

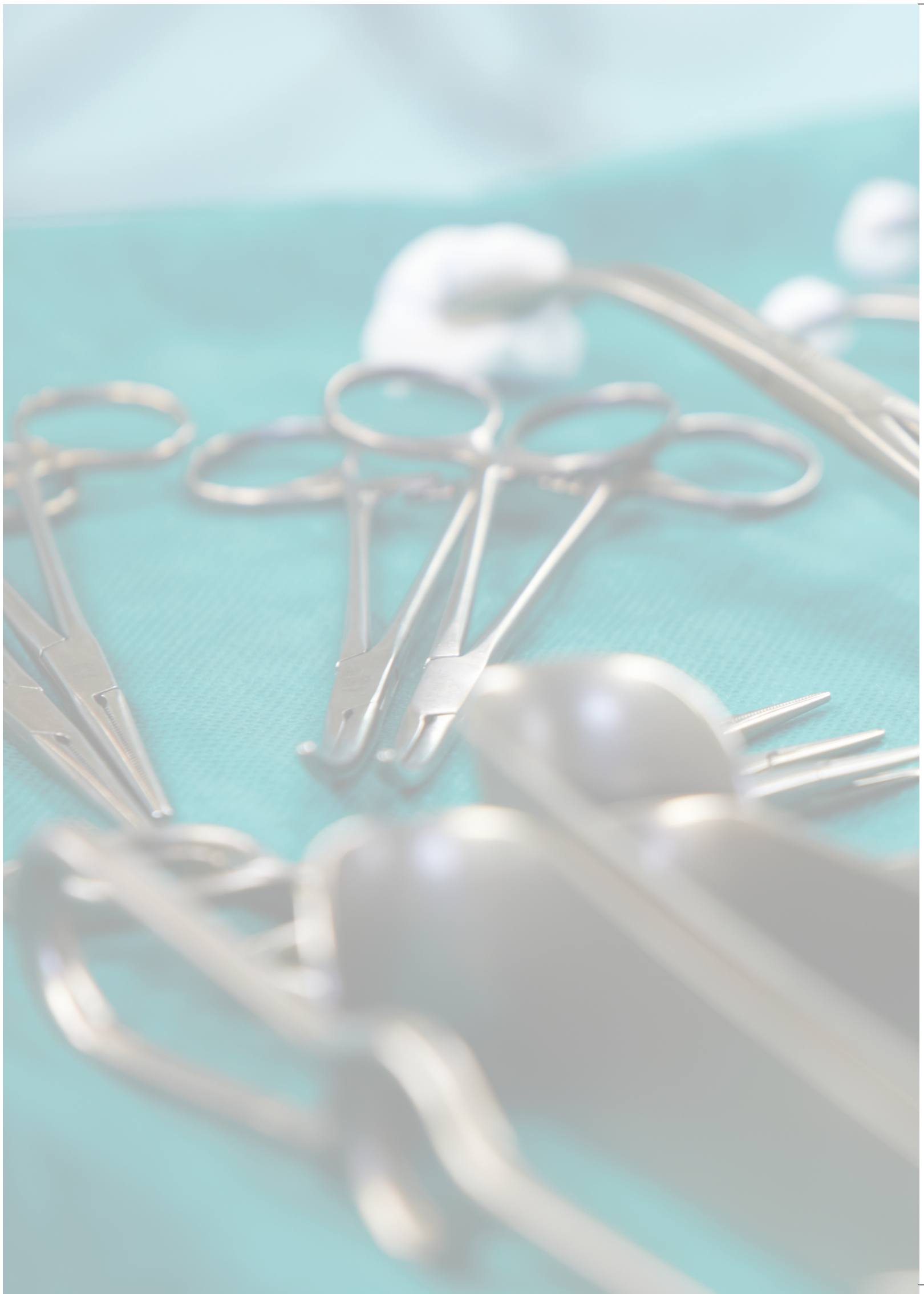


ROYAL AUSTRALASIAN  
COLLEGE OF SURGEONS

## Australian and New Zealand Audit of Surgical Mortality

### National Report 2013





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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, 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



In Australia the Audits of Surgical Mortality continue to provide comprehensive data for deaths occurring under surgical care around the nation. This year's report continues to develop the trends and data collected over the last decade. Also included in this report is a copy of the letter I have written to Mr Roff, Head of the Australian Private Hospitals Association, expressing my concern and apology in the distress caused to his organisation by an article that appeared in the Sydney Morning Herald. Once this letter was received, the engagement of the private hospital group has improved substantially in New South Wales and hopefully will continue over the next twelve months.

The audit has also recognised it is important that we feed into the quality activity of hospitals around the nation. To this end, ANZASM is developing a report designed for hospitals or regions that highlights the trends and results for them, based on the Audit data and comparing it with state and national results. We are confident this will be of great value to health authorities to either reassure themselves that their results are consistent with the national or state performance, or highlight areas of concern that may require further investigation.

The ANZASM audit has always been designed to be one that provides education and support to the activities of surgeons. It has never been designed as a policing agency. This is much more appropriately done within the hospitals through their standard review of mortality and morbidity. Our work can highlight system problems or specific errors of judgement made on particular cases and, indeed, our booklets, circulated on a regular basis, act as a direct form of feedback to all surgeons. Education is our primary aim. The policing of the activity must remain with health authorities and hospitals.

The Australian Health Practitioner Regulation Agency (AHPRA) will in future years be much more assiduous in ensuring that continuing professional medical education has been obtained by surgeons. Participating in the Audit is part of that process. The College will not be providing a Continuing Professional Development (CPD) signoff unless participation in the Audit, where required and possible, has been undertaken. This is clearly in the best interests of the surgeons of Australia and their patients as it attests to the fact that these individuals have been engaged in the education and feedback process offered by the ANZASM.

It is also important to acknowledge the outstanding work of the various agencies conducting the collection and feedback of data within each state, in particular the Clinical Directors who take on a difficult and challenging task in ensuring that surgical practice is of the highest standard.

A handwritten signature in black ink, appearing to read 'Guy Maddern'.

**Professor Guy Maddern**  
Chairman, ANZASM



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# ROYAL AUSTRALASIAN COLLEGE OF SURGEONS

Patron: H.R.H. The Prince of Wales



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22 May 2014

Mr Michael Roff  
Chief Executive Officer  
Australian Private Hospitals Association  
PO Box 7426  
Canberra BC  
ACT 2610

Dear Mr Roff,

## **Surgical Mortality Audits**

In the past, comments that I have made have been portrayed in the media as accusing the New South Wales private hospitals of not wanting to participate in state wide mortality audits.

I am now aware that this is not the case and as such the reported comments are inaccurate.

I do apologise for the articles in the media and the way this has been portrayed as well as any subsequent distress that was caused.

I do look forward to the comprehensive uptake of mortality audits by private hospitals across Australia, but particularly in New South Wales. I am sincerely hopeful that my apology will enable productive co-operation between our two organisations going forward.

Yours sincerely

Professor Guy Maddern  
Clinical Director, Australian and New Zealand Audits of Surgical Mortality

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## SHORTENED FORMS

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ACTASM	Australian Capital Territory Audit of Surgical Mortality
ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
CHASM	Collaborating Hospitals Audit of Surgical Mortality
DVT	deep vein thrombosis or deep vein thromboembolism
FLA	first-line assessment
NTASM	Northern Territory Audit of Surgical Mortality
QASM	Queensland Audit of Surgical Mortality
RANZCOG	The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
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 is funded by its state or territory Department of Health (Western Australia, Victoria, South Australia, Queensland, Tasmania, Australian Capital Territory and Northern Territory). The Collaborating 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 audit has risen from 60% in 2009 to 96% by the end of 2013.

## Hospital participation

All public hospitals in Australia participate in the audit. Private sector participation is slightly lower (89%) due to slower uptake by private hospitals in some regions. In July 2013 the Queensland Health Department agreed to fund the participation of private hospitals and these figures have been included in this report.

## Analysis

This report contains a comparative analysis of cases reported to the ANZASM from 1 January 2009 to 31 December 2013. There are 5,978 of cases (24%) which were either excluded from the audit or had not completed the full audit (peer review) process at the census date. Some data are missing due to incomplete information provided in surgical case forms (SCFs) and it is noted in the text where this occurs. The data from 2009 to 2012 has been updated, reflecting the continuous nature of the data collection and reporting requirements within the audit. Cases that are still under review will be captured in the next report.

## Audit numbers

From 1 January 2009 to 31 December 2013, a total of 24,561 deaths were reported to ANZASM. Of these, 18,583 cases (76%) had completed the audit process by the census date in March 2014. The clinical information from these completed cases provides the patient profiles described in this report.

## Demographic profile of audited cases

Of the 18,583 audited cases, the mean age was 74 years (standard deviation [SD] 17). Ages varied from one day to 105 years and males represented 54% of cases.

## Risk profile of audited cases

The majority (85%) of audited deaths occurred in patients admitted as emergencies with acute life-threatening conditions and 88% of patients had one or more significant coexisting illnesses.

## Risk management

In general, deep vein thromboembolism (DVT) prophylaxis strategies were being appropriately applied. In only 3% of cases did assessors conclude that the DVT prophylaxis management was inappropriate.

Critical care support was deemed necessary in 64% of cases. In 3% of cases, in which 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 information will be presented in future audits.

## Profile of operative intervention

There were 13,794 patients who underwent a surgical procedure (74%). A total of 19,149 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. The consultant surgeon made the decision to operate in 87% of cases and performed the surgery in 61% of cases.

Of the patients who had surgery, 15% 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. Transfer delay (41%) and inappropriateness of transfer (22%) were the most common criticisms. Insufficient clinical documentation (17%) was also identified as an issue, and this is of concern given the necessity of all involved clinicians having a complete picture of the patient's issues on presentation.

## Peer-review outcomes

Thirteen 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. Inadequate information was the reason for referral in 1,465 of the 2,309 SLA requests (63%).

The most common criticism made by assessors was delay in delivering definitive treatment, and 76% of those delays were attributed to the surgical team. This finding has led the regional audits of surgical mortality to develop and deliver a series of education programs aimed at surgeons, as well as junior and senior hospital staff, which address the various facets of delay and communication.

Clinical issues were described in 18% of the 18,583 cases that completed the audit process. However, adverse events in patient care were reported in just 3% of all cases in 2013.



## Comparison of data between the 2011 to 2013 audit periods

Table 1: National comparison - 2011-2013 audit periods (cumulative totals)

Areas for national comparison	2011	2012	2013
Surgeon Participation	90%	94%	96%
Hospital Participation: Public:	99%	100%	100%
Private:	73%	76%	89%
Closed cases	10,044	14,031	18,583
Emergency vs. Elective Admissions	85%:15%	86%:14%	86%:14%
Male / female ratio	54%:46%	54%:46%	54%:46%
Median age for males vs. females	72 and 76	76 and 81	76 and 81
ASA* >4	54%	46%	54%
Admitted with one or more comorbidities	88%	90%	88%
Cases with perceived risk of death considerable or expected	63%	62%	62%
VTE prophylaxis use assessed as inappropriate by assessor	4%	2%	3%
Issues with fluid balance	9%	10%	7%
Patients who had one procedure	75%	78%	74%
Patients who had more than one procedure	25%	22%	26%
Consultant deciding	86%	86%	87%
Patients with unplanned return to theatre	15%	16%	15%
Patients with postoperative complications	33%	33%	34%
Patients with anaesthetic-related issues	7%	7%	7%
Procedures abandoned	5%	6%	5%
Patients transferred	27%	28%	27%
Issues related to inter-hospital transfers	654 issues	889 issues	966 issues
Infections acquired before admission†	n/a	44% (376/845)	45% (332/744 )
Infections acquired during admission†	n/a	56% (469/845 cases)	55% (412/744 cases)
Hospital acquired infection†	n/a	64% (298/469 cases)	59% (243/412 cases)
Traumatic events associated with falls in care home or hospital‡	n/a	37% (141/383 cases)	39% (136/351 cases)
Request for second-line assessment	10%	12%	12%
Areas of concern or adverse events (total)	9% and 4% (13%)	9% and 3% (12%)	9% and 3% (12%)

\* American Society of Anesthesiologists Class

† Excludes NSW data, WA started collecting data in 2013.

‡ Data from Queensland, Western Australia (from July 2013), Victoria and Northern Territory.



## Recommendations and key points

The recommendations are as follows:

- Continue to increase active participation of surgeons and hospitals towards 100%.
- Continue to identify emerging trends in mortality and address them 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.
- The audit revealed that surgical emergencies are greater risks for patients where care is shared, for example where a patient is transferred from a nursing home to a public hospital. All health professionals should increase their awareness of these risks, especially in clinical handover between teams, to improve the quality and safety of patient care.
- Communication is one of the most essential points in good patient care. This includes communication between surgeons and their junior staff, between disciplines, and between nursing and medical staff. If you do not tell others what you are thinking or what is happening, everyone will be functioning in isolation.
- Delays in the decision to operate are still an ongoing issue. In complex cases, there needs to be clear demonstrable leadership in patient management. There should be regular team meetings with all disciplines involved to ensure the treatment plan is understood by all. Consultants should continue to be actively involved in the care of their patients, including the decision-making process.
- Improved postoperative management is still important. The patient should be discharged to the ward with comprehensive orders whilst preventative measures should be implemented for reducing complications. Instructions must be given about further management when discharged from a clinical or surgical team. The potential outcomes from the probable clinical diagnosis must be considered when developing a treatment plan. The patient should be transferred to a medical unit if elderly, high-risk and if medical issues are assessed as being the prominent clinical factor during the admission episode, providing that the surgical postoperative care can be performed appropriately in that setting.

## Other recommendations

- Ensure greater completeness and accuracy of the SCFs. Failure to fully complete the form 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 may lead to a reduction in requests for SLAs.
- Periodic review of forms to improve efficiency without detracting from the value of the data collection.
- An infection and trauma question was added to the SCF in 2011. The data is currently too small to make any significant comment however interesting trends are starting to emerge. In particular, an infection issue occurs in significant numbers across all regions in the postoperative care area. Falls occurring in either a care center or hospital also appear to be high.
- Closer collaboration with respective regional Departments of Health around the forthcoming release of the ANZASM Clinical Governance Report. The report uses audit data and provides Departments of Health and public and private hospitals with a trending analysis of clinical management events both within their hospitals and compared to state and national data.
- Delivery of themed national case note review booklets on current topical issues, such as the impact of obesity on surgery, delay in patient care and transfer issues.

# 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 2013.
- ANZASM's main roles are to inform, educate, facilitate change and improve quality of surgical practice.
- This report is an analysis of the 18,583 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 2013 are included in this report from Western Australia, South Australia, Tasmania, Victoria, New South Wales and Queensland. 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 punitive process.

## 1.3 Structure and governance

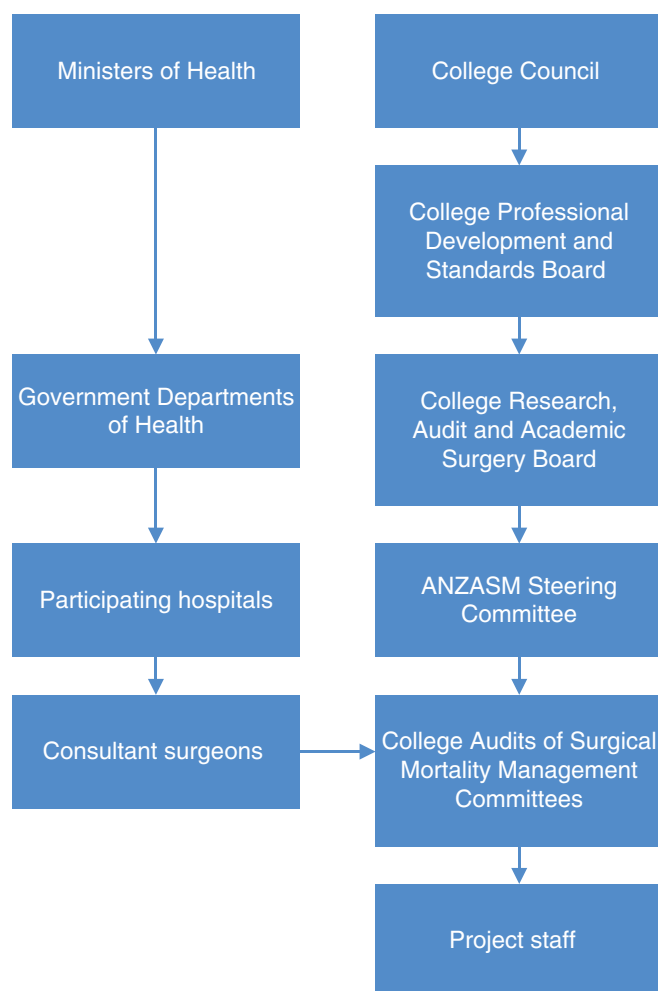
ANZASM is managed by the Research Audit and Academic Surgery Division of the College. ANZASM oversees the implementation and standardisation of each regional audit to ensure consistency in audit processes and governance structure across all jurisdictions (see Figure 1).

The individual regional audits are funded by their respective 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 Australian and New Zealand Audit of Surgical Mortality (ANZASM)





## 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.

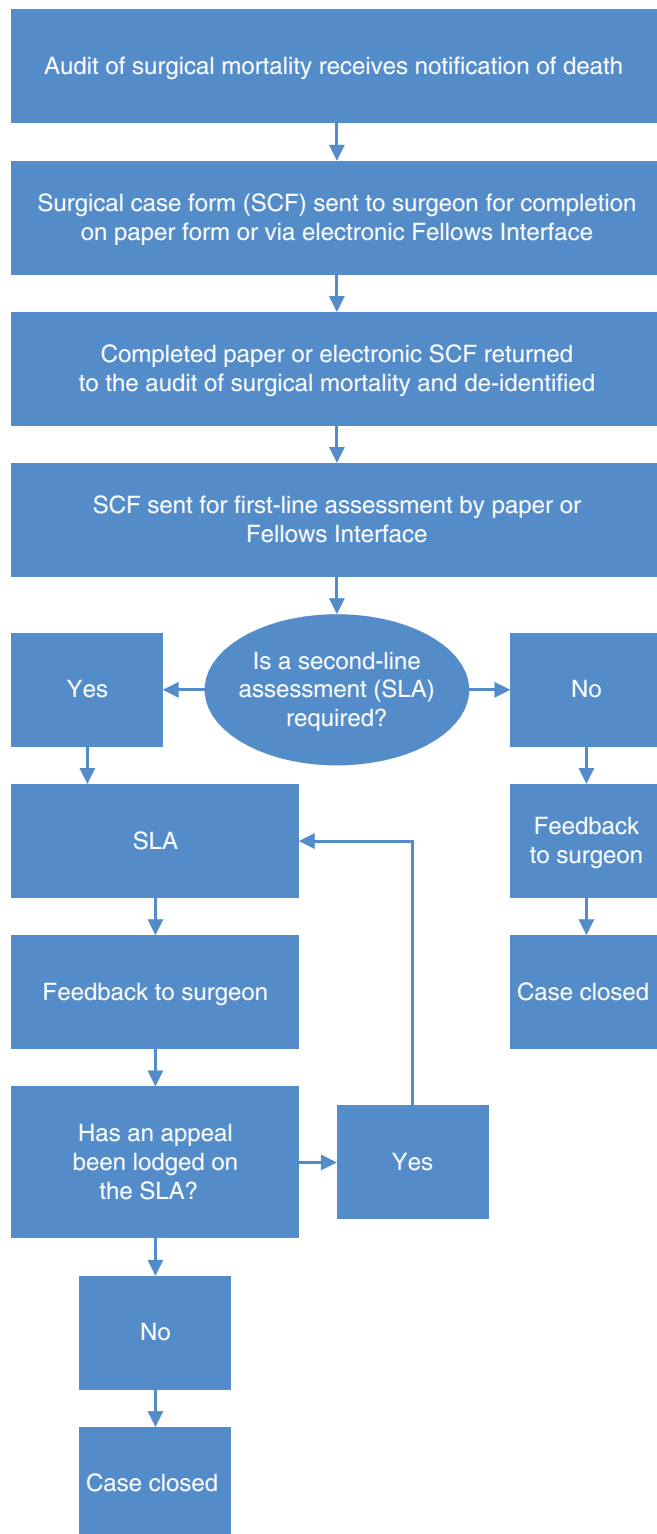
The clinical details pertaining to the management of each case are recorded on a standard, structured surgical case form (SCF) completed by the consultant or treating surgeon associated with the case. The completed SCF is returned to the appropriate audit of surgical mortality office, where it is de-identified and sent for first-line assessment (FLA) by a surgeon of 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 in which the death occurred.

There are two possible outcomes of a 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





## 1.5 Providing feedback

The principal aim of the ANZASM is education as a component of a surgeon's continuing professional development. 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 important 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. If a clinical incident or event took place, the surgeon is asked to provide more information on 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 or 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 audit of surgical mortality 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 the following spectrum of criticism for use by assessors.

- *Area for consideration.* The assessor believes an area of care could have been improved or different, but recognises that the issue is perhaps debatable.

- *Area of concern.* 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 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 2013 report covers deaths reported to ANZASM from 1 January 2009 to 31 December 2013, censored on 31 March 2014. 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 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 the 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 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 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 for the 2009 to 2013 audit periods.



## 2. AUDIT PARTICIPATION

### Key points

- On a national basis surgeon participation is 96%. This may be an underestimate of the true intent to participate as not all private hospitals are participating.
- Participation in ANZASM became a mandatory component of the Royal Australasian College of Surgeons Continuing Professional Development Program in January 2010.
- The SCF return rate at census date for participating surgeons was 84%.
- At present, 100% of all public and 89% of all private hospitals are participating in the audit program.

### 2.1 Audit numbers

During the period January 2009 to December 2013, ANZASM received 24,561 notifications of death associated with surgical care:

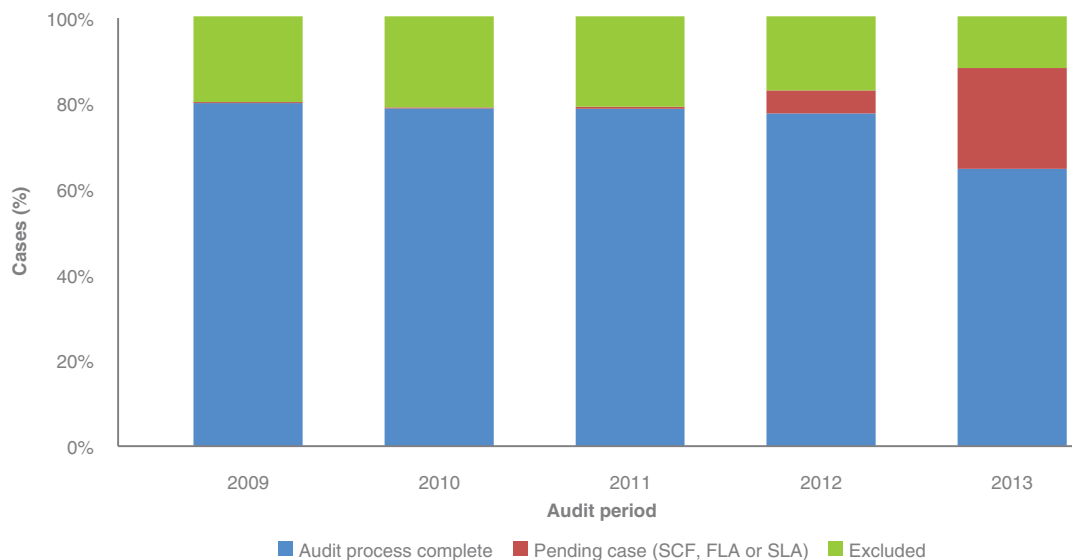
- Of these, 76% of cases (18,583) had completed the audit process by the census date (76%). The clinical information from these deaths provides the patient profiles described in this report and is the denominator in all analyses pertaining to outcomes from the audit, unless stated otherwise.

- The remaining 24% (5,978) 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=4,487).
- The case had not completed the full audit (peer-review) process at the census date (n=1,491).

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=18,583)



Excluded cases comprise of non-surgical, non-participant or terminal care cases.  
SCF: surgical case form; FLA: first-line assessment; SLA: second-line assessment.

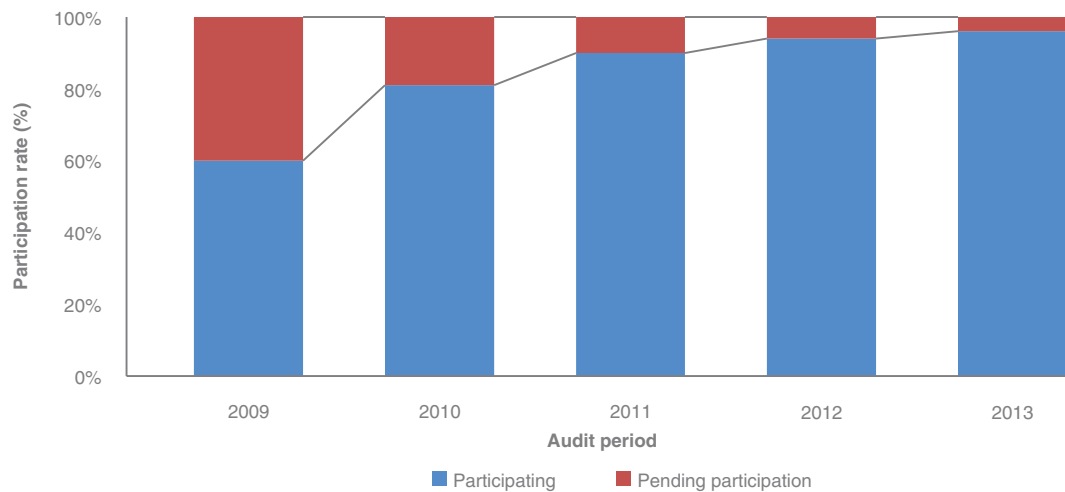
Figure 3 shows the proportion of cases with completed forms over the different audit periods. The 2013 audit period has a higher number of pending cases, however it is expected that this number will decrease to become more in line with the earlier years as additional cases are completed. The audit process relies not only on surgeons agreeing to participate, but also on their timely completion of surgical case and assessment forms.





Figure 4 shows the increase in surgeon participation in Australia from 2009 to 2013. Pending participation indicates that a Fellow has been invited to participate in the audit, but no response has been received.

Figure 4: Participation by Fellows (N=4,610)



Note: n= 216 excluded from analysis due to non-participation in audit, interstate or overseas move, or Fellows who 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 2 and 3.

Table 2: Regional participation by Fellows (N=4,610)

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

Table 3: Regional participation by Fellows as assessors (N=4,610)

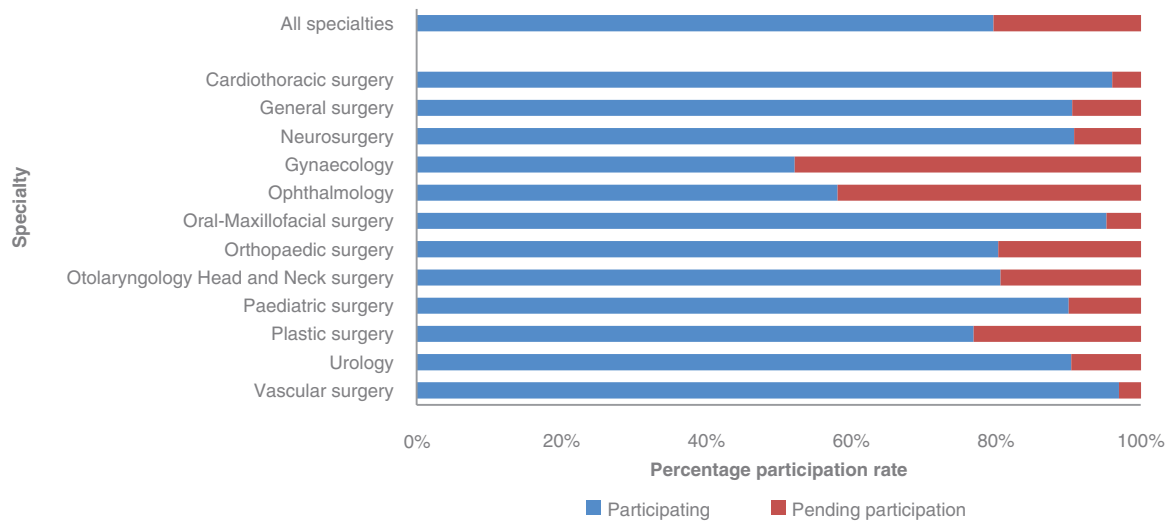
Assessor type	Region							
	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
First-line assessor	58%	47%	84%	90%	56%	86%	70%	38%
Second-line assessor	55%	44%	85%	96%	57%	69%	42%	28%

Comment

- At the end of 2013, 96% of eligible Fellows (4,418/4,610) had agreed to participate, a 36% 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 an essential component of the College's Continuing Professional Development Program and is necessary for recertification. ANZASM aims for 100% participation of surgeons and hospitals nationally.
- Reasons given for surgeons' non-participation included refusing to participate in the audit and surgeons working in a private hospital that, as at the end of 2013, was not participating in the audit. Surgeons who had gone overseas were also excluded from the audit.
- There is increasing use of the ANZASM electronic interface in which surgeons enter the data directly. Of participating surgeons nationally, 46% are now using the electronic interface (2,150/4,722), compared to 33% (1,500/4,540) in the previous report.<sup>1</sup> Use of the electronic interface is encouraged as it is easy to use and provides both time and process efficiencies.



Figure 5: Surgeon participation by specialty (N=4,610)



Note: Gynaecologists formally started participating in the audit process in December 2011.

Comment

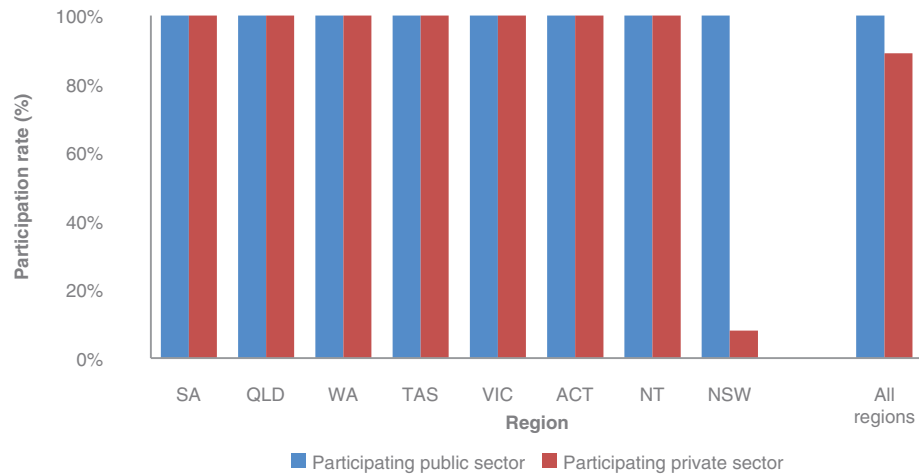
- Participation rates vary amongst the different specialties. Pending participation means that a letter has been sent out inviting the individual to participate in the audit, but a response has not yet been received.
- There are 607 Gynaecologists who have agreed to participate in the ANZASM audit process. Participation for the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) surgeons is voluntary under their Continuing Professional Development Program.



## 2.2 Hospital participation

All public hospitals where surgery is performed have agreed to take part in the audit program.

Figure 6: Hospital sector participation by region



### Comment

- A recruitment drive targeting the private sector commenced at the end of 2010 and the private sector's response to the opportunity to participate in the audit has generally been positive. There has been a positive and encouraging expansion in private hospital participation, increasing from 43% in 2009 to 89% in 2013, and aim for 100% by the end of 2015.
- All states now have full private sector participation, with the exception of New South Wales where participation is expected to increase during 2014 and 2015. In July 2014, the Australian Private Hospitals Association agreed to support the Collaborating Hospitals' Audit of Surgical Mortality in NSW and has communicated this message to its members.
- ANZASM would like to acknowledge the Queensland Health Department's decision to fund participation of private hospitals. As of 1 July 2014, all private hospitals in Queensland are participating in the audit.



### 3. DEMOGRAPHIC PROFILE OF AUDITED CASES

#### Key points

- A majority (86%) of audited deaths occurred in patients admitted as emergencies with acute conditions.
- The mean age and spectrum of comorbidity in audited deaths indicates that surgical mortality predominantly occurs in the sick and elderly.
- One or more pre-existing medical conditions or comorbidities were reported for 88% of patients (16,421/18,583) in this audited series.
- 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.

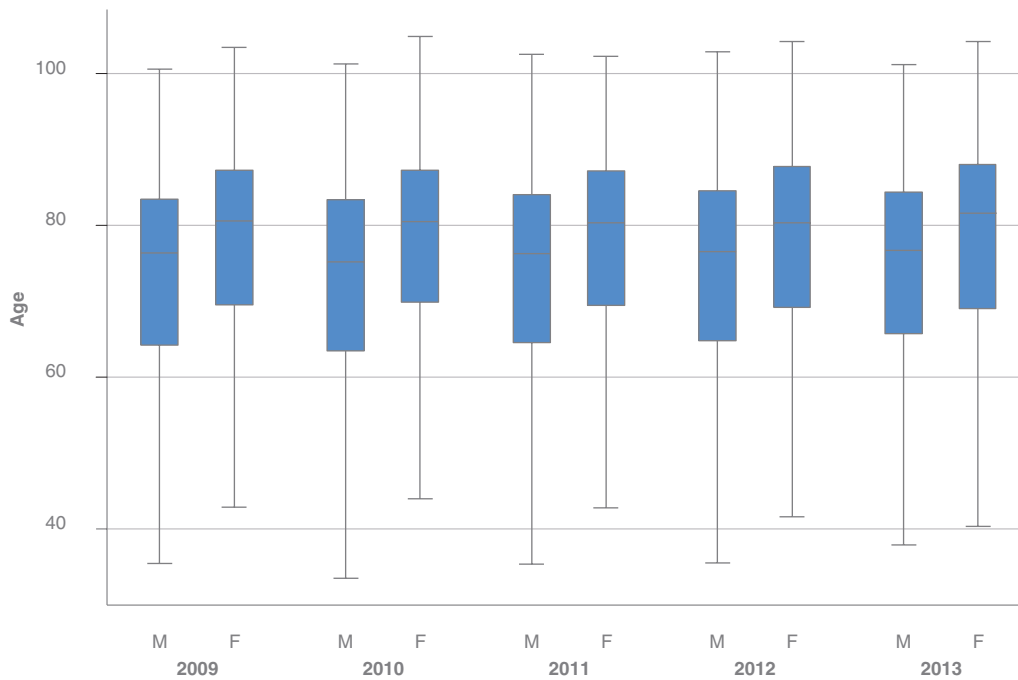
Figures 7, 8, 9, and 11 are box-and-whisker plots, in which:

- 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.

#### 3.1 Age and gender

The age distribution of deaths by gender and year, gender and region, and surgical specialty are shown in Figures 7, 8 and 9 respectively.

Figure 7: Age distribution of deaths by gender and year (N=18,583)



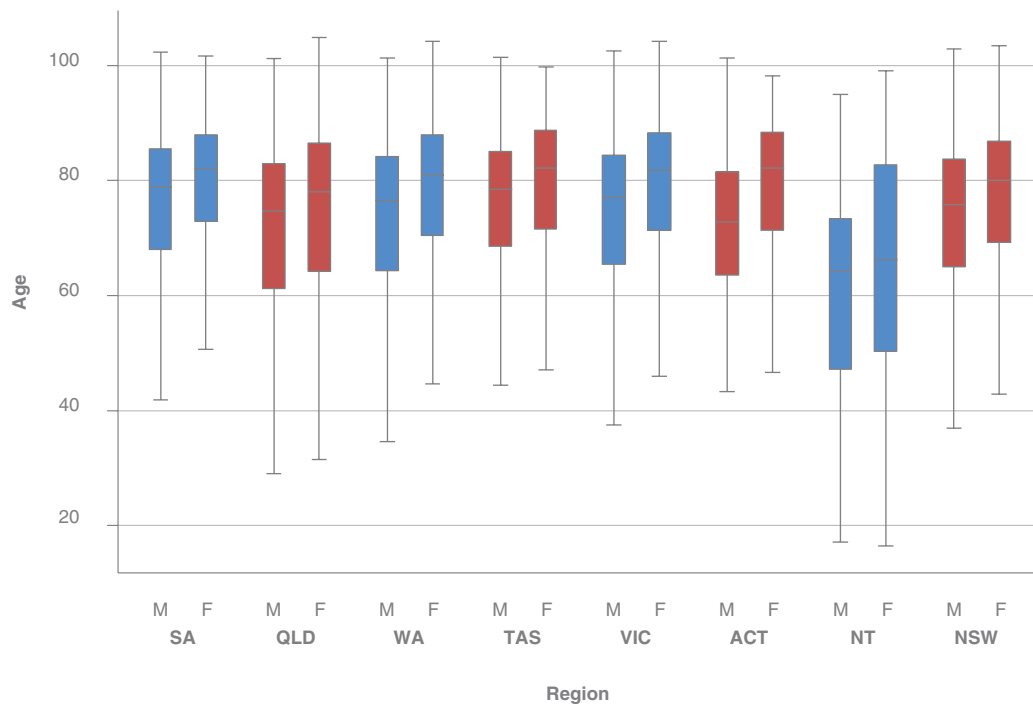
Note: excludes extreme values

#### Comment

- The age and gender distribution of the audited deaths was similar over the reporting audit periods.
- The stable distribution of age and gender across the five years of the audit means that any trends identified are not due to a change in the demographics of the population.



Figure 8: Age distribution of deaths by gender and region (N=18,583)



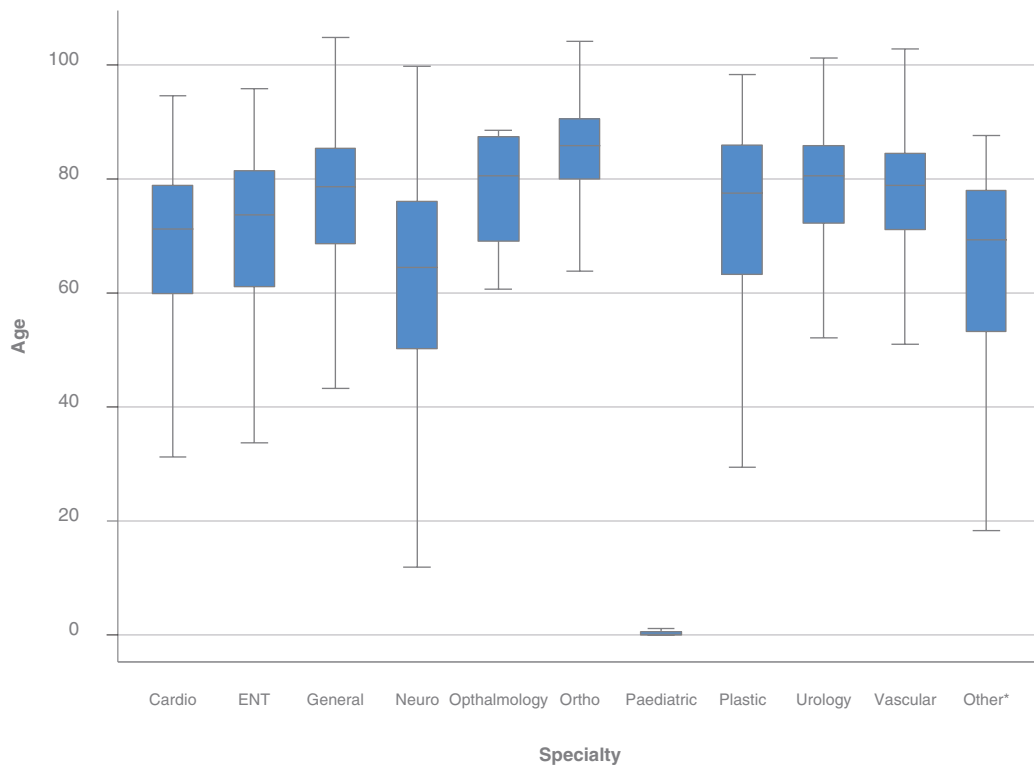
Note: excludes extreme values

Comment

- The gender distribution of audited deaths was similar across all regions with the exception of the Northern Territory, which had a lower median age of death for males and females compared to the other regions.



Figure 9: Age distribution of deaths by surgical specialty (N=18,583)



\*Other specialties listed by the treating surgeon include trauma and transplant, otology, general practitioners and gynaecology.  
ENT: ear, nose and throat.

#### Comment

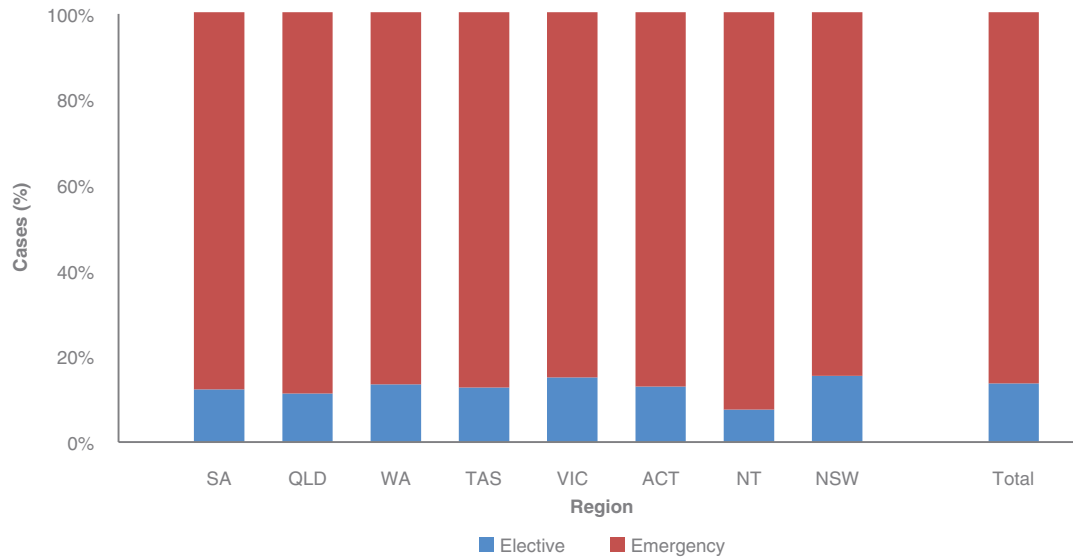
- The mean age at death may relate to the underlying disease process in the individual specialties (e.g. young head injury patients in Neurosurgery).
- This plot excludes extreme values to avoid skewing the majority of the data. This means that all very young cases are not included, with the exception of those relating to Paediatric surgery.
- Although statistically considered as extreme values, it is worth noting that in 2013, one region had 16 deaths of children less than 12 years of age. These were mostly newborns with cardiothoracic malformations (data not shown).



### 3.2 Admission status of audited cases

The admission status of audited cases indicates whether patients were admitted electively or as emergencies (see Figures 10 and 11).

Figure 10: Admission status of cases by region (N=18,583)



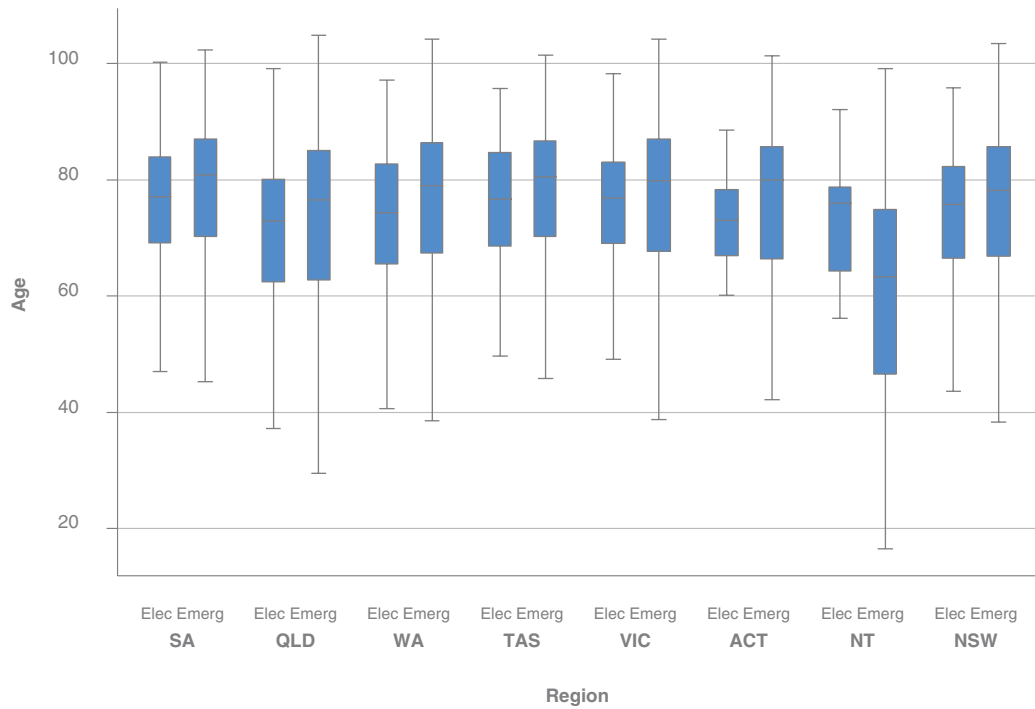
Missing data: n=241 (1%).

#### Comment

- The majority 85% of audited deaths (15,829/18,583) occurred in patients admitted as emergencies for acute life-threatening conditions.
- Northern Territory has a lower elective admission rate however this may be due to there being only one private hospital in the region.



Figure 11: Age distribution of deaths by admission status and region (N=18,583)



Missing data: n=241 (1%). Excludes extreme values.

Elec: elective; Emerg: emergency.

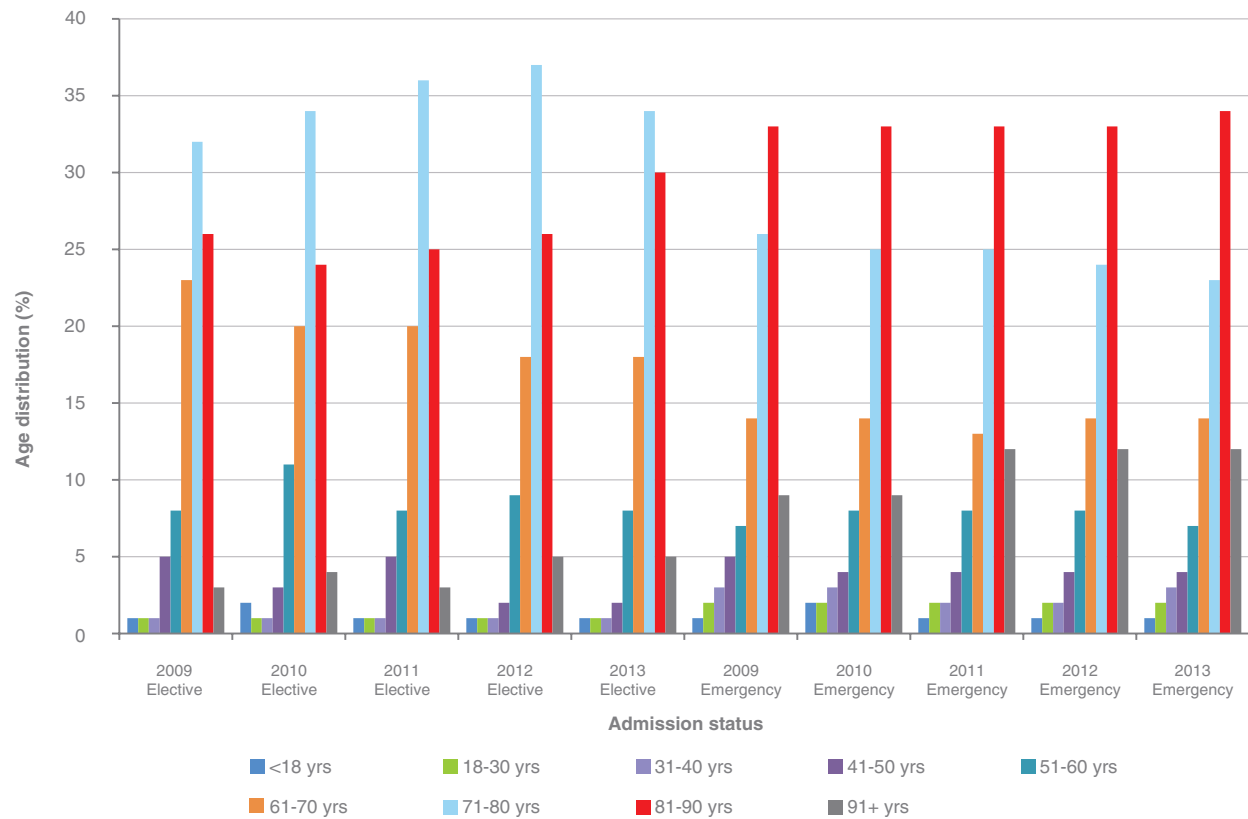
#### Comment

- Patients who died following emergency admission generally (with the exception of NT) 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 it 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 12: Age range distribution by year and admission status (N=18,583)



Missing data: n=241 (1%).

Comment

- The age distribution of emergency and elective deaths has remained similar over time.
- Deaths occurring in elective surgery are a greater percentage in the age group 71-80 years and appear to be increasing since 2009. For emergency cases there is a greater percentage of deaths in the 81-90 year age group.



### 3.3 Risk profile of audited cases

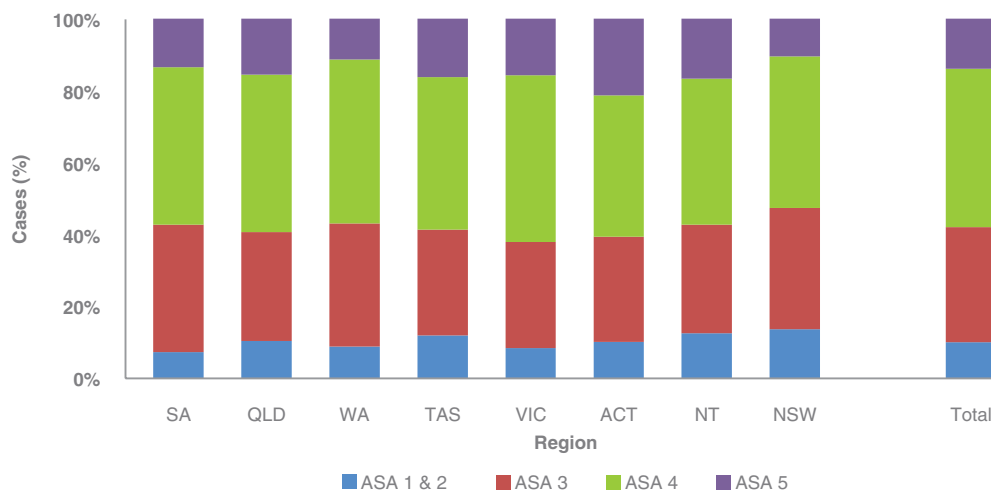
#### 3.3.1 American Society of Anesthesiologists class

The American Society of Anesthesiologists (ASA) status is an international measure of patient risk used by anaesthetists. The ASA grades and their characteristics are:

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 13, 14, 15 and 16 respectively.

Figure 13: Frequency of ASA grades by region (N=18,583)



Missing data: n=1,198 (6%).

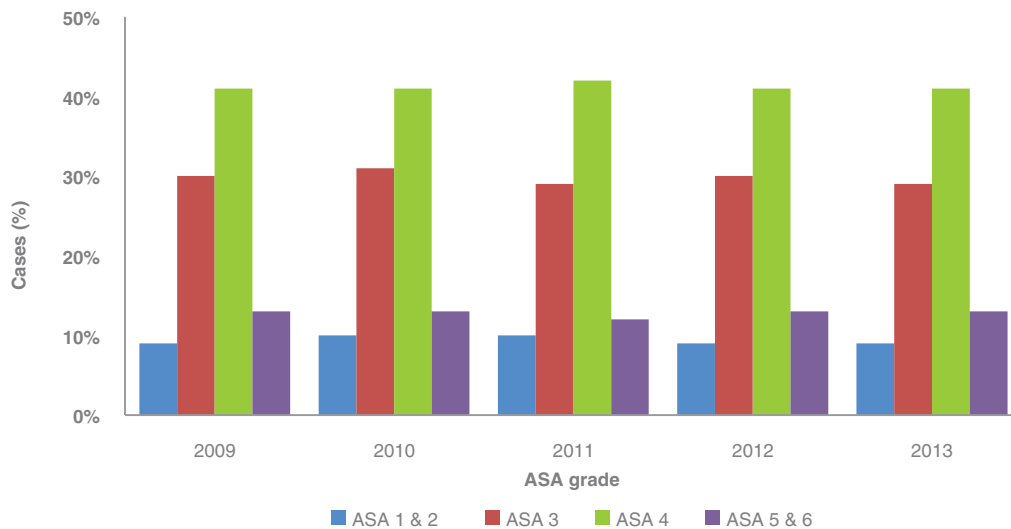
ASA: American Society of Anesthesiologists.

#### Comment

- The majority 84% of patients (15,604/18,583) 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 (6% overall) (data not shown).



Figure 14: Distribution of ASA grades by year (N=18,583)



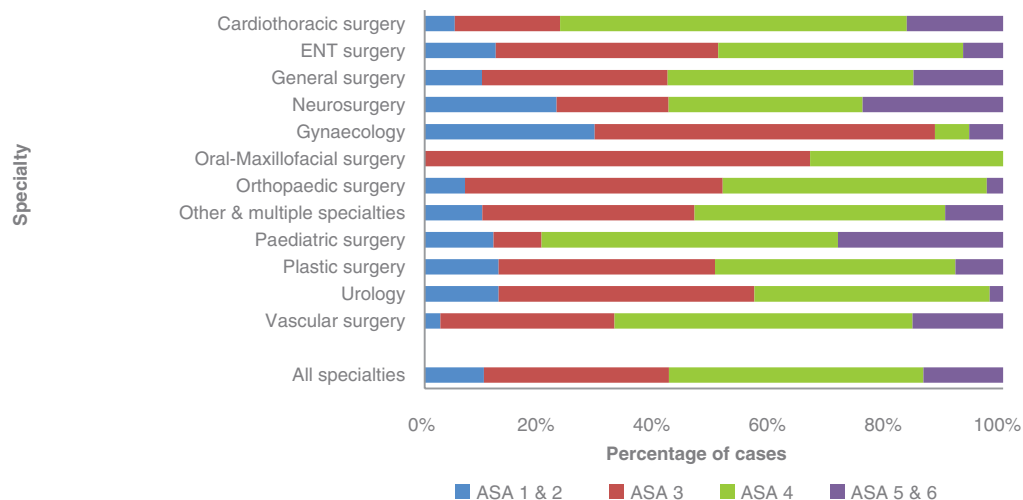
Missing data: n=1,198 (6%).

ASA: American Society of Anesthesiologists.

Comment

- There were no major differences across the five audit periods. The number of patients with an ASA grade greater than or equal to 3 was similar across the years, and was consistently above 84%.

Figure 15: Frequency of ASA grades by surgical specialty (N=18,583)



Missing data: n=1,198 (6%).

Other & multiple specialties: other specialties listed by the treating surgeon included anaesthesia, intensive care unit, medicine, oncology, thoracic medicine, ophthalmology and trauma. Includes cases in which multiple specialties were involved in a single case.

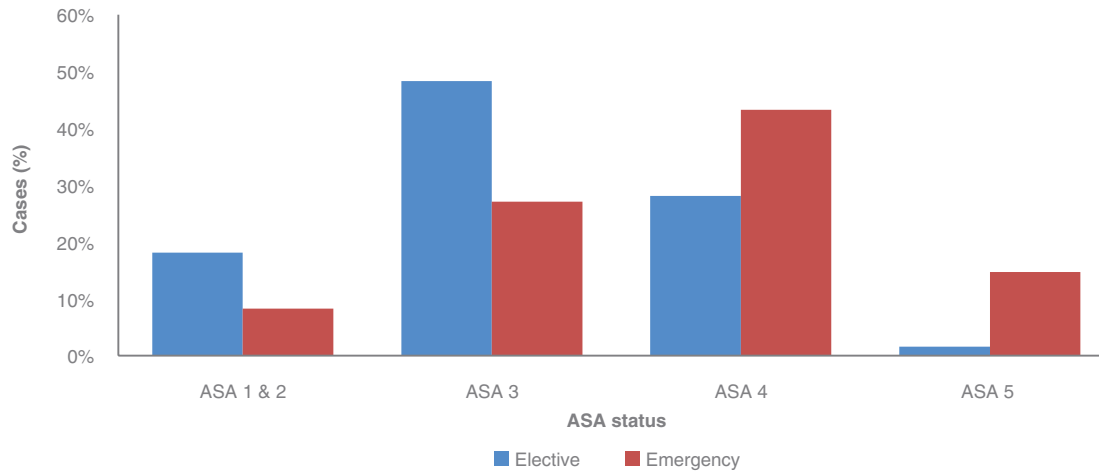
ASA: American Society of Anesthesiologists.

Comment

- Reflecting the casemix of the different specialties, there was some variation in ASA grades. The larger number of ASA 1 and 2 cases seen in Neurosurgery is a reflection of the population of young patients with head injuries, while in obstetrics and gynaecology this reflects the fact that the patients tend to be younger.
- Some distortion of the data is seen in low volume areas such as ophthalmology, oral-maxillofacial and obstetrics and gynaecology.



Figure 16: Frequency of ASA class by admission status (N=18,583)



Missing data: n=1,198 (6%).

ASA: American Society of Anesthesiologists.

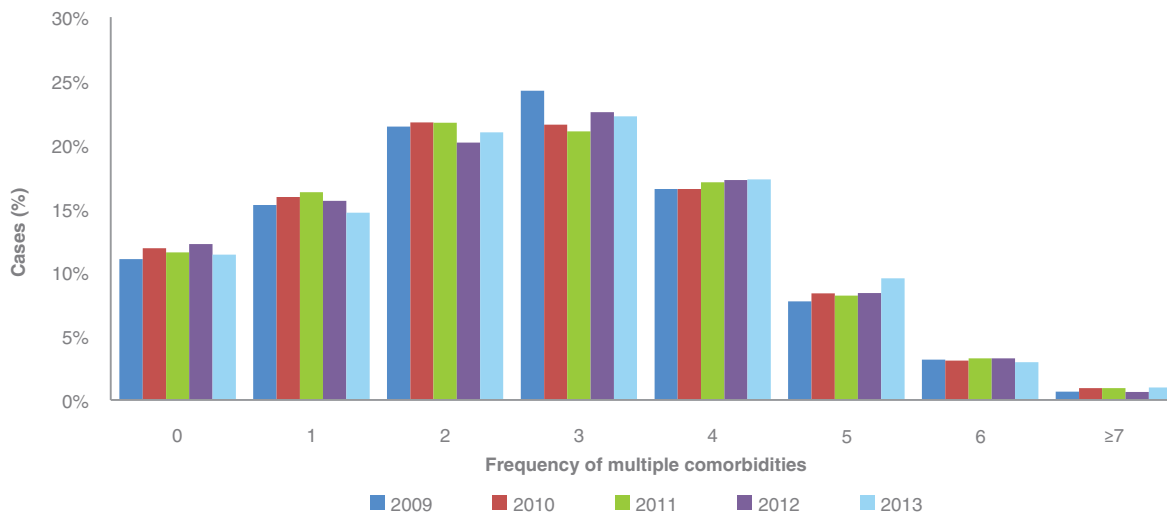
Comment

- The majority of emergency (78%) and elective (85%) patients were described as having an ASA score greater than or equal to 3.

### 3.3.2 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 patients is provided in Figure 17 across the audit periods.

Figure 17: Frequency of multiple comorbidities in individual patients across audit years (N=18,583)



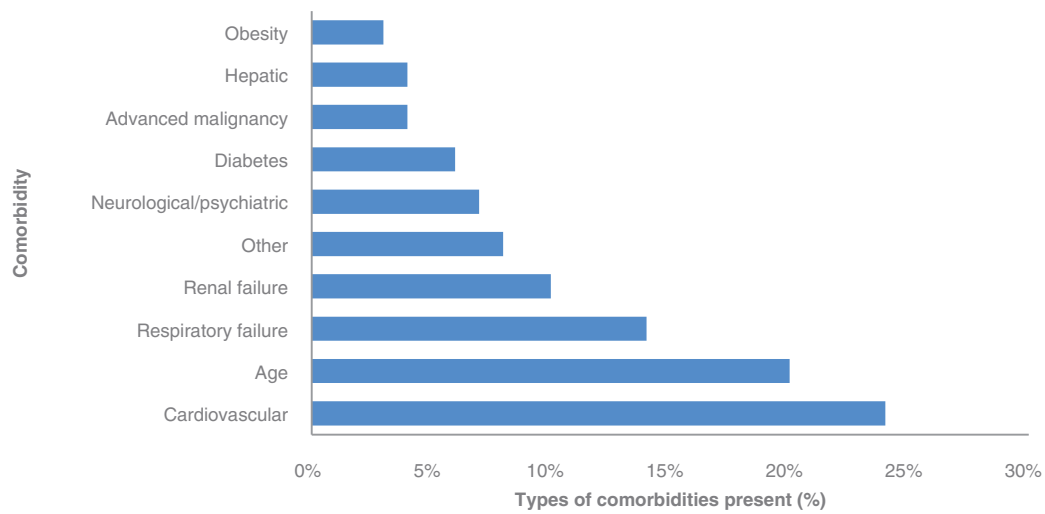
Missing data: n=847 (5%).

Comment

- One or more comorbidities were reported in 88% audited cases (16,421/18,583).
- Most patients 73% had at least two comorbidities (13,524/18,583), emphasising the higher risk profile of this group of patients.
- The pattern of comorbidities is consistent across the audit years.
- Information on the specific types of comorbidities is provided in Figure 18.



Figure 18: Frequency of specific comorbidities (N=48,182 comorbidities in 18,583 patients)



Missing data: n=847 (5%).

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

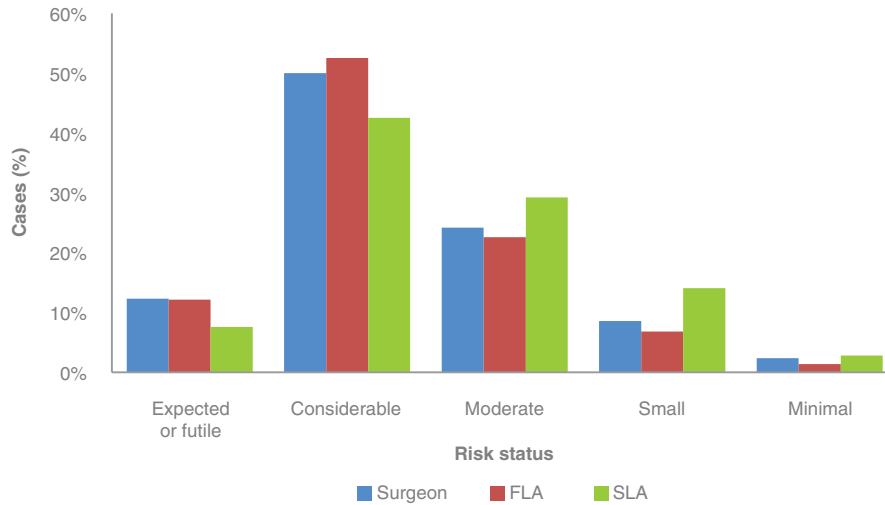
- The most common comorbidities (cardiovascular, age and respiratory failure) were similar in terms of incidence in both male and female patients (data not shown).
- There were no major differences in distribution of comorbidities found between the five years of the audited period (data not shown).
- There has been a small increase in cases where obesity has been rated as a slightly significant factor. There were 3% recorded cases (280/9,177) in 2009, rising to 4% cases (367/10,390) in 2012 (data not shown).



### 3.3.3 Surgeon perception of risk status

The treating surgeon and assessors record the perceived risk of death of the patient at the time of treatment (Figure 19).

Figure 19: Risk of death as perceived by the treating surgeon and assessors (N=18,583)



Missing data: n=1,069 (4%).

FLA: first-line assessor; SLA: second-line assessor.

#### Comment

- The perceived risk of death, as reported by surgeons, was considerable or expected in 62% of cases (8,592/13,794), and small or minimal in only 11% of cases (1,510/13,794). 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 first-line assessor and the second-line assessor in regard to the risk of death. The risk was perceived to be considerable or expected by the surgeon in 62% of cases (8,592/13,794); the first-line assessor in 65% of cases (8,906/13,778); and the second-line assessor in 50% of cases (978/1,952).

## 4. RISK MANAGEMENT STRATEGIES



### Key points

- Deep vein thromboembolism (DVT) prophylaxis use was recorded in 11,127/13,794 (81%) of cases in which patients underwent a surgical procedure. Across the regions DVT utilisation varied from 73% to 87% of cases.
- In only 3% of cases did assessors conclude that the DVT prophylaxis management was not appropriate.
- In the majority of instances those patients expected to benefit from critical care support did receive it. The review process suggested that 3% 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 and 7% 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 if it was, the type of prophylaxis used (see Figures 20 and 21). If not given, the reason it was withheld was requested and the assessors reviewed the appropriateness of these decisions.

Figure 20: DVT prophylaxis use during the audit period (N=11,127)



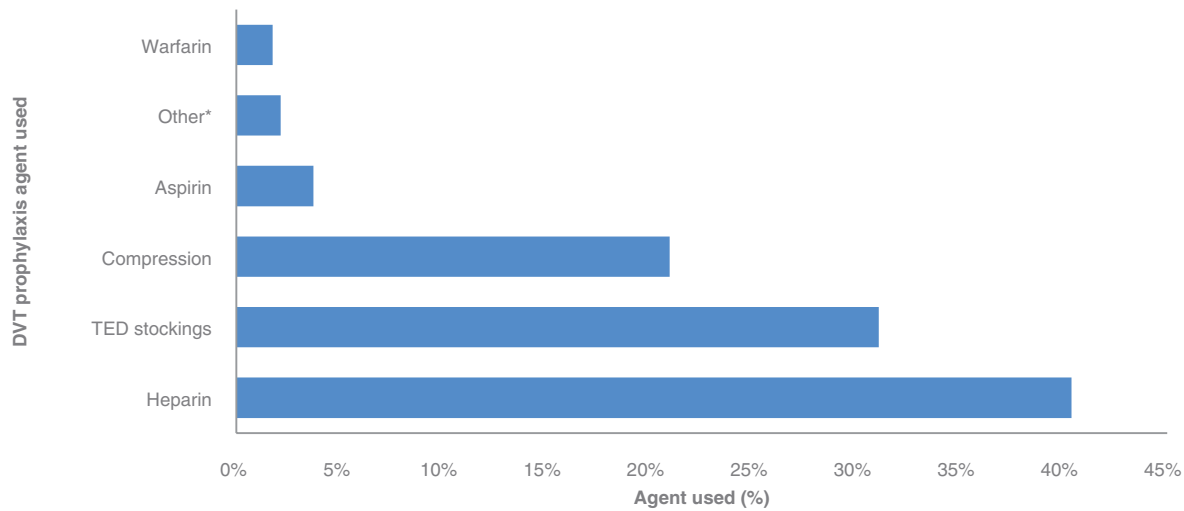
Missing data: n=406 (3%).

#### Comment

- DVT prophylaxis was used in 81% of cases (11,127/13,794). Usage has remained steady over the audit periods.



Figure 21: Type of DVT prophylaxis used (N=20,526 instances in 11,127 cases)



Missing data: n=406 (3%).

\* Clexane, Clopidogrel, Danaparoid, Enocaprin, Enoxaparin, early mobilisation, Fragmin, inferior vena cava filter, Lepirudin and Plavix.

TED: thromboembolic deterrent

Comment

- In the 11,127 patients who received prophylaxis, the most frequently agents used were Heparin (40%) and TED stockings (31%).

Table 4: Distribution of DVT prophylaxis use by region (N=20,526 instances in 11,127 patients)

DVT prophylaxis agents used	Region							
	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
Heparin	47%	35%	44%	41%	46%	43%	40%	37%
TED stockings	29%	33%	33%	28%	30%	27%	30%	31%
Compression	16%	23%	15%	24%	15%	20%	23%	27%
Aspirin	4%	5%	3%	4%	4%	3%	2%	2%
Other*	2%	2%	3%	2%	3%	4%	2%	1%
Warfarin	2%	2%	2%	1%	2%	3%	3%	1%

Missing data: n=406 (3%).

\* Clexane, Clopidogrel, Danaparoid, Enocaprin, Enoxaparin, early mobilisation, Fragmin, inferior vena cava filter, Lipirudin and Plavix.

TED: thromboembolic deterrent

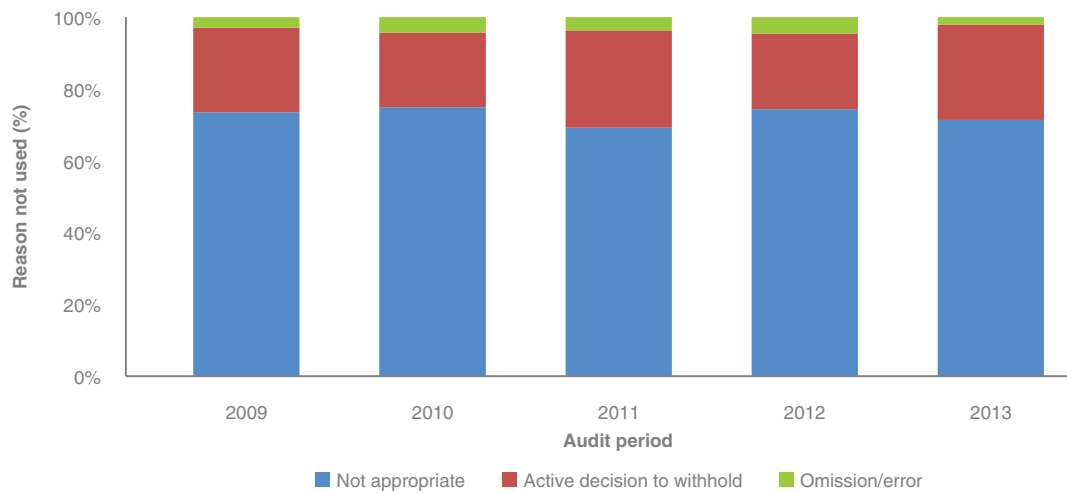
Comment

- 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. Compression and Heparin had the greatest proportionate difference.





Figure 22: Stated reasons for non-use of DVT prophylaxis (N=1,972)

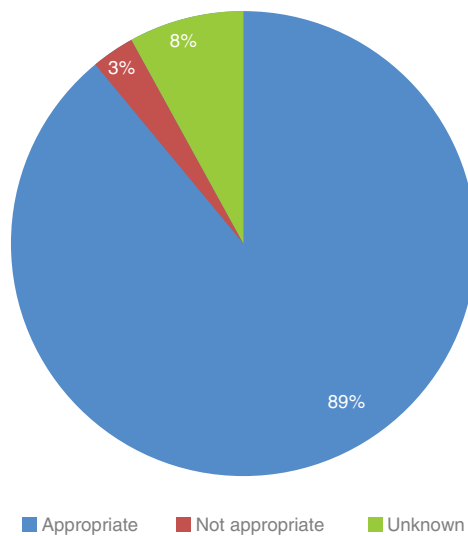


Missing data: n=289 (13%).

Comment

- Non-use of DVT prophylaxis was due to error or omission in only 4% of cases (71/1,972). In the majority of instances prophylaxis was withheld for clinical reasons.
- The assessors' perception of the appropriateness of DVT prophylaxis management is shown in Figure 23.

Figure 23: First and second-line assessor perception of appropriateness of DVT prophylaxis management (N= 15,730)



Missing data: n=1,170 (7%).

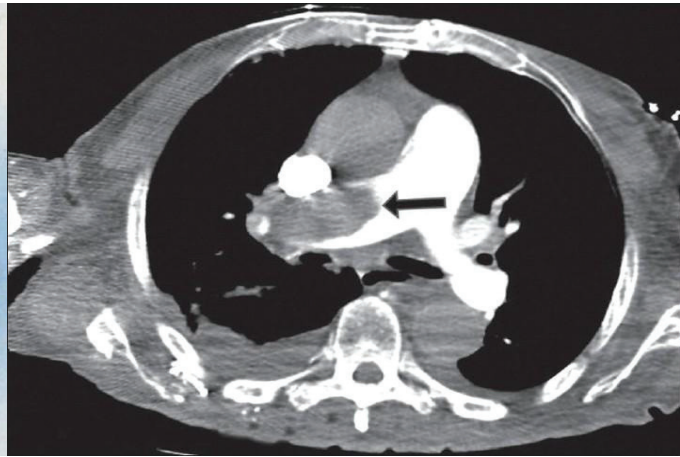
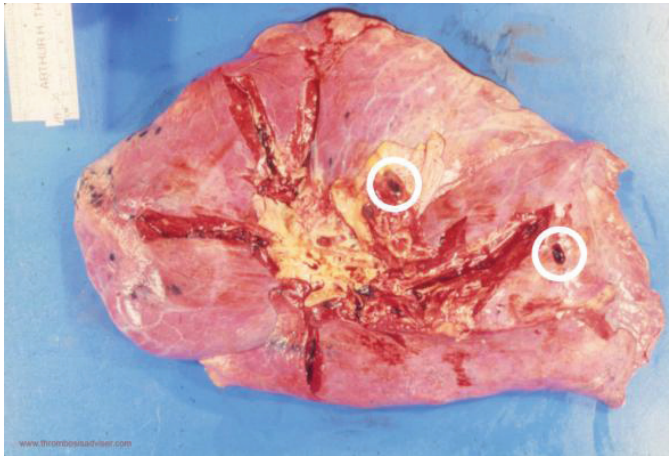
Comment

- Assessors concluded that DVT prophylaxis usage was not appropriate in 3% of cases (425) or unknown in 8% of cases (1,292/15,730) where the patient underwent a surgical procedure.



## Case Study #1

### DVT and Pulmonary Embolism



Whole lung in which pulmonary arteries are obstructed by fresh (red) thrombus (circles) and CT pulmonary angiogram showing a massive filling defect suggestive of pulmonary embolism represented by an arrow.

An elderly patient died from a fatal pulmonary embolus nearly two weeks after a radical cystectomy and right nephroureterectomy with ileal conduit formation. There was always at least a moderate risk of perioperative death as the patient had pre-existing comorbidities of ischaemic heart disease and renal impairment (American Society of Anaesthesiologists Level 3) as well as being of advanced age.

The patient was at high risk of postoperative deep vein thrombosis/ pulmonary embolism and may have received more aggressive prophylaxis. A month prior to the operation the patient had undergone a transurethral bladder tumour resection and insertion of ureteric stents. This procedure was covered by subcutaneous (s/c) heparin for around three days. The notes provided are brief but it would seem the patient had difficulty walking after that operation (unstated reasons) and did not leave hospital between that operation and the cystectomy. It is unclear as to whether the patient received ongoing heparin during that time.

On the day before the cystectomy the resident medical officer's admission notes state the patient had a past history of DVT and PE. This was not recorded at the pre-admission clinic or by the consultant anaesthetist at the same clinic, nor was it entered on the surgeon's admission/consent form.

The patient received an average dose of s/c heparin the night before the cystectomy, but no heparin at all on the day of surgery. Calf-compressions were used during the operation and for the first 24 hours. Thereafter, the patient wore thromboembolism deterrent stockings and received a further average dose of s/c heparin twice daily until death. Postoperatively, the patient had a prolonged ileus requiring total parenteral nutrition support. The physiotherapists clearly had considerable problems mobilising the patient, partly due to the clinical condition of the patient.

#### Clinical Lessons

This patient was at considerable risk of DVT/PE, yet, for unstated reasons, did not receive heparin on the day of surgery. Consideration could have been given to more aggressive prophylaxis both pre- and postoperatively e.g. Clexane 40 mg s/c daily or even a higher dose.

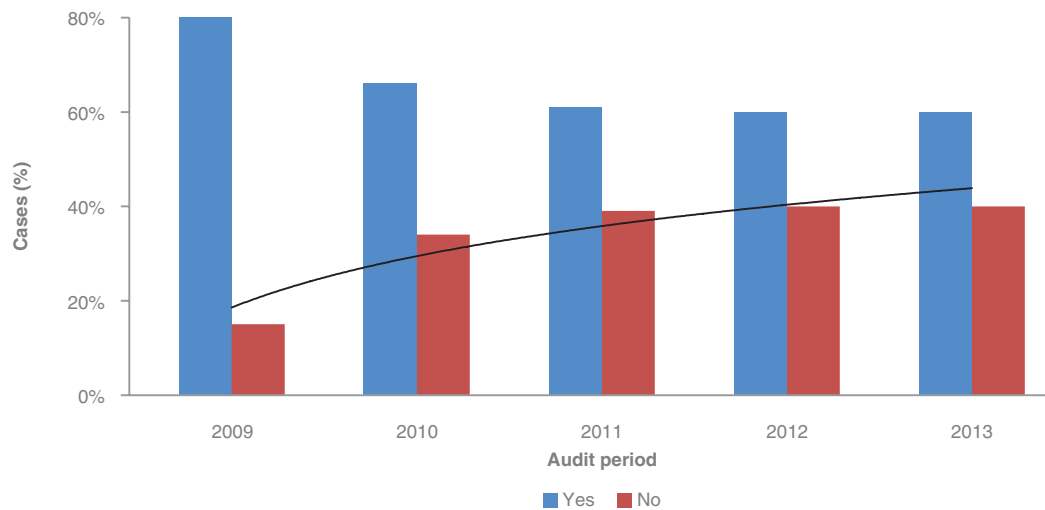


## 4.1 Provision of critical care support to patients

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 24). The first- and second-line assessors review the appropriateness of use of critical care support. It is recognised that this is a subjective assessment of needs and potential benefit.

The SCF was revised mid-2013 to collect data on 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 questions, thus ensuring that this area of care can be appropriately analysed.

Figure 24: Provision of critical care support during audit period (N= 18,583)



Missing data: n=7,035 (38%).

The trend line is a visual representation of a "trend" over a period of time and is the average based on the highs and lows. In this case there is a growing requirement for CCU support over the audit period.

### Comment

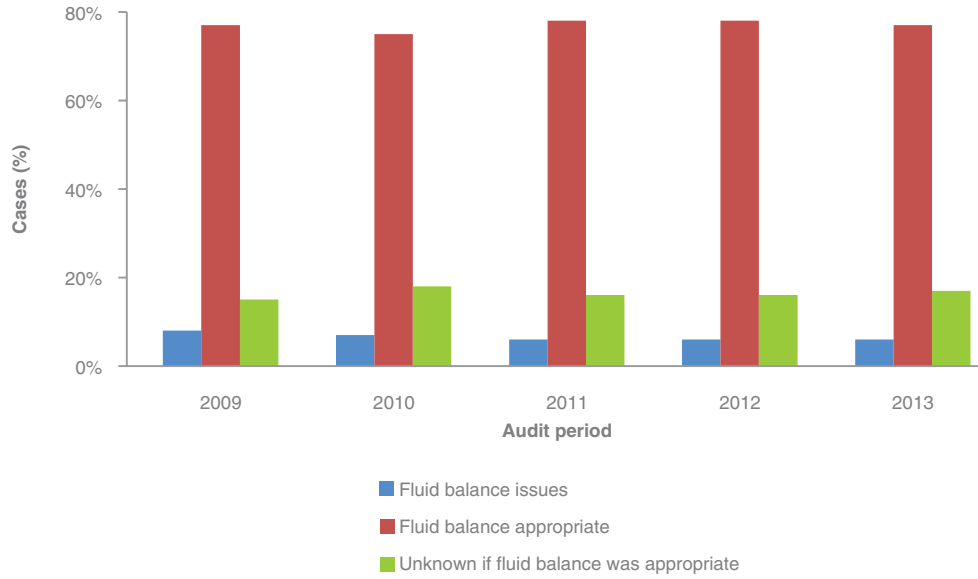
- In 64% of audited cases (11,883/18,583), patients received critical care support over the audit period.
- Between 2011-2013, the proportion of cases in which critical care support was provided has remained stable. It should be noted that patients not receiving critical care does not necessarily indicate a lack of critical care facilities.
- The assessors perceived that 3% of patients who did not receive critical care support might have benefited from it (data not shown).
- Over the audit period, there has been a high proportion of missing data (38%) regarding whether the provision of critical care support was adequate or not. As a result, ANZASM has revised the question in 2010 to improve the reporting for this question. It is hoped that there will be a downward trend in the amount of missing data to allow for more meaningful analysis.



## 4.2 Fluid management

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

Figure 25: Appropriateness of fluid management (N= 18,583)



Missing data: 1,737 (9%).

### Comment

- In 6% of cases (1,106/18,583) assessors felt there was an issue with fluid balance. In a further 15% of cases (2,769), assessors indicated the evidence provided was inadequate to reach a conclusion.
- The percentage of missing data (9%) in this section prevents further identification of trends and hinders the analysis of the data.

# 5. CAUSE OF DEATH

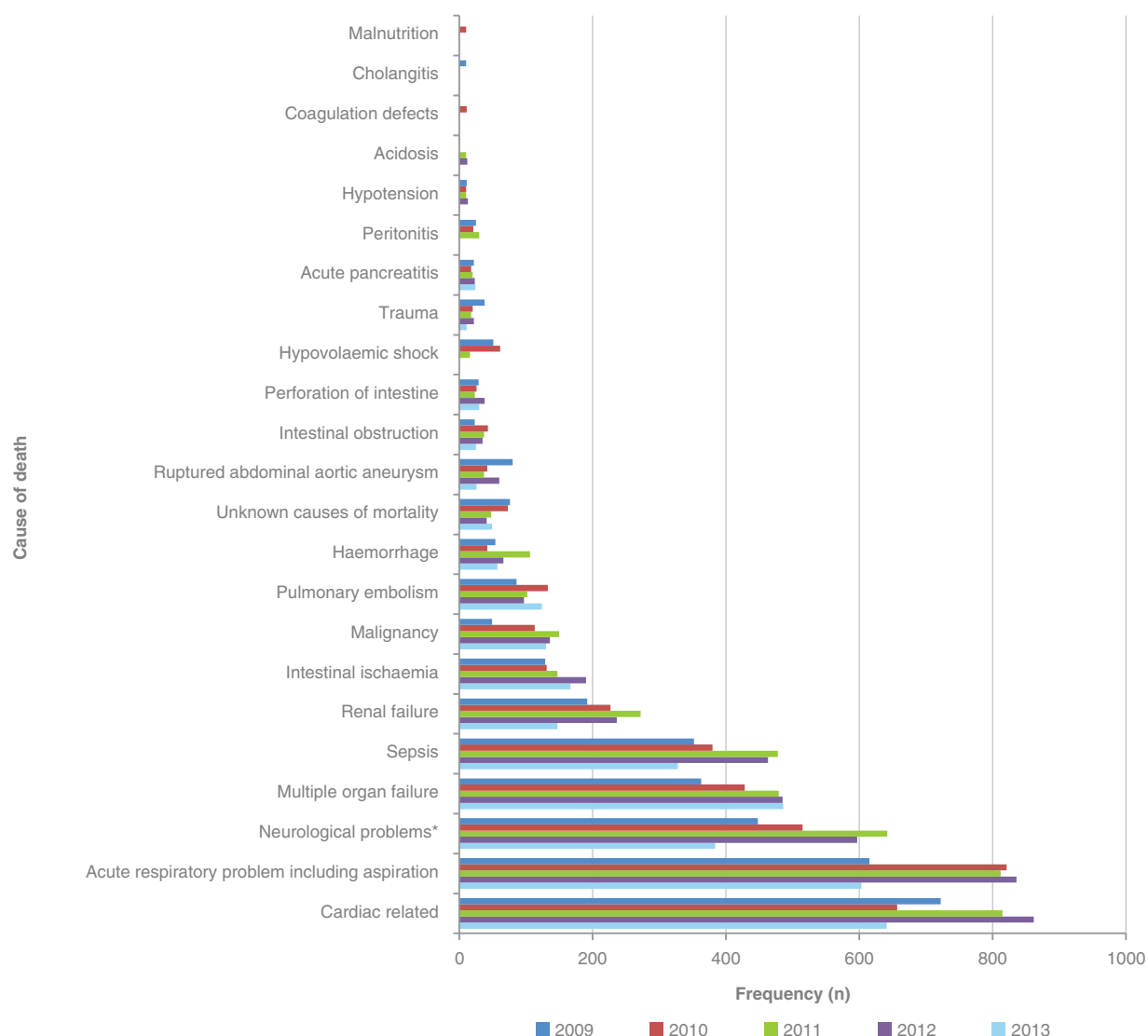


## 5.1 Frequency of causes of death reported in audited cases

### Key points

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

Figure 26: Causes of death where  $n \geq 10$  (N=22,570 causes of death recorded for 18,583 patients)



Missing data: n=453 (2%)

\* Neurological problems include: diffuse brain injury, head injury, intracerebral haemorrhage, subarachnoid haemorrhage and subdural haematoma.

Not all cases have gone through the full audit process and are still under review. Their outcomes are not available for this report and will be featured in the next report.

### Comment

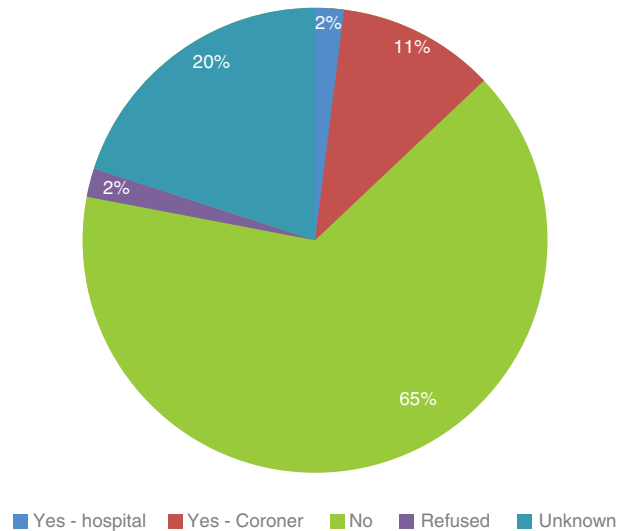
- There has been an increase in cases related to malignancy, from 1% of incidents in 2009 (49/3,375) to 3% in 2012 (136/4,212).



## 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 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 27 and Table 5.

Figure 27: Overview of postmortems performed (N=18,583)



Missing data: n=602 (3%) cases

Table 5: Overview of postmortems performed by region (N=18,583)

Postmortem status	Region							
	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
No	58%	69%	73%	66%	61%	40%	67%	66%
Unknown	29%	18%	15%	22%	20%	26%	10%	20%
Yes - coroner	12%	10%	9%	7%	15%	33%	20%	10%
Yes - hospital	<1%	2%	1%	3%	1%	<1%	1%	2%
Refused	<1%	1%	2%	2%	3%	<1%	2%	2%

Missing data: n=602 (3%) cases

### Comment

- A coronial postmortem was reported to have been performed in only 11% of audited cases (2,031/18,583). In some of the regions the numbers were low, and this could impact the interpretation of the data.
- In 87% of cases (16,208/18,583) 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

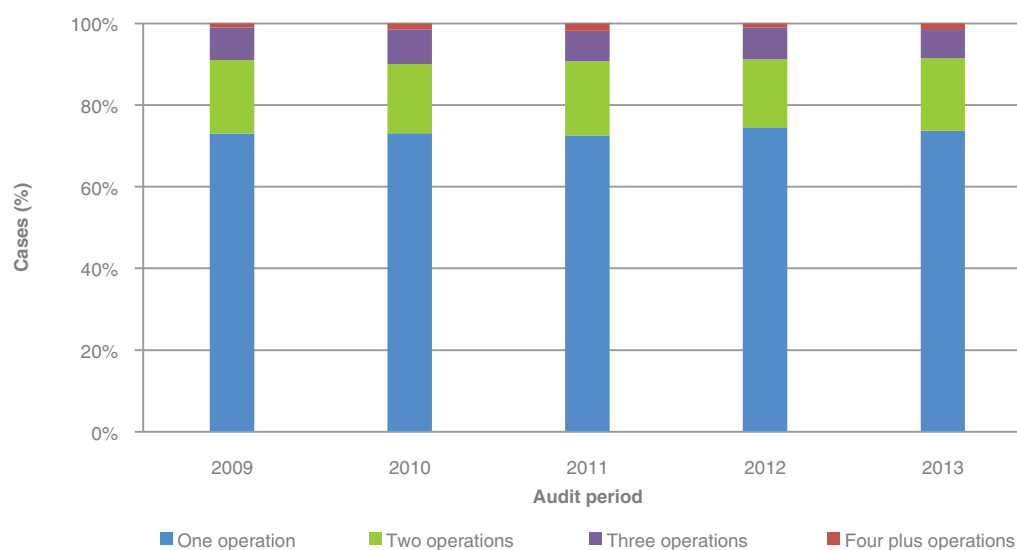


### Key points

- In total, 74% of patients (13,794/18,583) had a surgical procedure.
- More than one visit to the operating room was required by 27% of patients (3,664/13,794) during their hospital stay.
- A consultant surgeon made the decision to operate in 87% of instances (16,700/19,149) and performed 61% of the operations (11,596/19,149). Consultant surgeons performance of surgery is considered appropriate when the risk profile of this group of patients is considered.
- The rate of subsequent (unplanned) returns to theatre was 15%, with some patients requiring multiple episodes of surgery.
- The most common postoperative complications recorded were postoperative bleeding, procedure-related sepsis and tissue ischaemia.

### 6.1 Operative rate

Figure 28: Frequency of multiple operations on individual patients (N=13,794)



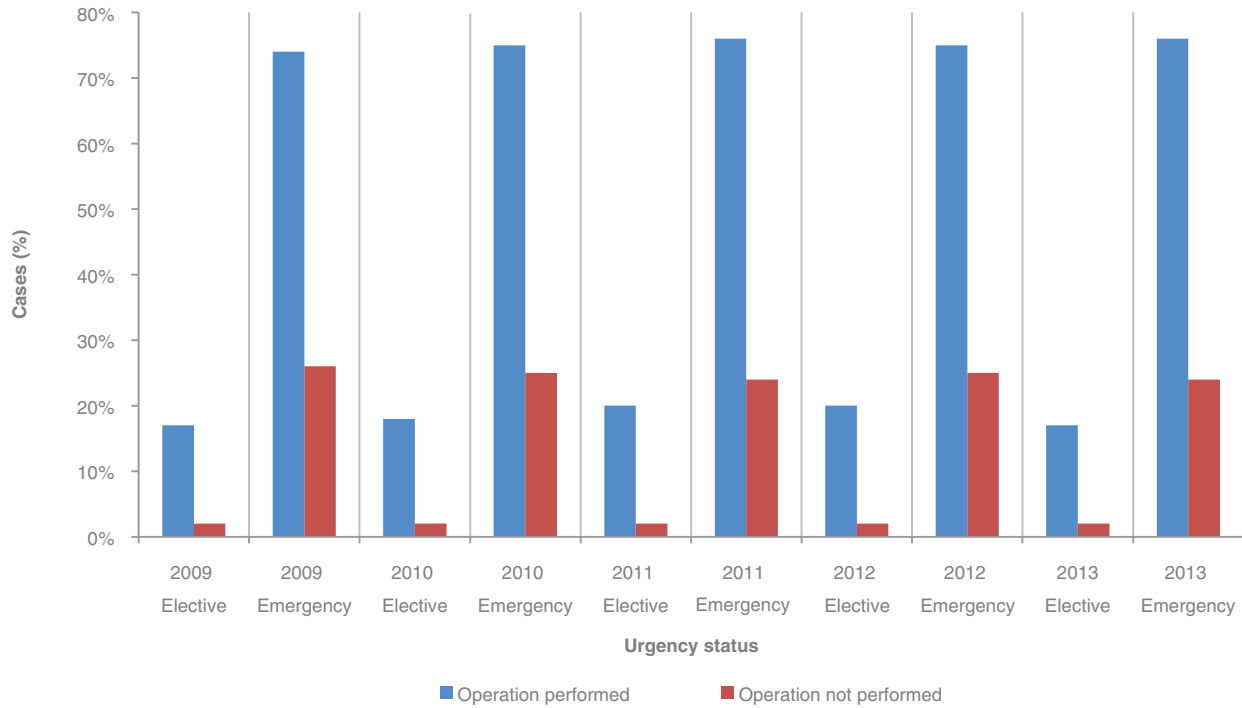
Missing data: n=785 (4%) cases

#### Comment

- 74% of audited patients (13,794/18,583) underwent an episode of surgery either during their last admission or within 30 days prior to death.
- There were 22% patients who had no surgery (4,004/18,583) during their final inpatient admission.
- A total of 20,736 operative episodes were undertaken on the 13,794 patients who had surgery; this reflects the fact that an individual patient can have more than one episode of surgery during their admission.
- Of those who had surgery, 73% of patients had just one operation (10,088/ 13,794).
- There were 27% of patients (3,664/13,794) who had more than one surgical episode.
- There has been relatively little change in the frequency of multiple operations over the 2009–2013 audit period.



Figure 29: Operative and non-operative cases by admission status (N=13,794 patients)



Missing data: n=785 (4%) cases.

#### Comment

- Deaths where no operation was performed occurred in 8% of elective admissions (206) and in 25% of emergency admissions (3,740) over the audit period (data not shown). The decision not to operate was generally an active decision to palliate an irretrievable situation.

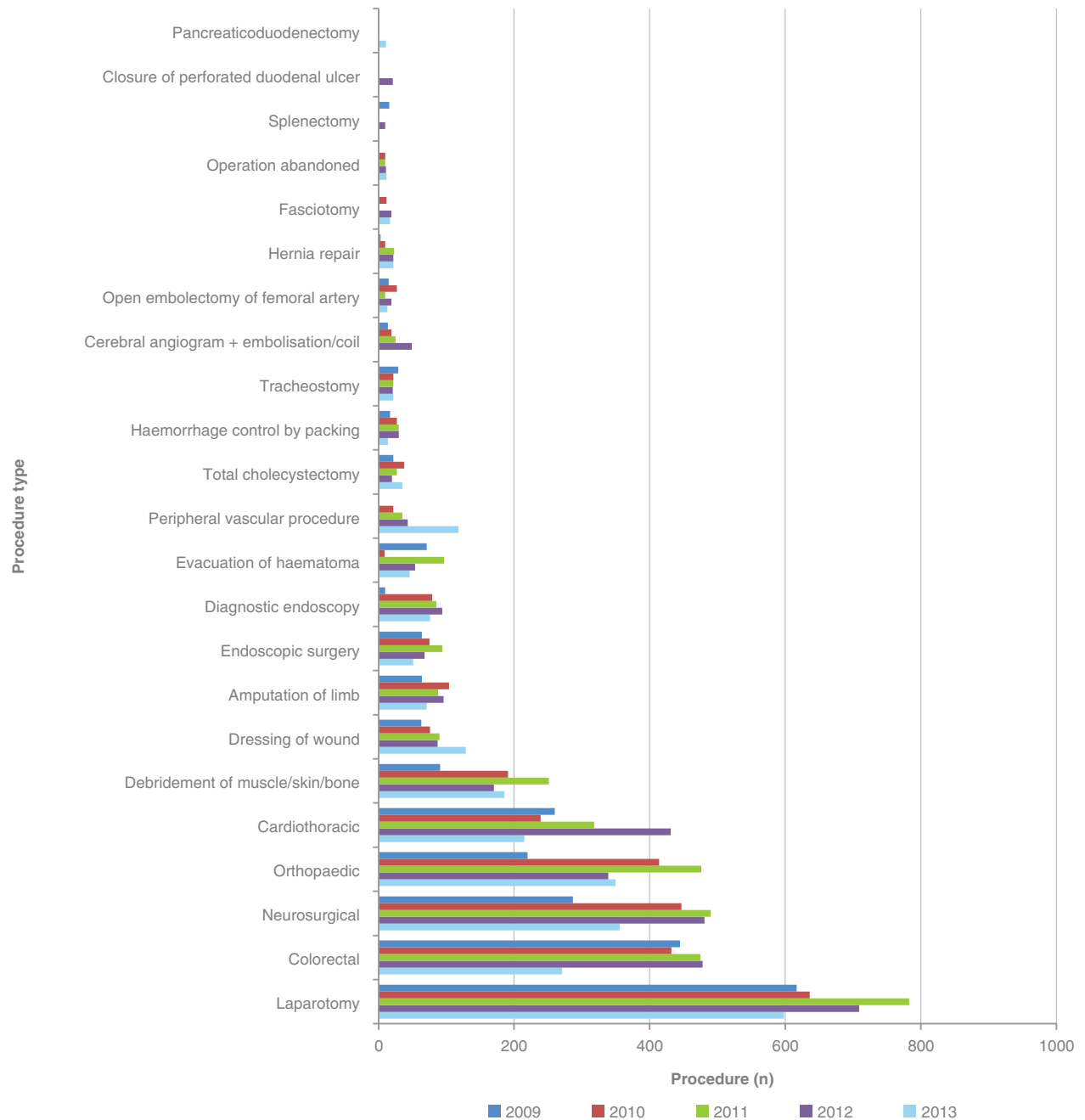




## 6.2 Frequency of operative procedures

The frequency of operative procedures in patients is shown in Figure 30.

Figure 30: Types of procedure, where the number of procedures >10 (N= 20,736 procedures in 13,794 patients)



Missing data: n=92 cases (1%).

Neurosurgical procedures include: clipping of aneurysm of cerebral artery, craniotomy (evacuation of non-trauma injuries, tumour resection and excision or drainage of abscess) and posterior fossa craniotomy for infarct. The laparotomy group includes all abdominal procedures not specified in other sections (e.g. colorectal procedures).

Not all cases have gone through the full audit process and are still under review. Their outcomes are not available for this report and will be featured in the next report.

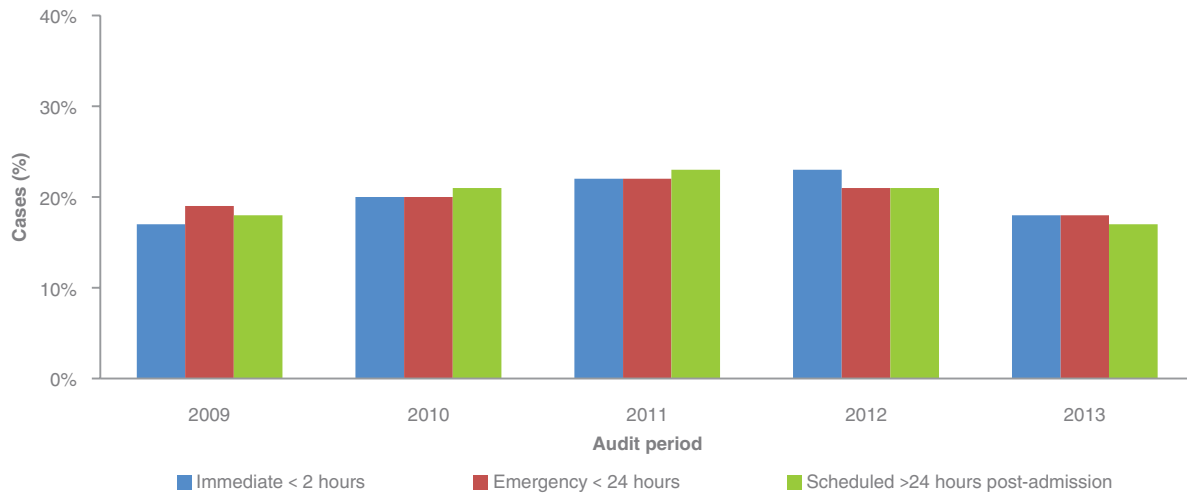
### Comment

- A patient can undergo multiple procedures during the same admission and during the same surgical episode.



### 6.3 Timing of emergency episodes

Figure 31: Timing of emergency surgical episodes (N=14,384)



Missing data: n=876 (5%).

#### Comment

- The timing and urgency of operations has been relatively consistent over the audit period.
- The urgency (time criticality) of a patient's condition predicts the timing of any surgery.
- Of the 59% of audited series (8,490/14,384) were classified as emergency surgical episodes.
- Overall, 35% of emergency admissions (5,018/14,543) to a surgical unit went to surgery within 24 hours of admission. The scheduling problems associated with managing urgent cases are well recognised.
- The majority of emergency surgery was performed in the public sector (data not shown).

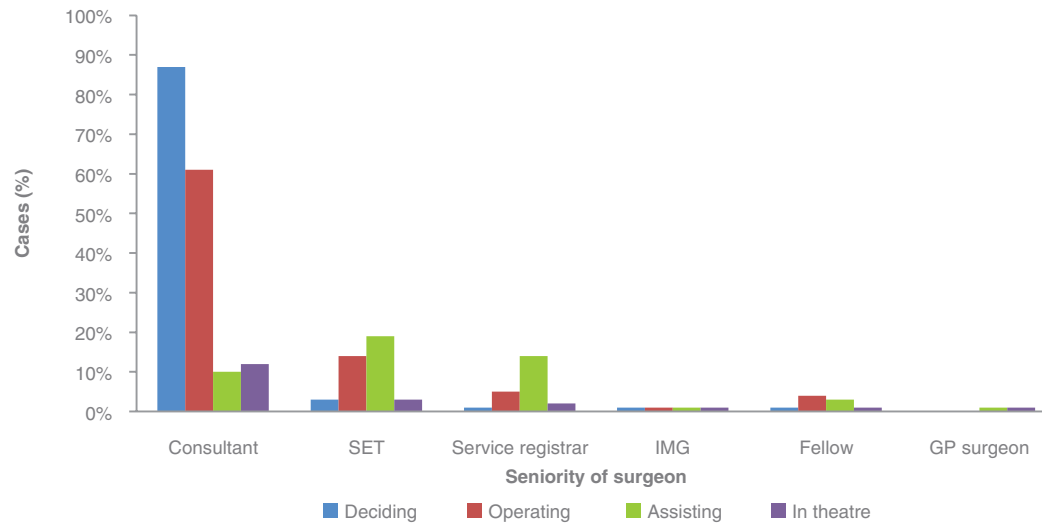
According to a 2008 report on the status of Australian public hospitals, emergency surgery occurs in the most urgent or critical cases and generally needs to be performed within 24 hours. In 2008–09, over 262,000 emergency surgeries were performed in Australia, with the majority carried out in public hospitals.<sup>2</sup> This 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 is asked to record the seniority of the surgeon who made the clinical decision to operate and who performed the surgery (see Figure 32).

Figure 32: Seniority of the surgeon making the decision to operate and performing the surgery (N=20,736 operations in 13,794 patients)



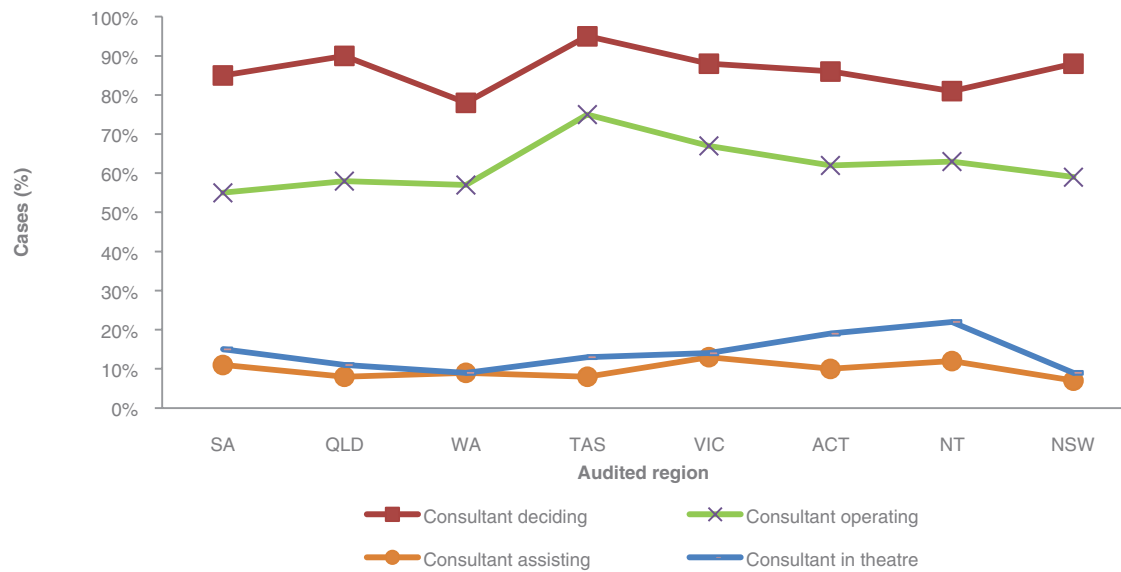
Missing data: n=39 (<1%). IMG - International Medical Graduate, SET – Surgical Education and Training, GP – General Practitioner

#### Comment

- The data in Figure 32 refers to the full audit period (2009 to 2013). Over the audit period there has been little change in the proportion of surgical episodes in which consultant surgeons made the decision to operate and performed the operation (data not shown).
- The input from consultant surgeons was high. In 87% of cases they made the decision to operate and in 61% of cases they performed the operation.
- For each episode there may have been more than one grade of surgeon deciding, operating, assisting or in theatre.



Figure 33: Consultant involvement by region performing surgery (N=19,149 operations in 13,794 patients)



Missing data: n=39 (<1%).

Comment

- There was some variation across regions in terms of consultant involvement in surgery. These differences reflect local approaches to surgical training and staffing levels.

### 6.4 Unplanned return to theatre

The treating surgeon is asked to indicate whether there was an unplanned return to the operating theatre following the initial operative procedure (see Table 6).

Table 6: Patients with an unplanned return to theatre (N=13,794)

Return to theatre status	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)
No return to theatre	84%	84%	84%	84%	85%
Return to theatre	15%	15%	15%	15%	14%
Don't know	<1%	1%	1%	<1%	1%

Missing data: n=673 (5%).

Comment

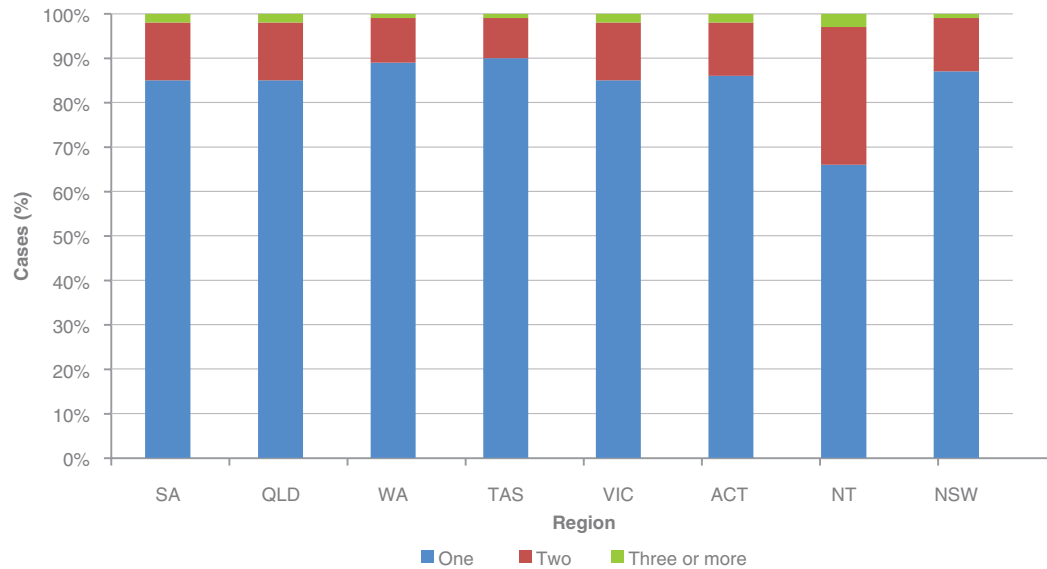
- Patients who underwent a surgical procedure had an unplanned return to theatre in 15% of the audited cases (2,008/13,794).
- The proportion of patients requiring a return to theatre was relatively unchanged during the audit periods.



## 6.5 Postoperative complications

The treating surgeon has to record any complications that occurred following a surgical procedure (Figure 34).

Figure 34: Patients developing postoperative complications (N=4,436 patients with one or more complication in 13,794 patients)



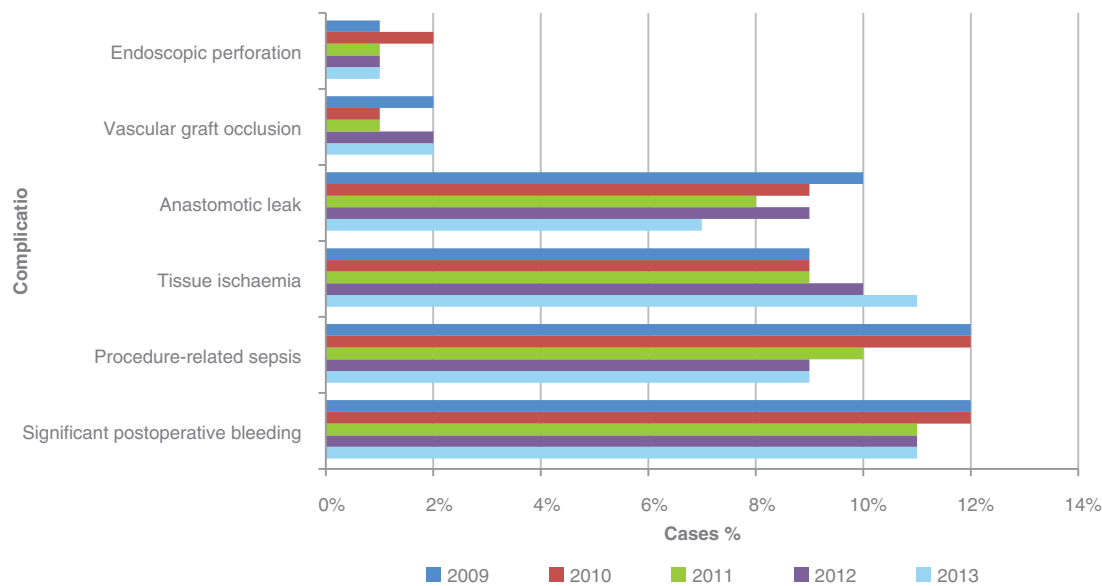
Missing data: n=365 (3%).

### Comment

- Postoperative complications were reported in 34% of the audited cases (4,635/13,794) who underwent a surgical procedure.
- The significance of these complications in relation to the eventual outcome was unknown. Significance varies from minor (no effect on outcome) to major (leading to death).



Figure 35: Distribution of types of postoperative complications, where  $\geq 10$  (N=5,178)



Comment

- Other complications were identified including 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.
- 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 2013 (e.g. procedure-related sepsis and anastomotic leaks).

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. According to the surgeons’ assessments as to whether anaesthetic problems played a role in the death only 7% of cases (1,009/13,794) were thought to have an anaesthetic component to the death.

- Anaesthesia was suggested as a significant factor in the outcome of 1% of patients (200/13,794) who had a surgical procedure. However, in 6% of cases (809/13,794), 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 2013 (data not shown).
- Cases where anaesthesia appeared to play a major role are referred to the appropriate regional Anaesthetic Death Review Committee, where available. Often these cases have already been detected by the anaesthetic group.

6.7 Operative procedure abandoned

The treating surgeon is asked to record if they abandoned any surgical procedure. 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 5% of operations (956/19,110). The proportion of abandoned operations was largely unchanged between 2009 and 2013.

# 7. PATIENT TRANSFER ISSUES



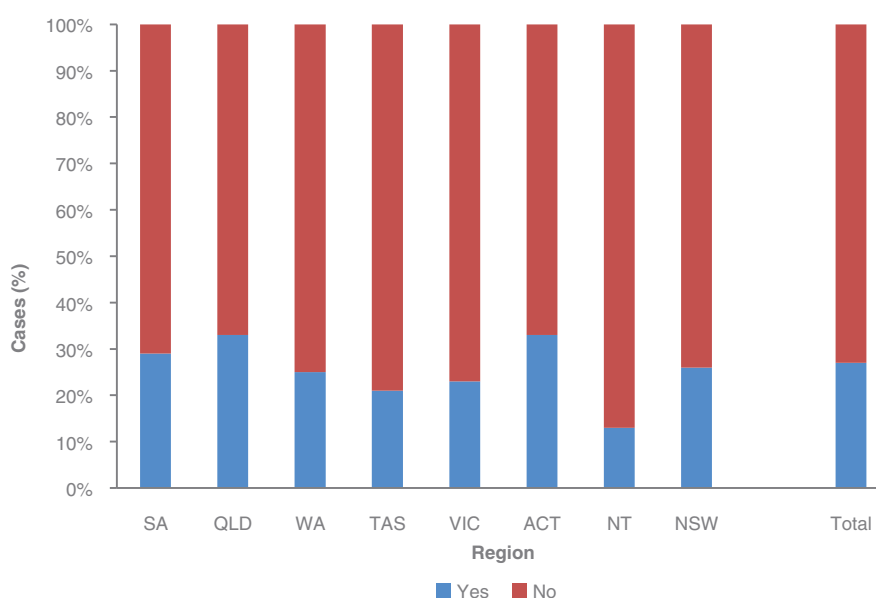
## Key points

- A transfer between hospitals was required in 27% audited cases (3,613/13,458).
- Issues related to transfer were raised by the treating surgeons in 11% of cases (396/3,613) in which a transfer took place.
- The most frequent issues were transfer delay (41%), inappropriateness of transfer (22%) and insufficient clinical documentation (17%).

## 7.1 Frequency of need for transfer

The audit process examines transfers between hospitals. Transfer typically occurs because of the need for a higher level of care or specific expertise. See Figure 36 for a regional breakdown of the percentage of cases transferred.

Figure 36: Frequency of need for transfer to another hospital, by region (N=13,794)



Missing data: n=336 (2%).

### Comment

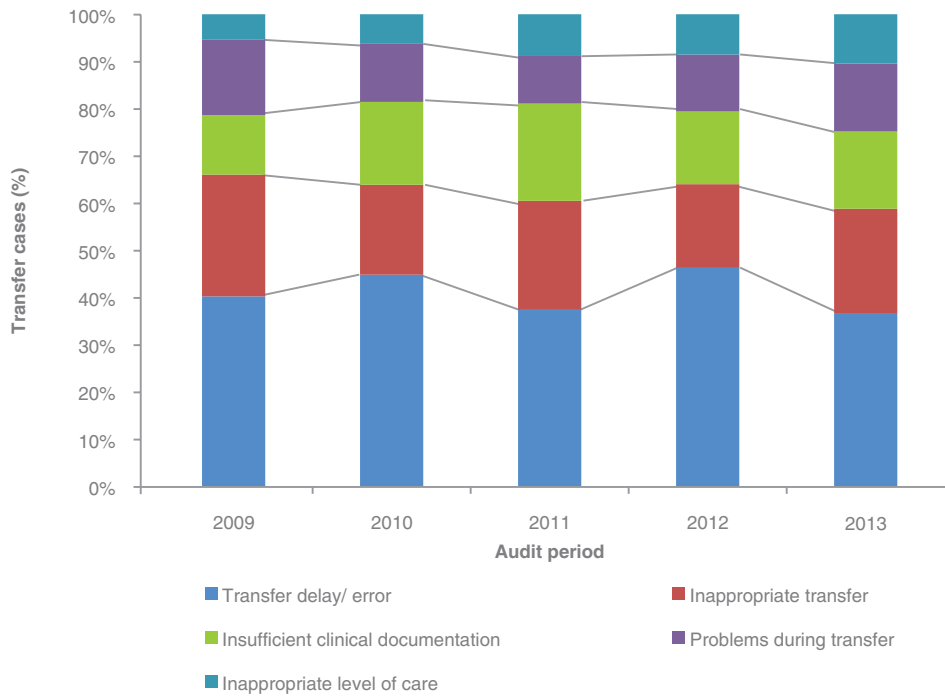
- The need for transfer varied among regions and probably reflects the geographical distribution of available healthcare facilities, particularly in Queensland, the Australian Capital Territory and South Australia.
- Over the reporting period 27% of audited cases (3,613/13,458) required transfer between hospitals.



## 7.2 Issues associated with patient transfer

The treating surgeon was asked to record any issues associated with the transfer of a patient between hospitals (see Figure 37).

Figure 37: Type of issues associated with patient transfer (N=966 issues in 3,613 transferred patients)



Missing data: n=190 (5%).

### Comment

- Issues related to transfer were raised by the treating surgeon in 11% of cases (396/3,613) involving a patient transfer. Under the audit's current legal framework, specific case information cannot be provided to the ambulance service or referring hospital.
- Over the whole audit period, the most frequent issues raised were transfer delay (41%), inappropriateness of transfer (22%) and insufficient clinical documentation (17%).
- Insufficient clinical documentation is a concern that could be readily improved. Good communication ensures that all clinicians involved have full knowledge of the patient's health status.
- According to a peer-reviewed article 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 reduce time to appropriate surgery without inappropriate delays. In the opinion of the surgeons, 40% of delayed patients had poor pre-operative management.<sup>3</sup>





## Case Study #2

### Deterioration While Awaiting Transfer



A patient in their fifties was admitted to hospital A, with a history of lower abdominal pain and tenderness evident several weeks prior to admission. There was also a history of diabetes, obesity and coronary artery disease. Examination revealed mild abdominal tenderness. An abdominal x-ray showed dilated large bowel, with fluid levels in the small bowel. Sub-acute large bowel obstruction was diagnosed. The patient was treated appropriately with intravenous fluids, subcutaneous heparin and transferred to the high-dependency unit (HDU). A CT scan suggested that the obstruction was in the sigmoid colon, possibly cancer. Transfer to hospital B was ordered.

Transfer did not occur until the morning of the following day. The patient had deteriorated overnight with hypotension, tachycardia, oliguria and large volumes of nasogastric aspirate. The consultant at hospital A was unaware of the delay in transfer and of the patient's deterioration. On arrival at hospital B, the patient deteriorated further. A cardiac arrest occurred and the patient was unable to be resuscitated. The autopsy revealed myocardial ischaemia and large bowel obstruction, due to a diverticular stricture.

#### Clinical Lessons

Fluid management was a contributing factor to the patient's deterioration. The patient had been placed on maintenance fluids and the pathological losses had not been replaced. When recognised, appropriate measures were taken, including a fluid bolus, transfer to HDU and central line insertion.

The consultant at hospital A was not informed of the delay or the patient's deterioration. Notification of senior medical staff is mandatory when such deterioration is identified. When inter-hospital transfer for a sick patient is planned, management must continue until the time the ambulance arrives.



## 8. INFECTION AND TRAUMA

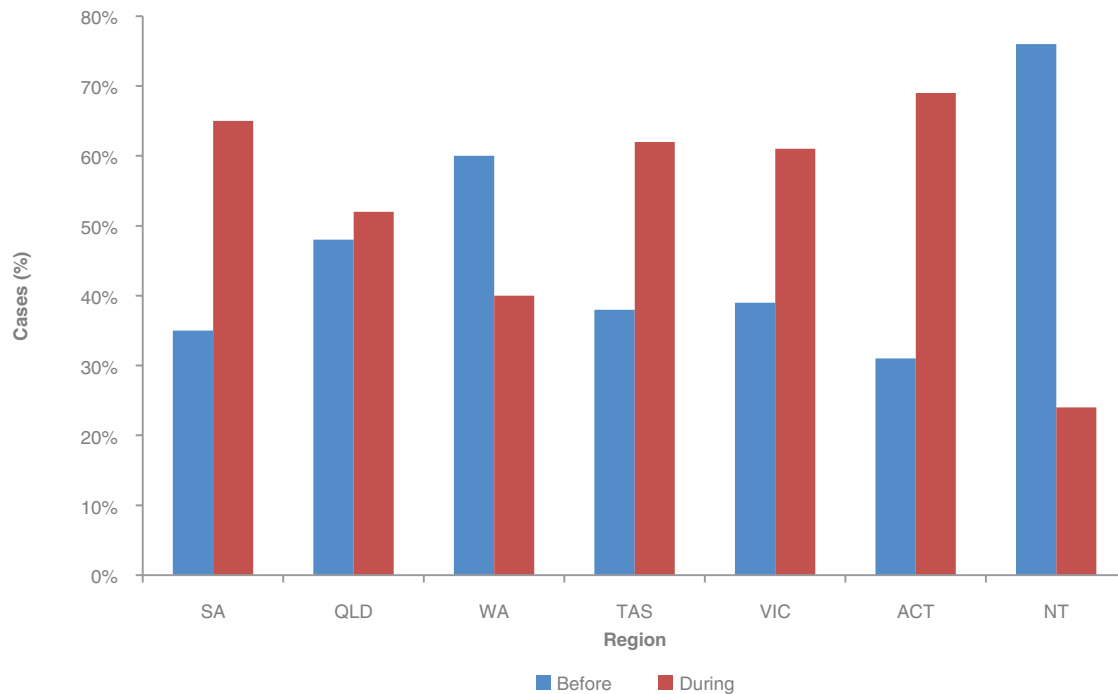
### Key points

- ANZASM started collecting data on infection and trauma cases in 2012. All regions except New South Wales collect data on infection cases occurring in patients who require surgery. Data on trauma cases is currently collected in four regions: Queensland, Western Australia, Victoria and the Northern Territory.
- Between 2012 and 2013, 22% of the audited cases (1,589/7,233) had a clinically significant infection.
- Of the 908 traumatic events identified, 82% (745) were caused by falls, of which 12% (108) were caused by traffic accidents. The remaining 6% (55) events were associated with domestic, public or self-inflicted violence (data not shown).

### 8.1 Infections

In 2012 ANZASM started collecting data on infection cases occurring in patients who required surgery. ANZASM is keen to monitor trends in infection, to ensure strategies are implemented to prevent and minimise infections contracted both intraoperatively and postoperatively. All regions except New South Wales collect this data (see Figure 38). Western Australia started collecting this data in July 2013.

Figure 38: Infections acquired before or during the admission by region (N=1,589)



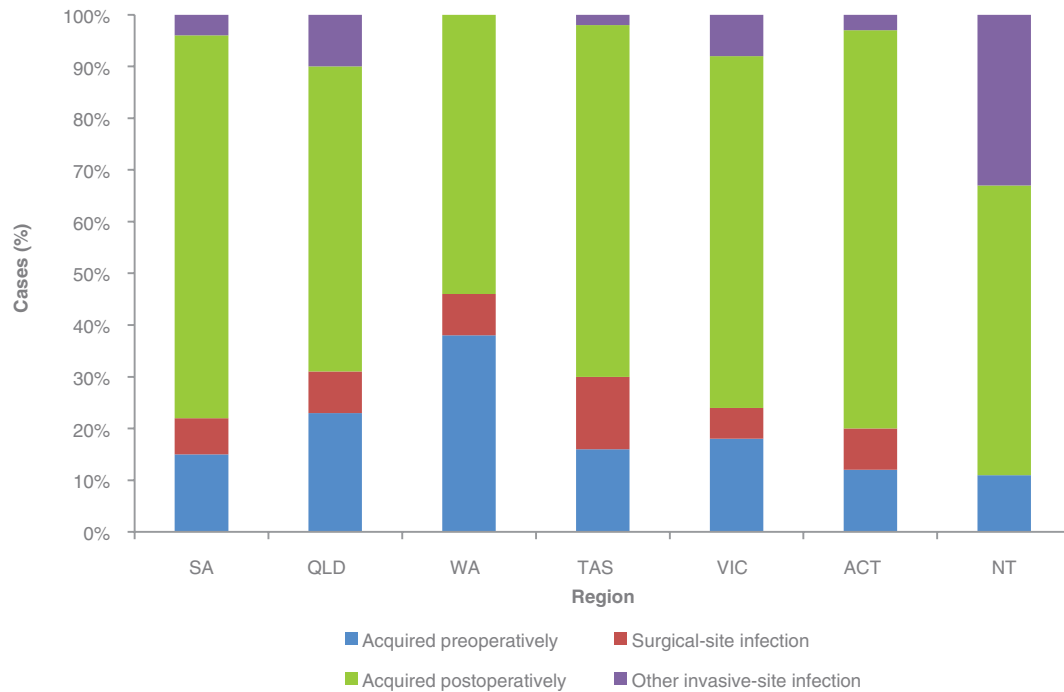
Missing data n=65 (4%).

#### Comment

- Of the 7,233 audited cases reported between 2012 and 2013, a clinically significant infection was attributed to 22% of cases (1,589) (data not shown).
- Infections occurred during the patients' admission in 55% of cases (881/1,589).
- The different distribution of infection within the Northern Territory may be as a result of late presentations from patients living in remote communities.



Figure 39: Regional breakdown of infections acquired during the admission (N=881)

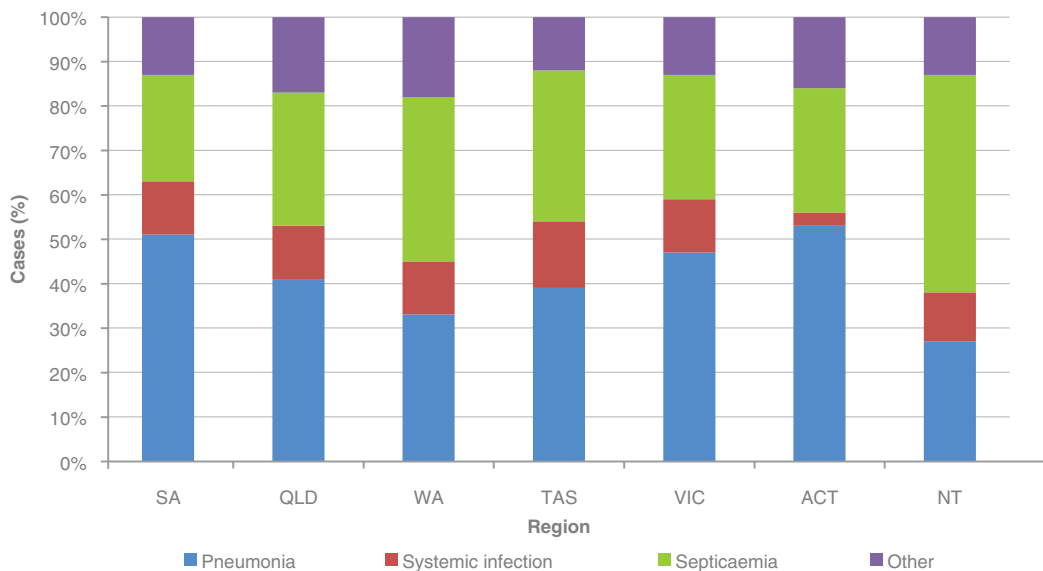


Missing data n=71 (8%).

Comment

- Of the cases of infection acquired during admission over the two-year period, 61% were acquired postoperatively (541/881), 14% were acquired preoperatively, 7% were as a result of other invasive-site infections and 18% were surgical-site infections.

Figure 40: Types of infections acquired either before or during the admission by region (N=1,589)



Missing data n=18 (1%).

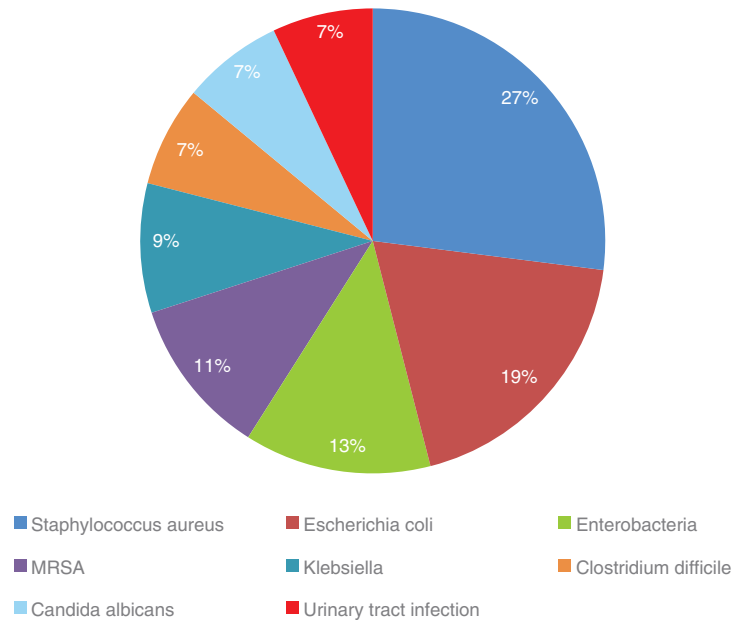
Other category includes: Klebsiella, Clostridium difficile, Escherichia coli and Methicillin-resistant Staphylococcus aureus.

Comment

- Of all the 1,589 cases of infection acquired prior to or during admission over the two year period, pneumonia was responsible for 44% (705) of cases, septicaemia 28% (448) of cases, other infections in 14% (230) of cases and systemic infection in 12% (188) cases.



Figure 41: Types of infections, where positively identified (N=593)



Missing data n=134 (8%).

MRSA: Methicillin-resistant Staphylococcus aureus; E.coli: Escherichia coli

#### Comment

- Over the two year period the infection was positively identified in 37% of cases of infection (593/1,589) acquired prior to or during admission (data not shown).
- E Coli, MRSA and Staphylococcus Aureus accounted for 52% (309) of all cases.

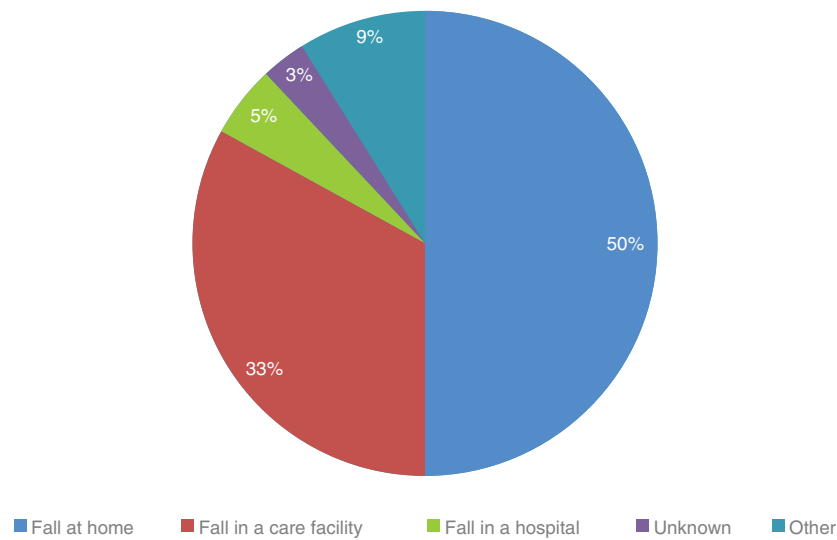


## 8.2 Trauma

In 2012 ANZASM started collecting data on trauma cases in which severe bodily injury or shock occurred in patients requiring surgery. The types of traumatic events leading to injury or shock vary, but may include falls, accidents or violence. ANZASM is keen to monitor trends, especially in falls, to ensure strategies are implemented to prevent or minimise future harm. This data is currently collected by four regions: Queensland, Western Australia (from July 2013), Victoria and Northern Territory

During the period January 2012 to the end of December 2013 a traumatic event was attributed to 23% of cases (908/3,987) (data not shown). Of the 908 traumatic events, 745 (82%) were caused by falls (Figure 42); 108 (12%) were caused by traffic accidents (Figure 43); and 55 (6%) were associated with domestic, public or self-inflicted violence (data not shown).

Figure 42: Locations associated with falls (N=745)



Missing data n=11 (1%)

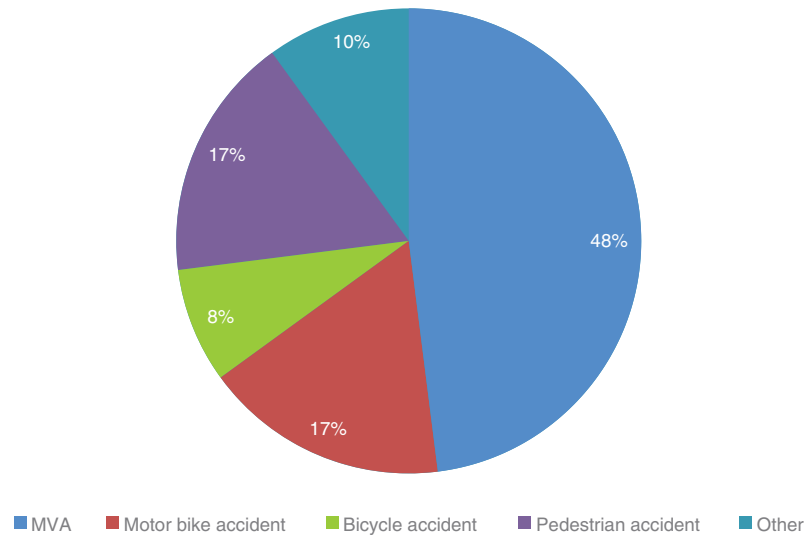
Other category includes roads, workplace related and public venues

### Comment

- Falls were associated with 82% of recorded traumatic events (745/908).
- Of the 745 falls, 50% were at home (364), 37% occurred in a hospital or care facility (277) and 12% were unknown or elsewhere (93).



Figure 43: Types of traffic accidents associated with trauma cases (N=108)



Missing data n=1 (1%)

MVA: motor vehicle accident.

Other category includes: quad bike, ultralight aircraft and workplace related.

#### Comment

- Of the 108 traumatic events, accidents related to motor vehicles were associated with 48% of cases (52/108). These figures are low but will become more relevant as more data is collected.



### Case Study #3

#### Further bleeding in multiple trauma



A patient in their 70s was admitted to rural hospital A following a motor vehicle accident in which the patient sustained multiple injuries. These included fractures of the pedicle of C2 and the spinous processes of L3 & L4, left rib fractures with a small pneumothorax visible only on chest CT, a splenic laceration, a probable de-vascularised left kidney and free intra-peritoneal blood. Following resuscitation, including the administration of fresh frozen plasma and O negative blood, the patient was transferred by air to hospital B (tertiary referral centre). A laparotomy was performed and a retroperitoneal haematoma noted, as was a stable splenic laceration. No major source of bleeding was identified.

Postoperatively, a falling haemoglobin indicated ongoing bleeding. Prophylactic anticoagulation resulted in an elevated Activated Partial Thromboplastin Time and International Normalised Ratio. The patient was mildly obtunded. Nasogastric feeding was instituted, despite persisting ileus. Aspiration pneumonitis occurred. The patient died two and a half weeks later.

#### Clinical Lessons

Given that an O negative blood transfusion was considered necessary in hospital A, with a CT scan diagnosis of free blood in the peritoneum, consideration should have been given for a laparotomy at hospital A where there was surgical capability.

Signs of ongoing bleeding following a laparotomy should trigger a repeat CT scan of the abdomen. Aspiration pneumonitis needs to be constantly considered in a patient on nasogastric feeds with a depressed conscious state.



## 9. PEER-REVIEW OUTCOMES

### Key points

- An SLA was requested in 13% of audited cases. A lack of information provided by treating surgeons was the most frequent cause of referral for second-line assessment, accounting for 63% of the cases sent onto SLA, and 8% of all audited cases.
- Over the entire audit period less than 5% of audited cases were sent to SLA because of concerns over clinical issues.
- The most common criticism leveled was delay in the delivery of definitive treatment.
- From 1 January 2009 to 31 December 2013, ANZASM identified 4,799 clinical management issues.
- In only 4% of all patients audited were issues of clinical management perceived to have contributed to the death of the patient.

### 9.1 Second-line assessments

The peer-review process comprises 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 18,583 cases underwent FLA. 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:

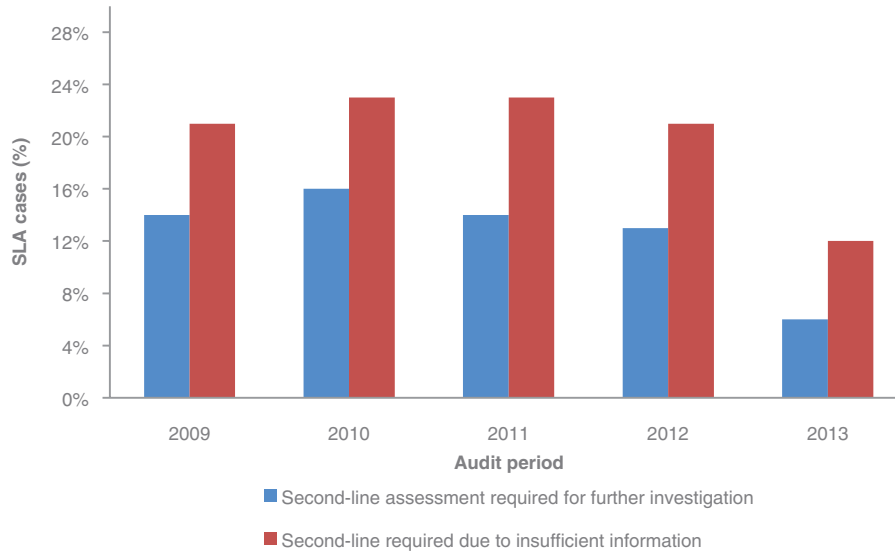
- instances where a more detailed review of the case could better clarify events leading up to death and any lessons arising;
- an unexpected death, such as the death of a young and fit patient with benign disease, or a day surgery case.

The number of SLAs required because of a lack of clinical information has decreased from 21% in 2009 to 12% in 2013. 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 5% of cases was a SLA requested because of concerns regarding clinical management. This has not altered over the five surveyed years. The reasons given for referral to SLA are displayed in Figure 44.





Figure 44: Reason for referral for second-line assessment (SLA) (N=2,309 SLAs in 18,583 audited cases)



Missing data: n=246 (2%).

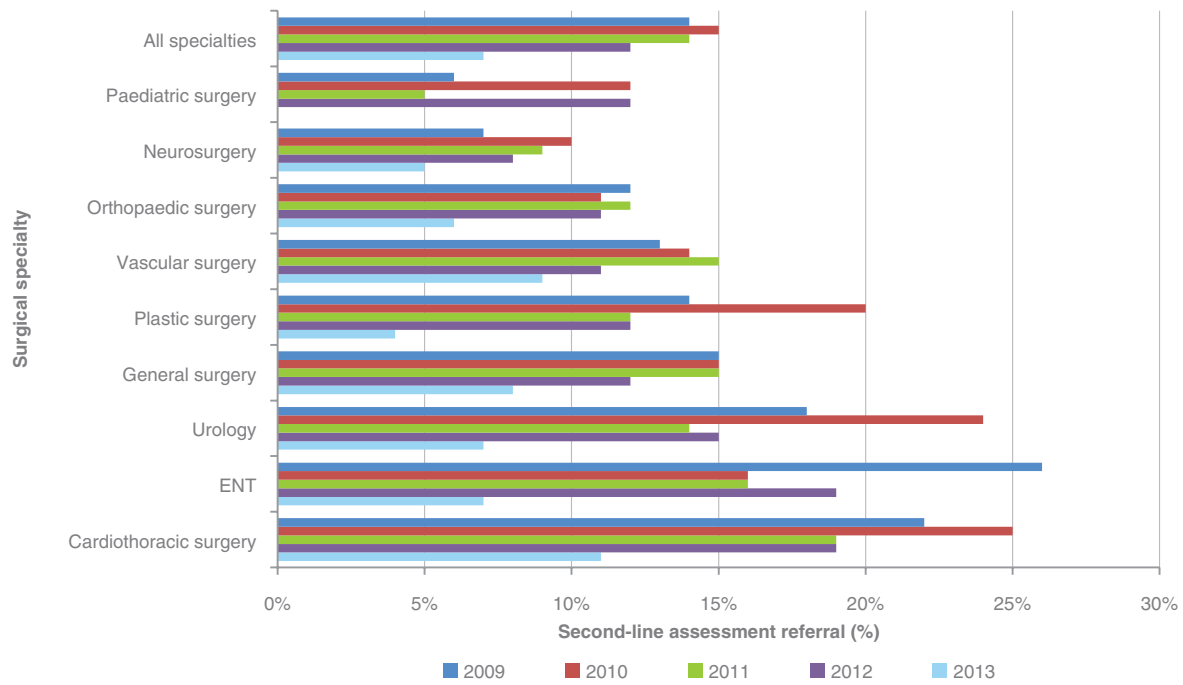
#### Comment

- A SLA was requested in 12% of audited cases (2,309/18,583). Of the cases referred for SLA, a lack of adequate information in the SCF was the trigger in 63% of audited cases (1,465/2,309). This represents 8% of all audited cases. Encouragingly, the number of cases has fallen slightly since the 2012 ANZASM National report, in which 65% of SLA referrals were due to inadequate SCF information.<sup>1</sup>
- The need for an SLA can often be avoided if the surgeon completes the SCF properly and provides adequate information.



The frequency of cases referred for SLA in the surgical specialties during the audit period is given in Figure 45.

Figure 45: Frequency of second-line assessment referral among surgical and other specialties (N=2,309 SLAs)



Missing data: 21 cases (1%).

ENT: ear, nose and throat.

#### Comment

- There was some variation in the SLA rate among specialties, and across the audit period. There was an overall drop in the need for SLA in most specialties in 2013.



## 9.2 Clinical management issues

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

There are two possible outcomes. The first is that the death of the patient was a direct outcome of the disease process, with clinical management having no impact on the outcome. The second is a perception that aspects of patient management may have contributed to the death of the patient.

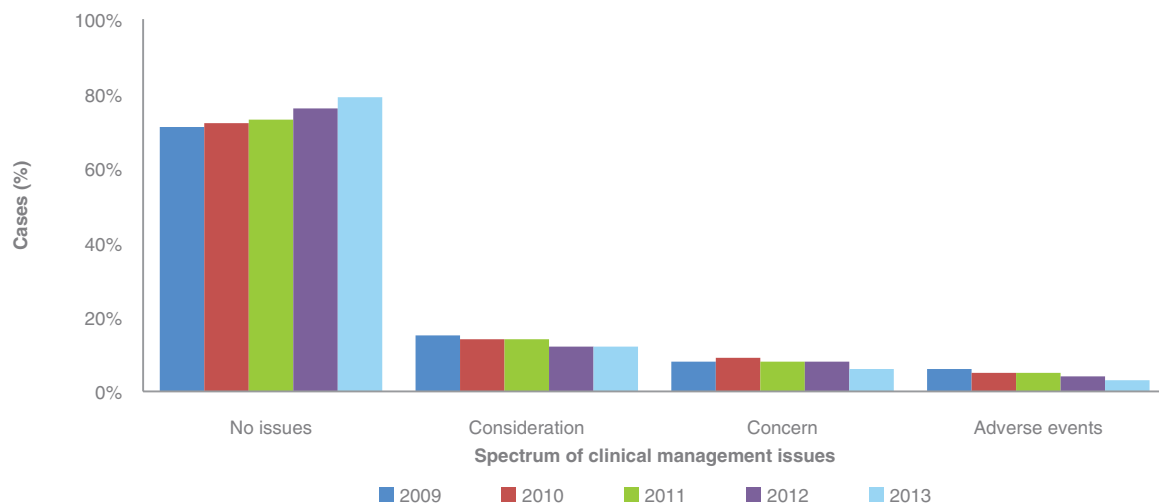
In making an assessment of contributing factors the assessor can identify an:

- Area of consideration: 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: 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. The injury or event was sufficiently serious that it led to prolonged hospitalisation; temporary or permanent impairment or disability; or contributed to or caused death of the patient. In addition, there are predetermined outcomes classified as an adverse event (e.g. anastomotic leak or pulmonary embolus). It must be emphasised that an adverse event does not imply negligence. Some adverse events will occur even with the best of care, for example a fatal pulmonary embolism even when the best DVT prophylaxis is used. An adverse event is not necessarily preventable and may not contribute to the death of the patient (see 9.2.1).

Figure 46 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 on areas of concern and adverse events, although data is collected on areas of consideration.

Figure 46: Frequency and spectrum of clinical management issues recorded per patient over time (N=18,583)



Missing data: n=61 (<1%).

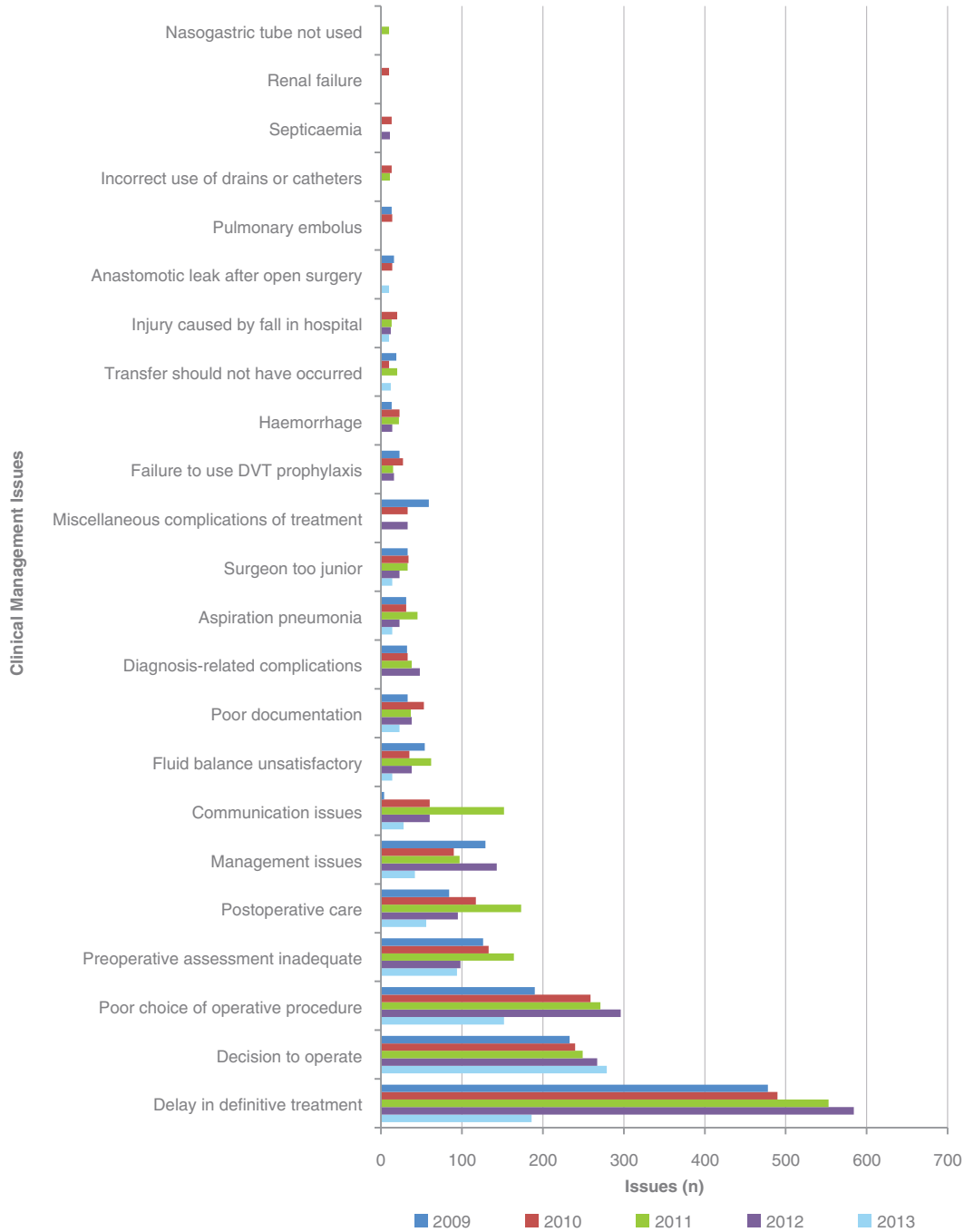
### Comment

- In 74% of audited cases (13,784/18,583) assessors felt there were no clinical management issues. When combined with areas of consideration, of which there were 13% of cases (2,446) the total number of cases with no or minor criticism was 87% (16,230).
- The proportion of cases with no clinical management issues increased from 72% in 2009 to 79% in 2013.
- The identification of an area of concern or adverse event by an assessor denotes a greater degree of criticism of clinical management. In this series an area of concern or adverse event occurred in 12% of audited deaths (2,292/18,583). Table 7 provides information on the severity of clinical management issues identified for each specialty.
- Cases in which patients experience an adverse event are a key focus of the audit due to the perception by assessors that the treatment provided may have contributed to the patient's death. The proportion of cases with adverse events decreased from 196 (6%) in 2009 to 110 (3%) in 2013. While this change is statistically significant ( $p < 0.001$ ) it is only relevant once the two audit periods have a similar proportion of completed cases. However the comparison is not yet valid as a proportion of more recent cases are still undergoing assessment, so the figure in 2013 may increase.



The frequency of specific clinical management issues is shown in Figure 47. This chart includes all clinical management issues (areas of consideration, concern and adverse events). In some patients more than one issue was identified.

Figure 45: Frequency of second-line assessment referral among surgical and other specialties (N=2,309 SLAs)



Missing data: n=165 (2%).

Note: Management issues include: patient management issues, adverse events related to treatment guidelines or protocols, unsatisfactory medical management and treatment not conforming to guidelines.

DVT: deep vein thrombosis.

Not all cases have gone through the full audit process and are still under review. Their outcomes are not available for this report and will be featured in the next report.



## Comment

- Delay in implementing definitive treatment is 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. Reasons for delay include geographical issues, diagnostic problems in the emergency department, inappropriate diagnosis, need for transfer, availability of theatre and communication issues.
- 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 4% of the specific issues identified between 2009 and 2013.

A delay in the implementation of definitive treatment was perceived in 28% of the audited patients (2,291/8,185). The attribution of responsibility for treatment delays is shown in Figure 48. This data is derived from the SCF and reflects the view of the treating surgeon.

## Case Study #4

### The deteriorating patient and communication

An elderly, previously independent patient was admitted with severe upper abdominal pain and no other bowel symptoms. There was a prior history of an abdominal hysterectomy for fibroids 40 years earlier and the patient was taking warfarin for atrial fibrillation. Physical examination was unremarkable, but an abdominal computed tomography scan showed a complete distal small bowel obstruction. The surgeon on call was not immediately notified, and the patient was transferred from the emergency department (ED) to the surgical ward with non-operative management of intravenous (IV) fluids and a gastric tube.

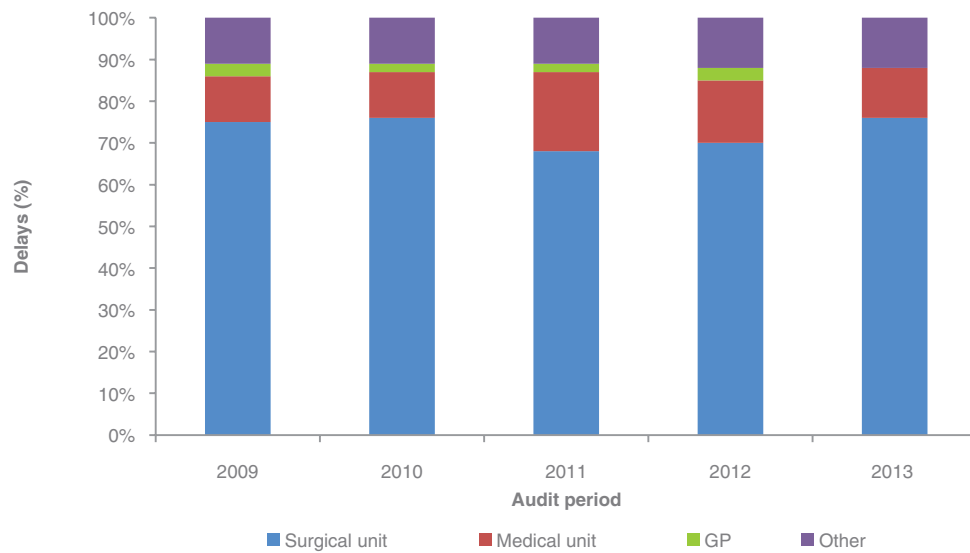
Management by junior medical staff did not adequately replace fluid losses. The next day the surgeon saw the patient, who had signs of acute peritonitis. The patient's anticoagulated state and fluid imbalance were then treated appropriately. Surgery was further delayed by the need to use the emergency theatre for an emergency caesarean section. When the patient eventually came to surgery, a band across the ileum had caused infarction of most of the small bowel, which required resection. Despite intensive treatment, the patient required a further bowel resection and died two weeks after the first operation.

### Clinical Lessons

For management of an ill patient, it is imperative that all members of the surgical team, particularly those in charge, are informed of the patient's condition and any changes in the clinical state. Similarly, consultants on call for emergencies must be available to provide appropriate, experienced backup to junior surgical staff and timely consultation. If earlier surgery had been performed, it may have been limited to simple division of adhesions and the infarction of bowel and subsequent death may have been avoided.



Figure 48: Attribution of responsibility for treatment delays (N=2,494)



Missing data: n= 165 (7%).

Other category includes: emergency departments, radiology departments, other hospitals and patient-related factors.

#### Comment

- The surgical unit was deemed responsible for 75% of treatment delays in 2009 and 76% in 2013.
- More than one team may be responsible for any perceived delays in treatment.
- Other clinical areas, medical units or general practitioners were deemed responsible for 9% of delays over the entire audit period.



### 9.2.1 Perceived impact of clinical management issues

First- and second-line assessors are asked 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 for 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. Tables 7, 8, 9, 10 and 11 show data that is patient-focused rather than incident-focused.

Table 7: Clinical management issues by specialty and severity as identified by SLA (N=4,738 events in 18,583 patients)

Surgical specialty	Adverse events	Concern	Consideration	Consideration
Cardiothoracic surgery	8%	12%	19%	61%
General surgery	5%	9%	15%	71%
Neurosurgery	3%	5%	8%	84%
Obstetrics and Gynaecology	18%	18%	18%	46%
Orthopaedic surgery	3%	6%	11%	80%
Otolaryngology head and neck	3%	9%	18%	71%
Other*	9%	9%	19%	64%
Paediatric surgery	5%	5%	11%	79%
Plastic surgery	3%	8%	15%	74%
Urology	6%	9%	16%	69%
Vascular surgery	4%	8%	15%	72%
All cases	5%	8%	13%	74%

Missing data: n=61 cases (<1%).

\* anaesthesia, intensive care unit, medicine, oncology, ophthalmology, oral and maxillofacial, thoracic medicine, trauma and transplant.

#### 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 frequency of adverse events between the specialties. The exact reason is not readily apparent however it may reflect the proportion of high-risk surgical procedures. For example, there are very few minor operations in cardiothoracic surgery. Many are complex procedures with high risk patients, and this may explain the apparently high number of adverse events.



Table 8: Degree of criticism of patient management per patient by SLA (N=18,583)

Degree of criticism of patient management	Number of patients	% of audited series
No issue of management identified	13,784	74%
Area of consideration	2,446	13%
Area of concern	1,442	8%
Adverse event	850	5%
Total	18,522	100%

Missing data: n=61 cases (<1%).

#### Comment

- There was significant criticism (area of concern or adverse event) of clinical management in 12% of cases in this audited series (2,292/18,583).
  - In instances where a patient had more than one clinical management issue noted the most severe has been used in this data set.
- There was minimal variation across regions in terms of the incidence of significant clinical management issues (data not shown).

Table 9: Perceived impact on clinical outcome of the areas of consideration and concern, and adverse events (N=18,583)

Perceived impact	Number of patients	% of audited series (N= 18,414)
No issue of management identified	13,784	79%
Did not affect clinical outcome	1,047	6%
May have contributed to death	2,835	15%
Probably caused death	748	4%
Total	18,414	100%

Missing data: n=169 cases (1%).

#### Comment

- In 4% of patients (748/18,583) were the perceived issues of clinical management felt to have probably caused the death of the patient.





*Table 10: Perceived preventability of clinical issues in the areas of consideration and concern, and adverse event groups (N=18,583)*

Perceived preventability of clinical issues	Number of patients	% of audited series (N=18,270)
No issue of management identified	13,784	75%
Definitely preventable	1,019	5%
Probably preventable	1,940	11%
Probably not preventable	1,378	8%
Definitely not preventable	149	1%
Total	18,270	100%

Missing data: n=313 cases (2%).

Comment

- The assessors felt that 5% of clinical incidents (1,019/18,270) detected were definitely preventable.

*Table 11: Perception of clinical team responsible for clinical issues (N=4,799)*

Clinical team felt to be responsible	Number of patients	% of audited series (N= 4,359)
Surgical team	2,947	68%
Other clinical team	951	22%
Hospital issue	233	5%
Other*	228	5%
Total	4,359	100%

Missing data: n=440 cases (10%).

\* transferring hospital, blood bank or transfusion services, emergency department, the general practitioner or referring doctor, the ambulance service, remote areas or lack of sufficient staff.

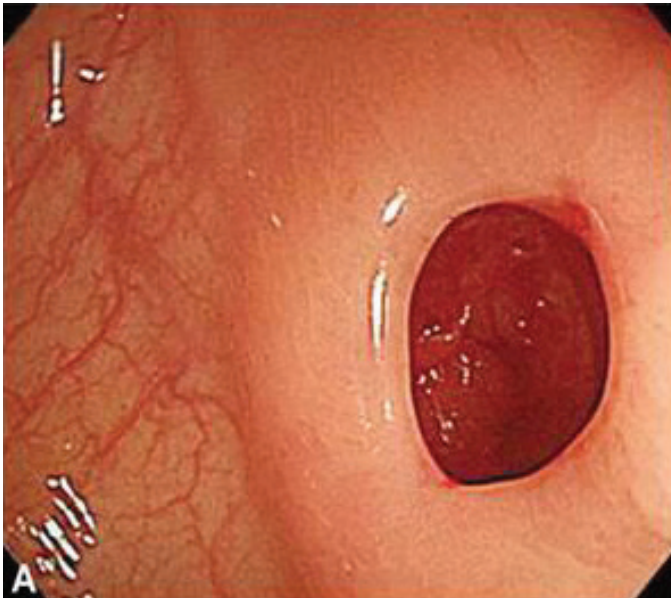
Comment

- First- and second-line assessors indicated that the surgical team was responsible for 68% of patients (2,947/4,799) with perceived clinical issues.



## Case Study #5

### Colonoscopy perforation—delay after perforation



(A) Diagnostic colonoscopy-associated perforation. The perforation occurred during excessive pushing of the colonoscope. It is relatively large.

An elderly patient presented with extensive medical comorbidities including diabetes, hypertension, diverticular disease, liver cirrhosis with portal hypertension, and ascites. The patient had previously developed necrotising fasciitis of the buttock. After initial debridement, the patient was transferred for further management and ICU admission. The patient then underwent a laparoscopic loop transverse colostomy and multiple debridement procedures to the buttock. Subsequently the patient was admitted for reversal of the loop colostomy. The patient was later readmitted for investigation of rectal bleeding. A colonoscopy was performed, which demonstrated what was thought to be a stenosis in the sigmoid colon. The colonoscope was pushed through the stenosis and into a large cavity, which was recognised as possibly being extra-colonic. The patient initially seemed well and further investigations were planned for the possible stricture and inflammatory mass.

Post-colonoscopy, the patient rapidly deteriorated with generalised peritonitis and sepsis. At laparotomy, there was a large perforation in the rectum and extensive adjacent diverticular disease. A limited Hartmann's resection was performed and the patient was transferred for ICU admission and management. A repeat laparotomy was undertaken;

there was extensive intra-abdominal blood with active arterial bleeding from the pre-sacral area. This was controlled with suture, Floseal and packing. The patient was returned to theatre twice and eventually the packs were removed and the abdomen closed. A week after removal of the packs, the patient rapidly deteriorated.

A further return to theatre resulted in a diagnosis of purulent peritonitis. This was treated with abdominal lavage and rectal stump drainage. However, the patient continued to deteriorate and subsequently died.

#### Clinical Lessons

This patient had extensive comorbidities; once faecal peritonitis from the perforated rectum was established, there was a high likelihood of mortality. It appears that the delay in performing the Hartmann's resection may have contributed to the patient's demise. However, the perforation was secondary to the severe diverticular disease and it is possible that the stricture was in fact a diverticulum - a recognised hazard of colonoscopy in the setting of severe diverticulosis and would be classified as an adverse event.

## 10. CONCLUSIONS



The audits of surgical mortality are excellently positioned 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, including the continued participation of surgeons and the opportunity to enhance and expand the existing data on surgical mortality.

There has been a significant improvement in participation amongst both surgeons and hospitals across most of the regions. As the audit continues to grow and develop, the ability to identify trends across Australia will further add to the ongoing knowledge of the participants, potentially leading to better outcomes for all surgical patients.

### Achievements and future directions:

- The audit has achieved widespread acceptance, with a 96% participation rate from surgeons.
  - The majority of patients in the audit were emergency admissions with at least one comorbidity.
  - The ASA rating of 4 or higher remained stable at 54% this year, comparable to previous years.
  - Deep vein thromboembolism (DVT) prophylaxis use was recorded in 81% of cases (11,127/13,794) in which patients underwent a surgical procedure. Across the regions DVT utilisation varied from 73% to 87% of cases. In only 3% of cases did assessors conclude that the DVT prophylaxis management was not appropriate.
  - In the majority of instances those patients expected to benefit from critical care support did receive it. The review process suggested that 3% 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 and 7% of patients were perceived to have had poor management of their fluid balance.
  - Delay in implementing definitive treatment is 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. Reasons for delay include geographical issues, diagnostic problems in the emergency department, inappropriate diagnosis, need for transfer, availability of theatre and communication issues. The decision to proceed to surgery and the choice of operative procedure are also high on the list of clinical management issues.
  - Cases in which patients experience an adverse event are a key focus of the audit due to the perception by assessors that the treatment provided may have contributed to the patient's death. The proportion of cases with adverse events decreased from 196 (6%) in 2009 to 110 (3%) in 2013. While this change is statistically significant ( $p < 0.001$ ) it is only relevant once the two audit periods have a similar proportion of completed cases. However the comparison is not yet valid as a proportion of more recent cases are still undergoing assessment, so the figure in 2013 may increase.
  - 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 the 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, Queensland and South Australia during the course of 2014 and 2015.
  - The audit will continue to encourage use of the Fellows Interface, a web-based portal for entering SCFs and completing first-line assessments. An important initiative, the Fellows Interface minimizes data entry time and the risk of errors relating to data entry, while improving turnaround time. Nationally, usage is around 38%. It is expected that a phasing out of the paper-based forms will commence in 2015, necessitating the use of the Fellows Interface. The introduction of compulsory fields will improve the quality of the data.
  - The audit will continue to produce the National case note review twice a year for distribution to surgeons, trainees and other clinical staff involved in patient care. Each audit of surgical mortality contributes to the National case note review, and the publication continues to be very well received by the surgical community. Some regions also produce their own regional case note review booklets.
  - The use of interstate assessors in some regions safeguards the independent peer-review process and ensures that second-line cases remain de-identified. This is of particular importance in instances when a case may be well-known in a region or where there are very small numbers of surgeons in a particular specialty or sub-specialty.
  - Improvements have been made to the SCF that enable the collection of greater detail around patient mortality where infection was present.
  - 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 RANZCOG Fellows. It is encouraging that within 12 months many of the regions have over 50% participation by gynaecological Fellows.
- A greater national awareness and acknowledgment of the value of the audit among health professionals should see both increased surgical participation and a greater level of detail provided on forms. In turn, this will 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.



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## 12. ACKNOWLEDGMENTS



ANZASM would like to acknowledge the support and assistance of those individuals and institutions that have helped in the continuation and development of this project, including:

- participating surgeons
- first-line assessors
- second-line assessors
- hospital medical records departments
- State and Territory Departments of Health for funding the project
- Office of Safety and Quality at the regional Departments of Health for their continual commitment and support to ANZASM
- Royal Australasian College of Surgeons for their infrastructure and oversight of this project.
- ANZASM project managers

### Bio-statistical consultants

- Dr Nick Andrianopoulos, Senior Research Fellow, Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine Monash University.

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## NOTES

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## NOTES

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## **Australian and New Zealand Audit of Surgical Mortality**

# **National Report 2013**

Royal Australasian College of Surgeons

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