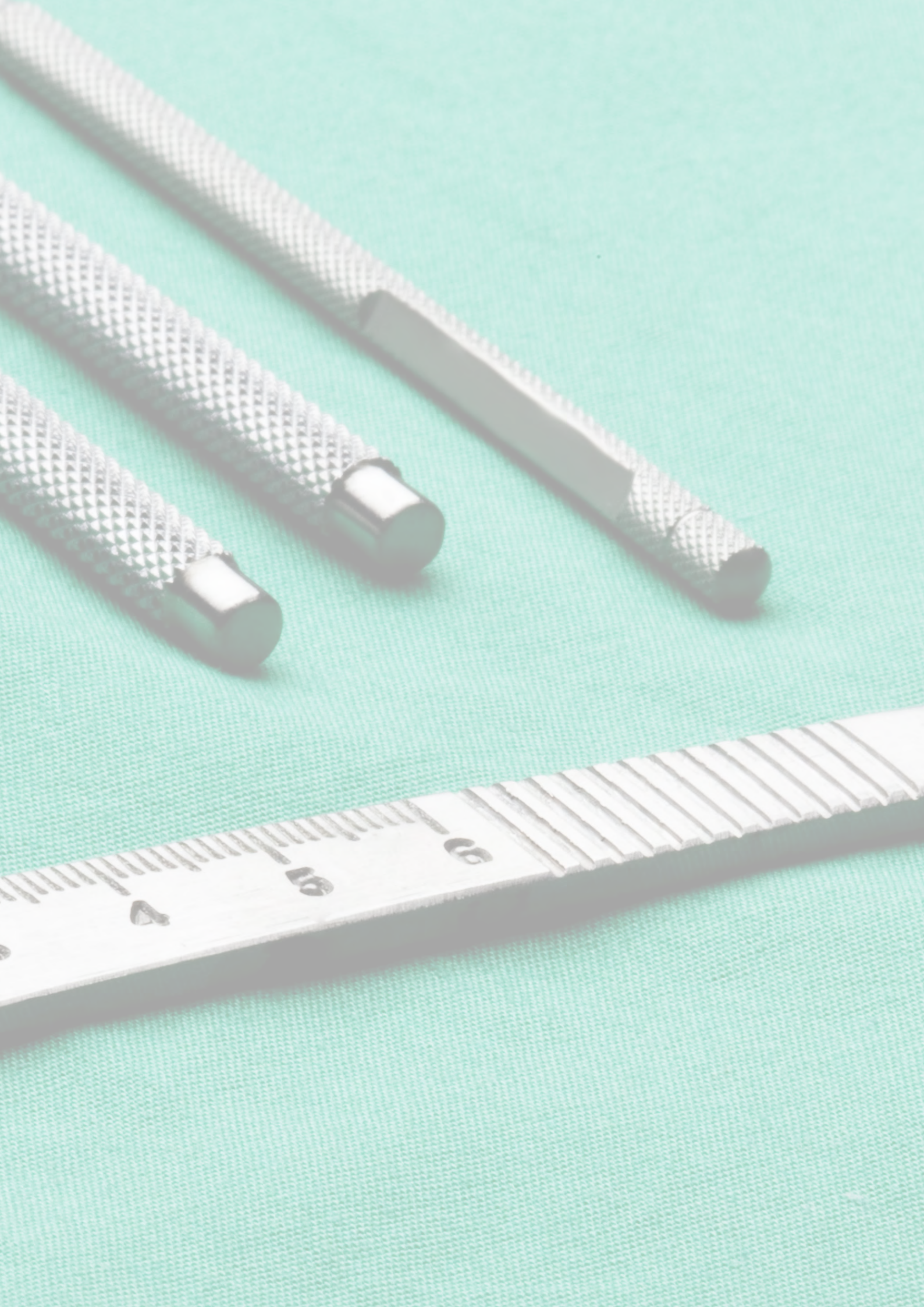
ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS

Australian and New Zealand Audit of Surgical Mortality

National Report 2012



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The information contained in this annual report has been prepared on behalf of the Royal Australasian College of Surgeons, Australian and New Zealand Audit of Surgical Mortality Steering Committee. The Australian and New Zealand Audit of Surgical Mortality, including the Western Australian, Tasmanian, South Australian, the Australian Capital Territory, Northern Territory, New South Wales, Victorian and Queensland audits of surgical mortality, has protection under the Commonwealth Qualified Privilege Scheme under Part VC of the Health Insurance Act 1973 (gazetted 23 August 2011).

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CHAIRMAN'S REPORT

With all Australian States and Territories now participating in the Audit of Surgical Mortality and most private and public hospitals able to contribute at no cost, the excuses for not being participants have gone. There is increasing engagement from the surgical community, State Governments are supportive, and interesting data and publications are appearing. Over the last three years there have been five publications, six awaiting publication, and numerous projects underway.

This Annual Report for 2012 provides overview data of the results, but the detail can only be effectively dealt with in peer-reviewed publications. At the other end of the spectrum, the published clinical vignettes offer valuable information and insights into management problems that have had disastrous outcomes. These case studies are relevant to all surgeons and should be read by us all. Most of the examples come from second-line assessments (SLA) conducted after being alerted by an initial concerning first-line assessment (FLA). Recently, concerns have been raised about the reliability by which SLAs are initiated. During the next year, comparisons of FLA-triggered SLAs will be compared with SLAs done at random. This will either provide important reassurance that our processes are robust or initiate a change in the design of our data collection.

To further disseminate the lessons learnt from the audit, educational workshops are now being run in all States on a regular basis. I would urge all, who have the opportunity, to attend. The lessons brought forward are based on actual experience and data, rather than only theoretical musings.

I trust the 2012 Annual Report is of value and stimulates further discussion and support for what is a unique national audit activity and a source of increasing attention from around the world.

Professor Guy Maddern
Chairman, ANZASM

SHORTENED FORMS

ACTASM	Australian Capital Territory Audit of Surgical Mortality
ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
ASM	audit of surgical mortality
CHASM	Collaborating Hospitals Audit of Surgical Mortality
CPD	Continuing Professional Development
DVT	deep vein thrombosis
FLA	first-line assessment
GP	general practitioner
ICU	intensive care unit
NTASM	Northern Territory Audit of Surgical Mortality
QASM	Queensland Audit of Surgical Mortality
SAAPM	South Australian Audit of Perioperative Mortality
SCF	surgical case form
SLA	second-line assessment
TASM	Tasmanian Audit of Surgical Mortality
VASM	Victorian Audit of Surgical Mortality
WAASM	Western Australian Audit of Surgical Mortality

EXECUTIVE SUMMARY

Background

The Australian and New Zealand Audit of Surgical Mortality (ANZASM) is an independent, external peer-review of surgical mortality in all states and territories of Australia. Each audit of surgical mortality (ASM) is funded by its state or territory Department of Health (Western Australia, Victoria, South Australia, Queensland, Tasmania, Australian Capital Territory and Northern Territory). The Collaborative Hospitals Audit of Surgical Mortality (CHASM) in New South Wales provides comparable data to ANZASM but is independently managed by the Clinical Excellence Commission of New South Wales.

Surgeon participation

Surgeon participation in the audits rose from 60% in 2009 to 94% by the end of 2012.

Hospital participation

In total, 99% of all public hospitals in Australia are now participating in the audit. Private sector participation is lower (76%), caused primarily by non-participation of Queensland and limited participation of New South Wales private hospitals at the time of writing this report. It should be noted that in July 2013 the Queensland Health Department agreed to fund the participation of private hospitals. These figures will be reflected in the next report.

Analysis

This report contains a comparative analysis of cases reported to ANZASM from 1 January 2009 to 31 December 2012. Some data are missing due to incomplete information provided in surgical case forms (SCFs); where this occurs, it is noted in the text. Data from 2009 and 2010 have been updated; this reflects the continuous nature of the data collection and reporting requirements within the audit. Cases that are still under review are captured in the next report.

Audit numbers

From 1 January 2009 to 31 December 2012, a total of 19,096 deaths were reported to ANZASM. Of these, 14,031 cases had completed the audit process by the census date in March 2013. The clinical information from these completed cases provides the patient profiles described in this report.

The remaining 5,065 cases were either excluded from the audit (admitted for terminal care, inappropriately attributed to surgery or treated by surgeons not participating in the audit) or had not completed the full audit (peer-review) process at the census date. Cases that had not completed the audit process are therefore still under review and will be captured in next year's report.

Demographic profile of audited cases

Of the 14,031 audited cases, the mean (standard deviation) age was 74 (±17) years. The age range varied from two days to 105 years. Males represented 54% of cases.

Risk profile of audited cases

The majority (86%) of audited deaths occurred in patients admitted as emergencies with acute life-threatening conditions. 89% of patients had significant coexisting illnesses.

Risk management

In general, deep vein thromboembolism (DVT) prophylaxis strategies were being appropriately applied. In two per cent of cases where prophylaxis was consciously withheld by the treating surgeons, assessors usually agreed with the decision to withhold.

Critical care support was deemed necessary in 58% of cases. In five per cent of the remaining cases where patients did not receive critical care, reviewers felt the patient may have benefited from it. The current audit dataset does not allow identification of the reasons behind this. However this will be presented in future audits.

Profile of operative intervention

There were 10,907 (78%) patients who underwent a surgical procedure. A total of 15,276 separate surgical episodes were recorded for these patients, demonstrating that an individual patient can have more than one visit to the operating room during a single admission. In 86% of the operative episodes, the consultant surgeon was the decision-maker and in 60% of cases a consultant surgeon performed the surgery.

Of the patients who had surgery, 16% had an unplanned return to the operating theatre because of complications.

Patient transfers

Despite some improvement, there are still issues around the transfer of patients to other hospitals. This is a concern as it is essential that all clinicians involved have a complete picture of the patient's issues upon presentation. Insufficient clinical documentation (16%) was a criticism, which is of concern. Inappropriateness of transfer (28%) and transfer delay (37%) were the most common criticisms.

Peer-review outcomes

Twelve per cent of audited cases were referred for second-line assessment (SLA) or case note review during the audit period. Referral rate for SLA varied among regions. This is not a reliable measure of the incidence of clinical issues, as referral for SLA is often required due to inadequate information in the SCF. This was the case in 1,144 (65%) of the 1,747 second-line requests.

The most common criticism made by assessors was delay in delivering definitive treatment. However, 67% of these delays were attributed to the surgical team. This finding has led the regional ASMs to develop and deliver a series of education programs aimed at surgeons and junior and senior hospital staff, which address the various facets of 'delay' and 'communications'.

Clinical issues were described in 26% of the 14,031 cases that completed the audit process. However, significant criticism of patient care was reported in just five per cent of all cases. The perceived relationship of clinical management to outcome was less clear in the remaining cases.

Comparison of data between the 2009 and 2011 audit periods

When data are compared between the four audit periods, trends emerge. On a positive note:

- Surgeon participation has increased from 60% to 94%.
- The frequency of adverse events remained low at five per cent, and cases with no issues identified have remained stable with 72% in 2009 and 75% in 2012.
- The quality of the clinical information in SLAs is improving; the need for an SLA due to insufficient information falling from 19% in 2009 to just eight per cent in 2012.
- Input from consultant surgeons has remained high in terms of deciding and operating on patients.

However:

- There has been a steady increase from 2009 to 2012 of 23% (18% to 41%) of cases where CCU support was not provided to patients when it should have been provided.
- The frequency of transfer delays has increased from 36% in 2009 to 44% in 2012.
- Missing data remains an issue as this prevents the identification of trends and hinders analysis.
- Fluid balance in the surgical patient is an ongoing challenge. In this series, 10% of patients were perceived to have had poor management of their fluid balance.

RECOMMENDATIONS AND KEY POINTS

The recommendations are as follows:

- Continue to increase active participation of surgeons and hospitals towards 100%.
- Continue to seek for emerging trends in mortality and address these where possible through ongoing educative and interactive seminars.
- Clinical information on handover, delays in transfer, and procedure-related sepsis are ongoing issues that need to be addressed.
- Ensure greater completeness and accuracy of the SCFs. The failure to fully complete the forms substantially detracts from data quality. Missing data in the SCF prevents assessors from reaching a conclusion regarding the need for further investigation and greatly reduces the amount of data available for analysis by ANZASM. Increased clinical information could, therefore, lead to a reduction in requests for SLAs being carried out.
- Enhancements to Fellows Interface – scheduled for February 2014 to allow for the self-generation of a notification of death and to include the revised surgical case for revisions.
- An infection and trauma question was introduced into the surgical case form in 2011. The data is currently too small to make any significant comment in this report, however the intention is to report on it in the next report.
- The forms are periodically reviewed to make it more efficient without detracting from the value of the data collection.

1. INTRODUCTION

Key points

The Australian and New Zealand Audit of Surgical Mortality (ANZASM) is an external peer-review audit by surgeons of deaths that occur under their surgical care.

- This report is a review of all deaths notified during the period 1 January 2009 to 31 December 2012.
- ANZASM's main roles are to inform, educate, facilitate change and improve quality of surgical practice.
- This report is an analysis of the 14,031 cases that completed the full audit process.

1.1 Background

The Royal Australasian College of Surgeons became responsible for the management of the Western Australian Audit of Surgical Mortality (WAASM) in 2005. WAASM was modeled on the Scottish Audit of Surgical Mortality, which has operated since 1988. The College has expanded the program to all other states and territories under the umbrella of ANZASM.

Complete data for the period 1 January 2009 to 31 December 2012 from Western Australia, South Australia, Tasmania, Victoria, New South Wales and Queensland are included in this report. The Australian Capital Territory and Northern Territory joined the program during 2010.

1.2 Objectives

The principal aims of the audit are to inform, educate, facilitate change and improve quality of practice within surgery. The primary mechanism is peer-review of all deaths associated with surgical care. The audit process is designed to highlight system and process errors and to identify trends in surgical mortality. It is intended as an educational rather than a punitive process.

1.3 Structure and governance

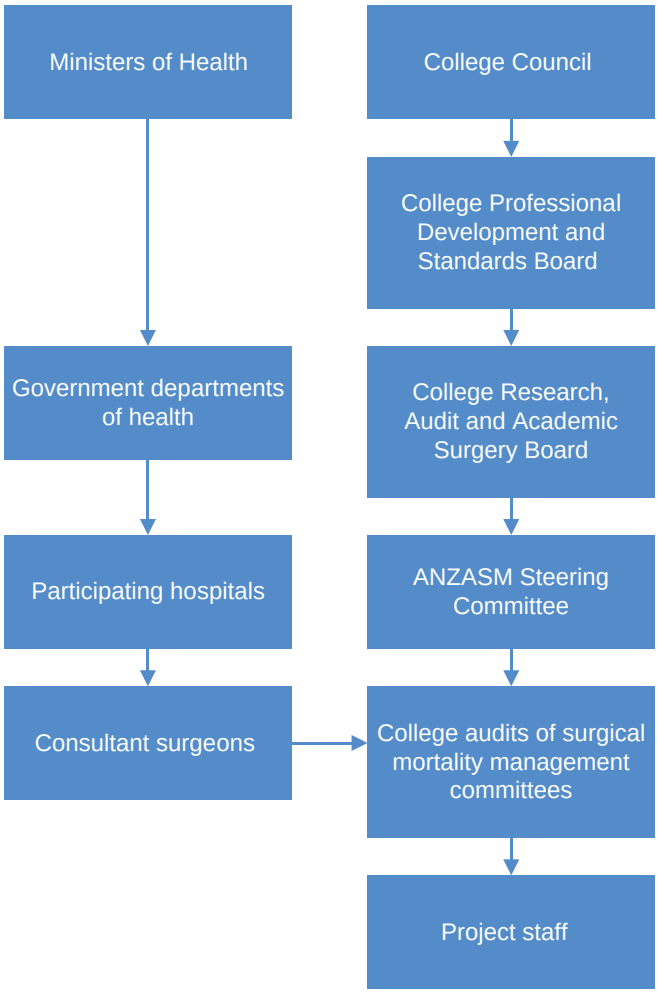
ANZASM is managed by the Research Audit and Academic Surgery Division of the College. ANZASM oversees the implementation and standardisation of each regional audit to ensure consistency in audit processes and governance structure across all jurisdictions (see Figure 1).

The individual regional audits are funded by their Departments of Health. The College provides infrastructure support and oversight to the project.

Participation by surgeons has been mandated as part of the College's Continuing Professional Development program since January 2010.

ANZASM receives protection under the Commonwealth Qualified Privilege Scheme, part VC of the *Health Insurance Act 1973* (gazetted 23 August 2011).

Figure 1: Governance structure of the ANZASM



ANZASM: Australian and New Zealand Audit of Surgical Mortality.

1.4 Methodology

Individual regional audits of surgical mortality are notified of in-hospital deaths associated with surgical care. The method of notification varies by region. In some regions this notification comes from the hospitals or another source that is independent of the surgeon. All cases in which a surgeon was responsible for, or had significant involvement in, the care of a patient are included in the audit, whether or not the patient underwent a surgical procedure.

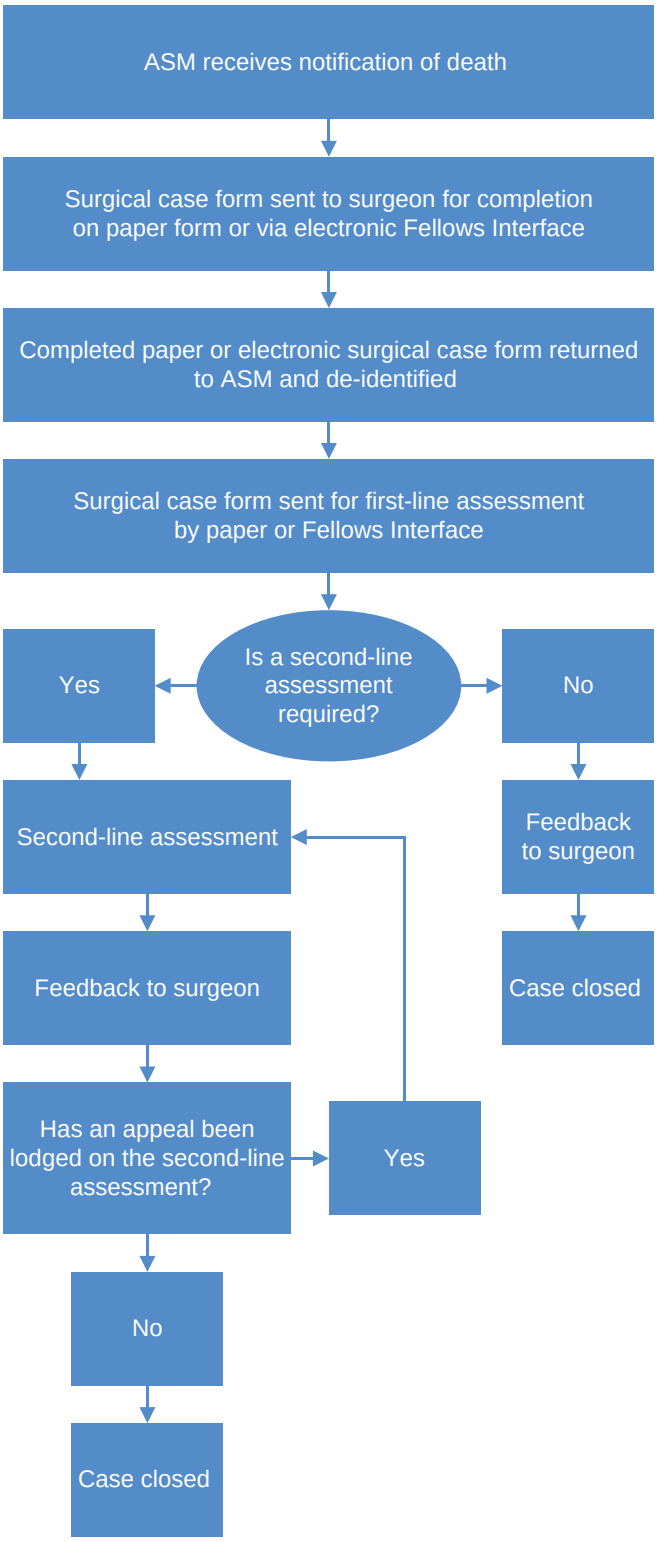
The clinical details pertaining to the management of each case are recorded on a standard, structured surgical case form (SCF) completed by the consultant or treating surgeon associated with the case. The completed SCF is returned to the appropriate audit of surgical mortality audit office, where it is de-identified and sent for first-line assessment (FLA) by a surgeon with the same surgical specialty but from a different hospital. De-identification means the first-line assessor is unaware of the name of the deceased, the treating surgeon or the hospital where the death occurred.

There are two possible outcomes of this FLA:

- The information provided by the treating surgeon is adequate to reach a conclusion about the case and to identify any issues of management, if present.
- A further in-depth assessment (second-line assessment (SLA) or case note review) is necessary either:
  - for clarification of issues of patient management identified or suspected by the first-line assessor, or
  - because the information provided by the treating surgeon was inadequate to reach a conclusion.

Where an SLA is deemed necessary, assessors are selected using the same criteria as for first-line assessors. The audit process is outlined in Figure 2.

Figure 2: The audit process



ASM: audit of surgical mortality.

1.5 Providing feedback

The principal aim of the ANZASM is education as a component of a surgeon's continuing professional development (CPD). This is achieved by providing commentary obtained during the audit process directly to the treating surgeon as well as highlighting lessons learned from de-identified cases in a national case note review booklet. The individual regional audits also produce their own annual reports and case note review series, which highlight particular issues in patient management.

1.6 Reporting conventions

1.6.1 Reporting clinical incidents

In the structured SCF, the surgeon is asked to document whether there were any clinical incidents during the care of the patient and to describe the incident. The surgeon is asked to:

- report on the perceived impact of the incident on the outcome by stating whether the incident:
  - made no difference to the outcome
  - may have contributed to death
  - caused the death of a patient who would otherwise have been expected to survive
- provide their perception as to preventability, using the following categories:
  - definitely preventable
  - probably preventable
  - probably not preventable
  - definitely not preventable
- indicate which clinical area was most responsible for the incident/event:
  - audited surgical team
  - another clinical team
  - hospital
  - other.

First and second-line assessors also complete the same assessment matrix.

1.6.2 Analysis of clinical incidents

A primary objective of the ASM peer-review process is ascertaining if death was a direct result of the disease process alone, or if aspects of management of the patient might have contributed to that outcome. Where there is a perception that the clinical management may have contributed to death, ANZASM specifies a spectrum of criticism to be used by assessors:

- *an area for consideration:* where the assessor believes an area of care could have been improved or different, but recognises that the issue is perhaps debatable
- *an area of concern:* where the assessor believes that an area of care should have been better
- *an adverse event:* an unintended injury or event that was caused by the medical management of the patient rather than by the disease process, and which was sufficiently serious to lead to prolonged hospitalisation; or which contributed to or caused death. Specific complications (e.g. pulmonary embolus, anastomotic leak) are by definition always adverse events but may not be preventable.

1.6.3 Data analysis

The 2012 report covers deaths reported to ANZASM from 1 January 2009 to 31 December 2012, censored on 31 March 2013. The full audit process takes an average of two months from notification of death to completion. This means that some cases are still under review and their outcomes are not available for this report. These cases will of course be featured in the next report. Patients admitted for terminal care are excluded from the full audit process.

For the purposes of collating data for this national report, data are encrypted, sent to and stored in a central Structured Query Language server database with a reporting engine. All transactions are time-stamped. 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 data are analysed using the Statistical Package for Social Sciences, version 15.0, statistical package STATA version 10.1, and Microsoft Office Excel (2010). Numbers in the parentheses in the text (n) represent the number of cases analysed. As not all data points were completed, the total number of cases used in the analyses varies. The total numbers of cases (n) included in individual analyses are provided in all tables and figures in the report.

It should be noted that where no comparative data are given, there was no significant difference between the 2009 to 2012 audit periods.

2. AUDIT PARTICIPATION

Key points

- On a national basis, surgeon participation is 94%. This may be an underestimate of true intent to participate as not all hospitals are participating
- Since January 2010, participation in ANZASM has been made a mandatory component of CPD. It is expected that this will encourage more surgeons to participate.
- The SCF return rate at census date for those participating surgeons is 80%.
- 99% of all public and 76% of all private hospitals are currently participating in the audit program.

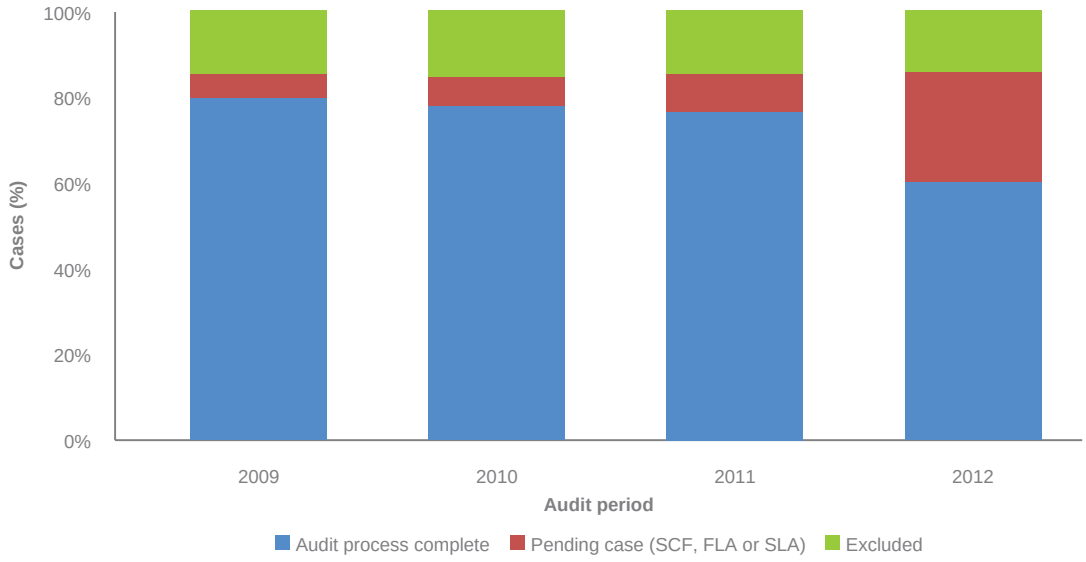
2.1 Audit numbers

During the period January 2009 to December 2012, ANZASM received 19,096 notifications of death associated with surgical care:

- Of these, 14,031 cases had completed the audit process by the census date. The clinical information from these 14,031 deaths provides the patient profiles described in this report and is the denominator in all analyses pertaining to outcomes from the audit, unless stated otherwise.
- The remaining 5,065 cases were not included in the audit for the following reasons:
  - The case was admitted for terminal care, inappropriately attributed to surgery or treated by surgeons not participating in the audit (n=2,835).
  - The case had not completed the full audit (peer-review) process at the census date (n=2,230).

The percentage of completed, pending or excluded cases for each audit period is shown in Figure 3.

Figure 3: Audit status at census date per year (n=14,031)

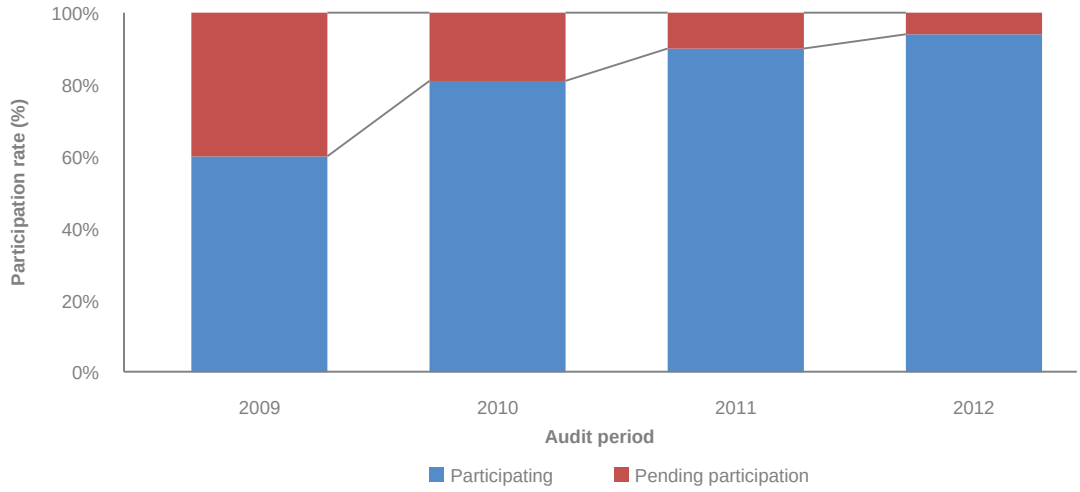


* Excluded cases were non-surgical, non-participant or terminal care cases.

SCF: surgical case form; FLA: first-line assessment; SLA: second-line assessment.

Figure 3 shows the number of completed forms over the respective audit periods. Over time, more case forms are completed and it is expected that the pending cases for 2012 will decrease in time, to be more in line with the earlier years. The audit process relies not only on surgeons agreeing to participate, but also on their timely completion and return of surgical case and assessment forms. Figure 4 shows the increase in surgeon participation in Australia from 2009 to 2012.

Figure 4: Participation by Fellows (n=4,540)



Note: n= 490 excluded from analysis due to non-participation in audit, retirement, interstate or overseas move or Fellows that are no longer in clinical practice.

The percentage of Fellows per region who participated in the audit, or were first- or second-line assessors, is displayed in Tables 1 and 2.

Table 1: Regional participation by Fellows (n=4,540)

	Region							
Surgeon participation status	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
Participating	95%	91%	99%	100%	97%	99%	96%	96%
Not participating	5%	9%	1%	0%	3%	1%	4%	4%

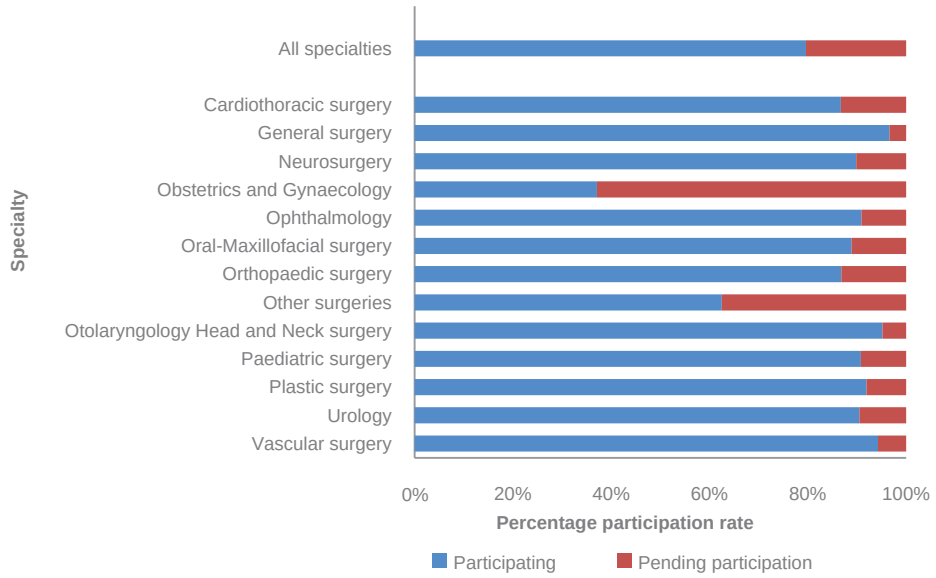
Table 2: Regional participation by Fellows as assessors (n=4,540)

	Region							
Assessor type	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
First-line assessor	50%	52%	84%	90%	56%	73%	57%	38%
Second-line assessor	51%	48%	85%	96%	57%	59%	53%	29%

Comment

- At the end of 2012, 94% of eligible Fellows had agreed to participate, a 34% increase in participation from 2009 when only 60% of Fellows were participating. This increase can be largely attributed to the ongoing rollout of the program, Fellows appreciating the value of the audit, and the College mandating participation in the mortality audit process in January 2010. Participation is now an essential component of recertification for Continuing Professional Development (CPD). It is hoped that higher numbers of participating surgeons can be achieved in the next audit period – the aim is for 100% participation nationally.
- Some reasons given for surgeons' non-participation included working in hospitals not currently participating in the audit in New South Wales and Queensland, or having gone overseas, and are thus also excluded from the audit.
- It should be noted that in July 2013, the Queensland Health Department agreed to fund the participation of the private hospitals. It is expected that surgeon participation in Queensland will rise as a result.
- Of the participating surgeons nationally, 33% are using the ANZASM electronic interface, in which surgeons enter the data directly. Greater uptake of the electronic interface is encouraged, as the electronic entry process is simple and rapid to use and saves considerable time in the process.

Figure 5: Surgeon agreement to participate by surgical total specialties (n=4,540)



'Other surgeries' listed by the treating surgeon includes specialties related to surgery in which other clinicians may participate: anaesthesia, intensive care unit (ICU), medicine, oncology, thoracic medicine and trauma.

Note: Obstetrics and Gynaecology formally started participating in the audit process in December 2011.

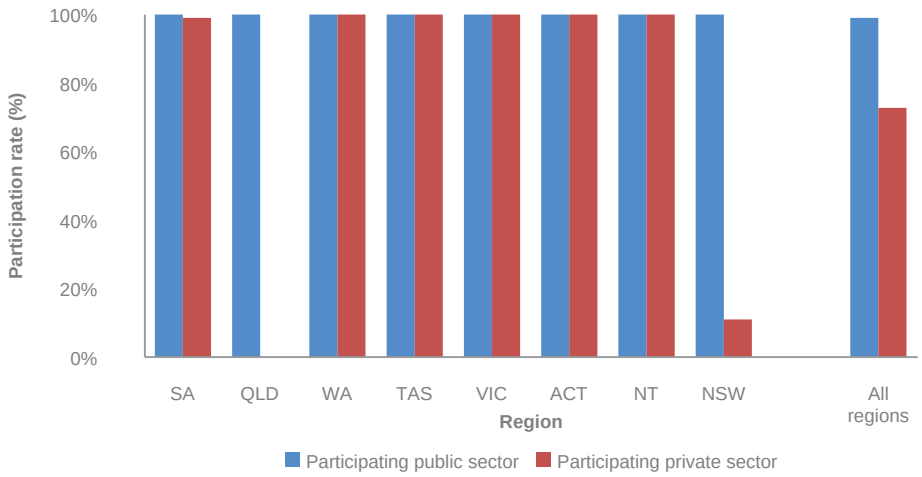
Comment

- Participation rates vary amongst the different specialties. Pending participation means that a letter has been sent out inviting the individual to participate in the audit, but have yet to receive a response back.
- There are 374 Obstetrics and Gynaecology Fellows who have agreed to participate in the ANZASM audit process. Participation for RANZCOG Fellows is voluntary under their CPD program,

2.2 Hospital participation

Almost all public hospitals (99%) have agreed to take part in the audit program.

Figure 6: Hospital sector participation by region



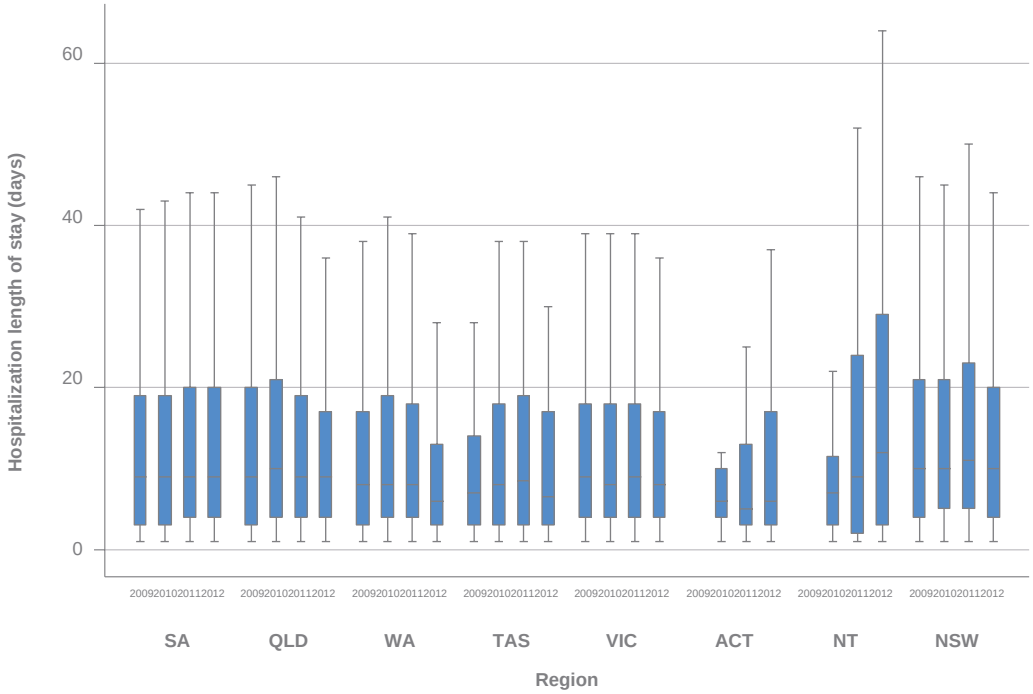
Comment

- Nationally since the end of 2010, there has been an increased recruitment drive in the private sector to join the audit process, and generally the private sector participation is positive. There has been a significant increase in private hospital participation since the last report (76% vs. 43% in 2009).
- ANZASM would like to encourage the regions where little or no private sector participation is evident, as it is crucial that all deaths are reviewed.
- It should be noted that in July 2013, the Queensland Health Department agreed to fund the participation of all the private hospitals. These figures will be reflected in the next report.

Figures 7, 8, 9, 11 and 12 are box-and-whisker plots, in which:

- the central box represents the values from the lower to upper quartile (25th–75th percentiles)
- the middle line represents the median value
- the vertical line extends from the minimum value to the maximum value, excluding extreme values.

Figure 7: Length of stay per year in hospital by region (n=14,031)



Note: ACT and NT joined the ANZASM mortality audit process in 2010.

Comment

- There are noticeable downward trends in the length of stay of patients, particularly in Queensland and Western Australia. Conversely, there is an upward trend in the stay of patients in the Australian Capital Territory and Northern Territory. The latter region would warrant further investigations due the higher than average length of stay by patients.

3. DEMOGRAPHIC PROFILE OF AUDITED CASES

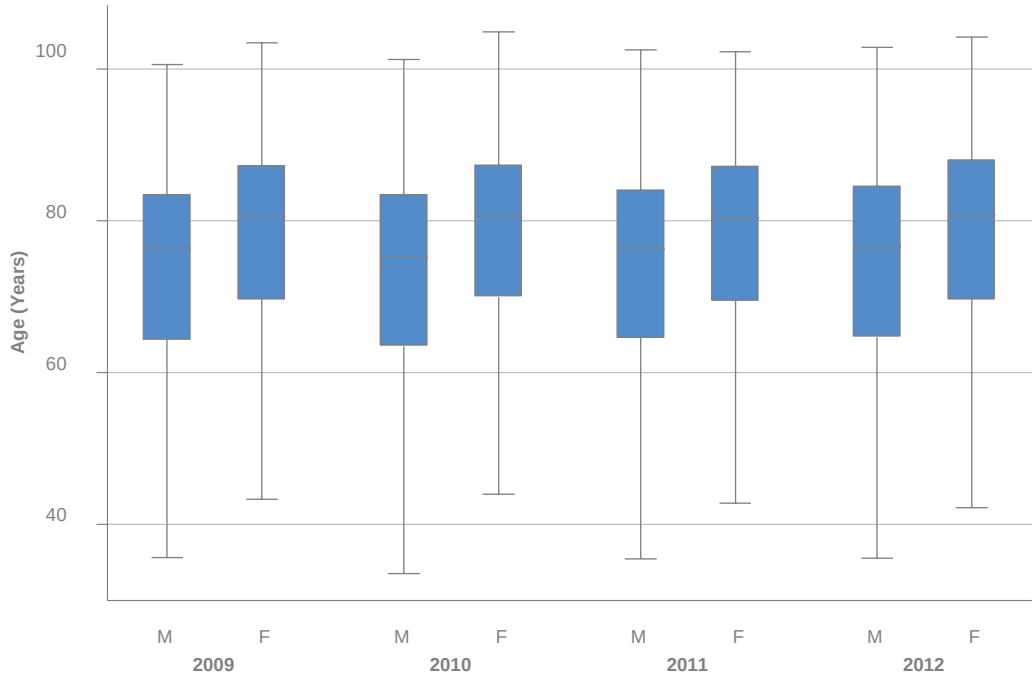
Key points

- A majority (86%) of audited deaths occurred in patients admitted as emergencies with potentially acute conditions. The mean age and spectrum of comorbidity in audited deaths indicates that surgical mortality predominantly occurs in the sick and elderly.

3.1 Age and gender

The age distribution of deaths by gender and year, gender and region, and surgical specialty are shown in Figures 8, 9 and 10.

Figure 8: Age distribution of deaths by gender and year (n=14,031)

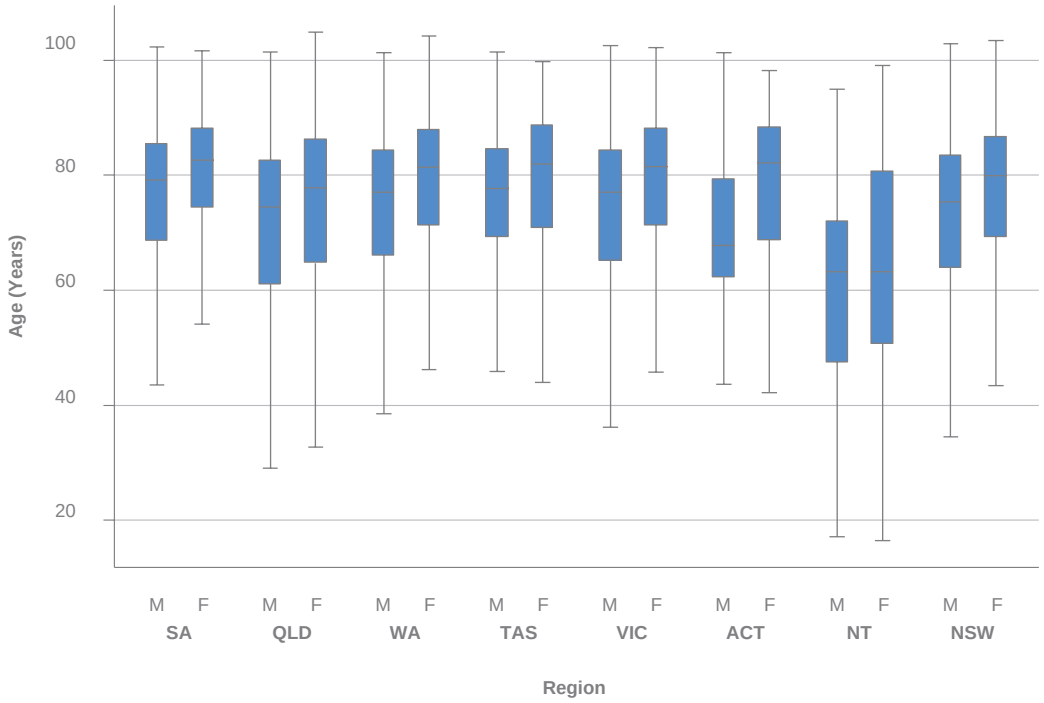


Note: excludes extreme values

Comment

- The age and gender distribution of the audited deaths was similar over the reporting audit periods.

Figure 9: Age distribution of deaths by gender and region (n=14 ,031)

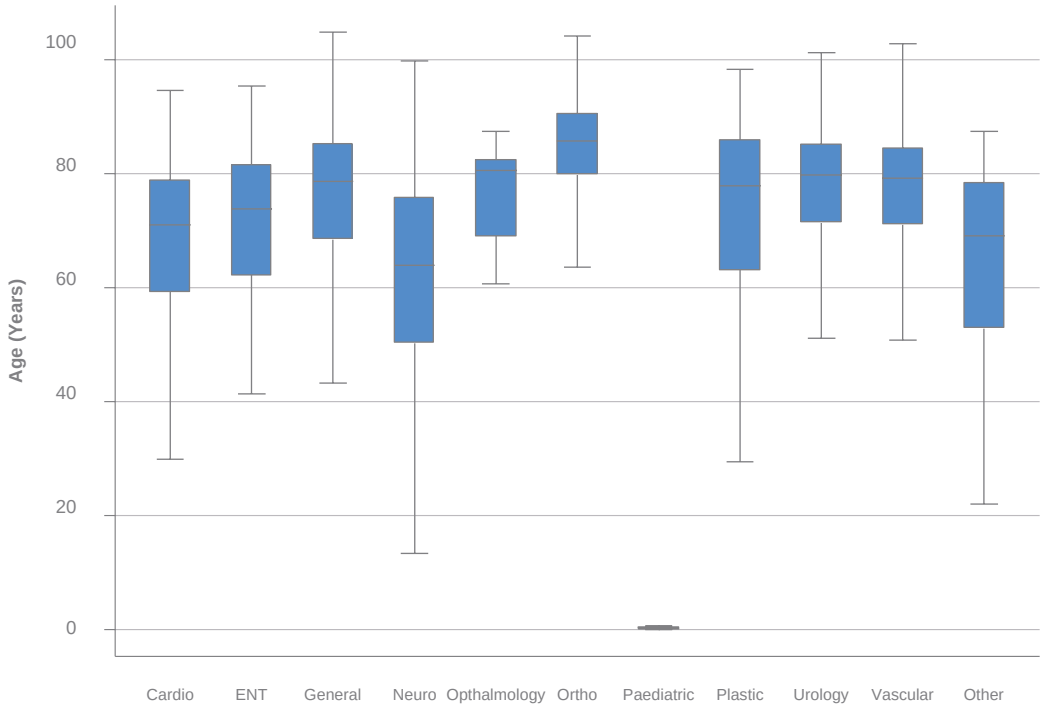


Note: excludes extreme values

Comment

- The gender distribution of audited deaths was similar across all regions, with the exception of NT, which had a lower median age of death for males and females, compared to the other regions.
- The male to female gender ratio was 54:46.
- The median age for males and females was 76 and 81 years respectively.
- Females predominated in the 80–90 year range, while males predominated in the 70–80 year age range (data not shown in this graph).
- The stable distribution of age and sex across the four years of the audit indicates that any trends noted in the report are due to process or surgical management changes and not to changes in the surgical population.

Figure 10: Age distribution of deaths by surgical specialty (n=14,031)



Other' specialties listed by the treating surgeon includes trauma and transplant, otology, anaesthesia, general practitioners and gynaecology.
ENT: ear, nose and throat.

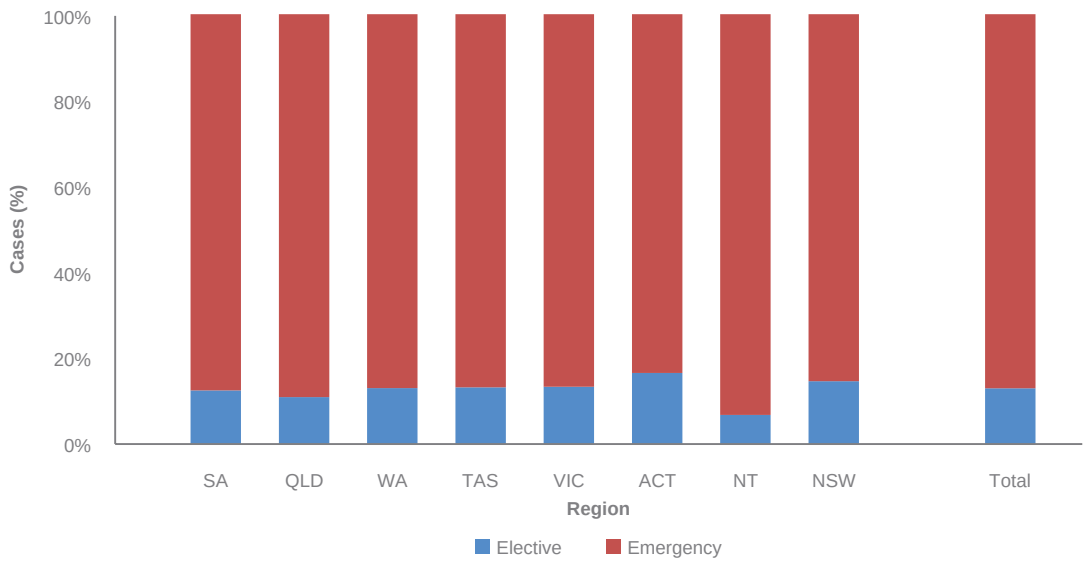
Comment

- The mean age at death is related to the types of surgeries being performed in the individual specialties.
- This plot excludes extreme values to avoid skewing the majority of the data. This means that all very young cases are not displayed, apart from in Paediatric Surgery.

3.2 Admission status of audited cases

The status of audited cases indicates whether patients were admitted electively or as emergencies (see Figures 11, 12 and 13) are shown below.

Figure 11: Admission status of cases (n=14,031)

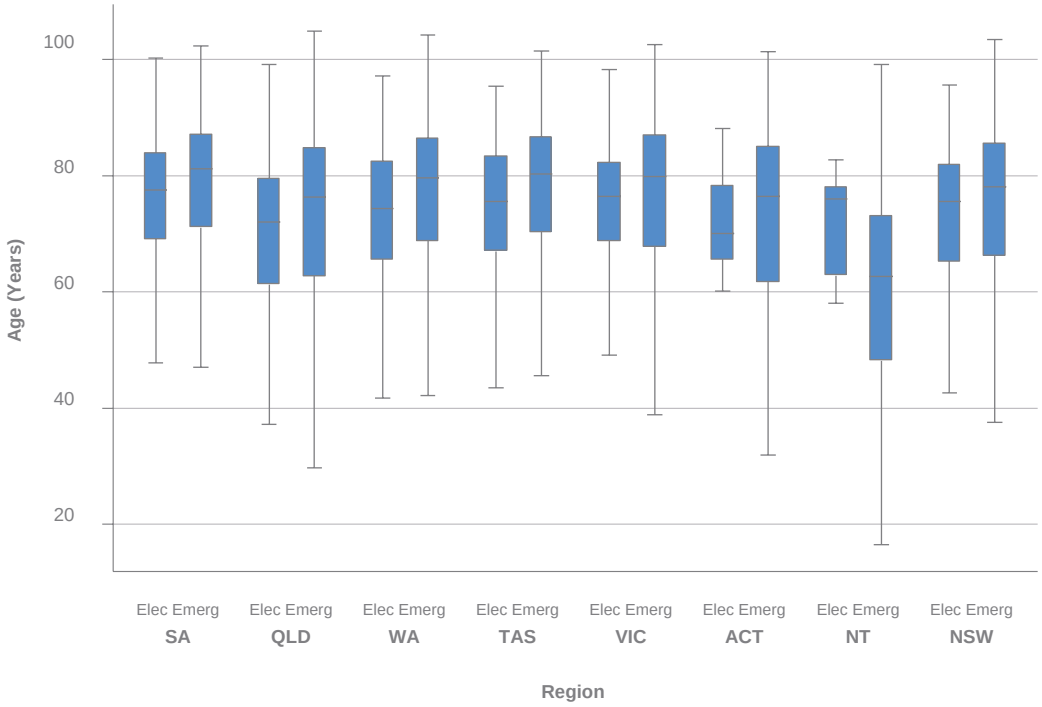


Missing data: n=238 (2%).

Comment

- The majority (86%) of audited deaths occurred in patients admitted as emergencies for acute life-threatening conditions.
- ACT (17%) has a slightly higher elective admission compared to the national average of 14%. Conversely NT has a lower admission rate, however this may be due to population size and access to elective facilities.

Figure 12: Age distribution of deaths by admission status and region (n=14,031)

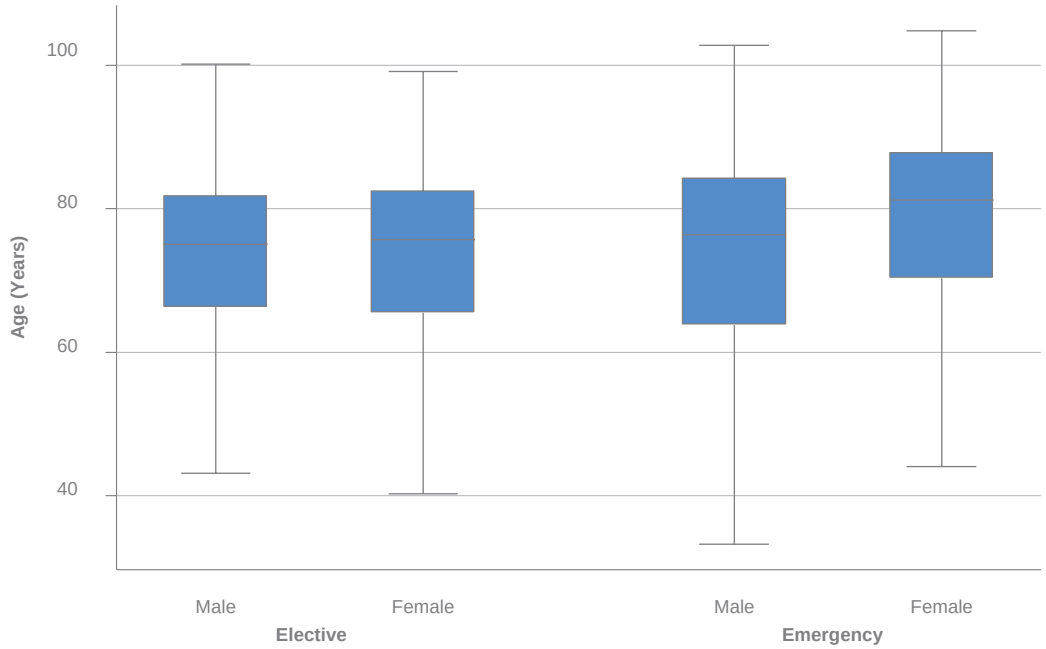


Missing data: n=238 (2%). Elec: elective; Emerg: emergency and excludes extreme values

Comment

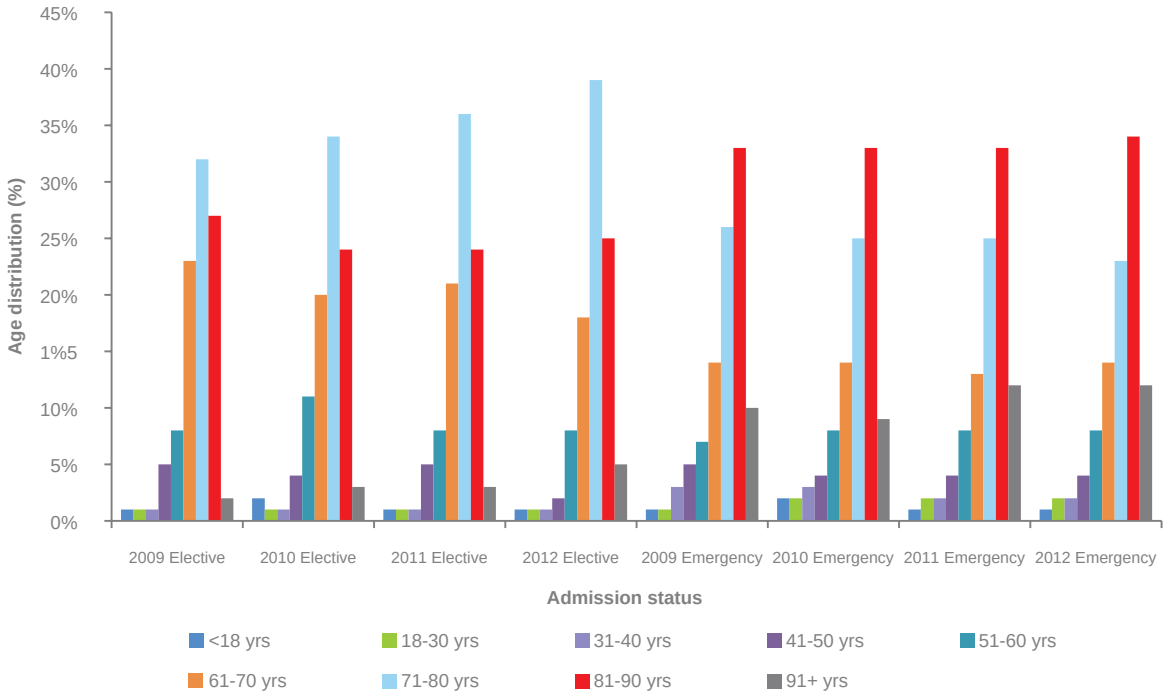
- Patients who died following emergency admission were older than those who died following elective admissions (p< 0.001) (data not shown). The national median age of death for elective admissions was 74 years and for emergency admissions was 80 years (data not shown).
- Admission status distribution of audited deaths was similar across all regions, with the exception of Northern Territory where elective cases were older than emergency cases.

Figure 13: Age distribution by admission status (n=14,031)



Missing data: n=238 (2%) and excludes extreme values

Figure 14: Age range distribution by admission status (n=14,031)



Missing data: n=238 (2%).

Comment

- The age distribution of emergency and elective deaths has been similar over time.
- Deaths occurring in elective surgery are a greater percentage in the age group 71-80 years and for emergency cases in the 81-90 year age group.

3.3 Risk profile of audited cases

This section reviews the risk profile of audited cases. This includes the American Society of Anesthesiologists (ASA) status, reported comorbidities, and the treating surgeon's perception of risk of death.

Key points

- The clinical risk profile indicates that the majority of deaths occurred in patients with coexisting illness presenting with acute life-threatening conditions.
- 90% of patients in this audited series were reported to have had pre-existing medical conditions/ comorbidities.

3.4 American Society of Anesthesiologists status

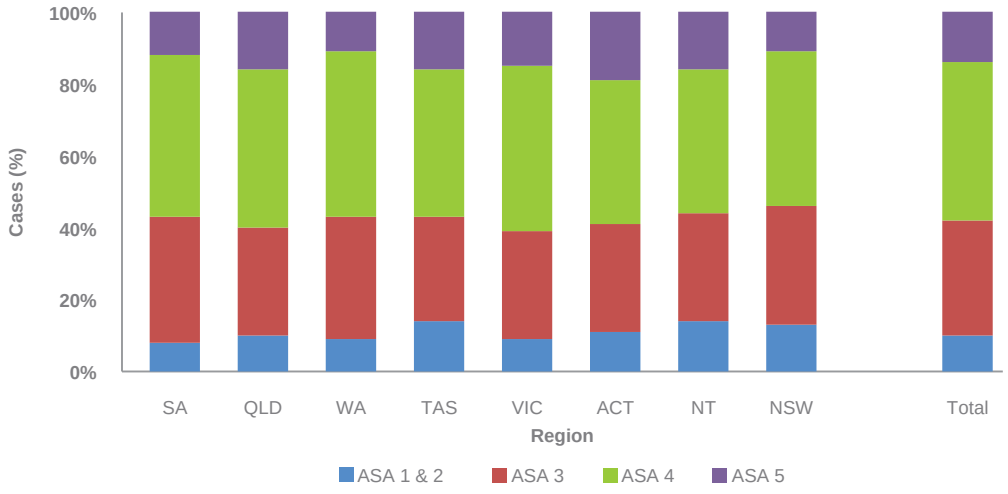
The ASA status is an international measure of patient risk used by anaesthetists.

ASA grade characteristics:

1. A normal healthy patient.
2. A patient with mild systemic disease.
3. A patient with moderate systemic disease.
4. A patient with severe systemic disease that is a constant threat to life.
5. A moribund patient unlikely to survive 24 hours, who is not expected to survive without an operation.
6. A declared brain-dead patient whose organs are being removed for donor purpose.

The frequency of ASA grades according to region, year, specialty and admission status are provided in Figures 15, 16, 17 and 18.

Figure 15: Frequency of ASA grades by region (n=14,031)



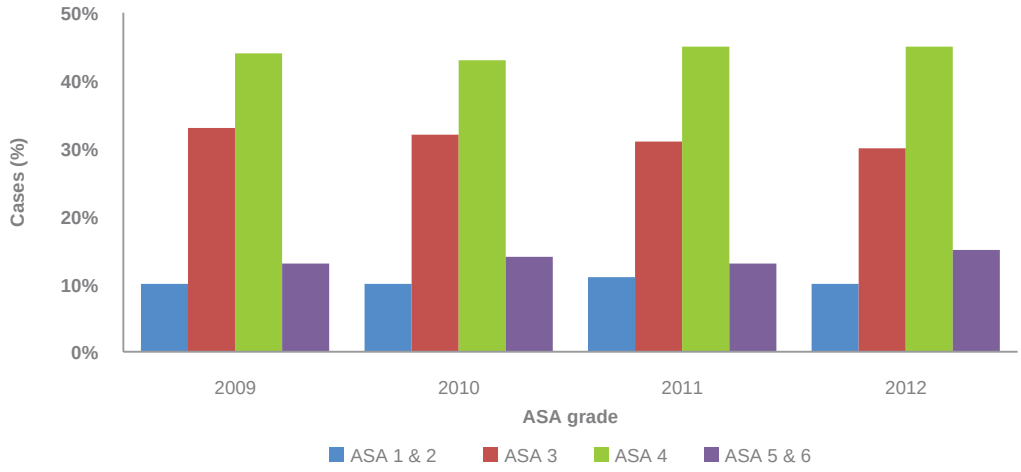
Missing data: n=846 (6%).

ASA: American Society of Anesthesiologists.

Comment

- The majority (90%) of patients had an ASA grade greater than or equal to 3, indicating that a moderate to severe degree of systemic disease was present at the time of treatment.
- The risk status as indicated by the ASA score was similar in all regions.
- There was a significant amount of missing data about ASA grades in some regions (six per cent overall) (data not shown).

Figure 16: Distribution of ASA grades by year (n=14,031)



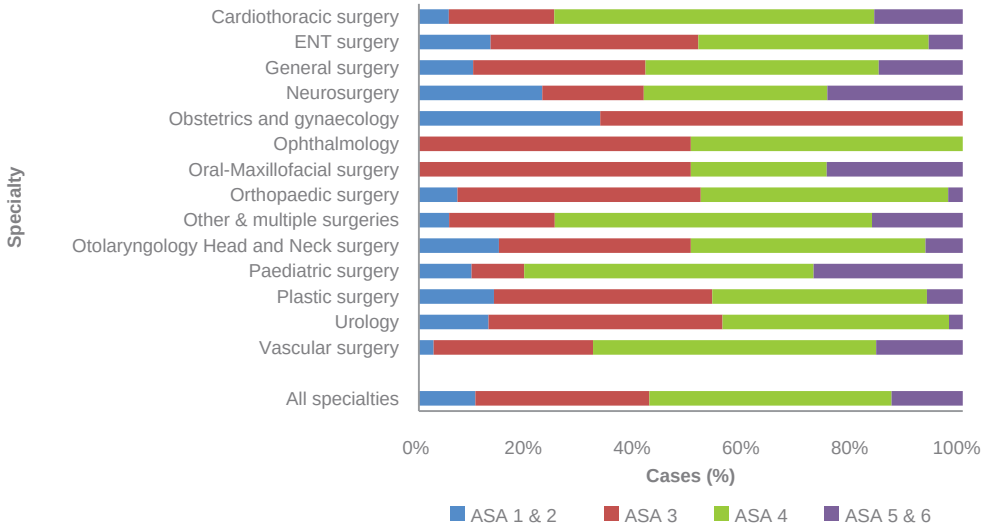
Missing data: n=846 (6%).

ASA: American Society of Anesthesiologists.

Comment

- There were no major differences during the four audited periods. ASA greater than or equal to 3 was similar across time and consistently above 85%.

Figure 17: Frequency of ASA grades by surgical specialty (n=14,031)



Missing data: n=846 (6%).

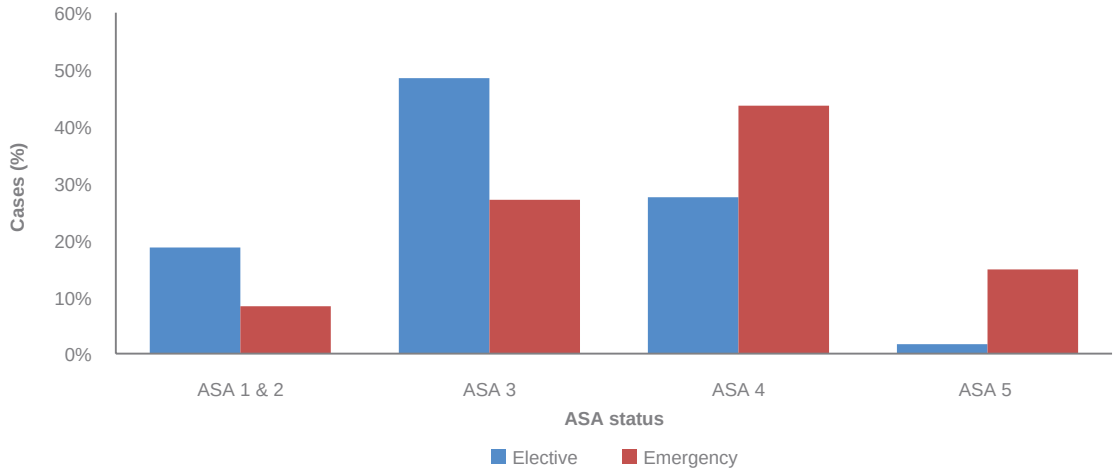
*Other surgeries listed by the treating surgeon included anaesthesia, intensive care unit (ICU), medicine, oncology, thoracic medicine and trauma. This figure includes cases where multiple specialties were involved in one case.

ASA: American Society of Anesthesiologists.

Comment

- There was some variation in ASA grades among the subspecialties, which reflects their casemix. An example is neurosurgery, where the larger number of ASA 1 and 2 cases is a reflection of the population of young patients with head injuries.
- Some distortion of the data is seen in low volume areas such as ophthalmology, oral-maxillofacial and obstetrics and gynaecology.

Figure 18: Frequency of ASA grades by admission status (n=14,031)



Missing data: n=846 (6%).

ASA: American Society of Anesthesiologists.

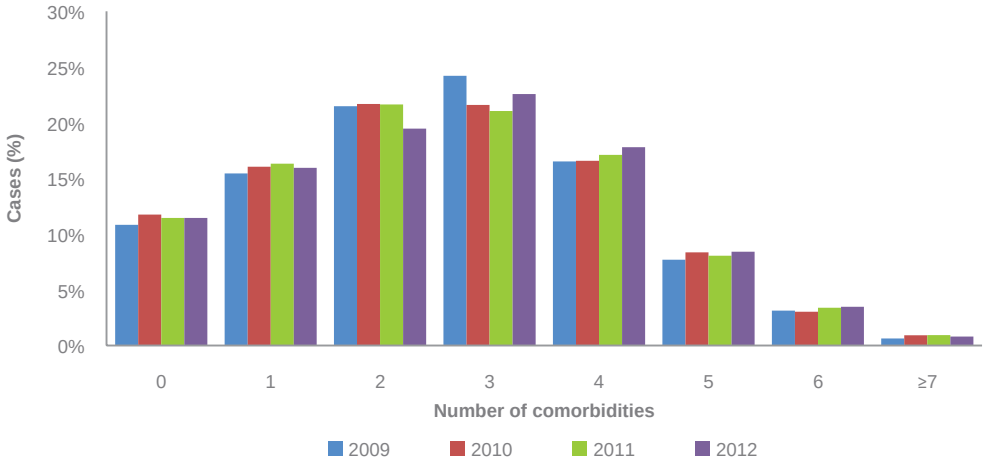
Comment

- 78% of elective and 86% of emergency patients were described as having an ASA score greater than or equal to 3.

3.5 Comorbidity

Surgeons are asked to record all known comorbidities (coexisting medical conditions) in addition to the primary medical (presenting) problem. The frequency of multiple comorbidities in individual patients per year is provided in Figure 19.

Figure 19: Frequency of multiple comorbidities in individual patients across audit years (n=14,031)

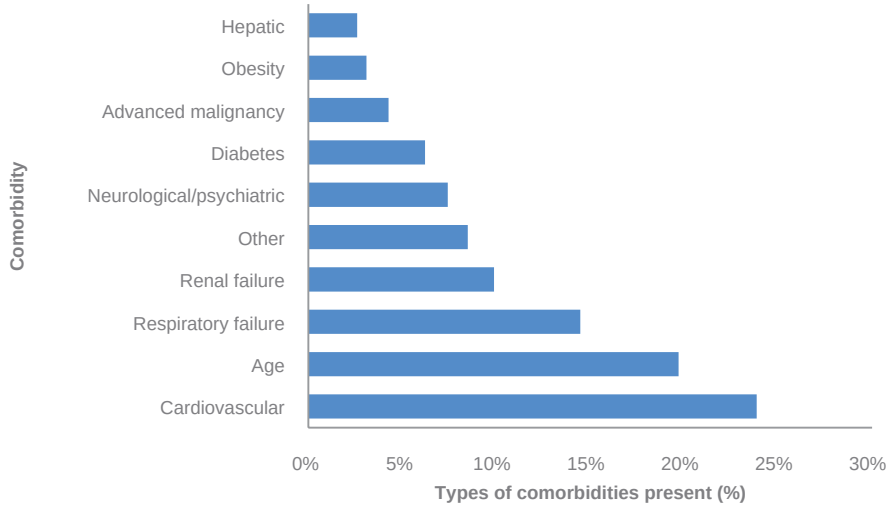


Missing data: n=282 (2%).

Comment

- In 12,441 (89%) of the 14,031 audited cases, comorbidities were reported.
- Most patients (73%) had at least two comorbidities emphasizing the higher risk profile of this group of patients.
- The frequency of specific comorbidities is provided in Figure 20.

Figure 20: Frequency of specific comorbidities (n=36,378 comorbidities in 14,031 patients)



Missing data: n=282 (2%).

*Other comorbidities covered a wide range and included alcohol abuse, anaemia, anticoagulation, bowel ischaemia, cachexia, cellulitis, coagulopathy, dementia, human immunodeficiency virus/acquired immunodeficiency syndrome, malnutrition, motor neurone disease, polymyalgia rheumatica, rheumatoid arthritis, sepsis and systemic lupus erythematosus.

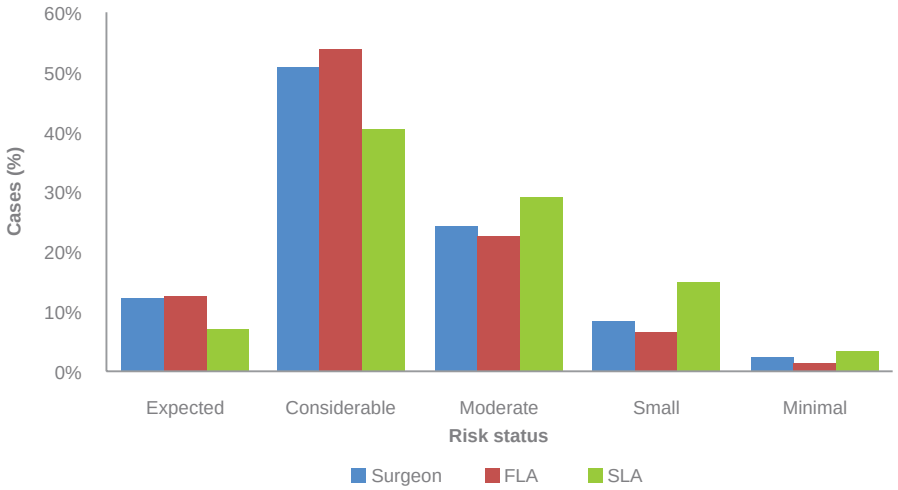
Comment

- The most common comorbidities – cardiovascular, advanced age and respiratory failure – were similar in terms of incidence in both male and female patients (data not shown).
- There were no major differences in distribution of comorbidities found between the four years of the audited period (data not shown).

3.6 Surgeon perception of risk status

The treating surgeon and assessors record the perceived risk of death of the patient at the time of treatment (see Figure 21).

Figure 21: Risk of death as perceived by treating surgeon and assessors (n=14,031)



FLA: first-line assessor; SLA: second-line assessor.
Missing data: n=750 (5%).

Comment

- The perceived risk of death, as reported by surgeons, was considerable or expected in 62% of cases and small or minimal in only 11% of cases. This is further evidence of the high-risk profile of this patient group suggested by the mean age, ASA score and associated comorbidity.
- There was a reasonable correlation between the treating surgeon, the FLA and the SLA in regard to the risk perception. For the expected and considerable risk groups combined, the totals were 63% (perceived by surgeon), 66% (FLA) and 48% (SLA).

4. RISK MANAGEMENT STRATEGIES

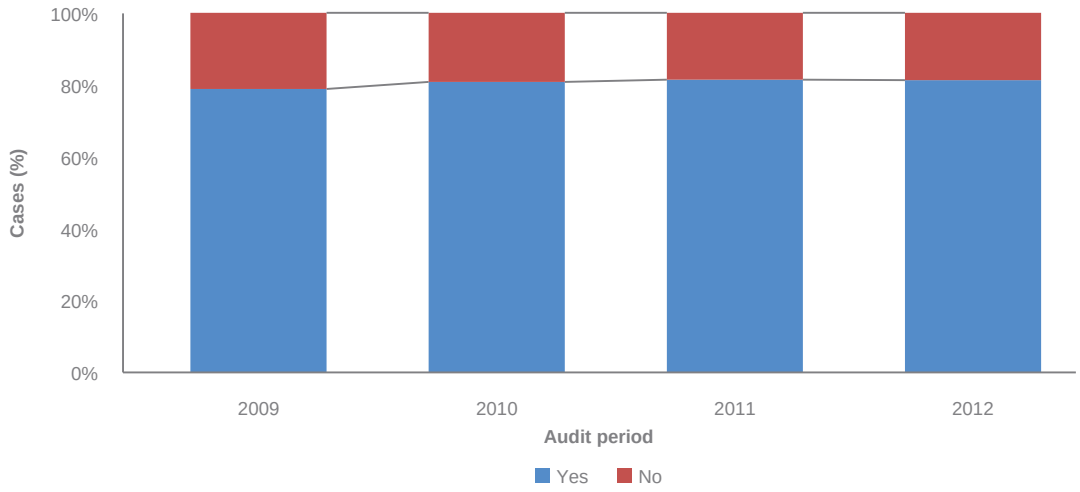
Key points

- Deep vein thromboembolism (DVT) prophylaxis use was recorded in 10,907 of 14,031 (78%) of cases where patients underwent a surgical procedure and the utilisation rate varied from 73% to 87% of cases across the regions.
- In this audited series of deaths, the DVT prophylaxis provided was generally deemed as appropriate. Of the 23% of cases where prophylaxis was deliberately withheld by the treating surgical team, there were only two per cent of these cases, where assessors disagreed with the decision to withhold.
- In the majority of instances, those patients expected to benefit from critical care support did receive it. However, the review process suggested that five per cent of patients who did not receive treatment in a critical care unit would most likely have benefited from it.
- Fluid balance in the surgical patient is an ongoing challenge. In this series, seven per cent of patients were perceived to have had poor management of their fluid balance.

4.1 Prophylaxis for venous thromboembolism

The treating surgeon was asked to record if deep vein thrombosis (DVT) prophylaxis was given and what prophylaxis was used (see Figures 22 and 23). If not given, the reason it was withheld was requested and the assessors reviewed the appropriateness of these decisions.

Figure 22: DVT prophylaxis used during the audit period (n=14,031)

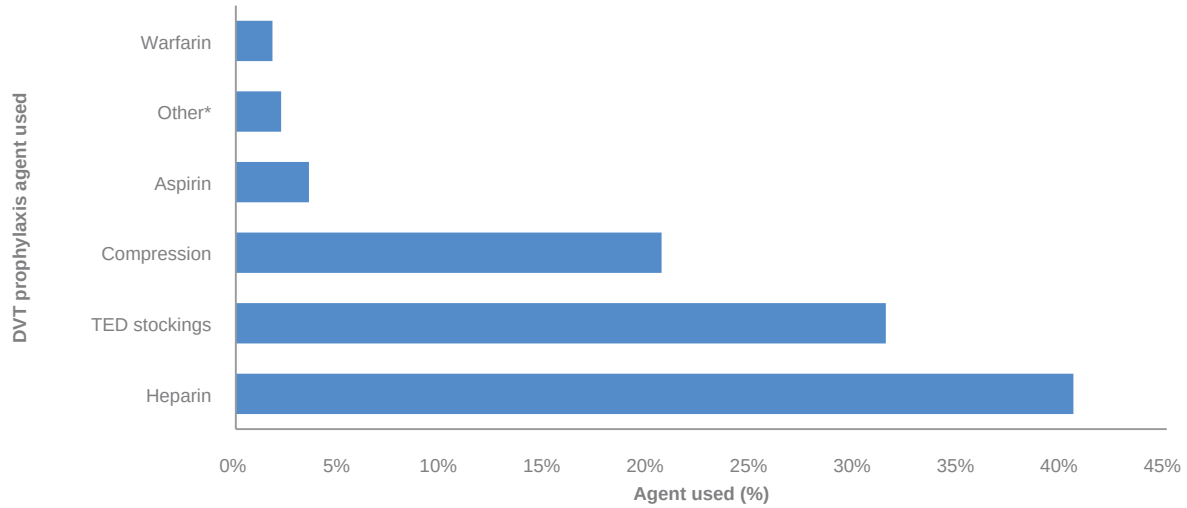


Missing data: n=242 (2%).

Comment

- DVT prophylaxis was used in 10,907 of 14,031 (78%) of cases.

Figure 23: Type of DVT prophylaxis used (n=16,504 instances in 10,907 cases)



*Other agents recorded were Clexane, Clopidogrel, Danaparoid, Enocaprin, Enoxaparin, early mobilisation, Fragmin, inferior vena cava filter, Lipirudin and Plavix.
TED: thromboembolic deterrent
Missing data: n=242 (2%).

Comment

- In the 8,595 patients who received prophylaxis, the most frequently used agents were Heparin (40%) and TED stockings (31%).

Table 3 Distribution of DVT prophylaxis used by region (n=16,504 instances in 10,907 patients)

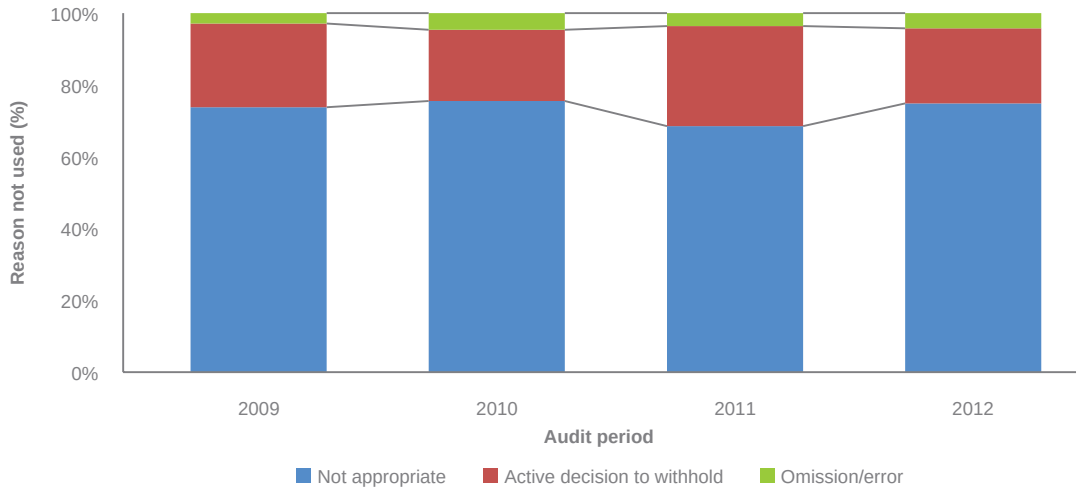
DVT prophylaxis agents used	Region							
	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
Heparin	47%	35%	44%	42%	46%	45%	44%	38%
TED stockings	28%	34%	34%	27%	31%	27%	27%	31%
Compression	16%	23%	14%	24%	14%	20%	19%	26%
Aspirin	4%	5%	3%	4%	4%	2%	4%	2%
Other	3%	1%	3%	2%	3%	4%	3%	1%
Warfarin	2%	2%	2%	1%	2%	2%	3%	2%

'Other' agents recorded were Clexane, Clopidogrel, Danaparoid, Enocaprin, Enoxaparin, early mobilisation, Fragmin, inferior vena cava filter, Lipirudin and Plavix.
TED: thromboembolic deterrent
Missing data: n=242 (2%).

Comment

- DVT prophylaxis use varied from 73% to 87% across the regions (data not shown).
- There were variations in the use of certain forms of prophylaxis across the regions, particularly for use of compression, and Heparin which had the greatest proportionate difference.

Figure 24: Stated reasons for non-use of DVT prophylaxis (n=1,526)

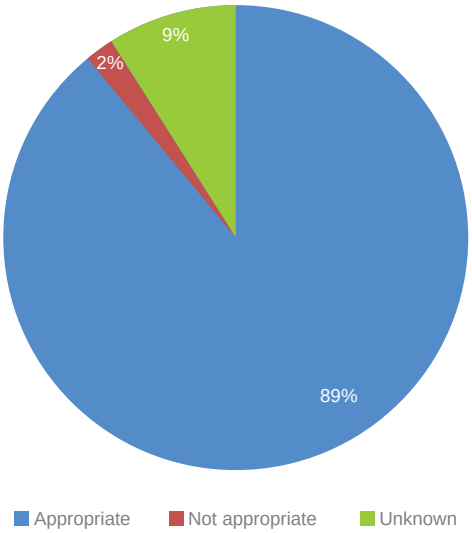


Missing data: n=544 (26%).

Comment

- Non-use of DVT prophylaxis was due to error or omission in only 58 of the 1,526 cases (four per cent). In the majority of instances prophylaxis was withheld for clinical reasons. There has been a slight decrease from 2011 to 2012 in the number of cases where an active decision to withhold DVT prophylaxis was made.
- The assessors' perception of the appropriateness of the decision to withhold DVT prophylaxis is shown in Figure 25.

Figure 25: Assessor perception of appropriateness of DVT prophylaxis management (n= 12,288)



Missing data: n=843 (7%).

Comment

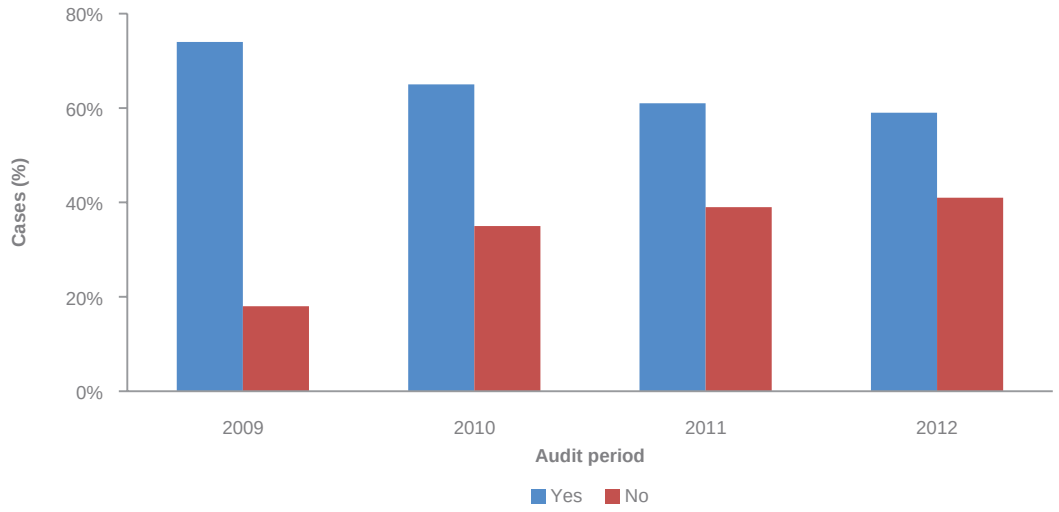
- Assessors concluded that DVT prophylaxis usage was not appropriate in 300 (2%) or unknown in 1,100 (9%) cases where the patient underwent a surgical procedure.

4.2 Provision of critical care support to patients

The treating surgeon is asked to record whether or not a patient received critical care support in an intensive care or high dependency unit before or after surgery (see Figure 26). The first- and second-line assessors review the appropriateness of the use of critical care support. It is recognised that this is a subjective assessment of needs and potential benefit.

The SCF has been revised and will be used from the second half of 2013 to identify the reasons why patients did not receive critical care support and to rectify the large amount of missing data in this section. It is hoped that this revised question will encourage surgeons to complete the form and thus ensure sufficient data for analysis in this area of care.

Figure 26: Provision of critical care support during audit period (n= 14,031)



Missing data: n=1,423 (10%).

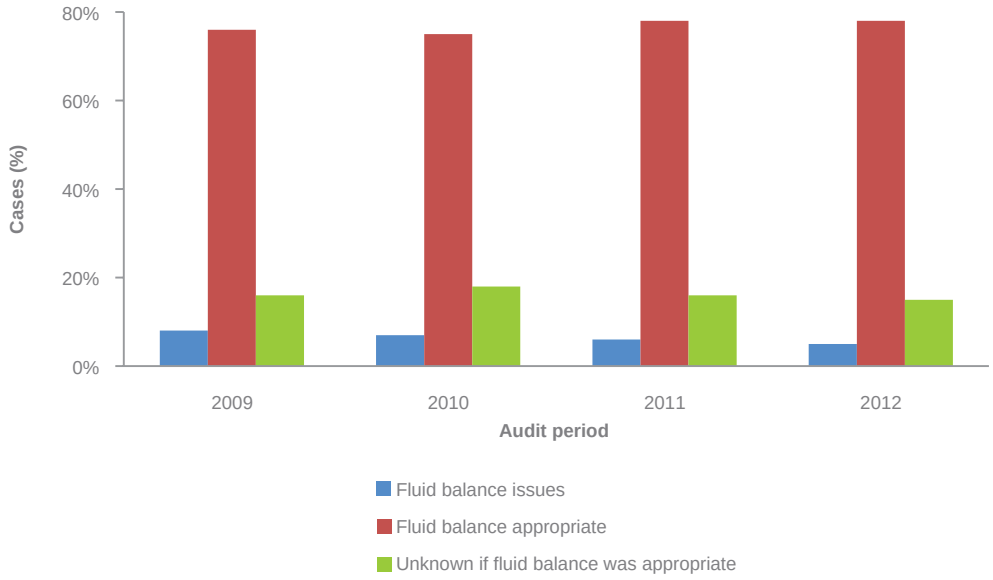
Comment

- Of the 14,031 audited cases, 8,090 (58%) patients received critical care support.
- There has been a steady increase from 2009 to 2012 of 23% (18% to 41%) of cases where critical care support was not provided to patients. This increase in patients not receiving critical care does not necessarily indicate a lack of critical care facilities.
- The assessors perceived that five per cent of patients who did not receive critical care support might have benefited from critical care (data not shown).
- There was a high proportion of missing data (59%) in response to whether the provision of ICU/ CCU was adequate or not in 2009. As a result, ANZASM revised the question to improve the reporting for this question. In 2010, missing data was to 25% and in 2012 it reduced again to 10%. It is hoped that this downward trend of missing data continues.

4.3 Fluid management

This section looks at the appropriateness of fluid balance management in the audited cases.

Figure 27: Appropriateness of fluid management (n= 14,031)



Missing data: 1,066 (8%) first- or second-line assessments.

Comment

- In 976 (10%) cases, surgeons felt there was an issue with fluid balance. In a further 15% of cases, assessors indicated the evidence provided was inadequate to reach a conclusion.
- The percentage of missing data (eight per cent) in this section prevents further identification of trends and hinders the analysis of the data.

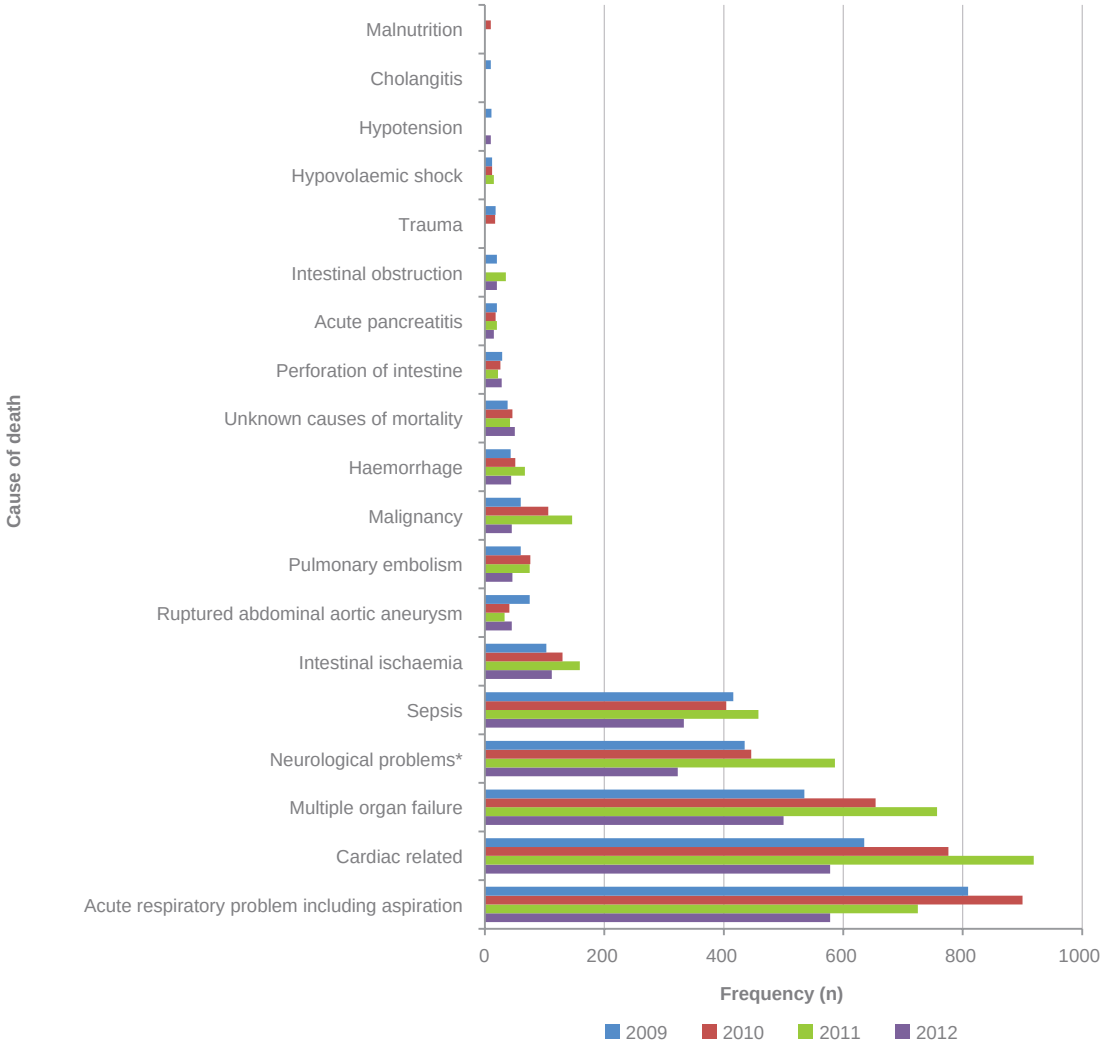
5. CAUSE OF DEATH

5.1 Frequency of causes of death reported in audited cases

Key points

- The most frequent causes of death were respiratory failure, cardiac-related issues, multi-organ failure, and neurological problems (see Figure 28).
- Causes of death were consistent over the entire audit period.

Figure 28: Causes of death where n≥10 (n=19,727 causes of death recorded for 14,031 patients)



Missing data: n=767 (5%).

Note: * Neurological problems included - diffuse brain injury, head injury, intracerebral haemorrhage, subarachnoid haemorrhage,subdural haematoma – nontraumatic.

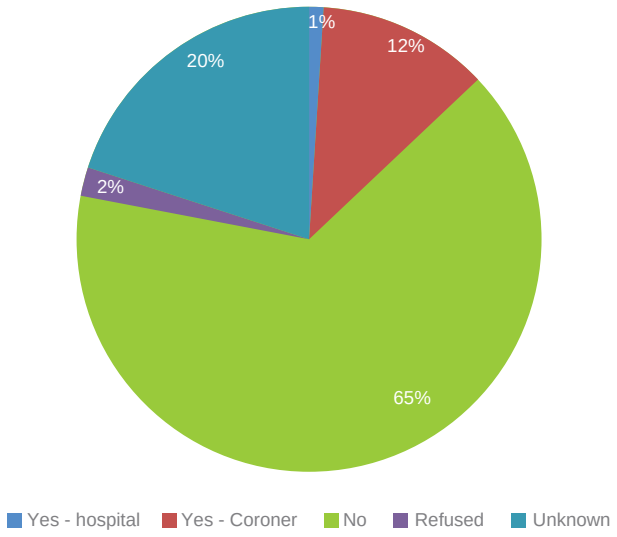
Comment

- There has been a drop in acute respiratory problems from 809 incidents in 2009 to 578 in 2012.

5.2 Establishing cause of death

The cause of death recorded by the treating surgeon is based on the clinical course of the patient and any relevant supporting evidence from investigations. Where doubt exists around the circumstances leading to a death, the case may be referred to the coroner. In other instances, where the cause of death is not clear, a postmortem examination may be requested. This latter method of confirming cause of death is requested with decreasing frequency (data not shown). An overview of postmortems performed is shown in Figure 29 and Table 4.

Figure 29: Overview of postmortems performed (n=14,031)



Missing data: n=418 (3%) cases.

Table 4: Overview of postmortems performed by region

Postmortem status	Region							
	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
No	60%	68%	73%	66%	61%	40%	67%	66%
Unknown	27%	18%	15%	22%	20%	26%	10%	20%
Yes - coroner	13%	10%	9%	7%	15%	33%	20%	10%
Yes - hospital	<1%	2%	1%	3%	1%	<1%	1%	2%
Refused	<1%	2%	2%	2%	3%	<1%	2%	2%

Missing data: n=418 (3%) cases.

Comment

- A coronial or hospital postmortem was reported to have been performed in only 1,759 (13%) of the 13,613 audited cases. In some of the regions, the numbers were low and this impacts on interpretation of the data.
- In 11,854 (87%) cases, either no postmortem was performed, a postmortem was refused or it is unknown whether one was conducted.
- The majority of postmortems carried out were coronial. The need for coronial input varied among regions.
- The low rate of postmortems limits confirmation of cause of death.
- There were no significant changes in trends during the audit period (data not shown).

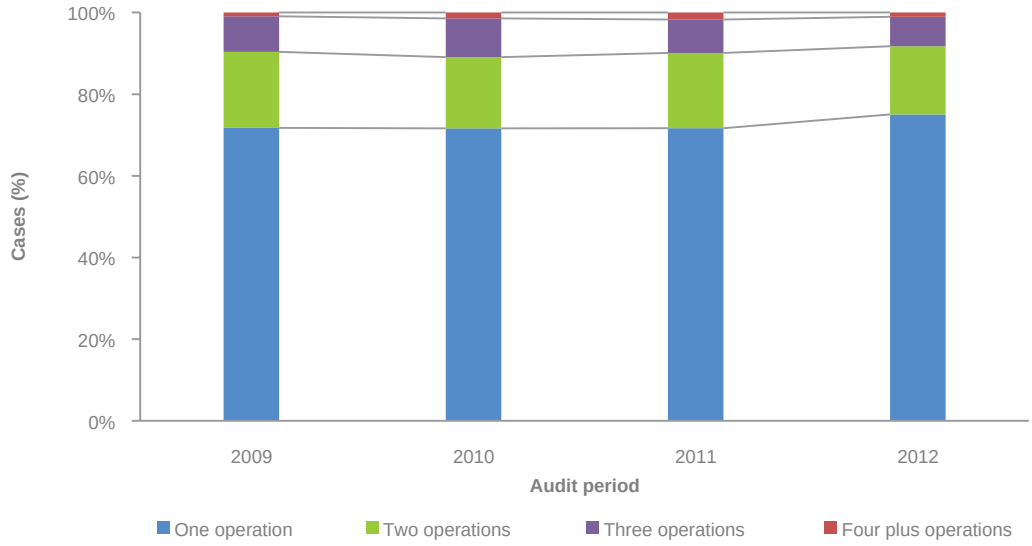
6. PROFILE OF OPERATIVE INTERVENTION

Key points

- 10,907 (78%) of 13,999 patients had a surgical procedure.
- 28% of patients required more than one visit to the operating room during their hospital stay.
- A consultant surgeon made the decision to operate in 86% of instances and performed 60% of the operations. Consultant surgeons performing the surgery is appropriate when the risk profile of this group of patients is considered.
- The rate of subsequent (unplanned) returns to theatre was 16%; in some patients, multiple additional episodes of surgery were needed.
- The most common postoperative complications recorded were postoperative bleeding, procedure-related sepsis and tissue ischaemia.

6.1 Operative rate

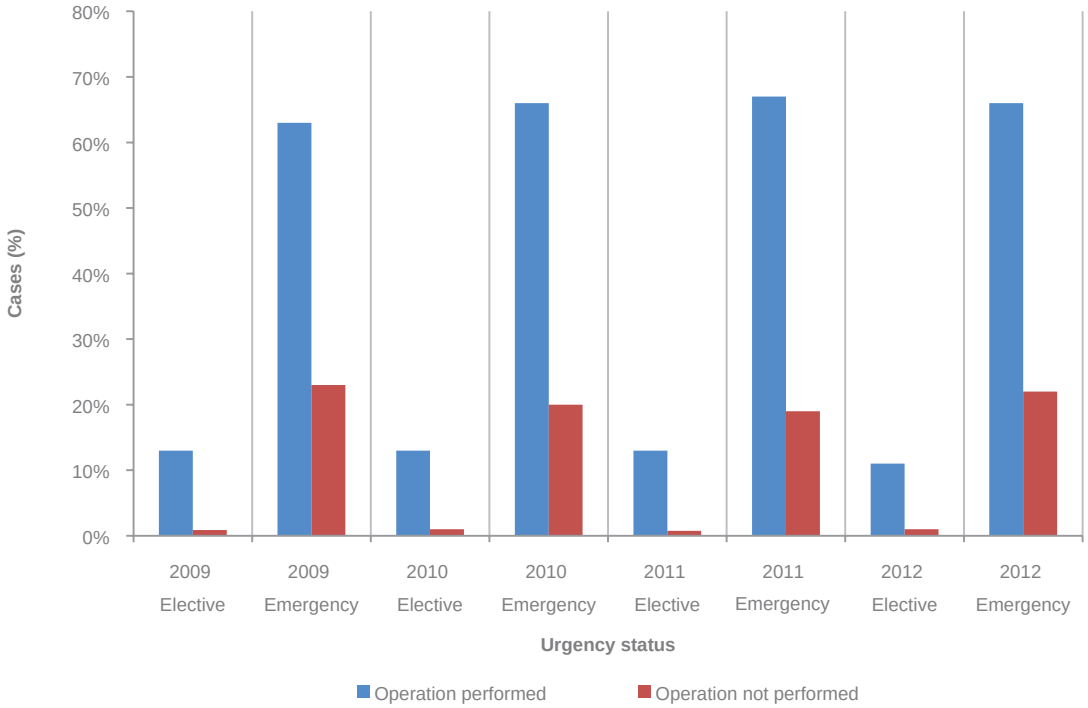
Figure 30: Frequency of multiple operations on individual patients (n=10,907)



Comment

- A total of 10,907 (78%) of the 14,031 audited patients underwent an episode of surgery either during their last admission or within 30 days prior to death.
- Twenty-two per cent of patients had no surgery during their final inpatient admission.
- A total of 15,276 operative episodes were undertaken on the 10,907 patients who had surgery; this reflects the fact that an individual patient can have more than one episode of surgery during their admission.
- A majority of 7,846 (72%) of all patients admitted had just one operation.
- 28% of patients had more than one surgical episode.
- There has been relatively little change in the frequency of multiple operations over the 2009–2012 audit period.

Figure 31: Operative and non-operative episodes performed by admission status (n=14,031 patients)



Missing data: n=32 (<1%) cases.

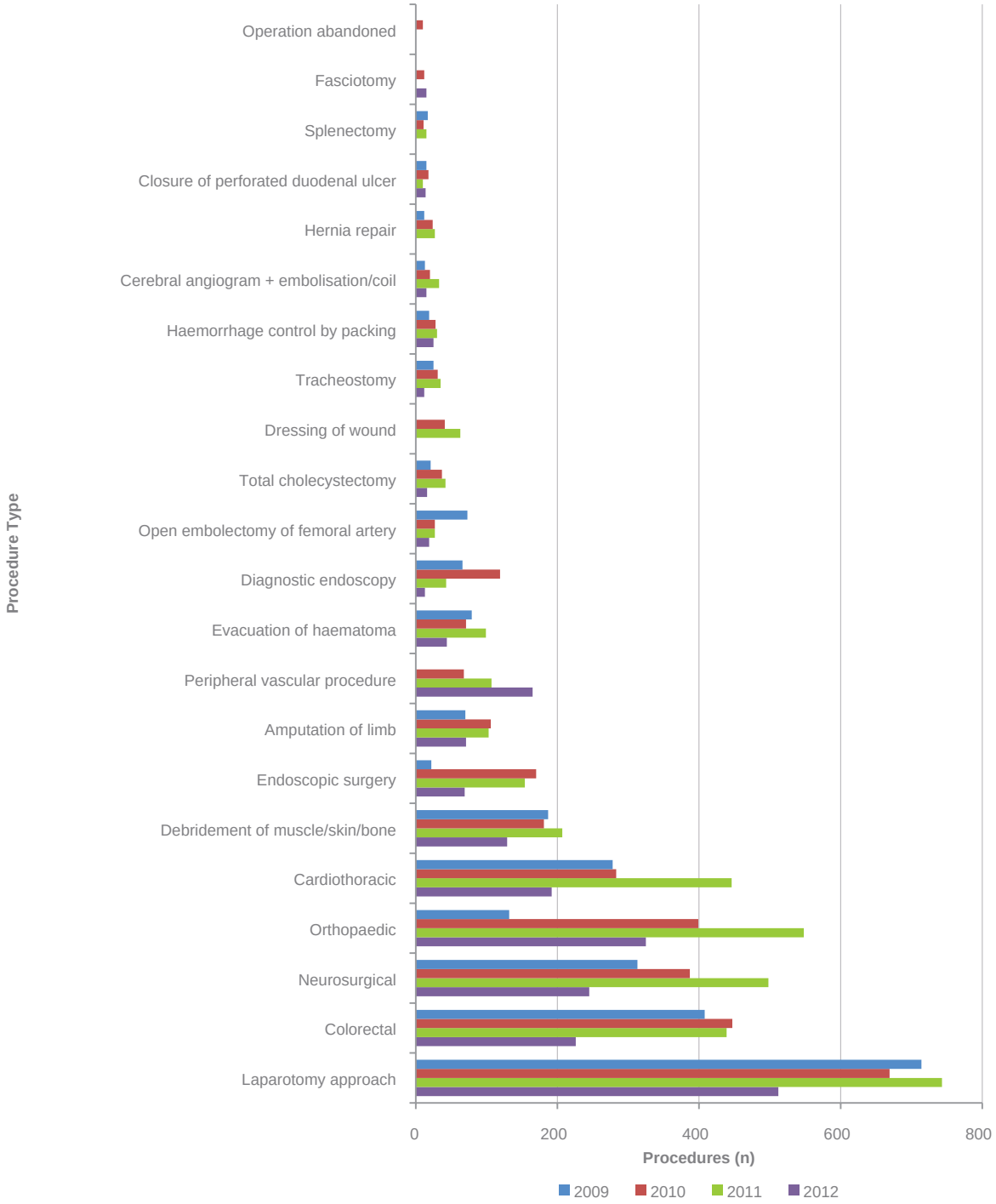
Comment

- Deaths where no operation was performed occurred in 71 (four per cent) of elective admissions and in 2,979 (25%) of emergency admissions (data not shown). The decision not to operate was generally an active decision to palliate an irretrievable situation.

6.2 Frequency of operative procedures

The frequency of operative procedures in individual patients is shown in Figure 32.

Figure 32: Types of procedure, where the number of procedures >10 (n= 15,276)



Missing data: n=115 cases (1%).

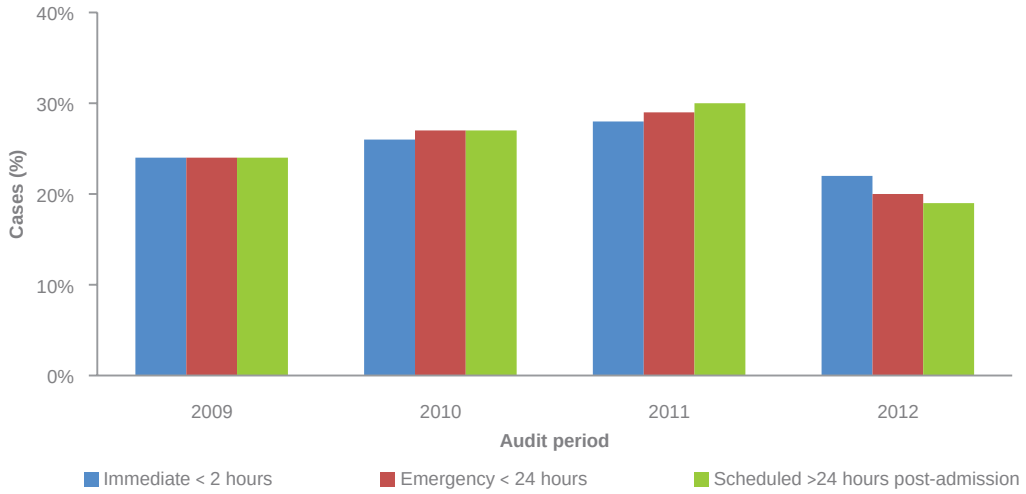
Note: * Neurosurgical included - clipping of aneurysm of cerebral artery, craniotomy for evacuation of non-trauma injuries, for excision / drainage of abscess or tumour resection and posterior fossa craniotomy for infarct

Comment

- A patient can undergo multiple procedures during the same admission and during the same surgical episode.
- The procedures with the highest listed frequency are often associated with emergency admission for trauma or other common conditions.
- The laparotomy group includes all procedures that have an abdominal approach.

6.3 Timing of emergency episodes

Figure 33: Timing of emergency surgical episodes (n=11,425)



Missing data: n=734 (6%)

Comment

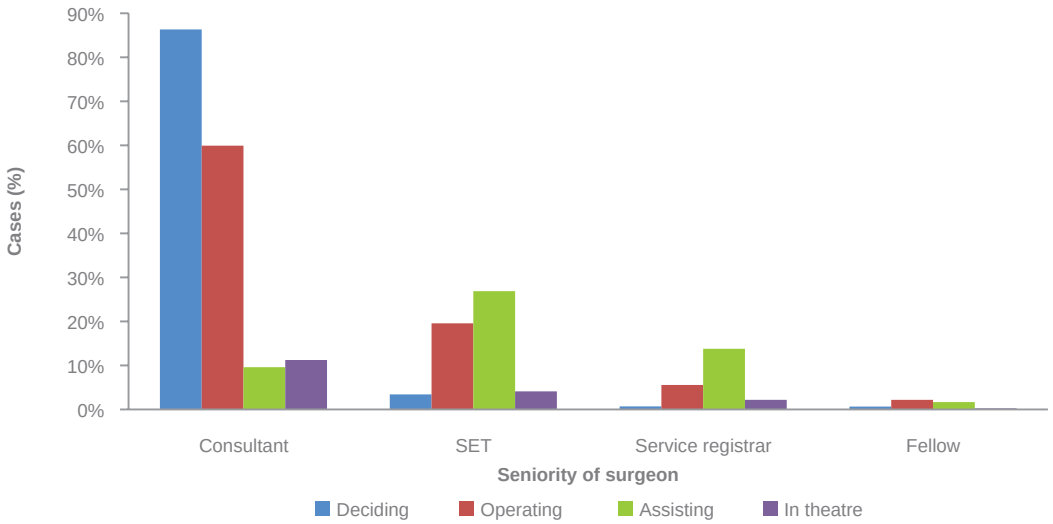
- The urgency (time criticality) of a patient's condition predicts the timing of any surgery.
- Of the 10,907 audited series, 6,675 (61%) were classified as emergency surgical episodes.
- Overall, 4,175 (39%) of emergency admissions to a surgical unit went to surgery within 24 hours of admission. The scheduling problems associated with managing these urgent cases are well recognised.
- The majority of emergency surgery was performed in the public sector (data not shown).

According to a 2008 report on the status of Australian public hospitals, emergency surgery occurs in the most urgent or critical cases and generally needs to be performed within 24 hours. In 2008–09, over 262,000 emergency surgeries were performed in Australia, with the majority carried out in public hospitals[1]. This has led to the development of acute surgical units in some areas. Such units have preferential access to the operating suites to expedite treatment.

6.3.1 Seniority of surgeon performing surgery

The surgeon completing the SCF has to record the seniority of the surgeon who made the clinical decision to operate and who performed the surgery (see Figure 34).

Figure 34: Seniority of surgeon making the decision to proceed and performing the surgery (15,212 operations in 10,907 patients)

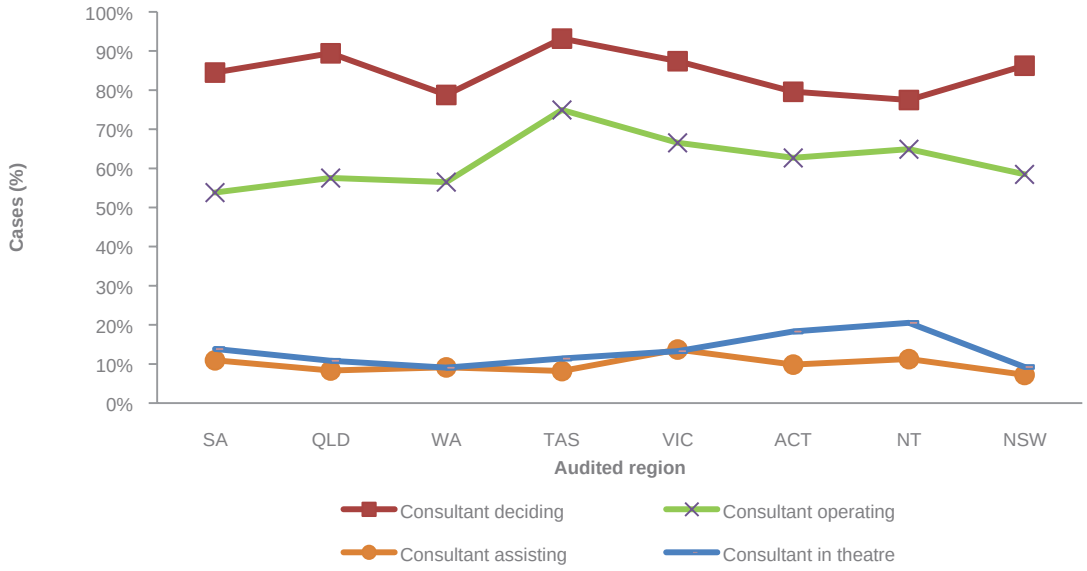


Missing data: n=64.

Comment

- The above data refers to the full audit period (2009–2012). There has been little change in the proportion of surgical episodes in which consultant surgeons decided and operated over the full audit period (data not shown).
- The input from consultant surgeons was high. In 86% of cases, they made the decision to operate; in 81% of cases they either performed the operation, assisted, or were present in the operating theatre.
- An anaesthetist was present in 13,852 (94%) of all operative episodes (data not shown). In 6% of cases it was not stated on the form whether there was an anesthetist present or not.
- There may have been more than one grade of surgeon deciding, operating, assisting or in theatre for each episode.

Figure 35: Consultant involvement by region performing surgery (15,276 operations in 10,907 patients)



Missing data: n=64.

Comment

- There was some variation across regions for consultant involvement, that is, operating and assisting in surgery. These differences reflect local approaches to surgical training and staffing levels.

6.4 Unplanned return to theatre

The treating surgeon has to indicate if there was an unplanned return to the operating theatre following the initial operative procedure (see Table 5).

Table 5: Patients requiring unplanned return to theatre (n=10,907)

Return to theatre status	2009 (%)	2010 (%)	2011 (%)	2012 (%)
No return to theatre	2118 (84%)	2262 (83%)	2525 (84%)	1789 (84%)
Return to theatre	407 (16%)	437 (16%)	464 (15%)	332 (16%)
Don't know	5 (>1%)	7 (1%)	5 (1%)	1 (>1%)

Missing data: n=555 (5%).

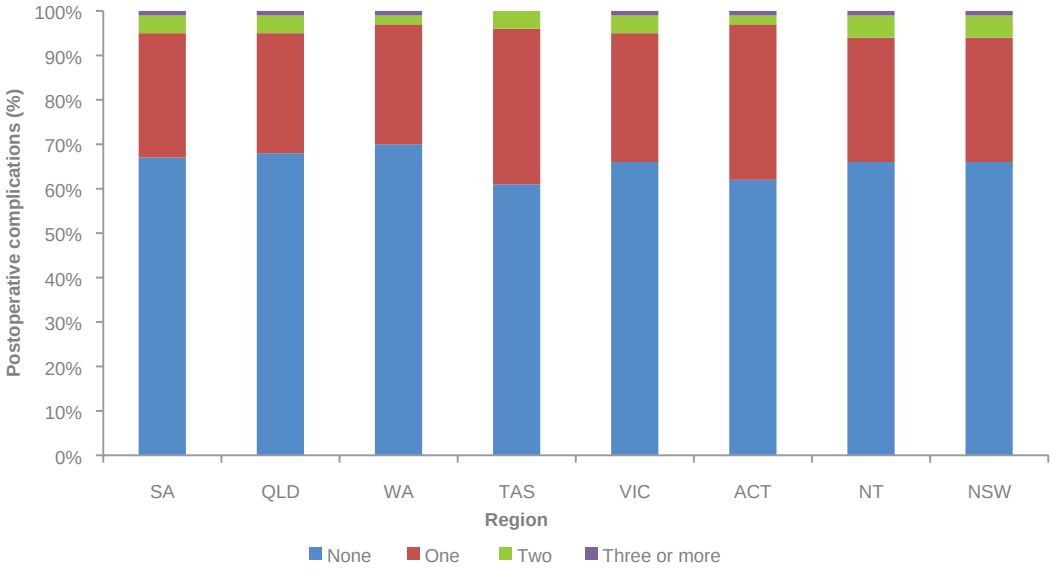
Comment

- In 16% of the audited cases, patients who underwent a surgical procedure had an unplanned return to theatre.
- The proportion of patients requiring a return to theatre was relatively unchanged during the audit periods.

6.5 Postoperative complications

The treating surgeon has to record any complications that occurred following a surgical procedure.

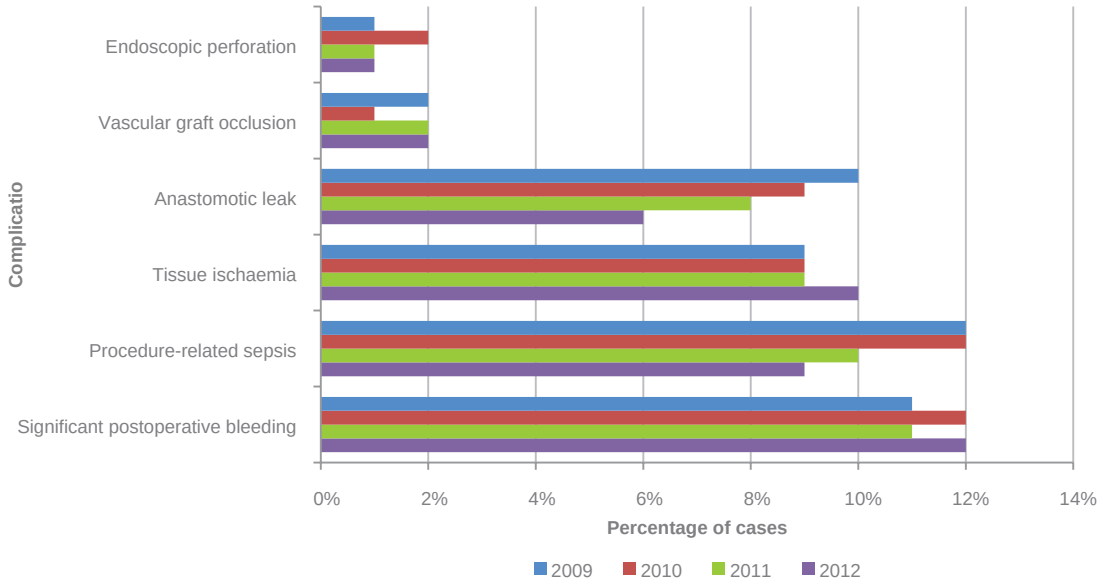
Figure 36: Patients developing postoperative complications (n=10,907)



Comment

- Postoperative complications were reported in 3,615 (33%) of the 10,907 audited cases who underwent a surgical procedure.
- The significance of these complications in relation to the eventual outcome was unknown. Significance will of course vary from minor (with no effect on outcome) to major (leading to death).

Figure 37: Distribution of types of postoperative complications, where ≥ 10 (n=4,255)



Note: other complications were identified and these included cardiac failure, intrapulmonary haemorrhage, intra-cerebral bleed, postoperative hypoxia, acute or chronic renal failure, paraplegia, liver failure, pneumonia, perforated viscus, pulmonary embolism, pyelonephritis, renal failure, respiratory failure, seizures, stroke and wound haematoma.

Comment

- The most common postoperative complications over the audit period were postoperative bleeding, procedure-related sepsis and tissue ischaemia.
- There has been a decrease in some of the more common postoperative complications between 2009 and 2012 (for example, procedure-related sepsis and anastomotic leaks).
- Only complications recorded in 10 or more patients have been listed here.

6.6 Anaesthetic problems

A general anaesthetic in a critically ill elderly patient with comorbidities is a dangerous event, even more so in the emergency situation where there is not enough time to optimise the patient's state. Drug reactions, cardiac and respiratory complications may occur. Indeed, it is surprising that there were not more anaesthetic problems. According to the surgeons' assessments as to whether anaesthetic problems played a role in the death only 7% of all (10,907) cases were thought to have an anaesthetic component to the death.

- Anaesthesia was suggested as a significant factor in the outcome of 157 (one per cent) of patients who had a surgical procedure. However, in 621 (six per cent) cases, anaesthesia was possibly involved in the outcome (data not shown).
- The proportion of deaths where anaesthetic issues were raised was relatively unchanged between 2009 and 2012 (data not shown).
- Cases where anesthesia appeared to play a major role are referred to the appropriate Anaesthetic Death Review Committee. Often these cases have already been detected by the anaesthetic group.

6.7 Operative procedure abandoned

The treating surgeon has to record if they abandoned any surgical procedure and the reasons for this decision.

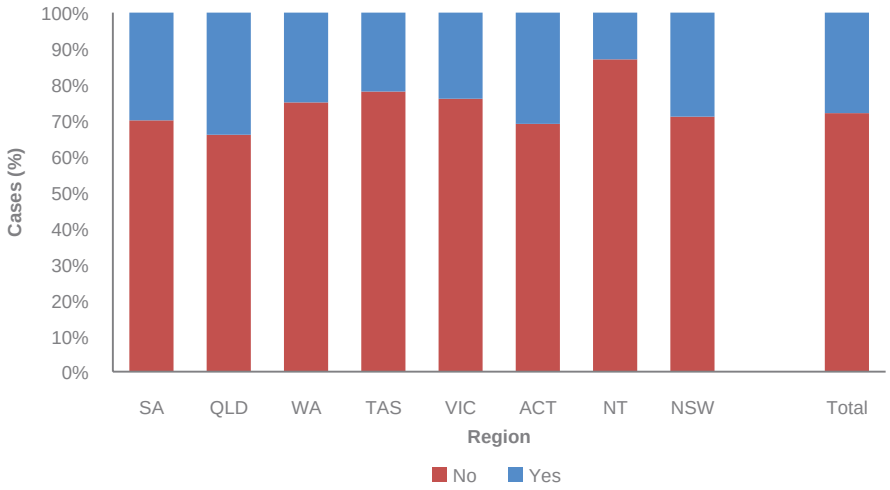
If the surgeon finds during surgery that the patient is suffering from an incurable and untreatable disease, this may lead to a decision to abandon the operative procedure. Such a decision was made in 735 (six per cent) of audited cases. The proportion of abandoned operations was largely unchanged between 2009 and 2012.

7. PATIENT TRANSFER ISSUES

7.1 Frequency of need for transfer

The audit process examines transfers between hospitals. Transfer is typically necessitated by the need for a higher level of care or specific expertise. A total of 3,032 patients needed to be transferred to another hospital. See Figure 38 for a regional breakdown of the percentage of cases transferred.

Figure 38: Frequency of need for transfer to another hospital, by region (n=10,697)



Missing data: n=210 (2%).

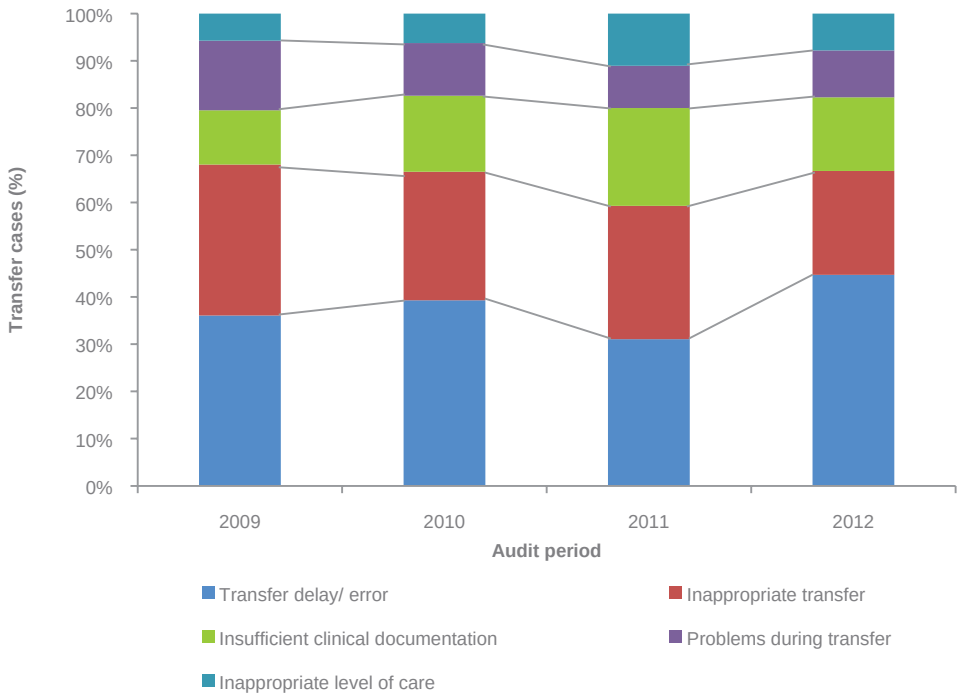
Comment

- The need for transfer varied among regions and probably reflects the geographic distribution of available healthcare facilities, particularly in QLD, the ACT and NSW.
- 28% (3,032) of audited cases required transfer between hospitals.

7.2 Issues associated with patient transfer

The treating surgeon was asked to record any issues associated with the transfer of patients between hospitals (see Figure 39).

Figure 39: Type of issues associated with patient transfer (889 issues in 3,872 transferred patients)



Missing data: n=213 (6%).

Comment

- In 393 (10%) of the 3,872 transferred patients, issues related to transfer were raised by the treating surgeons. Under the current legal framework of the audit, information cannot be fed back to the ambulance services or referring hospitals on specific cases.
- Over the whole audit period, the most frequent issues raised were transfer delay (37%), inappropriateness of transfer (28%) and insufficient clinical documentation (16%). However, the frequency of transfer delays has increased from 36% in 2009 to 44% in 2012.
- Insufficient clinical documentation is a concern as communication is essential to ensure that all clinicians involved have a complete picture of a patient's health status. This is a factor that could readily be improved.
- In a paper by the Queensland Audit of Surgical Mortality (QASM), surgeons indicated there was a need for improvement in a number of areas in the hospital service. Better preoperative assessment with precise radiology and preparation of patients is essential to achieve earlier diagnosis. Improvement in communication at the consultant level may enhance time to appropriate surgery without inappropriate delays. In the opinion of the surgeons, 40% of delayed patient's had poor pre-operative management[2].

8. PEER-REVIEW OUTCOMES

Key points

- Second-line assessment was requested in 12% of audited cases. A lack of information provided by treating surgeons was the most frequent cause of referral for second-line assessment, accounting for 65% of the cases sent onto SLA and eight per cent of audited cases.
- Less than five per cent of the audited cases were sent to SLA because of concerns over clinical issues over the entire audit period.
- The most common criticism leveled was delay in the delivery of definitive treatment.
- From 1 January 2009 to 31 December 2012, ANZASM identified 3,945 clinical management issues.
- Clinical issues described as areas of consideration, area of concern, or adverse events represent criticism of patient care. In only one per cent of all patients audited were these issues of clinical management perceived to have contributed to the death of the patient.

8.1 Second-line assessments

The peer-review process is a retrospective examination of the clinical management of patients who died while under the care of a surgeon. All assessors (first- and second-line) must decide if the death was a direct result of the disease process alone, or if aspects of the management of the patient may have contributed to the outcome.

A total of 12,038 cases underwent first-line assessment only. The first-line assessor decides if the treating surgeon has provided enough information to allow them to reach an informed decision on the appropriateness of management of the case. If inadequate information was provided then the first-line assessor requests a second-line case note review. Other triggers for requesting SLA are:

- where a more detailed review of the case could better clarify events leading up to death and any lessons arising from the case under review.
- where death was unexpected, e.g. in a young fit patient with benign disease or in a day surgery case.

The number of SLAs required because of a lack of clinical information has decreased from 19% in 2009 to eight per cent in 2012. This is an indirect measure of true surgeon compliance in the audit process, with surgeons providing more detailed and more accurate surgical case forms. In less than five per cent of cases was a SLA requested because of concerns regarding clinical management. This has not altered over the four surveyed years. The reasons given for referral to SLA are displayed in Figure 40.

Figure 40: Reason for referral for second-line assessment (n=1,747 SLAs in 14,031 audited cases)

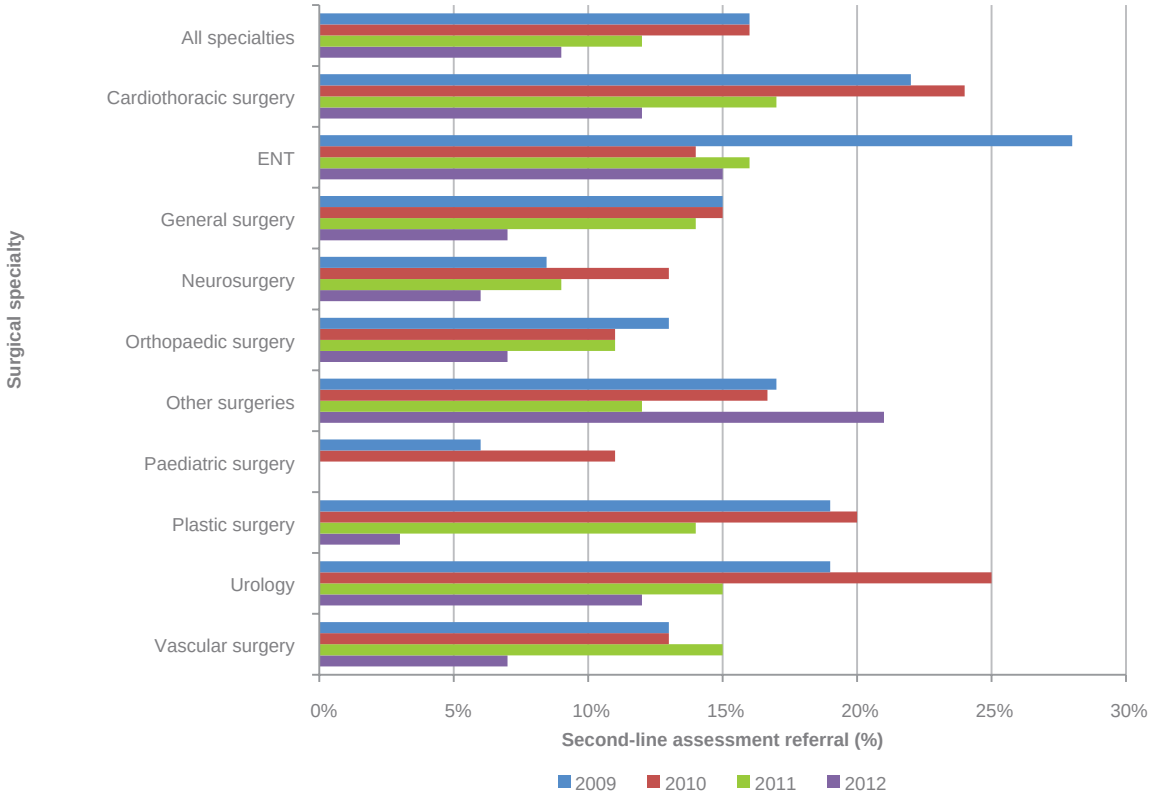
Missing data: n=246 (2%).

Comment

- An SLA was requested in 1,747 (12%) of the 14,031 audited cases across the census period. Lack of adequate information provided by the treating surgeon in the SCF was the trigger in 1,144 (65%) audited cases (eight per cent of all audited cases). Encouragingly, this is a reduction from 84% reported in the last annual report.
- The need for an SLA can often be avoided if the surgeon completes the SCF properly and provides adequate information.
- Less than five per cent of audited cases were sent to a SLA because of concerns regarding clinical management over the audit period (data not shown).

The frequency of cases referred for SLA in the surgical specialties during the audit period is given in Figure 41.

Figure 41: Frequency of SLA referral among surgical and other specialties (n=1,747 SLA)



*Other surgeries category listed by the treating surgeon covers the following specialties: anaesthesia, intensive care unit (ICU), medicine, neurology, oncology, thoracic medicine, trauma, ophthalmology and transplant, obstetric and gynecological and ears/ nose/ throat
Missing data: 246 cases (2%).

Comment

- There was some variation in the SLA rate among specialties and across the audit period with an overall drop in the need for SLA in most specialties in 2012. The exceptions to this were specialties with a low number of deaths where it is likely that the low numbers distort the data.

8.2 Clinical management issues

A primary objective of the peer-review process is determining if death was a direct result of the disease process alone, or if aspects of the management of a patient might have contributed to that outcome.

There are two possible outcomes: either the death was a direct outcome of the disease process and the clinical management had no impact on the outcome, or there was a perception that aspects of patient management may have contributed to the death of the patient.

In making an assessment of contributing factors the assessor can identify an:

- Area of consideration; where the assessor believes an area of care could have been improved or different, but recognises the issue is perhaps debatable. It represents a suggestion regarding treatment options or a minor criticism.
- Area of concern; where the assessor believes that an area of care should have been better.
- Adverse event; an unintended injury or event that was caused by the medical management of the patient rather than by the disease process, and which was sufficiently serious to lead to prolonged hospitalisation, or to temporary or permanent impairment or disability of the patient, or which contributed to or caused death. In addition, there are predetermined outcomes classified as an adverse event (e.g. anastomotic leak, pulmonary embolus). It must be emphasised that an adverse event does not imply negligence as some adverse events will occur even with the best of care. For example, a fatal pulmonary embolism can occur even with the use of the best DVT prophylaxis. It also must be emphasised that an adverse event is not necessarily preventable and may not contribute to the death of the patient. This important point is further explored in section 8.2.1.

Figure 42 demonstrates the degree of criticism of clinical management recorded per patient. Where a number of criticisms were made in any one case, the most severe degree of criticism is attributed. ANZASM primarily focuses upon areas of concern and adverse events. Data on areas of consideration are collected, but they are suggestions rather than strong views about treatment options.

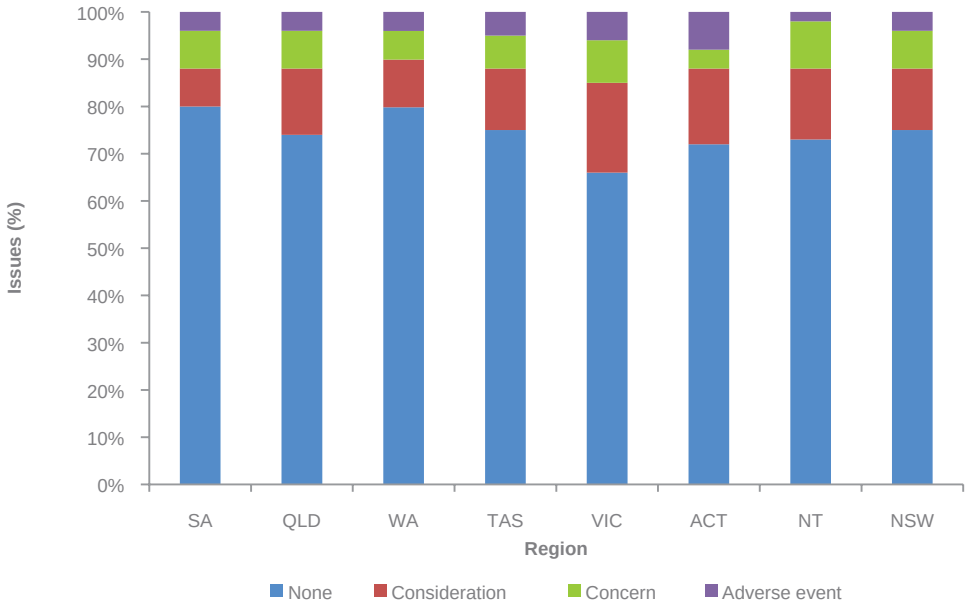
Figure 42: Frequency and spectrum of clinical management issues recorded per patient over time (n=14,031)

Missing data: n=53 (<1%).

Comment

- In 10,357 (74%) of 14,031 audited cases, assessors felt there were no issues of clinical management. When this is combined with areas of consideration (1,875 instances (14%)), the total number of cases with no or minor criticism only was 12,232 (88%).
- The number of cases with no clinical management issues has increased from 72% in 2009 to 79% in 2012.
- If an assessor flags an area of concern or adverse event, this implies a greater degree of criticism of clinical management. In this series this occurred in 1,746 (12%) of audited deaths (see Table 5 in Section 8.2.1 for details by specialty).
- The number of adverse events noted has decreased from six per cent (n=197) in 2009 to three per cent (n=94) in 2012. This group of patients is the focus of our audit as assessors perceive the treatment has impacted on the patient's outcome. This change is statistically significant (P<0.001).

Figure 43: Frequency and spectrum of clinical management issues recorded by region between 2009 and 2012 (n=14,031)



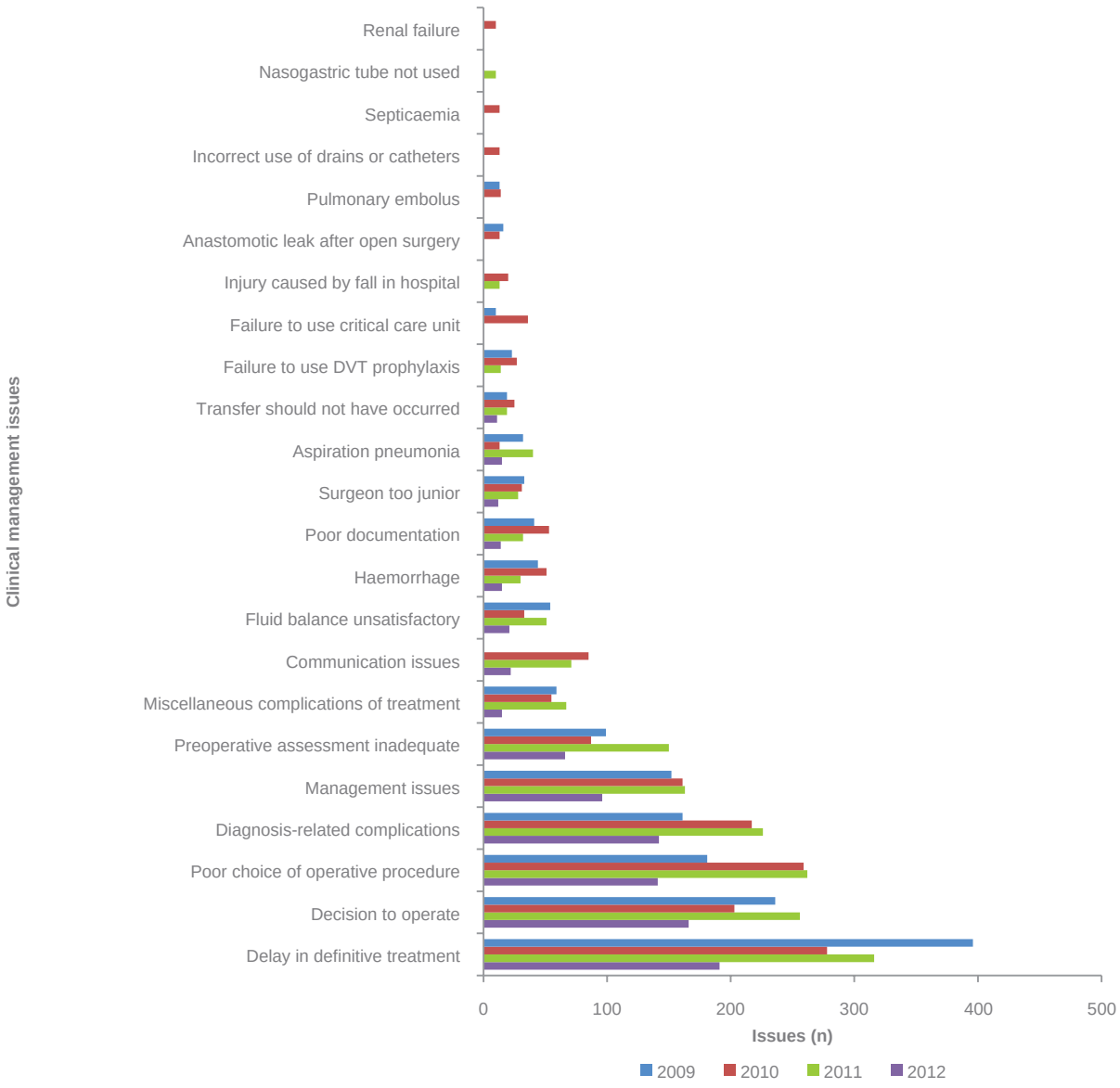
Missing data: n=53 (<1%).

Comment

- The highest rate of area for consideration was raised in VIC, where in light of the educational component of the audit, the assessors believe an area of care could have been different, but recognised that it may be a current area of peer debate as various treatment options are available to patients.

The frequency of specific clinical management issues is shown in Figure 44. This chart includes all clinical management issues – areas of consideration, concern and adverse events – and in some patients there is more than one issue.

Figure 44: Frequency of specific clinical management issues if ≥ 10 (n=5,941 issues)



DVT: deep vein thrombosis.

Management issues are made up of issues such as adverse factors in management, adverse events related to treatment guidelines/protocols, unsatisfactory medical management and treatment not conforming to guidelines.

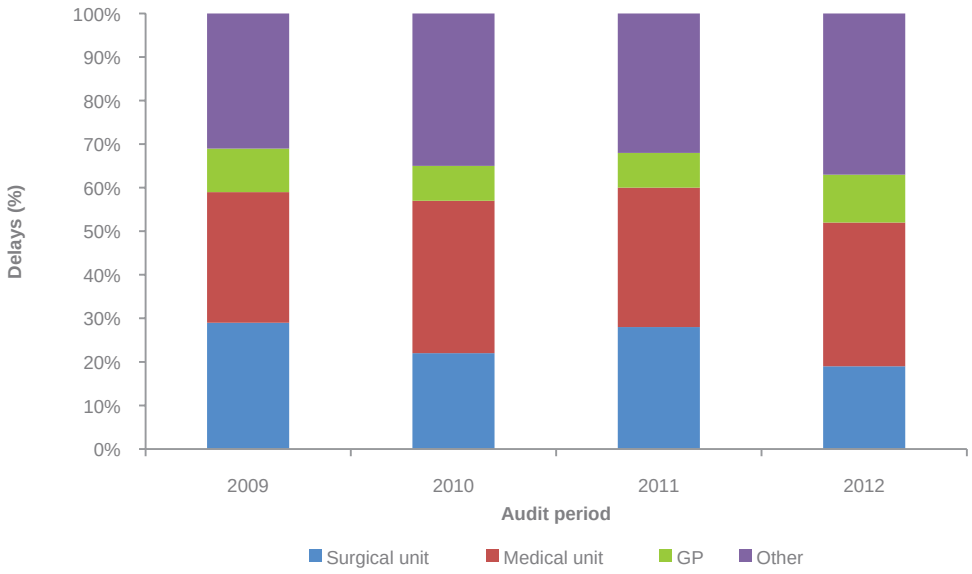
Missing data: n= 136 (2%).

Comment

- Delays in implementing definitive treatment are still the most frequent clinical management issue. These delays can be due to a number of factors and not all are the responsibility of the treating surgeon. These include geographical issues, diagnostic problems in the emergency department, inappropriate diagnosis, need for transfer, availability of theatre and communication issues.
- It should be noted that in 2012 there has been a notable drop in the number of cases where a delay in definitive treatment was an issue, especially as the total number of audited cases has increased over the audit period.
- The decision to proceed to surgery and the choice of operative procedure are also high on the list of clinical management issues.
- Good communication among those involved in patient care is essential to ensure the treatment plan is properly understood and coordinated. Poor communication accounted for three per cent of the specific issues identified in 2010 and 2012.

In 945 (nine per cent) of the audited patients there was perceived to be a delay in implementation of definitive treatment. The attribution of responsibility for treatment delays is shown in Figure 47. This data is derived from the surgical case form and so reflects the treating surgeon's own view.

Figure 45: Attribution of responsibility for treatment delays (n=945)



Missing data: n= 300 (32%).

'Other' category included emergency departments, radiology departments, other hospitals and patient-related factors.

Comment

- The surgical unit was deemed responsible for 29% of treatment delays in 2009 and 19% in 2012.
- 75% of delays were caused by other clinical areas, medical units or general practitioners over the entire audit period.
- It should be noted that more than one team may be responsible for any perceived delays in treatment. These treatment delays are identified by the treating surgeons and not the assessors.

8.2.1 Perceived impact of clinical management issues

First- and second-line assessors have to indicate:

1. what impact any perceived issues of patient management might have had on the clinical outcome
2. whether or not these issues were preventable
3. which clinical team was responsible for the issues.

Assessors are asked to select a response on these factors from a three- or four-part scale, called a Likert scale. The Likert scale is used to stratify responses to questions 1 and 2. The clinical teams felt to be responsible for management issues are recorded in question 3.

First- and second-line assessors may identify more than one issue of clinical management in each patient under review. It is important therefore that the impact of any of these criticisms on an individual patient's outcome is analysed and compared. In the tables below, all patients associated with an area of consideration, concern or adverse events are represented. Tables in this section show data that are patient-focused rather than incident-focused. Table 6 looks at attribution of responsibility for the clinical issues reported.

Table 6: Clinical management issues by specialty and severity as identified by SLA (n=14,031)

Surgical specialty	Adverse events	Concern	Consideration	No issues
Cardiothoracic surgery	8%	12%	19%	61%
General surgery	5%	9%	15%	71%
Neurosurgery	3%	5%	8%	84%
Orthopaedic surgery	3%	5%	11%	80%
Otolaryngology head and neck	3%	9%	18%	71%
Other*	9%	9%	19%	64%
Paediatric surgery	3%	6%	10%	82%
Plastic surgery	2%	11%	13%	74%
Urology	6%	12%	16%	66%
Vascular surgery	4%	8%	15%	72%
All cases	5%	8%	13%	74%

*'Other' surgeries cover the following specialties: anaesthesia, intensive care unit (ICU), medicine, oncology, ophthalmology, obstetrics and gynaecology, oral and maxillofacial, thoracic medicine, trauma and transplant.
Missing data: n=53 cases (<1%).

Comment

- This analysis compares the incidence of significant criticism of clinical care (areas of concern, adverse events) with lesser or no issues, by specialty.
- There is a difference in the adverse events between specialties. The exact reason is not readily apparent. It may reflect the proportion of high risk of some surgical procedures. In cardiothoracic surgery there are very few minor operations with many being complex and with high risk patients, which may explain the apparently high number of adverse events.

Table 7: Degree of criticism of patient management per patient by SLA (n=14,031)

Degree of criticism of patient management	Number of patients	% of audited series
No issue of management identified	10,357	74%
Area of consideration	1,875	13%
Area of concern	1,094	8%
Adverse event	652	5%
Total	13,978	100%

Missing data: n=53 cases (<1%).

Comment

- There was significant criticism (area of concern or adverse event) of clinical management in 1,746 (13%) of cases in this audited series.
- If a patient had more than one clinical incident noted, then the most severe has been used in this data set.
- The incidence of significant management issues reflected minimal variation across regions (data not shown).

Table 8: Perceived impact on clinical outcome of areas of consideration and concern, and adverse events (n=14,031)

Perceived impact on clinical outcome	Number of patients	% of audited series (n=13,902)
No issue of management identified	10,357	75%
Did not affect clinical outcome	813	6%
May have contributed to death	2,166	15%
Probably caused death	566	4%
Total	13,902	100%

Missing data: n=129 cases (1%).

Comment

- In only four per cent of patients were the perceived issues of clinical management felt to have probably caused the death of the patient.

Table 9: Perceived preventability of clinical issues in the areas of consideration and concern, and adverse event groups (n=13,793)

Perceived preventability of clinical issues	Number of patients	% of audited series (n=13,793)
No issue of management identified	10,357	75%
Definitely preventable	763	5%
Probably preventable	1,491	11%
Probably not preventable	1,059	8%
Definitely not preventable	123	1%
Total	13,793	100%

Missing data: n=238 cases (2%).

Comment

- The assessors felt that 763 (five per cent) of clinical incidents detected were definitely preventable.

Table 10: Perception of clinical team responsible for clinical issues (n=3,339)

Clinical team felt to be responsible	Number of patients	% of audited series (n=3,339)
Surgical team	2,226	67%
Other clinical team	727	22%
Hospital issue	186	5%
Other*	200	6%

Missing data: n=335 cases (10%).
*'Other' refers to the transferring hospital, blood bank/ transfusion services, emergency department, the general practitioner or referring doctor, the ambulance service, remote areas or lack of sufficient staff.

Comment

- First- and second-line assessors indicated that the surgical team was responsible for 2,226 (67%) of the perceived clinical issues of the 3,339 patients.

9. CONCLUSIONS

The Audits of Surgical Mortality are in an excellent position to use the extensive information learned during the audit process to promote safer healthcare practices. There is significant value to the Australian health consumer in the audit continuing as a quality assurance activity, in order to maintain the participation of surgeons and enhance the existing data on surgical mortality.

There has been a significant improvement in participation among both surgeons and hospitals across most of the regions. The audit offices have added to the ongoing professional development of surgical teams throughout Australia by contributing de-identified cases to the National Case Note Review Booklet. As the audit grows and develops, the ability to identify trends across Australia will further add to the ongoing knowledge of the particpants, and potentially lead to better outcomes for all surgical patients.

Achievements and future directions:

- The audit has had wide acceptance with a 94% participation rate from surgeons, up from 60% in 2009.
- Peer-reviewed feedback has been provided directly to individual surgeons, via assessors' comments, on individual cases. This is an essential component of the audit as it provides specific targeted information on a case by case basis.
- Workshops and seminars have been facilitated based on regional reports and in-depth investigations of issues identified. These activities have increased the quantity and quality of information disseminated on issues that have greatly affected clinical governance and patient care across the country. Further workshops have been planned for Tasmania, Victoria and South Australia during the course of 2014.
- The audit will continue to encourage the use of the 'Fellows Interface' web-based tool as an important initiative which provides users with a dynamic, user-friendly tool to enter online SCFs and complete first-line assessments. This minimises data entry time, the risk of errors in data entry, and hastens turnaround time. Nationally usage is around 38%. The plan in 2014 is to make the online portal compulsory, with a phasing out of the paper-based forms. The introduction of compulsory fields will also improve the quality of the data.
- The audit will continue to produce and deliver a National Case Note Review Booklet twice a year for distribution to surgeons, trainees and other clinical staff involved in patient care. Each of the ASMs contributed to the national *ANZASM Surgical Mortality Report 2011*, and also the National Case Notes Review Booklet. These cases were identified as offering clinical insights, and have been well received by the surgical community.
- The use of interstate assessors in some regions has ensured that the second-line cases remain de-identified. This is to safeguard the independent peer-review process within the regions particularly when a case may be well-known in a region or where there are very small numbes of surgeons in a particular specialty or sub-specialty..
- Improvements have been made to the surgical case form in order to collect more detail around a patient mortality with infection.
- Improvement in the quality and effectiveness of communication within the clinical team, and with other teams involved in the care of patients, was identified as an area for future improvement and education.
- The audit now includes Fellows of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG). It is encouraging that within a year of participating, many of the regions have over 50% participation by its gynaecological Fellows.

A greater national awareness and acknowledgment of the value of the audit among health professionals should see increased surgical participation and data completeness of forms and enable further, in-depth trend analysis and informative reporting.

The College and the state and territory Departments of Health can be proud of this important initiative to promote best surgical practice across the nation.

10. REFERENCES

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- Associate Professor Michael Fearnside, AM (CHASM)
- Mr Tony Sparnon (Councilor)
- Mr James Aitken (WAASM)
- Mr Glenn McCulloch (SAAPM)
- Dr Cathy Ferguson (POMRC representative, NZ)
- Dr John North (QASM/ NTASM)
- Mr Rob Bohmer (TASM)
- Dr John Tharion (ACTASM)
- Reverend Anthony Taylor (Consumer Representative)

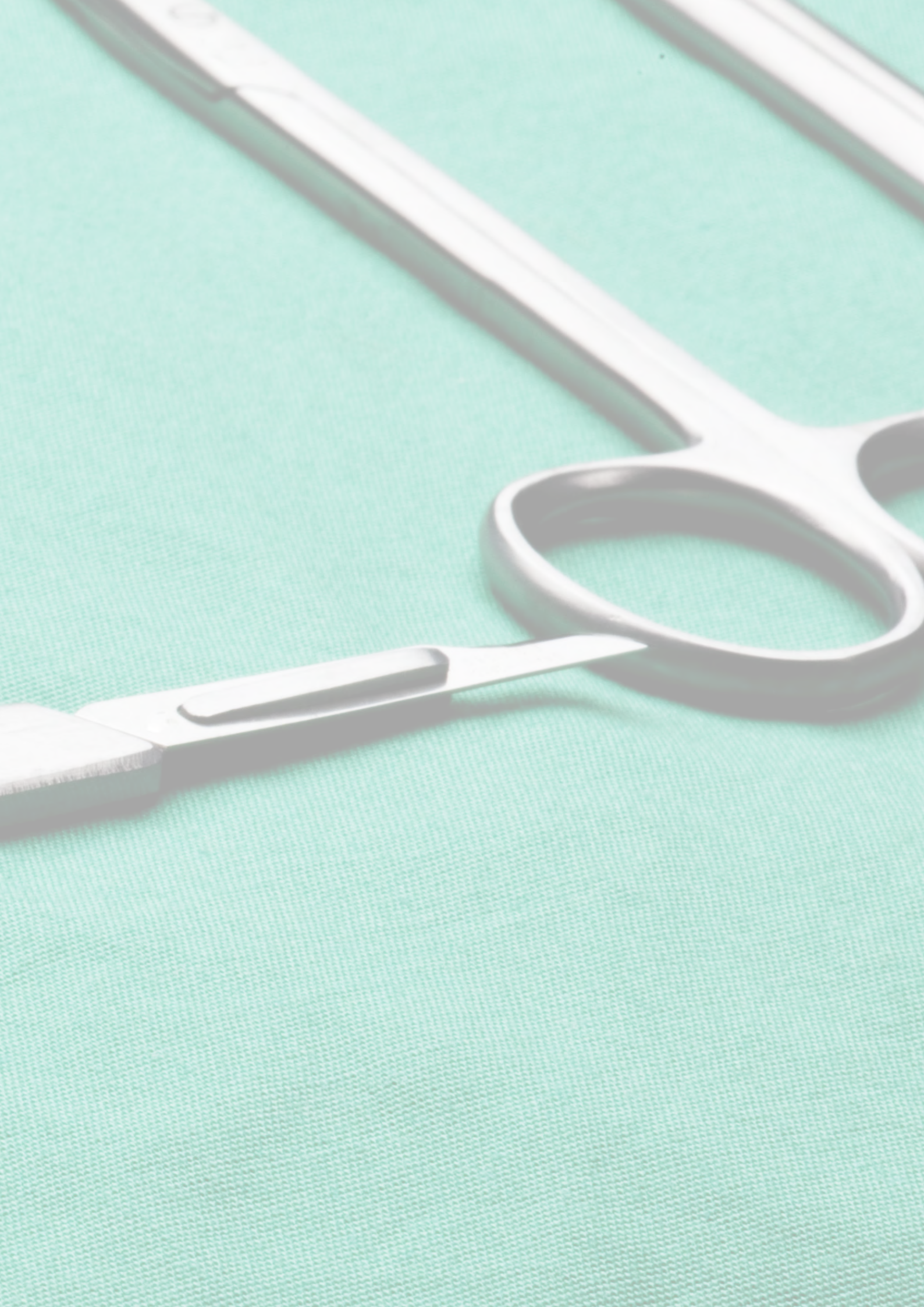
ANZASM Management

- Associate Professor Wendy Babidge, Research, Audit and Academic Surgery Division
- Mr Gordon Guy, Australian and New Zealand Audit of Surgical Mortality, ANZASM
- Ms Veronica Walker, Australian Capital Territory Audit of Surgical Mortality, ACTASM
- Ms Paula Cheng, The Collaborating Hospitals Audit of Surgical Mortality, CHASM
- Ms Therese Rey-Conde, Queensland Audit of Surgical Mortality, QASM/ NTASM
- Ms Sasha Stewart, South Australian Audit of Perioperative Mortality, SAAPM
- Ms Lisa Lynch, Tasmanian Audit of Surgical Mortality, TASM
- Ms Claudia Retegan, Victorian Audit of Surgical Mortality, VASM
- Dr Diana Azzam, Western Australian Audit of Surgical Mortality, WAASM

ANZASM regional staff

- Adeline Nguyen, CHASM
- Adeline Neo, WAASM
- Alex Oros, CHASM
- Andrew Chen, VASM
- Bruce Czerniec, CHASM
- Dylan Hanson, VASM
- Erin Gilmore, CHASM
- Franca Itotoh, WAASM
- Kimberley Cottell, SAAPM
- Jenny Allen, QASM
- Jessele Vinluan, VASM
- Kyrsty Webb, QASM
- Ruth Murphy, CHASM
- Sonya Faint, QASM

NOTES



ROYAL AUSTRALASIAN
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Australian and New Zealand
Audit of Surgical Mortality

National Report 2012

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