



**ROYAL AUSTRALASIAN COLLEGE OF SURGEONS
AUSTRALIAN AND NEW ZEALAND AUDIT OF
SURGICAL MORTALITY**

**NATIONAL REPORT
2015**



ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS



The Royal Australian
and New Zealand
College of
Obstetricians
and Gynaecologists



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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 25 July 2016).

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CHAIRMAN'S REPORT

With focus on audit and Continuing Professional Development (CPD), the Australian and New Zealand Audits of Surgical Mortality (ANZASM) project has become of increasing importance to Fellows of the Royal Australasian College of Surgeons (RACS). There continues to be concern within all jurisdictions regarding the safety of surgery being conducted, both in the public and private sector. The audit provides reassurance that all surgically-related deaths are being assessed and approximately 10% undergo second-line assessment, which help to highlight areas of concern, improvement and failings.

The audit has Qualified Privilege which means that the information shared is secure from subpoena by either the courts or local health departments. The original information, however, is nearly always available through Freedom of Information so there is no restriction placed on investigating cases by any legitimate interest – it is just that the activities of the audit and the information it generates is not freely available. Having said that, the information generated by the audit is shared through publications directed at the hospitals to show how they are performing against peer hospitals, and even small hospitals can be included into this providing that information is not able to be linked directly to a surgeon participating in the audit.

In order to maintain CPD compliance, members of the RACS are required to participate and CPD compliance is required for registration with the Medical Board. The Medical Board will be taking greater interest in the quality and reliability of CPD participation in future years. Being part of a robust national audit into surgical deaths will position the RACS and its Fellows well for any further changes that may develop from within the Australian Health Practitioner Regulation Agency.

The challenge for the RACS and its Fellows is to maintain 100% compliance and engagement with ANZASM and, indeed, the data generated from the audit needs to be analysed and widely promulgated. Over the last five years in excess of 20 publications have appeared and many more are in the pipeline. This provides not only vital feedback to the performance of the Australian audit but also insights that can be picked up by other countries and surgical groups around the world.

Although the audit is an expensive exercise, costing several million dollars annually to maintain, it seems a small price to pay for what has been a remarkable improvement in surgical mortality over the last five years. It may not be all due to the audit, but it has certainly been a major contributor to this remarkable improvement.



Professor Guy Maddern

Chairman

Australian and New Zealand Audit of Surgical Mortality (ANZASM)

SHORTENED FORMS

ACT	Australian Capital Territory
ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
CT	computed tomography
DVT	deep vein thrombosis
FLA	first-line assessment
GCS	Glasgow Coma Scale
NSW	New South Wales
NT	Northern Territory
QLD	Queensland
RACS	Royal Australasian College of Surgeons
RANZCOG	The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SA	South Australia
SCF	surgical case form
SLA	second-line assessment
TAS	Tasmania
TED	thromboembolic deterrent
VIC	Victoria
WA	Western Australia

EXECUTIVE SUMMARY

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.

Participation



60% Surgeons (2009)
97.6% Surgeons (2015)



2015
100% Public Hospitals
92% Private Hospitals

Analysis & Audit Numbers



78.9% Audited (28,434/36,047)



21.1% Excluded (7,612/36,047)

Risk Profile



55:45 Male:Female

Ages

Mean age of 74, varied from 1 day to 104 years



85% (24,043/28,434) of audited deaths occurred in patients admitted as emergencies with acute life-threatening conditions

89% (25,298/28,434) of patients had one or more significant coexisting illness

Operations



79.2%
(22,506/28,434) of patients underwent a surgical procedure

15.5%
(3,484/22,506) of the surgery patients had an unplanned return to the operating theatre because of complications

88%
(27,983/31,962) of operations, the consultant surgeon made the decision to operate

62%
(19,779/31,962) of cases the consultant surgeon performed the surgery

Patient Transfers



10.6%
(609/5,759) of transfer issues raised related to transfer delays

5.6%
(324/5,759) for inappropriateness of transfer

4.3%
(248/5,759) for insufficient clinical documentation

Infection



Infections were

- 18%** Pneumonia
- 8%** Intra-abdominal sepsis
- 5%** Septicaemia

32%
(4,124/12,524) of patients died with a clinically significant infection



Outcomes



The most common criticism made by assessors was delay in delivering definitive treatment.

63.2%
(3,796/6,008) of those delays were attributed to the surgical team.



13%
(3,636/28,434) of audited cases were referred for second-line assessment (SLA)



72%
(2,634/3,754) inadequate information was the reason for referral to SLA in audited cases

25.7%
(7,304/28,434) cases with clinical issues



5%
(1,321/28,434) of cases had an adverse event in patient care



COMPARISON OF DATA BETWEEN THE 2013 TO 2015 AUDIT PERIODS

Table 1: National comparison, 2013-2015 audit periods

Areas for national comparison	2013	2014	2015
Surgeon participation	94%	96%	97%
Hospital participation: Public	100%	100%	100%
Private	76%	89%	92%
Closed cases at year end (cumulative)	18,583	23,292	28,434
Admissions: Emergency	86%	85%	85%
Elective	14%	15%	15%
Gender: Male	54%	54%	55%
Female	46%	46%	45%
Median age for males and females	76 and 81	75 and 82	76 and 81
ASA status ≥ 4	46%	54%	54%
Admitted with one or more comorbidities	90%	88%	89%
Cases with perceived risk of death considerable or expected (as perceived by the surgeon)	62%	62%	62%
DVT prophylaxis use assessed as inappropriate by assessor	2%	3%	2%
Issues with fluid balance	10%	7%	6%
Patients who had one procedure [∞]	78%	74%	79%
Consultant deciding to operate	86%	87%	88%
Patients with unplanned return to theatre	16%	15%	15%
Patients with postoperative complications	33%	34%	32%
Patients with anaesthetic-related issues	7%	7%	7%
Procedures abandoned	6%	5%	5%
Patients transferred	25%	24%	25%
Delays related to interhospital transfers	10%	11%	9%
Total number of clinically significant infections	23.4% (1,069/4,564)	24.4% (1,171/4,791)	26.6% (930/3,494)
Total number of infections acquired before admission*	38.2% (409/1,069)	39.5% (463/1,171)	42.3% (393/930)
Infections acquired during admission*	58% (488/841)	59% (569/957)	59% (479/807)
Traumatic events associated with falls in care home or hospital†	36% (144/395)	40% (176/444)	41% (178/432)
Request for second-line assessment	12%	12%	13%
Areas of concern and adverse events (total)	8% and 4% (12%)	7% and 4% (11%)	6% and 3% (9%)

ASA: American Society of Anesthesiologists; DVT: deep vein thrombosis.

* Excludes New South Wales data; Western Australia started collecting data in 2013.

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

∞ Audit patients who underwent an episode of surgery either during their last admission, or within 30 days prior to death.

RECOMMENDATIONS AND KEY POINTS

The recommendations and key points are as follows:

- Improve the completeness of data collected on the SCFs to reduce the number of SLAs required due to insufficient information. The majority of fields to be made mandatory in the latter half of 2016 in the online Fellows Interface forms.
- Improved postoperative management is important. The patient should be discharged to the ward with comprehensive orders, including preventative measures for reducing complications. Instructions must be given regarding further management when a patient is discharged from a clinical or surgical team.
- 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.
- In response to the higher proportion of postoperative complications and serious clinical incidents among elective admissions, both the audits and departments of health should continue to promote the importance of recognising the signs of the deteriorating patient.
- Closer collaboration with respective regional departments of health following the release of the ANZASM clinical governance reports. These reports use audit data to provide departments of health, and public and private hospitals, with a trending analysis of clinical management events within their hospitals as well as comparisons with state and national data.
- Delivery of themed national case note review booklets on current topical issues, such as the impact of obesity on surgery, issues around anticoagulation, delay in patient care and transfer issues.
- The audit should continue to review falling surgical mortality rates to ascertain whether the audit process has contributed to the reduction of surgical mortality across the country. This could identify trends in which further perioperative improvements can be made in collaboration with the departments of health.
- The ANZASM regional audit staff continue to encourage active participation of surgeons and hospitals, with participation now close to 100%.
- The ANZASM regional audit staff continue to identify emerging trends in mortality and address them where possible through ongoing educative and interactive seminars.
- Communication is one of the key elements to good patient care. This includes communication between surgeons and their junior staff, between disciplines, and between nursing and medical staff.
- Delays in the decision to operate remain 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, especially in the decision-making process.
- Surgical patients, particularly those with certain comorbidities, are more susceptible to developing infection and stringent infection control care should be considered. Improvements can be achieved by focusing on patient transfers to adequate control facilities, strengthening current guidelines for infection control procedures, especially hand washing, and revision of stringent training and adherence to patient care protocols.
- The audit revealed that patients admitted as surgical emergencies have a greater risk of falling while in hospital. All health professionals should increase their awareness of this risk to improve the quality and safety of patient care.

1 INTRODUCTION

KEY POINTS

- ▶ The Australian and New Zealand Audit of Surgical Mortality (ANZASM) is an external peer review audit of deaths that occur while a patient is under the care of a surgeon, whether or not the patient underwent an operative procedure.
- ▶ This report is a review of all deaths notified during the period 1 January 2009 to 31 December 2015.
- ▶ This report is an analysis of the 28,434 cases that have completed the full audit process.

1.1 Background

The Royal Australasian College of Surgeons (RACS) 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 RACS has expanded the program to all other states and territories under the umbrella of ANZASM.

Completed data for the period 1 January 2009 to 31 December 2015 are included in this report from Western Australia, South Australia, Tasmania, Victoria, New South Wales and Queensland. The Australian Capital Territory and Northern Territory joined the program during 2010.

1.2 Objectives

The principal aims of the audit are to inform, educate, facilitate change and improve the 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

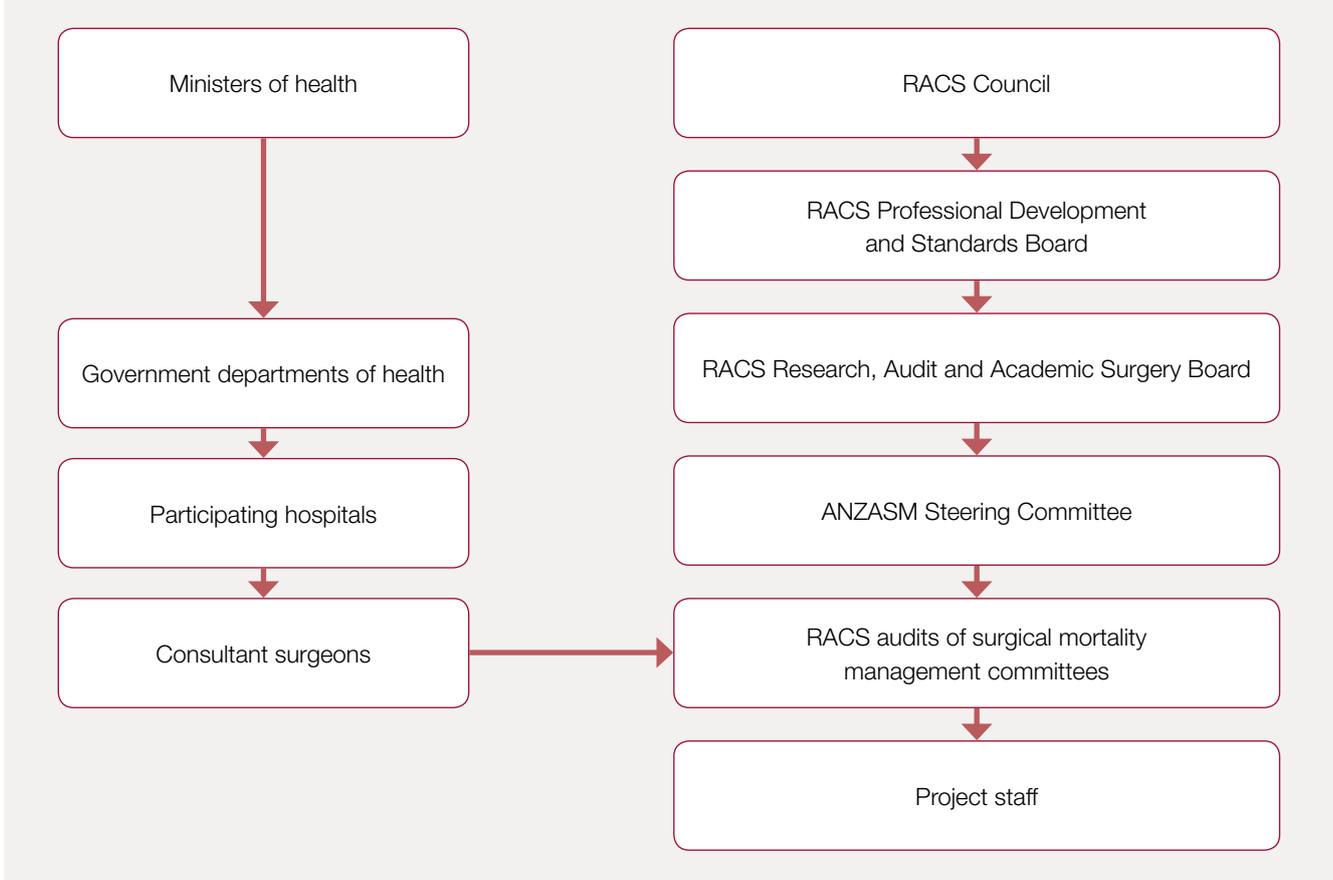
ANZASM is managed by the Research, Audit and Academic Surgery Division of RACS. ANZASM oversees the implementation and standardisation of each regional audit to ensure consistency in audit processes and governance structure across all jurisdictions (see Figure 1).

The individual regional audits are funded by their respective departments of health. RACS provides infrastructure support and oversight to the project.

Participation by surgeons has been mandated as part of the RACS 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 25 July 2016).

Figure 1: Governance structure of the Australian and New Zealand Audit of Surgical Mortality (ANZASM)



Note: RACS: Royal Australasian College of Surgeons; ANZASM: Australian and New Zealand Audits of Surgical Mortality

1.4 Methodology

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

The clinical details pertaining to the management of each case are recorded on a standard, structured 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.

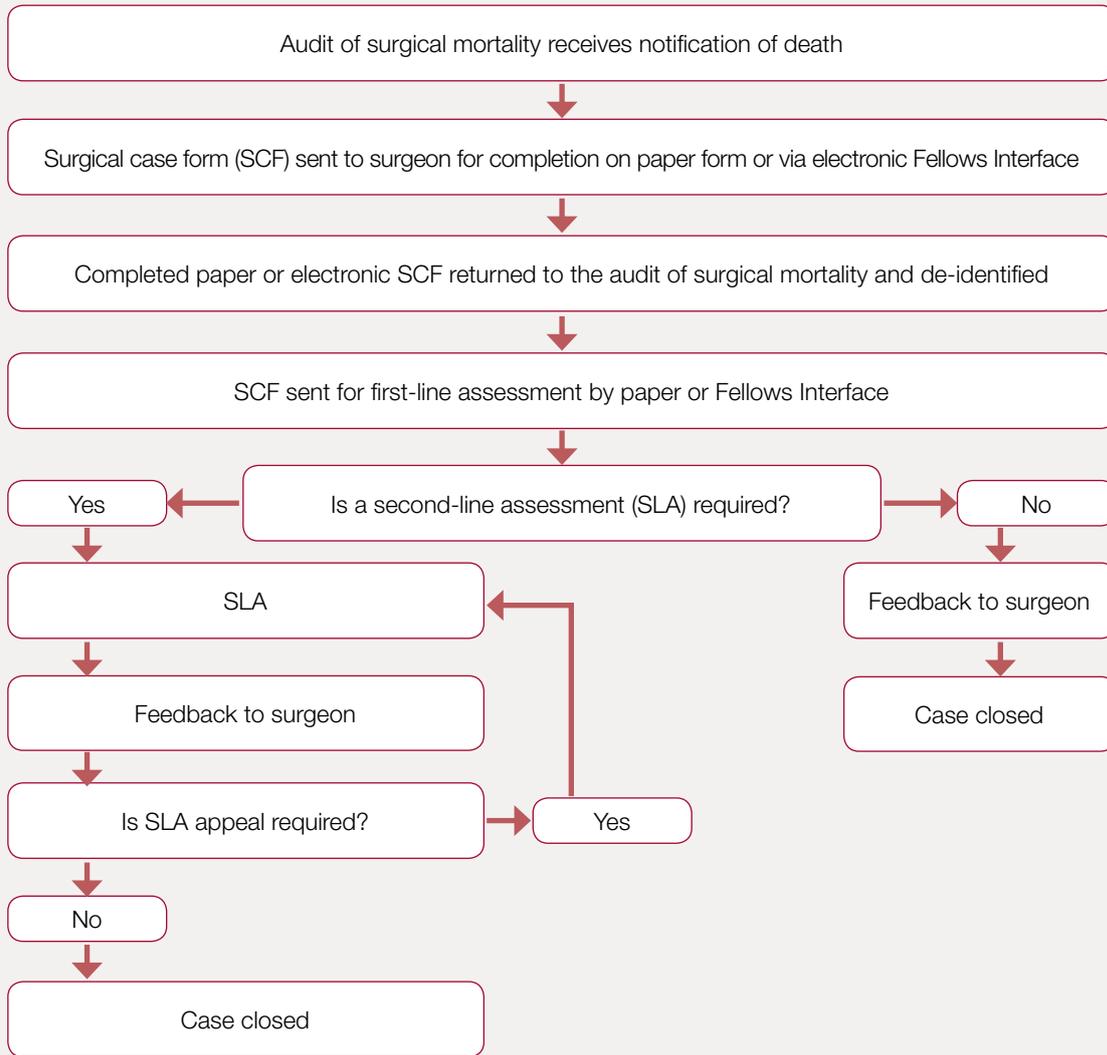
The clinical information from these deaths provides the patient profiles described in this report and is the denominator in all analyses pertaining to outcomes from the audit, unless stated otherwise.

There are two possible outcomes of an 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 (SLA) 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 the assessor is 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

One of the primary aims of ANZASM is education and furthermore, participation in the audit is a mandatory 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 the National Case Note Review Booklet. The individual regional audits also produce their own yearly reports and case note review booklet series, which highlight important issues in patient management.

The case reviews within this report form part of the feedback process. This is essential to the quality improvement of the ANZASM. The cases in this report are from a variety of specialties and a variety of authors, and chosen to highlight certain aspects contained within the report. Some have been edited to focus on a few points in a complex story or to reduce their length.

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 provide information on the following:

- 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 complete the same assessment matrix.

1.6.2 Analysis of clinical incidents

A primary objective of the ANZASM peer-review process is ascertaining whether 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 2015 National Report covers deaths reported to ANZASM from 1 January 2009 to 31 December 2015, censored on 31 March 2016. The full audit process can take up to three months from notification of death to completion. Some cases were still under review as at the census date, and the case outcomes were 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 2015 report data were 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.

Data for the years 2009 to 2011 have been grouped in figures and tables for the purpose of clarity. It should be noted that where no comparative data are given, there was no significant difference for the 2009 to 2015 audit periods.

2 AUDIT PARTICIPATION

KEY POINTS

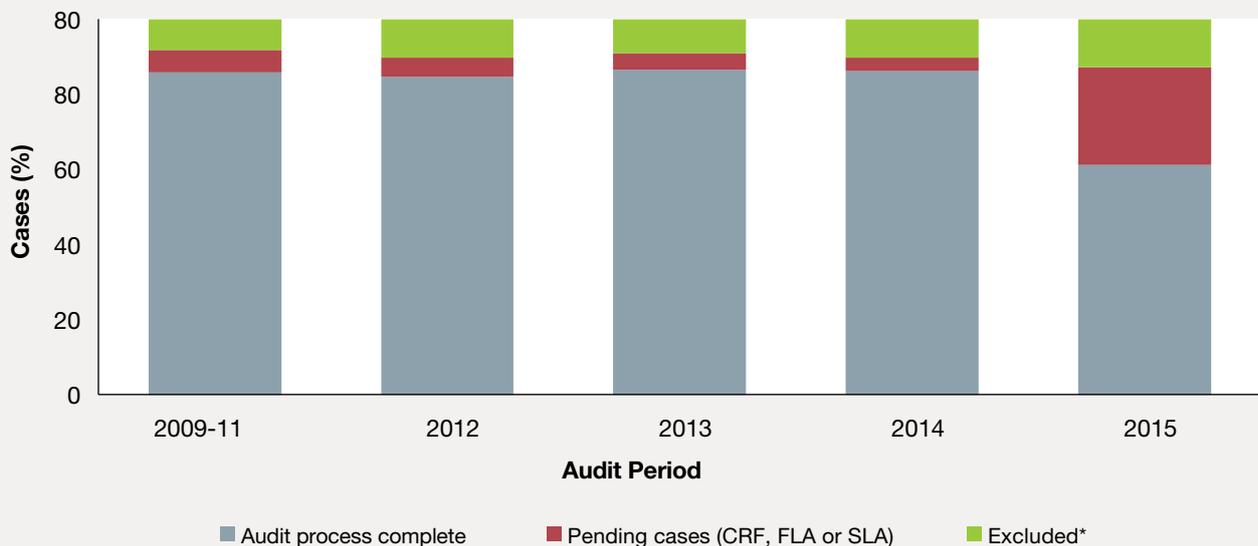
- ▶ Nationally, 97.6% (4,754/4,870) of surgeons participated in the audit.
- ▶ The SCF return rate at census date for participating surgeons was 86%.
- ▶ 100% of all public hospitals and 92% of all private hospitals are currently participating in the audit program.

2.1 Audit numbers

- During the period January 2009 to December 2015 ANZASM received 36,047 notifications of deaths associated with surgical care.
- 79% (28,434/36,047) of cases had finished the audit process by the census date.
- The remaining 21% of cases (7,612) were not included in the audit for the following reasons:
 - The case was admitted for terminal care, inappropriately attributed to surgery, lost to follow-up or treated by surgeons not participating in the audit (4,892).
 - The case had not completed the full audit process at the census date (2,720).

Figure 3 shows the proportion of cases with completed forms over the different audit periods. While the 2015 audit period has a higher number of pending cases, it is expected that this number will decrease to become more in line with the earlier years as additional cases are finalised. The audit process relies not only on surgeons agreeing to participate, but also on their timely completion of surgical case and assessment forms.

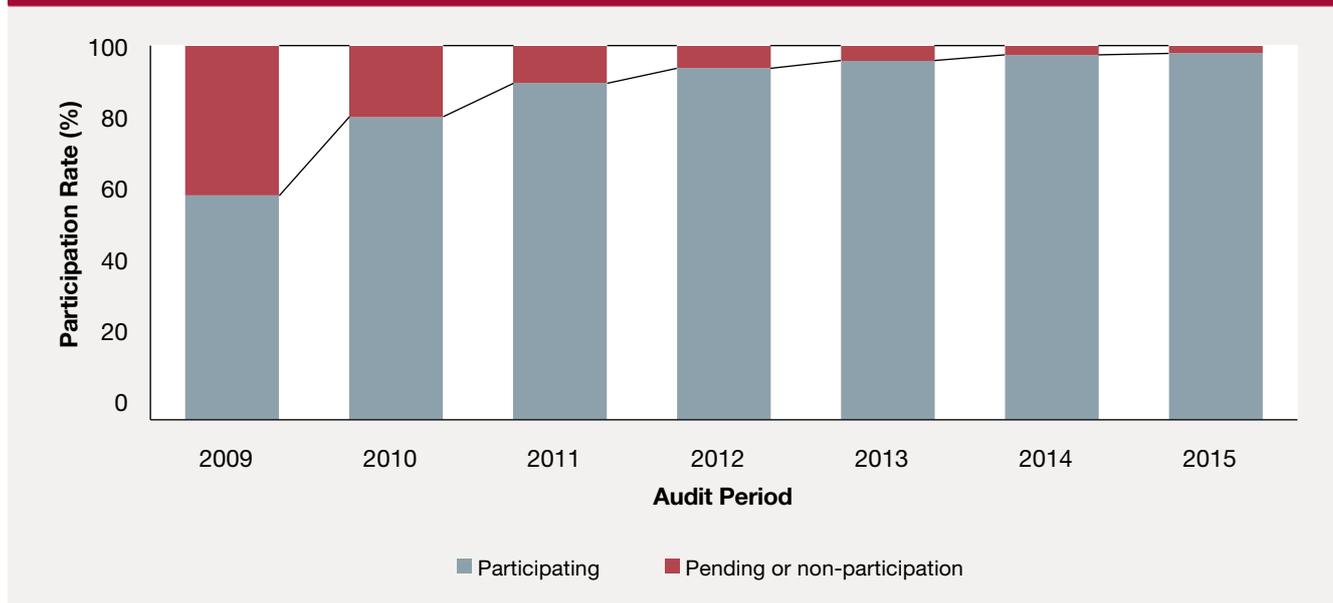
Figure 3: Audit status at census date per year (n=36,047)



* Excluded cases comprise non-surgical, non-participant, lost to follow-up or terminal care cases.
SCF: surgical case form; FLA: first-line assessment; SLA: second-line assessment.

Figure 4 shows the increase in surgeon participation in Australia from 2009 to 2015. Pending participation indicates that a Fellow has not responded to the invitation to participate in the audit.

Figure 4: Participation by Fellows (n=4,870 as at the end of 2015)



Nationally, 97.6% (4,754/4,870) of surgeons participated in the audit. This may underestimate the true intent to participate, as not all hospitals are participating, some Fellows have retired from clinical practice and some Fellows have temporarily relocated overseas. Participation in ANZASM became a mandatory component of the RACS Continuing Professional Development Program in January 2010. The percentage of Fellows per region who participated in the audit (as at the end of 2015) is shown in Table 2, while the percentage of Fellows per region who acted as first- or second-line assessors (as at the end of 2015) is shown in Table 3.

Table 2: Current regional participation by Fellows as at the end of 2015 (n=4,870)

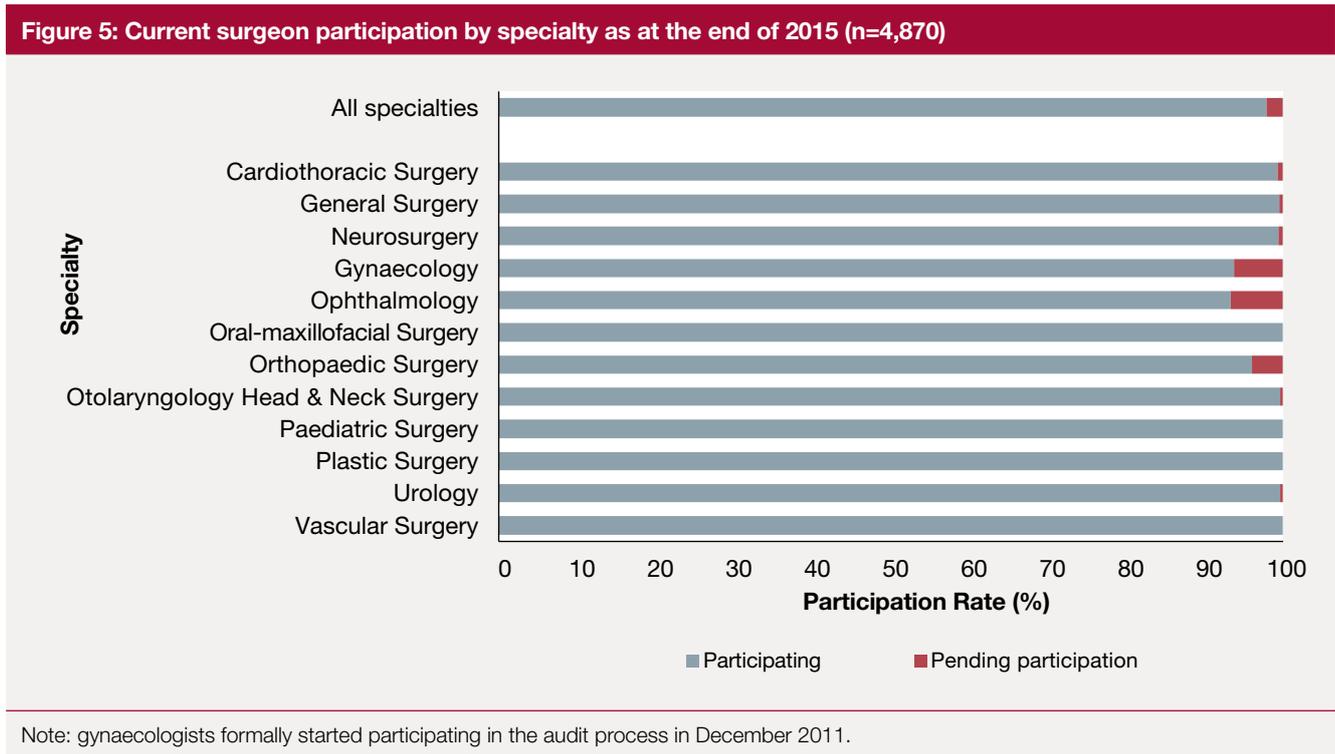
Surgeon participation status	Region							
	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
Participating	100%	99%	99%	100%	97%	100%	98%	96%
Not participating	0%	1%	1%	0%	3%	0%	2%	4%

Table 3: Current regional participation by Fellows as assessors as at the end of 2015 (n=4,870)

Assessor type	Region							
	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
First-line assessor	56%	56%	97%	62%	59%	73%	70%	37%
Second-line assessor	55%	50%	97%	59%	60%	55%	42%	28%

Comment:

- Reasons given for both surgeons and assessors' non-participation included potentially participating in other CPD programs, refusing to participate in the audit and surgeons working in a private hospital that, as at the end of 2015, was not yet participating in the audit.
- There is increasing use of the Fellows Interface in which surgeons enter the data online. Of participating surgeons, 57.4% (2,794/4,870) are now using the Fellows Interface compared with 50% in the previous report (2,350/4,704)⁽¹⁾. Use of the Fellows Interface is encouraged as it is easy to use and provides both time and process efficiencies. It should be noted that it is not currently available in New South Wales.
- A breakdown of surgical participation by specialty is shown in Figure 5.



Comment:

- Participation rates vary amongst the different specialties. Pending participation means that a letter has been sent inviting the individual to participate in the audit, but that a response has not yet been received.
- 567 gynaecologists 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 in which surgery is performed have agreed to take part in the audit program by the end of 2015.

Figure 6: Hospital sector participation by region



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

Comment:

- Ongoing recruitment drives targeting the private sector continued during the course of 2015. In general, the private sector’s response to the opportunity to participate in the audit has been positive. There has been an encouraging expansion in private hospital participation in New South Wales, from 8% in 2013 to 47% in 2015. The aim is to further increase New South Wales private hospital participation towards full participation. Overall, private hospital participation rose from 89% in 2013 to 92% in 2015.

3 DEMOGRAPHIC PROFILE OF AUDITED CASES

KEY POINTS

- ▶ 85.7% (24,043/28,042) 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 individuals who are sick, elderly and have major pre-existing comorbidities.
- ▶ One or more pre-existing medical conditions or comorbidities were reported for 90.7% (25,298/27,882) of patients.
- ▶ 76.4% (20,325/26,601) of patients had an ASA grade 3 or 4

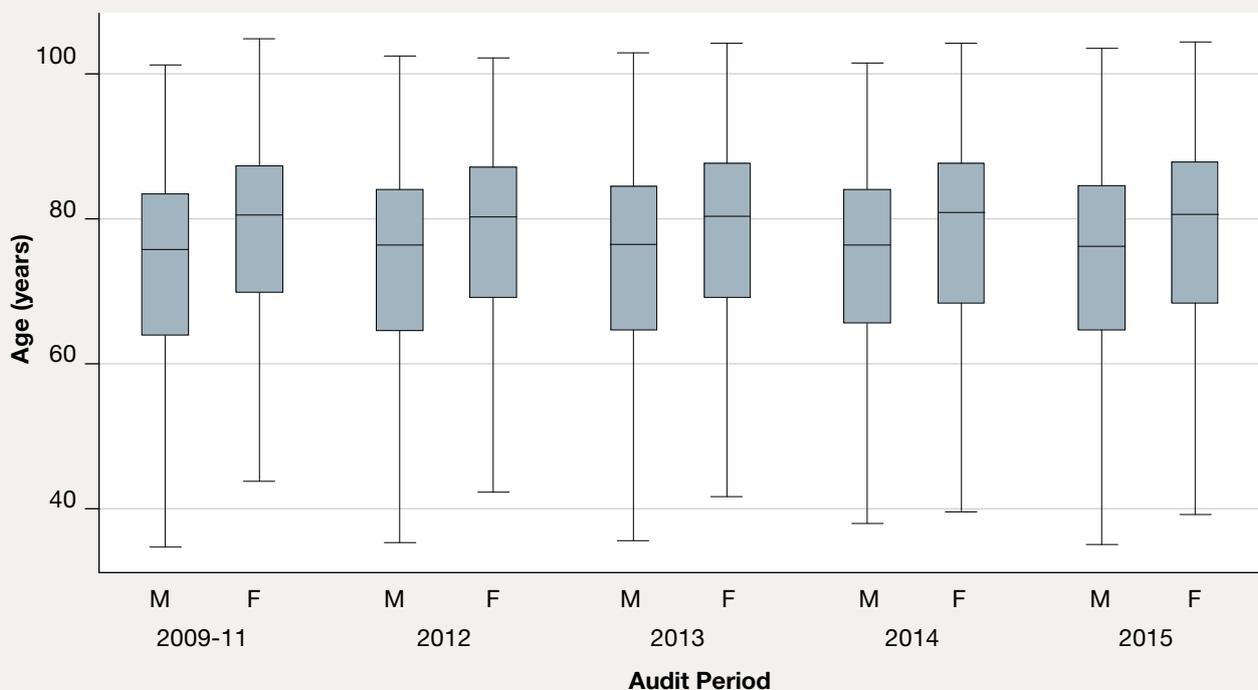
Figures 7, 8, 9, and 11 are box-and-whisker plots in which:

- the central box represents the values from the lower to upper quartile (25th to 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=28,429)

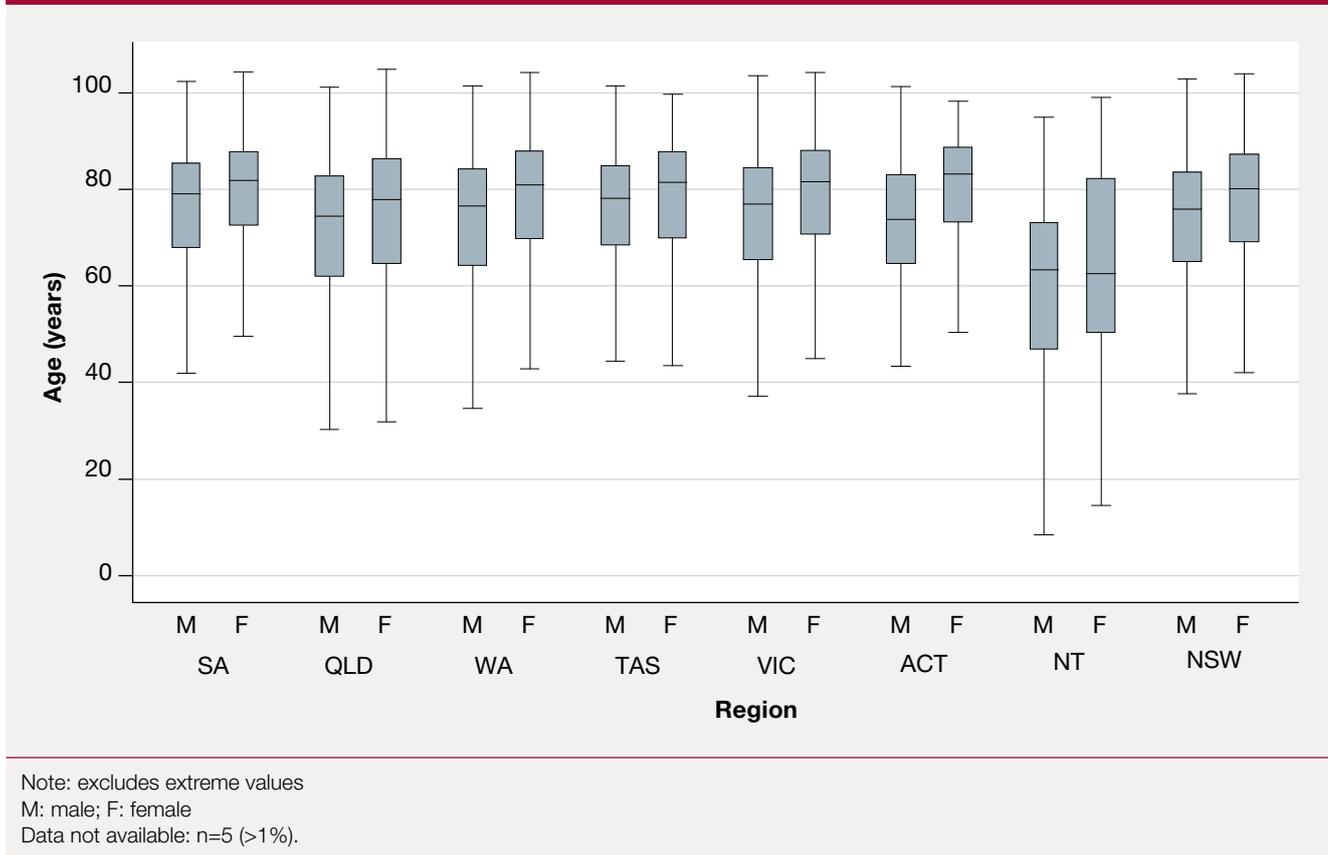


Note: excludes extreme values; M: male; F: female
Data not available: n=5 (>1%).

Comment:

- The age and gender distribution was similar over the audit reporting 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.

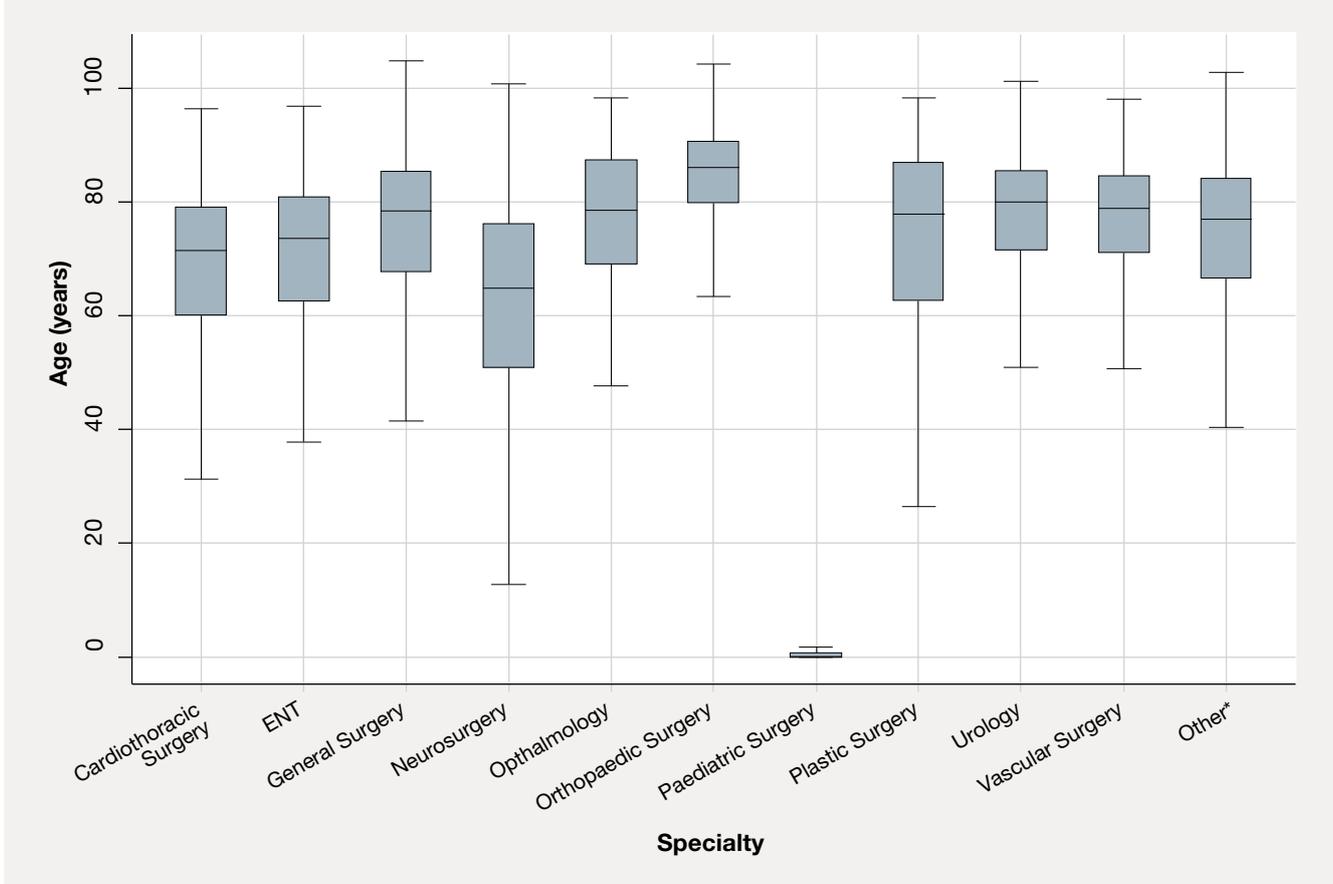
Figure 8: Age distribution of deaths by gender and region (n=28,429)



Comment:

- The gender distribution of audited deaths was similar across all regions with the exception of the Northern Territory. The Northern Territory had a lower median age of death for males and females compared with the other regions, reflecting the younger population in that region. This may be due to a higher proportion of deaths of young males from head injury, primarily following motor vehicle accidents.

Figure 9: Age distribution of deaths by surgical specialty (n=28,429)



* Other specialties listed by the treating surgeon include Trauma and Transplant, Otolaryngology, General Practitioner and Gynaecology.
 ENT: Ear, Nose and Throat.
 Data not available: n=5 (>1%).

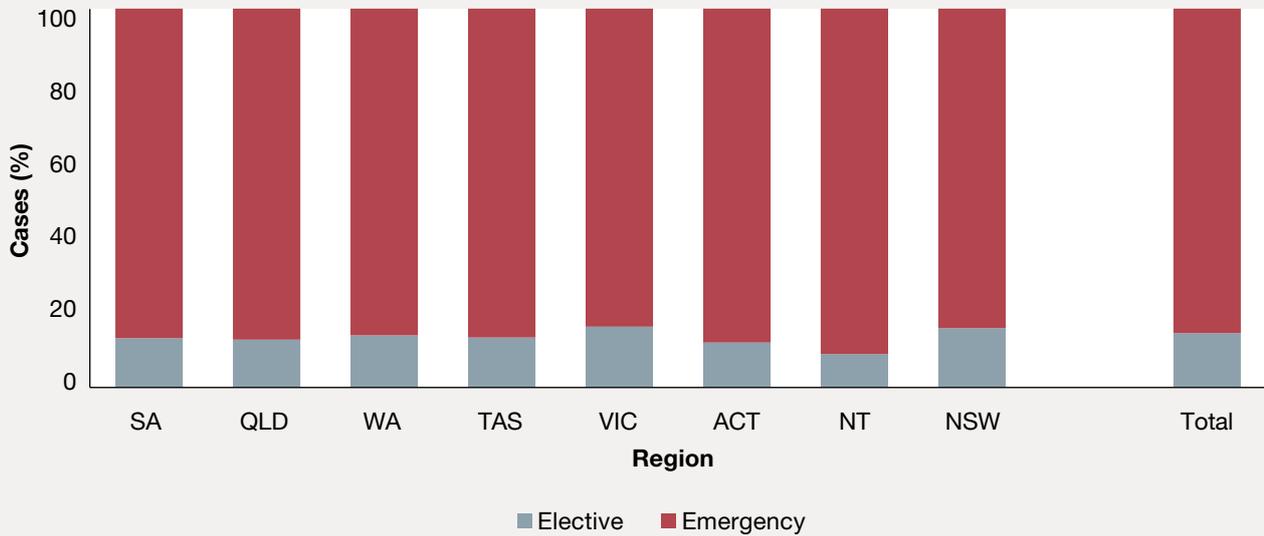
Comment:

- The mean age at death may relate to the underlying disease process in the individual specialties (such as 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 have not been included, with the exception of those relating to Paediatric Surgery.

3.2 Admission status of audited cases

The admission status of audited cases indicates whether patients were admitted electively or as emergencies (see Figure 10 and Figure 11). The age range distribution by year and admission status can be seen in Figure 12.

Figure 10: Admission status of cases by region (n=28,042)

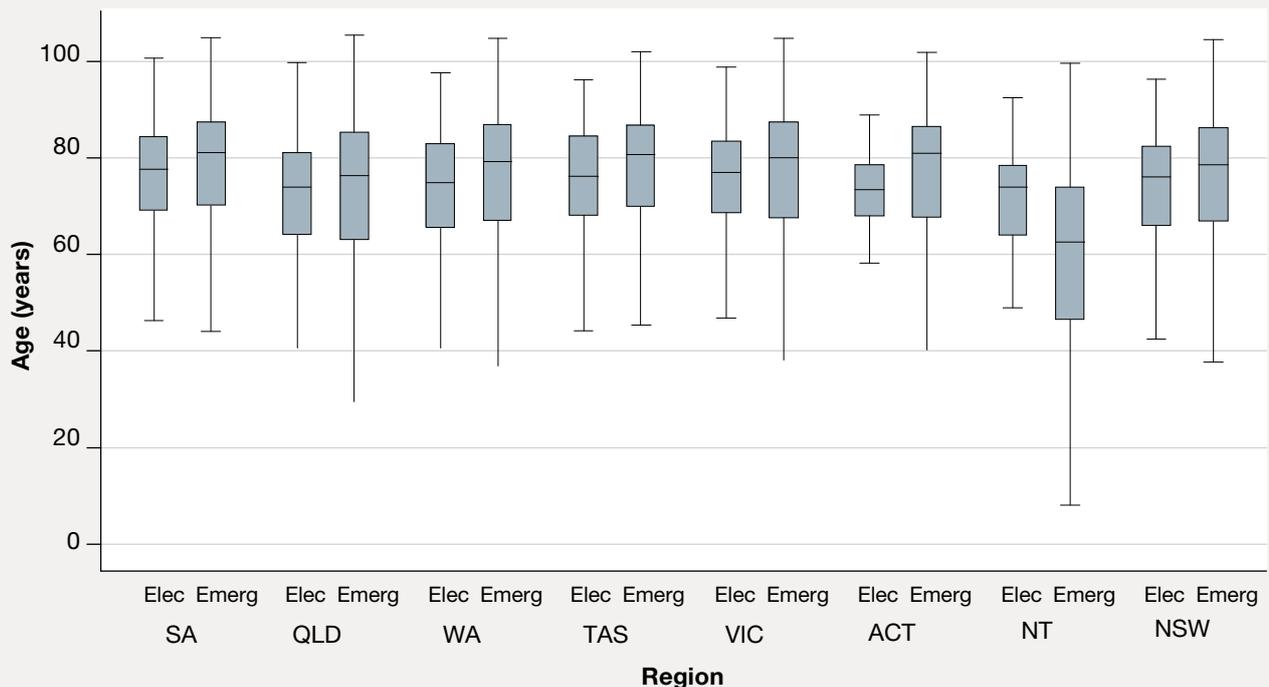


Data not available: n=392 (1%).

Comment:

- Patients admitted as emergencies for acute life-threatening conditions comprised 85.7% (24,043/28,042) of audited deaths.

Figure 11: Age distribution of deaths by admission status and region (n=28,042)

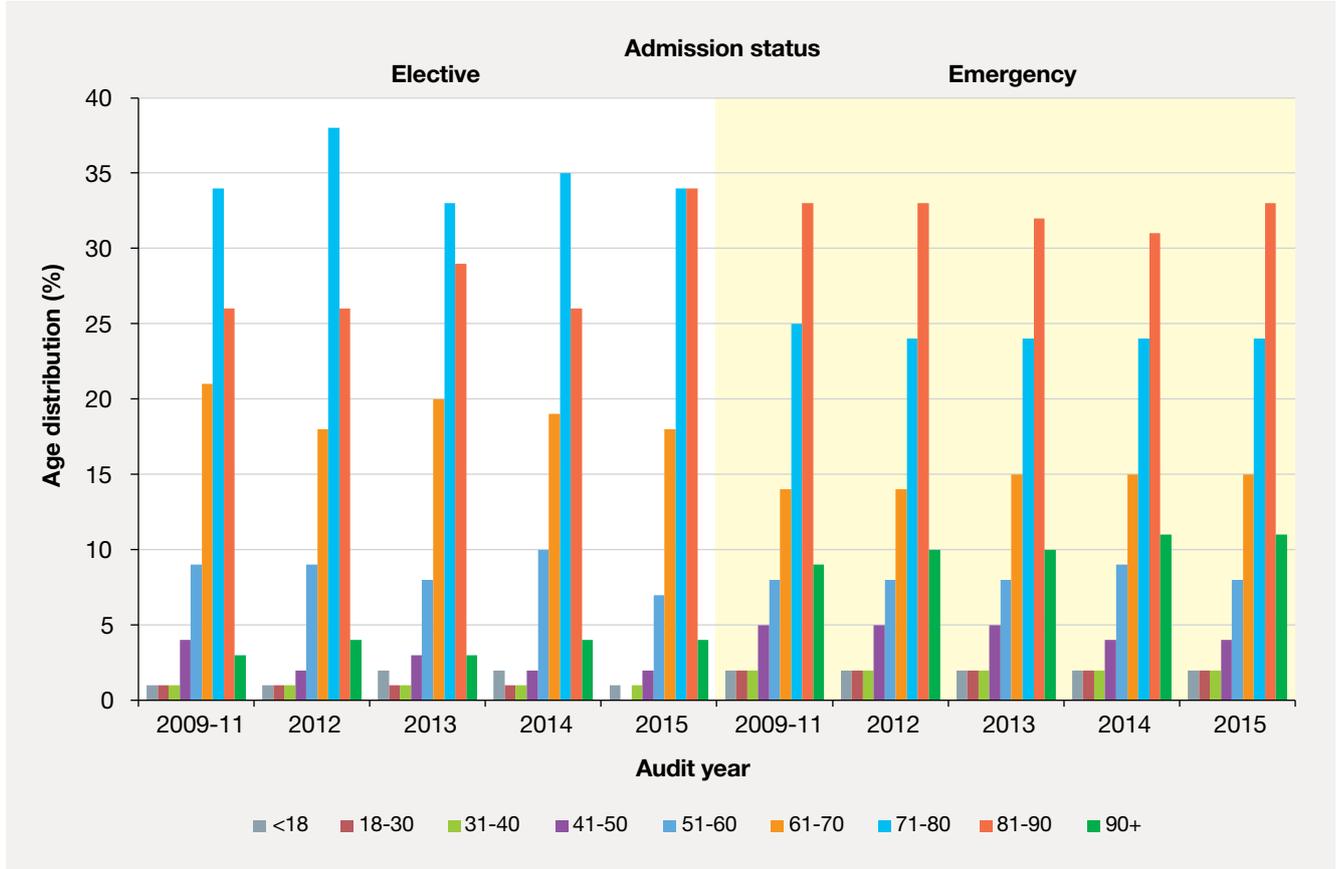


Data not available: n=392 (1%).
 Note: excludes extreme values.
 Elec: elective; Emerg: emergency.

Comment:

- Between 2009 and 2015, patients who died following an emergency admission were generally (with the exception of patients within the Northern Territory) older than those who died following an elective admission ($p < 0.001$; data not shown). In the reporting period, the median age of death was 72 years for elective admissions and 79 years for emergency admissions.
- The admission status distribution of audited deaths was similar across all regions, with the exception of the Northern Territory. Within the Northern Territory elective cases were older than emergency cases.

Figure 12: Age range distribution by year and admission status (n=28,042)



Data not available: n=392 (1%).

Comment:

- The age distribution of emergency and elective deaths has remained similar over time.
- Across the reporting period, the 71-80 age group contributed to more elective surgery deaths than any other group, while the 81-90 age group contributed the most emergency deaths.

3.3 Risk profile of audited cases

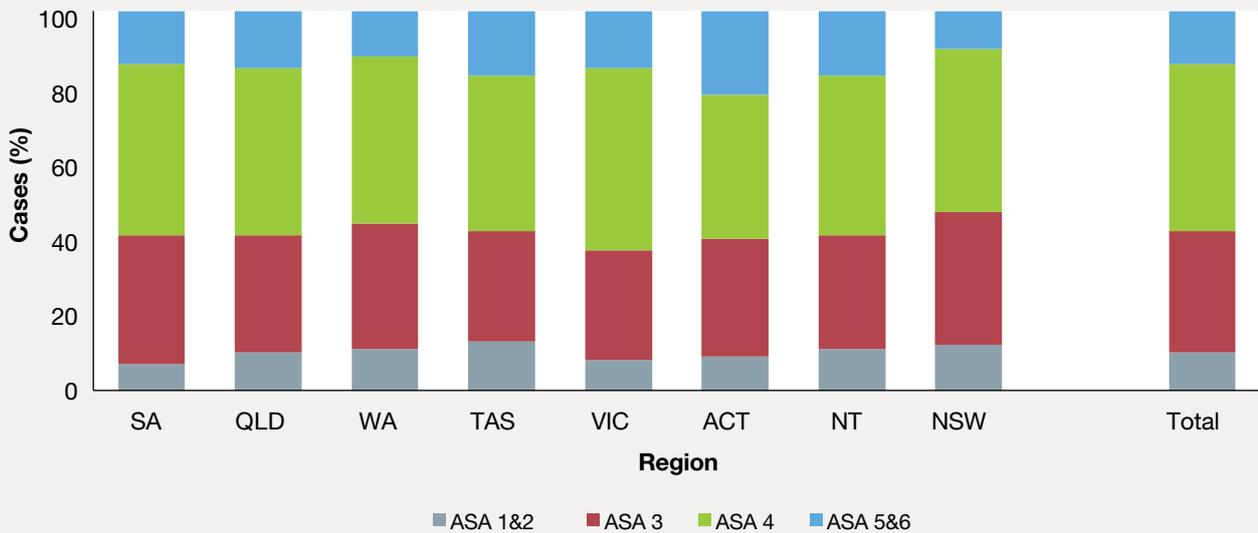
3.3.1 American Society of Anesthesiologists grade

The American Society of Anesthesiologists (ASA) grade 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=26,601)



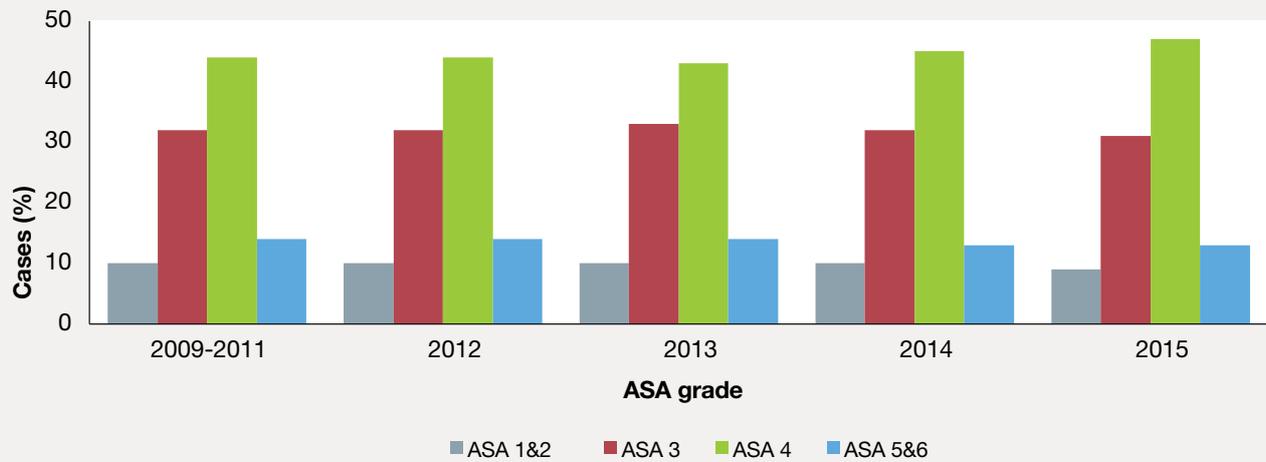
Data not available: n=1,833 (6%).

ASA: American Society of Anesthesiologists.

Comment:

- 76.4% (20,325/26,601) of patients had an ASA grade 3 or 4. This indicates that a relatively severe degree of systemic disease was present in the majority of patients at the time of treatment.
- The risk status as indicated by the ASA grade was similar in all regions.

Figure 14: Distribution of ASA grades by year (n=26,601)

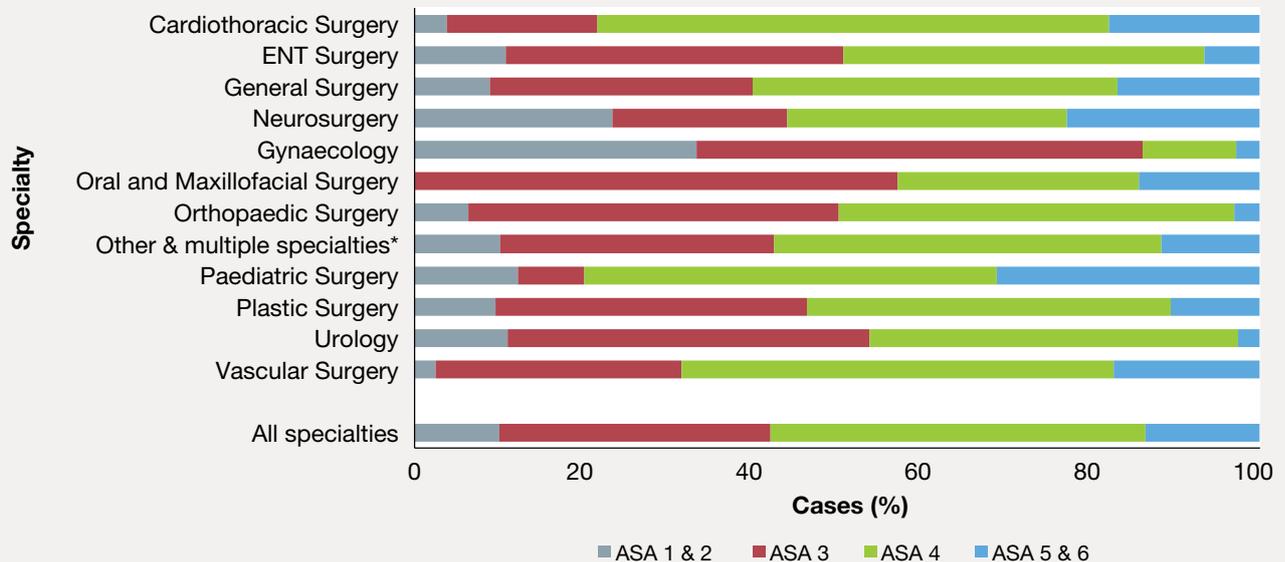


Data not available: n=1,833 (6%).
ASA: American Society of Anesthesiologists.

Comment:

- There were no major differences across the five audit periods. The percentage of patients with an ASA grade greater than or equal to 4 was similar across the years.

Figure 15: Frequency of ASA grades by surgical specialty (n=26,601)

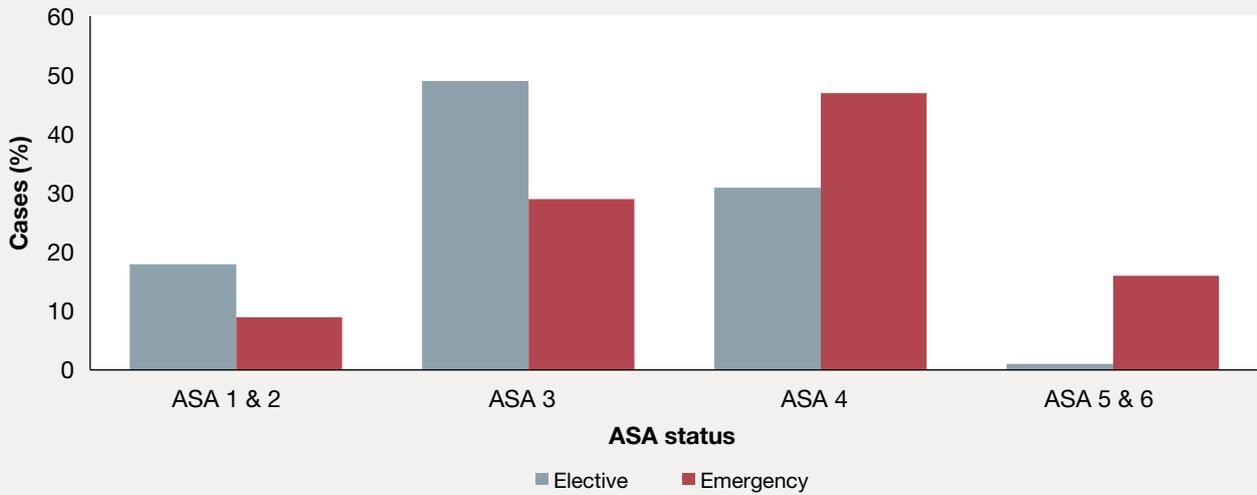


Data not available: n=1,833 (6%).
Other & multiple specialties*: other specialties listed by the treating surgeon include Anaesthesia, Intensive Care Unit, Oncology, Thoracic medicine, Ophthalmology and Trauma. Includes cases in which multiple specialties were involved in a single case.
ASA: American Society of Anesthesiologists; ENT: Ear, Nose and Throat.

Comment:

- There was some variation in ASA grades, reflecting the casemix of the different specialties. 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 Gynaecology, the patients tend to be younger.
- Some distortion of the data is seen in low volume areas such as Oral and Maxillofacial Surgery, and Gynaecology.

Figure 16: Frequency of ASA grades by admission status (n=26,601)



Data not available: n=1,833 (6%).
 ASA: American Society of Anesthesiologists.

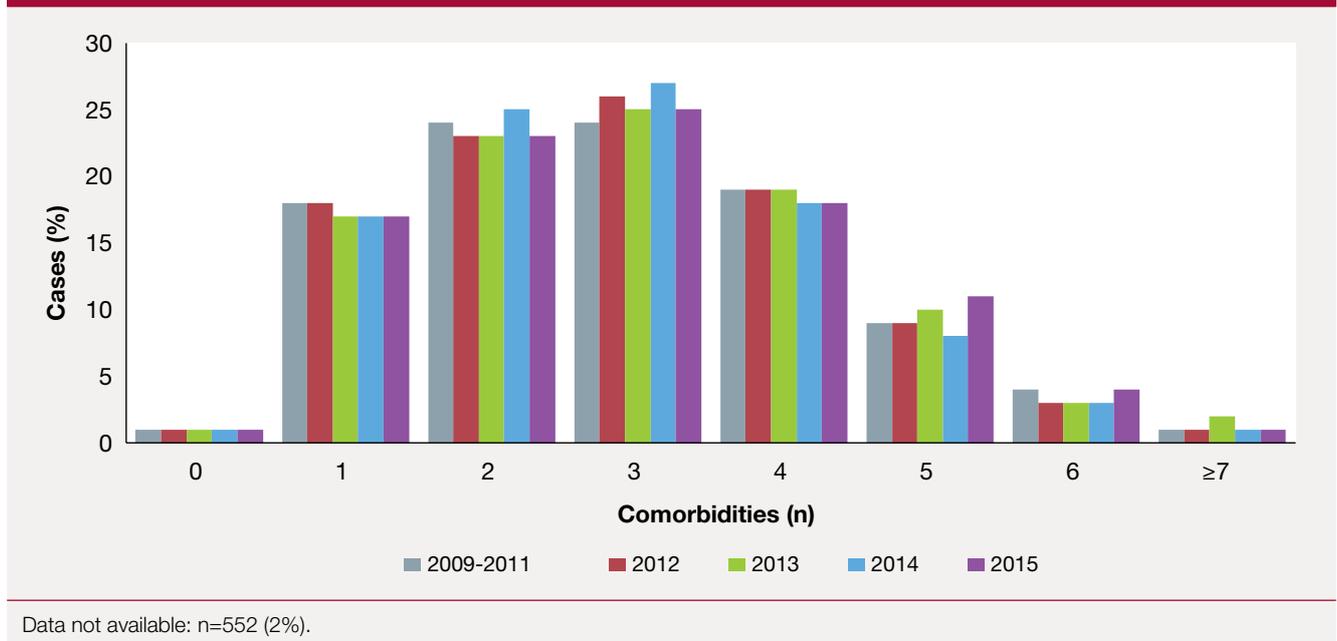
Comment:

- The majority of both emergency patients (91.4%; 20,504/22,437) and elective patients (81.7%; 3,139/3,844) were described as having an ASA grade greater than or equal to 3. The proportion of elective patients with an ASA score greater than or equal to 3 has decreased from the previous report (in which it was 82% of cases).⁽¹⁾

3.3.2 Comorbidity

Surgeons were asked to record all known comorbidities (coexisting medical conditions) in addition to the primary medical (presenting) problem. The number of comorbidities reported for individual patients by audit period is provided in Figure 17.

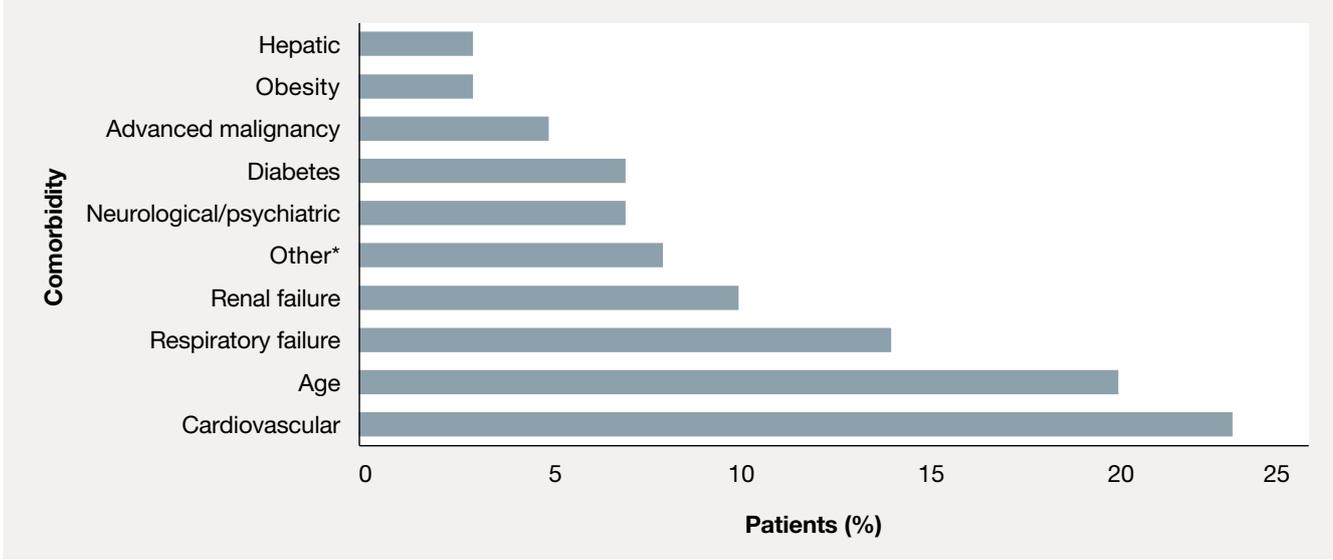
Figure 17: Number of comorbidities in individual patients across audit years (n=27,882)



Comment:

- One or more comorbidities were reported in 90.7% (25,298/27,882) of audited cases.
- 74.6% (20,804/27,882) of patients had at least two comorbidities, emphasising the high risk profile of this group of patients.
- The pattern of comorbidities is reasonably consistent across the audit years.
- Information on the specific types of comorbidities present in audit patients is provided in Figure 18.

Figure 18: Frequency of specific comorbidities (n=74,095 comorbidities in 27,882 patients)



Data not available: n=552 (2%).

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

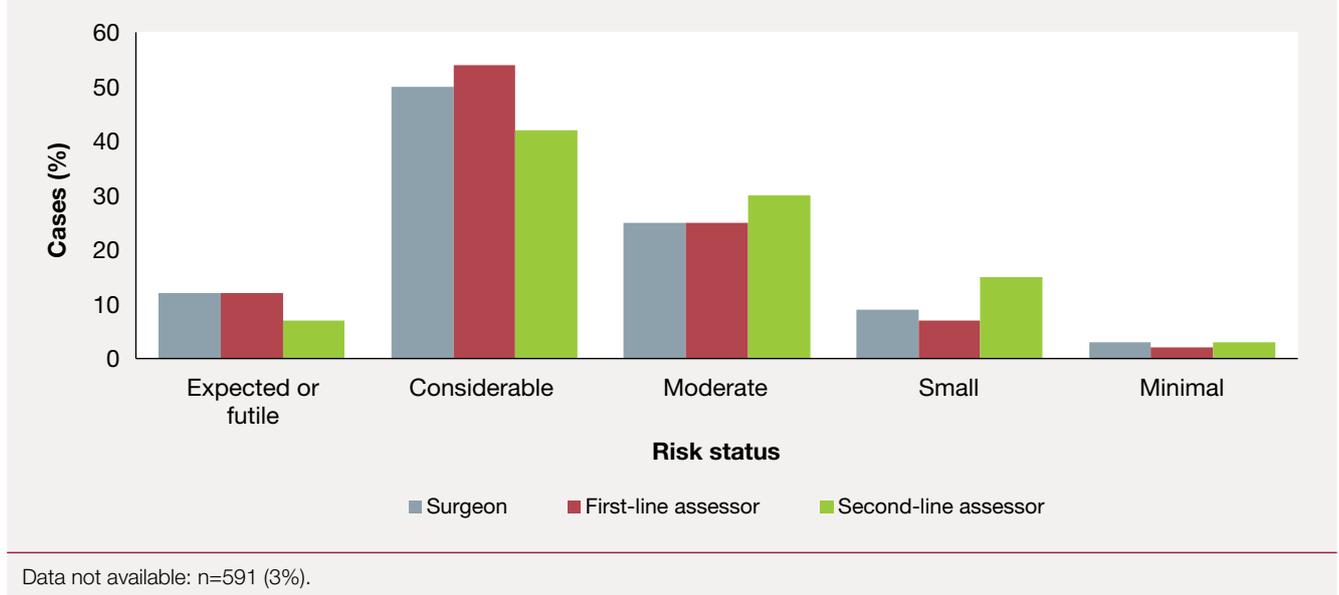
Comment:

- The most common comorbidities (cardiovascular, advanced age and respiratory failure) had a similar incidence in both male and female patients (data not shown).
- The number of cases involving obesity has increased, and since the last report has overtaken hepatic in terms of frequency.⁽¹⁾
- There were no major differences in the distribution of comorbidities between the five audit periods (data not shown).

3.3.3 Surgeon perception of risk status

The treating surgeon and assessors were asked to record the patient's perceived risk of death at the time of treatment (see Figure 19).

Figure 19: Risk of death as perceived by the treating surgeon and assessors (n=21,915)



Comment:

- The perceived risk of death, as reported by surgeons, was considerable or expected in 62.7% (13,741/21,915) of cases, and small or minimal in 12% (2,634/21,915) of cases. This is further evidence of the high-risk profile of this patient group suggested by the mean age, ASA score and associated comorbidity.
- There was a reasonable correlation between the treating surgeon, the first-line assessor and the second-line assessor in regards to the risk of death.
- The patient's risk of death was perceived to be considerable or expected by the surgeon in 62.7% (13,741/21,915) of cases; by the first-line assessor in 66.2% (14,274/21,549) of cases; and by the second-line assessor in 50.4% (1,613/3,200) of cases.

4 RISK MANAGEMENT STRATEGIES

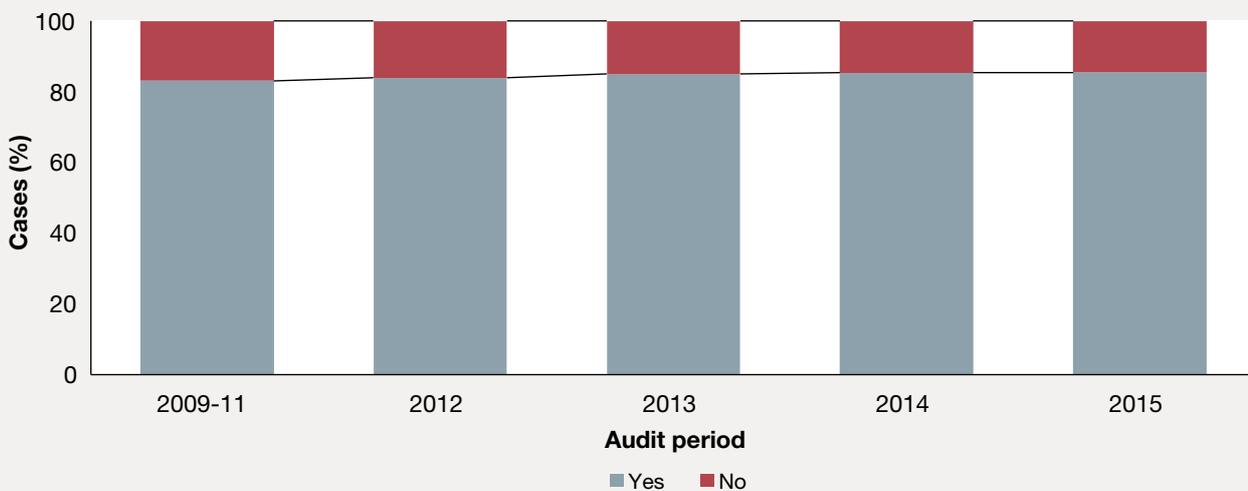
KEY POINTS

- ▶ The use of DVT prophylaxis was recorded for 84.2% (18,243/21,659) of cases where a surgical procedure was performed. Across the regions, DVT prophylaxis usage varied from 76% to 86% of cases.
- ▶ In only 2.3% (556/23,960) of cases did the assessors conclude that the DVT prophylaxis management was not appropriate.
- ▶ In the majority of instances, patients received critical care support. The review process suggested that 7.2% (713/9,942) 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 7.8% (2,278/29,389) of patients were perceived to have had poor management of their fluid balance.

4.1 Prophylaxis for DVT

The treating surgeon was asked to record whether DVT prophylaxis was given and if it was, the type of prophylaxis used (see Figures 20 and 21). If DVT prophylaxis was not given, the treating surgeon was asked to record why it was withheld. Assessors were asked to review the appropriateness of the use, or non-use, of DVT prophylaxis.

Figure 20: DVT prophylaxis use during the audit period (n=21,659)

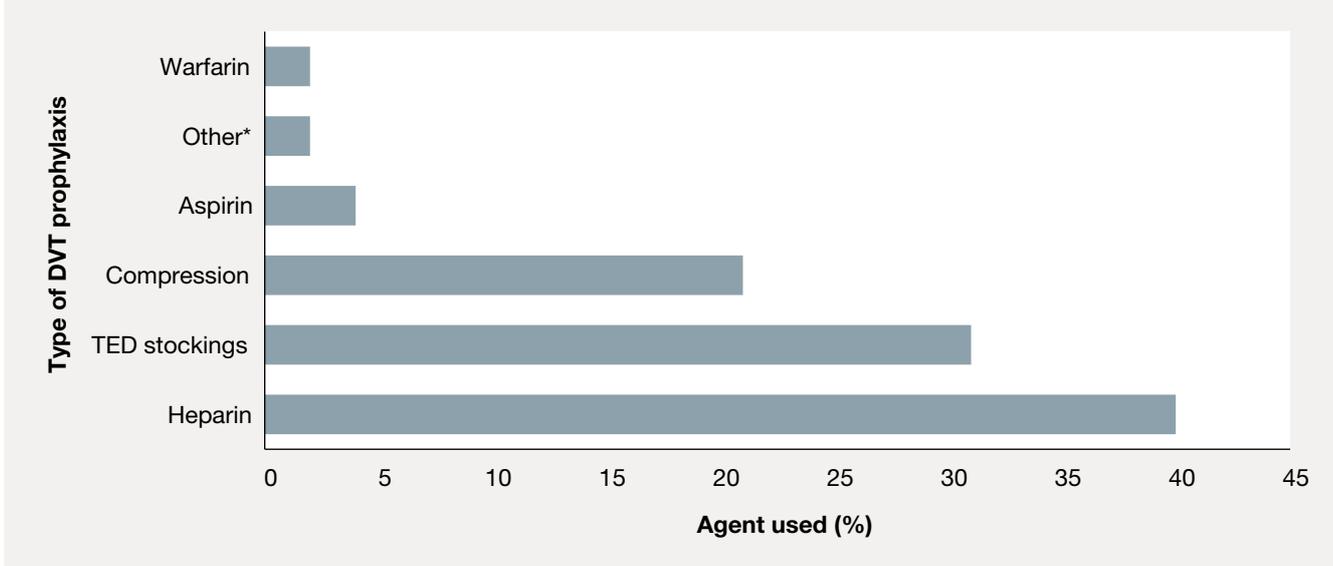


Data not available: n=847 (3.7%).
 DVT: deep vein thrombosis.

Comment:

- DVT prophylaxis was used in 84.2% (18,243/21,659) of all cases that underwent an operation. Usage has remained steady across the audit periods.

Figure 21: Type of DVT prophylaxis used (n=33,973 instances in 18,243 cases)



Data not available: n=847 (3.7%).
 *Includes Clexane, Clopidogrel, Danaparoid, Enocaprin, Enoxaparin, early mobilisation, Fragmin, inferior vena cava filter, Lepirudin and Plavix.
 DVT: deep vein thrombosis; TED: thromboembolic deterrent

Comment:

- The most frequently used prophylaxis agents were heparin (40.3%; 13,691/33,973) and thromboembolic deterrent (TED) stockings (30.5%; 10,377/33,973).

The distribution of DVT prophylaxis use by region is shown in Table 4.

Table 4: Distribution of DVT prophylaxis use by region (n=33,973 instances in 18,243 patients)

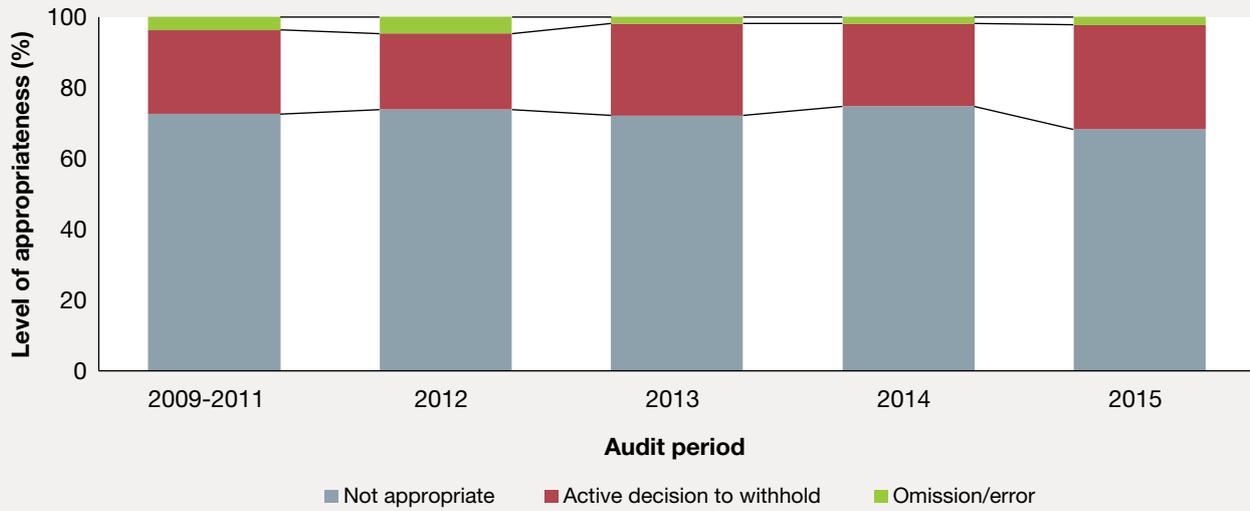
DVT prophylaxis agents used	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
Heparin (any form)	46%	35%	44%	40%	45%	43%	38%	38%
Warfarin	2%	2%	1%	1%	2%	2%	2%	2%
Aspirin	4%	5%	4%	4%	4%	3%	4%	3%
Sequential compression device	18%	23%	17%	25%	17%	22%	21%	25%
TED stockings	27%	33%	32%	28%	29%	27%	33%	31%
Other*	3%	2%	2%	2%	3%	3%	2%	1%

Data not available: n=847 (3.7%).
 *Includes Clexane, Clopidogrel, Danaparoid, Enocaprin, Enoxaparin, early mobilisation, Fragmin, inferior vena cava filter, Lipirudin and Plavix.
 DVT: deep vein thrombosis; TED: thromboembolic deterrent.

Comment:

- 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=2,962)

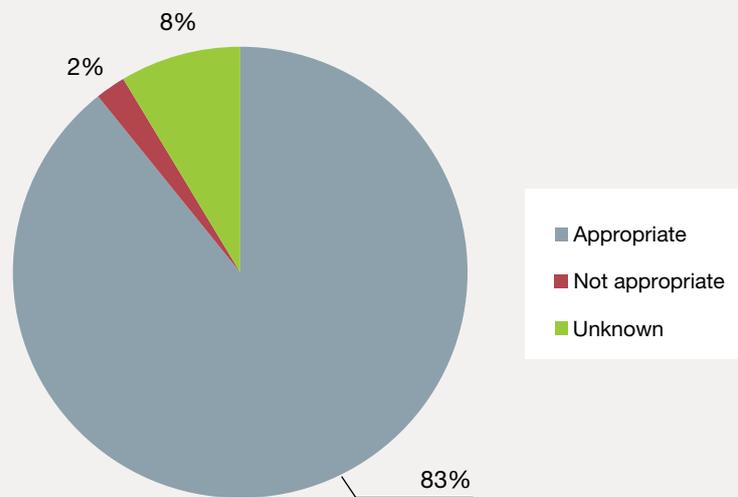


Data not available: n=454 (13%).
 DVT: deep vein thrombosis.

Comment:

- Over the entire audit period, non-use of DVT prophylaxis was due to error or omission in only 3.1% (92/2,962) of cases. 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: Appropriateness of DVT prophylaxis management as perceived by first- and second-line assessors (n=23,960)



Data not available: n=1,648 (6.4%).
DVT: deep vein thrombosis

Comment:

- Assessors concluded that DVT prophylaxis usage for cases in which the patient underwent a surgical procedure was not appropriate in 2.3% (556/23,960) of cases. The assessors also stated that appropriateness was unknown in 8.6% (2,068/23,960) of cases.

Case study #1: Inadequate DVT prophylaxis leads to pulmonary embolus

Summary:

An elderly patient was admitted for a knee replacement. The operation proceeded uneventfully and the patient's initial recovery was unremarkable. In the middle of the sixth postoperative day the patient was assisted to the toilet. A short while later the alarm was sounded and the patient was found collapsed. Resuscitation was unsuccessful. No postmortem was undertaken.

Collapse following a call to stool is a classical presentation of pulmonary embolus. Although a pulmonary embolus was considered the likely diagnosis by the medical officer attending the arrest call, it does not appear to have been considered as a possible diagnosis by the surgeon. The surgeon indicated that subcutaneous heparin was used as DVT prophylaxis. On the medication chart the first dose of subcutaneous heparin appears to have been given some 30 hours after the commencement of the surgery. The nurse progress chart suggests that a foot pump was used on the operation day, but thereafter neither a pump nor antiembolic stockings were used.

Clinical lessons:

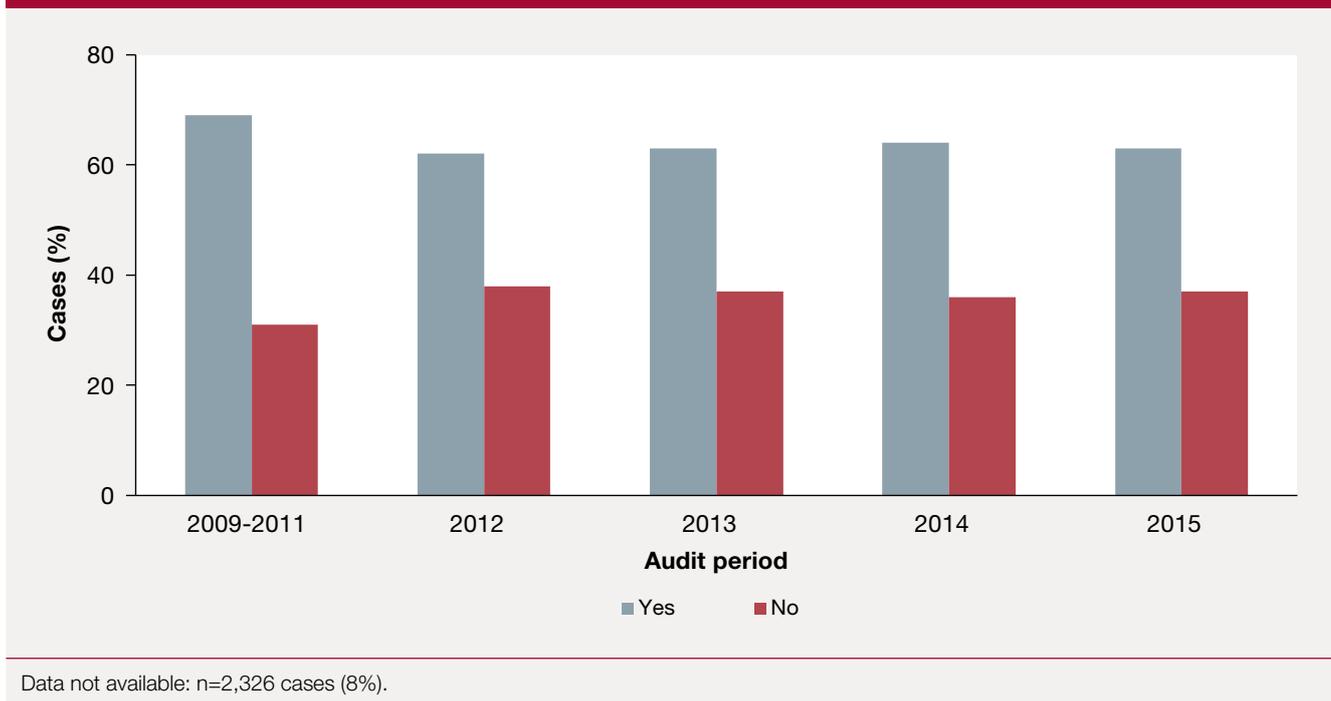
Knee surgery is a high risk procedure for DVT and pulmonary embolus, and DVT prophylaxis must be administered in a timely fashion. Presumably prophylactic subcutaneous heparin was the surgeon's intended antithrombotic management, but it does not appear to have been administered as ordered. The discontinued use of pumps or stockings, as well as the apparent delay in anticoagulation administration could have detrimentally contributed to the overall outcome in this case.

4.2 Provision of critical care support to patients

The treating surgeon was 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 reviewed the appropriateness of the use, or non-use, of critical care support. It is recognised that this is a subjective assessment of needs and potential benefit.

The SCF was revised in early 2014 to collect data on the reasons why patients did not receive critical care support and to rectify the lack of data in this section. It is anticipated that this revision will provide more information on this area of care, which can then be appropriately analysed.

Figure 24: Provision of critical care support during audit period (n=26,108)



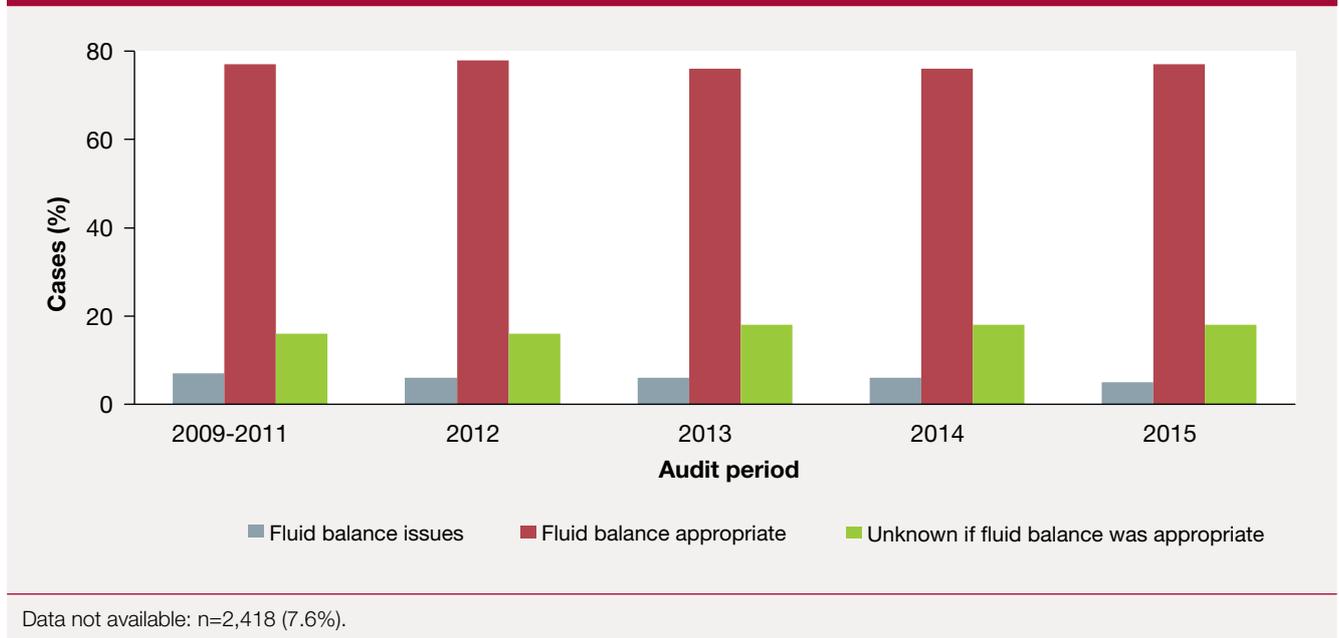
Comment:

- Critical care support was received by 65.3% (17,057/26,108) of all patients.
- It should be noted, if a patient did not receive critical care it does not necessarily indicate a lack of facilities.
- Over the reporting period, the assessors perceived that 7.2% (713/9,942) of patients who did not receive critical care support might have benefited from it.
- Between 2009 and 2015, 8% of cases lacked data on the provision of critical care support.

4.3 Fluid management

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

Figure 25: Appropriateness of fluid management by assessor (n=29,389)



Comment:

- In 7.8% (2,278/29,389) of cases, the assessors considered that there was an issue with fluid balance. In a further 15.9% (4,685/29,389) of cases, the assessors indicated that the evidence provided was inadequate to support a conclusion.

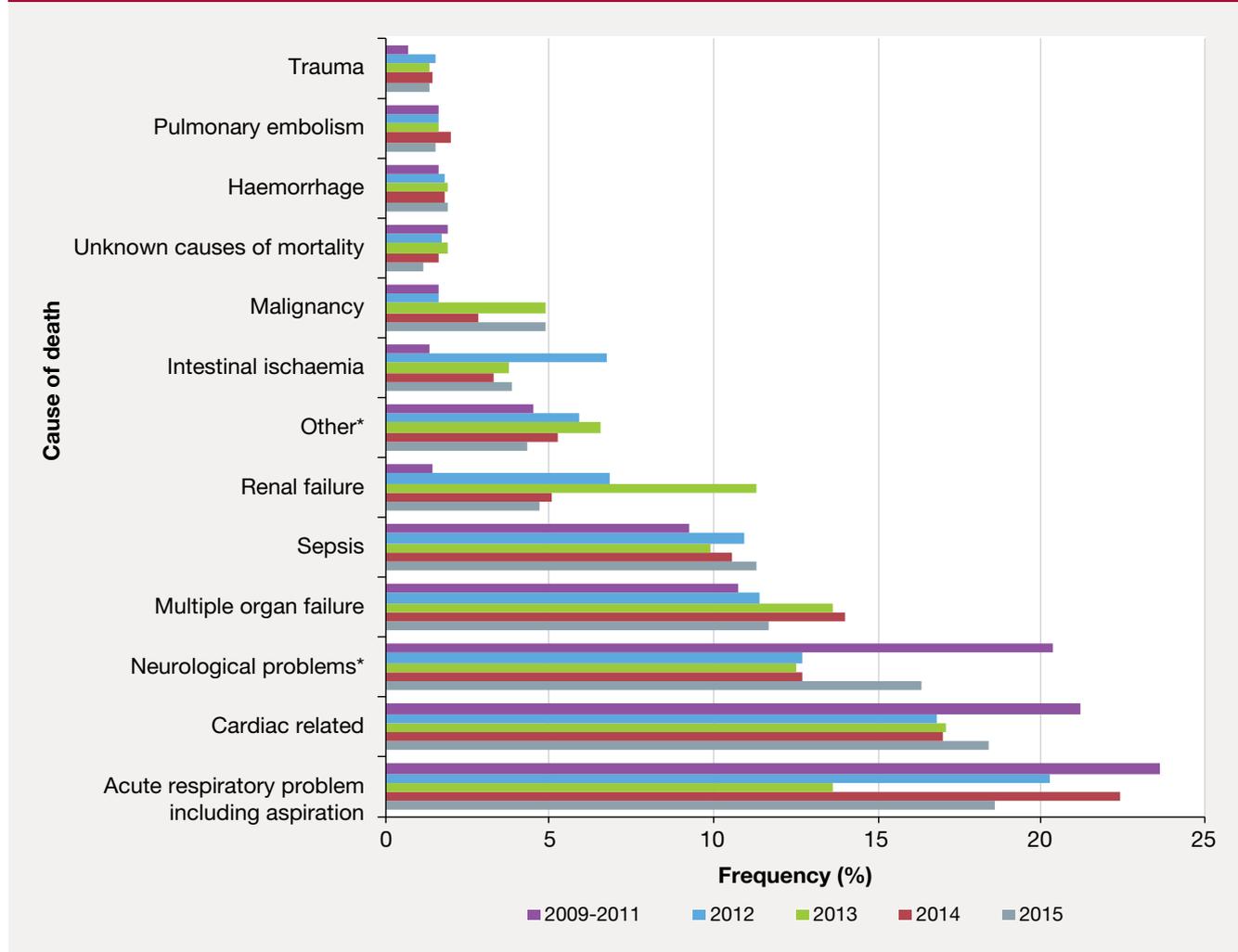
5 CAUSE OF DEATH

KEY POINTS

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

5.1 Most frequent causes of death

Figure 26: Top 12 causes of death (n=36,399 causes of death recorded for 28,070 patients)



Data not available: n=364 patients (1%).

Neurological problems include diffuse brain injury, head injury, intracerebral haemorrhage, subarachnoid haemorrhage and subdural haematoma. Other includes Ruptured abdominal aortic aneurysm, intestinal obstruction, peritonitis, perforation of intestine, acute pancreatitis, hypotension, hypovolaemic shock, fracture neck of femur, malnutrition, acidosis, coagulation defects, cholangitis, necrotising fasciitis, falls, cirrhosis of liver and anaphylactic shock.

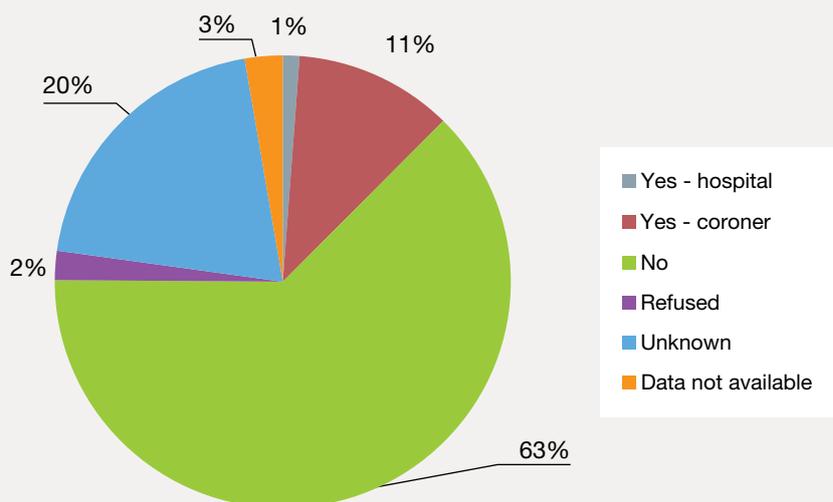
Comment:

- Across the reporting periods, the frequency of cases relating to acute respiratory problems and cardiac-related issues has remained high.⁽¹⁾

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 the cause of death is being 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=27,671)



Data not available: n=763 cases (3%).

Table 5: Overview of postmortems performed by region (n=27,671)

Postmortem status	SA	QLD	WA	TAS	VIC	ACT	NT	NSW
Yes – hospital	<1%	1%	1%	2%	1%	2%	2%	2%
Yes – coroner	12%	8%	12%	10%	17%	29%	15%	9%
Refused	<1%	2%	2%	2%	3%	2%	1%	2%
Unknown	29%	18%	19%	22%	21%	25%	14%	19%
No	58%	71%	66%	64%	58%	42%	68%	68%

Data not available: n=763 cases (3%).

Comment:

- The majority of postmortems were coronial. The need for coronial input varied amongst regions, with the highest percentage of cases recorded in the Australian Capital Territory.
- Across all regions, coronial postmortem was reported to have been performed in only 12.8% (3,534/27,671) of audited cases. In some of the regions the numbers were low.
- In the reporting period, 87.2% (24,137/27,671) of cases a postmortem was not performed, refused, or it is unknown whether one was conducted.
- The low rate of postmortems limits confirmation of the cause of death.
- There were no significant changes in trends across the audit periods (data not shown).

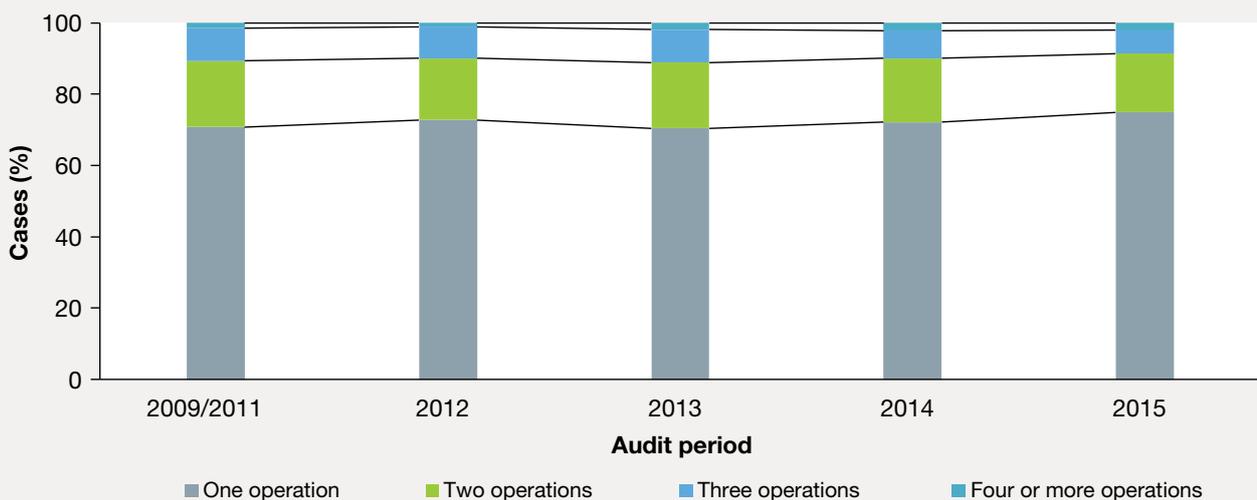
6 PROFILE OF OPERATIVE INTERVENTION

KEY POINTS

- ▶ A surgical procedure was performed on 79.4% (22,506/28,434) of patients. More than one visit to the operating room was required for 28.2% (6,343/22,506) of patients during their hospital stay.
- ▶ A consultant surgeon made the decision to operate in 87.6% (27,983/31,962) of operations and performed them in 61.9% (19,779/31,962) of cases.
- ▶ The rate of subsequent (unplanned) returns to theatre was 16.1% (3,484/21,603), with some patients requiring multiple episodes of surgery.
- ▶ The most common postoperative complications were postoperative bleeding, procedure-related sepsis and tissue ischaemia.

6.1 Operative rate

Figure 28: Frequency of patients undergoing one or more operations by audit period (n=22,506)



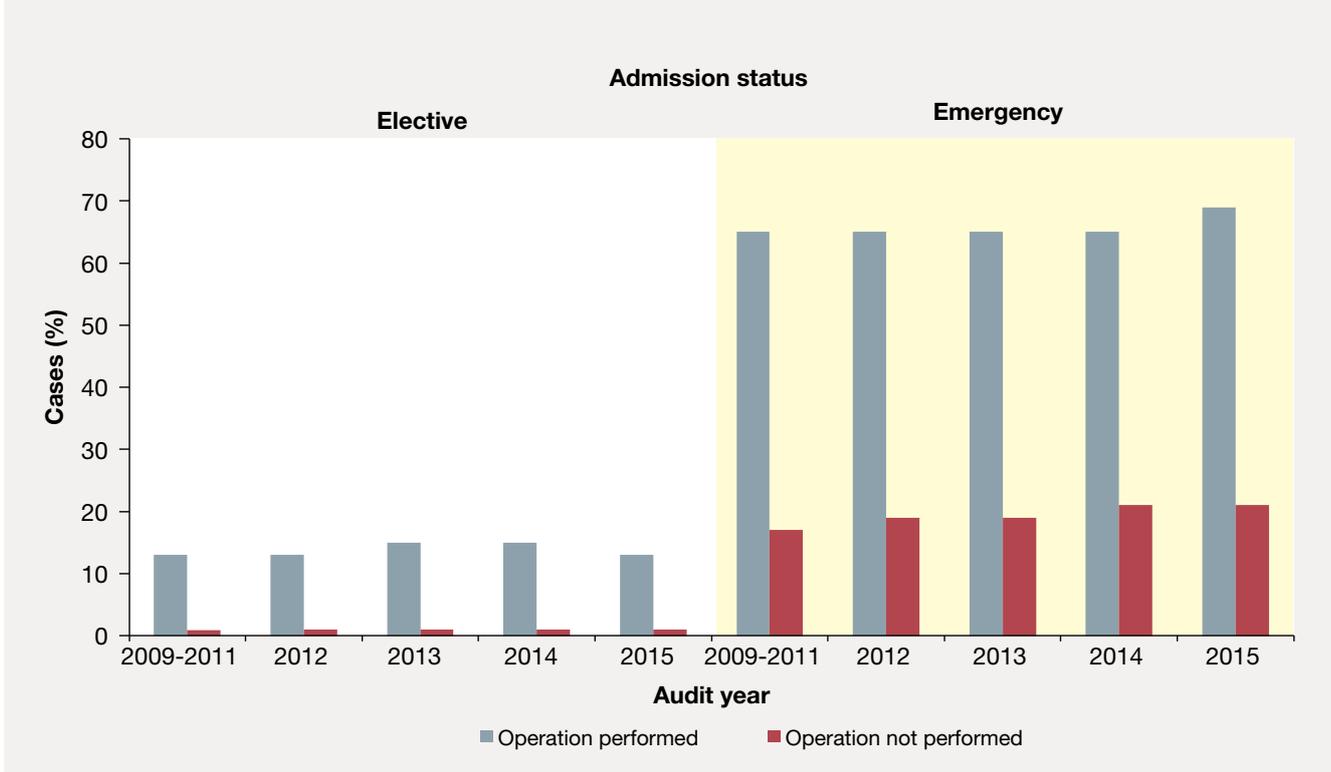
Data not available: n=85 cases (<1%).

Comment:

- 79.4% (22,506/28,349) of audit patients underwent an episode of surgery either during their last admission, or within 30 days prior to death.
- 20.6% (5,843/28,349) of patients had no surgery during their final admission.
- A total of 31,962 operative episodes were undertaken on the 22,506 patients who had surgery, reflecting the fact that an individual patient can have more than one episode of surgery during their admission.
- 71.8% (16,163/22,506) of patients had just one operation.
- 28.2% (6,343/22,506) of patients had more than one operation.
- There has been relatively little change in the frequency of multiple operations between the 2009 and 2015 reporting periods.

Operative and nonoperative cases by admission status and year are shown in Figure 29.

Figure 29: Operative and nonoperative cases by admission status (n=28,349 patients)



Data not available data: n=5 (<1%) for elective cases and n=80(<1%) for emergency cases.

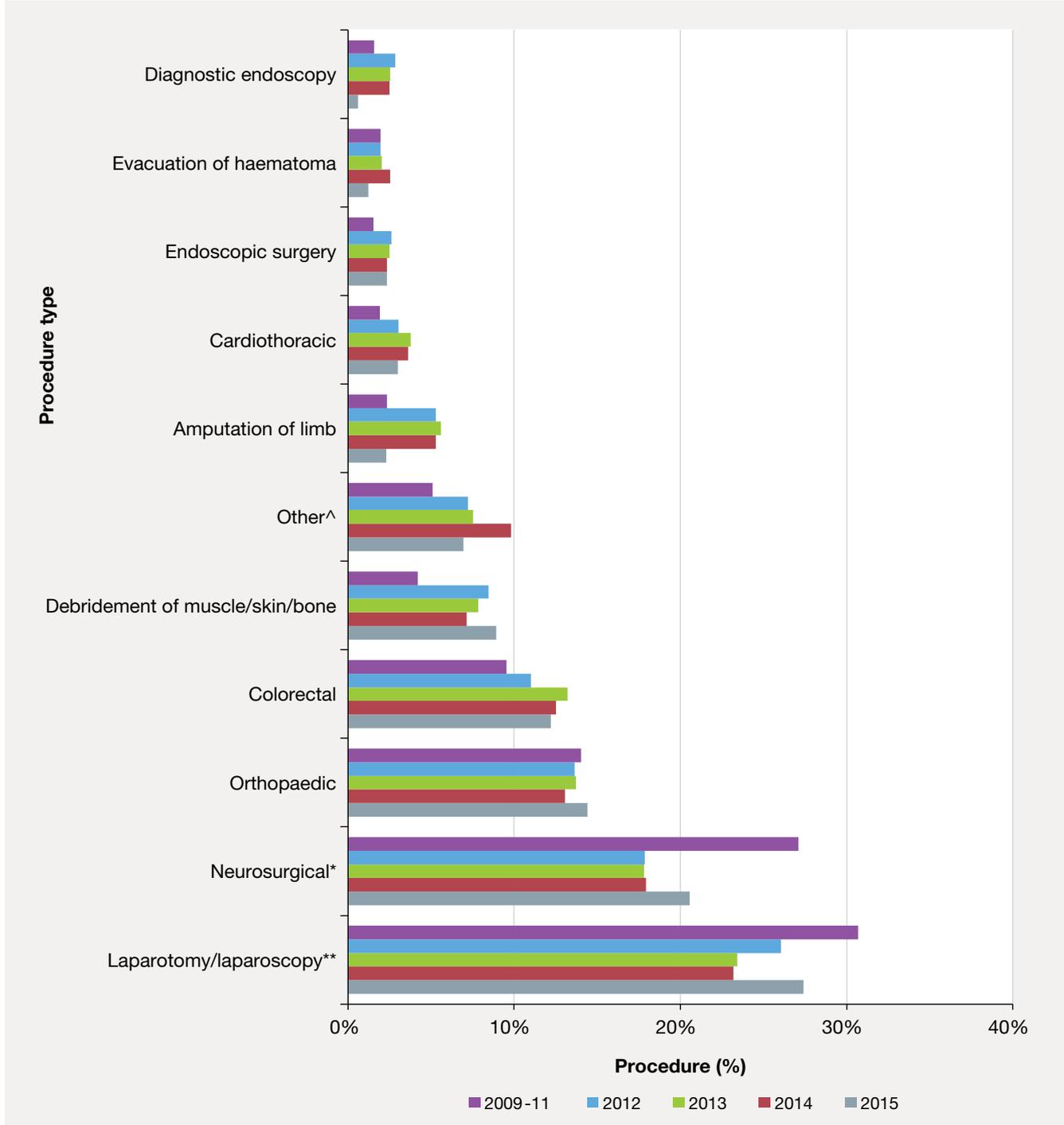
Comment:

- Across the reporting periods, 4.3% (170/3,994) of elective admission patients, and 23.4% (5,604/23,963) of emergency admission patients, did not undergo an operation prior to death. 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 is shown in Figure 30. A patient can undergo multiple procedures during the same admission and during the same surgical episode.

Figure 30: Types of procedure, where the number of procedures (n=31,962 procedures in 22,506 patients)



*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).

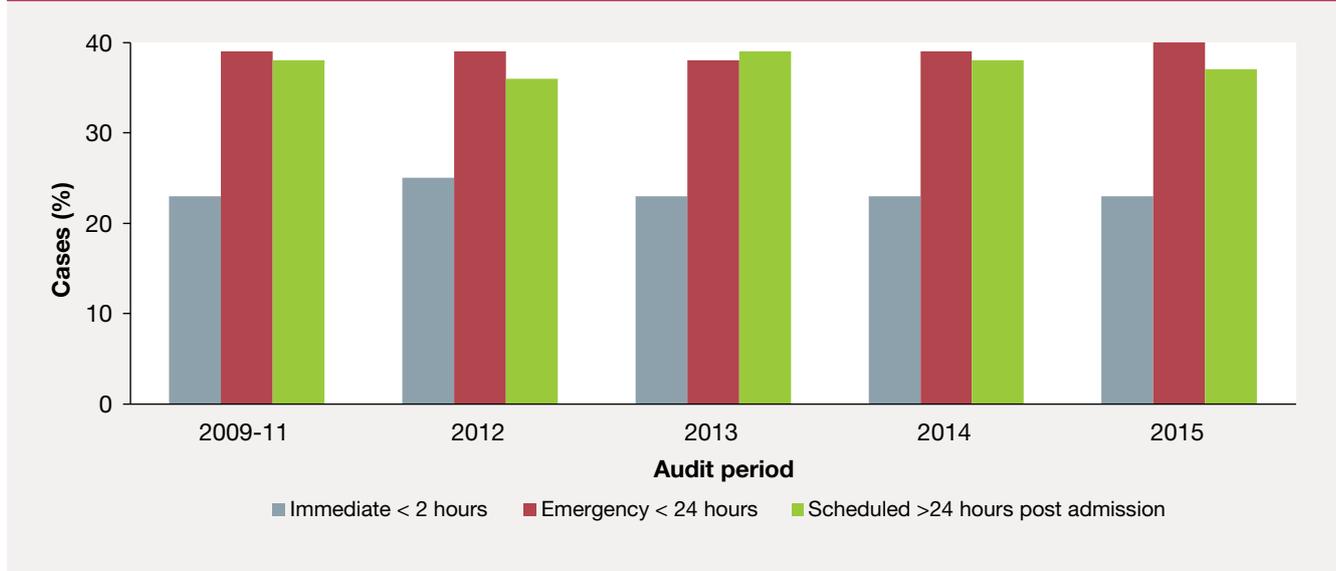
Other^ includes dressing of wound, cerebral angiogram & embolisation/coil, hernia repair, peripheral vascular procedure, haemorrhage control by packing, total cholecystectomy, tracheostomy, fasciotomy, splenectomy, open embolectomy of femoral artery, closure of perforated duodenal ulcer, operation abandoned, pancreaticoduodenectomy and nephrectomy.

Comment:

- The laparotomy/laparoscopy operation group were likely to include multiple procedures. Neurosurgical procedures was the other operative category a high number of recorded procedures. Only the top 10 procedures are listed in the figure.

6.3 Timing of emergency episodes

Figure 31: Timing of emergency surgical episodes (n=22,188)



Data not available data: n=5 (<1%) for elective cases and n=80(<1%) for emergency cases.

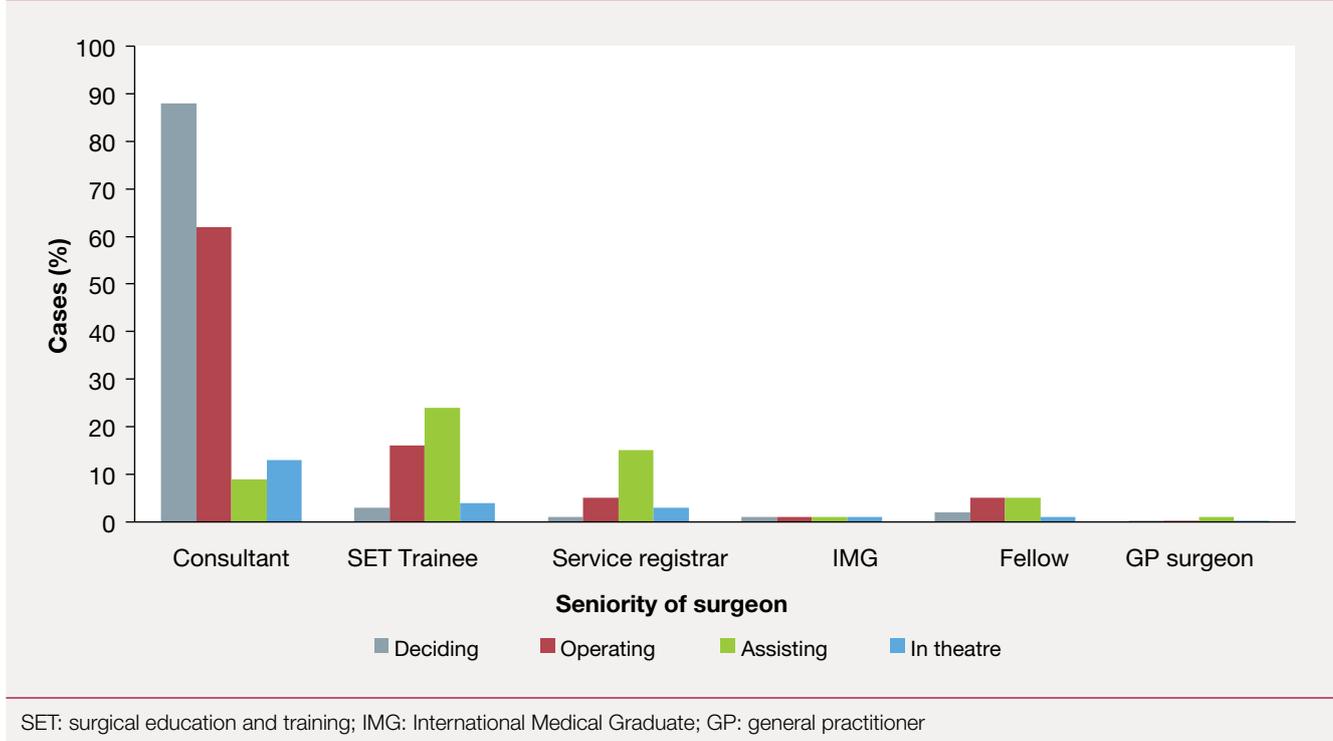
Comment:

- The timing and urgency of operations has been relatively consistent across the audit periods.
- The urgency (time criticality) of a patient’s condition predicts the timing of any surgery.
- 62.1% (13,788/22,188) of patients were classified as emergency or immediate surgical admissions.
- 37.9% (8,400/22,188) of emergency admissions to a surgical unit went to surgery within 24 hours of admission.
- The majority of emergency surgery was performed in the public sector across the reporting periods (data not shown).

6.3.1 Seniority of surgeon performing surgery

The surgeon completing the SCF was asked to record the seniority of the surgeon who made the clinical decision to operate as well as the seniority of the surgeon who performed the surgery (see Figure 32).

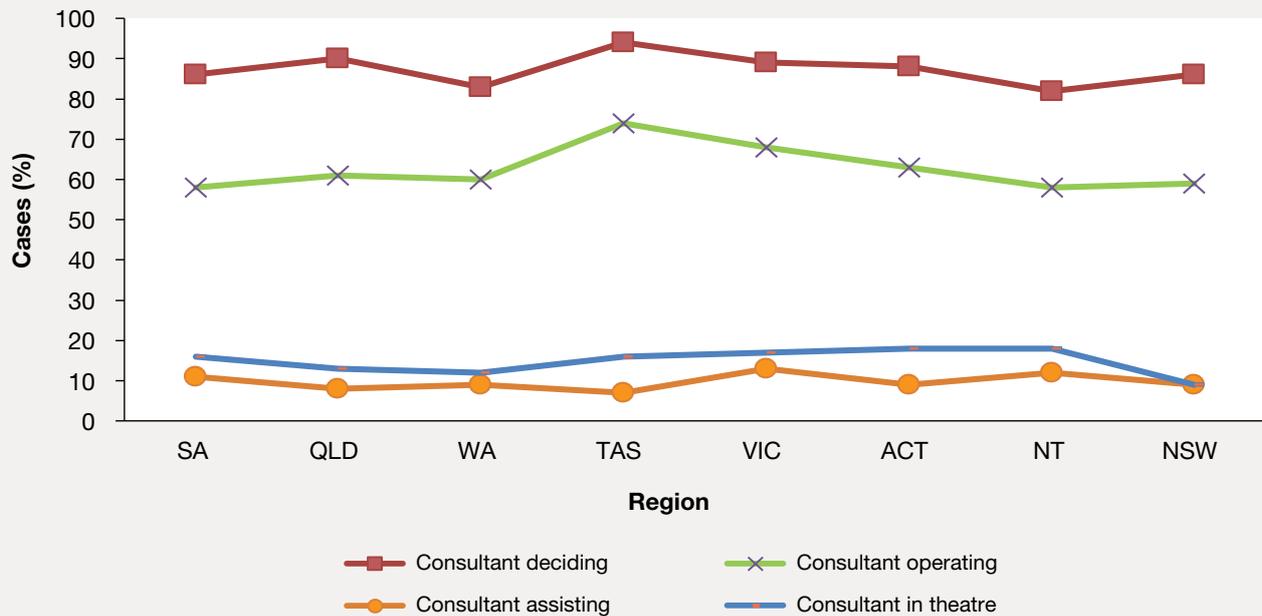
Figure 32: Seniority of the surgeon making the decision to operate and performing the surgery (n=31,962 operations in 22,506 patients)



Comment:

- The input from consultant surgeons was high. In 87.6% (27,983/31,962) of cases, the consultant surgeon made the decision to operate.
- For each surgical episode there may have been more than one grade of surgeon deciding, operating, assisting, or in theatre.
- Between 2009 and 2015 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).

Figure 33: Consultant involvement in surgery by region (n=31,962 operations in 22,506 patients)



Comment:

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

6.4 Unplanned return to theatre

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

Table 6: Percentage of patients with an unplanned return to theatre (n=21,603)

Return to theatre status	2009 – 2011	2012	2013	2014	2015
No return to theatre	83.7%	83.4%	83.1%	83.3%	85.3%
Return to theatre	16.2%	16.5%	16.6%	16.5%	14.5%
Do not know	0.1%	0.1%	0.3%	0.2%	0.2%

Data not available: n=903 (4%).

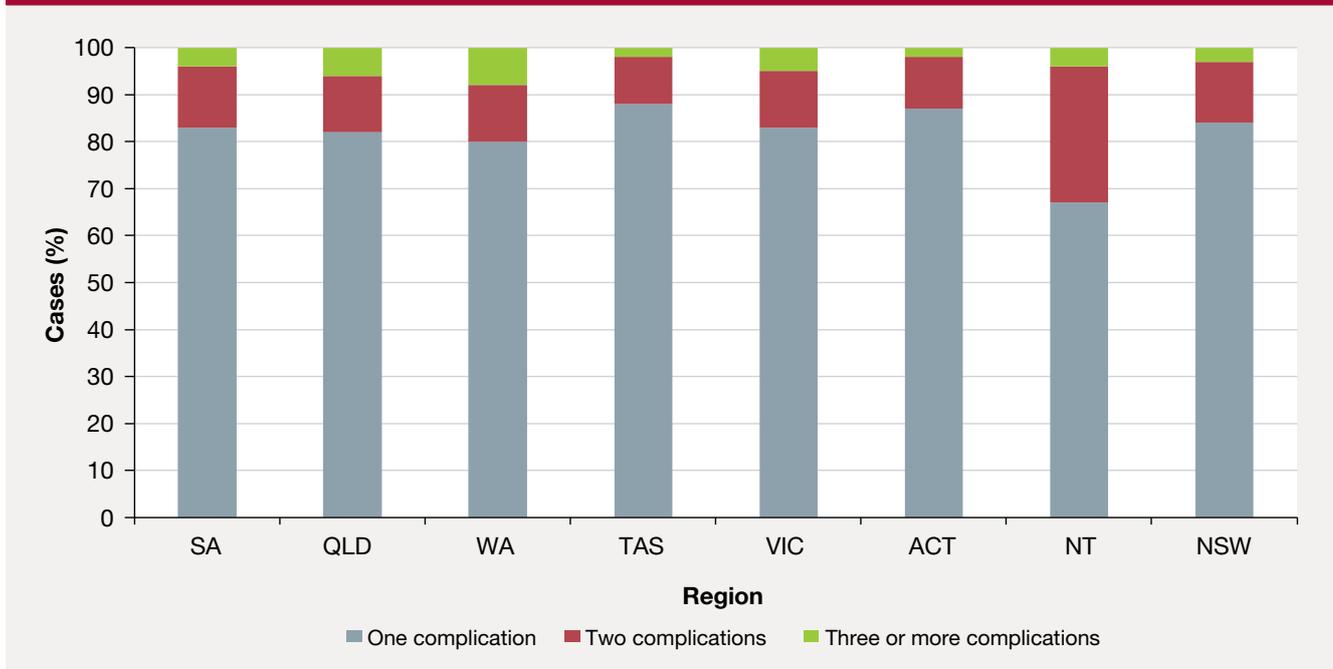
Comment:

- 16.1% (3,484/21,603) of patients who underwent a surgical procedure had an unplanned return to theatre.
- The proportion of patients requiring a return to theatre was relatively unchanged across the audit periods.

6.5 Postoperative complications

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

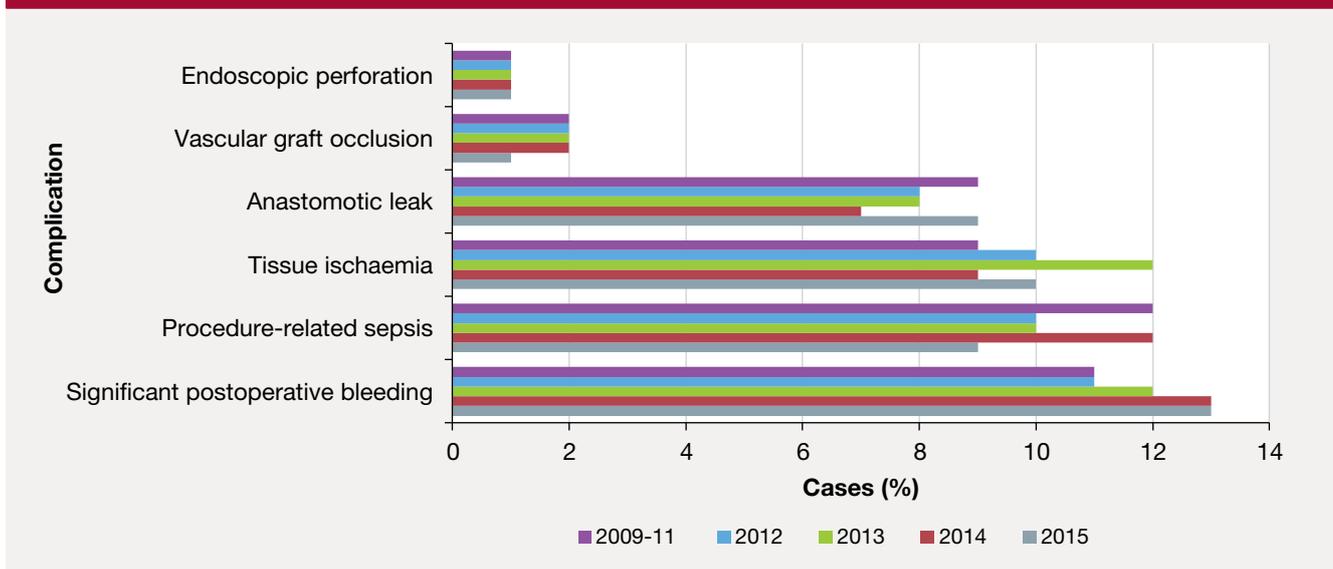
Figure 34: Patients developing one or more postoperative complications (n=7,317 patients in 22,506 patients)



Comment:

- Postoperative complications were reported in 32.5% (7,317/22,506) of patients who underwent a surgical procedure.
- Significance varies from minor (no effect on outcome) to major (led to death).
- Compared to other regions, the number of complications in the Northern Territory differed, where patients can present with a larger number of pre-existing comorbidities.

Figure 35: Distribution of types of postoperative complications (n=6,603)



Comment:

- Other complications were identified, including: cardiac failure, intrapulmonary haemorrhage, intracerebral bleeding, 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.
- Between 2009 and 2015, the most common postoperative complications 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 2015 like vascular graft occlusion.

6.6 Anaesthetic problems

A general anaesthetic in a critically ill elderly patient with comorbidities is a dangerous situation, even more so in an emergency when there is not enough time to optimise the patient's state. Drug reactions, and cardiac and respiratory complications may occur. According to surgeons' assessments, 7.5% (1,653/22,050) of cases were thought to have an anaesthetic component to the death.

- Anaesthesia was suggested as a significant factor in the death of 1.5% (337/22,050) of patients who had a surgical procedure. Anaesthesia was possibly involved in the outcome in 6% (1,316/22,050) of cases across the reporting period.
- The proportion of cases for which anaesthetic issues were raised was relatively unchanged between 2009 and 2015 (data not shown).
- Cases where anaesthesia appeared to play a major role are referred to the appropriate regional Anaesthetic Death Review Committee, where available. These cases have often already been identified by the anaesthetic group.

6.7 Operative procedure abandoned

The treating surgeon was asked to record whether they abandoned any surgical procedure. If the surgeon finds during surgery that the patient is suffering from an incurable or untreatable disease, they may decide to abandon the operative procedure. Such a decision was made in 5.5% (1,534/27,763) of operations. The proportion of abandoned operations was largely unchanged between 2009 and 2015 (data not shown).

7 PATIENT TRANSFER ISSUES

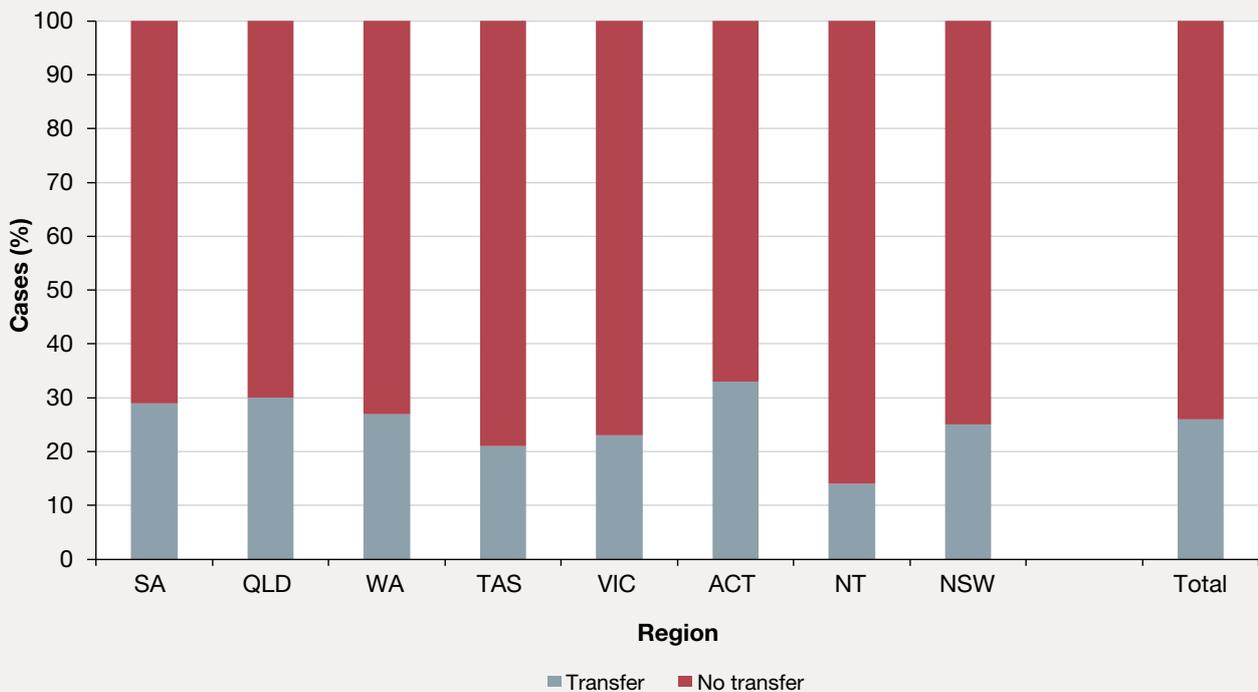
KEY POINTS

- ▶ A transfer between hospitals was required in 26.1% (5,759/22,039) of cases where an operation was performed.
- ▶ 10.6% (609/5,759) of issues raised related to transfer delays. In 5.6% (324/5,759) of cases related to inappropriateness of transfer, and 4.3% (248/5,759) to insufficient clinical documentation.

7.1 Frequency of need for transfer

The audit process examines transfers between hospitals. A 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 in which a transfer occurred.

Figure 36: Frequency of need for transfer to another hospital, by region (n=22,039)



Data not available: n=467 (2%).

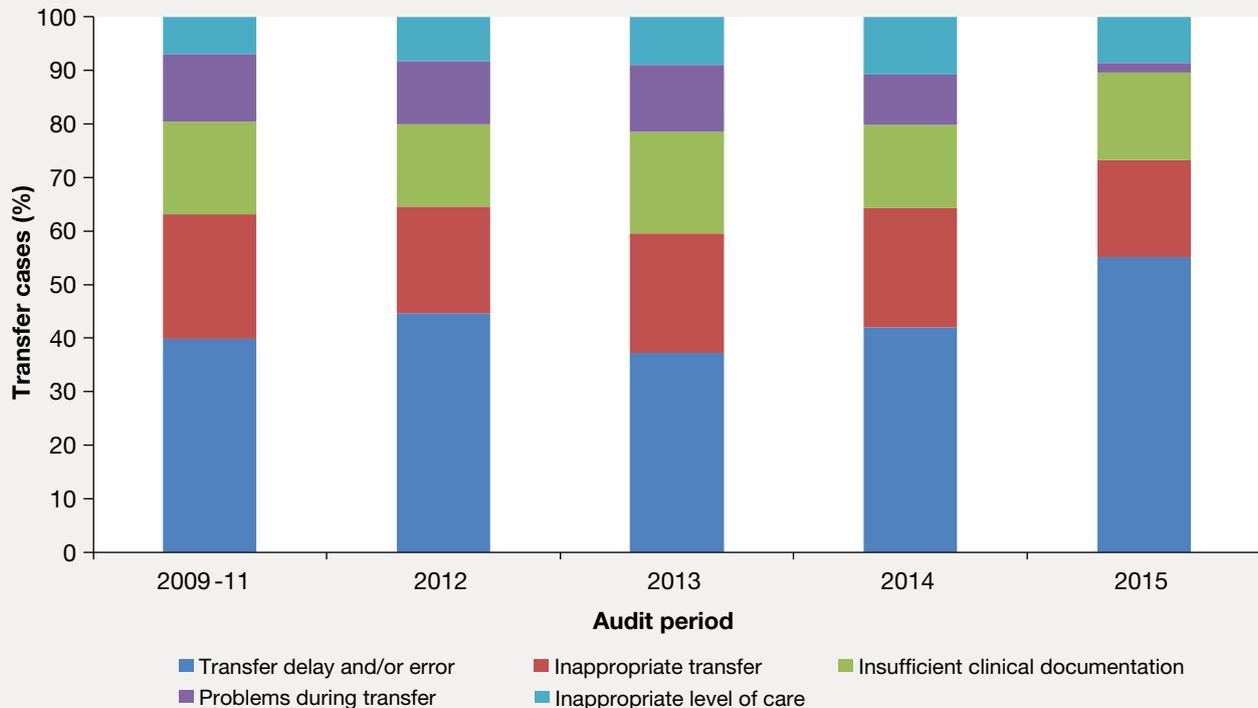
Comment:

- The need for transfer varied amongst the regions, probably reflecting the geographical distribution of available healthcare facilities, particularly in Queensland, the Australian Capital Territory and South Australia.
- 26.1% (5,759/22,039) of cases involved a transfer between hospitals, where an operation was performed.

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: Types of issues associated with patient transfer (n=1,231 issues in 5,438 patients)



Data not available: n=321 cases (5%).

Comment:

- 10.6% (609/5,759) of issues raised related to transfer delays. In 5.6% (324/5,759) of cases related to inappropriateness of transfer, and 4.3% (248/5,759) to insufficient clinical documentation.
- Insufficient clinical documentation is a transfer issue that could be readily improved. Good communication ensures that all clinicians involved have full knowledge of the patient's health status.
- In a peer review article by the Queensland Audit of Surgical Mortality (QASM), surgeons indicated there was a need for improvement in a number of areas within 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.⁽³⁾

Case study #2: Inter-hospital transfer (intubation for transfer)

Case summary:

A middle-aged patient with a headache in the morning collapsed. The patient arrived at a rural hospital nearly two hours later and was triaged as a '2' with pupils dilated – motor response was not recorded. The secondary hospital emergency department advised that the patient be transferred unintubated.

During the ambulance transfer, airway intervention was difficult despite the patient being unconscious with fixed, dilated pupils. By around midday the patient arrived at the second hospital, breathing spontaneously. A chest

X-ray demonstrated aspiration. Severe hypertension was treated with hydralazine resulting in hypotension. The computed tomography (CT) scan demonstrated a massive subarachnoid haemorrhage from a giant basilar aneurysm, with hydrocephalus and evidence of posterior cerebral artery infarction.

By mid-afternoon mannitol was started. The intracranial pressure was greater than 50mm Hg with the insertion of an external ventricular drain. Sedation was ceased and the patient remained unresponsive with unreactive pupils. The patient was palliated and brain death was certified the next day.

Clinical Lessons:

In an ideal situation the patient should have been intubated, ventilated and sedated prior to transfer. This would prevent aspiration (if it had not already occurred), help maintain pO₂ and possibly help control intracranial pressure by preventing the pCO₂ from rising. The drugs used for this would need to be administered by someone experienced in airway management, and would have helped intracranial pressure and brain perfusion.

The logistics of communication between rural and major hospitals should be a priority for hospital management. Advice between hospitals regarding patient treatment needs to occur, as most of these treatments can be implemented in the rural setting providing that staff have the necessary skills.

Training staff to ensure they have the appropriate skills for this type of emergency is also an issue for management. There was no neurologic assessment chart in the rural hospital record, and motor responses were inadequately noted. These are important components of the Glasgow Coma Scale.

The death certificate was incorrectly completed. Subarachnoid haemorrhage, not brain death, was the cause of death.

8 INFECTION AND TRAUMA

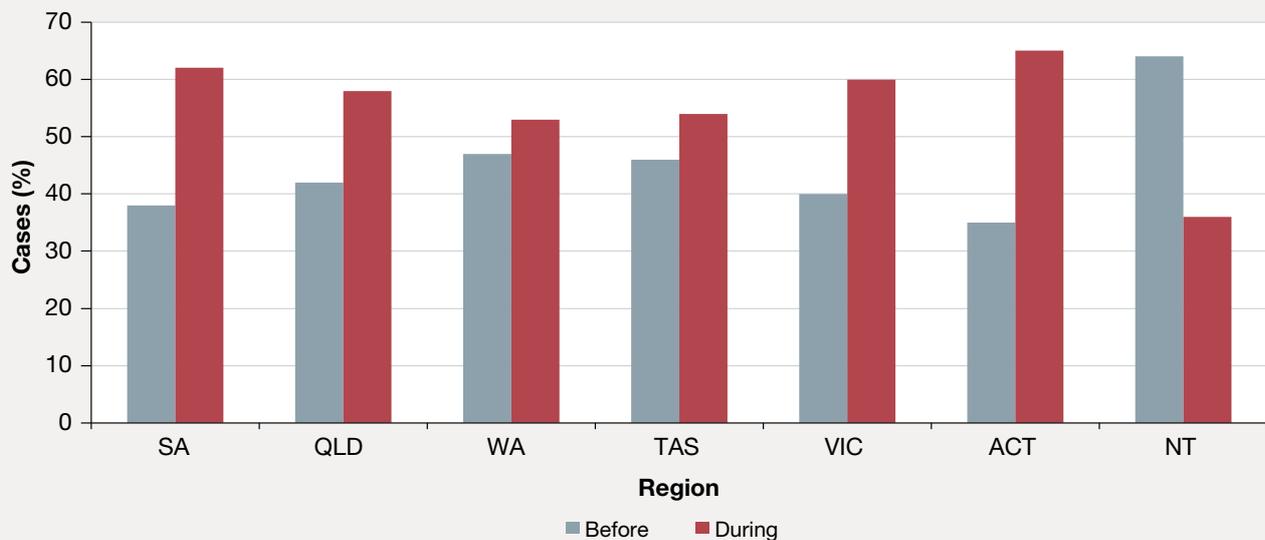
KEY POINTS

- ▶ ANZASM started collecting data on infection and trauma cases in 2012. All regions except New South Wales collect data on infection in patients who require surgery. Data on trauma cases is currently collected in four regions: Queensland, Western Australia, Victoria and the Northern Territory.
- ▶ A clinically significant infection was present in 32.9% (4,124/12,524) of cases reported between 2012 and 2015.
- ▶ Of the 2,581 traumatic events, 80.5% (2,077) were caused by falls, 12% (290) were caused by traffic accidents, 5% (112) were associated with domestic, public or self-inflicted violence and 4% (102) were other traumatic events.

8.1 Infections

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

Figure 38: Proportion of infections acquired before or during the admission by region (n=4,124)

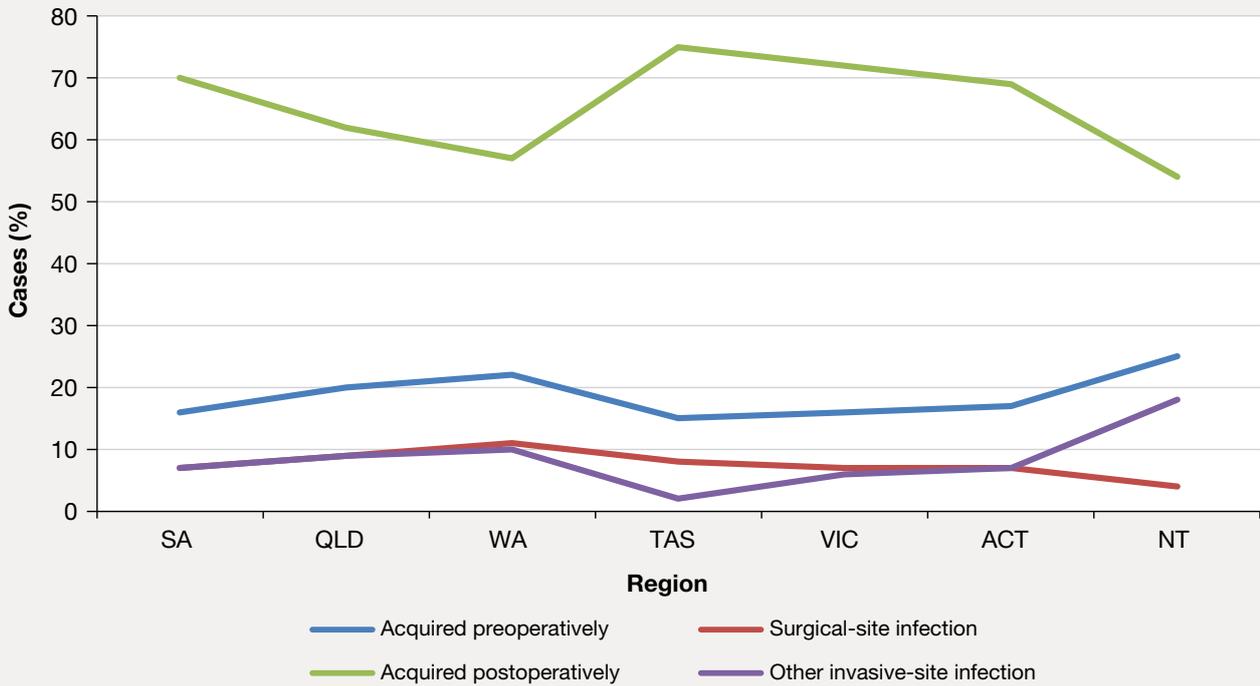


Data not available: n=167 cases (4%).

Comments:

- Of the 12,524 audited cases reported between 2012 and 2015, a clinically significant infection was present in 32.9% (4,124/12,524) of cases.
- Of the cases that had a clinically significant infection, 58.4% (2,412/4,124) occurred during the patient's admission, and 41.5% (1,712/4,124) occurred prior to admission.
- The different distribution of infection within the Northern Territory may result from late presentations of patients living in remote communities.

Figure 39: Regional breakdown of infections acquired during the admission (n=2,266)

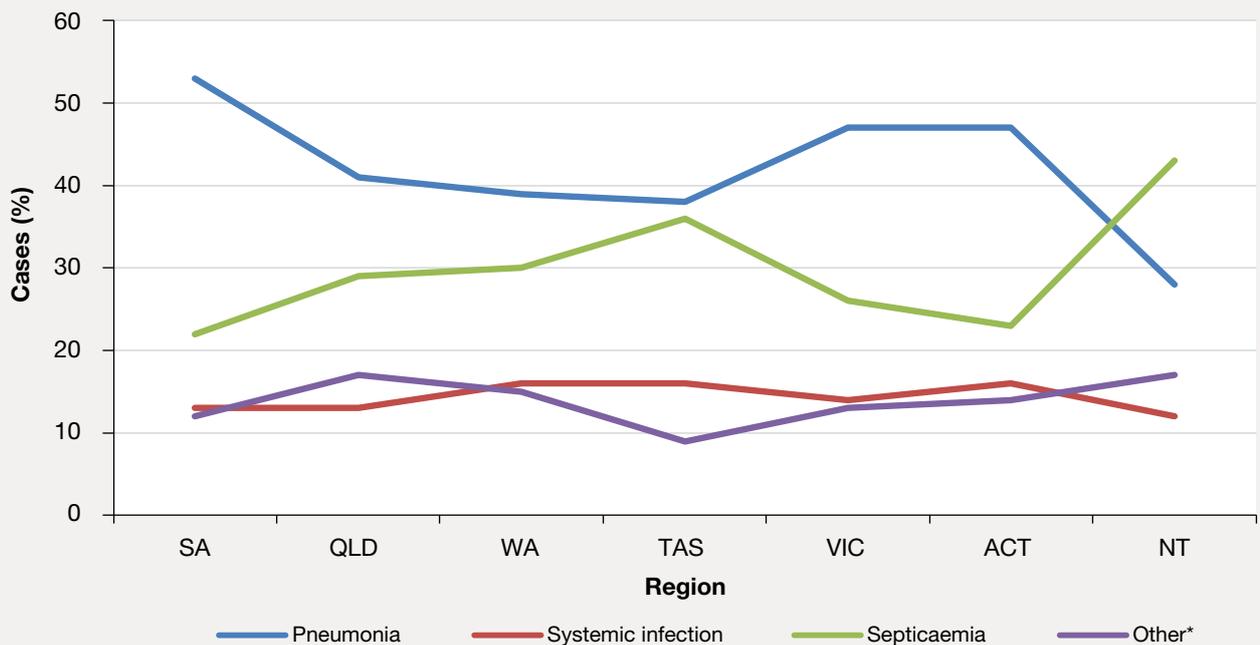


Data not available: n=146 cases (6%).

Comments:

- In terms of the timing of infections acquired during admission, 66.8% (1,514/2,266) were acquired postoperatively, 17.7% (400) were acquired preoperatively, 7.6% (172) were acquired from other invasive-site infections and 7.9% (180) were surgical-site infections across the reporting periods.

Figure 40: Types of infections acquired either before or during the admission by region (n=4,124)



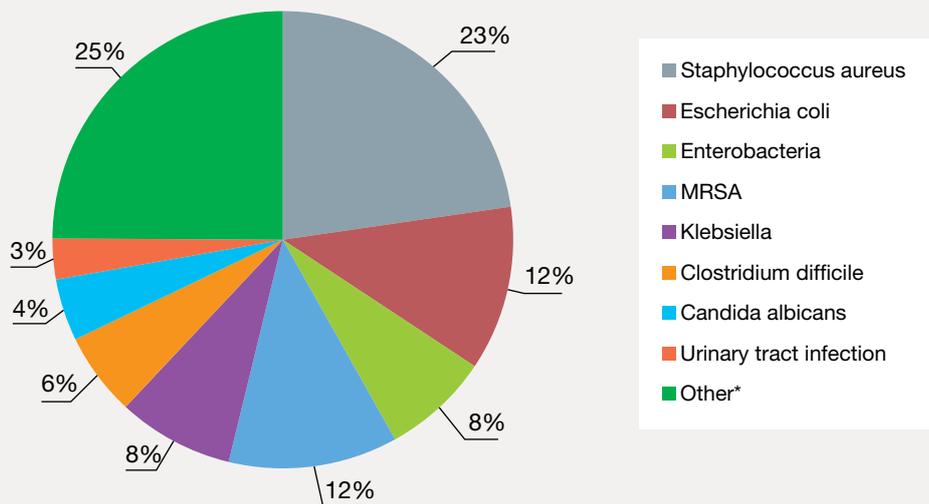
Data not available n=167 cases (4%).

*Other category includes Klebsiella, Clostridium difficile, Escherichia coli and methicillin-resistant Staphylococcus aureus.

Comments:

- Of the 4,124 cases of infection acquired prior to or during admission, pneumonia was responsible for 44.2% (1,825) of cases, septicaemia for 26.8% (1,104) of cases, other infections were responsible for 14.3% (588) of cases, and systemic infection for 13.6% (562) of cases.

Figure 41: Type of infection, where positively identified (n=1,666)



Other infections include: Moraxella, multiple organisms, human immunodeficiency virus, pneumonia, *Pseudomonas aeruginosa*
MRSA: methicillin-resistant *Staphylococcus aureus*.

Comments:

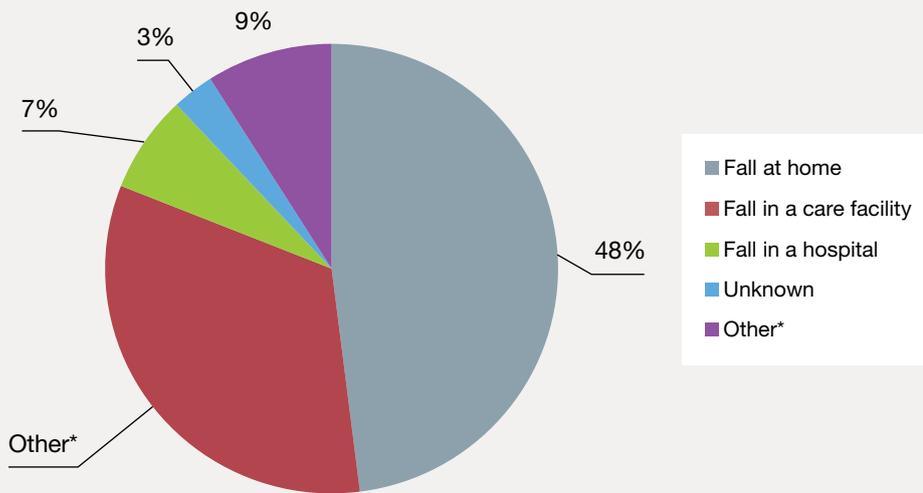
- Over the reporting period the infection was identified in 42% (1,666/3,972) of cases in which it was acquired prior to or during admission.
- *Staphylococcus aureus* and *Escherichia coli* accounted for 34.3% (572/1,666) of all cases of infection.

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. This data is currently collected in four regions: Queensland, Western Australia (from July 2013), Victoria and the Northern Territory.

During the period January 2012 to the end of December 2015, a traumatic event was attributed to 28% (2,581/9,212) of cases. Of the 2,581 traumatic events, 80.5% (2,077) were caused by falls, as shown in Figure 42.

Figure 42: Locations associated with falls (n=2,581)

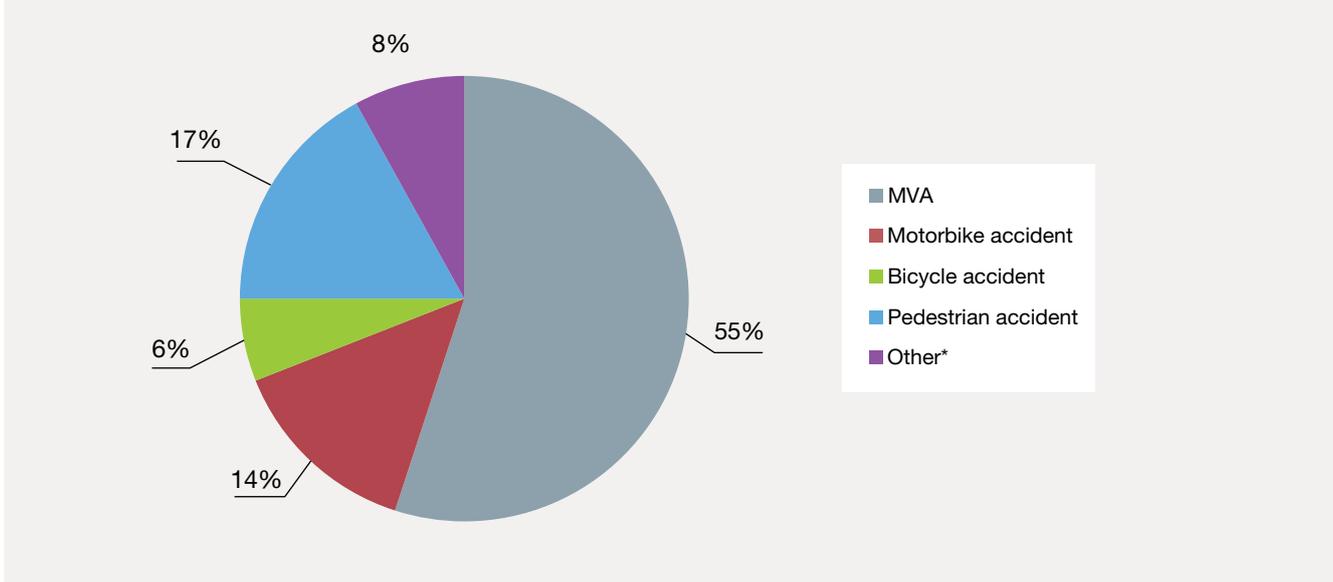


*Other category includes roads, workplace-related and public venues.

Comments:

- Of the traumatic events, falls were associated with 80.5% (2,077/2,581) of cases.
- Of the 2,077 falls, 47.5% (985) occurred at home, 39.2% (815) occurred in a hospital or care facility, and 13.3% (277) were unknown or elsewhere.
- In the reporting period, 12.4% (320/2,581) of cases were caused by traffic accidents, as shown in Figure 43. Domestic, public or self-inflicted violence was associated with 4.5% (117/ 2,581) across the reporting period.

Figure 43: Types of traffic accidents associated with trauma cases (n=320)



Data not available: n=1 (<1%).
 Other category includes: quad bike, ultralight aircraft and workplace-related.
 MVA: motor vehicle accident.

Comments:

- Motor vehicle accidents comprised 55% (176/320) of cases involving a traffic accident. Due to the small amount of current data this should be interpreted with caution.

Case study #3: Postoperative low urine output following a fall

Case summary:

This case involves an elderly patient who was admitted with a displaced subcapital fractured left neck of femur following a mechanical fall earlier that day. The patient was mentally alert and independent. There was a history of atrial fibrillation medicated with warfarin, and intermittent asthma/bronchitis. Medication included furosemide and carvedilol for controlled hypertension. The patient was also taking Sinemet for restless legs.

Screening blood tests indicated that the patient had adequate platelets, normal haemoglobin, urea of 10.7 mmol/L and creatinine of 100 µmol/L. The serum potassium was slightly elevated (5.5 mmol/L). The patient was given vitamin K to neutralise the effects of the warfarin and was prepared for theatre on the following day for a bipolar hemiarthroplasty. A small dose of prothrombin was administered just prior to the procedure due to a very slightly elevated International Normalised Ratio of 1.5. The patient had a combined spinal and general anaesthetic. There was no mention of blood loss or of any particular problems with the operation or the anaesthetic. On return to the ward the patient was alert and able to have something to eat that evening. The patient was seen at 18:50 by the covering surgical intern because of a low urine output, and was ordered a 500 mL bolus of intravenous fluid. At that time the patient appeared well, was afebrile and had stable observations. There was no mention of wound problems.

The last observations appeared to be taken at 02:00 on the first postoperative day. The patient was found deceased later that morning at 05:10. There was no mention in the case notes (including the 02:00 observations) as to whether the urine output had improved. At that time all observations appeared normal and the patient was alert.

Clinical lessons:

The cause of the sudden and unfortunate death was probably of cardiac origin or possibly a massive stroke. It is doubtful that this death could have been prevented under the circumstances, particularly as the patient appeared to be doing well when seen at 02:00.

The assessor was critical, however, of the failure to mention the urine output following the bolus of fluid given at 18:50 the previous evening. It would have been appropriate for this patient to have been reviewed on at least one occasion by the covering medical staff to assess the urinary output problem and general state. This would most likely have happened had the patient been in a high dependency unit. It is highly doubtful, however, that this patient's death was the direct result of a poor urine output, unless they became extremely hypotensive between the time of the last observation at 02:00 and death at 05:10. If this patient had been in a high dependency unit they would have received better monitoring, and resuscitation may also have been attempted.

One of the lessons that can be learnt from this case is that the low postoperative urinary output may have predicted ongoing problems that would have justified closer supervision throughout the evening and night. If a high dependency unit bed was not available a special area in the ward for postoperative cases would seem desirable to allow closer observation.

9 PEER REVIEW OUTCOMES

KEY POINTS

- ▶ Between 2009 and 2015, an SLA was requested for 12.9% (3,636/28,178) of cases. Lack of information provided by the treating surgeon was the most frequent cause of referral for SLA, accounting for 67.8% (2,436/3,598) of referrals.
- ▶ Overall, 4.3% (1,200/28,178) of cases were sent for SLA due to concerns over clinical issues.
- ▶ The most common criticism by both first- and second-line assessors was delay in the delivery of definitive treatment.
- ▶ A total of 7,304 clinical management issues were identified.
- ▶ Issues of clinical management were perceived to have contributed to the death of the patient in 4.7% (1,321/28,349) of cases.

9.1 Second-line assessments

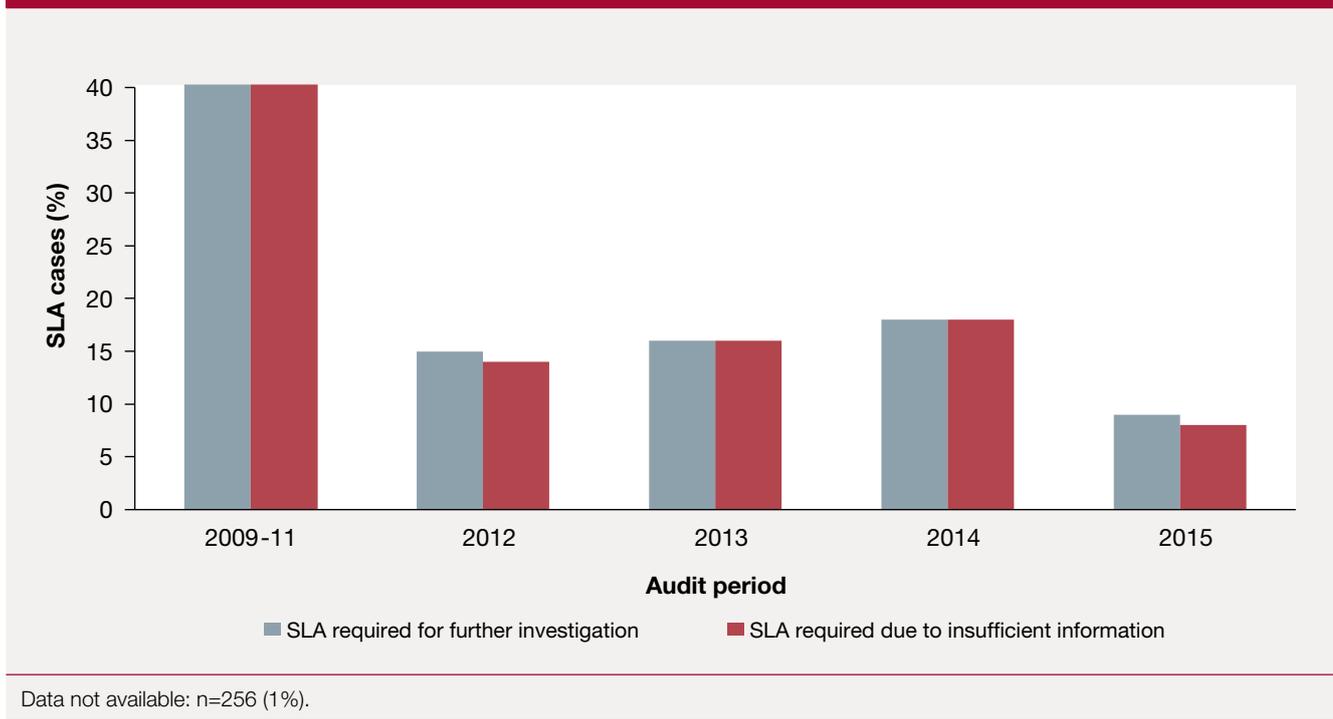
The peer review process comprises a retrospective examination of the clinical management of patients who died while under the care of a surgeon. All assessors (first- and second-line) must decide whether the death was a direct result of the disease process alone, or if aspects of the management of the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

A total of 28,178 cases underwent FLA. The first-line assessor decides whether the treating surgeon has provided enough information to allow them to reach an informed decision on the appropriateness of the management of the case. If inadequate information was provided then the first-line assessor requests an SLA. Other triggers for requesting an 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 due to a lack of clinical information has dropped (76% in 2009 to 67.8% in 2015). This is an indirect measure of true surgeon compliance with the audit process, with surgeons providing more detailed and more accurate information in the SCFs. There have also been educative training sessions on how to be an assessor and these have proved beneficial in reducing the numbers of SLAs due to a lack of information. An SLA was requested due to concerns regarding clinical management in 4.2% (1,200/28,349) of cases, and this has not altered over the five reporting years. The reasons given for referral for SLA are shown in Figure 44.

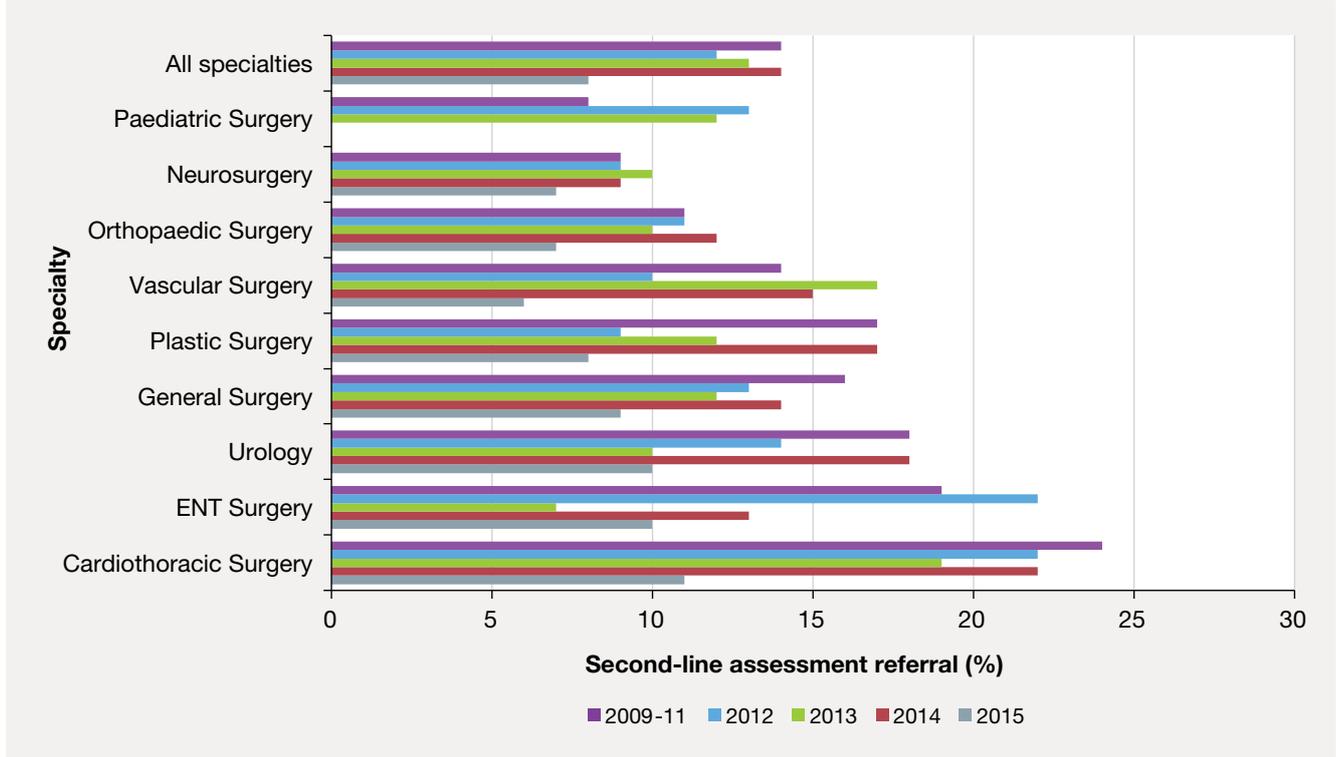
Figure 44: Reason for referral for second-line assessment (SLA) (n=3,636 SLAs in 28,178 audited cases)



Comment:

- An SLA was requested in 12.9% (3,636/28,178) of cases during the audit period. A lack of adequate information in the SCF was the trigger for referral in 67.8% (2,436/3,598) of all cases that underwent SLA.
- The need for an SLA can often be avoided if the surgeon completes the SCF comprehensively and provides adequate information.
- The number of SLAs required due to a lack of clinical information has remained reasonably constant across the reporting period.
- The frequency with which cases were referred for SLA, by surgical specialty, is provided in Figure 45.

Figure 45: Frequency of second-line assessment (SLA) referral amongst surgical specialties (n=3,636 SLAs)



ENT: Ear, Nose and Throat.

Comment:

- There was some variation in the SLA rate among specialties, and across the audit periods. The need for SLA in most specialties between 2009 and 2015 has remained relatively steady at 12.9% (3,636/28,178).
- There have been no SLAs for Paediatric Surgery for the 2014 and 2015 reporting years.

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.

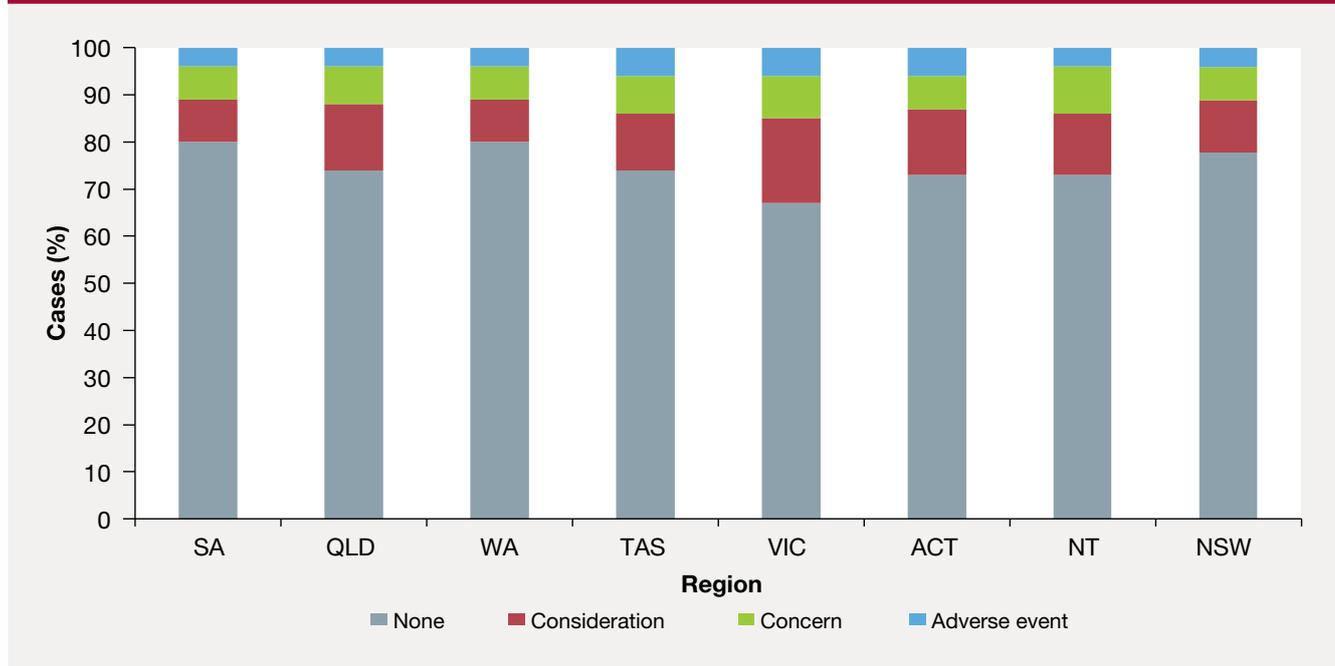
There are two possible outcomes for the peer-review process. The first is that the death of the patient was a direct outcome of the disease process, with clinical management having no impact on the outcome. The second is a perception that aspects of patient management may have contributed to the death 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 the 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 despite the use of the best DVT prophylaxis available. 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 for each patient. Where a number of criticisms were made in any one case, the most severe degree of criticism has been attributed. The 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=28,349)



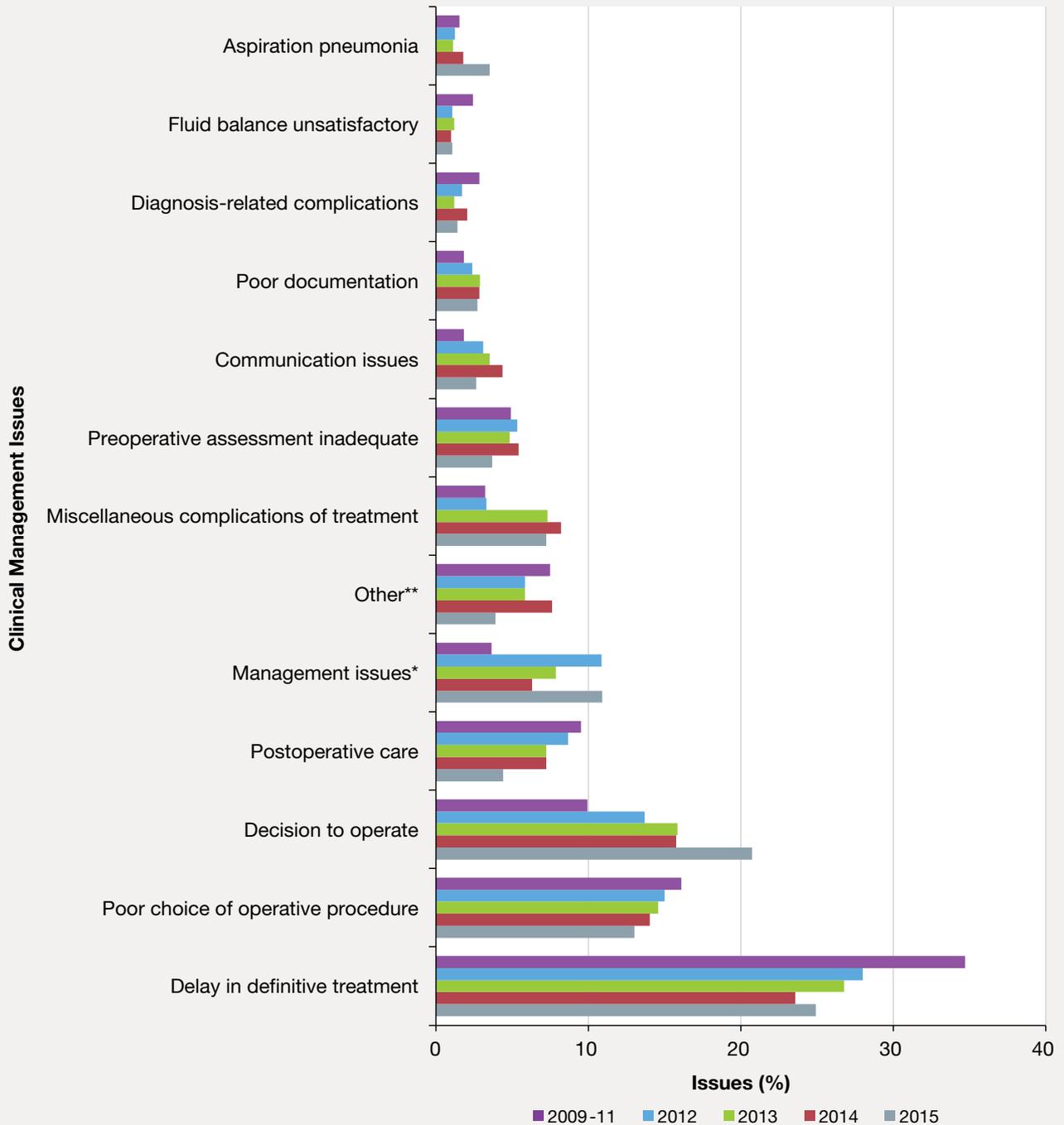
Data not available: n=85 (1%).

Comment:

- No clinical management issues were identified by the assessor in 74.5% (21,130/28,349) of cases. When combined with areas of consideration (13% of cases; 3,690), the total number of cases with no or minor criticism was 87.3% (24,820).
- The identification of an area of concern or adverse event by an assessor denotes a greater degree of criticism of clinical management. In this report, an area of concern or adverse event occurred in 12.4% (3,529/28,349) of cases across the reporting period.
- Cases featuring an adverse event(s) are a key focus of the audit especially if there is a perception by assessors that the treatment provided may have not been optimal. An adverse event occurred in 4.7% (1,321/28,349) of cases.
- The proportion of cases with no clinical management issues slightly increased from 72.2% (8,226/11,389) in 2009/11 to 79.7% (2,777/3,485) in 2015 (data not shown).

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 47: Top 12 frequencies of specific clinical management issues where there were more than 10 cases per procedure (n=14,833 instances)



Data not available: n=10 (1%).

DVT: deep vein thrombosis.

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

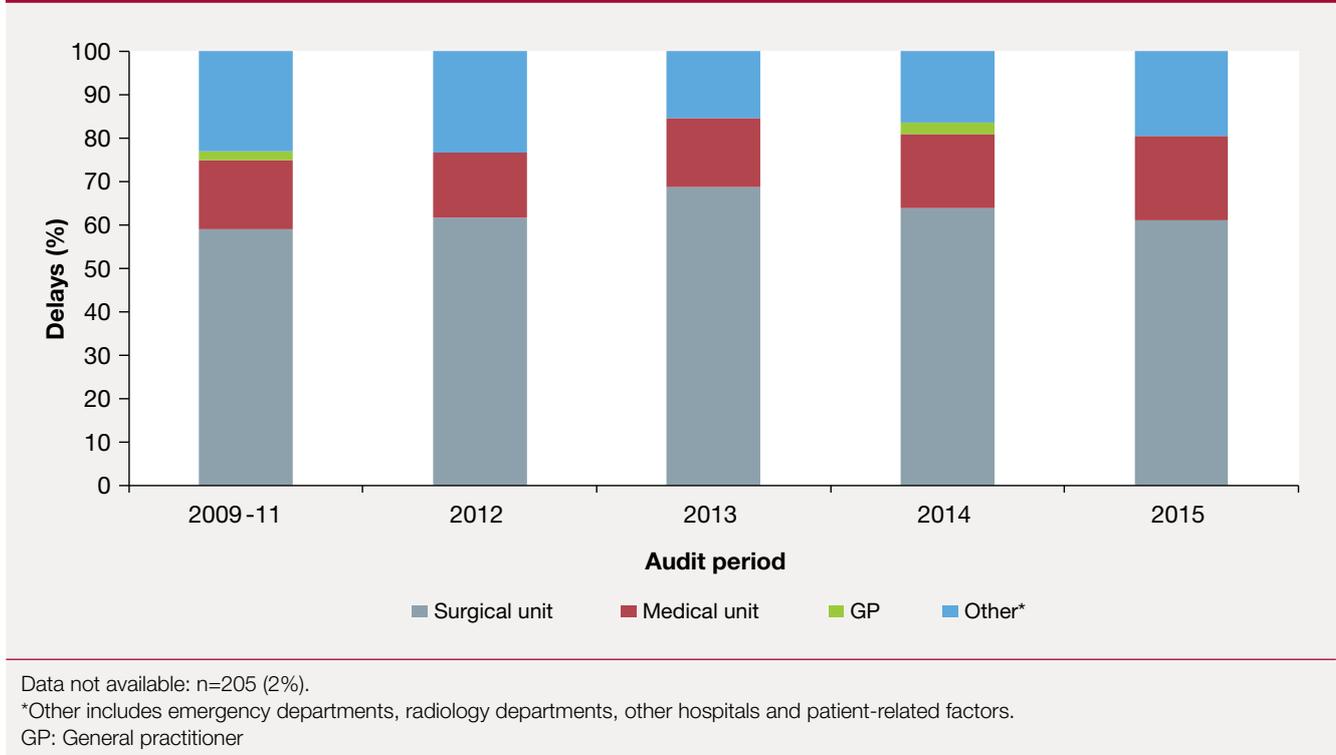
Other** includes surgeon too junior, failure to use DVT prophylaxis, transfer should not have occurred, injury caused by fall in hospital, Haemorrhage, anastomotic leak after open surgery, septicaemia, pulmonary embolus, renal failure, nasogastric tube not used and incorrect use of drains or catheters

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 operate and the choice of operative procedure are also high on the list of clinical management issues.
- Good communication amongst those involved in patient care is essential to ensure the treatment plan is properly understood and coordinated. Poor communication accounted for 2.7% (403/14,833) of the issues identified.

Between 2009 and 2015, a delay in the implementation of definitive treatment was perceived in 30% (4,454/14,833) of clinical management issues. 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.

Figure 48: Attribution of responsibility for treatment delays (n=3,796)



Comment:

- The surgical unit was deemed responsible for 59% (1,009/1,712) of treatment delays in 2009/11 and 61% (193/316) in 2015. Some 2015 cases are still under review, and have not completed the audit process. The full extent of any variance will become clear in the next report.
- Across the reporting period, other clinical areas, medical units and general practitioners were deemed responsible for 38.2% (1,449/3,796) of delays.
- More than one team may be responsible for any perceived delays in treatment.

Case study #4 Delay in diagnosis of fractured neck of femur can be fatal

Case summary:

This very elderly patient presented to an emergency department following an unwitnessed fall. The patient complained of right hip pain and was unable to walk. Plain X-rays of the pelvis and hip did not show a fracture. The patient was discharged back to a high-care nursing home but, due to ongoing pain and immobilisation, returned to hospital one week later. Further X-rays, including a CT scan, showed a subcapital fracture of the neck of the right femur. The patient was on clopidogrel and there was a delay of five days in being able to operatively treat the fractured neck of femur. It was decided that the fracture would be treated with a Moore's unipolar hemiarthroplasty. After reaming, the Moore's prosthesis could not be inserted and the decision was made to change to a cemented Unitrax Exeter femoral stem. In the process of passing a plug down the femoral canal to block the passage of cement distally, the patient developed significant bradycardia and, subsequently, a cardiac arrest. The patient was resuscitated intraoperatively and the wound closed, leaving the patient with, in effect, an excisional arthroplasty of the hip. The patient's condition continued to deteriorate and she died soon afterwards.

Clinical lessons:

It is evident that on the initial presentation the patient had a fracture of the neck of the right femur. The casualty resident noted that she had pain when rotating and abducting the hip. A so-called normal initial X-ray does not exclude a fracture of the hip. It is most likely that there was an undisplaced subcapital fracture of the neck of the right femur. This was clinically confirmed by the fact that the patient had ongoing pain and failed to mobilise.

On re-presentation one week later it was commented that there was a subcapital fracture of the neck of the right femur noted on X-rays and CT scanning. In the documentation, however, there was very little evidence in relation to whether this fracture was displaced or undisplaced. There was one comment about impaction of the fracture. The patient was assessed preoperatively from both a medical and anaesthetic point of view. The regular medication of clopidogrel was the major factor associated with the delay in operative treatment of the hip fracture. The treating orthopaedic team identified the patient to be of a small build and to have a small femur and pelvis on radiological investigation. It was decided to carry out a Moore's hemiarthroplasty. This was, presumably, on the basis that the patient walked minimally and had a displaced subcapital fracture of the neck of the right femur.

It is very difficult to template X-rays in relation to the use of a Moore's prosthesis. The current use of computerised X-ray systems also makes it very difficult to template prostheses. Intraoperatively, the Moore's prosthesis could not be seated. It was decided to use an Exeter type small stem to circumvent the problem. The equipment required for the Exeter prosthesis was not open and ready for use. It had to be retrieved from the theatre storeroom and opened. Clearly this added time to the length of the surgical procedure, and it is probable, as is often the case after a period of fasting and intraoperative blood loss, that around this time the patient was relatively under-volumed. The procedure of passing a femoral plug down a tight canal is equivalent to passing a nail. It would seem that this procedure resulted in some sort of embolic phenomenon that resulted in cardiovascular collapse. The other possibility in this patient is that a pulmonary embolism occurred, as the patient had been in bed for 12 days after the fracture. Initial resuscitation was successful but postoperatively the patient quickly deteriorated and died.

In summary:

1. The decision to discharge the patient on the first attendance without radiologically excluding a hip fracture was incorrect. The casualty resident made the diagnosis clinically. We need to remind ourselves that diagnoses in medicine and surgery are based on history and examination. Radiological investigations may be confirmatory of the clinical diagnosis.
2. The use of an irreversible antiplatelet agent disrupted the appropriate management of the patient. We need to ask whether or not an elderly patient should be on an irreversible antiplatelet agent (versus aspirin etc.). The scientific literature overwhelmingly indicates that patients with fracture of the neck of the femur must be treated operatively as soon as possible in order to minimise complications and the likelihood of death.

3. There was insufficient information to determine whether the subcapital fracture of the neck of the femur was significantly displaced. If there was complete displacement, that is, a Garden grade 3 or Garden grade 4 fracture, then excision of the femoral head and hemiarthroplasty, either via a Moore's prosthesis or cemented unipolar hemiarthroplasty, was appropriate. If the subcapital fracture was undisplaced or minimally displaced, then consideration could have been given to fixation with a hip screw or cannulated screws. This is a less invasive procedure as it does not open up the hip joint and expose the patient to all the risks of partial or total hip arthroplasty.

Some surgeons would be willing to carry out fixation with a hip screw or cannulated screws soon after the fracture even in the setting of a patient on clopidogrel. Earlier diagnosis, less operative delay and a wider choice of operative procedures may have led to a better clinical outcome. However, given that the patient was very elderly and had a history of a previous transient ischaemic attack and possible heart disease, the potential for significant complications and even death were high at the time of admission.

9.2.1 Perceived impact of clinical management issues

First- and second-line assessors were 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.

First- and second-line assessors may identify more than one issue of clinical management for each patient under review. 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 the highest level assessor (n=7,219 events in 28,264 patients)				
Specialty	Adverse Events	Concern	Consideration	No Issues
Cardiothoracic Surgery	8.2% (130/1,592)	13.2% (210/1,592)	21.3% (339/1,592)	57.1% (909/1,592)
General Surgery	5.4% (467/8,694)	9.2% (801/8,694)	13.9% (1,207/8,694)	71.3% (6,201/8,694)
Neurosurgery	2.6% (112/4,322)	4.8% (206/4,322)	8.7% (375/4,322)	83.6% (3,615/4,322)
Gynaecology	11.4% (5/44)	13.6% (6/44)	29.5% (13/44)	45.4% (20/44)
Ophthalmology	7.1% (1/14)	7.1% (1/14)	7.1% (1/14)	78.6% (11/14)
Orthopaedic Surgery	2.9% (158/5,517)	5.7% (314/5,517)	11% (607/5,517)	80.1% (4,423/5,517)
Other*	4.9% (221/4,506)	8% (361/4,506)	13.3% (601/4,506)	73.1% (3,296/4,506)
Paediatric Surgery	4.5% (5/112)	5.4% (6/112)	8.9% (10/112)	81.2% (91/112)
Plastic & Reconstructive Surgery	5.3% (17/322)	8.1% (26/322)	15.2% (49/322)	71.4% (230/322)
Urology	6.3% (61/970)	8.2% (80/970)	16% (155/970)	69.4% (673/970)
Vascular Surgery	5.6% (103/1,826)	8.7% (158/1,826)	14.3% (261/1,826)	71.1% (1,299/1,826)
All cases	4.7% (1,321/28,264)	7.8% (2,208/28,264)	13% (3,690/28,264)	74.7% (21,130/28,264)

Data not available: n=85 cases (1%).
 *Anaesthesia, Intensive Care Unit, Oncology, Oral and Maxillofacial, Thoracic Medicine, Trauma and Transplant.

Comment:

- This analysis compares the incidence of significant criticisms of clinical care (areas of concern and adverse events) with lesser or no issues, by specialty.
- There is a difference in the percentage 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 and Gynaecology. Many are complex procedures with high-risk patients, and this may explain the higher number of adverse events.⁽⁶⁾

Table 8: Overall criticism of patient management over the total audit period (n=28,349)

Degree of criticism of patient management	Number of patients	Per cent of patients
No issues of management identified	21,130	74
Consideration	3,690	13
Concern	2,208	8
Adverse event	1,321	5

Data not available: n=85 cases (1%).
 In instances where a patient had more than one clinical management issue the most severe has been used in this data set.

Comment:

- There was significant criticism of clinical management (area of concern or adverse event) in 12.4% (3,529/28,349) of cases.
- There was minimal variation across regions in terms of the incidence of significant clinical management issues (data not shown).

Table 9: Perceived impact of clinical management issues on clinical outcomes over the total audit period (n=28,192)

Impact of clinical management issues on clinical outcome	Number of patients	Per cent of patients
No issues of management identified	21,130	74
Made no difference	1,587	6
May have contributed to death	4,287	15
Caused death of patient who would otherwise be expected to live	1,188	4

Data not available: n=242 cases (3%).

Comment:

Perceived issues of clinical management were felt to have probably caused death in 4.2% (1,188/28,192) of cases.

Table 10: Perceived preventability of clinical management issues over the total audit period (n=27,971)

Perceived preventability of clinical management issues	Number of patients	Per cent of patients
No issues of management identified	21,130	77
Definitely	1,552	6
Probably	2,920	10
Probably not	2,125	7
Definitely not	244	<1

Data not available: n=463 cases (6%).

Comment:

- The assessors felt that 6% (1,552/27,971) of patients had clinical incidents that were definitely preventable.

Table 11: Perception of clinical team responsible for clinical issues (n=6,600)

Clinical team perceived to be responsible	Patients (n)	%
Surgical team	4,615	70
Other clinical team	1,344	20
Hospital issue	325	5
Other*	316	5
Total	6,600	100

Data not available: n=704 cases (10%).
 *Other includes transferring hospital, blood bank or transfusion services, emergency department, the general practitioner or referring doctor, the ambulance service, remote areas or insufficient staff.

Comment:

- Assessors indicated that the surgical team was responsible in 70% (4,615/6,600) of patients with perceived clinical issues.

Case study #5: Delay in communication resulted in head injury death

Case summary:

This is a tragic case as it involves a young patient who should have survived a bad head injury but did not because of poor communication regarding deterioration of the level of consciousness.

The history provided was that the patient had allegedly been consuming alcohol and had fallen off the back of a utility vehicle. The patient was found at the scene about 20 minutes later and the first reported Glasgow Coma Scale (GCS) score was 9/15. Two hours later the patient was sedated, paralysed and intubated because of vomiting and concern regarding maintaining the airway. Transfer to a regional neurosurgical unit occurred; a CT head was done. This showed bilateral frontal contusions and small subdural haematomas (2 mm). The basal cisterns were not compressed given the young age, except for some localised frontal oedema. There were also occipital and basal skull fractures. The patient was weaned off the ventilator and woken in the intensive care unit, and was able to be extubated the afternoon after admission. The patient was GCS 14/15 when the neurosurgery team were first able to assess the patient.

This was about 30 hours after the injury and about 24 hours after admission. The patient was then transferred to the neurosurgical ward. The case notes suggest that the observations in the ward were no more often than 3 hourly. There is a GCS observation recorded at 10:20 hours and another one at a time that is not clear. The next observations were recorded at 16:15 hours, implying 3-hourly observations. That afternoon things went badly wrong. The nursing record states that at 15:00 hours the patient was “confused to time, place and person” but no formal GCS was done. The notes also state that at the start of the shift the patient was “alert and talking”. At 16:00 hours the patient is recorded as “asleep”. At 16:15 the patient is recorded as “blown pupils and no eye opening to pain”. The neurosurgical team were not aware of these events until 16:15 hours. There had also been a CT scan performed at noon with the appearance of a worsening cerebral oedema. Again, this was not communicated to the treating team.

An emergency bifrontal decompressive craniectomy was done without any improvement and the patient was declared brain dead 60 hours after the injury and 28 hours after being GCS 14.

Clinical Lessons:

This case demonstrates two areas of poor communication. The neurological observations on the ward were inadequate, both in their frequency and quality. A patient with a head injury may be deteriorating due to an intracranial mass and not simply “sleeping”. Worsening cerebral oedema in a head-injured patient is a matter of concern and the radiologist should have informed the clinical team of this significant alteration.

10 ABORIGINAL AND TORRES STRAIT ISLANDER PERSONS

The findings presented here show that the Aboriginal and Torres Strait Islander surgical population were younger than the non-Indigenous surgical population. The report also shows that while younger people in this group had a much higher rate of serious comorbidities than the non-Indigenous Australian population, access to surgical care was the same for the two groups.

Overview of Aboriginal and Torres Strait Islander persons in Australia / by region:

At the end of 2015 there were 713,589 Aboriginal and Torres Strait Islander persons in Australia⁽⁷⁾.

- 31% (220,902/ 713,589) in New South Wales
- 28.5% (203,045/ 713,589) in Queensland
- 13.1% (93,778/ 713,589) in Western Australia
- 10.1% (72,251/ 713,589) in Northern Territory
- 7.1% (50,983/ 713,589) in Victoria
- 5.6% (39,800/ 713,589) in South Australia
- 3.6% (25,845/ 713,589) in Tasmania
- 0.9% (6,707/ 713,589) in the Australian Capital Territory.

10.1 Aboriginal and Torres Strait Islander persons and surgically-related deaths

Overview of audit patients identifying as Aboriginal and Torres Strait Islander:

During the reporting period (2009 to 2015) there were 324 cases involving a patient who identified as an Aboriginal and Torres Strait Islander person. Deaths of patients who identified as Aboriginal and Torres Strait Islander persons occurred in Queensland (38%; 124/324), Northern Territory (34%; 109/324) and South Australia (15%; 49/324). The remaining 42 deaths occurred in other regions.

- Two-thirds of the surgical Aboriginal and Torres Strait Islander deaths occurred in far north Queensland.
- In the Northern Territory, 30% of the population are Aboriginal and Torres Strait Islander persons. The Northern Territory has the highest proportion of Aboriginal and Torres Strait Islander persons of any Australian state or territory⁽⁷⁾.

These deaths of Aboriginal and Torres Strait Islander persons occurred in all the states and territories, but reporting was not uniform. Due to differences in collecting systems, there is no data from New South Wales, and limited data from Western Australia or Tasmania. However, for the other regions the proportion of deaths were:

- 0.06% (124/ 203,045) in Queensland
- 0.15% (109/ 72,251) in the Northern Territory
- 0.12% (49/ 39,800) in South Australia
- 0.03% (20/50,983) in Victoria
- 0.08% (6/ 6,707) in the Australian Capital Territory.

10.2 Aboriginal and Torres Strait Islander persons and age

Aboriginal and Torres Strait Islander persons who died in the perioperative period were younger than non-Indigenous persons (see Table 12 and Figure 49).

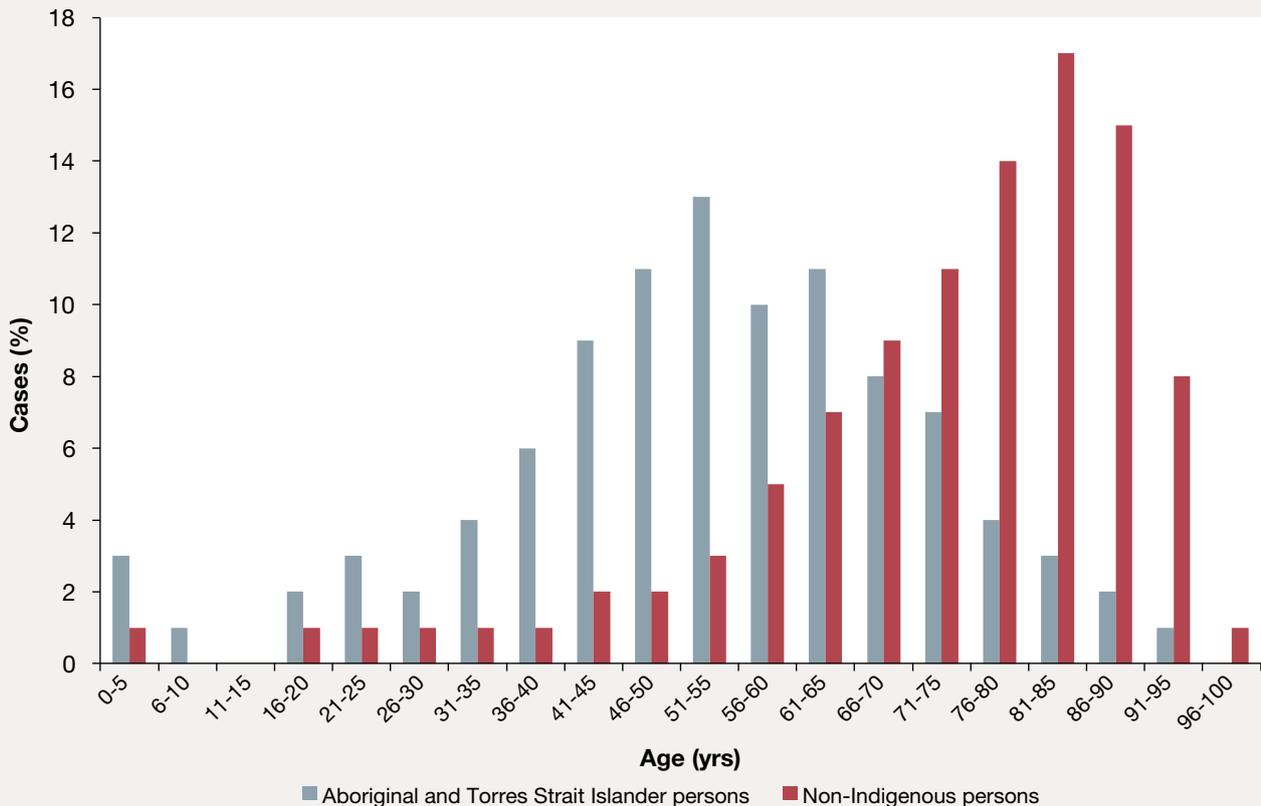
There was a 25 year difference in the median age of death for Aboriginal and Torres Strait Islander persons compared with non-Indigenous persons.

Table 12: Age at death of Aboriginal and Torres Strait Islander persons and non-Indigenous persons (n=10,967)

	Age at death of Aboriginal and Torres Strait Islander persons (n=324)	Age at death of non-Indigenous persons (n=10,967)
Median (Interquartile range)	54 years (44–66)	79 years (66–86)
Minimum	0 years	0 years
Maximum	95 years	104 years

Data not available: n=17,467 cases (61%).

Figure 49: Age distribution of Aboriginal and Torres Strait Islander persons (n=324) and non-Indigenous persons (n=10,967) in ANZASM in 5-year groups



Data not available: n=17,467 cases (61%).

Yrs: years.

10.3 Aboriginal and Torres Strait Islander persons and comorbidities

The prevalence of comorbidities is a problem for the surgical care of Aboriginal and Torres Strait Islander persons, particularly in younger people.

When patient age was capped at 50 years or younger, a considerable difference emerged between Aboriginal and Torres Strait Islander persons and non-Indigenous persons (see Table 13).

However, in the overall population (not just patients 50 years or younger) audit data shows that serious comorbidities were present at similar rates in the two populations. Comorbidities were present in 87.2% (293/336) of Aboriginal and Torres Strait Islander persons, compared with 90% (9,584/10,652) of non-Indigenous persons.

	Per cent of patients with comorbidities present	Number of cases with comorbidities present
Aboriginal and Torres Strait Islander persons	73%	92/126
Non-Indigenous persons	57.2%	551/963

As shown in Table 13, Aboriginal and Torres Strait Islander persons 50 years or younger are more likely to have comorbidities than younger non-Indigenous persons of the same age group. There is a statistically significant risk ratio of 1.28 (95% confidence interval 1.13 to 1.44) for comorbidities in younger Aboriginal and Torres Strait Islander persons compared with younger non-Indigenous persons.

10.4 Aboriginal and Torres Strait Islander persons and operations

The operative rate was similar, with 74% (240/324) of Aboriginal and Torres Strait Islander patients undergoing an operation compared with 79% (8,637/10,967) of non-Indigenous patients.

10.5 Aboriginal and Torres Strait Islander persons and risk of death

Death risk	Aboriginal and Torres Strait Islander persons (n=240)	Non-Indigenous persons (n=8,637)
Minimal	1.2%	2.4%
Small	4.6%	9.3%
Moderate	25%	25.1%
Considerable	53%	49.3%
Expected death	15.4%	12.6%
Missing	0.8%	1.3%
Data not available: n=95 cases (1%).		

10.6 Aboriginal and Torres Strait Islander persons and clinical management

In most areas of care, there was no strong difference in patients who had an operation in any of the clinical management indicators when Aboriginal and Torres Strait Islander persons were compared with non-Indigenous persons (see Tables 15 and 16). However, there were statistically significant differences in the use of DVT prophylaxis, unplanned returns to theatre and being treated in critical care units. Aboriginal and Torres Strait Islander persons were slightly less likely to receive DVT prophylaxis, but were more likely to have an unplanned return to theatre or be treated in a critical care unit.

A recent publication looking at patients in the Northern Territory showed that surgical care, as measured by accepted indicators, was generally equivalent in both groups.⁽⁸⁾

Table 15: Clinical management improvements according to second-line assessors

Improvement in management of surgical care	Aboriginal and Torres Strait Islander persons (n=46)	Non-Indigenous persons (n=1,243)	Risk Ratio (95%CI)
Preoperative management	28.3% (13/46)	27.6% (340/1,233)	1.02 (0.64-1.64)
Choice of operation	8.7% (4/46)	14.6% (181/1,241)	0.60 (0.23-1.54)
Timing of operation	21.7% (10/46)	18.2% (224/1,232)	1.20 (0.68-2.10)
Decision to operate	17.3% (8/46)	17.1% (213/1,243)	0.97 (0.51-1.83)
Intraoperative	17.4% (8/46)	15.4% (190/1,233)	1.13 (0.59-2.15)
Postoperative care	18.2% (8/44)	20.4% (256/1,225)	0.83 (0.44-1.58)

Note: CI = Confidence Interval

There was no statistically significant difference between these two groups for these parameters.

Table 16: Issues with postoperative care according to second-line assessors

Postoperative care	Aboriginal and Torres Strait Islander persons (n=330)	Non-Indigenous persons (n=10,627)	Risk Ratio (95%CI)
Postoperative complications detected	29.9% (76/254)	33.7% (2,812/8,339)	0.89 (0.73-1.07)
Use of DVT prophylaxis	72.8% (238/327)	78.7% (8,267/10,508)	0.93 (0.89-0.99)*
Unplanned return to theatre	15.5% (51/330)	12.4% (1,297/10,441)	1.24 (0.96-1.61)
Unplanned readmission	2.4% (8/330)	2.9% (299/10,381)	0.08 (0.04-0.17)*
Fluid balance problems	7.6% (25/330)	8.5% (883/10,386)	0.89 (0.61-1.30)
Communication issues	9% (29/324)	3.4% (351/10,352)	2.64 (1.84-3.79)*
Treated in critical care unit	73.8% (236/320)	61.5% (6,538/10,627)	1.20 (1.12-1.28)*
Unplanned ICU admission	17.9% (59/329)	17.2% (1,793/10,395)	1.04 (0.82-1.32)
Different action by surgeon	16.6% (54/325)	14.1% (1,468/10,390)	1.18 (0.92-1.51)

Note: CI = Confidence Interval; DVT: deep vein thrombosis; ICU: intensive care unit. *Statistically significant

Surgeons reported differences between the two groups which were statistically significant in the areas of DVT prophylaxis usage, unplanned readmissions, communication issues and treated in a critical care unit.

10.7 Aboriginal and Torres Strait Islander persons and clinical incidents

Table 17: Clinical incidents in Indigenous patients who died and Non-indigenous patients who died

Area of issue	Indigenous patients (n=174)	Non-indigenous patients (n=5,397)	Relative risk for aboriginal and Torres Strait Islander persons
Consideration	94 (54.0%)	2,527 (46.8%)	1.15 (1.00-1.33)*
Concern	59 (33.9%)	1,249 (23.1%)	1.47 (1.18-1.81)*
Adverse event	19 (10.9%)	455 (8.4%)	1.30 (0.84-2.00)

Note; *P=0.05 vs. Non-indigenous patient control

Table 17 presents data that makes two points: that there is a statistical difference in the proportion of Indigenous patients who have areas of concern compared with non-indigenous patients; also there is no significant difference between the two groups in the proportion that have adverse events. However this data does not claim that there are significant clinical differences between the two groups.

11 CONCLUSIONS

The audits of surgical mortality are uniquely positioned to use the extensive information collected 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 97.6% (4,754/4,870) participation rate from surgeons.
- The majority of patients in the audit were emergency admissions with at least one comorbidity.
- DVT prophylaxis use was recorded in 84.2% (18,243/21,659) of cases in which patients underwent a surgical procedure. In only 3.1% (92/2,962) 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 7% 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 7.8% (2,278/29,389) issues with 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.
- The proportion of cases with adverse events has remained relatively static 3.6% (151/4,196) in 2012(2) to 3.4% (118/3,494) in 2015. A proportion of more recent cases are still undergoing assessment, so the figures for 2015 may change however.
- Peer review 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.
- The ANZASM clinical governance reports are released annually to hospitals that have three or more operating surgeons (to ensure that none of the participants are identifiable). These reports use audit data to inform hospitals and government health departments, in particular, trends of clinical management issues within their hospitals and compared to similar state and national hospitals.
- Seminars have been facilitated based on regional reports and in-depth investigation of the issues identified. These activities have increased the quantity and quality of information disseminated on issues supporting clinical governance and patient care across the country. Further workshops have been planned for the ACT, Tasmania, Victoria, Queensland and South Australia during the course of 2016 and 2017.
- The audit will continue to encourage use of the Fellows Interface, the web-based portal for entering SCFs and completing FLAs. The Fellows Interface is an important initiative which minimises data entry time and the risk of errors relating to data entry, while improving turnaround time. Nationally, usage is around 57%. It is expected that a phasing out of the paper-based forms will commence during the course of 2016/17, 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 Booklet 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 Booklet, 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 where 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 includes RANZCOG Fellows. It is encouraging that within 12 months since the last report many of the regions had over 55% participation by gynaecological Fellows.

A greater national awareness and acknowledgment of the value of the audit amongst 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 RACS 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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Bio-statistical consultant

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

ANZASM Steering Committee members

- Professor Guy Maddern, Chair, ANZASM
- Associate Professor Ian Bennett, Chair, Research, Audit and Academic Surgery
- Mr Barry Beiles, Victorian Audit of Surgical Mortality (VASM)
- Professor Peter Zelas, OAM, CHASM
- Mr Tony Sparnon, Councillor
- Mr James Aitken, WAASM
- Mr Glenn McCulloch, South Australian Audit of Perioperative Mortality (SAAPM)
- Dr Cathy Ferguson, Perioperative Mortality Review Committee representative, New Zealand
- Dr John North, QASM and Northern Territory Audit of Surgical Mortality (NTASM)
- Mr Rob Bohmer, Tasmanian Audit of Surgical Mortality (TASM)
- Dr John Tharion, Australian Capital Territory Audit of Surgical Mortality (ACTASM)
- Dr Sue Valmadre, RANZCOG representative
- Reverend Anthony Taylor, consumer representative

ANZASM Management

- Associate Professor Wendy Babidge, Director Research, Audit and Academic Surgery Division
- Ms Pip Coleman, Business and Development Manager, Research, Audit and Academic Surgery Division
- Mr Gordon Guy, ANZASM Manager
- Ms Veronica Walker, Australian Capital Territory Audit of Surgical Mortality, ACTASM Project Manager
- Ms Paula Cheng, CHASM Project Manager
- Ms Therese Rey-Conde, Queensland Audit of Surgical Mortality, QASM/NTASM Project Manager
- Ms Sasha Stewart, SAAPM Project Manager
- Ms Lisa Lynch, TASM Project Manager
- Ms Claudia Retegan, VASM Project Manager
- Dr Diana Azzam, WAASM Project Manager

ANZASM regional staff

- Adeline Nguyen, CHASM
- Alex Oros, CHASM
- Andrew Chen, VASM
- Bruce Czerniec, CHASM
- Dylan Hansen, VASM
- Erin Gilmore, CHASM
- Franca Itotoh, WAASM
- Katie Cocivera, VASM
- Kimberley Cottell, SAAPM
- Jenny Allen, QASM
- Jessele Vinluan, VASM
- Kyrsty Webb, QASM
- Natalie Zorbas-Connell, WAASM
- Ruth Murphy, CHASM
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