

National UK audit projects in anaesthesia

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Key points

There are a number of national audit projects relevant to anaesthesia and critical care. Typically, they provide recommendations and generate standards for the improvement of patient care.

The Confidential Enquiry into Maternal and Child Health examines all maternal deaths to improve quality and safety of obstetric care.

The National Confidential Enquiry into Patient Outcome and Death formerly concentrated on perioperative mortality but now deals with acute care more broadly.

The Intensive Care National Audit and Research Centre runs a case mix database to generate standards for comparison for the intensive care units.

Audit has been defined as 'a systematic approach to the peer review of medical care in order to identify opportunities for improvement and provide a mechanism for realizing them'.¹ For some years, it has been expected that doctors in the UK will take part in audit as part of their professional responsibilities. A great deal of useful audit activity takes place at local departmental level, where work is typically criterion-based, that is, comparing practice to an agreed standard. There are also a number of well-established national initiatives of relevance to anaesthetic and critical care practice. Often, these are more concerned with establishing patterns and trends and making recommendations that lead to new standards for practice. The aims of this review are to describe these initiatives, summarize their recent findings and recommendations, and set them in context.

The Confidential Enquiry into Maternal and Child Health

The Confidential Enquiry into Maternal and Child Health (CEMACH) is an independent body managed by representatives from eight Royal Colleges with three additional lay members. It was formed in 2003 from its predecessors, the Confidential Enquiry into Stillbirths and Deaths in Infancy and the Confidential Enquiry into Maternal Deaths, the latter having started in the 1950s. The stated remit of CEMACH is now to 'improve the health of mothers, babies and children by carrying out confidential enquiries on a nationwide basis and then widely disseminating their findings and recommendations'.²

Like its predecessor, the Confidential Enquiry into Maternal Death, CEMACH collects data in 3 yr cycles. There is a lag time to publication—the report on the years 2003–5 appeared late in 2007. Maternal death is defined as 'the death of a woman whilst pregnant or within 42 days of termination of pregnancy'. All deaths of pregnant women are reviewed and classified into those

attributed to pregnancy (*direct*), those secondary to pre-existing maternal disease aggravated by pregnancy (*indirect*), and those unrelated to the pregnancy, for example, death due to road traffic crash (*co-incident*). There is also a further category of deaths occurring from 6 weeks to 1 yr after delivery (*late deaths*). Risk factors for maternal death in general include social disadvantage, poor socioeconomic status, ethnic minority groups, black African women, late booking and poor attendance, obesity, domestic violence, and substance abuse.

In the 2003–5 triennium, the largest overall cause of direct maternal deaths was thromboembolic disease. The other main direct causes are hypertensive disease, haemorrhage, ectopic pregnancy, genital tract sepsis, and amniotic fluid embolism. The number of deaths attributable to anaesthesia is generally low (1 in 1994–6, 8 in 1991–3, and 4 in 1988–90). In 2003–5, there were six direct deaths due to anaesthesia. These are described briefly in the box given in the following page. There were 31 additional deaths to which anaesthesia was deemed to have contributed.

Recurring themes in these deaths are patient obesity, delay in recognition and management of problems, and failure to involve experienced staff. Recurrent themes from the last two reports include the following.

- (i) Failure to recognize and manage severe illness in the pregnant or recently delivered woman. The physiology of pregnancy and the rarity of severe illness in this group combine to hamper recognition. The application of modified early warning scores is advised. Much of this also applies to the management of, and resuscitation from, sepsis.
- (ii) Recognition and management of obstetric haemorrhage. Points made included a failure to consider concealed haemorrhage,

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delay in recognition of continued haemorrhage in the post-operative period, and the management of women who decline blood and blood products.

- (iii) When presented with problem cases requiring special skills or investigations, obstetric anaesthetists should call on the assistance of anaesthetic colleagues in other subspecialties and colleagues in other disciplines.
- (iv) Anaesthesia training must ensure competence in airway management, especially the recognition and management of oesophageal intubation.
- (v) Intensive care should start as soon as it is needed and can be provided initially in an obstetric theatre. Where available, outreach staff should be used.

Deaths caused by anaesthetic intervention, 2003–5

Deaths 1 and 2 were in early pregnancy and both occurred after postoperative respiratory failure. Both women were obese. The first suffered a failed re-intubation after severe bronchospasm on extubation. Better training in intubation and its consequences were recommended. The second occurred after postoperative ventilatory depression in the recovery room, probably secondary to fentanyl administration before the end of anaesthesia. The responsibility of anaesthetists for their patients until fully recovered with cardiovascular and respiratory stability was emphasized. Both these cases involved trainee anaesthetists and it was felt that additional skilled help may have avoided these deaths.

Death 3 occurred in a morbidly obese asthmatic woman, who developed breathing difficulties in the recovery room after spinal anaesthesia for elective Caesarean section and subsequently suffered a cardiac arrest on the post-natal ward. This highlighted a failure to recognize and treat postoperative respiratory failure and difficulties in accessing adequate resuscitation equipment on the post-natal ward.

Death 4 was caused by drug administration error—a woman received 150 ml of a 500 ml bag of 0.1% bupivacaine i.v. A number of systems factors created the conditions where this error could occur; the use of specific equipment to prevent recurrence is recommended.

Death 5 occurred in a patient with HELLP syndrome and abnormal great vein anatomy secondary to pectus excavatum. Right internal jugular vein cannulation had been attempted, unsuccessfully. At autopsy, a large right-sided haemothorax and trauma to the proximal part of the intrathoracic internal jugular vein were found. This may have been caused by the rigid dilator. Care in the use of these was advised.

Death 6 occurred in an obese woman with a history of renal problems, who required a general anaesthetic a few weeks post-partum for ultrasound-guided drainage of renal sepsis. An unexplained cardiac arrest occurred, from which resuscitation was unsuccessful. This was presumed to have been due to electrolyte disturbance.

National Confidential Enquiry into Patient Outcome and Death

The National Confidential Enquiry into Perioperative Death was set up in 1989 after pilot investigations in a small number of English health regions. Initially, enquiries focused on deaths within 30 days of surgery, using review of index cases identified by ‘reporters’ in local hospitals. Questionnaires were distributed to clinicians who had been involved in the care of the deceased, and the patients’ case notes were reviewed by expert advisors in each specialty. Reports from the Enquiry repeatedly highlighted lack of preoperative assessment and preparation, documentation,

supervision (locums and trainees), and decisions whether to operate on very sick patients. The Enquiry has repeatedly recommended provision of adequate HDU/ICU facilities, dedicated day-time emergency theatres, correct matching of staff skills to the complexity of surgical and anaesthetic demands, and individuals avoiding practising outside the limits of their experience. These recommendations carried considerable weight and influence³ and in the last 15 yr or so, they have been widely implemented. Latterly, investigation focused on more discrete perioperative topics such as the distribution of operations over 24 h and procedures in particular groups of patients. In 2004, the organization altered its name and broadened its remit to include not only perioperative care but other aspects of the work of the acute hospital. Administratively, like CEMACH, it is now part of the UK National Patient Safety Agency.

The last three reports of relevance to anaesthesia are summarized here. The full reports are available online.⁴

Who operates when? II (2003)

The principal recommendations made were to ‘revise the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) classification of urgency of operation to include more specific definitions and guidelines, which are relevant across surgical specialties’. A shortcoming in hospitals’ ability to provide information in standard spreadsheet format was highlighted and hence a recommendation for the provision of better information systems to record and review anaesthetic and surgical activity was made. Once again, the provision of adequate critical care facilities and appropriately trained staff and prompt access of emergency patients to theatres were highlighted as areas for improvement. Trusts should also ensure that all essential services such as emergency theatres, HDU, and ICU are provided on a single site wherever emergency/acute care is delivered. A suggestion was also made that debate should start on whether non-essential surgery should now be considered during extended hours, as trainee doctors’ hours are being reduced.

Abdominal aortic aneurysm: a service in need of surgery? (2005)

The breadth of the recommendations from this report reflected the multidisciplinary collaboration which such patients receive. Points of particular relevance to anaesthetists include:

- (i) better logbook documentation to allow the identification of major cases that the anaesthetist has managed;
- (ii) a recommendation that fewer anaesthetists should be doing more cases, that is, there should be less of a place for the ‘occasional’ major vascular anaesthetist;
- (iii) more robust systems for the care of and documentation of epidural catheters in the postoperative period are required;
- (iv) the numbers of patients routinely undergoing mechanical ventilation after vascular surgery could be reduced.

An acute problem (2005)

This study examined the care of medical patients referred to intensive care. Recommendations included:

- (i) greater involvement of consultant physicians in the referral process—referral (and acceptance) by senior house officers is inappropriate;
- (ii) greater use should be made of ‘track and trigger’ monitoring systems;
- (iii) inpatient referrals should be assessed before admission to ICU unless in exceptional circumstances. A consultant intensivist should be involved before a patient is admitted to ICU and review all admitted patients within 12 h. Regular audit should be performed against this standard;
- (iv) delays in admission to ICU should be reported as critical incidents.

Intensive Care National Audit and Research Centre

Dating back to 1994, the Intensive Care National Audit and Research Centre (ICNARC) is the sister organization to the UK Intensive Care Society and has the remit of improving the organization and practice of critical care through audit and research. It promotes local critical care audit by providing population-based data for comparison (i.e. standards), and participating in a wide range of relevant research. The Centre aims to improve audit and research quality and capacity and encourage evidence-based practice and policy.⁵

A key tool that ICNARC uses is the Case Mix Programme (CMP). This is a clinical database formed from data provided by approximately 75% of the UK ICUs.⁶ Information provided into the CMP database includes case mix data (age, acute severity, co-morbidity, surgical status, and need for admission) and admission outcome. Thus, the database is a source of valuable information for the organizing of critical care and a useful tool for research. Members of the CPMD can request *ad hoc* analysis reports and analysis of specific types of data, for example, children, outcomes of surgical vs medical patients, burns, Guillain–Barré syndrome, the elderly. Other recent audit activity that ICNARC has been involved in include audit of use of drotrecogin alpha (activated) for severe sepsis, outcome in the ICU after admission after cardiac arrest and the System of Patient-Related Activity (SOPRA).⁵

The Royal College of Anaesthetists

The Royal College of Anaesthetists (RCoA) has, in keeping with its statutory duty to protect the public by maintaining high standards of care, commissioned a substantial amount of relevant work.

The College resource ‘Raising the Standard’ was originally published in 2000 and was revised in 2006. This represents a compendium of audit ‘recipes’ devoted to providing a framework for continuous quality improvement in anaesthesia. Covering all

aspects of anaesthetic practice, this publication includes guidance on the conduct of audit on 143 topics in clinical anaesthesia, pain management, and the organization of critical care services. Each template contains a justification for performing the audit, suggestions for standards comparison and data collection, and a summary of common reasons for failure to achieve the standards.⁷

The RCoA has also funded four national audit projects to date. The first and second were published in 2005 and were conducted in response to concerns raised in the NCEPOD report of 2002. The first, on supervision, was a survey of consultants (supervising) and non-consultants (supervised) in 135 anaesthetic departments (43% of all UK departments). The remit was to examine hospital policies, systems, and anaesthetists attitudes to supervision.⁸ Key findings included:

- (i) anaesthetic record charts not meeting locally desirable standards;
- (ii) less than half (48%) of staff grade/associate specialist anaesthetists received a formal induction;
- (iii) a lack of written guidelines on the management of patients of ASA physical status of III or greater;
- (iv) around 21.4% of hospitals provided no guaranteed named consultant or immediate support to non-consultants working alone. In the audit period (5 days), 2% of trainees reported that consultant input was immediately needed but not immediately obtainable;
- (v) strong support for consultant supervision from the surveyed consultants and trainees. Half agreed that every NHS patient undergoing a general anaesthetic should have a named consultant anaesthetist.

Recommendations were made for addressing these issues.

The second national audit concerned morbidity and mortality (M&M) reviews and was a response to NCEPOD’s 2002 finding that 57% of perioperative deaths were not reviewed by anaesthetists as a body within their departments. One thousand three hundred and fifteen consultant anaesthetists and 131 audit coordinators/clinical directors from 135 (43%) of the UK’s 315 anaesthetic departments responded to the survey asking for details of the system in their hospitals for review of M&M.⁹ Most responding departments had a system for identifying deaths related to anaesthesia, though 26% did not. The most common forum for M&M discussion was dedicated meetings, followed by audit meetings. A very high level of consultant support for M&M meetings was expressed; perceived benefits included the discussion and correction of important problems, including those relating to equipment failure, drug errors, preoperative care, and communication failure. Recognition of important conditions such as aortic stenosis and difficult airways also featured. Changes made in response to M&M meetings included guidelines written or reinforced, equipment purchase, and emphasis on altering systems such as consultant supervision and drug labelling. Respondents’ suggested improvements included:

- (i) the nomination of a lead consultant with responsibility for the recognition and monitoring of M&M;
- (ii) better systems for notification and follow-up of anaesthetic-related death and incidents;
- (iii) formalized meetings, that is, regular, multidisciplinary, compulsory, and 'blame-free' with staff able to attend and anonymity protection issues attended to;
- (iv) the content of the meetings to include case presentations, discussion of near misses and feedback on previously discussed items.

The third national College audit has attempted to establish the incidence of the major complications of spinal and epidural anaesthesia and did so in two stages. First, over 2 weeks from September 18, 2006 all spinal/epidurals/combined spinal–epidurals/caudals performed in UK NHS hospitals were counted (*snapshot phase*). Secondly, over a year, the audit sought to prospectively identify all major complications of these interventions (*prospective phase*). Data were collected on complications of procedures performed from September 1, 2006 until August 31, 2007. Combining the data from the two phases allowed the determination of the prevalence and incidence of the complications of interest:

- (i) spinal bleeding (e.g. spinal haematoma);
- (ii) major nerve damage (e.g. paraplegia, spinal cord damage, spinal cord infarction, and major neuropathy);
- (iii) wrong route errors (i.v. drugs given epidurally/intrathecally or vice versa);
- (iv) death where the anaesthetic/analgesic procedure is implicated as causal.

This was achieved by establishing a national network of local 'reporters' in each anaesthetic department. Efforts were also made to promote awareness of the project among those groups of doctors to whom these patients may present, including neurologists, spinal and neurosurgeons, radiologists, and neuroradiologists. The careful planning and engagement of the UK anaesthetic community led to a return rate from the snapshot phase of 99.7% and a high (>90%) rate of accurate data. It has been possible to calculate that approximately 700 000 neuraxial procedures are performed every year in the UK (spinals 45%, epidurals 41%, and the rest being caudals and combined spinal/epidurals). The results of the second phase are still being processed.

The fourth College audit, now at the design stage, will set out to determine both the number of airway management procedures performed in the UK every year and the major complications arising from them. It will follow roughly the same format as the third. Data will be collected from all hospital areas where airway management takes place.

Strengths and limitations of the audit process

Although clinical audit is an essential tool in the process of improving patient care, it has several potential limitations. Many audits, in particular the confidential enquiries, are retrospective, uncontrolled studies that focus on relatively small numbers of patients and attempt to derive lessons from them for wider applicability. This was recognized by Lunn,¹⁰ one of the initiators of NCEPOD, who pointed out that the enquiries assume that the care received by those who died was similar to that received by those who survived, which may not necessarily be true. However, one of the educational strengths of the confidential enquiry reports is the use of individual case 'vignettes' to illustrate general points about patient care. It should also be noted that the endpoint of death is relatively easily identified and studied, but the scrutiny of 'near misses' may represent a very useful but more challenging measure to assess.

Nevertheless, the national audit initiatives are highly regarded and well respected within the medical profession and beyond, and continue to assist us as we aim for ever higher standards of care.

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Please see multiple choice questions 19–22