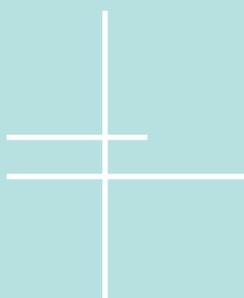
The National Pain Audit: Phase I (<http://www.nationalpinaudit.org>)

CPD and Curriculum mapping

Training curriculum competences: PM_HS_06, PM_AK_14, 16

References

- 1 Department of Health Clinical Standards Advisory Group. Services for patients with pain. *DH*, London March 2000 (http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4007468&chk=mVIBUb).
- 2 150 years of the Annual Report of the Chief Medical Officer: On the state of public health. *DH*, London 2008 (page 33-39) (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/AnnualReports/DH_096206).
- 3 Anaesthetists and non-acute pain management. *AAGBI*, London 1993 (<http://www.aagbi.org/sites/default/files/nonacuteeg3.pdf>).
- 4 The Royal College of Anaesthetists and The Pain Society. Pain management services: Good practice. *RCoA*, London May 2003 (<http://www.rcoa.ac.uk/docs/painservices.pdf>).



11.16

Audit of Pain Management Programmes

Dr R Makin, Miss L Moores, Dr H Twiddy

Why do this audit?

The provision of interdisciplinary pain management programmes can, in well selected patients, reduce psychological distress and improve physical function.^{1,2} The provision of pain management programmes has grown, often with demand outstripping supply. Robust audit data encourages both the delivery of quality care and demonstrates the effectiveness of such treatments in future service planning and commissioning. This is particularly important with chronic pain services currently under the spotlight of the National Pain Audit, in the collection phase of patient reported outcome measures of treatments provided.

Best practice: research evidence or authoritative opinion

Evidence suggests that pain management programmes delivered by an interdisciplinary team are more effective than single mode treatments.³

Core staff needed to run a pain management programme include: clinical psychologist, physiotherapist and a medically qualified person (most commonly a consultant in pain medicine). Occupational therapists and nurses may also be involved.⁴ A designated area should be provided for the provision of pain management programmes within a pain service.

All staff work under psychological principles, led by a clinical psychologist. There is evidence for the efficacy of pain management programmes based upon cognitive behavioural principles, including acceptance and commitment therapy.⁵

Suggested indicators

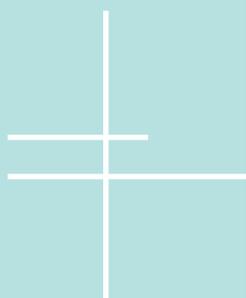
- D Pain relief is not the primary goal.
- D A distinction needs to be made between statistically significant change and clinically meaningful change.
- D % patients who are significantly improved on self-reported measures of depression, disability and pain acceptance.
- D % patients who are significantly worse on each measure.
- D A proposed framework for interpreting the clinical importance of treatment outcomes in clinical trials of the efficacy and effectiveness of chronic pain treatments is the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT).⁶
- D Minimal benefit 10–20% change.
- D Moderately important benefit at least 30% change.
- D Substantially important benefit at least 50% change.

Proposed standard or target for best practice

- D Ensure operational aspects of programme are compliant with the British Pain Society's recommended guidelines.
- D Minimal patient non-completion.
- D Patients should be followed up for at least 12 months at agreed intervals to assess the maintenance of treatment effects. This has been particularly supported in children and adolescents.⁷

Suggested data to be collected

- D Validated measures of outcome should be used to assess the effectiveness of pain management programmes.⁸ Treatment outcomes should include measures of disability and emotional functioning.
- D More recently attention has been paid to the measurement of psychological flexibility in adaptive functioning.⁹
- D Patient satisfaction questionnaires should be collected.



Common reasons for failure to meet standard

- D Poor selection of patients.
- D New onset of biomedical symptoms.
- D Inadequate or poor:
 - ◆ administration of programme
 - ◆ staff skills
 - ◆ teamwork
 - ◆ time allocation
 - ◆ delivery of programme
 - ◆ cohesion within the group
 - ◆ agreement with terms of reference of programme.

Related audits

The National Pain Audit (<http://www.nationalpainaudit.org>)

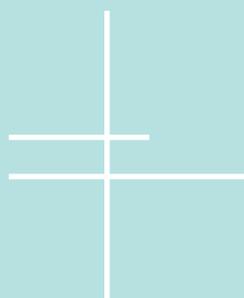
CPD and Curriculum mapping

CPD matrix codes: **2E02, Level 3 Pain Medicine**

Training curriculum codes: **PM_IK_08, PM_AK_03**

References

- 1 Hoffman BM et al. Meta-analysis of psychological interventions for chronic low back pain. *Health Psychology* 2007;**26**:1–9.
- 2 Guidance on the provision of anaesthesia services for chronic pain management. RCoA, London July 2011 (<http://www.rcoa.ac.uk/node/713>).
- 3 Morley S, Eccleston C, Williams AC. Systematic review and meta analysis of randomized controlled trials of cognitive behavioural therapy for chronic pain in adults, excluding headache. *Pain* 1999;**80**:1–13.
- 4 Recommended guidelines for pain management programmes for adults. BPS, London 2007 (http://www.britishpainsociety.org/pub_professional.htm#pmp).
- 5 McCracken LM, Gutiérrez-Martínez O. Processes of change in psychological flexibility in an interdisciplinary group-based treatment for chronic pain based on Acceptance and Commitment Therapy. *Behav Res Ther*, 2011;**49**:267–274.
- 6 Dworkin RH et al. Interpreting the Clinical Importance of Treatment Outcomes in Chronic Pain Clinical Trials: IMMPACT Recommendations. *Pain* 2008;**9(2)**:105–121.
- 7 Palermo TM et al. Randomized controlled trials of psychological therapies for management of chronic pain in children and adolescents: an updated meta-analytic review. *Pain* 2010;**148(3)**:387–397.
- 8 Williams AC. Pain measurement in chronic pain management. *Pain Reviews* 1995;**2**:39–63.
- 9 Vowles K, McCracken L. Comparing the role of psychological flexibility and traditional pain management coping strategies in chronic pain treatment outcomes. *Behav Res Ther* 2010;**48(2)**:141–146.



11.17

Long-term use of opioid analgesia in chronic non-malignant pain

Dr L A Colvin

Why do this audit?

While it is recognised that opioids can be effective analgesics, there can also be problems with long term use in terms of tolerance, dependence and effects on the endocrine and immune systems. Patient selection and follow up is important.

If opioids are being used in the chronic setting, then we should ensure that the benefits of continued use outweigh potential adverse effects.

Best practice: research evidence or authoritative opinion

There is good evidence that opioids can be effective analgesics, although this is predominantly in the short to medium term, with a clear need for further research into longer term outcomes. There are a number of guidelines that have been produced, based on the available evidence, that do provide a basis for the use of opioids in clinical practice. The British Pain Society guidelines on the use of opioids in chronic pain have been recently updated¹ and are a useful reference. There are also guidelines from the Canadian Medical Association² and the American Pain Society and the American Academy of Pain Medicine, who commissioned a systematic review of the evidence.³ There is ongoing concern, particularly about iatrogenic addiction and drug diversion,⁴ with the majority of guidelines recommending careful long-term monitoring and re-evaluation of the need for opioid therapy.

The guidelines highlight that long acting, non-injectable opioids should be used, with the avoidance of short acting opioids by any route. In line with the recommendation for regular review, it is also recommended that a single prescriber should oversee the prescription, with a requirement for pain relief to support continued use.

Suggested indicators

There is increasing evidence that simply monitoring pain intensity is inadequate, for assessing a clinically meaningful response to drug therapy.^{5,6,7}

Given the complex nature of chronic pain and its impact on quality of life, more comprehensive indicators of the need for, and the efficacy and safety of, opioid treatment are required including:

- D Documented comprehensive assessment before starting treatment, with discussion of treatment goals and consideration of other appropriate treatments.
- D Regular review at least monthly. This should evaluate pain relief, physical, psychological and social function, sleep, side effects and signs of problem drug use. Changes in other analgesic medication should be monitored and documented.
- D Opioid usage should be monitored to provide an early indication of loss of efficacy or signs of tolerance or dependence requiring further specialist input. Preparation, dose and route should be recorded. Rapid dose escalation or requirements for early prescription issue should trigger early review.

Proposed standard or target for best practice

- D 100% of patients being started on strong opioids should have a documented comprehensive pain assessment.
- D 100% of patients should have regular review and reassessment of their pain and the effectiveness and adverse effects of opioid therapy.

Suggested data to be collected

- D Primary outcome measure: pain relief.
- D Patient knowledge about treatment and awareness of treatment goals.
- D Quality of life measures including cognitive function, mood, sleep, general function, relationships with others.
- D Side effects.
- D Dose, route and preparation.
- D Use of concurrent medication.
- D Frequency of review/follow up plan.

Common reasons for failure to meet standard

- D Inadequate initial assessment and patient selection.
- D Incorrect use of opioids including poor compliance, opiophobia, therapy started with inadequate follow up arrangements.
- D Problems with regular review and assessment due to limitations in availability of healthcare or due to patient-related factors, such as failure to attend for review.

Related audits

- 11.7 – Management of non-surgical pain in the adult patient
- 11.11 – Acute pain management and the substance misusing patient
- 11.14 – Management of patients with repeat admissions for acute or chronic pain
- 11.18 – Compliance in the use of oral medication
- 11.20 – Non-medical prescribing for acute and chronic pain patients

CPD and Curriculum mapping

CPD matrix codes: **2E03, Level 3 Pain Medicine**

Training curriculum competences: **PM_BK_04, 06, 07, PM_IK_04 PM_IK_06–08, PM_IK_06, 08, 10, PM_HK_02, PM_HS_01, 04, 06, PM_AK_04, PM_AS_01, 03, 07**

References

- 1 Opioids for persistent pain: Good practice. 2nd ed. *British Pain Society* London 2010 (http://www.britishpainsociety.org/pub_professional.htm#opioids).
- 2 Furlan AD, Reardon R, Weppler C. National Opioid Use Guideline Group. Opioids for chronic noncancer pain: a new Canadian practice guideline. *CMAJ* 2010;**182**:923–930 (<http://www.cmaj.ca/content/182/9/923.full.pdf+html>).
- 3 Chou R et al. Clinical Guidelines for the Use of Chronic Opioid Therapy in Chronic Noncancer Pain. *Pain* 2009;**10**:113–130.
- 4 Von Korff M, Kolodny A, Deyo RA, Chou R. Long-Term Opioid Therapy Reconsidered. *Ann Int Med* 2011;**155**(5):325–328.
- 5 Dworkin RH et al. Evidence-based clinical trial design for chronic pain pharmacotherapy: a blueprint for ACTION. *Pain* 2011;**152**:S107–S115.
- 6 Dworkin RH et al. Research design considerations for confirmatory chronic pain clinical trials: IMMPACT recommendations. *Pain* 2010;**149**:177–193.
- 7 Dworkin RH et al. Interpreting the clinical importance of treatment outcomes in chronic pain clinical trials: IMMPACT recommendations. *Pain* 2008;**9**:105–121.



11.18

Compliance in the use of oral medication

Dr B Miller

Why do this audit?

There is increasing evidence that failure to comply with drug therapy is a major barrier to the successful treatment of many conditions.¹

Without a clear idea of whether drugs are taken and taken correctly, the clinician is unable to make appropriate decisions as to whether the patient would benefit from a repeat trial with a different approach (e.g. simpler schedule, lower dose), a different 'flavour' of medication (e.g. pregabalin instead of gabapentin), or an entirely new option.

As CPD activity, this audit will show compliance with GMC guidelines² and, for trainees, will be evidence of higher or advanced training.

Best practice: research evidence or authoritative opinion

The issue shows surprisingly little variation from symptom control³ to life threatening disease management,⁴ with rates of non-adherence in the early stages of treatment around 30–50%.

The reasons are many and complex, but there is evidence that the prescriber can help to reduce this.^{5,6}

Suggested indicators

- D % of patients taking the drug at prescribed doses at 6–8 weeks.⁷
- D % of patients taking sub-optimal doses.
- D % of patients no longer taking medication and reason for this.
- D % of patients with side effects leading to sub-optimal treatment or abandonment.
- D % abandonment due to lack of efficacy.

Proposed standard or target for best practice

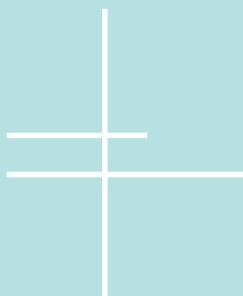
- D 65% taking the drug correctly at 6–8 weeks.
- D Figures for abandonment due to lack of efficacy for a correctly taken medication should not be included in the results.
- D The other indicators have no recognised standards, but may provide local services with information to help improve compliance.

Suggested data to be collected

- D Data will normally be obtained by patient interview – this may be face to face or by telephone – and subject to the limits of these methods.
- D Other methods, such as the reports of carers, records of prescriptions, and bottle and tablet counts, may occasionally be used to supplement this.

Common reasons for failure to meet standard

- D Failure to understand the rationale behind drug use (e.g. 'Will this anti-epileptic drug give me epilepsy?').
- D Lack of clear instructions on how to take drug (e.g. PRN, escalating dose).
- D Lack of efficacy.
- D Side effects, especially if unexpected or without advice on management.



Related audits

11.17 – Long term use of opioid analgesia in chronic non-malignant pain
 11.20 – Non medical prescribing for acute and chronic pain patients

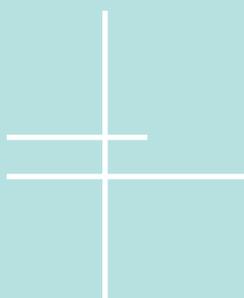
CPD and Curriculum mapping

CPD matrix codes: **2E03, Level 3 Pain Medicine**

Training curriculum competences: **PM_IK_06, PM_HS_01, PM_AS_07**

References

- 1 Bloom BS. Daily regimen and compliance with treatment. Editorial. *Br Med J* 2001;**323**:647.
- 2 Good Practice in Prescribing Medicines. Section 6b. GMC, London September 2008 (http://www.gmc-uk.org/guidance/ethical_guidance/prescriptions_faqs.asp).
- 3 Deeks JJ et al. Efficacy, tolerability and upper gastrointestinal safety of celecoxib for treatment of osteoarthritis and rheumatoid arthritis: systematic review of randomised controlled trials. *Br Med J* 2002;**325**:619–623.
- 4 Butler JA et al. Frequency and impact of non adherence to immunosuppressants after renal transplantation: a systematic review. *Transplantation* 2004;**77**:769–789.
- 5 Claxton AJ et al. A systematic review of the association between dose regimens and medication compliance. *Clin Therapeut* 2001;**34**:1296–1310.
- 6 Peterson AM et al. Meta-analysis of trials of interventions to improve medication adherence. *Am J Health Syst Pharm* 2003;**60**(7):657–665.
- 7 Barber N et al. Patients' problems with new medication for chronic conditions. *Qual Saf Health Care* 2004;**13**(3):172–175.



11.19

Lumbar epidural steroid injections – standards, practice and outcomes

Dr B Miller

Why do this audit?

The use of lumbar, and caudal, epidural steroid injections is a widespread practice in the management of radicular and spinal stenosis-related pain, with or without back pain.^{1,2,3,4}

There is debate as to their place and efficacy, but not on their safe administration. Auditing the outcome of epidural injections and making these figures available locally may allow pain services to provide patients with realistic expectations of outcomes and demonstrate to local healthcare commissioning services that an injection service has utility despite any controversy.

As CPD activity, this audit will show compliance with GMC guidelines⁵ and, for trainees, will be evidence of higher or advanced training.

Best practice: research evidence or authoritative opinion

- D Guidelines on standards of practice exist.^{6,7}
- D Adverse event rates of dural tap are 2.5%, transient headache 2.3% and a transient increase in pain 1.9%.^{8,9}
- D Benefits are more difficult to predict, being dependent on the underlying condition, the time that symptoms have been present, previous treatments attempted (e.g. surgery) etc.

Suggested indicators

- D Evidence of consent.
- D An environment with full resuscitation facilities.
- D Measurement of heart rate and non-invasive blood pressure during procedure.
- D Evidence of review within 12 weeks.
- D Minor/short-term complications.
- D Major/long-term complications.
- D Results at 12 weeks.

Proposed standard or target for best practice

- D 100% evidence of consent including: the use of steroids off-licence; common, and, rare but significant side effects.⁷
- D 100% procedural and 30 mins post-procedural measurement of heart rate and non-invasive blood pressure.
- D 100% use of fluoroscopy.⁷
- D 90% evidence of review by 12 weeks including:
 - ◆ < 3% minor complications, effects lasting < 12 weeks⁷
 - ◆ < 1% major complications, effects lasting > 12 weeks.¹⁰

Suggested data to be collected

- D Review of consents, theatre records and case notes.
- D Review of fluoroscopy image storing systems (were available).
- D Out-patient or telephone review data for complications.
- D Patient satisfaction data.

Common reasons for failure to meet standard

- D Lack of awareness of FPM guidelines.
- D Lack of resources.
- D Lack of trained staff.
- D Failure to record procedural images – where facilities are available.
- D Failure to obtain patient's report of results (e.g. patient doesn't attend clinic, or can't be contacted or clinician forgets to capture information).

Related audits

11.22 – Medial branch neurotomy for lumbar facet joint spinal pain

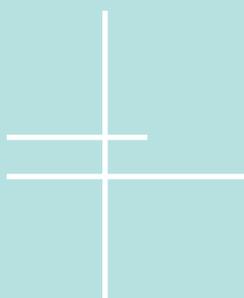
CPD and Curriculum mapping

CPD matrix codes: **2E02, Level 3: Pain Medicine**

Training curriculum competence: **PM_HK_01, PM_HS_02, PM_AK_05, PM_AS_04**

References

- 1 Price C et al. Cost-effectiveness and safety of epidural steroids in the management of sciatica. *Health Technol Assess* 2005;**9**(33):1–74.
- 2 Peloso P et al. Medicinal and injection therapies for mechanical neck disorders. *Cochrane Database of Systematic Reviews* CD000319 2006 (<http://www.cochrane.org/reviews/en/ab000319.html>).
- 3 Samanta A, Samanta J. Is epidural injection of steroids effective for low back pain? *Br Med J* 2004;**328**(7455):1509–1510.
- 4 McQuay HJ et al. Systematic review of outpatient services for chronic pain control. *Health Technol Assess* 1997;**1**(6):i–iv,1–135.
- 5 Good Medical Practice: Paras 12, 13, 14c, 22b, 30, 36. GMC, London 2009 (http://www.gmc-uk.org/guidance/good_medical_practice.asp).
- 6 Clinical Standards Advisory Group. Services for patients with pain. CSAG, 1999.
- 7 Recommendations for good practice in the use of epidural injection for the management of pain of spinal origin in adults. *Faculty of Pain Medicine of the RCoA*, London April 2011 (<http://www.rcoa.ac.uk/node/2206>).
- 8 Watts RW, Silagy CA. A meta-analysis on the efficacy of epidural corticosteroids in the treatment of sciatica. *Anaesth Intens Care* 1995;**23**(5):564–569.
- 9 Armon C et al. Therapeutics and Technology Assessment Subcommittee of the American. Assessment: use of epidural steroid injections to treat radicular lumbosacral pain: report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology* 2007;**68**(10):723–729.
- 10 McQuay H, Moore A. An evidence-based resource for pain relief. *Oxford University Press*, 1998: pp 216–218.



11.20

Non-medical prescribing for acute and chronic pain patients

Dr R Knaggs

Why do this audit?

Over recent years the government has developed a role for prescribing by appropriately qualified non-medical practitioners. From May 2006, nurse independent prescribers, have been able to prescribe any medicine for any medical condition within their competence until recently, including some controlled drugs for limited indications.¹ Similarly, pharmacist independent prescribers were able to prescribe any medicine, with the exception of any controlled drugs, for any medical condition within their competence. In April 2012 legislative changes now permit nurse independent prescribers to prescribe any schedule 2–5 controlled drugs for any medical condition, within their clinical competence, removing the previous limitations and pharmacist independent prescribers to prescribe any schedule 2–5 controlled drugs for any medical condition, within their clinical competence.² These changes do not apply to the prescribing of cocaine, diamorphine or dipipanone for the treatment of addiction which is restricted to Home Office licensed doctors. In addition nurses, pharmacists and a range of allied health professionals may use supplementary prescribing involving a voluntary prescribing partnership between an independent prescriber (doctor or dentist) and a non-medical prescriber to implement an agreed patient specific clinical management plan (CMP) with the agreement of the patient.³

Best practice: research evidence or authoritative opinion

Best practice for non-medical prescribing is dictated by the legal framework under which it was developed.^{4,5,6,7}

Suggested indicators

Prescribing activity

- D Total number of items prescribed over a predetermined period.
- D Number of prescriptions written over a predetermined period.
- D Medicines prescribed by non-medical prescriber during a predetermined period.
- D Number of times each patient has been reviewed by non-medical prescriber over a predetermined period.

Supplementary prescribing

- D Is a CMP available for each patient?
- D Is the CMP specific for each patient?
- D Is each CMP completed fully?
- D Is each CMP legible?
- D Has each patient been reviewed by a medical practitioner within the last 12 months?

Proposed standard or target for best practice

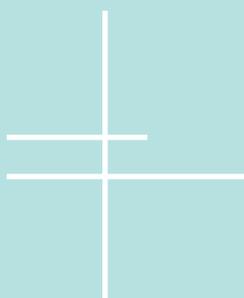
Prescribing activity

- D There are no standards for best practice; however healthcare professionals should regularly prescribe medication to maintain competence.
- D All medicines prescribed should be in accordance with national or local prescribing policies^{5,6,7} and guidelines.

Supplementary prescribing

- D A clinical management plan (CMP) is available for all (100 %) patients.
- D The CMP is individualised for all (100 %) patients.
- D All (100 %) CMPs either use the Department of Health template or contain identical information fields.
- D All (100 %) CMPs are legible.
- D All (100 %) patients have had a review by a medical practitioner within the preceding 12 months.

Suggested data to be collected	D Data will be collected by prospective data collection or retrospective documentation review.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D Misconceptions and misunderstanding regarding nature and practice of non-medical prescribing. D Insufficient time to complete CMP or illegible CMP. D Infrequent clinical supervision with medical practitioner: D Prescribing outside local prescribing guidance or CMP. D Availability of training places for non-medical health care practitioners.
Related audits	<p>11.17 – Long-term use of opiate analgesia in non-malignant pain</p> <p>11.18 – Compliance in the use of oral medication</p>
CPD and Curriculum mapping	<p>CPD matrix codes: 2E02, Level 3: Pain Medicine</p> <p>Training curriculum competence: PM_HK_08</p>
References	<ol style="list-style-type: none"> 1 Nursing and Midwifery Council. Standards of proficiency for nurse and midwife prescribers <i>NMC</i>, London 2006. 2 Nurse and pharmacist independent prescribing changes announced (http://www.dh.gov.uk/health/2012/04/prescribing-change/). 3 National Prescribing Centre. Supplementary prescribing: A resource to help health care professionals to understand the framework and opportunities. <i>NPC</i>, Liverpool 2003. 4 National Prescribing Centre. Non-medical prescribing by nurses, optometrists, pharmacists, physiotherapists, podiatrists and radiographers. A quick guide for commissioners. <i>NPC</i>, Liverpool March 2010. 5 National Prescribing Centre. A single competency framework for all prescribers. <i>NPC</i>, Liverpool May 2012. 6 Department of Health. Supplementary Prescribing by Nurses, Pharmacists, Chiropodists/ Podiatrists, Physiotherapists and Radiographers with the NHS in England. A guide for implementation. <i>DH</i>, London May 2005. 7 Department of Health. Improving patients' access to medicines: A guide to implementing nurse and pharmacist independent prescribing within the NHS in England. <i>DH</i>, London April 2006.



Payment by results

Dr O Olukoga

11.21

Why do this audit?

Payment by Results (PbR) is the system by which hospitals in England are paid for treatments given to patients for admitted care, outpatients and accident and emergency care.¹

It was introduced in 2003–04, and by 2006–07 all NHS trusts were remunerated for patient care by this system.

Pivotal to the PBR system are accurate diagnosis using the ICD-10 (International Classification of Diseases 10th Revision)² and application of the correct OPCS-4 code³ as well as the HRG grouping at deriving the tariff.

The clinician's role is very important in the accurate documentation of diagnosis and treatment undertaken so as to allow for correct coding and tariff to be applied to the treatment in order to inform appropriate remunerations for work undertaken.

HRGs are derived from reference costs submitted by NHS trusts annually. Inaccurate coding and under-reporting could lead to an inaccurate reference cost exercise and inaccurate tariff.

Best practice: research evidence or authoritative opinion

The ICD-10 (International Classification of Diseases 10th Revision) is used for coding diagnosis on the NHS.

The OPCS-4 is used by the NHS to document operations, procedures and interventions. The current version in use is the OPCS-4.6, which has been in use since April 2011.³

When a patient is treated, NHS coders enter the ICD-10 diagnosis from the patient notes and the diagnosis into hospital Patient Administration system (PAS). This is used to describe the episode of care.

These are then grouped into healthcare resource groups (HRGs) which are standard groupings of clinically similar diagnosis and interventions which use similar healthcare resources.⁴

Suggested indicators

- D Diagnosis ICD-10 codes.
- D Procedure codes.
- D HRG grouping.
- D Reference Cost Index.

Proposed standard or target for best practice

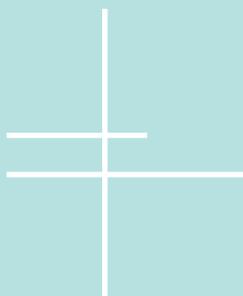
- D 100% activity recorded accurately and in agreement with Trust coders.
- D 100% accuracy of procedure codes and HRG codes.
- D Reference Cost Index of approximately 100.

Suggested data to be collected

- D Diagnosis ICD-10 codes.
- D Procedure codes.
- D HRG grouping.
- D Reference Cost Index.

Common reasons for failure to meet standard

- D Lack of awareness of coding system.
- D Lack of awareness of importance of coding.
- D Lack of liaison between clinicians and coders.
- D Inaccurate documentation of diagnosis.
- D Inaccurate documentation of treatment offered.
- D Inaccurate documentation of co-morbidity.

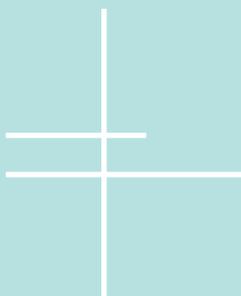


CPD and Curriculum mapping

References

Training curriculum competence: PM_AK_15

- 1 A simple guide to Payment by Results. *DH*, London 2010 (http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@ps/documents/digitalasset/dh_120254.pdf).
- 2 World Health Organization International Classification of Diseases (ICD-10) (<http://www.who.int/classifications/icd/en/>).
- 3 OPCS 4.6 latest version (<http://www.connectingforhealth.nhs.uk/systemsandservices/data/clinicalcoding/codingstandards/opcs4/opcs-4.6>).
- 4 Pain Management HRGs (http://www.ic.nhs.uk/webfiles/Services/casemix/Pain_Management_HRGs.pdf).



11.22

Medial branch neurotomy for lumbar facet joint spinal pain

Dr K Kyriakides, D S Gupta, Dr A Swanepoel

Why do this audit?

Lumbar facet (Zygapophyseal) joints are one of various structures in the spine that can act as primary pain generators and a source of somatic low back pain. Lumbar facet joints have been implicated as a cause of chronic pain in up to 15–45% of low back pain patients.^{1,2}

Despite all efforts by clinicians around the world putting forward various symptoms and signs as predictors of lumbar facetogenic pain, none of these features can reliably lead to a firm diagnosis. Both medial branch of the dorsal primary rami (MBDPR; nerve supply to the facet joint) blocks and intra-articular injections have been shown to be equally effective in diagnosing lumbar facetogenic low back pain. Comparative studies of MBDPR and intra-articular injections using local anaesthetic and steroid found no difference in immediate pain relief.³ False positive rates of single diagnostic block have been reported to range from 17–41%.⁴ The false positive rate is reduced to 3% with two sets of diagnostic blocks.

Once correct diagnosis has been accurately made, radiofrequency denervation (RF) of the MBDPR has been demonstrated to be very effective in the treatment of facetogenic low back pain; Dreyfuss et al reported that at one year, 60% of their patients have 80% pain relief and 80% can expect 60% pain relief.⁵ Bogduk in a narrative review summarises the available evidence for RF of the MBDPR and highlights the problems with older studies emphasising the need for proper patient selection and appropriate technique of RF for optimal outcome.⁶

MBDPR blocks using local anaesthetic and/or steroids have also been shown to have a therapeutic role.⁷ There is considerable debate about the evidence base for the intra-articular injection of local anaesthetic and/or steroids.

This audit aims to assess procedural aspects, selection of patients, treatment and outcome measures for pharmacological and RF neurotomy of MBDPR for facetogenic low back pain.

Best practice: research evidence or authoritative opinion

- D General recommendations/guidelines on standards of practice for other interventional pain procedures, published by the Faculty of Pain Medicine of the Royal College of Anaesthetists.⁸
- D Recommendations by the International Association for the Study of Pain (IASP) for the precise diagnosis of facetogenic lumbar low back pain.⁹
- D Best practice guidelines for the management of facetogenic low back pain published by the International Spinal Intervention Society (ISIS).¹⁰
- D Evidence-based guidelines for the diagnostic and procedural aspects of RF denervation.^{4,11}

Suggested indicators

- D Evidence of informed consent.
- D Environment with fluoroscopy/full resuscitation facilities.
- D Monitoring of vital signs in line with local arrangements, during procedure and 30 min post-procedurally.
- D Assessment of diagnosis of facetogenic low back pain.
- D Assessment of procedural/technical aspects of RF denervation.
- D Evidence of follow up within 8–12 weeks.
- D Assessment of clinical effectiveness/outcome of RF denervation.
- D Assessment of complications – both minor/short-term and major/long-term.

Proposed standard or target for best practice

- D 100% evidence of informed consent.
- D 100% provision of environment with fluoroscopy/full resuscitation facilities.
- D 100% procedural and 30 min post-procedural monitoring as per local arrangements.
- D 100% diagnosis reached through two sets of diagnostic blocks.
- D 100% evidence of follow up within 8–12 weeks (via telephone or outpatient review).
- D < 2% incidence per lesion, of minor complications resulting in morbidity.¹²
- D <0.1% major complications resulting in morbidity.

Suggested data to be collected

- D **Epidemiological data:** age, gender, weight, ethnicity, number and spinal levels approached.
- D **Outcome measures:** in a number of different domains which collectively look at several quality of life indicators including pain relief (degree and duration), effect on sleep and mood, effect on mobility and ability to work, and utilisation of healthcare resources.

Common reasons for failure to meet standard

- D Lack of awareness of existing evidence-based/best practice guidelines.
- D Lack of appropriate training.
- D Lack of resources.
- D Lack of trained staff.
- D Lack of capturing data regarding clinical effectiveness/complication rates.

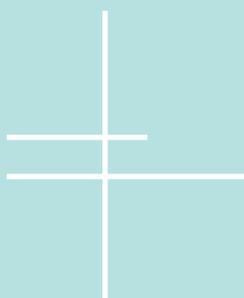
CPD and Curriculum mapping

CPD matrix codes: **Level 3: Pain Medicine**

Training curriculum competence: **PM_HK_01**

References

- 1 Schwarzer A et al. Clinical features of patients with pain stemming from the lumbar zygapophyseal joints. Is the lumbar facet syndrome a clinical entity? *Spine* 1994;**19**:1132–1137.
- 2 Manchikanti L et al. Prevalence of lumbar facet joint pain in chronic low back pain. *Pain Physician* 1999;**2**:59–64.
- 3 Marks R C et al. Facet joint injection and facet nerve block: A randomised comparison in 86 patients with chronic low back pain. *Pain* 1992;**49**:325–328.
- 4 Cohen SP et al. Pathogenesis, diagnosis and treatment of lumbar zygapophyseal (facet) pain. *Anaesthesiology* 2007;**106**:591–614.
- 5 Dreyfuss P et al. Efficacy and validity of radiofrequency neurotomy for chronic lumbar zygapophysial joint pain. *Spine* 2000;**25**:1270–1277.
- 6 Bogduk N, Dreyfuss P, Govind J. A narrative review of lumbar medial branch neurotomy for the treatment of back pain. *Pain Med* 2009;**10**:1035–1045.
- 7 Boswell MV et al. A systematic review of therapeutic facet joint interventions in chronic spinal pain. *Pain Physician* 2007;**10**:229–253.
- 8 Recommendations for good practice in the use of epidural injection for the management of pain of spinal origin in adults. *Faculty of Pain Medicine of the RCoA*, London April 2011 (<http://www.rcoa.ac.uk/node/2206>).
- 9 Merskey H, Bogduk N (Eds). Lumbar spinal or radicular pain syndromes. In: *Classification of chronic pain* (2nd Edn). *IASP Press*, Seattle 1994: p181.
- 10 Bogduk N. Practice guidelines for spinal diagnostic and treatment procedures. *International Spinal Intervention Society*, California 2004.
- 11 Hooten et al. Radiofrequency neurotomy for low back pain: Evidence-based procedural guidelines. *Pain Med* 2005;**6**:129–138.
- 12 Kornick C et al. Complications of lumbar facet radiofrequency denervation. *Spine* 2004;**29**:1352–1354.



11.23

Intrathecal drug delivery in the management of cancer-related pain

Dr L Lynch, Dr K Grady

Why do this audit?

There are no prospective audits of ITDD (intrathecal drug delivery) systems, such as the one proposed, for cancer-related pain, although retrospective audits and surveys have been reported.

Current practice varies widely depending on local factors such as funding and expertise, such that some centres will run largely external systems backed up with a community nursing team and others a physician run fully implanted system setup with no nursing support at all. Some pain clinics may not support any IT catheter work at all and some only for hospice or hospital based in-patients.

There is no standardisation or consensus regarding the hardware implanted, drug doses used, or aftercare in the UK. It is not known whether there is overall superiority of one system against another or whether each is effective.

There are consensus statements published which relate to specific drugs used and the maximum doses and concentrations. There are also recommendations published addressing best practices, but no audit of application.

Some drugs are specifically contraindicated for intrathecal use including ketamine and methadone (which are neurotoxic) and diamorphine is contraindicated for use in Medtronic Synchromed pumps, as it can cause pump stall. It is not clear whether or not these drugs are still in use and whether problems are seen.

Best practice: research evidence or authoritative opinion

Best practice for intrathecal drug delivery demands careful patient selection. Input at every stage is the province of the multi-professional and multi-disciplinary team. A minimum resource base for both positioning IT catheters for attachment to external pumps and siting the fully implanted systems, has been described and this includes not only the ability of the operator; but a sterile theatre environment with fluoroscopy, and aftercare facilities. 24-hour medical cover; experienced other team members and neurosurgical backup are also pre-requisites.^{1,2} It is of note that the British Pain Society recommendations¹ suggest this technique is underused in the management of cancer pain. Consensus statements have been published guiding the choice of drugs, concentrations chosen and maximum doses,³ although it is noted that these are more relevant for chronic non-cancer pain than patients with a very limited life expectancy.

Suggested indicators

- D Patient's assessment of pain relief, quality of life and function, although balance between collecting data and using scoring systems capable of being used by those suffering from advanced cancer and related problems. Brief Pain Inventory⁴ and patient's global impression of change as minimum with other options available for the more robust e.g. a 5 point EQ-5D.⁵
- D Management of incident and breakthrough pain.
- D Incidence of infection.
- D Incidence of granulomata.
- D Analgesic drug doses and changes.
- D Healthcare utilisation.

Proposed standard or target for best practice

- D Indications: adherence to recommendations.
- D Assessment: adherence to recommendations e.g. MRSA screening.
- D Antibiotic prophylaxis (at time of implant).
- D Recorded reduction in pain and improvement in function scores (pain reduction of 30–50%).
- D Drug-related adverse events recorded e.g. granulomata.
- D Catheter/pump-related adverse events recorded e.g. infections (adverse events are common and occur at 0.45 events per patient per year).
- D Duration of life compared with predicted life expectancy recorded.

Suggested data to be collected

- D Demographics.
- D Site and nature of pain (nociceptive or neuropathic or mixed).
- D Primary cancer and staging.
- D Estimated life expectancy (death imminent, less than 3 months, greater than 3 months but with progressive/recurrent disease or cancer survivor).
- D Test dose – yes/no, single shot/infusion, drugs used and result.
- D Implant date.
- D Catheter and pump details e.g. fully implanted system or tunnelled catheter and external pump.
- D Drug details – which drugs used, concentrations and doses
- D Background infusion details.
- D Bolus details – drugs and doses, duration of bolus infusion, lock-out interval, maximum activations set and doses actually used.
- D Other analgesic drugs and daily doses.
- D Brief Pain Inventory.⁴
- D EQ-5D.⁵
- D Patient recorded outcome measures; patient's impression of usefulness, physician's impression of improvement.
- D Healthcare resource utilisation – GP visits/hospice use/hospital inpatient.
- D Free text e.g. disease progression.

Common reasons for failure to meet standard

- D Timely referral of patients. Local referral practices from oncology, palliative medicine and hospices, as well as surgeons, treating physicians and GPs affect when, in the course of their disease, a patient is seen. Early referral may lead to a more planned procedure or referral to a centre offering an appropriate technique.
- D Funding. Funding of both hardware, drugs and manpower affect the choices available to local teams and their patients, in terms of systems available and site of care.
- D Local practice and expertise.
- D Variable survival and patient group. Life expectancy is notoriously difficult to predict and the actual implant of a system and provision of good quality pain relief and concomitant reduction in huge doses of systemic opioids, may improve prognosis.

Related audits

- D Williams JE, Grady K. Intrathecal Drug Delivery for the management of pain and spasticity in adults; a national audit.² *BPS Pain News* Winter 2008 (http://www.britishpainsociety.org/member_newsletter.htm).
- D Shihab et al. ITDD for chronic pain; a national audit. *Neuromodulation* 2005;**8(2)**:12–20.
- D Peng et al. Survey of the practice of spinal cord stimulators and intrathecal analgesic delivery implants for management of pain in Canada. *Pain Res Management* 2007;**12(4)**:281–285.

CPD and Curriculum mapping

CPD matrix codes: **Level 3: Pain Medicine**

Training curriculum competence: **PM_AK_40–45, PMS_AS_38–42**

References

- 1 Intrathecal Drug Delivery for the management of pain and spasticity in adults; recommendations for best clinical practice. *British Pain Society*, London 2008.
- 2 Deer T et al. Consensus guidelines for the selection and implantation of patients with non-cancer pain for Intrathecal Drug Delivery. *Pain Physician* 2010;**13**:E175–213.
- 3 Deer T et al. Polyanalgesic Consensus Conference 2007. Recommendations for the management of pain by Intrathecal Drug Delivery; report of an interdisciplinary expert panel. *Neuromodulation* 2007;**10**:300–328.
- 4 Keller J et al. British Pain Inventory. *Clin Journal Pain* 2004;**20(5)**:309–318.
- 5 Euroqol Group. Euroqol – a new facility for the measurement of health related quality of life. *Health Policy* 1990;**16**:199–208.

11.24

Individual performance template for pain medicine anaesthetists

Dr M B Taylor, Dr G Simpson

Why do this audit?

'Revalidation is the process by which doctors will have to demonstrate to the GMC, normally every five years, that they are up-to-date and fit to practise.' (NHS Revalidation Support Team)

Individual performance in this document is not a clinical audit. The purpose is to provide a benchmark, with examples, of the categories of supporting information relevant to pain medicine which are necessary for revalidation. The scope is restricted to the pain medicine part of practice.

Check the boxes adjacent to the text if it applies to your current appraisal/revalidation practice. Aim for scores > 36/43.

Best practice: research evidence or authoritative opinion

The GMC has published 'the Good Medical Practice Framework for appraisal and revalidation'.^{1,2} The Framework, which is based on Good Medical Practice and will be the standard approach for all appraisals, consists of 4 domains each described by 3 attributes. Supporting the Framework are The Good Anaesthetist³ (published by the RCoA), and the Good Pain Medicine Specialist⁴ (published by the Faculty of Pain Medicine), to map the specialist standards of practice to the GMC domains and attributes.

Domain 1 – Knowledge, skills and performance

- 1.1 Maintain your professional performance
- 1.2 Apply knowledge and experience to practice
- 1.3 Ensure that all documentation recording your work is clear, accurate and legible

Domain 2 – Safety and quality

- 2.1 Contribute to and comply with systems to protect patients
- 2.2 Respond to risks to safety
- 2.3 Protect patients and colleagues from any risks posed by your health

Domain 3 – Communication, partnership and teamwork

- 3.1 Communicate effectively
- 3.2 Work constructively with colleagues and delegate effectively
- 3.3 Establish and maintain partnerships with patients

Domain 4 – Maintaining trust

- 4.1 Show respect for patients
- 4.2 Treat patients and colleagues fairly and without discrimination
- 4.3 Act with honesty and integrity

See appendix I for detailed application of these domains to pain medicine

The portfolio of evidence assembled about the Framework should be used by the pain medicine doctors to:

- D reflect on their practice and their approach to pain medicine
- D reflect on what the information demonstrates about their pain medicine practice and the pain service where they work
- D identify areas of practice where they could make improvement or undertake further development
- D demonstrate they are up to date and fit to practise

The Academy of Medical Royal Colleges has published a structured reflective template to allow doctors to document their reflections for their portfolio.⁵ The supporting information detailed below is not a comprehensive list of everything required in all the above domains, but aims to highlight the most important requirements in pain medicine practice. No patient identifiable data must be present in the portfolio.

Suggested data to be collected

1. General Information

Scope of work

- D Your **job plan** must be balanced between pain medicine and anaesthetic sessions to allow appropriate maintenance of skills especially in relation to on-call commitments.
- D Your **whole practice description** should include information about your pain medicine multidisciplinary team and your role within the team. Detail how the team functions including pain MDT, CPD and clinical governance meetings.
- D If your pain service implants **intrathecal infusion pumps** you must provide information about how your service provides continuous out-of-hours emergency cover.
- D Your **workload** (continuously recorded logbook including outcome data e.g. with new/discharge, BPI data). Details of:
 - ◆ Annual numbers of new out-patient seen and diagnostic categories,
 - ◆ Annual number of follow up patients seen. New to follow up ratio referenced to national data.
 - ◆ Annual number and type of procedures performed. Details of complex procedures.
- D Details of how you are achieving the objectives detailed in the **personal development plan (PDP)** from your last appraisal. The PDP should reflect the scope of work as a doctor and take into account the principles outlined in the RCoA Guidelines for Continuing Professional development⁶ and levels 1–3 of the CPD matrix.⁷
- D Details of any issues concerning **probity** or **health**.

2. Keeping up to date

Continuing Professional Development

- 1 You must meet the objectives of your personal development plan agreed at appraisal.
- 2 CPD must cover the full scope of your clinical and non-clinical practice including training for educational supervision, research and management.
- 3 Use the principles outlined in the RCoA Guidelines for Continuing Professional Development⁵ and levels 1–3 of the CPD Matrix.⁷
- 4 Keep records and minutes of meetings attended including action reports after MDT/governance meetings.
- 5 Complete Reflective templates after CPD activities.
- 6 Achieve at least 50 credits/year and at least 250 over the 5-year revalidation cycle.
- 7 Of the 50 annual credits a minimum of 20 external and 20 internal should be obtained.
- 8 Register and use the RCoA CPD online (<http://www.cpd.rcoa.ac.uk>).

3. Review of your practice⁸

You will need to demonstrate you participate in activities that review and evaluate your pain medicine practice to show quality improvement activity, and, where possible, evidence and reflection of personal performance against recommended standards/guidelines.

- 1 **Clinical audit:** a minimum of one complete audit cycle (audit, practice review and re-audit) in every 5-year revalidation cycle. You need to show evidence of active engagement and results of:
 - ◆ personal and local audits, using for example, process and standards found in the RCoA Raising the standard compendium of audit recipes (2012).
 - ◆ regular audits within your pain department team of key areas of practice which may include consent, medical record keeping, infection control, compliance with British Pain Society/Faculty of Pain Medicine guidelines.

2 Review of clinical outcomes. Evidence of:

- ◆ participation in national audits, registries and databases where applicable.
- ◆ for interventions with recognised outcome measures, clinical outcomes can be used alongside or instead of audit or case reviews. However there should be evidence of reflection and commentary on personal input, and where needed change in practice. It is recommended all procedures are audited with post-procedure diaries, and BPI at subsequent outpatient visits. This is essential for complex interventions.

3 Case reviews and discussions. These demonstrate your engagement in discussion with your pain medicine colleagues and team in order to enhance and maintain the quality of your work.

- ◆ If these are used as a substitute for clinical audit or clinical outcomes (after discussion with your appraiser) 2 case reviews are necessary each year covering your professional practice over the 5-year revalidation cycle.
- ◆ The case reviews should include the discussion with colleagues at department MDT meetings with reflective comments against national standards and action points.

4 Significant events: clinical incidents, significant untoward incidents. Keep anonymised records of incidents or declare in your appraisal if no incidents.

- ◆ Provide details based on logged data from your local hospital or national incident reporting system.
- ◆ Detail reflection, learning points and action taken.

4. Feedback on your practice⁹

1 Colleague feedback. At least one validated multi-source feedback exercise, from a spread of the healthcare professionals with whom you work, should be undertaken each 5-year revalidation cycle. If available, results should be benchmarked to other pain medicine specialists. Reflections and development needs should be detailed.

2 Patient/carer feedback. At least one validated patient feedback exercise should be undertaken in the revalidation cycle preferably in year two. This allows time for repeat survey if required. Additional patient feedback may be used:

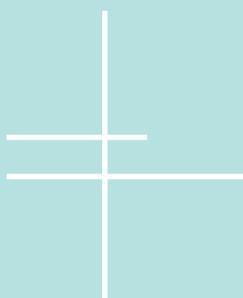
- ◆ pain department patient experience and satisfaction surveys
- ◆ patient reported clinical outcomes.

3 Feedback from clinical supervision, teaching and training.

- ◆ Evidence of training for the role should be given.
- ◆ Evidence of performance from school of anaesthesia/deanery/department is required at least once in a 5-year revalidation cycle.
- ◆ Feedback from course organisers about quality of teaching.

4 Formal complaints. Details of any formal complaints, how they were managed and your reflections should be discussed at every appraisal.

5 Compliments. Annual record of unsolicited compliments from patients, carers and colleagues. This is optional. Reflections on compliments can be included.



Common reasons for failure to meet standard

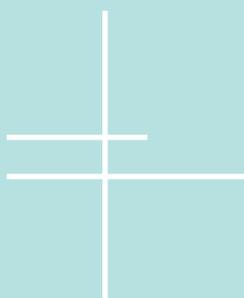
- D Prolonged gestation of revalidation and uncertainty about the requirements. Inadequate guidance from appraisers.
- D Failure to collect appropriate quality and quantity of data.
- D Inadequate pain medicine audit systems; Inadequate data from hospital administration systems; Lack of available benchmark and evidence-based standards.
- D Lack of pain medicine MDT, clinical governance and audit meetings.
- D Failure to complete the audit cycle.

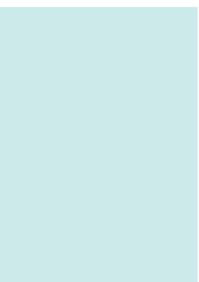
Related audits

All other audits in this section

References

- 1 Good medical practice framework for appraisal and Revalidation. GMC, London 2012 (http://www.gmc-uk.org/doctors/revalidation/revalidation_gmp_framework.asp).
- 2 Supporting Information for appraisal and revalidation. GMC, London 2012 (http://www.gmc-uk.org/doctors/revalidation/revalidation_information.asp).
- 3 The good anaesthetist: standards of practice for career grade anaesthetists. RCoA, London 2010 (<http://www.rcoa.ac.uk/node/1955>).
- 4 The good pain medicine specialist: standards for revalidation of specialists in pain medicine. FPM, London 2012 (<http://www.fpm.ac.uk/node/2961>).
- 5 Reflective template for revalidation. AoMRC, London 2012 (http://www.aomrc.org.uk/component/docman/doc_download/9466-draft-academy-reflective-template-for-revalidation.html).
- 6 Guidelines for continuing professional development. RCoA, London 2012 (<http://www.rcoa.ac.uk/node/1922>).
- 7 CPD Matrix. RCoA, London 2011 (<http://www.rcoa.ac.uk/cpd>).
- 8 Supporting information for appraisal and revalidation: guidance for doctors in anaesthesia, intensive care and pain medicine. RCoA, London 2012 (<http://www.rcoa.ac.uk/node/1951>).
- 9 Guidance on colleague and patient feedback for revalidation. RCoA, London 2011 (<http://www.rcoa.ac.uk/node/1954>).





Section 12: Delivery of anaesthetic services

Edited by Dr Kathleen Ferguson

- 12.1** Department accommodation and adequacy of secretarial and administrative support
- 12.2** Hours of work (trainees and consultants)
- 12.3** Assistance for anaesthesia
- 12.4** Efficient use of planned operating lists
- 12.5** In-patient cancellations from theatre lists
- 12.6** Availability of emergency theatres (NCEPOD)
- 12.7** Purchase of new and replacement equipment
- 12.8** Maintenance of anaesthetic equipment
- 12.9** Training in the use of anaesthetic equipment
- 12.10** Efficiency of scavenging systems
- 12.11** Induction courses for new staff
- 12.12** Knowledge of major incident policy
- 12.13** Critical incident reporting
- 12.14** Follow up arrangements for patients with suspected drug reactions
- 12.15** Disposal of controlled drugs
- 12.16** Infection control in anaesthesia
- 12.17** Availability and use of International Colour Coding System (ICCS) syringe labels

12.1

Department accommodation and adequacy of secretarial and administrative support

Dr J MacDonald

Why do this audit?

To enable an anaesthetic service to function effectively and efficiently, it requires an operational base, the Department of Anaesthesia, staffed by an able secretariat, providing well co-ordinated administrative assistance. This operational base must consist of an appropriate level of accommodation and facilities, and be staffed by a well integrated team of medical professionals, allied medical staff, and secretarial and administrative staff. This hub should allow the provision of high quality support both to the health service and patient population, as well as to those who work within the Anaesthetic Department itself. Appropriate departmental accommodation and adequacy of secretarial and administrative support are fundamental to the provision of an excellent, innovative and safe anaesthetic and critical care service, and thus we should be proactive in assessing and reviewing local need as compared to availability.

Best practice: research evidence or authoritative opinion

The Royal College of Anaesthetists 'Guidelines for the provision of anaesthetic services'¹ states:

- D 'Departments of anaesthesia require an appropriate level of secretarial and administrative assistance to release anaesthetists from clerical tasks, to maintain an organisational base and to contribute effectively to theatre efficiency. The level of support is dependent on the number of consultants and clinical and administrative activity undertaken, but local requirements for such support must be acknowledged and provided for by the employing organisations.'
- D 'Departments of anaesthesia must have adequate information technology support to enable immediate access to the electronic patient data, theatre lists and schedules and staffing rotas. In large and complex departments consideration should be given to electronic rota management so that human resources can be released for other important administrative or clinical tasks related to the day-to-day running of the department and patient care.'
- D 'Staff need accommodation for confidential interviews, teaching and educational activities, provision of books, current medical literature, and information technology including computing and internet access.'
- D 'When staff are required to be resident or working out-of-hours in the hospital, living and working conditions should meet at least the minimum nationally agreed standards. These include study and rest accommodation.'

The Association of Anaesthetists (AAGBI) previously defined best practice for departmental accommodation and secretariat. 'The 2003 (New) Contract and Job Planning for Consultants'² provides advice as regards accommodation and secretarial support and stipulates that resources required (to ensure delivery of objectives) must simultaneously be identified and provided, such as:

- D Staffing Support (Secretarial support/Technical and IT support/Managerial support/Audit support staff)
- D Accommodation (Office accommodation as recommended in NHS Estates Health Building Note 26, which suggests that normally one office should be provided for every WTE Consultant/the office should be located in a site which is accessible during the normal working day/presence of office space for supporting staff/Secretarial office(s)/Common room/Teaching space/Clinic space.)

Suggested indicators

Departments of anaesthesia should conform to the recommendations of the AAGBI and RCoA.^{1,2,3}

For accommodation, indicators may be invented under various headings – basic accommodation, location, planning and design, communications, provision of computers, and should include the following.

- D The existence of offices for consultants, trainees and secretariat.
- D One office per two consultants.
- D Office for secretariat.
- D Office for trainees.
- D Existence of a staff lounge.
- D Existence of a seminar room with audio-visual aids.
- D Existence of a computer room/audit office.
- D Adequate state of repair of all the above.

	<p>For adequacy of secretarial and administrative support:</p> <ul style="list-style-type: none"> D An adequate number of secretaries as defined by AAGBI. D % secretaries who have the correct skills for the job (decided after consultation between the auditor, the department chairman and the department secretary; reflected in the job description for the post). D Existence of internal and external telephones. D Computer for word processing for each secretary, with an answer phone/equivalent, access to hospital intranet and nhs.net, photocopier and facsimile. D % anaesthetists in the department (including trainees) who are satisfied with the secretarial support available to them. D % of secretaries who feel that their workload is usually manageable. D % hours in the working day that the telephone is manned.
Proposed standard or target for best practice	<ul style="list-style-type: none"> D 100% departments of anaesthesia should conform to the above.
Suggested data to be collected	See suggested indicators.
Common reasons for failure to meet standard	<p>Accommodation:</p> <ul style="list-style-type: none"> D Failure to perceive need by consultant anaesthetists or managers. D Ignorance of references/failure to comply with AAGBI recommendations. D Apathy or lack of funds. <p>Secretarial/Administrative Support:</p> <ul style="list-style-type: none"> D Lack of administrative will to provide locum cover for secretarial absence. D Low pay with resultant recruitment difficulties. D Workload v time balance. D Difficult interpersonal relationships.
CPD and Curriculum mapping	<p>CPD matrix codes: I103, I105</p> <p>CCT in Anaesthetics: Professionalism in medical practice</p>
References	<ol style="list-style-type: none"> 1 Guidelines for the provision of anaesthetic services. Chapter 1: Keypoints on the provision of anaesthetic services. <i>RCoA</i>, London 2009 (http://www.rcoa.ac.uk/node/695). 2 Guidance on the 2003 (New) Contract and Job Planning for Consultant Anaesthetists. <i>AAGBI</i>, London 2005 (being reviewed) (http://www.aagbi.org/sites/default/files/jobplanning05.pdf) 3 Working Arrangements for Consultant Anaesthetists in the United Kingdom. <i>AAGBI</i>, London 2011 (http://www.aagbi.org/sites/default/files/working_arrangements_for_consultant_anaesthetists_2011_0.pdf).
Further reading	<ol style="list-style-type: none"> 1 Department of Anaesthesia: Secretariat and accommodation. <i>AAGBI</i>, London 1992 (http://www.aagbi.org/publications/guidelines/archive/docs/depsec92.pdf). 2 Defining best practice for the work environment – Guidance for consultant doctors. <i>BMA</i>, London 2008 (http://www.bma.org.uk/images/Definingbestpractice_tcm41-166394.pdf). 3 HSC 2000/036: Living and working conditions for hospital doctors in training. <i>DH</i>, London 2000 (http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Healthservicecirculars/DH_4003955). 4 Department of Health. Secretarial and support services for hospital medical and dental staff. Report of a Departmental Working Party. <i>DHSS</i>, London 1987. 5 NHS Scotland Service Level Agreement. Arrangements to Support the Delivery of Undergraduate and Postgraduate Medical Education and Training in Scotland. <i>NHS Scotland</i>, January 2011.

12.2

Hours of work (trainees and consultants)

Dr J MacDonald

Why do this audit?

Trainees' and consultants' hours of work are now regulated.¹ The new consultant contract limits the weekly hours of work to 48 hours maximum,² while a phased approach for trainees culminated in a reduction to a maximum of 48 hours per week in August 2009 (averaged over a 26-week reference period). The Joint Royal College of Anaesthetists and Royal College of Surgeons of England WTD 2009 Project (aimed to identify the solutions implemented by those trusts that reported compliance and to allow a selection of trusts that were not yet compliant to consider the practicality of the identified solutions for their own circumstances) demonstrated hospital compliance with WTD 2009 in both anaesthesia and surgery to be very poor.³ The BMA survey of junior doctors' working arrangements 2010 further demonstrates the perception of a negative impact which the EWTD has had.⁴

However, it is well documented that overwork can lead to stress, psychological dysfunction and poor performance. As the number of consultants is increased and consultant and trainee contracted hours are reduced, an audit showing what hours are actually worked is important, as is the effect on the quality of training.

Best practice: research evidence or authoritative opinion

Trainees' working hours should not exceed those described in the New Deal.¹

The job plan of individual consultants should ideally take into account actual hours worked (guidance has been given by the Association of Anaesthetists).^{5,6} Advice on the avoidance of stress, psychological dysfunction and fatigue resulting from overwork has also been published by the AAGBI.^{7,8}

However, the Joint WTD 2009 Project suggests 'the implementation of the WTD is in serious danger of having a deleterious effect on medical training, patient safety and service delivery.'³ This is confirmed by the BMA survey of junior doctors' working arrangements in 2010 which demonstrates poor compliance with the EWTD coupled with a perceived negative impact on training. The Royal College of Anaesthetists 'Guidelines for the provision of anaesthetic services'⁹ states that 'trainee rotas must be compliant with the 'New Deal' and current Working Time Directive (WTD) regulations without having a deleterious effect on medical training'.

Suggested indicators

- D % trainees who work within the limits described in the New Deal.
- D % trainees who express satisfaction with level of training within EWTD.
- D % consultant trainers who express satisfaction with quality of training within EWTD.
- D % consultants who fulfil their contractual hours.
- D % consultants allocated a minimum of 2.5 programmed activities for supporting professional activity (SPA) in their contract.
- D % consultants carrying out additional or external work who have agreed dedicated time for this in their contract.

Proposed standard or target for best practice

- D 100% of trainees should achieve the New Deal standard.
- D 100% consultants should fulfil their contractual hours.
- D 100% of consultant activity should be agreed in the job plan including time for SPA, additional and external duties.
- D Satisfactory training within the EWTD should occur 100% of the time.

Suggested data to be collected

- D See suggested indicators, including:
 - ◆ actual hours worked by trainees and consultants.
 - ◆ activities undertaken within the contracted time (direct clinical and supporting).

Common reasons for failure to meet standard

- D Shortage of staff.
- D Lack of management engagement in process.
- D Failure to fill vacancies or recruit locums.
- D Illness, acute or chronic.
- D Over-running operating lists.
- D Excessive emergency workload.

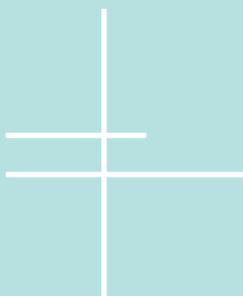
CPD and Curriculum mapping

CPD matrix codes: **1103, 1105**

CCT in Anaesthetics: Professionalism in medical practice

References

- 1 NHS Management Executive. Junior doctors, the new deal: Working arrangements for hospital doctors and dentists in training. *DH*, London 1991.
- 2 Department of Health. Terms and conditions – Consultants (England). *DH*, London 2003
- 3 WTD: Implications and practical suggestions to achieve compliance. Joint Royal College of Anaesthetists and Royal College of Surgeons of England WTD 2009 Project. *RCoA/RCS*, London 2009 (<http://www.rcoa.ac.uk/node/2288>).
- 4 http://www.bma.org.uk/employmentandcontracts/working_arrangements/hours/index.jsp
Including:
 - ◆ BMA survey of junior doctors' working arrangements 2010 (<http://www.bma.org.uk>)
 - ◆ A comparative analysis of the change in Junior Doctors' working arrangements from 2008 to 2010
 - ◆ Caplan RP. Stress, anxiety and depression in hospital consultants, general practitioners and senior health service managers. *Br Med J* 1994;**304**:1261–1263.
 - ◆ http://www.healthcareworkforce.nhs.uk/working_time_directive/pilot_projects/new_deal_and_wtd_booklets.html
- 5 Guidance on the (new) 2003 contract and job planning for consultant anaesthetists. *AAGBI*, London 2005 (<http://www.aagbi.org/pdf/Job%20Planning.pdf>).
- 6 Working Arrangements for Consultant Anaesthetists in the United Kingdom. *AAGBI*, London 2011 (http://www.aagbi.org/sites/default/files/working_arrangements_for_consultant_anaesthetists_2011_o.pdf).
- 7 Stress in anaesthetists. *AAGBI*, London 1997 (<http://www.aagbi.org/pdf/28doc.pdf>).
- 8 Association of Anaesthetists of Great Britain and Ireland. Fatigue and Anaesthetists. *AAGBI*, London 2004 (<http://www.aagbi.org/sites/default/files/fatigueo4.pdf>).
- 9 Guidelines for the provision of anaesthetic services. Chapter 1: Keypoints on the provision of anaesthetic services. *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/695>).



12.3

Assistance for anaesthesia

Dr J MacDonald

Why do this audit?

The presence of dedicated, competent, skilled and exclusive assistance for the anaesthetist is mandatory for the delivery of safe anaesthesia and should be standard practice. It is essential that this support for the anaesthetist is delivered by trained and accredited assistants.

Best practice: research evidence or authoritative opinion

The Royal College of Anaesthetists,¹ Association of Anaesthetists,² NCEPOD³ and Healthcare Improvement Scotland (HIS)⁴ have defined 'standard practice' in relation to anaesthetic assistance.

The AAGBI 'Anaesthesia Team 2010'² recommends 'trained assistance for the anaesthetist must be provided wherever anaesthesia is provided', and furthermore 'The AAGBI recommends that a trained anaesthesia assistant should always be immediately available and present during anaesthesia. Only in extreme emergencies, as judged by the anaesthetist, should anaesthetic intervention proceed without a trained assistant, e.g. acute unforeseen airway/bleeding problems'.

Similarly, the Royal College of Anaesthetists 'Guidelines for the provision of anaesthetic services' states: 'The provision of qualified and competent assistance is essential in every situation where anaesthesia is administered' and 'The anaesthetic assistant must be immediately available and provide dedicated assistance to the anaesthetist throughout'.¹

Healthcare Improvement Scotland (HIS, formerly NHS Quality Improvement Scotland) details that the provision of a suitably trained Anaesthetic Assistant (AA) is an essential safety standard.⁴

Assistance may be via Operating Department Practitioners (trained via an approved college/university programme that confers eligibility to apply for registration with the Health Professions Council) or nurses assisting anaesthetists. Nurses assisting anaesthetists should have been appropriately trained to a competent level. NHS Education for Scotland has designed a competency-based programme for anaesthesia assistants.⁵ This programme is administered by individual hospitals. The AAGBI 'would like to see the development of nationally recognised competencies for nurses assisting the anaesthetist'.

Suggested indicators

% cases in which the skilled assistant was:

- D present at induction of anaesthesia
- D immediately available throughout the case
- D dedicated to the case, and not covering another case in the anaesthetic room or elsewhere
- D a suitably qualified and experienced anaesthetic nurse, operating department assistant or ODP (in specialised cases the anaesthetist should agree that the assistant is suitably experienced (e.g. cardiac surgery))
- D appropriately trained and accredited.

Proposed standard or target for best practice

- D 100% cases should have a skilled assistant as above.

Suggested data to be collected

See suggested indicators, including:

- D name, grade, qualification and experience of assistant
- D whether present at induction/available immediately throughout the case/covering other cases elsewhere.

Common reasons for failure to meet standard

- D Inadequate theatre staffing levels.
- D Lack of resource for training – accredited courses, funding.

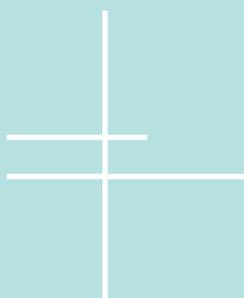
CPD and Curriculum mapping

CPD matric codes: I103, I105

CCT in Anaesthetics: Professionalism in medical practice

References

- 1 Guidelines for the provision of anaesthetic services. Chapter 1: Keypoints on the provision of anaesthetic services. *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/695>).
- 2 Association of Anaesthetists of Great Britain and Ireland. The Anaesthesia Team 3. *AAGBI*, London 2010 (http://www.aagbi.org/sites/default/files/anaesthesia_team_2010_o.pdf).
- 3 Campling, EA et al. The report of the National Confidential Enquiry into Perioperative Deaths. 1992/93. *NCEPOD*, London 1995 (<http://www.ncepod.org.uk/>).
- 4 NHS Quality Improvement Scotland, Anaesthesia Project Group. Anaesthesia – Care Before, During and After Anaesthesia. *NHS QIS*, Edinburgh July 2003 (http://www.healthcareimprovementscotland.org/previous_resources/standards/anaesthesia_care_before_duri.aspx) and follow up reports 2010.
- 5 Core Competencies for the Anaesthetic Assistant. Scottish Medical and Scientific Committee 2006 (updated 2010) (http://www.nes.scot.nhs.uk/media/4239/anaesthetic_core_competencies_2011.pdf).



12.4

Efficient use of planned operating lists

Dr P Bourke

Why do this audit?

Operating theatres are central to the modern NHS. They are both an expensive and at times scarce resource. Over the last decade and more, a considerable additional resource has been put into enhancing operating theatre efficiency. However, in many areas under- and over-running of theatre schedules continues to burden this resource. Accurate data regarding this misuse of resource is lacking. Routine accurate data collection will help inform planning and decision-making regarding allocation of theatre resource thereby avoiding waste.

Best practice: research evidence or authoritative opinion

To date, several agencies have highlighted underuse of planned operating lists. An Audit Commission report on operating theatres has clearly documented the requirement to keep up to date, accurate data relating to the use of planned operating lists through regular and ongoing use of audit.¹ Further to this, the Association of Anaesthetists has also produced guidance regarding the collection of audit data relevant to theatre efficiency.²

Central to improved theatre efficiency are a prompt start to the list and a finish close to the approximated end of the planned list. Although high utilisation rates can be generated by regularly over-running sessions this obviously impacts on succeeding lists and on staff morale

Suggested indicators

- D % operating lists which are cancelled too late to enable alternative use of the session. The timing will depend on local arrangements for making use of unfilled theatre time.
- D % lists starting > 10 min late.
- D % operating lists in which > 90% available time is used.
- D % operating lists which end > 15 min late.
- D % of lists finishing > 60 min late. This should exclude major unforeseen anaesthetic or surgical complications.

Proposed standard or target for best practice

- D < 5% of lists should be cancelled too late to allow alternative use of the session.
- D < 10% of lists should start > 10 min late.
- D > 90% lists should be running for > 90% of available time.
- D < 10% lists should end > 15 min late.
- D 0% of lists should finish > 60 min late, other than due to unforeseen major anaesthetic or surgical complications.

Suggested data to be collected

For each list:

- D Cancelled lists, timing of cancellation (including how long before the planned start time) and reason. If cancelled, was list offered out to other specialties, if so, with how much notice was it offered?
- D Surgeon, surgical firm, specialty, anaesthetist.
- D List start and finish times (planned and actual).
- D Reason(s) for late start and early or late finish.

Common reasons for failure to meet standard

- D 'Short notice' list cancellations.
- D Inadequate communication between departments on availability of personnel.
- D Late starts, inappropriate gaps and early finishes.
- D Staff or theatre unavailable: surgeon, anaesthetist, ODA or theatre staff delayed; intrusion of other specialty or emergency.
- D Porter/anaesthetist/surgeon/recovery delays.
- D Patient unavailable: ward unable to prepare patient on time; patient arriving late in hospital; lack of consent; patient unfit or incompletely worked up.
- D Bed problems: ward bed not available or uncertainty of critical care bed availability.
- D Over runs.
- D Unexpected surgical finding.

CPD and Curriculum mapping

- D Miscalculation of time required for surgery.
- D List overbooked.

CPD matrix codes: **1102, 3J00**

Advanced training domain 2, 3 & 5

References

- 1 Operating theatres, a bulletin for health bodies. *Audit Commission*, London 2003.
 - 2 Theatre efficiency. *AAGBI*, London 2003 (<http://www.aagbi.org/pdf/Theatre%20Efficiency.pdf>).
 - 3 Theatre Programme. Step guide to improving operating theatre performance. *Modernisation Agency*, June 2002 (http://www.modern.nhs.uk/scripts/default.asp?site_id=28&id=6706).
-



12.5

In-patient cancellations from theatre lists

Dr A H Jansen

Why do this audit?

Cancellation of in-patients from theatre lists is distressing to patients and staff. Theatres are an expensive resource that should be used maximally and efficiently. 'Admission on day of surgery' is set to become the norm, with obvious impact on anaesthetic assessment services, and possibly also in-patient cancellations.

Best practice: research evidence or authoritative opinion

The patient's charter stipulates that no patient should be cancelled on the day of operation unless there are medical emergencies or staff sickness precluding treatment.¹ The Association of Anaesthetists has provided guidelines on the effective use of theatres.² The Scottish government's Planned Care Improvement Programme has indicated that 'day case surgery should be considered the norm for the majority of elective procedures'.³

Suggested indicators

Proportion of elective cases cancelled on the day of surgery taking into consideration the various modes of patient admission:

- D day case without previous pre-assessment
- D day case with previous pre-assessment
- D admission before day of surgery with previous pre-assessment
- D admission before day of surgery without previous pre-assessment.

Proposed standard or target for best practice

The Department of Health standards on cancellation of operations makes it clear that every effort should be made to avoid cancellations therefore departments should be aiming for 0% in all three categories.^{4,5,6}

- 1 Hospital – non-clinical reasons.
- 2 Hospital clinical reasons.
- 3 Patient.

Suggested data to be collected

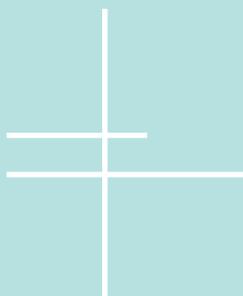
- D Specialty.
- D Surgeon.
- D Whole list cancellation vs individual cases.
- D Admission-on-day-of surgery vs admission-day-before-surgery.
- D Number of cases cancelled on day of proposed surgery vs total number of cases performed.
- D Reason for cancellation (see below).

Common reasons for failure to meet standard

- D Lack of general ward beds.
- D Lack of HDU/ICU beds.
- D Overbooked list.
- D Unexpectedly difficult surgical procedures.
- D Patient unfit for surgery.

Related audits

5.2 – Pre-admission assessment



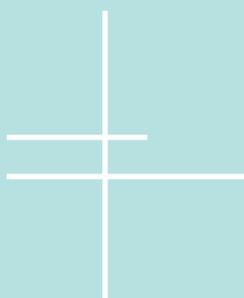
CPD and Curriculum mapping

CPD matrix codes: 2A03, 1102, 1104, 1105

Advanced training domain 2,3 & 5

References

- 1 The patient's charter. DH, London 1991.
- 2 Theatre efficiency. AAGBI, London 2003 (<http://www.aagbi.org/pdf/Theatre%20Efficiency.pdf>).
- 3 The Planned Care Improvement Programme. Scottish Executive. Edinburgh. 2006.
- 4 Step guide to improving operating theatre performance. NHS Modernisation Agency, London 2002 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4010286).
- 5 NHS Institute for Innovation and Improvement. Quality and Service Improvement Tools: Reducing Cancelled Operations (http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/cancelled_operations.html).
- 6 Operating Theatres: review of national findings. Audit Commission, London 2003 (<http://www.audit-commission.gov.uk/SiteCollectionDocuments/AuditCommissionReports/NationalStudies/TheatresAHP.pdf>).



12.6

Availability of emergency theatres (NCEPOD)

Dr P Bourke

Why do this audit?

The National Confidential Enquiry into Perioperative Deaths 1991/2 (NCEPOD)¹ identified the lack of an operating theatre dedicated to emergencies as an important resource shortage. Despite a period of investment in emergency theatre resource, inability to access this in a timely manner continued to be reported.^{2,3} The Audit Commission in their national review of operating theatres outlined some of the barriers to efficient use of theatre resources.³ With increasing pressures on resource allocation throughout the NHS this audit proves timely and necessary. Any contraction of availability of emergency theatres may lead to an increased risk of patient morbidity or mortality. This audit looks at the immediate availability of the emergency theatre for NCEPOD class I emergency surgery.

Best practice: research evidence or authoritative opinion

NCEPOD defines emergency surgery as 'immediately life saving where resuscitation continues simultaneously with surgery'. Examples are ruptured aortic aneurysm or major trauma. In this group any delay in surgery may jeopardise survival.

Suggested indicators

D % occasions as described below when the theatre manager could make a theatre available at 15 min notice for a NCEPOD class I emergency. There may be some emergencies where a 15 min delay is still too long, but this represents an adequate interval in many or most cases, making it a useful audit indicator.

Proposed standard or target for best practice

D A staffed and equipped theatre should be available at 15 min notice on 100% occasions.

Suggested data to be collected

- D The audit should be discussed with the theatre manager or theatre bleep holder before it begins.
- D We suggest that over a 2-week period at a random time during each day, the theatre manager is approached with a 'dummy' request for a theatre. The delay that would have occurred in making a theatre available should be noted. If the time delay exceeds 15 min, what were the circumstances and when would a theatre be available?

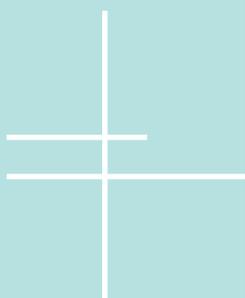
Common reasons for failure to meet standard

- D Emergency theatre already in use.
- D Long cases in all other theatres.
- D Emergency staff and/or equipment redeployed to fill gaps elsewhere.
- D No staffed emergency theatre due to staff shortage or lack of funding.
- D Appropriate staff skill mix not available for surgical specific surgical specialty.
- D Lack of availability of surgeon and, or anaesthetist.

CPD and Curriculum mapping

CPD matrix codes: 1102, 1105, 3100

Advanced training domain 2, 3, & 5

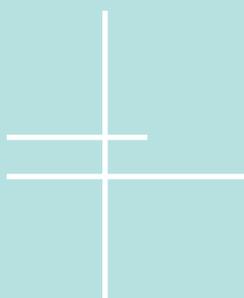


References

1. Campling EA et al. The report of the National Confidential Enquiry into Perioperative Deaths 1991/2. *NCEPOD*, London 1993 (<http://www.ncepod.org.uk/>).
2. The report of the National Confidential Enquiry into Perioperative Deaths 1993/4. *NCEPOD*, London 1996 (<http://www.ncepod.org.uk/>).
3. Who Operates When II. The national confidential enquiry into perioperative deaths 2003 *NCEPOD*, London 2003 (<http://www.ncepod.org.uk/>).
4. Operating Theatres A review of national findings. *The Audit Commission* 2008 (<http://www.audit-commission.gov.uk/itc/acuteportfolio.shtml>).

Further reading

- ◆ Calder FR, Jadhav V, Hale JE. The effect of a dedicated emergency theatre facility on emergency operating patterns. *The Surgeon: J Roy Coll Surg Edin* 1998;**43**:17–19.
- ◆ Changing the way we operate: Report of the National Confidential Enquiry into Perioperative Deaths 1999/2000. *NCEPOD*, London 2001 (<http://www.ncepod.org.uk/>).
- ◆ Anaesthesia under examination. The efficiency and effectiveness of anaesthesia and pain services in England and Wales. *Audit Commission*, December 1997



12.7

Purchase of new and replacement equipment

Dr J Mackay, Dr D A Thomas

Why do this audit?

All equipment has a finite life.

New anaesthetic techniques can result in better patient outcomes (shorter hospital stay/earlier return to work). Recent monitoring modalities may result in earlier warning of changes in a patient's condition. Such techniques may require additional equipment.^{1,2}

If equipment is not available, the anaesthetic technique may have to be modified, possibly resulting in a sub-optimal care.

Best practice: research evidence or authoritative opinion

The Association of Anaesthetists has published guidelines for the safe management of equipment.³

Health Improvement Scotland highlight the importance of keeping abreast of modern technology to deliver quality services.⁴

The National Audit Office recommends a 'properly planned approach to the acquisition of medical equipment'.⁵

Suggested indicators

- D Purchase dates and asset/working life of equipment.
- D Planned replacement programme for existing equipment.
- D % equipment budget allocated to new v replacement items.
- D % equipment bids (fully supported and endorsed by anaesthetic department) which are purchased.
- D Number of cases where the anaesthetic technique was modified because of the lack of equipment.

Proposed standard or target for best practice

- D All items replaced at the end of their (realistic) asset life.
- D 15% budget spent on new items.
- D 100% fully supported and endorsed bids should be successful.
- D No cases should have the anaesthetic technique modified for lack of equipment.

Suggested data to be collected

- D Purchase dates and asset/working life of equipment.
- D Planned replacement programme for existing equipment.
- D Number and value of supported bids made.
- D Number and value of purchases made.
- D Equipment budget available.
- D Number of anaesthetics modified through lack of equipment.

Common reasons for failure to meet standard

- D Lack of allocated resources.
- D Incomplete asset inventory.
- D Speculative asset life unrelated to working life.
- D Change in anaesthetic techniques (maybe due to new staff) prior to necessary resourcing and purchasing of equipment.
- D Equipment not available out of hours.

Related audits

12.9 – Training in the use of anaesthetic equipment

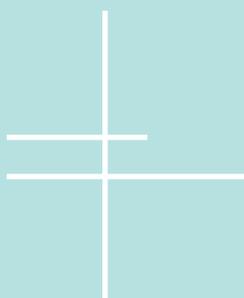
CPD and Curriculum mapping

CPD matrix codes: **1102, 3J00**

Training curriculum competences: **CC_D6_01–04; MN_AK_01–18**

References

- 1 Kenny GNC, White M. A portable computerised control system for propofol infusion. *Anaesthesia* 1990;**45**:692–693.
- 2 Calvert N et al. The effectiveness and cost effectiveness of ultrasound locating devices for central venous access. *NICE*, October 2002 (<http://www.nice.org.uk/page.aspx?o=38179>).
- 3 Association of Anaesthetists of Great Britain and Ireland. Safety Guideline: Safe Management of Anaesthetic Related Equipment. *AAGBI*, London 2009 (http://www.aagbi.org/sites/default/files/safe_management_2009_o.pdf).
- 4 Anaesthesia: care before, during and after anaesthesia – Standards (http://www.healthcareimprovementscotland.org/previous_resources/standards/anaesthesia.aspx).
- 5 The Management of Medical Equipment in NHS Acute Trusts in England. Report by the Comptroller and Auditor General. *National Audit Office* HC 475 Session 1998–99; 10 June 1999 (<http://www.nao.org.uk/idoc.ashx?docId=41ac60c7-d9e9-47c6-8b9a-5e83566d1369&version=-1>).



12.8

Maintenance of anaesthetic equipment

Dr D A Thomas

Why do this audit?

Use of increasingly complex anaesthetic equipment is increasing in many anaesthetic sites.¹ Most anaesthetic equipment is subject to frequent repetitive use.

It is essential for safe anaesthesia that equipment is maintained in good working order.² Planned preventative maintenance (PPM) may save breakdowns.³

Some equipment comes with a service contract valid for a defined period of time. Much anaesthetic equipment can be serviced in-house.

Best practice: research evidence or authoritative opinion

The Association of Anaesthetists³, RCoA² and QIS⁴ have published guidelines for the safe management of equipment.

Manufacturers publish a recommended schedule of servicing for new equipment.

Manufacturers provide training for in-house servicing. Departments of anaesthesia have a collective responsibility to ensure the maintenance of equipment.⁵

Suggested indicators

- D Existence of a named consultant (and deputy) responsible for equipment.
- D Inventory of all anaesthetic equipment with the date maintenance is due.
- D Existence of service contracts and dates of expiry.
- D % of equipment with a service contract served on time.
- D Record of named personnel qualified to service equipment in-house
- D % equipment serviced in-house and personnel servicing.
- D % equipment checked by clinical staff after maintenance.

Proposed standard or target for best practice

- D A named consultant (and deputy) should be in charge of equipment.
- D Inventory of equipment should be complete, including service contracts and dates of service.
- D 100% equipment serviced according to manufacturer's schedule.
- D 100% equipment labelled with the next service date.
- D Accurate list of staff trained to service specific equipment.
- D 100% of equipment serviced in-house by trained personnel.
- D 100% of equipment approved by clinical staff after maintenance.
- D 100% equipment removed from service due to failure should be recorded.

Suggested data to be collected

- D Presence of labelling with the date the next service is due.
- D Existence and completeness of service history.
- D Existence of service contracts.
- D Existence of in-house PPM programme.
- D Identification of engineer carrying out service.
- D Log of breakdowns and repairs.
- D Record of post-service approval by clinician.

Common reasons for failure to meet standard

- D Failure to maintain accurate records.
- D Absence of PPM programme for "minor" equipment
- D Failure to report minor malfunctions.
- D Failure to identify which in-house personnel are qualified to maintain specific equipment.
- D Movement of equipment between areas.

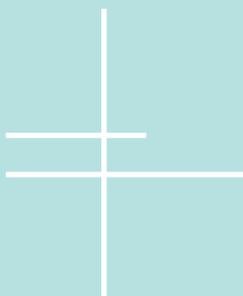
CPD and Curriculum mapping

CPD matrix codes: **1102; 3J00**

Training curriculum competences: **CC_D6_01–04; MN_AK_01–18**

References

- 1 Beydon L, Bourbain JL, de Vauma D. A survey of operating and recovery room ventilators and monitoring equipment as well as their maintenance [French]. *Ann Fr Anesth* 1996;**15**(1):71–74.
- 2 Guidelines for the provision of anaesthetic services. Chapter 1: Keypoints on the provision of anaesthetic services. *RCoA*, London 2009 (<http://www.rcoa.ac.uk/node/695>).
- 3 AAGBI Safety Guideline: Safe Management of Anaesthetic Related Equipment. *AAGBI*, London 2009 (http://www.aagbi.org/sites/default/files/safe_management_2009_0.pdf).
- 4 NHS Quality Improvement Scotland, Anaesthesia Project Group. Anaesthesia – Care Before, During and After Anaesthesia. *NHS QIS*, Edinburgh July 2003 (http://www.healthcareimprovementscotland.org/previous_resources/standards/anaesthesia_care_before_duri.aspx).
- 5 Guidelines for the Provision of Anaesthetic Services 2009 (<http://www.rcoa.ac.uk/GPAS>).



12.9

Training in the use of anaesthetic equipment

Dr D A Thomas

Why do this audit?

Increasingly complex equipment is used in many anaesthetic sites.¹ User error is a cause in a substantial number of reported cases of serious injury.²

Best practice: research evidence or authoritative opinion

The Association of Anaesthetists recognise that hospitals must ensure all personnel are trained but that it is the anaesthetist's responsibility to understand the function and checking of equipment.³

QIS state that all anaesthetic staff should receive formal and documented instruction on the use of equipment and that Instruction manuals are easily accessible.⁴

Most manufacturers provide user guides for equipment. Many manufacturers provide training at the installation of new equipment. Some will train later 'new starts'.

Suggested indicators

- D % staff trained at introduction of new equipment.
- D % staff familiar with all/specific equipment.
- D Availability of user guides.

Proposed standard or target for best practice

- D A named consultant should be in charge of equipment.
- D 100% staff should be trained to use equipment they might use.
- D Availability of a trainer with time to teach new staff.
- D 100% equipment should have user guides available.
- D 100% anaesthetic machine should be checked daily before use.

Suggested data to be collected

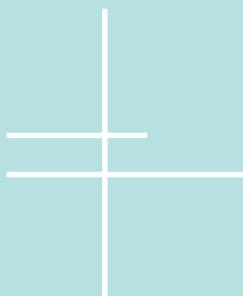
- D Availability of a trainer with time to teach new staff.
- D Availability of user guides (paper or electronic).
- D Personal and institutional records of training.
- D Logbook of daily pre-session check of anaesthetic machine

Common reasons for failure to meet standard

- D High turnover of trainee and locum anaesthetic staff.
- D Failure to keep accurate records of training.
- D Failure to recognise that common equipment may not be familiar to all.
- D Lack of storage location for paper user guides.

Related audits

12.7 – Purchase of new and replacement equipment.

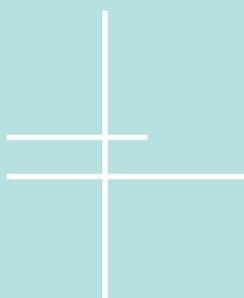


CPD and Curriculum mapping

This audit cannot be mapped to the CPD matrix or the training curriculum. Please refer instead to the GMC publication *Good Medical Practice* (http://www.gmc-uk.org/guidance/good_medical_practice.asp).

References

- 1 Beydon L, Bourbain JL, de Vauma D. A survey of operating and recovery room ventilators and monitoring equipment as well as their maintenance [French]. *Ann Fr Anesth* 1996;**15**(1):71–74.
- 2 The Management of Medical Equipment in NHS Acute Trusts in England. Report by the Comptroller and Auditor General. *National Audit Office HC 475* Session 1998–99; 10 June 1999 (<http://www.nao.org.uk/ldoc.ashx?docid=41ac60c7-d9e9-47c6-8b9a-5e83566d1369&version=-1>).
- 3 Checking Anaesthetic Equipment 4. *AAGBI*, London 2004 (under revision) (<http://www.aagbi.org/sites/default/files/checkingo4.pdf>).
- 4 NHS Quality Improvement Scotland, Anaesthesia Project Group. Anaesthesia – Care Before, During and After Anaesthesia. *NHS QIS*, Edinburgh July 2003 (http://www.healthcareimprovementscotland.org/previous_resources/standards/anaesthesia_care_before_duri.aspx).



12.10

Efficiency of scavenging systems

Dr K Ferguson

Why do this audit?

The effects of environmental pollution by inhalational anaesthetics on theatre personnel remains of concern despite the increasing use of low flow anaesthesia and the airway adjuncts such as the LMA.^{1,2} Workplace exposure limits (WEL) and advice on pollution control have been updated for nitrous oxide, halothane and enflurane in the new Health and Safety Executive regulations.³ Limits are not published for sevoflurane or desflurane but self-imposed standards may be identified using manufacturer's recommended limits.

Best practice: research evidence or authoritative opinion

Control of substances hazardous to health (COSHH) was introduced in 1988. The Health and Safety Executive (HSE) have updated the guidance by amending the 2002 guidelines.³ Further advice is available on the HSE website under the headline COSHH essentials. This website is a collaborative venture between the HSE, the TUC and CBI and provides online advice regarding chemicals in the work place.⁴

Suggested indicators

- D % of anaesthetic 'sites' within a hospital which have scavenging equipment that meets the WEL.
- D % of anaesthetic sites within a hospital which have been monitored within the last 6 months.
- D % anaesthetic sites, including recovery areas, which met the WEL for levels of inhalational anaesthetics.

Proposed standard or target for best practice

- D 100% anaesthetic sites should have equipment which meets the WEL.
- D 100% sites should have been monitored within the last 6 months.
- D 100% sites should meet the standards for levels of inhalational anaesthetics as defined by the WEL.

Suggested data to be collected

- D As above. Where pollution levels are high, the source should be found and corrected, and the site retested.
- D Number and duration of breaches of OES.

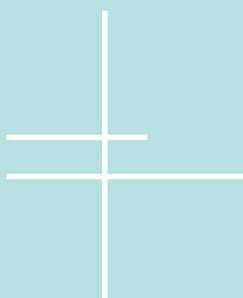
Common reasons for failure to meet standard

- D Scavenging not adequate, faulty or not used correctly.
- D Inadequate resources for regular testing.

CPD and Curriculum mapping

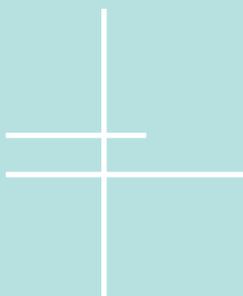
CPD matrix codes: **IA03**

Training curriculum competence: **PC_BK_26, PC_BK_87**



References

- 1 Gichrist CJ et al. Exposure to nitrous oxide in a paediatric dental unit. *Int J Paediatr Dent* 2007;**17**:116–122.
- 2 Raj N. Evaluation of personal, environmental and biological exposure of paediatric anaesthetists to nitrous oxide and sevoflurane. *Anaesthesia* 2003;**58**(7):630–636.
- 3 Health and Safety Executive 2005 Workplace Exposure Limits: Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations 2002 (as amended) (<http://www.hse.gov.uk/pubns/priced/eh40.pdf>).
- 4 COSHH Essentials: <http://www.hse.gov.uk/coshh/essentials/index.htm>.



12.11

Induction courses for new staff

Dr K Ferguson

Why do this audit?

All new staff, including permanent and locum staff appointments, should take part in a formal induction course.^{1,2,3,4,5} The content and delivery of the induction programme may be organised and agreed between the relevant department, the employer and the postgraduate education team. Local service and training rules, responsibilities and protocols should be made clear, verbally and in writing. In order to conduct safe anaesthesia, the anaesthetist must be familiar with the equipment being used.⁶ Failure to understand how to use the equipment is a recognised cause of anaesthetic incidents.^{7,8}

Best practice: research evidence or authoritative opinion

The General Medical Council, the Association of Anaesthetists, NHS Employers, Healthcare Improvement Scotland and DHSSPSNI rate the importance of induction programmes highly.^{1,2,3,4,5} There is a wealth of resources to support medical staff induction available online. Some examples are listed in the reference section below.^{9,10,11,12}

Suggested indicators

- D % new members of staff who have attended a formal induction course within 1 week of arrival.
- D % staff members who are aware of all the elements of an agreed induction programme within 1 month of arrival.
- D % staff members who have written evidence of induction.
- D % staff members who have undergone appropriate training before the introduction of new equipment to the department.

Proposed standard or target for best practice

- D All of the above indicators should be true for 100% staff.

Suggested data to be collected

A list of the minimum elements of an induction programme for trainees, consultants, non-consultant career grade staff, and for locum staff should be made. This should be done in consultation with the Training Programme Director; College Tutor; Clinical Director and Human Resources staff. Examples of comprehensive induction programmes exist and are readily available (see references). Suggestions include:

- D geographical layout, e.g. location of day theatres, emergency medicine, coronary care unit (especially for those carrying the cardiac arrest bleep), high dependency units, etc
- D personnel, e.g. department members, administrative and managerial staff
- D organisational aspects, e.g. source of operating lists, the rota, holiday and study leave requests
- D clinical protocols, e.g. obstetric analgesia protocol, criteria and process for HDU and ICU admissions, acute pain service protocols, etc
- D use of support services, e.g. out-of-hours blood tests, how to obtain blood products, physiotherapy and pharmacy enquiries
- D house keeping, e.g. parking, catering, where the coffee is kept, changing-room lockers, where to obtain theatre shoes, etc
- D educational goals and development plan and written agreement.

Over a 6–12 month period all new staff should be interviewed 2 weeks after their arrival and their knowledge assessed.

Common reasons for failure to meet standard

- D Lack of commitment to programme.
- D Incomplete programme provided.
- D No time/insufficient time provided for induction.

Related audits

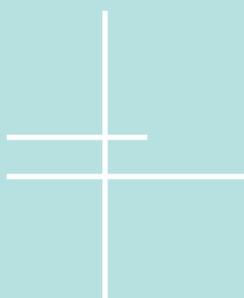
I2.9 – Training in the use of anaesthetic equipment

CPD and Curriculum mapping

This audit cannot be mapped to the CPD matrix or the training curriculum. Please refer instead to the GMC publication *Good Medical Practice* (http://www.gmc-uk.org/guidance/good_medical_practice.asp).

References

- 1 The Trainee Doctor. GMC, London 2011 (http://www.gmc-uk.org/Trainee_Doctor.pdf_39274940.pdf).
- 2 Consultant trainee relationships – a guide for consultants. AAGBI, London 2001 (http://www.aagbi.org/pdf/consultant_trainee.pdf).
- 3 NHS Quality Improvement Scotland, Anaesthesia Project Group. Anaesthesia – Care Before, During and After Anaesthesia. *NHS QIS*, Edinburgh July 2003 (http://www.healthcareimprovementscotland.org/previous_resources/standards/anaesthesia_care_before_duri.aspx).
- 4 The State of Medical Education and practice. GMC, London 2011 (http://www.gmc-uk.org/State_of_medicine_Final_web.pdf_44213427.pdf).
- 5 Report on induction processes for medical staff in the HPSS. *DHSSPSNI* 2005 (http://www.dhsspsni.gov.uk/induction_report_final.doc).
- 6 AAGBI Safety Guidelines: Safe Management of Anaesthetic Related Equipment (http://www.aagbi.org/sites/default/files/safe_management_2009_0.pdf).
- 7 Cooper JB, Newbower RS, Kitz RJ. An analysis of major errors and equipment failure in anesthesia management: considerations for prevention and detection. *Anesthesiology* 1984;**60**:34–42.
- 8 Cassidy CJ, Smith A, Arnot-Smith J. Critical incident reports concerning anaesthetic equipment: analysis of the UK National Reporting and Learning System (NRLS) data from 2006–2008. *Anaesthesia* 2011;**66**:879–888.
- 9 NHS Connecting for Health: (<http://www.connectingforhealth.nhs.uk/systemsandservices/icd/informspec/careerplan/phi/personal/learningweb/personal/induction>).
- 10 Welcome to the medical team. *NHS Employers*, 2011 (http://www.nhsemployers.org/SiteCollectionDocuments/Welcometomedteam_2010_web_MH_190710.pdf).
- 11 Report on induction processes for medical staff in the HPSS (http://www.dhsspsni.gov.uk/induction_report_final.doc).
- 12 State of readiness checklist. *NHS Employers*, 2011 (http://www.nhsemployers.org/PlanningYourWorkforce/MedicalWorkforce/Medical_Education_and_training/Specialty-and-GP-training/Pages/Stateofreadinesschecklist2011.aspx).



12.12

Knowledge of major incident policy

Dr J Gudgeon, Dr J Clarke, Dr P Keeling

Why do this audit?

All staff in an acute hospital responding to major incidents should be aware of the Major Incident Policy which is derived from DH guidance documents.^{1,2,3,4} Local policies may vary between hospitals. In order to function in the event of a major incident all hospital staff must be familiar with the local policy. Regular training is essential. This audit can be useful both departmentally and hospital wide.

Best practice: research evidence or authoritative opinion

Acute hospitals nominated to respond to a major incident must:

- D have a major incident plan that complies with DH recommendations
- D ensure that the policy is regularly reviewed in line with DH updates
- D ensure that all staff are trained and equipped for their roles in a major incident.

Suggested indicators

- D % of staff who know where the written major incident policy is kept.
- D % of staff who know how to obtain it out of hours.
- D % of staff (to include consultants, trainees and administrative staff) who know their immediate role in the event of a major incident alert or a major incident.
- D % of staff in post for less than a year who received information about the policy at their hospital induction.
- D % of staff in post for more than a year who have received training or information updating them on the policy during the preceding year.

Proposed standard or target for best practice

- D All indicators should be true in 100% of staff.

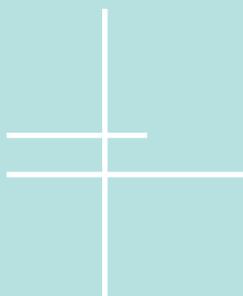
Suggested data to be collected

All members of the department and/or a selection of staff throughout the hospital should be asked the following:

- D Where is the major incident document kept in your department?
- D How do you obtain it out of hours?
- D What is your first action if a major incident alert is declared?
- D What is your first action if a major incident is declared?
- D If you have joined the hospital within the last year did you receive a copy of the policy (or the relevant section of it) at your induction?
- D If you have joined the hospital more than a year ago – have you received any training or refresher information about the policy in the last year?

Common reasons for failure to meet standard

- D Failure of the hospital or department to include major incident training at induction.
- D Failure to provide hospital or departmental updates.
- D Absence of staff at times of updates.



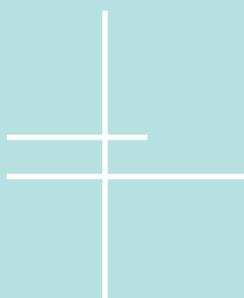
CPD and Curriculum mapping

CPD matrix codes: 1I02, 2A02, 3A10

The CCT in Anaesthesia Training Programme – Intermediate and Higher Training, Trauma Management and Stabilisation, and Higher Training, Domain 2 – Team Working, Domain 3 – Leadership, Domain 5 – Management.

References

- 1 NHS emergency planning guidance 2005. *DH*, London 2005 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4121072).
- 2 NHS emergency planning guidance: planning for the development and deployment of Medical Emergency Response Incident Teams in the provision of advanced medical care at the scene of an incident. *DH*, London 2010 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_114464).
- 3 NHS Emergency Planning Guidance 2005: underpinning materials - critical care contingency planning in the event of an emergency where the numbers of patients substantially exceeds normal critical care capacity. *DH*, London 2007 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_081282).
- 4 Strategic command arrangements for the NHS during a major incident. *DH*, London 2007 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_081507).



12.13

Critical incident reporting

Dr K Ferguson

Why do this audit?

A critical incident is 'any unintended event which reduced or could have reduced the margin of safety for the patient'. It is anticipated that learning and improvement in patient safety and quality of care can be achieved by reporting and reviewing critical incidents and near misses.² Equipment failure and human error; or commonly both, may cause a critical incident.³ However, there is substantial under-reporting of both incidents leading to harm and near misses. At present the NRLS receives incident reports (England and Wales). Through a data sharing agreement the Safe Anaesthesia Liaison Group (SALG) provide analysis summaries of these and more rapid responses on serious events.

Best practice: research evidence or authoritative opinion

The application of critical incident monitoring to anaesthesia resulted in the Australian Incident Monitoring Study (AIMS).⁵ Further similar studies have been reported in Holland¹ and Hong Kong.⁶ The Royal College of Anaesthetists (RCoA) piloted a Critical Incident Study. The number of incidents is high, about 1 in 15 cases.⁷ Under-reporting is gross and widespread. The use of a mandatory system for reporting adverse events, mishaps and errors was recommended by the Department of Health in An organisation with a memory⁸ and Building a safer NHS for patients.⁹ WHO, as part of their patient safety initiative, have produced draft guidelines on effective reporting systems.¹⁰

Proposed standard or target for best practice

- D Existence and use of a system within the department for reporting, analysing and acting on critical incidents.
- D % critical incident reports that include a minimum data set.
- D % of anaesthetic procedures from which a critical incident report is generated.
- D % of reported critical incidents that are discussed at a review meeting.
- D % of reported critical incidents that had suitable corrective and timely action taken, in the opinion of the auditor:
- D Evidence that the departmental system is tied into the hospital's mandatory reporting systems in an explicit and agreed manner.

Suggested indicators

- D The standard of best practice should be that each anaesthetic department uses a critical incident monitoring system.
- D 100% critical incident reports should include a minimum data set. Anaesthesia eform is recommended NRLS Anaesthesia Report Form (<https://www.eforms.npsa.nhs.uk/asbreport>).
- D % of anaesthetic procedures from which a critical incident report is generated is expected to be about 6.7% (1 in 15).⁷
- D 100% reported critical incidents should be discussed at a review meeting.
- D 100% reported critical incidents should have had suitable and timely local corrective action taken.¹¹
- D 100% of incidents should have documentation to support evidence of their onward transmission to hospital and national (NPSA) reporting systems.

Suggested data to be collected

- D The content and follow up of all critical incident reports made during the audit period should be recorded.
- D Alternatively it may be possible to identify further critical incidents by a short intensive audit of every operating list. Anaesthetists would be required to confirm the absence of a critical incident, under headings to include disconnections, wrong drug, wrong dose, wrong route, equipment or monitoring failure, adverse physiological event, etc. This might have the dual effect of increasing awareness of critical incident reporting and revealing a critical incident rate closer to the real rate.

Common reasons for failure to meet standard

- D Lack of readily available forms and/or forgetfulness.
- D Failure to understand what constitutes a critical incident.
- D Failure to realise that a critical incident occurred due to late presentation of the effects of the incident or lack of patient follow up.
- D Failure to know or believe true occurrence of incidents.
- D Fear of criticism, disciplinary action or litigation.^{12,13}
- D Morbidity and mortality reviews – the content and outcomes from meetings held
- D Hours of work.
- D Levels of supervision – reviewed within ARCP process.

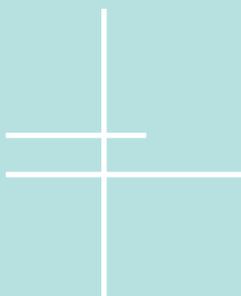
CPD and Curriculum mapping

CPD matrix codes: **II01, II05**

Training curriculum competences: **PO_BK, PO_BS, CI_BK, CI_IK, CI_IS**

References

- 1 Chopra V et al. Reported significant observations during anaesthesia: a prospective analysis over an eighteen month period. *Br J Anaesth* 1992;**68**:13–17.
- 2 R P Mahajan Critical incident reporting and learning *Br J Anaesth* 2010;**105**(1):69–75.
- 3 Runciman WB et al. System failure; an analysis of 2000 incident reports. *Anaesth Intens Care* 1993;**21**:684–695.
- 4 National Patient Safety Agency. Seven steps to patient safety: A guide for NHS staff. *NPSA*, London 2003 (<http://www.nrls.npsa.nhs.uk/resources/collections/seven-steps-to-patient-safety/>).
- 5 Webb RK, Currie M, Morgan CA. The Australian Incident Monitoring Study: an analysis of 2000 incident reports. *Anaesth Intens Care* 1993;**21**:529–542.
- 6 Short TG, O'Regan A, Lew J. Critical incident reporting in an anaesthetic department quality assurance programme. *Anaesthesia* 1992;**47**:3–7.
- 7 Spittal MJ, Findlay GP, Spencer I. A prospective analysis of critical incidents attributable to anaesthesia. *Int J Qual Health C* 1995;**7**(4):364–371.
- 8 An organisation with a memory. *DH*, London June 2000 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4065083).
- 9 Building a safer NHS for patients: Implementing an organisation with a memory. *DH*, London April 2001 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4006525).
- 10 WHO draft guidelines for adverse event reporting and learning systems. *WHO* 2005 (http://www.who.int/patientsafety/events/05/Reporting_Guidelines.pdf).
- 11 Runciman WB. Incident monitoring. In: Aitkenhead AR (Ed). *Quality assurance and risk management in anaesthesia*. *Ballière's Clinical Anaesthesiology*, 1996;**10**(2):333–355.
- 12 Jayasuriya, JP, Anandaciva S. Compliance with an incident report scheme in anaesthesia. *Anaesthesia* 1995;**50**(10):846–849.
- 13 Lack JA. Perioperative anaesthetic audit. In: Kenny GNC (Ed). *Automated anaesthetic records*. *Baillière Tindall*, London 1990; pp 171–184.



12.14

Follow up arrangements for patients with suspected drug reactions

Dr A Bayliss

Why do this audit?

This audit focuses on three types of adverse reaction. These are:

- D anaphylaxis
- D suxamethonium apnoea
- D malignant hyperpyrexia.

When suspected, these reactions require follow up. The results of investigations must be made known to the patient, and the family may need to be investigated also. There is no simple mechanism for such follow up, and this audit will determine whether follow-up is occurring correctly in all cases.

Similar follow up arrangements may be required to further evaluate and plan future management of difficult and failed intubations.¹

Best practice: research evidence or authoritative opinion

Protocols for correct follow up of anaphylaxis and malignant hyperpyrexia are available.^{2,3,4}

For suxamethonium apnoea all first degree relatives should be screened according to local laboratory protocols and as described in standard text books.^{5,6} Further testing may be required at a regional or supra-regional reference laboratory.

Suggested indicators

- D % original anaesthetists aware of the outcome of follow up. Responsibility lies with this person unless it is clearly passed on.
- D % patients fully investigated and informed of the results.
- D % families fully followed up.
- D % cases where the GP is aware of the outcome for his records.
- D % cases where yellow card has been sent (if appropriate).
- D % cases where correct action was taken at the time of the incident so that follow up is possible.
- D (for anaphylaxis only – correct blood taken, etc).

Proposed standard or target for best practice

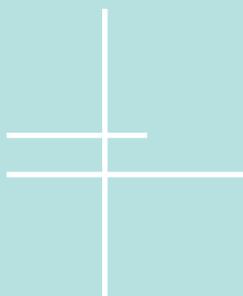
- D All above indicators should be true for 100% cases of serious adverse drug reaction.
- D All patients with difficult airways should be informed and followed up.

Suggested data to be collected

The difficulty with this audit will be identifying all the cases. The critical incident record book, theatre incident book, local immunology and biochemistry lab records may be useful sources. The audit information may be obtained from the patient's notes. It may be necessary to contact the GP to find out about family follow up.

Common reasons for failure to meet standard

- D No organised setting for such follow up, e.g. a regular clinic session.
- D Long time in obtaining data from outside sources.
- D Non-compliance by patient or family.



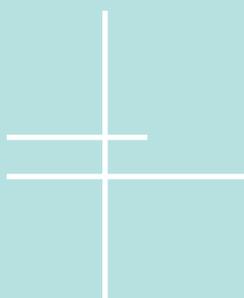
CPD and Curriculum mapping

CPD matrix codes: I101, I105, I101

Training curriculum competences: BK, CI_BS, CI_IK, CI_IS

References

- 1 Difficult Airway Society. Guidelines for difficult airway follow-up. *DAS*, London 2004 (<http://www.das.uk.com>).
- 2 Suspected anaphylactic reactions associated with anaesthesia 4. *AAGBI*, London 2009 (http://www.aagbi.org/sites/default/files/anaphylaxis_2009_0.pdf).
- 3 AAGBI Safety Guideline. Malignant hyperthermia crisis. *AAGBI*, London 2011 (<http://www.aagbi.org/sites/default/files/MH%20guideline%20for%20web%20v2.pdf>).
- 4 Further information from UK MH Investigation Unit, St James University Hospital, Leeds (<http://www.leedsth.nhs.uk/services/malignant-hyperthermia/>).
- 5 Suxamethonium. In: Yentis SM, Hirsch NP, Smith GB (Eds). *Anaesthesia and Intensive Care A to Z*. *Churchill Livingstone* 4th Edition 2009: pp 512–514.
- 6 Suxamethonium. In: Calvey TN, Williams NE (Eds). *Principles and practice of pharmacology for anaesthetists*. *Blackwell Scientific* Oxford 2008: pp 101.



12.15

Disposal of controlled drugs

Dr K Ferguson

Why do this audit?

There are well defined legal requirements covering the storage, use and disposal of controlled drugs.^{1,2,3,4,5} Anaesthetists have access to a wide variety of drugs during the course of an anaesthetic. Disposal of controlled drugs is important because of the potential for abuse. This audit aims to assess whether anaesthetists and their assistants are aware of recommended practice. With the introduction of accountable officers and a formal process to oversee the safe destruction and disposal of controlled drugs it may be possible to audit the practice itself. When these drugs are used outside a conventional operating theatre setting, the same standards should apply regarding their disposal.

Best practice: research evidence or authoritative opinion

All controlled drugs given and wasted should be accounted for.^{4,5} The Association of Anaesthetists⁶ recommends that:

- D syringes containing residual unused controlled drugs should be emptied before being discarded
- D drug solutions should not be flushed down the drain, but should be emptied onto absorbent material before disposal.

Suggested indicators

- D % anaesthetists and their anaesthetic assistants (ODA, ODP, anaesthetic nurses) who are aware of the two above recommendations for disposal of controlled drugs.
- D % anaesthetists who state that they practise these recommendations in their daily work.
- D % anaesthetic assistants questioned who are aware of these recommendations for disposal of controlled drugs.
- D % anaesthetic assistants who state that they practise these recommendations in their daily work.
- D % availability of register available to record dispensing of controlled drugs.
- D % of complete records of drug administered and drug disposed of.

Proposed standard or target for best practice

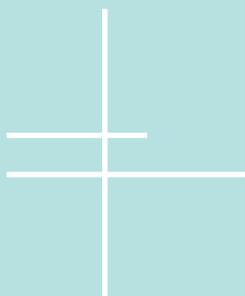
- D 100% anaesthetists should be aware of the recommendations.
- D 100% of anaesthetists questioned should state that they practise these recommendations.
- D 100% anaesthetic assistants questioned should be aware of the recommendations.
- D 100% of anaesthetic assistants questioned should state that they practise these recommendations.
- D 100% register available wherever controlled drugs are prescribed and used in anaesthetic practice.
- D 100% complete records in the register.

Suggested data to be collected

All anaesthetists and their assistants should be questioned about their practice. Nurses from wards where opiate infusions are used should also be questioned. Practice should include documenting volume or amount of drug wasted, and emptying the residual unused controlled drug onto absorbent material before discarding.

Common reasons for failure to meet standard

- D Lack of awareness of guidelines and regulations.
- D Lack of belief in necessity to comply with guidelines.

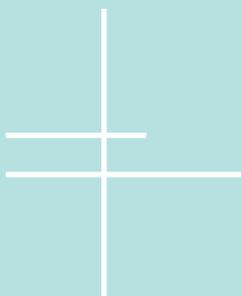


CPD and Curriculum mapping

This audit cannot be mapped to the CPD matrix or the training curriculum. Please refer instead to the GMC publication *Good Medical Practice* (http://www.gmc-uk.org/guidance/good_medical_practice.asp).

References

- 1 Medicines Act, 1968 (<http://www.legislation.gov.uk/ukpga/1968/67/contents>).
- 2 The Misuse of Drugs Act, 1971 (<http://www.legislation.gov.uk/ukpga/1971/38/contents>).
- 3 Health Act 2006 (http://www.legislation.gov.uk/ukpga/2006/28/pdfs/ukpga_20060028_en.pdf).
- 4 Dangerous Drugs, England, Scotland The Controlled Drugs (Supervision of Management and Use) Regulations 2006. Statutory Instrument No. 3148 (http://www.legislation.gov.uk/uksi/2006/3148/pdfs/uksi_20063148_en.pdf).
- 5 The Misuse of Drugs (Amendment) (England, Wales and Scotland) Regulations 2011 No. 448 (<http://www.legislation.gov.uk/uksi/2011/448/made>).
- 6 Controlled drugs in perioperative care. AAGBI, London 2006 (<http://www.aagbi.org/pdf/drugs.pdf>).



12.16

Infection control in anaesthesia

Dr J Leedham, Dr R Kitson

Why do this audit?

Healthcare associated infections (HCAs) are increasing in-patient mortality and their duration of hospital stay. This is costing NHS Trusts an estimated, additional £4,000–£10,000 per patient.¹

Many patients we anaesthetise have their normal immune defences compromised in some way. In addition we perform many invasive procedures where complicating neuroaxial and systemic infections can be devastating.

Many professional bodies (AAGBI, EPIC, ANZCA, ASRAPM, ASA)^{2,3,4,5,6} have published similar guidance in this area based upon our current understanding of infection transmission. Increasing awareness and debate about this evidence base will highlight which elements of clinical practice are essential in the prevention and control of HCAI and which are less substantiated by available evidence.

We have a duty to improve the safety of patient care and as such we must take steps to minimise the risks of infection to them, our colleagues and ourselves. Established good practices will help to protect us if infective cases go unrecognised.

Best practice: research evidence or authoritative opinion

The complex relationship between contamination, colonisation and infection remains to be fully explained. Most experts therefore recommend that exhaustive efforts should be directed at minimising all sources of infection wherever possible.

Prevention is certainly prudent in an era of increasing bacterial resistance and redundant anti-microbial agents. Many recommendations from the guidelines are simple and can be successfully implemented through due diligence. However, these measures need to become embedded into everyday practice and consistently applied by everyone.

Suggested indicators

- D Identified department lead on infection control.
- D Use of aseptic technique and full barrier precautions for invasive procedures (spinals, epidurals, central venous catheters).
- D Use of aseptic technique for single shot peripheral nerve blocks and arterial line insertions.
- D Hand hygiene before each new patient or equipment contact.
- D Safe handling and disposal of sharps.
- D Non-use of same syringe, infusion tubing or needle for different patients.
- D Existence of a functional and appropriate local inoculation injury procedure.
- D Contaminated equipment, e.g. Guedel oropharyngeal airway placed in a designated receptacle.
- D New bacterial/viral filter positioned between the breathing circuit and each new patient.
- D Cases with potential to disperse microbes harmful to other patients should be scheduled last on the list wherever possible.
- D Compliance with endocarditis and surgical antibiotic prophylaxis guidelines.
- D Identification of the immune-compromised patient at pre-assessment.
- D Nationally recommended decontamination policies are followed for all reusable anaesthetic equipment.

Proposed standard or target for best practice

- D 100% compliance with published guidelines or local policies.

Suggested data to be collected

- D Direct observation of working practices by colleagues, operating department practitioners or theatre nurses during elective lists.

Common reasons for failure to meet standard

- D Time pressures, convenience of cutting corners and cost implications of increased disposable equipment use.
- D Individual 'anaesthetic rituals' may have been practised repeatedly for many years and these habits are consequently very hard to change. These perpetuate and reinforce local cultures of practice.
- D Lack of awareness of new updated standards, policies and guidelines.

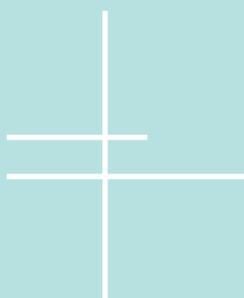
CPD and Curriculum mapping

CPD matrix codes: **IE01**

Training curriculum codes: **IF_BK_01-05, IF_BS_01-07**

References

- 1 Clean, safe care: reducing infections and saving lives. *DH*, London January 2008 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_081650).
- 2 Infection Control in Anaesthesia 2. *AAGBI*, London September 2008 (http://www.aagbi.org/sites/default/files/infection_control_o8.pdf).
- 3 Pratt, RJ et al. epic2: National Evidenced-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *J Hosp Infection* 2007;**65**:S1-S64.
- 4 Australian New Zealand College of Anaesthetists. Guidelines on infection control in anaesthesia. *ANZCA*, Review PS28, February 2005.
- 5 Hebl JR. The importance and implications of aseptic technique in regional anaesthesia. *Reg Anaesth Pain Med* 2006;**31**:311-323.
- 6 American Society of Anesthesiologists. Recommendations for Infection Control for the practice of Anesthesiology (second edition). *ASA*, Park Ridge USA 1999.



12.17

Availability and use of International Colour Coding System (ICCS) syringe labels

Dr N Bhuskute, Dr D Earl

Why do this audit?

Correct ICCS syringe labelling is important in anaesthetic practice to assist in avoiding errors in drug preparation and administration. Syringe swaps (up to 70%)^{1,2} and misidentification of labels (up to 46%),^{1,2} have both been shown to be significant factors in anaesthetic drug errors.³

A majority of anaesthetists consider labelling as the most important single factor in identifying a drug syringe.²

Best practice: research evidence or authoritative opinion

To minimise drug administration errors in all operating theatre and critical care environments, the Councils of the Royal College of Anaesthetists, the Association of Anaesthetists of Great Britain and Ireland, the College of Emergency Medicine and Intensive Care Society have recommended adoption of the International Colour Coding System (ICCS) for syringe labelling.^{4,5}

Suggested indicators

- D Existence of a locally agreed list of recommended critical care/anaesthetic drugs.
- D Evidence of availability of all ICCS syringe labels for the recommended list in each relevant clinical area.
- D % of other methods or non ICCS labels used for syringe labelling.
- D % of availability and use of the appropriate labels.
- D Evidence of critical incident reporting of labelling-related issues.

Proposed standard or target for best practice

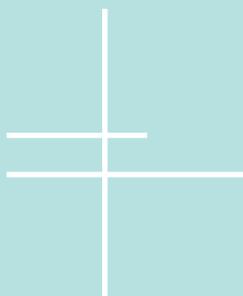
- D 100% availability of recommended drug list.
- D 100% availability of ICCS labels.
- D 100% use of ICCS labels.
- D 0% use of alternative methods of labelling.
- D 100% critical incident reporting of errors in drug administration and preparation.

Suggested data to be collected

- D Locally recommended drug list.
- D Check availability of ICCS syringe labels for all drugs in all operating theatre and critical care areas.
- D Drug errors reported as critical incident.

Common reasons for failure to meet standard

- D Unavailability of recommended drug list and ICCS labels.
- D Alternative methods of labelling and drug identification.
- D Lack of critical incident reporting of drug errors.
- D Checks of all above not regarded as important.

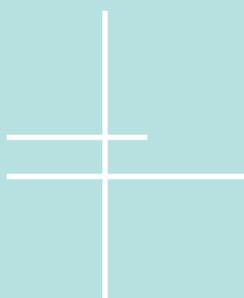


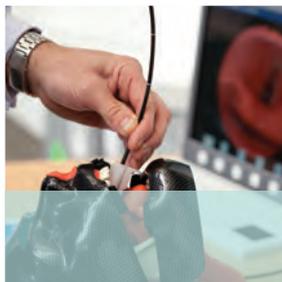
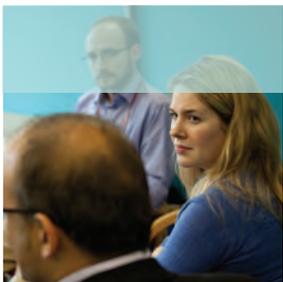
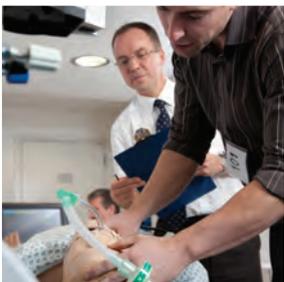
CPD and Curriculum mapping

Training curriculum codes: CD_8_01–07

References

- 1 Orser B, Chen R, Yee D. Medication errors in anaesthetic practice. A survey of 687 practitioners. *Can J Anaesth* 2001;**48**:139–146.
- 2 Critical incident involving syringe labels. *Anaesthesia* 2007;**62**(1):95–96.
- 3 Khan FA, Hoda MQ. Drug related critical incidents. *Anaesthesia* 2005;**60**(1):48–52.
- 4 Syringe labelling in critical care areas. *RCoA Bulletin* 2003;**19**:953.
- 5 Syringe labelling in critical care areas: June 2004 update. *RCoA Bulletin* 2004;**27**:1370.





Section 13: Training

Edited by Dr Edward Wilson

- 13.1** Consultant supervision of trainees in operating lists
- 13.2** Trainee logbooks – are they up to date?
- 13.3** Study leave for trainees, including attendance at FRCA courses
- 13.4** Continuing Professional Development (CPD)
- 13.5** ICU training
- 13.6** Airway management training for novice anaesthetists
- 13.7** Airway management training for higher trainees (ST 5–7)
- 13.8** Delivery, timing and quality of pain medicine training for anaesthetic trainees
- 13.9** Delivery, timing and quality of pain training for the higher and advanced pain trainee

13.1

Consultant supervision of trainees in operating lists

Dr J Clarke, Dr P Keeling, Dr G Sridhar

Why do this audit?

To ensure compliance with Royal College of Anaesthetists (RCoA) guidelines^{1,2} and that all trainees are receiving this most fundamental aspect of training.

Best practice: research evidence or authoritative opinion

The RCoA has issued guidance on the appropriate supervision of trainees.¹ To ensure patient safety, trainees new to the specialty must, at all times, be directly supervised until they have passed the Initial Assessment of Competence.

Suggested indicators

D % trainees with the correct proportion of actual accompanied lists, as stated in the RCoA guidelines.

Proposed standard or target for best practice

- D 100% novice trainees in their first 12 weeks of anaesthesia should have all timetabled lists directly supervised by a consultant or post fellowship senior trainee.
- D 100% all other trainees to have at least three operating sessions per week supervised by a consultant.

Suggested data to be collected

A survey can be carried out over a minimum one month period. This should be done using departmental records and trainee logbooks. Trainee logbooks should give an accurate source of information as to actual supervision. Departmental rotas will show planned training sessions. The supervisor should be present throughout the session and not doing another list at the same time. An out-of-theatre session such as on labour ward counts as a list. Apart from consultants, clinical supervision can be provided by approved staff, associate specialist (SAS) grades and senior trainees.

A comparison of the two will show:

- D actual supervision levels
- D number of planned sessions to ensure the department is correctly planning for training
- D number of planned supervision sessions against actual sessions which will give a percentage of the number of last minute changes and thus give a measure of crisis levels in department.

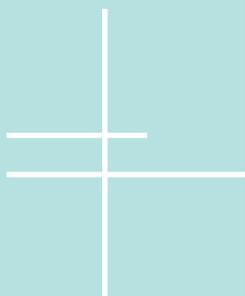
Common reasons for failure to meet standard

- D Service commitments over-riding training needs.
- D Absence amongst colleagues
- D Departmental staffing inadequate for required service delivery.
- D Poor departmental planning.

CPD and Curriculum mapping

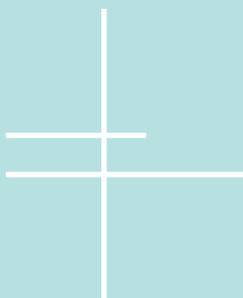
CPD matrix codes: **IH01**

Training curriculum competences: **Annex A, Domains 3–5 and 8, Annex G**



References

- 1 Curriculum for a CCT in Anaesthetics, Edition 2: Section 2 and 6. RCoA, London August 2010 (<http://www.rcoa.ac.uk/node/1462>).
- 2 Curriculum for a CCT in Anaesthetics, Edition 2: Appendix. RCoA, London August 2010 (<http://www.rcoa.ac.uk/node/1462>).



13.2

Trainee logbooks – are they up to date?

Dr J Clarke, Dr P Keeling, Dr G Sridhar

Why do this audit?

To ensure that all trainees keep an up-to-date logbook as recommended by RCoA.^{1,2}

This will highlight those trainees who are failing to keep an adequate logbook, which is an essential requirement for progression up the career ladder.

Best practice: research evidence or authoritative opinion

The Royal College of Anaesthetists (RCoA) states it is mandatory for all trainees to maintain an up-to-date logbook, except for those in their final two years of training.¹

Suggested indicators

Review of trainee logbooks looking at essential information as defined by RCoA.

Proposed standard or target for best practice

D 100% trainees should have logbooks in a format that contains the minimum recommended data set.² Patients must not be individually identifiable from the patient ID used. If trainees are relying solely on computerised theatre records, they should ensure ASA grade and supervision level are also recorded.

Suggested data to be collected

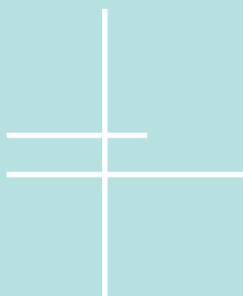
- D % of trainees whose logbook is up to date on the day of the audit.
- D % of trainees with completed records no more than 7 days prior to the date of the audit.
- D % of cases that included the ASA grade.
- D % of cases that included supervision levels.
- D % of cases that included patient's age or date of birth.
- D % of trainees that included a record of critical incidents. This can then be cross referenced with the actual number reported to the Department.

Common reasons for failure to meet standard

- D Lack of engagement in training process by trainee.
- D Lack of understanding of importance of logbook.
- D Overworked or stressed trainee who defers filling in details.
- D Lack of adequate supervision by College Tutor or Educational Supervisor.

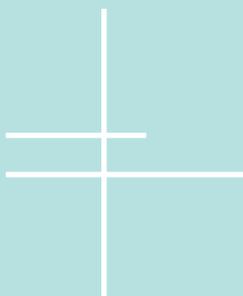
CPD and Curriculum mapping

CPD matrix: **Level 1 evidence**



References

- 1 Curriculum for a CCT in Anaesthetics, Edition 2: Section 9. RCoA, London August 2010 (<http://www.rcoa.ac.uk/node/1462>).
- 2 Royal College of Anaesthetists Electronic logbook (<http://www.logbook.org.uk/>).



13.3

Study leave for trainees, including attendance at FRCA courses

Dr J Clarke, Dr P Keeling, Dr G Sridhar

Why do this audit?

It is important that trainees have study leave^{1,2,3} including, where appropriate, access to a recognised FRCA course. Factors that prevent trainees from taking appropriate study leave should be identified and corrected at an early stage.

Best practice: research evidence or authoritative opinion

The NHS terms and conditions of service handbook² outlines the recommended study leave for trainees.

Suggested indicators

- D % trainees who have taken at least 75% of their study leave entitlement in the year prior to the date of the audit.
- D % candidates for the primary and final FRCA who have attended a recognised course prior to taking the examination.

Proposed standard or target for best practice

- D 75% of trainees should have used at least 75% of their study leave entitlement in the year prior to the date of the audit.
- D 100% candidates for the primary or final FRCA should have attended a recognised course before their first attempt at the exam.

Suggested data to be collected

This data could be collected at the Annual Review of Competence Progression (ARCP)/Record of In-training Assessment (RITA), or the audit could be undertaken within a department. The following could be collected.

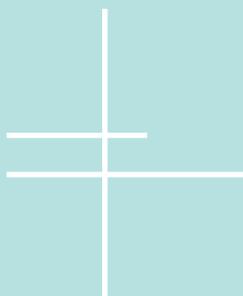
- D The number of days of study leave taken within one year against entitlement.
- D Whether the trainee has attended a recognised course within 6 months of their first attempt at an exam.
- D A detailed analysis of the specific reasons for failure to take appropriate study leave.
- D Ask trainees to grade all their study leave as a %. In relation to exams identify courses and exam outcomes to identify good and less good courses for other trainees.
- D Names of courses attended as well as cost and length of course, to help build up a data set on courses available.

Common reasons for failure to meet standard

- D Lack of knowledge of study leave entitlement.
- D Service commitment does not allow for full entitlement.
- D Trainee not fully engaged with training programme.
- D Not enough training places on local course.
- D Hospital unable to release all trainees at same time.

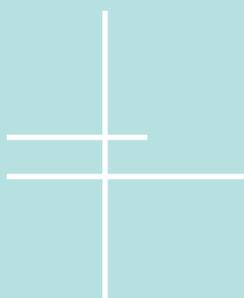
CPD and Curriculum mapping

Training curriculum competence: **CC_D7_01**



References

- 1 Conference of Postgraduate Medical Deans of the United Kingdom. Study Leave policy. *COPMED*, 2006 (http://www.copmed.org.uk/page.php?page_id=8).
- 2 NHS terms and conditions of service handbook. *NHS Employers*, Amendment 26 2012 (http://www.nhsemployers.org/SiteCollectionDocuments/AfC_tc_of_service_handbook_fb.pdf).
- 3 The Trainee Doctor. Foundation and specialty, including GP training. *GMC*, London 2011 (http://www.gmc-uk.org/Trainee_Doctor.pdf_39274940.pdf).



13.4

Continuing Professional Development (CPD)

Dr J Clarke, Dr P Keeling, Dr G Sridhar

Why do this audit?

It is a General Medical Council (GMC) requirement that career grade anaesthetists (including consultants, associate specialists, staff and trust grade and specialty doctors) participate in CPD.¹ Anaesthetists will be required to present evidence of their participation in CPD for their annual appraisal.² An output of the annual appraisal, which will feed into revalidation, will be confirmation that an anaesthetist has engaged in CPD to a satisfactory level, in keeping up to date across the scope of their professional practice and meeting the objectives in their personal development plan.³

An audit will provide feedback that anaesthetists in the department are meeting these GMC requirements and if not, the possible reasons why.

Best practice: research evidence or authoritative opinion

The GMC do not require doctors to be a member of a college CPD scheme but suggest that doctors may find participation in such a scheme as helpful in keeping up to date and being able to show adherence to the appropriate standards in the specialty.

The RCoA maintains a credit based CPD scheme, accredits educational activities having met defined quality criteria, provides guidance through a matrix of knowledge and skill areas to be covered in CPD and has developed an online CPD system allowing anaesthetists to record their participation in CPD.⁴

Suggested indicators

- D % of career grade anaesthetists who achieved the RCoA recommendation of obtaining a minimum of 50 CPD credits per year. Of these 50 credits, a minimum of 20 internal (of which at least 10 credits should be derived from local clinical governance meetings) and 20 external credits should be obtained. The other 10 credits allow a degree of flexibility in practice.
- D % of career grade anaesthetists who had an appraisal and it was agreed by their appraiser that they have presented appropriate supporting information on CPD reflecting the nature and scope of their professional practice and work.
- D % of career grade anaesthetists who had an appraisal and it was agreed by their appraiser that progress was being made against last year's personal development plan has taken place.

Proposed standard or target for best practice

- D 100% of career grade anaesthetists should achieve the RCoA minimum CPD credits requirement and agreement from their appraisers that their CPD is of an adequate and satisfactory level.

Suggested data to be collected

- D End of year CPD report for the annual appraisal from each individual anaesthetist summarising the CPD credits obtained across internal and external activities. Registered users of the RCoA online CPD system can automatically generate this summary report. Reports should be anonymised when submitted to the local/departmental co-ordinator carrying out the audit.
- D Appraisal output statement indicating agreement from the appraiser that appropriate supporting information on CPD has been presented and progress has been made against the personal development plan. The statement should be anonymised when submitted to the local/departmental co-ordinator carrying out the audit.
- D Reasons should be collected as to why, if an anaesthetist fails to obtain the minimum number of CPD credits (including internal and external) recommended by the RCoA, or if the appraisal output statement fails to indicate an agreement on CPD or progress has been made against the personal development plan.

Common reasons for failure to meet standard

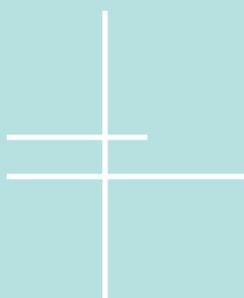
- D Failure of the individual anaesthetist to appreciate the importance of CPD
- D Service commitments over-riding CPD.
- D In some specialist areas, such as obstetrics or cardiothoracic, it will not be possible for all members of staff to attend key meetings or CPD events.
- D Lack of funding, resource allocation or support from employers, including limited study leave funding and insufficient SPA time.^{5,6}

CPD and Curriculum mapping

References

Training curriculum competence: CC_D7_01, I3 Training

- 1 Continuing professional development: guidance for all doctors. GMC, London 2012 (http://www.gmc-uk.org/CPD_guidance_June_12.pdf_48970799.pdf).
- 2 Supporting information for appraisal and revalidation. GMC, London 2012 (http://www.gmc-uk.org/Supporting_information100212.pdf_47783371.pdf).
- 3 Medical appraisal guide: a guide to medical appraisal for revalidation in England. NHS Revalidation Support Team 2012 (<http://www.revalidationsupport.nhs.uk/CubeCore/uploads/RSTMAGforReval0312.pdf>).
- 4 RCoA CPD guidance, matrix and online system (<http://www.rcoa.ac.uk/cpd>).
- 5 Advice on supporting professional activities in consultant job planning. AMRC, London 2010 (<http://www.rcoa.ac.uk/node/1440>).
- 6 AAGBI and RCoA view of time for supporting professional activities (SPAs). AAGBI Anaesthesia News 2010, Issue 271 (<http://www.rcoa.ac.uk/node/1439>).



13.5

ICU training

Dr J Clarke, Dr P Keeling, Dr G Sridhar

Why do this audit?

To ensure that proper training occurs during ICU modules.^{1,2}

Best practice: research evidence or authoritative opinion

The Faculty of Intensive Care Medicine (FICM) and the Royal College of Anaesthetists (RCOA) have produced required standards for training during ICU modules.^{1,2} Clinical training in ICU should be in blocks of three months for all basic, intermediate and higher trainees. All trainees are required to keep a logbook and during the intermediate training complete a minimum of 10 expanded case summaries.

Suggested indicators

- D % appropriately timed blocks of training during basic and intermediate training.
- D % trainees keeping a logbook and case summaries.
- D % weeks when a trainee has attended at least one teaching session with an ICU consultant

Proposed standard or target for best practice

- D 100% training blocks should meet above stipulations.
- D 100% of trainees should keep ICM log book
- D 100% trainees on the ICU module should attend at least one teaching session with an ICU consultant each week.

Suggested data to be collected

Trainee portfolios, programme director's records on ICU training and anaesthesia rotations should be examined.

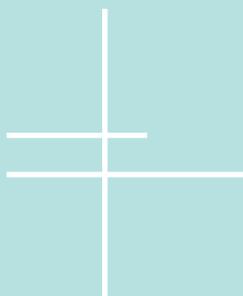
- D Asking TPD to supply all ICU training data to ensure each trainee is programmed to receive correct amount of training.
- D Ask anaesthetic secretaries to collate how much time each trainee was allocated to ICU over a set period, e.g. 6 months.
- D Carry out a postal or email survey of all trainees in your school or department to ascertain if each trainee:
 - 1 kept a logbook
 - 2 spent a minimum of three months on ICU
 - 3 prepared 10 cases if in intermediate training
 - 4 received (on average) one teaching session per week from an ICU consultant.

Common reasons for failure to meet standard

- D Need for service provision.
- D Trainees not aware of logbook requirement.
- D Difficulties with timing of a session to enable all trainees to attend teaching session.
- D ICU emergencies taking priority over teaching.

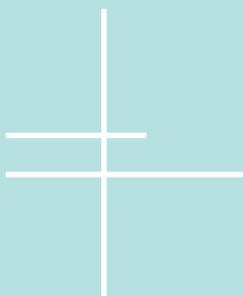
CPD and Curriculum mapping

CPD matrix: code: 3C00



References

- 1 Curriculum for a CCT in Anaesthetics, Edition 2: Section 10–12. RCoA, London August 2010 (<http://www.rcoa.ac.uk/node/1462>).
- 2 Curriculum for a CCT in ICM. *Faculty of Intensive Care Medicine*, London 2010 (<http://www.ficm.ac.uk/icm-cct-curriculum>).



13.6 Airway management training for novice anaesthetists

Dr C Whymark

Why do this audit?

Airway management is a fundamental skill in anaesthetic practice. Airway management techniques include use of the facemask, laryngeal mask airway (LMA) and tracheal intubation.

In the initial three months of training it is important that new-start anaesthetists gain adequate experience in all these techniques as these skills will form the basis of all airway management, whether routine or difficult, expected or unexpected. These three aspects are not specifically assessed during the initial assessment of competency (2010 curriculum) and there are currently no recommended minimum case numbers.

Concerns about reduced competence in basic airway management have persisted as training time and caseload continue to fall.

Best practice: research evidence or authoritative opinion

There is evidence that for practical procedures, 50 attempts will confer a degree of competence.^{1,2} This number is also achievable in the context of early training in anaesthesia.

Suggested indicators

The emphasis of this audit is on the ability of a training rotation to deliver a satisfactory volume of airway management experience to the novice trainee, rather than to determine airway competency in individual trainees *per se*.

- D % novice trainees with logbook documentation of all cases including a record of airway management during the initial 3-month period of training.
- D % trainees achieving experience of 50 cases of each of three categories of basic airway management, i.e. facemask, LMA, tracheal intubation.

Proposed standard or target for best practice

- D 100% of new-start trainees should have a complete record of the airway management technique used for every case carried out in the first 3 months.
- D 100% should have achieved 50 cases in each category.

Suggested data to be collected

- D The number of cases carried out using:
 - ◆ facemask alone or with oropharyngeal airway
 - ◆ LMA
 - ◆ tracheal intubation.

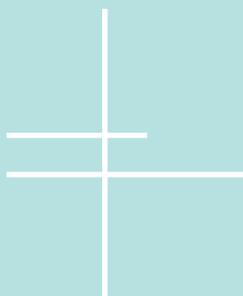
Common reasons for failure to meet standard

- D Case mix: trainees may not be exposed to a sufficient number or appropriate balance of cases to achieve the broad range of experience necessary. This should be taken into account when compiling weekly departmental rotas.
- D Trainers need to monitor the progress of trainees on a month by month basis to address such deficiencies as soon as possible.
- D Trainees should be discouraged from taking leave during this initial period of intensive training.
- D Poor compliance with completion of logbooks.

CPD and Curriculum mapping

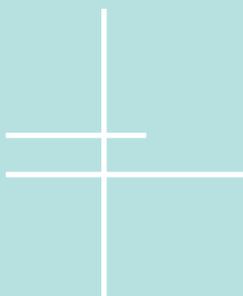
CPD matrix codes: **IC01, IC02**

Training curriculum competences: **Annex B**



References

- 1 Konrad C et al. Learning manual skills in anaesthesiology: is there a recommended number of cases for anesthetic procedures. *Anesthesiology* 1998;**86**:635–639.
- 2 Mulcaster JT et al. Laryngoscopic intubation. Learning and performance. *Anesthesiology* 2005;**98**:23–27.



13.7 Airway management training for higher trainees (ST 5–7)

Dr V Oshan

Why do this audit?

Airway management skills are a core component in the training of any anaesthetist and are an essential unit of training within higher level training in the 2010 CCT curriculum.¹ The ability to perform elective fiberoptic intubation in awake or anaesthetised patients under distant supervision and to manage patients with complex airway disorders under local supervision are the core learning outcomes of this module.

However, there are concerns that some hospitals are ill equipped to provide adequate training in this field and the competencies achieved by trainees may be less than satisfactory.^{2,3}

Best practice: research evidence or authoritative opinion

The Royal College of Anaesthetists has outlined the competencies for higher training in airway management in the manual for CCT in Anaesthetics (2010 Curriculum).¹ This higher unit is one of the two mandatory units of higher training which all trainees are expected to complete satisfactorily during their general duties training block. Although the RCoA syllabus does not define the number of cases required to achieve competence in advanced airway skills, there is evidence in literature to suggest that 18–20 fiberoptic intubations confer a degree of expertise.^{4,5}

Suggested indicators

The audit can look into the quality and duration of higher training in airway management; the ability of the training module to provide adequate exposure to the trainee in acquiring complex airway management skills as outlined in the RCoA curriculum.

Proposed standard or target for best practice

- D 100% of the higher trainees should have logbook evidence of the complex airway cases managed during the module.
- D 100% of the higher trainees should have evidence of required competence in fiberoptic intubation in patients without serious intra-oral or laryngeal pathology (core learning outcome).
- D 100% of the trainees should have evidence of competence in managing patients with complex airway disorders in all situations under local supervision (core learning outcome).
- D 100% of the higher trainees should have experience of and be familiar with the use of advanced airway techniques and airway adjuncts including HFJV, Video laryngoscopes, Aintree intubation catheters, etc.

Suggested data to be collected

- D Duration of training block in higher airway management module.
- D Training courses/tutorials attended in advanced airway management during the module.
- D Number of cases carried out with and without direct supervision:
 - ◆ total number of complex airway cases
 - ◆ awake fiberoptic intubations
 - ◆ asleep fiberoptic intubations.
- D Evidence of competence in fiberoptic intubations and the use of other advanced airway adjuncts (e.g. DOPS).
- D Confidence level of the trainees in managing complex airway cases and performing fiberoptic intubations.

Common reasons for failure to meet standard

- D The trainees may not be exposed to the adequate number of cases required to achieve desired skills. This may be potentiated by the problems of reduced working hours and pressure to complete other essential modules of training within a limited time frame.
- D Inadequate record keeping in logbook.
- D Unavailability of expensive equipment for training purpose.

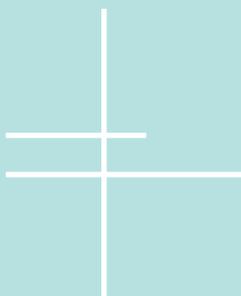
CPD and Curriculum mapping

RCoA CPD Matrix: **1C02, 2A01**

Training curriculum competences: **Annex D 12–13**

References

- 1 CCT in Anaesthetics – Higher level training (Annex D) Edition 2. RCoA, August 2010 (<http://www.rcoa.ac.uk/CCT/AnnexD>).
- 2 Stringer KR, Bajenov S, Yentis SM. Training in airway management. *Anaesthesia* 2002;**57**:967–983.
- 3 McNarry AF et al. Perception of training needs and opportunities in advanced airway skills: a survey of British and Irish trainees. *Eur J Anaesthesiol* 2007;**24**(6):498–504.
- 4 Johnson C, Roberts JT. Clinical competence in the performance of fiberoptic laryngoscopy and endotracheal intubation: a study of resident instruction. *J Clin Anesth* 1989;**1**:344–349.
- 5 Ovassapian A, Yelich SJ. Learning fiberoptic intubation. *Anesthesiol Clin NA* 1991;**9**:175–185.



13.8

Delivery, timing and quality of pain medicine training for anaesthetic trainees

Dr J Hughes, Dr S Mohammed

Why do this audit?

The RCoA has defined guidelines on pain medicine training within its curriculum. This audit attempts to assess the quality of pain medicine training for the anaesthetist at Basic and Intermediate levels of curricular training and thereby improve practice and quality of training. Logistics may make it difficult for the anaesthetic trainee to be exposed to all fields in pain medicine, as guided by the curriculum. The audit is aimed at reviewing pain medicine training and modifying it in order to fulfil the requirements of the curriculum.

Best practice: research evidence or authoritative opinion

Refer to the pain medicine sections of 'Curriculum for a CCT in Anaesthetics'.¹

Suggested indicators

Knowledge:

Number of tutorials/teaching sessions in:

- D history taking, physical examination, psychological assessment and interpretation of investigations.
- D treatment options for acute (surgical and non-surgical patient), chronic and cancer pain.

Access to clinical practice:

Number and proportion of sessions dedicated to:

- D Out-patient clinics
- D Acute pain rounds
- D Neural blockade and other interventions for chronic and cancer type pain.

Evidence of spiral learning and attendance at in-patient (acute) pain management sessions over all the training years.

Evidence of understanding of

- D palliative medicine
- D pain management programme
- D multidisciplinary team working.

Evidence of access to audit in pain medicine.

Proposed standard or target for best practice

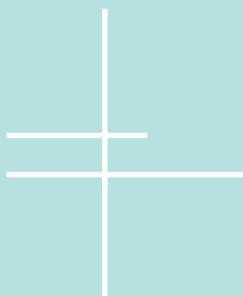
Refer to the pain medicine sections of 'Curriculum for a CCT in Anaesthetics'.¹

Suggested data to be collected

Data should be collected per Deanery regarding the training, which the anaesthetic trainee undergoes. In all cases the pain trainee should have had significant exposure to these indicators including dedicated clinical sessions.

Common reasons for failure to meet standard

- D Service provision.
- D Difficulty in organising dedicated tutorials in a hospital where there are only 1–2 trainees in a dedicated pain medicine module at any one time. Didactic training may therefore have to be done at a regional level where on-call commitments limit trainees' attendance.



Related audits

I3.9 – Delivery, timing and quality of pain training for the higher and advanced pain trainee

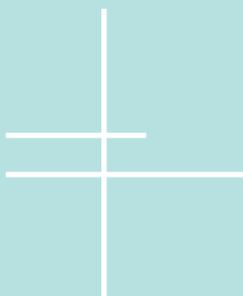
CPD and Curriculum mapping

RCoA CPD Matrix: ID01, ID02, 2E01, 2E02, 2E03

Training curriculum: Annex B 61–62, Annex C C54–55

References

- 1 Curriculum for a CCT in Anaesthetics, Edition 2: RCoA, London August 2010 (<http://www.rcoa.ac.uk/node/1462>).



13.9 Delivery, timing and quality of pain training for the higher and advanced pain trainee

Dr J Hughes, Dr S Mohammed

Why do this audit?

The RCoA has defined guidelines on pain medicine training within its curriculum and in FPM guidance.^{1,2} This audit attempts to assess the quality of pain medicine training for the anaesthetist at higher and advanced levels of curricular training and thereby improve practice and quality of training. Logistics may make it difficult for the anaesthetic trainee to be exposed to all fields in pain medicine, as guided by the curriculum. The audit is aimed at reviewing pain medicine training and modifying it in order to fulfil the requirements of the curriculum.

Best practice: research evidence or authoritative opinion

The pain medicine sections of the RCoA's 'Curriculum for a CCT in Anaesthetics' are the template for training at each level.¹

Suggested indicators

Knowledge:

Number of tutorials in:

- D history taking, physical examination, psychological assessment and interpretation of investigations
- D treatment options for acute (surgical and non surgical) chronic and cancer pain.

Access and training in the safe and competent use of imaging techniques in pain medicine.

Access to clinical practice:

Advanced pain training of at least 12 months whole-time or equivalent (excluding anaesthetic on-call commitments).

Number and proportion of sessions dedicated to:

- D out-patient clinics
- D acute pain rounds and in-patient rounds
- D neural blockade and other interventions for chronic and cancer type pain
- D expressed as numbers of clinics per month/of pain sessions per month.

No sessions, exposure to:

- D palliative medicine
- D paediatric pain medicine
- D spinal cord stimulation
- D implanted (epidural/intrathecal) drug delivery systems
- D pain management programmes
- D multidisciplinary team meetings in chronic pain
- D neurosurgical techniques in pain medicine.

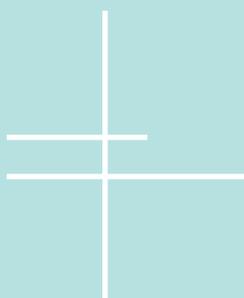
Access to education, research and audit

- D Participation in audit for pain medicine.
- D Teaching and participation with regards to research in pain medicine.
- D Participation and delivery of education in pain medicine.

Management exposure

- D Tutorial reviewing the business management principles for pain services.
- D Attendance at pain unit business meetings.

Proposed standard or target for best practice	Those set by the RCoA in the Curriculum for a CCT in Anaesthetics. ¹
Suggested data to be collected	Data should be collected per Deanery regarding the training that the higher and advanced pain trainee undergoes. In all cases the pain trainee should have had significant exposure to these indicators including dedicated clinical sessions.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D Service provision. D Availability of individual elements of training in any given unit. D Difficulty in organising dedicated tutorials in a region where there are only 1-2 trainees at any one time.
Related audits	I3.8 – Delivery, timing and quality of pain medicine training for anaesthetic trainees
CPD and Curriculum mapping	<p>RCoA CPD Matrix: 3E00</p> <p>Training curriculum: Annex D40–41, Annex E59–64</p>
References	<ol style="list-style-type: none"> 1 Curriculum for a CCT in Anaesthetics, Edition 2: RCoA, London August 2010 (http://www.rcoa.ac.uk/node/1462). 2 Assessment of Advanced Pain Medicine Trainees for FPMRCA. (FPM website: http://www.rcoa.ac.uk/node/1523). 3 Providing Advanced Training in Pain Medicine for Anaesthetists – Guide for Regional Advisors, Trainers and Trainees. FPM RCoA, London 2010 (http://www.rcoa.ac.uk/node/2175). (Where should this be cited in the text?)





Section 14: Neuroanaesthesia

Edited by Dr Judith Dinsmore

- 14.1** Prevention of hyperthermia in acutely brain injured patients
- 14.2** Quality of transfers of patient with severe traumatic brain injury
- 14.3** Subarachnoid haemorrhage
- 14.4** Initial management of patients with acute Spinal Cord Injury
- 14.5** Ensuring best practice in the management of the patient with raised intracranial pressure in patient with severe traumatic brain injury
- 14.6** Compliance with guidelines for the management of the unconscious patient at risk of spinal injury
- 14.7** Intra-arterial thrombectomy

14.1

Prevention of hyperthermia in acutely brain injured patients

Dr L Hammon, Dr J Andrzejewski, Dr S Jankowski

Why do this audit?

Pyrexia is known to be detrimental to the acutely injured brain.¹ Patients with acute brain injury (ABI) frequently develop elevated temperatures. Intensive care units should have guidelines in place to monitor and treat pyrexia in brain injured patients during the first week of admission or longer if there is evidence of ongoing cerebral ischaemia/inflammation.

Best practice: research evidence or authoritative opinion

For every 1°C rise in admission temperature the relative risk of a worse outcome is doubled for stroke patients.² The European Stroke Organisation guidelines state that hyperthermia should be avoided to limit the cerebral metabolic rate.³ In acute ischaemic stroke they advocate a prompt search for concurrent infection and treatment with paracetamol and fanning should the temperature reach 37.5°C.⁴

Fever is an independent risk factor for poor outcome following aneurysmal subarachnoid haemorrhage, and it is recommended that temperature is controlled using pharmacological and/or physical means.¹ Pyrexia has also been shown to independently worsen survival and increase secondary injury after traumatic brain injury.⁵

Recent evidence from patients following out of hospital cardiac arrest suggests that normothermia may be just as advantageous as hypothermia, (33°C versus 36°C⁶).

Suggested indicators

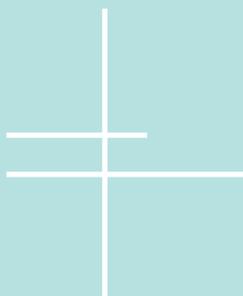
All patients admitted to intensive care with an ABI are at risk of pyrexia, either as a primary complication or from secondary infection. Examples of ABI may include traumatic brain injury, subarachnoid haemorrhage, stroke and post cardiac arrest.

Proposed standard or target for best practice

- D 100% of patients with an ABI have their core temperature measured and recorded hourly.
- D 100% of those patients who have a temperature $\geq 37^\circ\text{C}$ should receive interventions/ attempts to reduce their temperature within an hour.
- D No ventilated patients should have their temperature rise above 37.5°C.
- D Any patients whose temperature does rise above 37.5°C should have prompt initiation of a search for concurrent infection.

Suggested data to be collected

- D Patient core temperature hourly from admission to intensive care (or diagnosis of ABI) until discharge from ITU.
- D Time after temp $\geq 37^\circ\text{C}$ that active cooling was commenced.
- D Reason for delay in treatment if > 1 hour to active cooling.
- D Time after temp $\geq 37.5^\circ\text{C}$ to culture samples being taken.
- D Peak spike of temperature.
- D If infective component suspected, time to commence antibiotics.



Common reasons for failure to meet standard

- D Lack of awareness that hyperthermia is detrimental to outcome in ABI.
- D Lack of adequate cooling methods/equipment.
- D Temperature high despite adhering to agreed management protocol: Need for more aggressive protocol?
- D Transfer for CT/other reason cooling had to be put on hold.

CPD and Curriculum mapping

CPD matrix codes: **2C01, 2C03, 2F01, 3F00**

Syllabus for the CCT in Intensive Care Medicine: Domains and sections: **2.7, 3.1 and 3.6.**

References

- 1 Thorston Steiner et al. European Stroke Organization Guidelines for the Management of Intracranial Aneurysms and Subarachnoid Haemorrhage. *Cerebrovasc Disease* 2013;**35**:93–112.
- 2 Kammergaard LP et al. Admission Temperature Predicts Mortality After Acute Stroke, The Copenhagen Stroke Study. *Stroke* 2002;**33**:1759.
- 3 European Stroke Organisation guidelines (<http://bit.ly/U76EW2>).
- 4 European Stroke Organisation – Guidelines for Management of Ischaemic Stroke 2008 (<http://bit.ly/U76H4c>).
- 5 Helmy A, Vizcaychipi M, Gupta A. Traumatic brain injury: intensive care management. *BJA* 2007;**99**:32–42.
- 6 Niklas Nielsen et al. Targeted Temperature Management at 33°C versus 36°C after Cardiac Arrest. *N Engl J Med* 2013;**369**:2197–2206.



14.2

Quality of transfers of patient with severe traumatic brain injury

Dr I Tweedie

Why do this audit?

It has been known for many years that poor management during the transfer of patients with a severe traumatic brain injury (TBI) submits them to high burden of secondary insults, with the potential to have a deleterious effect on outcome. Many transfers are time critical due to the urgent need to drain haematomas. Regional transfer audits continue to show that not all critical care transfers match the standards.

Best practice: research evidence or authoritative opinion

In 1990 Peter Andrew demonstrated the secondary insult potential during transportation of patients with brain injury even within the same hospital.¹ The AAGBI have drawn up expert guidance for the transfer of patients with TBI,² which is echoed in the NICE guidance³ on the early management of TBI. This is underpinned by the guidance in the ICS transfer document.⁴ In patients with an assumed compromise to intracranial compliance it is important to manage factors, which can compromise that further, such as oxygenation, hypotension, hyper- and hypo-carbia, and inadequate sedation. These standards of care should be used for all patients with brain injury who need to be transferred sedated, intubated and ventilated, whether intrahospital or interhospital.

Suggested indicators

All patients with severe TBI who need to be transferred for treatment or diagnostic procedures, but distinguished by whether they are an intra- or inter- hospital transfer:

Proposed standard or target for best practice

All transfers should happen in a timely manner:

100% of patients must be adequately resuscitated prior to transfer.

100% of patients should be transferred by a suitably experienced team.

100% of patients should have care that follows national guidelines. For example:

- D Patient's airway controlled by intubation.
- D Patient mechanically ventilated with EtCO₂ monitoring.
- D Patient sedated with continuous intravenous infusion.
- D Patient monitored including ECG, SaO₂, and IBP, plus ICP if being monitored.
- D Target MAP, SaO₂ and EtCO₂ achieved and recorded?
- D SaO₂ and EtCO₂ checked against arterial blood gases prior to transfer.
- D Pupillary reaction observed and recorded.
- D There should be a written record of transfer and patient observations.

Suggested data to be collected

Data should be collected over a sufficient period of time to get adequate numbers of cases for analysis.

- D Type of transfer e.g. emergency or planned, inter- or intra-hospital.
- D For emergency transfers - total time from injury to receiving definitive treatment and length of time from decision to transfer to actual transfer.
- D Grade of doctor undertaking the transfer, have they had transfer training?
- D Evidence that patient was adequately resuscitated prior to transfer.
- D Patient's airway controlled by intubation, mode of ventilation and EtCO₂ monitoring during transfer.
- D SaO₂ and EtCO₂ checked against arterial blood gases prior to transfer commencing.
- D Additional patient monitoring during transfer.

- D Are target MAP, SaO₂ and EtCO₂ achieved and recorded? If not, is there evidence that they were treated, e.g. inotropes administered, ventilation adjusted.
- D Type and dose of sedation.
- D Pupillary reaction observed and recorded.
- D Seizures controlled.
- D Other injuries satisfactorily managed pre transfer; e.g. fractures splinted, haemo-pneumothoraces drained.
- D Patient condition on arrival.
- D For interhospital transfers – team communicated in advance that they were on the way and gave satisfactory handover on arrival.
- D There should be a written record of transfer and patient observations.
- D Untoward events during transfers
 - ◆ Equipment failures.
 - ◆ Patient deterioration, e.g. pupils becoming unreactive.
 - ◆ Transport problems, e.g. delays or navigation errors.
 - ◆ Missed injuries identified at receiving hospital.

Common reasons for failure to meet standard

- D Lack of training in safe transfer of critically ill patients with TBI.
- D Failure to agree local guidelines.
- D Lack of senior input into the preparation of the patient for transfer.

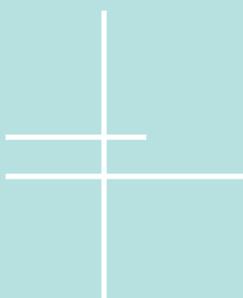
CPD and Curriculum mapping

CPD matrix codes: **2A11, 2C04, 2F01, 3F05**

Syllabus for the CCT in Intensive Care Medicine: Domains and sections: **10, 10.1.**

References

- 1 Andrews PJD, Piper IR, Dearden M. Secondary insults during intrahospital transport of head-injured patients. *Lancet* 1990;**335**:327–330.
- 2 Recommendations for the Safe Transfer of Patients with Brain Injury. *AAGBI*, London 2006 (<http://bit.ly/U7awGo>).
- 3 Head injury: Triage, assessment, investigation and early management of head injury in children, young people and adults (CG176). *NICE*, London 2014 (www.nice.org.uk/guidance/CG176).
- 4 Guidelines for the transport of the critically ill adult (3rd Edition) *ICS*, London 2011 (<http://bit.ly/1jmpKTz>).



14.3

Subarachnoid haemorrhage

Dr J Dinsmore

Why do this audit?

Subarachnoid haemorrhage (SAH) accounts for approximately 5% of all cerebrovascular events in the UK.¹ It tends to affect relatively young people, the mean age is 50 years, and the outcome is generally poor with about 50% dying within 1 month. Those who survive the initial bleed are at risk of rebleeding, hydrocephalus and delayed cerebral ischaemia (DCI).

Best practice: research evidence or authoritative opinion

The severity of bleed is graded on a 5-point scale: the World Federation of Neurological Surgeons (WFNS) scale based on Glasgow Coma Score and motor deficit. Lower WFNS grade patients are associated with a better outcome. Acute management is similar to that for other forms of brain injury. Extreme hypertension must be avoided to reduce the risk of rebleeding. Definitive treatment involves either coiling or clipping the aneurysm. Current best practice advises treatment within 48hrs in good grade patients (WFNS I-III).² The timing of intervention in poor grade patients is less clear.³ Nimodipine has been shown to be effective in reducing reduce poor outcome from DCI. The use of triple H therapy is controversial with no controlled studies showing a positive effect from any component. However it is important to avoid hypotension and hypovolaemia.⁴ Documentation of consent for intervention is frequently inadequate in these patients.⁵ Deaths following SAH often occur in young patients and therefore consideration for organ donation is highly appropriate.

Suggested indicators

I patients admitted to the intensive care unit with aneurysmal SAH.

Proposed standard or target for best practice

- D Administration of nimodipine within 24 hours of admission.
- D Hypertension (Systolic arterial pressure < 160 mmHg, MAP > 110 mmHg) should be treated in patients with unsecured aneurysms. Hypotension must be avoided.
- D Definitive neurovascular intervention (coiling or clipping) within 48 hours in good grade patients (WFNS grade I-III).
- D Appropriate consent taken, documented and discussion of risk recorded in notes.
- D Low readmission rate to ICU.
- D The consideration of organ donation as part of end of life care in all suitable patients.

Suggested data to be collected

- D Age, gender
- D WFNS grade
- D Date and time of SAH bleed and admission to ICU
- D Complications such as rebleeding or delayed cerebral ischaemia
- D Medical complications
- D Date and time of starting nimodipine
- D Blood pressure targets
- D Episodes of sustained hyper / hypotension
- D Date and time of definitive intervention
- D Date and time of any other surgical procedures
- D Reason for delay if > 48 hours between onset of SAH bleed and intervention?
- D Appropriate documentation of consent / type of consent in notes
- D Date and time of discharge from NICU
- D Place of discharge
- D Functional status on discharge
- D Readmission to ICU
- D In event of death:
 - ◆ Did brain stem death testing occur?
 - ◆ Patient suitable for donation after cardiac death?
 - ◆ Was the patient suitable for organ donation?
 - ◆ Did organ donation occur; if not why not?

Common reasons for failure to meet standard

- D Delay in primary diagnosis and referral.
- D Lack of appropriate services at weekends.
- D Lack of local guidelines or protocols.
- D Pressure on ICU beds.
- D Failure to recognise inability to give informed consent.
- D Failure to consider suitability for organ donation by medical staff.

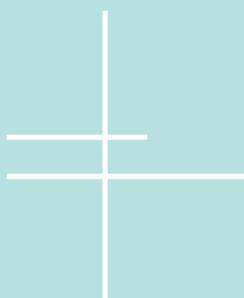
CPD and Curriculum mapping

CPD matrix codes: **2C06, 3C00, 3F00**

Training curriculum competencies: **NA_HK_02.**

References

- 1 Stroke Statistics. The Stroke Association, London 2013 (www.stroke.org.uk).
- 2 National Clinical Guideline for Stroke (4th Edition). Prepared by the Intercollegiate Stroke Working party. RCP, London 2012 (www.rcplondon.ac.uk/sites/default/files/national-clinical-guidelines-for-stroke-fourth-edition.pdf).
- 3 Molyneux AJ et al. International subarachnoid aneurysm trial (ISAT) Collaborative group. International subarachnoid aneurysm trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients with ruptured intracranial aneurysms: a randomized trial. *Lancet* 2002;**360**:1267–1274.
- 4 Diringner MN et al. on behalf of the Neurocritical Care Society. Critical care management of patients following aneurysmal subarachnoid haemorrhage: recommendations from the Neurocritical Care Society Multidisciplinary Consensus Conference. *Neurocrit Care* 2011;**15**:211–240.
- 5 Managing the Flow? A review of the care received by patients who were diagnosed with an aneurysmal subarachnoid haemorrhage. *NCEPOD*, London 2013.



14.4

Initial management of patients with acute Spinal Cord Injury

Dr X Watson, Dr A Zoumprouli

Why do this audit?

Spinal cord injury (SCI) is a major cause of morbidity, often resulting in severe and permanent disability. The annual estimated incidence of traumatic SCI is 15 per million in the UK and approximately 50% of those have an incomplete lesion. The potential for neurological improvement is therefore significant. Early recognition and prevention of secondary injury is paramount to the future of quality of life and has major implications on the long-term outcome. Management is initially targeted at preserving spinal cord function, minimising secondary injury and avoiding further morbidity.

Best practice: research evidence or authoritative opinion

Evidence for best practice in the management of SCI is published by the British Association of Spinal Cord Injury Specialists, the National Spinal Cord Injury Strategy Board (NSCISB) and by American Association of Neurological Surgeons and the Congress of Neurological Surgeons (AANS/CNS).¹⁻³ Local protocols may vary according to the services available but should all be in accordance with National recommendations. Initial management includes immobilisation of the injured spine, maintenance of the airway, systemic oxygen delivery and treatment of neurogenic shock.

Suggested indicators

All patients with cervical or high thoracic (above T6) SCI should be admitted to intensive care for monitoring and acute management.

Proposed standard or target for best practice

- D 100% of patients who sustained an injury with a mechanism compatible with spinal damage should have spinal immobilisation as part of the immediate resuscitation phase.
- D 100 % of patients with a SCI above T6 should be admitted to intensive care.
- D 100 % of patients should meet proposed targets within 4 hours of admission to intensive care including:
 - ◆ Referral to SCI Specialist centre.
 - ◆ Airway secured or regular vital capacity (VC) measurement.
 - ◆ Target mean arterial pressure (MAP) documented.
 - ◆ Insertion of arterial line.
 - ◆ Insertion of nasogastric tube (NG) tube.
 - ◆ Urinary catheter inserted.
 - ◆ Venothromboembolism (VTE) assessment documented.
 - ◆ ASIA scoring assessed and documentation of complete or incomplete injury.
 - ◆ Stress ulceration prophylaxis prescribed.
- D 100 % of patients should meet proposed targets within 24 hours of admission to Intensive care:
 - ◆ ASIA scoring documented.
 - ◆ Surgical plan documented.
 - ◆ Spinal clearance form completed.
 - ◆ Secondary survey completed and documented.
 - ◆ Referral to Physiotherapists and Occupational therapists.
 - ◆ Bowel care protocol implemented.
 - ◆ Regular neurological observations (every 2 hours).
 - ◆ Regular turning of patient (every 2 hours).

Suggested data to be collected

- D Mechanism and time of injury.
- D Time from injury to spinal immobilisation.
- D Time from injury to admission to intensive care.
- D Time of referral to SCI Specialist centre.
- D Airway interventions and timing.
- D Evidence of regular VC measurement.
- D Target MAP documented.
- D Time to insertion of arterial line.
- D Time to insertion of NG tube.
- D Time to insertion of urinary catheter.
- D Timing of VTE assessment.
- D ASIA scoring assessed and documentation of complete or incomplete injury.
- D Time to stress ulceration prophylaxis prescribed.
- D Time to documentation of surgical plan.
- D Timing of spinal clearance form completed.
- D Time to completion of secondary survey and documentation.
- D Time to referral to physiotherapists and occupational therapists.
- D Time to implementation of Bowel care protocol.
- D Frequency of neurological observations.
- D Frequency of patient turning.

Common reasons for failure to meet standard

- D Lack of awareness or understanding of guidelines
- D Assessment not carried out in timely fashion
- D Poor documentation in notes
- D Lack of agreement of protocol per unit

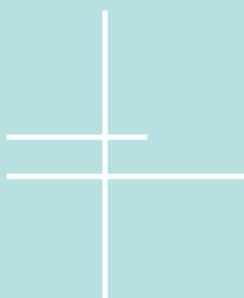
CPD and Curriculum mapping

CPD matrix codes: **2C06, 3C00, 3F00**

Training curriculum competencies: **NA_IS_14, NA_IK_14, NA_IK_13.**

References

- 1 Managing patients with SCI within major trauma. *National SCI Pathways*, 2013 (www.mascip.co.uk/sci-roadmap.aspx).
- 2 Guidelines on the Management of Acute Traumatic Spinal Cord Injury in a General Hospital. *BASCIS*, Shropshire (www.bascis.org.uk/?page_id=33).
- 3 Guidelines for the Management of Acute Cervical Spine and Spinal Cord Injuries. American Association of Neurological Surgeons and the Congress of Neurological Surgeons. *Neurosurgery* 2013;**72(suppl 2)**:1–259.



14.5 Ensuring best practice in the management of the patient with raised intracranial pressure in patient with severe traumatic brain injury

Dr R Lightfoot

Why do this audit?

Despite the development of specialist neurointensive care severe traumatic brain injury (STBI) (GCS <8) is still a common cause of morbidity and mortality.¹⁻⁴ The early transfer of patients to and the implementation of evidence based protocols in these specialist units have been shown to reduce mortality in patients with STBI.^{2,4} The adoption and adherence of local guidelines for the management of raised intracranial pressure is still not fully understood.

Best practice: research evidence or authoritative opinion

No universal UK guidelines.
Locally agreed guidelines based on best practice and evidence.

Suggested indicators

All patients admitted to specialist neurointensive care with severe traumatic brain injury requiring intracranial pressure monitoring.

Proposed standard or target for best practice

- D All patients have a documented management plan.
- D Patients should have ICP monitoring where appropriate.
- D 100% patients have a target CPP with a trigger for escalation in treatment.
- D Management should comply with level of care for ICP.

Suggested data to be collected

- D Reference point for CPP measurement (position where arterial line transducer is placed).
- D Cerebral Perfusion Pressure (CPP) target.
- D Trigger for escalation in treatment (target ICP).
- D Levels of care for ICP management.
- D Compliance with each level of care for ICP management.
- D Ventilator targets.
- D Target of serum sodium level.
- D Use of surgical interventions for reduction of ICP (decompressive craniectomy or external ventricular drain insertion).
- D Use of hyperosmolar therapy (including mannitol and hypertonic saline).
- D Use of cooling (including mechanism and target temperature).
- D Use of barbiturate coma and mechanisms of monitoring used.

Common reasons for failure to meet standard

- D No locally agreed guidelines.
- D Limitation of access to resources.

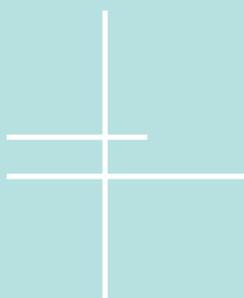
CPD and Curriculum mapping

CPD matrix codes: 2F01, 2F03, 2A11, 2A02 3F00

Training curriculum competencies: NA_IK_20, NA_IK_04.

References

- 1 Dinsmore J. Traumatic brain injury: an evidence-based review of management. *CEACCP* 2013;**6**:189–195.
- 2 Patel HC et al. Trends in head injury outcome from 1989 to 2003 and the effect of neurosurgical care: an observational study. *Lancet* 2005;**366**:1538–1544.
- 3 Clayton TJ, Nelson RJ, Manara AR. Reduction in mortality from severe head injury following introduction of a protocol for intensive care management. *BJA* 2004;**93**:761–168.
- 4 Harrison DA et al. Risk Adjustment In Neurocritical care (RAIN) – prospective validation of risk prediction models for adult patients with acute traumatic brain injury to use to evaluate the optimum location and comparative costs of neurocritical care: a cohort study. *Health Technol Assess* 2013;**17(23)**:1–350.



14.6 Compliance with guidelines for the management of the unconscious patient at risk of spinal injury

Dr R Lightfoot, Dr M Galea

Why do this audit?

The incidence of cervical, thoracic and lumbar spine trauma is reported at 5% in patients with blunt multi-trauma.¹⁻² A delay in diagnosis can result in up to an eight fold increase in neurological deficits. In addition any delay in spinal clearance, or in diagnosis, predisposes the unconscious patient to the complications of immobilisation and resultant increase in morbidity. This group of patients may be unconscious for a long time and so waiting for Glasgow Coma scale (GCS) to improve prior to clearance is not appropriate. However, there is little consensus on spinal clearance in the sedated patient so it can be difficult to get someone to accept responsibility.² Optimal management will involve adequate imaging in a timely manner, with access to reporting by a consultant radiologist. A multidisciplinary approach to defining aspects of care including number of personnel for turns and the use of a hard collar is vital to reduce the risk of complications before a diagnosis can be made.³ Local unit guidelines should include a named person for spinal clearance and record of management plan.

Best practice: research evidence or authoritative opinion

Existing evidence based management guidelines for cervical spine evaluation include those by the EAST group in the US. The same group have produced recommendations for thoracolumbar clearance.⁴ However there remains a lack of level I evidence in both. In the UK there is currently no national guidance relying on expert opinion and consensus recommendations.^{2,3,5} NICE has included guidance for the management of cervical spine injuries within their head injury guidelines.⁶ They identify a number of risk factors for cervical spine injury, including GCS \leq 13, intubated and ventilated patients, patients having other scans for polytrauma or traumatic brain injury, age greater than 65 years, or a suggestive mechanism of injury, e.g. fall from more than 1m height. A CT scan within an hour of any of these risk factors being identified is recommended, with a provisional written report available within an hour of the scan. Locally agreed guidelines tend to be based on available evidence, as described above, and best practice.

Suggested indicators

All patients admitted to intensive care with blunt multi-trauma.

Proposed standard or target for best practice

- D All units should have in place local guidelines incorporating current best practice recommendations as above.
- D Each patient should have a named consultant responsible for clearance and overall care.
- D Appropriate management plan completed within 24hrs of presentation.
- D Early CT imaging in unconscious patients.
- D Spinal precautions should be continued until appropriate imaging obtained.
- D Aim to remove unnecessary cervical collars, spinal extraction boards within 48-72 hrs.
- D At least 95% compliance with all aspects of guidelines.

Suggested data to be collected

- D Mechanism of injury.
- D Injury sustained.
- D Imaging performed in referring hospital or tertiary referral unit.
- D Adequacy of imaging performed.
- D Time of imaging reported.
- D Personnel reporting imaging.
- D Personnel involved with spinal management plan.
- D Timing of intervention of management plan.
- D Nursing management when turning patient before reporting of imaging.
- D Nursing management when turning patient after reporting of imaging.
- D Documentation of use of hard collar.
- D Documentation of duration of use of hard collar.
- D Duration of time in spinal immobilisation – hard collar, spinal board – before decision made.
- D Additional imaging performed on patient (including MRI or repeat CT/X-ray).
- D Spinal clearance signed off as per local unit guidelines.

Common reasons for failure to meet standard

- D No local guidelines.
- D Inadequate documentation.
- D Limited access to imaging in hospital.
- D Limited access to senior radiologists.

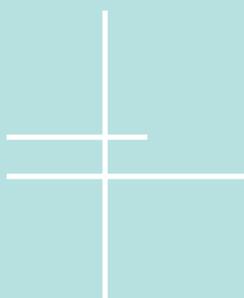
CPD and Curriculum mapping

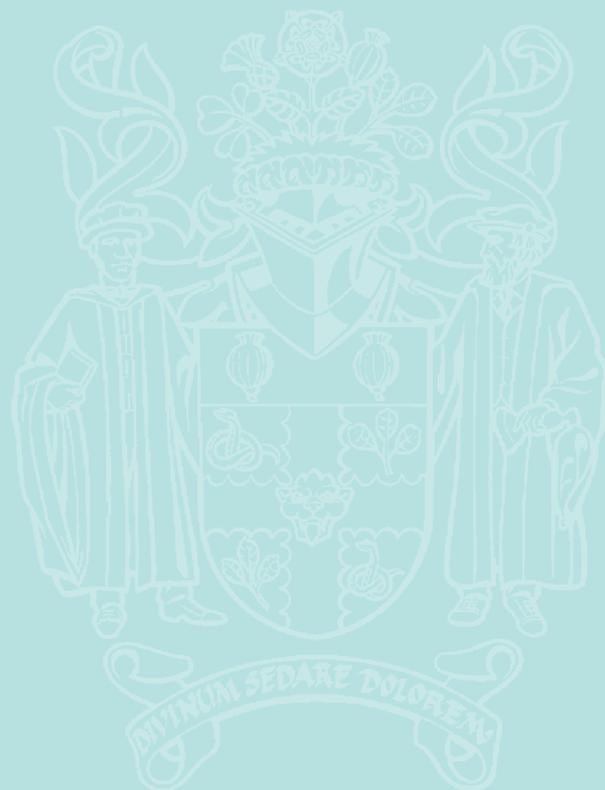
CPD matrix codes: 2A02, 2F02, 2F03, 3F00

Training curriculum competencies: NA_IK_I3, NA_IK_I4.

References

- 1 Como JJ et al. Practice Management Guidelines for identification of cervical spine injuries following trauma: Update from the Eastern Association for the Surgery of Trauma Practice Management Guidelines Committee. *J Trauma Acute Care Surg* 2009;**67**:651–659.
- 2 Morris CGT, McCoy E. Clearing the cervical spine in unconscious polytrauma victims, balancing risks and effective screening. *Anaesth* 2004;**59**:464–482.
- 3 Morris CG, McCoy EP, Lavery GG. Spinal immobilisation for unconscious patients with multiple injuries. *BMJ* 2004;**329**:495–499.
- 4 Sixta S et al. Screening for thoracolumbar spinal injuries in blunt trauma: An Eastern Association for the Surgery of Trauma practice management guideline. *J Trauma Acute Care Surg* 2012;**73**(Suppl 4):5326–5332.
- 5 Scott TE et al. Clearing the spine in the unconscious trauma patient: an update. *JICS* 2012;**13**:227–231.
- 6 CG176 Head injury: Triage, assessment, investigation and early management of head injury in children, young people and adults. NICE, London 2014 (<http://publications.nice.org.uk/head-injury-cg176/key-priorities-for-implementation>) (accessed 4 April 2014).





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