The Australian and New Zealand Audit of Surgical Mortality—Birth, Deaths, and Carriage

R. S. Raju, MS, MBBS, DNB,∗ G. S. Guy, BA (Hons), † A. J. Majid, MS, MBBS, FRACS,∗ W. Babidge, PhD, BSc,∗ † and G. J. Maddern, MS, PhD, MBBS, FRACS∗ †

Objective: This article outlines the formation of the Australian and New Zealand Audit of Surgical Mortality (ANZASM) and describes its objectives, governance, functioning and challenges.

Background: A nationwide audit of surgical mortality provides an overview of the leading causes of death in patients who require surgical care. It identifies system or process errors, trends in deficiency of care and helps develop strategies to reduce deaths in the surgical arena.

Methods: A standardized tool is used to systematically collect data after every surgical death. Patient details are reviewed by a peer surgeon (and in certain cases a second) to identify issues with patient management and hospital processes. The treating surgeon is then offered confidential feedback and alternate views on patient management.

Results: From January 2009 to December 2012, 19,096 deaths were reported to the ANZASM. Eighty-six percent of the audited deaths occurred in patients requiring an emergency admission. Significant criticism of patient care was reported in 13% of cases with 16% of clinical issues perceived to be preventable. Western Australia, which first began the audit process, has shown a 30% reduction in surgical deaths.

Conclusions: Nationwide mortality audits are a useful and worthwhile exercise. Recommendations identified in the audit reports direct educational strategies to reduce deaths in the surgical arena.

Keywords: audit, mortality, outcomes, quality care, surgery

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Surgical care in Australia poses unique challenges. With a population density of less than 3 people per square kilometer and large areas with small populations, surgical care is mainly centered in cities. The Royal Flying Doctor Service and other organizations facilitate transfer of sick patients from smaller country hospitals to the metropolitan hospitals. There is an efficient public health system and parallel private sector, with many surgeons working in both systems.

The Australian and New Zealand Audit of Surgical Mortality (ANZASM) was established to provide a snapshot of the causes behind mortality associated with surgical patients. Its principal objective is to inform, educate, and facilitate change and improve quality of practice in a surgical setting. The primary mechanism is peer review of all deaths associated with surgical care. It is designed to highlight system, process, and surgical errors and to identify trends in surgical mortality. It is intended as an educational rather than a punitive process.

This article aims to provide a description of the process involved in maintaining a nationwide surgical mortality audit. There are challenges related to governance, surgeon participation, conformity to legislation, confidentiality of findings, and feedback to surgeons. It is hoped that this article will provide sufficient information to those countries planning to start their own audits as well as stimulate other fields in medicine that do not have a national mortality audit.

Creation and Rollout of the Audit

The first Australian mortality audit began as a pilot project in Western Australia in 2001 and was modelled on the Scottish Audit of Surgical Mortality (SASM).† It was initially managed by the University of Western Australia and was later transferred to the Royal Australasian College of Surgeons (RACS) in 2005. Subsequently, the College Council expanded the audit to other states and territories, under the guidance of the ANZASM Steering Committee. In 2012, the Royal Australian and New Zealand College of Obstetricians and Gynecologists formally participated in the mortality audit process.

The regional audits of surgical mortality are funded by their respective State Departments of Health. In New South Wales, the Collaborating Hospitals Audit of Surgical Mortality is a member of the ANZASM, but it is managed by a Ministerial Committee of surgeons. Each regional audit maintains its own autonomy. The clinical director of each audit is a surgeon from that region, who interacts with surgeons and hospitals within their jurisdiction to ensure that the reports produced are relevant to their needs and requirements. The New Zealand audit is in its formative stages, with future collaboration between the 2 countries forthcoming. The challenge to maintain consistency in reporting methodology is addressed through regular workshops and seminars.

Participating surgeons are usually Fellows of the RACS. In January 2010, the RACS mandated participation in the ANZASM and made it a component of Continuing Professional Development. It is now a “requirement to participate in the Australian and New Zealand Audit of Surgical Mortality, if a surgeon is in operative-based practice, has a surgical death and an audit of surgical mortality is available in the surgeon’s hospital.” Without participation in the ANZASM, surgeons will not meet the requirements of the Continuing Professional Development program, which will impact on continuation of registration with the Medical Board of Australia. Surgeon participation in the audit nationally has increased from 60% in 2009 to 94% in 2012. Some reasons for surgeons’ nonparticipation include working in hospitals not currently participating in the audit, retirement or having gone overseas.

METHODS

ANZASM is managed by the Research, Audit and Academic Surgery Division of the RACS. The ANZASM Steering Committee
oversees the implementation and standardization of each regional audit to ensure consistency in processes and governance across all jurisdictions (Fig. 1).

Individual regional audits are notified of in-hospital deaths by medical records departments. This notification is independent of the surgeon. All cases in which a surgeon was responsible for, or had significant involvement in, are included in the audit, whether or not the patient underwent a surgical procedure.

Clinical details are entered by all surgeons in a standard surgical case form, which has 25 questions. It has been a challenge to ensure that the forms are completed accurately and fully, to enable comprehensive data analysis. Surgeons are given an option to complete an electronic, Web-based form or a paper copy. At present, a third of all surgeons prefer to use the electronic interface and it is intended that the audit be fully Web-based by 2015.

The data input from the surgical case forms is encrypted and stored in a central Structured Query Language server database with a reporting engine. All changes to audit data are recorded in an archive table enabling a complete audit trail to be created for each case. An integrated workflow rules engine supports the creation of letters, reminders, and management reports.

The deidentified surgical case form is then sent for first-line assessment to a surgeon from the same specialty but from a different hospital (Fig. 2). The deidentification process is necessary so that the first-line assessor is unaware of the name of the deceased, the treating surgeon, or the hospital where the death occurred. For certain subspecialties with low mortality or small numbers of surgeons in that region, the data are sent to a surgeon in another state.

There are 2 possible outcomes from this process:

- The information provided by the treating surgeon is adequate to reach a conclusion about the case and to identify any issues of management
- A further, in-depth, assessment (second-line assessment—SLA) is necessary

The SLA may be required

- for clarification on issues of patient management identified or suspected by the first-line assessor
- because the information provided by the treating surgeon was inadequate to reach a conclusion.

FIGURE 1. Governance structure of ANZASM.

FIGURE 2. The audit process. ASM indicates audit of surgical mortality.

- where death was unexpected, for example, in a young, fit patient with benign disease, or in a day care surgery case.

Second-line assessors are selected using the same criteria as for first-line assessors. The second-line assessor is provided with the medical case notes and the surgical case form and first-line assessment form. Over the past 4 years, 12% of all cases have gone onto SLA. It is expected that each case would be assessed and “closed” within a 3-month window. Monthly reminders are sent to surgeons in case of a delay and after 3 months, it is escalated to the clinical director of the audit.

The confidential comments and suggestions of the assessors are sent back to the treating surgeon. For surgeons who do not have a formal mortality audit in their hospitals, this may be the only peer review of deaths available to them. Selected deidentified cases are also published in a national case note review booklet, which is sent to all surgeons and trainees. A summary of the nationwide audit process, with trends, is published in an annual report. In addition, each region produces an annual report.
RESULTS

Almost all (99%) of Australian public hospitals, where surgery is conducted, now participate in the audit. Private sector participation is currently at 76% but is growing. From January 2009 to December 2012, 19,096 deaths were reported to the ANZASM. Of these, 14,031 cases had completed their audit process by the census date in March 2013. The remaining cases were either excluded from the audit (admitted for terminal care, inappropriately included, or treated by surgeons not participating in the audit) or had not yet completed the audit process.

Annual reports are released each year, summarizing the findings of the audit and are available on the ANZASM Web site. The first annual report was published in 2010 reflecting data from the 2009 calendar year, with subsequent reports reviewing data year on year.

Findings included the following:

- Of the 14,031 audited cases, the median age was 76 for men and 81 for women. Men represented 54% of cases.
- The majority of deaths (86%) occurred in patients admitted as emergencies.
- 73% of the patients had at least 2 comorbidities.
- 78% of elective and 86% of emergency patients had American Society of Anesthesiologists score of grade 3 or greater.
- 78% of patients underwent a surgical procedure, with 33% of them having postoperative complications.
- The commonest postoperative complications over the 4-year period were postoperative bleeding (11.5%), procedure-related sepsis (11%), tissue ischemia (9%), and anastomotic leak (8%).
- Delay in definitive treatment (19%), decision to operate (14%), and poor choice of operative procedure (14%) were the 3 commonest clinical management issues identified.
- Delay in transfer of patients increased from 36% in 2009 to 44% in 2012.
- Significant criticism of clinical management was reported in 13% of cases.
- In 16% of cases, the assessors felt that clinical issues were definitely or probably preventable.
- The assessors felt that the surgical team was responsible for 67% of the perceived clinical issues, with 22% attributed to other teams and 5% to hospital factors.

The national audit has already revealed issues requiring immediate attention—for example, management of the deteriorating patient, venous thromboembolism prophylaxis, communication issues, futile surgery, and delay in referral and delivering definitive treatment. Workshops have been held in individual regions to educate surgeons and medical teams on these issues. At each workshop, surgeons are presented with credible findings from audit data rather than from surgical literature. The impact on surgical practice of workshops and feedback to individual surgeons is now being determined. Indications are that they are very well received by the surgical community.

A survey of RACS fellows was conducted recently to get feedback from surgeons regarding the audit. The survey (n = 92) revealed that

- 80% of respondents agreed that the feedback from a second-line assessment was useful to them;
- 77% felt that ANZASM could affect patient outcomes positively; and
- 82% indicated feeling comfortable with reporting and commenting on patient management concerns within the audit process.

The ultimate aim of the audit is to achieve a downward trend in deaths associated with surgery. For example, Western Australia, which first began the audit process, has observed a decrease in surgical mortality from 35/100,000 population in 2004 to 24.6/100,000 now—a reduction of 29.7%. This reduction has been largely attributed to the audit and the resulting educational activities and action taken. There was a significant change in clinical and hospital practice in the 5 years after introduction of the audit, with strong support for the audit from hospital executives and consumers.

The Whipple procedure was found to have a mortality rate of 16%. After internal review, new guidelines were developed for this operation, which included presentation in a multidisciplinary team meeting in teaching hospitals, restriction of the procedure to working hours, and to ensure that a second qualified surgeon be present during the procedure. There has been no subsequent death reported over the past 18 months.

DISCUSSION

A program of this scale has significant challenges. The strength of any audit is its data. To sustain the audit in the long-term, surgeons should view it as an important and useful activity. It is also vital that surgeons have input into, and therefore ownership of, the audit process and development. It is integral that surgeons appreciate the audit’s “culture of reflection rather than blame.”

To ensure protection of sensitive information collected in the audit, ANZASM has been declared a quality assurance activity under the Commonwealth Qualified Privilege Scheme, part VC of the Health Insurance Act 1973. This provides significant protection to health care professionals participating in the audit process and encourages voluntary disclosure of mortality-related data. Information collected as part of the audit may not be used in legal proceedings. It also protects the first- and second-line assessors from legal action.

There is significant value to the Australian health consumer community at large in the audit continuing to be recognized as a quality assurance activity in this way, both to maintain the forthright participation of surgeons and to grow and enhance the existing data on surgical mortality.

It is in surgeons’ best interests to participate in an independent audit process, which is peer reviewed. A desire for self-regulation of course has to be balanced with the responsibility toward their patients. A fellow surgeon is in the best position to understand the clinical scenario, treatment options, and possible complications. Thus, there is a tremendous advantage and responsibility in running a nationwide surgical audit. The audit helps the College in fulfilling its role of maintaining surgical standards. A proper surgical audit satisfies the public and other stakeholders with the knowledge that there is a system that reviews surgical care. Without this, there is a possibility of an increasingly suspicious and litigious population.

Australian surgeons have, by and large, accepted the audit positively. In Western Australia, by 2004 (when participation was still voluntary), 96% of surgeons who had a death participated in the audit. A survey that year showed that 85% were in favor of the audit continuing and 73% said that it led to change in their practice. There were strong views on whether it should be voluntary or mandatory. They viewed it as a method to highlight health system and hospital issues and were happy to continue with it even though there was some overlap with other audits. As the audit rolled out to the rest of the country, surgeon participation rapidly grew from 60% in 2009 to 94% by 2012. A nationwide survey in 2012 showed that surgeons appreciated assessor feedback, the introspection process, and the educational activities.

The SASM began in 1994. Participation in the SASM is voluntary and includes anesthetists and interventional radiologists in addition to consultant surgeons. A major difference is that patients admitted for terminal/palliative care are included in the SASM but not in the ANZASM (unless they have an operation). This reduces the number of patients who go through the audit process. The SASM does not include postoperative patients who die while under the care of a surgeon.
nonsurgical unit. The ANZASM oversees all surgical deaths in the country, whereas the SASM excludes Thoracic, Cardiac, and Obstetric deaths (these specialties have a separate UK-wide audit). However, in both the SASM and ANZASM, only in-hospital mortality is included in the audit. The findings of the ANZASM are confidential and not available for legal use. This is in contrast to the Scottish audit, which in certain situations can be asked to reveal data to an investigation regarding a surgeon’s care in the interest of patient safety.

Large mortality data sets can lead to the generation of significant publications. In some instances, this may be the only data set that contains mortality data for a number of conditions or operations across the country. Initial publications based on the SASM described deaths due to inadequate deep venous thrombosis prophylaxis9 and large bowel operations with delay in diagnosis, treatment, and low consultant input.10 Publications have highlighted deaths after specific procedures (hernia repairs,11 upper gastrointestinal endoscopy,12 central line insertion,13) or diagnoses (gallstone disease14) and seen improvements for trends in survival after surgery for peptic ulcers,15 and colorectal and esophageal cancer.16,17 They have also observed a reduction in adverse events, greater levels of consultant input, and better high dependency unit usage. There has been a review of areas of concern related to anesthesia18 and one on provision of palliative care for patients with gastrointestinal cancer.19 From the data already obtained from the Australian audits, there have been publications on the impact of consultant operative supervision on mortality20 and an analysis of the causes and effects of delay before diagnosis. Other publications currently in process include looking at risk reduction, inappropriate choice of operation, and differences in perception of areas of concern between the surgeon and the assessors.

Funding for the audits is provided by each state and territory government. There are significant costs, particularly related to information technology infrastructure, which needs regular upgrading. It would be helpful if the Federal government could provide such core funding to secure the future of this critical national safety and quality initiative.

It is difficult to capture all issues arising from all surgical deaths across different specialties on 1 surgical case form. Reasons for death subsequent to an operation for fracture neck of femur may be different to those after pediatric surgery, as would issues surrounding emergency and elective surgery. There is a tension between increasing the size of the form to identify more issues and the corresponding decrease in likelihood of surgeons completing them diligently. A suggestion is that each year, the audit examines 1 major issue or complication in detail—for example, deep venous thrombosis, delays to surgery and diagnosis, and inappropriate surgery. This would provide a national perspective to the condition and allow for evaluation of trends after specific time intervals. It is also possible that over time, the audit will allow for more focused questions surrounding a specialty or diagnosis while still retaining its core issues. The annual report may become shorter and more detailed information be provided in a different format to different stakeholders who may be interested in specialty-specific information and trends.

The audit is not a tool for comparison of outcomes between individual surgeons, hospitals, or health care systems, but a method of analyzing systems and processes. Deficiencies in care are often “team failures” rather than surgeon failures. There is a chain of events that lead to mortality. It is important that in reporting back on cases, other clinicians involved are informed. In addition, hospitals are provided deidentified summary reports. We are working closely with them to provide reports that are useful for their needs within our confidentiality constraints.

The audit is not a panacea to all that ails surgery. The audit provides valuable information to surgeons, hospitals, and governments. It is then their role to ensure through publications and workshops that appropriate action is taken. If a surgeon has completed an audit form, it does not always address the entirety of the issue. There are many system failures and errors in medicine, which do not lead to death. Identifying near misses and the causes behind them may be as important as mortality.22 There is also the risk of surgeons becoming averse to taking risks as a result of being subjected to the audit process. Dissemination of findings of the audit to the media can be challenging. The media is often only interested in highlighting the negative outcomes such as the number of people who died under the care of surgeons, especially those which were preventable or had areas of concern and adverse events. The gains and positive outcomes of the audit are frequently overlooked.

Multihospital, regional and now national audits have tended to occur in the developed world with similar profiles, for example, a well-established system of primary and preventive care, ageing population, and relatively easy access to free or subsidized quality health care. It is important to recognize that each country has its own peculiar situation and medical scenario. Findings from the ANZASM would be a good starting point; however, each nation will need to identify risk factors and issues specific to their region when forming their own audits. Having had significant expertise now, the ANZASM is in a position to offer procedural and software help to any other region/country or specialty of medicine interested in setting up a large-scale audit. Similar data sets across countries and continents will lead to meaningful comparisons of mortality and efficacy of risk management and intervention.

CONCLUSIONS

A nationwide audit of surgical mortality is a powerful tool to help identify deficiencies of care leading to surgical mortality. Feedback to surgeons of problems, careful analysis of their genesis, and change in practice can all lead to a reduction in surgical deaths. The audit also reassures the public that every death is investigated and that efforts are made nationwide to ensure that the highest standard of outcomes is being achieved.

REFERENCES


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