SAAPM
South Australian Audit of Perioperative Mortality

2012 ANNUAL REPORT

Royal Australasian College of Surgeons

Government of South Australia
SA Health

South Australian Audit of Perioperative Mortality
Royal Australasian College of Surgeons
199 Ward Street
North Adelaide SA 5006
PO Box 3115, Melbourne Street
North Adelaide SA 5006

Clinical Director
Mr Glenn McCulloch
Phone: +61 8 8239 1144
Fax: +61 8 8239 1244

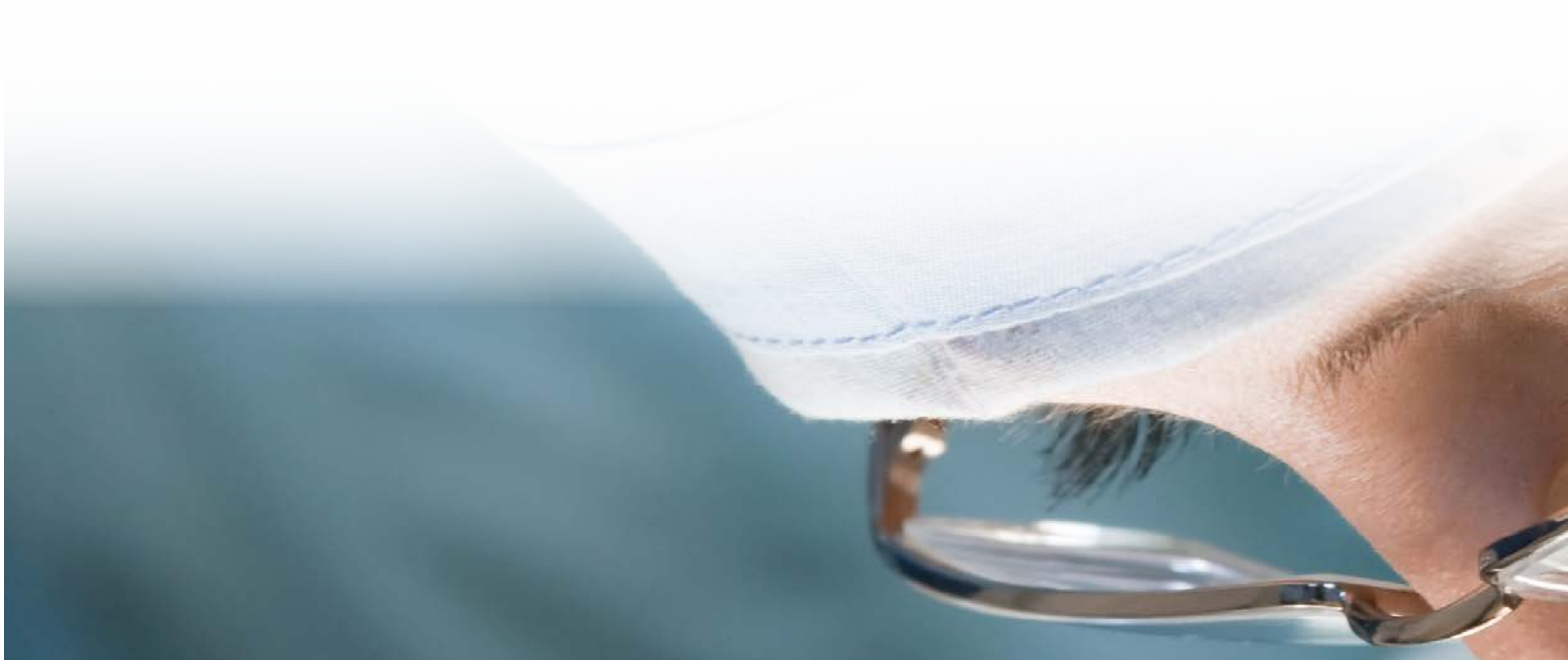
Project Manager
Ms Sasha Stewart
Phone: +61 8 8239 1144
Fax: +61 8 8239 1244

Project Officer
Ms Kimberley Cottell
Phone: +61 8 8239 1144
Fax: +61 8 8239 1244

Email: saapm@surgeons.org
Website: www.surgeons.org/saapm

- The information contained in this annual report has been prepared by the Royal Australasian College of Surgeons South Australian Audit of Perioperative Mortality Management Committee.
- The South Australian Audit of Perioperative Mortality is a confidential project with legislative protection at a state level by the Health Care Act 2008 under Part 7 (Quality improvement and research) and Part 8 (Analysis of adverse incidents) (gazetted 23 June 2011).
- The Australian and New Zealand Audit of Surgical Mortality (ANZASM), including the South Australian Audit of Perioperative Mortality, also has protection under the Commonwealth Qualified Privilege Scheme under Part VC of the Health Insurance Act 1973 (gazetted 23 August 2011).

CONTENTS



CONTENTS

TABLES

FIGURES

ABBREVIATIONS

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
BAS	Bi-National Audit System
CPD	Continuing Professional Development
DVT	deep vein thrombosis
ENT	Ear, Nose and Throat
FLA	first-line assessment
GP	general practitioner
ICU	intensive care unit
IQR	interquartile range
RAAS	Research, Audit and Academic Surgery
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SA	South Australia
SAAPM	South Australian Audit of Perioperative Mortality
SCF	surgical case form
SLA	second-line assessment
TED	thromboembolic deterrent

CHAIRMAN'S REPORT

This is the seventh Annual Report issued by the South Australian Audit of Perioperative Mortality (SAAPM). As in prior years, it reports and analyses the data that has been collected over the last year; much of the results are the same, but there are some changes.

As in previous years, the majority of the deaths are elderly patients admitted as emergencies with several co-morbidities. Unrecognised gastro-intestinal anastomotic leaks, ischaemic tissue (often gut), cardiac complications, and respiratory failure (including pneumonia) are prominent amongst the causes of death. Often not a lot can be done about these conditions, but one area that recurs is poor communication. Something can be done about that. It may be poor communication between nursing and medical staff, poor communication of critical radiological investigations to the treating surgical team, poor communication from transferring hospitals, or poor communication by junior staff to the responsible consultant.

One of the objects of the audit is to feed this information back to the treating teams. We do this by means of the annual report, national case report booklets and individual surgeon reports. From this year, for the first time, we will start including deaths in association with gynaecological procedures (not obstetric as these deaths are reviewed by other mechanisms). The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) is to be thanked for its involvement in our processes. In addition, paediatric surgical deaths are also to be included for the first time.

The involvement of surgeons in the audit process is still not 100%; around 87% of surgical case forms have been completed in 2012, up a little from 85% in 2011. Early indications suggest that the percentage may be a little higher in 2013. In the longer term, about 94% of surgical case forms are completed, but this is not 100%. There are still a small number of recalcitrant surgeons who are not submitting their surgical case forms, despite reminders and encouragement. Participation in ANZASM is a mandatory requirement of the RACS CPD program. Participation is defined as returning a surgical case record form when sent within a 3 month period. Those who do not participate in 2013 will not be able to verify their CPD compliance, and this puts in jeopardy their registration with the Medical Board of Australia who make CPD compliance a condition of registration.

Please read this report and note the lessons. I encourage all surgeons to complete the surgical case forms that are generated from their activities. I also thank the many First-Line Assessors and Second-Line Assessors who have helped us in 2012. I acknowledge the dedicated work by Sasha Stewart and Ken Lang (until March 2012) as project managers, and Kimberley Cottell and Heather Martin (until August 2012) as project officers.

Glenn McCulloch FRACS
SAAPM Clinical Director and Chairman

EXECUTIVE SUMMARY

Background

The South Australian Audit of Perioperative Mortality (SAAPM) is an external, independent, peer-reviewed audit of the process of care associated with surgically related deaths in South Australia. SAAPM commenced data collection on 1 July 2005 and is funded by the South Australian Department for Health and Ageing. The SAAPM project falls under the governance of the Australian and New Zealand Audit of Surgical Mortality Steering Committee and has protection at a state level under the Health Care Act 2008 (Part 7: Quality improvement and research) (gazetted 23 June 2011), in addition to federal coverage under the Australian and New Zealand Audit of Surgical Mortality through the Commonwealth Qualified Privilege Scheme, Part VC of the Health Insurance Act 1973 (gazetted 23 August 2011).

Audit process and reporting conventions

SAAPM is notified of deaths in all participating hospitals where a surgeon was involved in the care of the patient. SAAPM sends either a paper-based or electronic surgical case form to the surgeon for completion to obtain the full clinical picture. Surgeons are asked to report against the following criteria:

- *area of consideration*: where care could have been improved or different, but may be an area of debate;
- *area of concern*: where care should have been better managed;
- *adverse event*: an unintended injury, caused by medical management rather than by disease, which is sufficiently serious to lead to prolonged hospitalisation or to temporary or permanent impairment or disability of the patient, which contributes to, or causes, death.

The completed surgical case form is de-identified and reviewed by another consultant surgeon from the same specialty: this process is referred to as first-line assessment (FLA). The assessor completes an FLA form, providing comments on the case management and level of care provided to the patient. If the first-line assessor considers that there is insufficient information on the surgical case form to come to a conclusion, or if there are factors that warrant further investigation, a second-line assessment (SLA) is recommended. SAAPM provides the surgeon involved with feedback from the assessor(s).

Audit participation

Sixty-one hospitals in South Australia participated in SAAPM in 2011-2012, which represents an increase of three hospitals since the previous report. The number of deaths reported to SAAPM in this reporting period was 638, an increase of 16% from the 2010-2011 report where 549 deaths were reported. The number of surgical case forms returned to SAAPM has remained steady. At the time of writing, 87% of surgical case forms had been returned for this audit period, compared with 85% in the 2010-2011 reporting period.

Assessments

Of the 638 surgical case forms sent to surgeons, 553 were returned during the census period of 1 July 2011 to 30 June 2012. From the cases returned, 61 were excluded for a variety of reasons, most commonly because the patient was admitted for terminal care, but also, in some cases, because the hospital data systems could not identify the appropriate treating surgeon. The remaining 492 cases were subjected to FLA and, of those, 26 cases (5%) were recommended for SLA, which is slightly lower than for the 2010-2011 reporting period (7%). In total, 488 cases (4 FLAs were pending) completed first-line assessment during the census period.

Cases for analysis

Data analysed for this report covered cases reported to SAAPM from 1 July 2011 to 30 June 2012. SAAPM analysed areas of concern or adverse events ascribed to the cases by the first- or second-line assessors.

Patient sample demographics

Of the 638 patients who died, the median age at death was 80.9 years (interquartile range 70.9 - 86.8) and 59% were male. Of the cases in which the surgical case form was returned, 57% of patients had an American Society of Anesthesiologists (ASA) grade of four or more and 91% had at least one significant comorbidity present that increased the risk of death.

Areas of consideration, concern and adverse events

The proportion of cases associated with areas of concern or adverse events (11%) was slightly lower than the figures reported in 2010/11 and 2009/10 (13% and 14%, respectively). Overall, assessors found that an adverse event caused the death of a patient in 2% of the 484 cases for which data were available, compared with 5% in the previous year. The assessors found that three of the 12 cases with an adverse event or area of concern that caused the death of the patient were thought to be definitely preventable (<1% of all cases), while a further three out of the twelve were probably preventable (<1% of all cases). The most frequently reported adverse events were postoperative complications.

Admissions

Emergency admissions accounted for 85% of all cases, the balance being made up of elective admissions. This was similar to the 86% emergency and 14% elective admissions reported in 2010-2011.

Operative and non-operative deaths

In 28% of audited deaths, no operation was performed. The proportion of these cases where surgeons made an active decision not to operate was 44%.

In 6% of operative cases, the operation was abandoned because a terminal situation was found. Eighty-nine audited patients underwent two or more operations. In 12% of operative cases, the surgeon reported an unplanned return to theatre. The more operations performed, the more likely it was that the cases were associated with an area of concern or an adverse event.

Grade of surgeon

A consultant surgeon operated in 62% of the reported procedures. When a patient underwent multiple operations, consultant involvement in the subsequent operations decreased slightly to 60%.

DVT prophylaxis

Surgeons reported that DVT prophylaxis was used in 74% of cases, which was higher than the 71% recorded for the previous reporting period. Assessors identified two cases (<1%) where DVT prophylaxis was not used when it should have been.

RECOMMENDATIONS

Notifications

Improve hospital data systems to allow accurate tracking of the clinician responsible for an individual patient. Gain access to mortality reports from the South Australian Department for Health and Ageing to allow for cross-checking of deaths received directly from the public hospitals. This would ensure that a minimal number of cases would be excluded from the report due to incorrect identification of the treating surgeon.

Surgeon participation

Audit participation is a mandatory requirement for CPD certification under Category 1: Surgical Audit and Peer Review. Surgeon participation requires timely (within 3 months) and detailed completion of the surgical case forms to ensure accurate data collection. Certificates of participation will be sent to all complying surgeons if required for CPD audit. To remind surgeons of outstanding cases, an enhanced reminder system will be implemented such that all outstanding cases are sent in a single letter at regular intervals during the year.

Preoperative care

Monitor delays in patient transfer and patient diagnosis, and, in particular, ensure that patient assessments are adequate and the decision to operate is sound.

Postoperative care

Monitor postoperative care to ensure that issues such as nutritional care and fluid balance are addressed appropriately and in a timely manner.

Elective surgery

Monitor elective surgery mortality specifically related to preventable clinical incidents.

Clinical management

Continue to monitor deep vein thrombosis prophylaxis, particularly in relation to why it is not used during a patient admission, and ensure that practices are consistent with guidelines from the National Health and Medical Research Council and the Australian Commission for Safety and Quality in Health Care.

Critical Care

Continue monitoring critical care use to ascertain whether current bed allocation practices and patient care within these facilities are appropriate.

Reporting

Confirm baseline data by contacting the appropriate representatives of surgical specialty groups in the major metropolitan hospitals to gain information on surgical data for correlation with baseline data from the South Australian Department for Health and Ageing.

Provide ongoing participation and support in the National Surgical Mortality Audit Report.

Communicate with the South Australian Coroner for access to autopsy reports to assist with the assessment of cases where the cause of death is unknown or unclear.

Provide individual surgeon reports to all surgeons who have a death occur under their care during the reporting period to allow for benchmarking against their specialty and all surgeons in South Australia.

Provide de-identified individual hospital reports to participating hospitals, on request, to allow for comparisons between these hospitals and similar hospitals in South Australia and nationally.

1 INTRODUCTION

KEY POINTS

- **SAAPM is an external, independent, peer-reviewed audit of the process of care associated with all surgically related deaths in South Australia.**
- **This annual report covers the period from 1 July 2011 to 30 June 2012, as audited on 22 October 2012.**
- **The main role of SAAPM is to provide feedback to inform, educate, facilitate change and improve the quality of surgical practice.**

1.1 Background

The South Australian Audit of Perioperative Mortality (SAAPM) is an external, independent, peer-reviewed audit of the process of care associated with surgically related deaths in South Australia. The project is funded by the South Australian Department for Health and Ageing, and its methodology is based on the Scottish Audit of Surgical Mortality.[1]

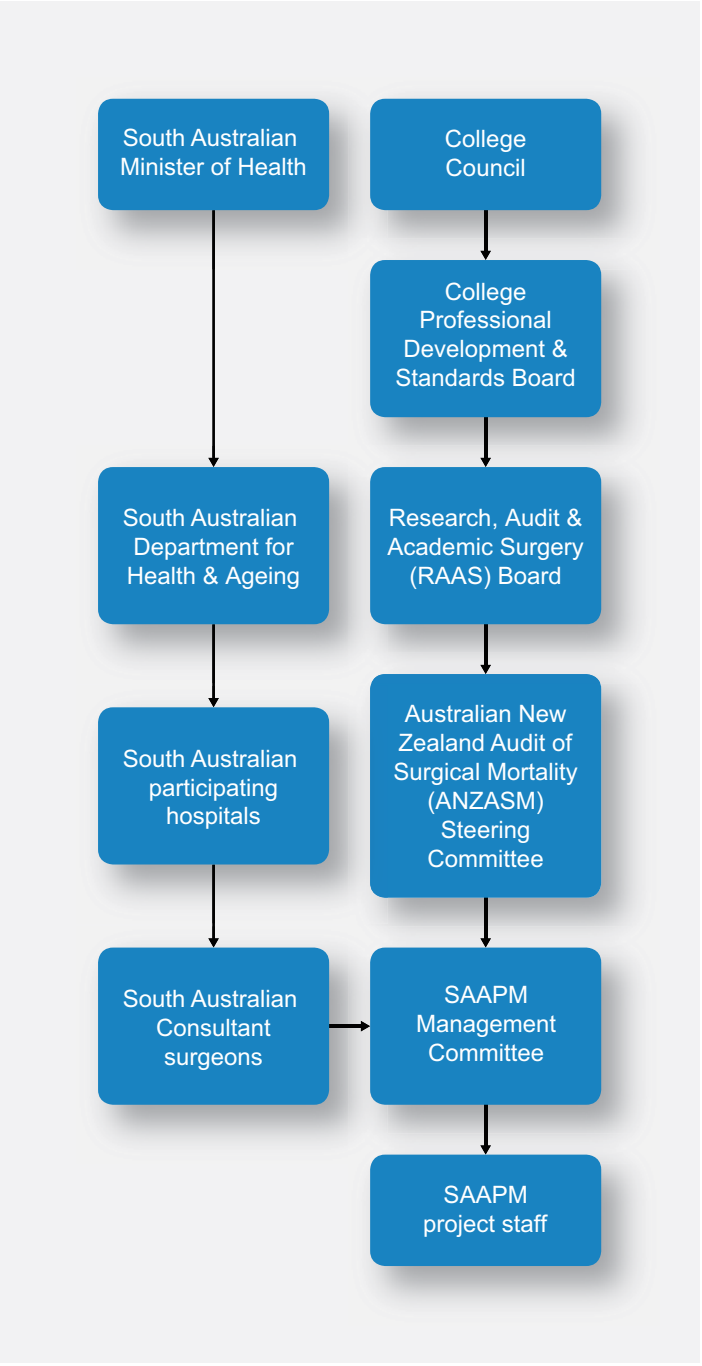
The timeline for the project was as follows:

- SAAPM commenced data collection on 1 July 2005;
- The Royal Australasian College of Surgeons formed the Australian and New Zealand Audit of Surgical Mortality (ANZASM) in 2005 and took over the management of the Western Australian Audit of Surgical Mortality, which was established in 2001;
- As of 2010, all states and territories in Australia participate in ANZASM.

1.2 Project governance

The project governance structure is illustrated in Figure 1.

Figure 1 Project governance structure



1.3 Confidentiality

SAAPM is a confidential project that has legislative protection at a state level under the South Australian Health Care Act 2008, Part 7 (Quality improvement and research) and Part 8 (Analysis of adverse incidents) (gazetted 23 June 2011), in addition to federal coverage under the ANZASM through the Commonwealth Qualified Privilege Scheme, Part VC of the Health Insurance Act 1973 (gazetted 23 August 2011). This protection covers SAAPM staff as well as surgeons acting in the capacity of first and second-line assessors.

2 THE AUDIT PROCESS

2.1 Methodology

The audit process begins when the SAAPM office is notified of the death of a patient who was under the care of a surgeon in a participating hospital. This notification comes from the medical record department or the safety and quality unit of the participating hospital, or directly from the South Australian Department for Health and Ageing. All cases in which a surgeon was involved in the care of the patient are included in the audit, whether or not the patient underwent a surgical procedure.

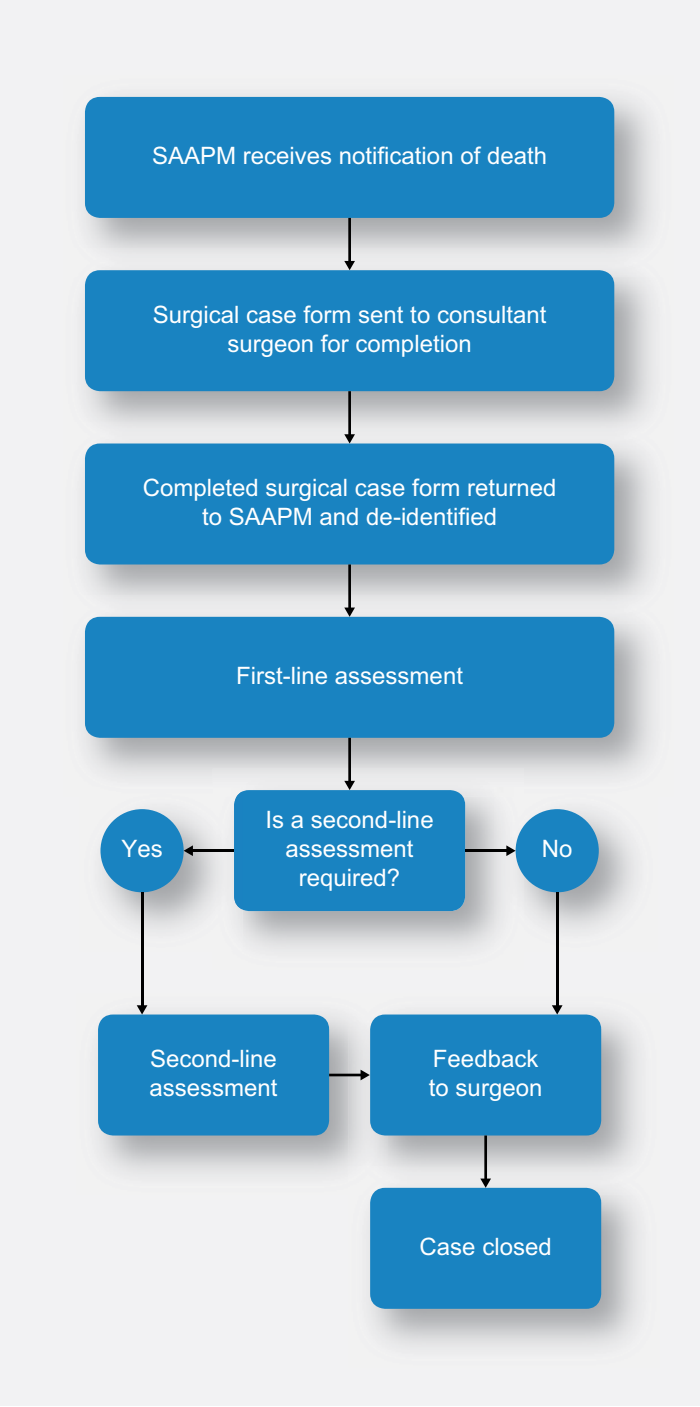
The consultant surgeon associated with the case is sent a surgical case form to complete. When the completed surgical case form is returned to the SAAPM office, it is de-identified and then assessed by a first-line assessor who will either close the case or recommend that it undergo further analysis through a second-line assessment (SLA), also known as a case note review.

Cases may be referred for SLA in the following situations:

- when areas of concern or adverse events are thought to have occurred during the clinical care of the patient that warrant further investigation
- a report would be useful for highlighting lessons to be learned, either for clinicians involved in the case or as part of a collated assessment (case note review booklet) for wider distribution
- the surgical case form lacks sufficient information to make an informed judgement

First and second-line assessors are consultant surgeons who work in the same specialty as the reporting surgeon, but in a different hospital from the one in which the death occurred. The aim is for the assessor to be truly independent and not be involved at all with the cases. The SAAPM audit process is shown in Figure 2.

Figure 2 The SAAPM audit process



2.2 Providing feedback

One of the main objectives of SAAPM is to provide feedback to inform, educate, facilitate change and improve surgical practice. Feedback is provided directly to the consultant surgeon after the completion of a first-line assessment (FLA) or SLA. The audit also produces a case note review booklet for surgeons, containing a selection of de-identified cases that highlight a number of management issues in patient care. This state-wide annual report, which contains analysis and commentary for data covering all surgical specialties, provides an overview of the project for surgeons and the wider community.

2.3 Categories of deaths investigated

Deaths currently included in SAAPM are classified into the following two categories:

- **Category 1: Operative deaths** - A death that occurs when a patient is admitted under the care of a surgeon or physician and has an operation or procedure during his or her last admission, regardless of the length of stay in the hospital or medical facility.

- **Category 2: Non-operative deaths** - A death that occurs when a patient is admitted under the care of a surgeon, but does not have an operation or procedure and dies during his or her last admission, regardless of the length of stay in the hospital or medical facility.

For the period of this audit report, cases which came under the care of specialists from the following Colleges were excluded:

- the Royal Australasian College of Dental Surgeons
- the Royal Australasian College of Physicians
- the Royal Australasian College of Ophthalmologists
- the Royal Australian and New Zealand College of Obstetricians and Gynaecologists*

Deaths that are identified by the reporting surgeon as terminal care cases are recorded, but these are excluded from further assessment in the audit. Terminal care is nominated by the surgeon on the surgical case form and cannot be identified from the notification of death information received by the SAAPM office. As noted in the Chairman's report, gynaecological cases will feature in the next annual report.

*Note: During 2012, the RANZCOG Board formally approved the participation and involvement of its Fellows in SAAPM. SAAPM will now receive notification of gynaecological deaths in SA hospitals and RANZCOG Fellows will be encouraged to participate (on a voluntary basis).

2.4 Reporting conventions

2.4.1 Reporting clinical incidents

On the surgical case form, the surgeon is asked to document whether there were any clinical incidents during the care of the patient. The surgeon is asked to classify the patient death into one of the following two categories:

- Cases related to disease progression: In these cases, patient death was due to the disease process, despite appropriate care, and no issues were identified with patient management;

- Cases with clinical incidents: In these cases, clinical incidents are identified that may have affected patient management. These events are divided into the following three categories:

  - Area of consideration: an area where care could have been improved or different, but may be an area of debate;

  - Area of concern: an area where care should have been better managed;

  - Adverse event: an unintended injury, caused by medical management rather than by disease, which is sufficiently serious to lead to prolonged hospitalisation or to temporary or permanent impairment or disability of the patient, which contributes to, or causes, death.

Reporting surgeons also evaluate the impact and preventability of the clinical incident, and determine which clinical team it was associated with. Specifically, the surgeon will report on the following:

- the impact of the incident on the outcome, that is, whether the incident made no difference to the patient's outcome, may have contributed to the patient's death, or caused the death of a patient who would otherwise have been expected to survive;

- whether the incident was definitely preventable, probably preventable, probably not preventable or definitely not preventable;

- with whom the incident was associated - the audited surgical team, another clinical team, the hospital or another factor.

First and second-line assessors also complete the same assessment matrix. The analyses contained in this report are based on the opinions ascribed to cases by either first- or second-line assessors.

2.4.2 Analysis of clinical incidents

SAAPM primarily focuses on areas of concern and adverse events. Cases in which an adverse event occurred that was definitely preventable are considered to be "most serious events". Data regarding areas for consideration is collected, but these are considered to be "less serious events" that have little impact on the overall care of the patient and are generally excluded from the analysis.

2.5 Data analysis

SAAPM is notified of deaths in participating South Australian hospitals where the patient was admitted under the care of a surgeon. The 2012 annual report covers deaths reported to SAAPM that occurred between 1 July 2011 and 30 June 2012. Numbers in previous annual reports may vary from this report because some cases were completed after the census dates of the previous annual reports.

Data is entered and stored in the Bi-National Audit System (BAS) and analysed using Microsoft Office Access (2010) and Microsoft Office Excel (2010) software. Because not all data points were complete, the total number of cases used in the analyses varies—these numbers are provided for all tables and figures in the report.

2.6 Performance review

Recommendations were included in the 2011 SAAPM report[2]. An important measure of the success of SAAPM is whether these recommendations have been addressed or achieved. These recommendations, and details of the progress made toward them, are provided in Section 5 of this annual report.

3 AUDIT PARTICIPATION & ASSESSMENT

KEY POINTS

- **The number of deaths occurring under the care of a surgeon increased considerably since the last reporting period. This is largely as a result of a number of the larger private hospitals participating in the SAAPM project for the first time.**

3.1 Overview of participation

3.1.1 Deaths reported to SAAPM

Participation in SAAPM is now mandatory, as part of the Continuing Professional Development program of the Royal Australasian College of Surgeons, for Fellows who work in a hospital where a mortality audit is available. Surgeons register to participate by signing the participation agreement form sent by the SAAPM office. When a notification of death is received from a hospital, the SAAPM office sends a surgical case form to the responsible surgeon.

Within this report, the number of cases is represented by the letter 'n'. Figure 3 displays the number of deaths, the surgical case form return and assessment rate, and the number of cases that have completed the audit process. The number of death notifications received per surgical specialty is shown in Table 1.

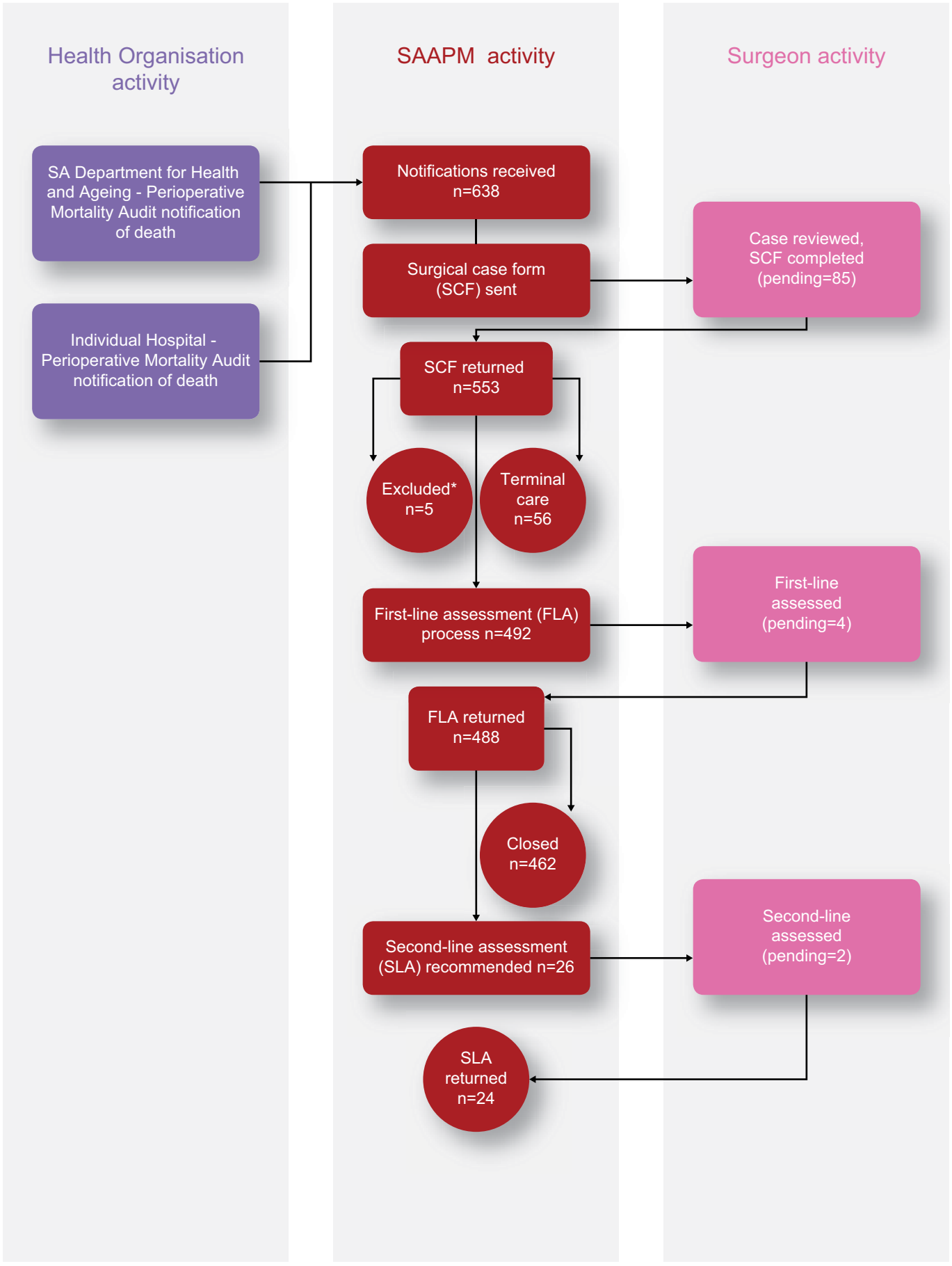
Table 1 Number of death notifications by specialty

Surgical Specialty	Number of patients	% of total
Cardiothoracic surgery	46	7
ENT	8	1
General surgery	280	44
Neurosurgery	63	10
Orthopaedic surgery	121	19
Paediatric surgery	3	<1
Plastic surgery	17	3
Urology	26	4
Vascular surgery	74	12
Total	638	100

Comment

The average number of deaths per annum reported to SAAPM since the project's inception in 2005 was 550. At the time of analysis, 87% of surgical case forms had been returned to the SAAPM office for the 2012 audit period. The number of deaths reported to SAAPM (638) was considerably higher than last year (569). The proportion of cases which have completed the audit process is 85%, the same as for the 2011 annual report.[2]

Figure 3 Deaths reported to SAAPM between 1 July 2011 and 30 June 2012



* Excluded from the audit process due to the case not being surgical or the treating surgeon was unable to be identified.

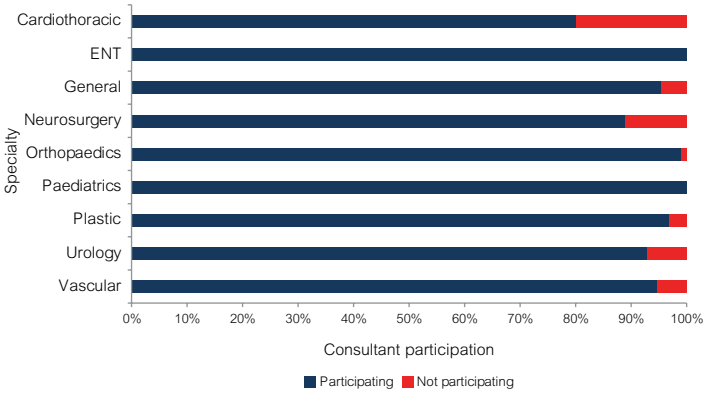
3.2 Surgeon participation in SAAPM

KEY POINTS

- **Participation of surgeons in the audit as first- and/or second-line assessors has remained steady since 2011.**
- **Participation in the audit is now mandatory for Continuing Professional Development (CPD) recertification through the College of Surgeons when a death is reported by a participating hospital.**

In 2010, the Royal Australasian College of Surgeons mandated participation in SAAPM as a part of CPD recertification in a participating hospital. Surgeons are defined as participating when they either actively agree to participate through a signed consent form or complete a surgical case form. Currently, surgeons are considered to be non-participating when they have had a reported death occur under their care during the census period and have not returned their outstanding surgical case form within 3 months of issue. Figure 4 shows the current participation status of surgeons by surgical specialty.

Figure 4 Participation status of surgeons by specialty



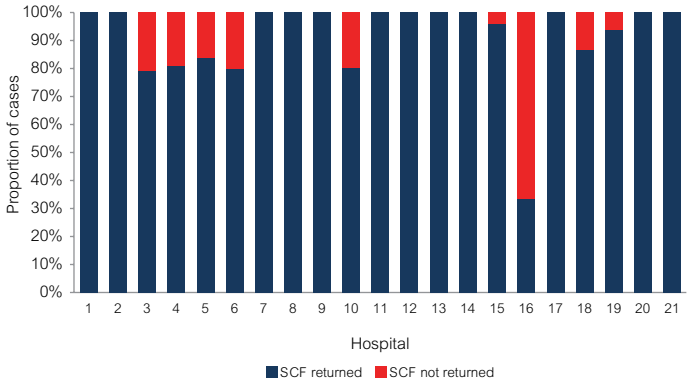
3.3 Hospital participation

KEY POINTS

- **61 hospitals within South Australia participated in the audit.**
- **71% of deaths occurred in three public hospitals.**

At the end of the reporting period, 61 hospitals in South Australia were participating in the audit. This included 48 public hospitals and 13 private hospitals. Of the 48 public hospitals participating, 39 were from regional centres. The percentage of forms sent and returned for each hospital is shown in Figure 5.

Figure 5 Return rates of surgical case forms by hospital



Note:40 participating hospitals did not record a surgical death during the reporting period.

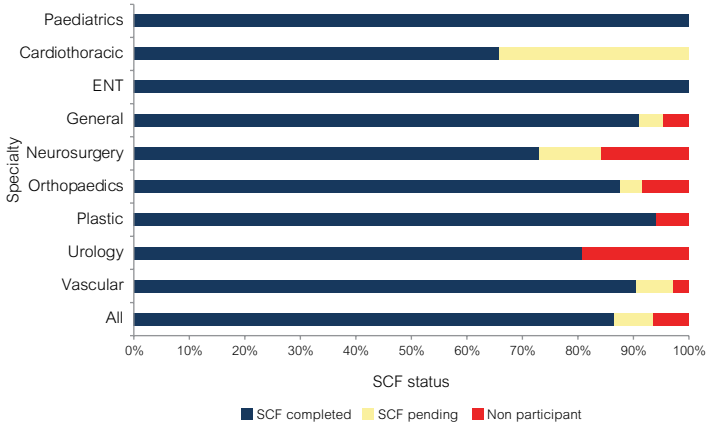
3.4 Surgical case form completion

KEY POINTS

- **The proportion of surgical case forms returned was similar to last year (87%).**
- **The 638 notifications of death were associated with 180 surgeons.**
- **More than 60% of the surgical case forms were completed by consultants.**

In the 2011-2012 audit period there were 638 reported deaths. These deaths were associated with 180 surgeons, 151 (84%) of whom were considered to be participating in the audit as they had completed a surgical case form within 3 months of issue. This participation rate was slightly lower than that reported for 2011 (90%).The completion rate of surgical case forms for each surgical specialty in this reporting period is shown below in Figure 6.

Figure 6 Proportion of surgical case forms completed by specialty (n=552 cases returned)



Comment

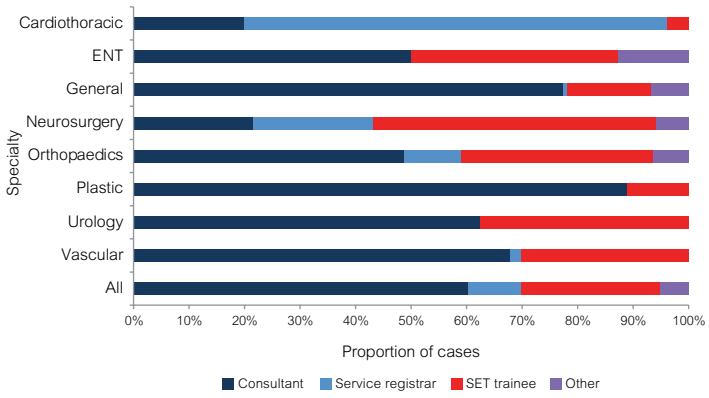
For most specialties, the rate of return of forms has remained relatively unchanged compared with the previous year, although there was an increase in the percentage of forms returned by plastic surgeons during this reporting period (from 73% to 94%).

Of the 638 surgical case forms sent to surgeons during the period 1 July 2011 to 30 June 2012, 553 were returned by the closure date (22 October 2012) for this data analysis.

Fifty-six cases were excluded because the patients were admitted for terminal care and, therefore, did not proceed through the audit. There were 85 surgical case forms pending at the census end date.

The seniority of the surgeon completing the surgical case form was recorded and compared across all surgical specialties (see Figure 7 below).

Figure 7 Seniority of surgeon completing the surgical case form



Note: Other includes surgical Fellow, senior registrar, surgical resident, Resident medical officer, International Medical Graduate or trauma Fellow.

3.5 Assessments

KEY POINTS

- **Of the 488 cases assessed, 26 (5%) progressed to SLA: of these cases, 38% required further investigation and 62% had insufficient information in the surgical case form.**
- **The number of cases recommended for SLA decreased slightly during this reporting period, despite an increase in the overall number of cases. This was due to fewer cases lacking information.**

For deaths that occurred during the reporting period, 553 surgical case forms were returned. Of these, 61 were excluded from the audit because the patient was admitted for terminal care or the hospital data systems could not identify the correct treating surgeon. Therefore, 492 eligible cases were sent for FLA. Four FLA cases were outstanding at the census end date. Following FLA, 26 out of 488 cases (5%) progressed to SLA: these cases comprised 62% that underwent SLA due to a lack of information and 38% that required further investigation. The number of cases recommended for SLA per surgical specialty is shown in Table 2. A listing of all the cases that have undergone assessment since the audit's inception in 2005 is shown in Table 3.

Table 2 Referral for second-line assessment by surgical specialty

Surgical Specialty	Number of cases	
	Total	For SLA
Cardiothoracic surgery	30	1
ENT	5	1
General surgery	219	14
Neurosurgery	42	2
Orthopaedic surgery	103	4
Plastic surgery	15	0
Urology	19	2
Vascular surgery	52	2
Paediatric surgery	3	0
Total	488	26

Note: Cases must have completed FLA to be included in this table.

Table 3 Cases which have undergone assessment (2005-2012)

	Jul 05 to Jul 06 n(%)	Jul 06 to Jul 07 n(%)	Jul 07 to Jul 08 n(%)	Jul 08 to Jul 09 n(%)	Jul 09 to Jul 10 n(%)	Jul 10 to Jul 11 n(%)	Jul 11 to Jul 12 n(%)
Cases for FLA	432	505	549	433	431	381	492
Cases closed after FLA*	356 (82)	373 (74)	377 (69)	406 (94)	405 (94)	360 (94)	462 (94)
SLA completed*	19 (4)	20 (4)	20 (4)	25 (6)	25 (6)	21 (6)	24 (5)

*Note: * Cases must have been completed and closed to be included in these categories.*

Comment

Over the seven years of data collection, a relatively consistent number of cases have undergone SLA each year. The proportion of cases closed after FLA has remained steady at 94% since the 2008-2009 period, and the proportion of cases requiring SLA has remained almost unchanged.

It is SAAPM's aim to remove the need for case note reviews due to inadequate information on the surgical case form, thereby reducing the need for SLA. Surgeons can help achieve this goal by providing a detailed history on the surgical case form, possibly by attaching a death summary.

4 RESULTS

4.1 Overview of sample

KEY POINTS

- **SAAPM was notified of 638 deaths during the census period.**
- **553 surgical case forms were completed during the census period.**
- **59% of all cases were male.**
- **In 57% of cases, an American Society of Anesthesiologists (ASA) grade of at least 4 was recorded.**
- **In 91% of cases, the patients had at least one comorbidity which was considered by the surgeon to have contributed to their death.**

4.2 Admissions

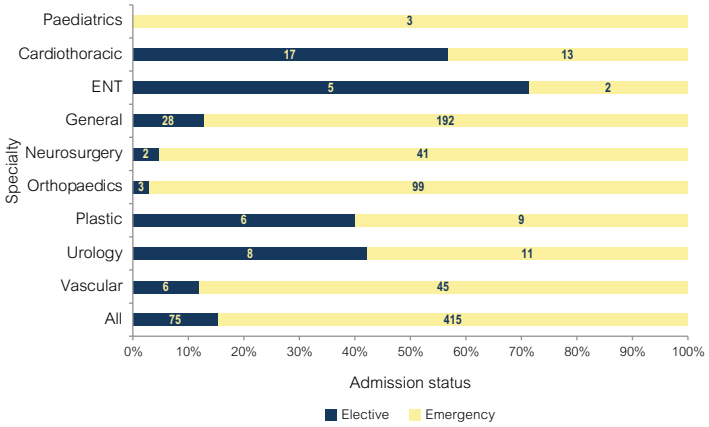
KEY POINTS

- **Of the total admissions, 15% were elective and 85% were emergencies.**
- **87% of cases were admitted under the care of a surgeon.**
- **72% of cases underwent at least one operation.**
- **97% of the 75 elective admissions underwent an operation.**
- **67% of the 415 emergency admissions underwent an operation.**

Data on admissions is concerned with the type of admission (emergency or elective) and whether the patient underwent an operation (operative) or not (non-operative). The admission status of the patients for each surgical specialty is shown in Figure 8.

Operative and non-operative cases are described in Section 4.9.

Figure 8 Admission status of audited patients by surgical specialty



Note: The number of cases is shown in the chart.

Comment

Overall, the majority of audited deaths occurred in patients admitted as emergencies for acute life-threatening conditions. In particular, the vast majority of deaths in the Vascular, Neurosurgery, Orthopaedics, General and Paediatric surgery specialties were emergency admissions.

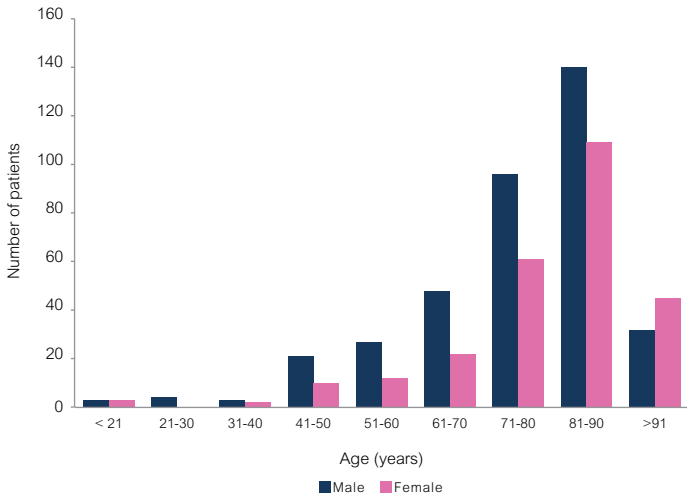
4.3 Age distribution

KEY POINTS

- **The median age of patients at death was 80.9 years.**
- **Deaths occurred most frequently in patients aged between 81 and 90 years.**

In the current reporting period, there were 638 recorded deaths, comprising 374 (59%) males and 264 (41%) females. Figure 9 indicates the age and sex distribution of all reported cases. Patients between the ages of 71 and 90 years accounted for approximately 76% of all cases. Patients aged from 81 to 90 years are the predominant group in the sample - the highest number of deaths for both males and females occurred in this age group.

Figure 9 Age distribution by gender



The median age of patients at death and its interquartile range (IQR) is shown for each surgical specialty in Table 4. As in previous years, the age distribution is heavily skewed toward the older age groups (with the obvious exception of Paediatric surgery).

Table 4 Median age of patients at death for each surgical specialty

Surgical Specialty	Median age (years)	IQR (25 - 75%) (years)
Cardiothoracic surgery	76.7	70.1-83.0
ENT	75.5	69.4-84.3
General surgery	80.1	69.8-86.3
Neurosurgery	71.5	55.2-78.0
Orthopaedic surgery	85.9	81.0-90.3
Plastic surgery	82.6	67.6-88.2
Urology	82.6	76.2-88.1
Vascular surgery	80.9	72.9-86.6
Paediatric surgery	3.2	2.7-3.9
Total	80.9	70.9-86.8

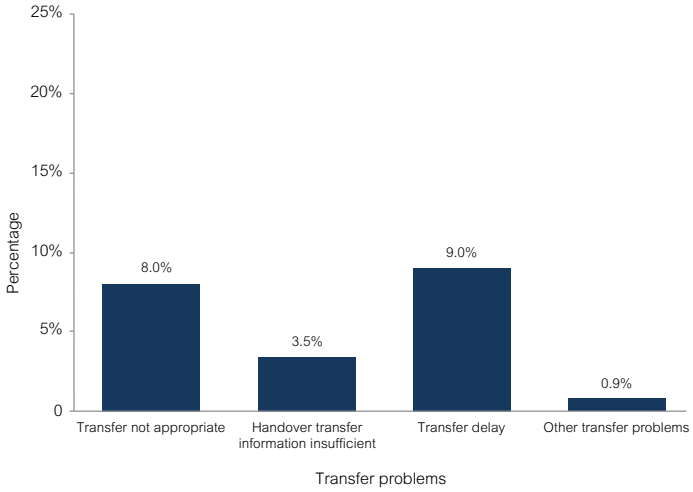
Comment

The distribution of patient age at death across the surgical specialties followed expectations, given the case mix of the individual specialties, and has remained consistent for all reporting periods. The younger median patient age at death in Neurosurgery reflects the contribution of head injury deaths among the predominantly younger age groups.

4.4 Transfers

Of the 479 patients for whom data was available, 123 (26%) were transferred between hospitals. Transfer typically occurred when a higher level of care or specific expertise was needed. Issues associated with patient transfers are shown in Figure 10.

Figure 10 Patient care issues associated with patient transfer



Note: Data missing for 13 cases.

Comment

- The transfer was considered to be appropriate in 92% of cases.
- The level of care during transfer was adequate in 100% of cases (data not shown).
- There was a delay in transfer in 9% of cases.

4.5 American Society of Anesthesiologists (ASA) grades

KEY POINTS

- **Most patients in the audit had an ASA grade of 3 or 4.**
- **Urology and ENT specialties had the highest proportion with ASA grades of 1 or 2.***
- **Neurosurgery and General surgery specialties had the highest proportion assessed as ASA grades 5 or 6.***

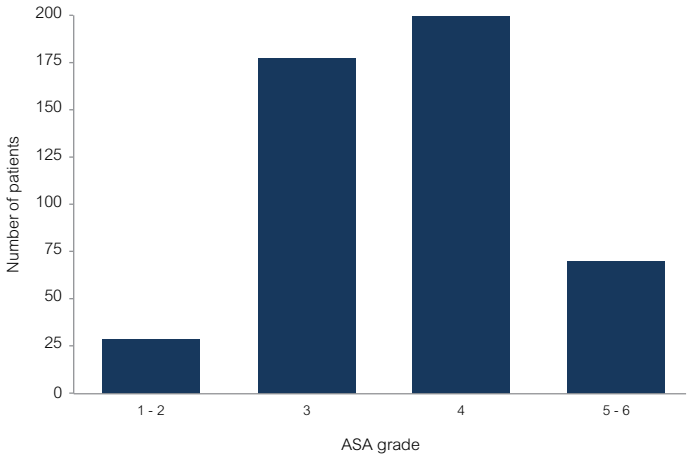
**Note: Paediatric specialty excluded due to the small number of cases.*

The ASA grade (Table 5) is an internationally recognised classification of perioperative risk. The ASA grade of 4 has been the most frequently reported grade across all years of the audit. Patients with an ASA grade of 4 have one or more chronic underlying medical conditions that significantly increase their risk of dying during anaesthesia or surgery. The ASA grade of the patients prior to surgery is shown in Figure 11, and the breakdown of patient ASA grades by surgical specialty is shown in Figure 12.

Table 5 ASA grades

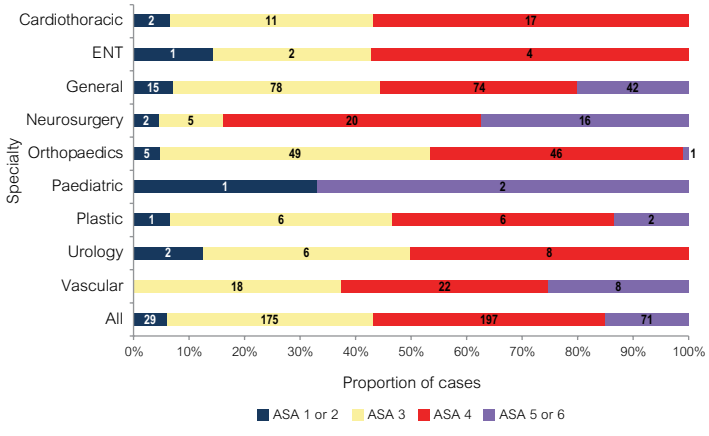
ASA Grade	Characteristics
1	A normal healthy patient
2	A patient with mild systemic disease and no functional limitation
3	A patient with moderate systemic disease and definite functional limitation
4	A patient with severe systemic disease that is a constant threat to life
5	A moribund patient unlikely to survive 24 hours, with or without an operation
6	A brain dead patient for organ donation

Figure 11 ASA grades of patients prior to surgery



Note: Data missing for 17 cases

Figure 12 ASA grade by surgical specialty



Note: Data missing for 17 cases.

Comment

ASA grades are a simple, but important, measure of comorbidity and are routinely recorded on the anaesthetic record. This important data point was missing in 3% of the forms returned; this is an improvement on the 8% missing in the previous reporting period.

An ASA grade of either 3 or 4 was assigned to 79% of patients, meaning that they were assessed as having either a moderate or severe degree of systemic disease upon admission to hospital.

Most patients in the audit had an ASA grade of 3 or 4. However Urology and ENT specialties had the highest proportion with ASA grades of 1 or 2 and Neurosurgery and General Surgery specialties had the highest proportion assessed as ASA grades 5 or 6. Paediatric specialty was excluded due to the small numbers of cases.

4.6 Malignancy

The presence of malignancy in a patient may complicate the presenting condition and potentially contribute to his or her death. Malignancy was present in 30% of cases. Among these patients, malignancy contributed to death in 63%. Metastatic disease was present in 48% of the cases with malignancy.

4.7 Comorbidity

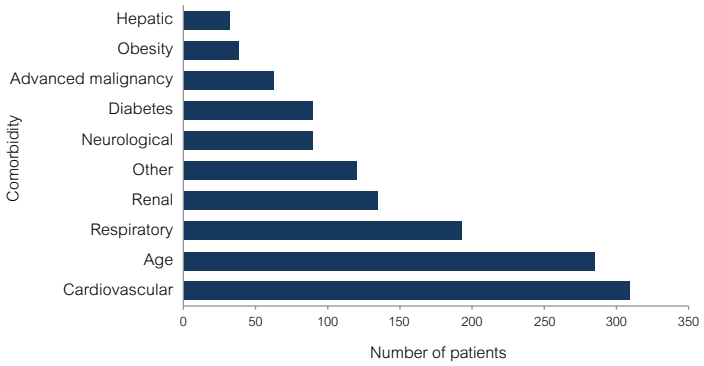
KEY POINTS

- **There were 1,357 comorbidities among 488 patients.**
- **The most common comorbidities were cardiovascular problems, advanced age and respiratory disease.**
- **The median number of comorbidities per patient was three.**
- **The Paediatric and Neurosurgery specialty had the most patients with zero or one comorbidity.**
- **The Orthopaedics and Plastic surgery specialties had the highest percentage of patients with 5 or more comorbidities.**

A total of 1,357 comorbidities were reported among 488 patients (Figure 13). The most frequently occurring factors were cardiovascular problems (23%), advanced age (21%) and respiratory disease (14%).

The number of comorbidities reported for patients by surgical specialty is shown in Figure 14.

Figure 13 Comorbidities present by frequency

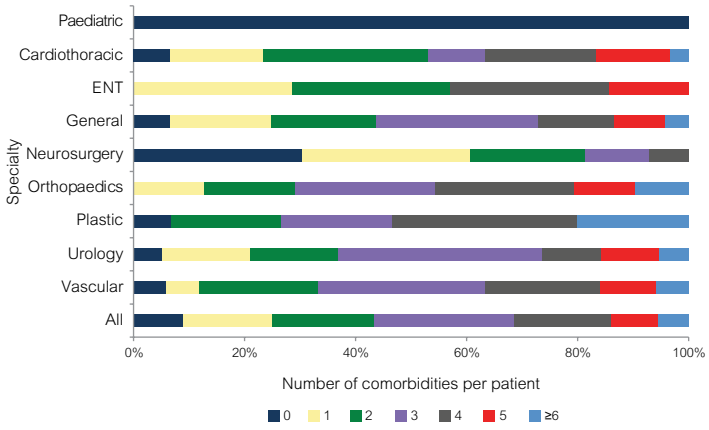


Note: Other includes dementia, malnutrition, myelodysplasia, immunosuppression, alcohol abuse and polymyalgia.

Comment

The median number of comorbidities per patient was three. Only 9% of patients did not have a significant comorbidity.

Figure 14 Number of comorbidities per patient by surgical specialty



Comment

The Paediatric and Neurosurgery specialties had the highest proportions of patients with zero or one comorbidity (100% and 60%, respectively); however, findings relating to the Paediatric surgery specialty must be interpreted with caution due to the small number of cases (n=3). The Orthopaedic and Plastic surgery specialties had the highest proportions of patients with 5 or more comorbidities (both 20%).

4.8 Preoperative diagnostic delays

Any causes of preoperative delay identified by the reporting surgeon were analysed. Preoperative delay was identified by the treating surgeon in 6% of cases (data not shown). Of 21 such cases for which data was available, 7 (33%) were associated with the surgical unit (Table 6).

Table 6 Responsibility for preoperative delays

Associated with:	n (%)
Surgical unit	7 (33)
Medical unit	6 (29)
GP	4 (19)
Other*	5 (24)
Emergency department	1 (5)
No Answer	1 (5)
Total	24

Note: There may be more than one response per case.
**Other includes delays in referral from nursing home.*

Preoperative delays were mainly caused by inexperienced staff (19%) or the misinterpretation of results (19%), or were seen as unavoidable (19%) (Table 7).

Table 7 Cause of preoperative diagnostic delays

Cause	n (%)
Inexperienced staff	5 (19)
Incorrect test	2 (7)
Misinterpretation of results	5 (19)
Results not seen	2 (7)
Unavoidable	5 (19)
Other	14 (52)
Total	33

Note: There may be more than one response per case.
Other includes delay in presentation, difficulty in interpreting results and symptoms evolving through examination.

4.9 Operative and non-operative cases

KEY POINTS

- **350 patients underwent a total of 477 operations.**
- **6% of the 350 operative cases were abandoned because the patient's situation was found to be terminal.**
- **12% of operative cases had an unplanned return to theatre.**
- **28% of cases did not undergo an operation.**
- **The most common reason for no operation was an active decision not to operate.**
- **In 26% of non-operative cases, the reason for not operating was unclear.**

There were 477 operations performed on 350 patients (Table 8). The reasons for not operating are shown in Table 9.

Table 8 Operations performed

Number of operations	n	%
No operation	137	28% of all cases
Operation performed	350	72% of all cases
1 operation	261	75% of operated cases
2 operations	63	18% of operated cases
3 operations	19	5% of operated cases
4 operations or more	7	2% of operated cases

Table 9 Reasons for not operating (n=166 in 137 patients)

Reason for non-operation	n	%
Not a surgical problem	27	20
Active decision not to operate	57	42
Patient refused operation	14	10
Rapid death	19	14
Active decision to limit treatment	13	9
Data missing	36	26
Total	166	100

Note: Some cases had more than one response.

4.10 Risk of death before surgery

Surgeons and assessors were asked to assess the risk of death prior to surgery.

- Surgeons estimated that 55% of patients had either a considerable risk or an expected risk of death.
- Assessors estimated that 63% of patients had either a considerable risk or an expected risk of death.
- Assessor estimates of the risk of death for a patient were generally higher than those reported by the treating surgeons (Figure 15).

Figure 15 Risk of death before surgery

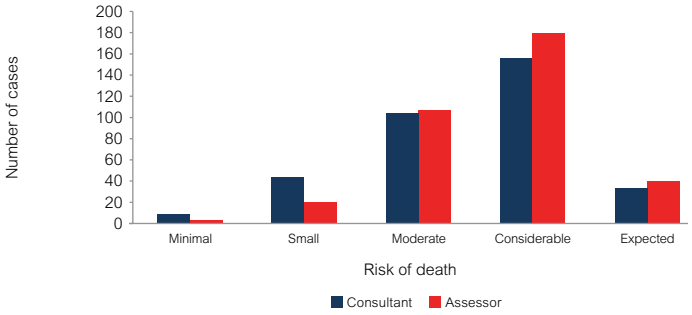
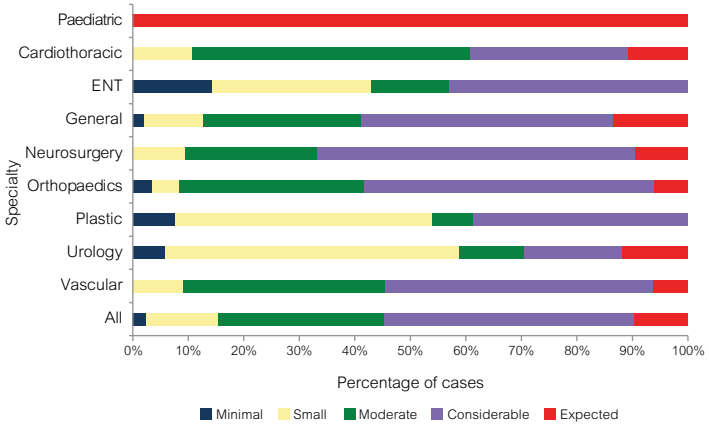


Figure 16 Risk of death before surgery by surgical specialty



Comment

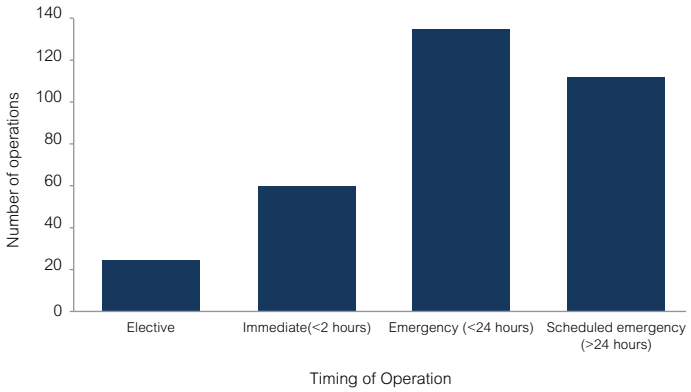
The Urology specialty had the highest percentage of deaths in patients who were assessed as having the lower levels of risk of death (Figure 16).

4.11 Timing of operations

The treating surgeon was asked to report on the timing of the procedure relative to admission and the time of day the operation was commenced.

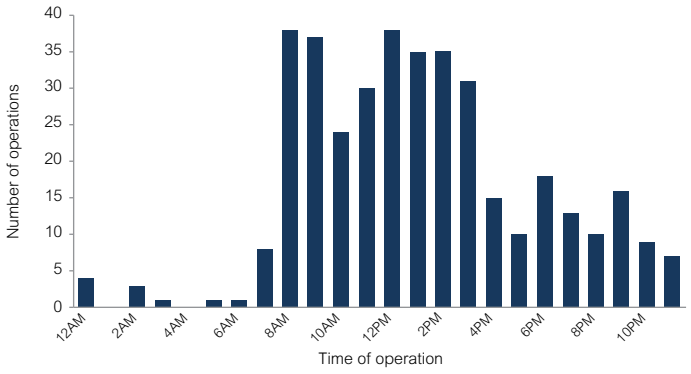
- During the reporting period, there were 407 emergency admissions for which data was available. Of these admissions, 272 patients underwent 357 operations.
- For emergency admissions, operations were most commonly initiated less than 24 hours after the patient was admitted (Figure 17).
- Most operations (including emergency and elective) occurred during normal working hours (Figure 18).

Figure 17 Timing of operation for emergency admissions



Note: Data is missing for 25 cases.

Figure 18 Time of operation



Note: Data missing in 93 cases

Comment

Operations were most commonly performed between 8am and 9pm when Consultant surgeons are usually present. Only a small percentage of operations (9%) were performed outside of this time period.

4.12 Grade of surgeon

When completing the SAAPM surgical case form, surgeons were asked to indicate the grade of surgeon involved at each level of the operative process: making the operative decision, performing the operation, directly assisting during the operation, and present in theatre during the operation (Table 10).

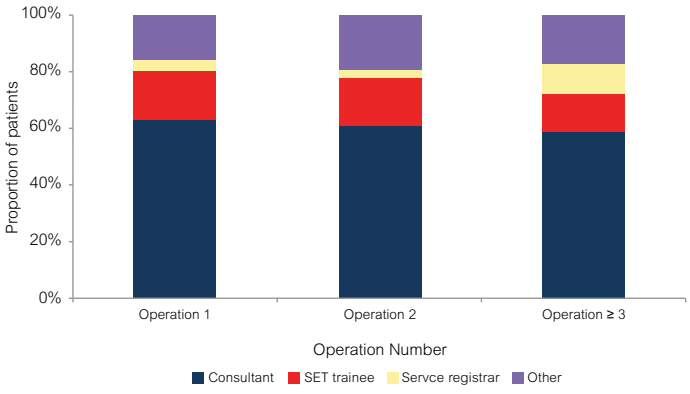
Table 10 Grade of surgeon involved in the operative process

	Proportion of surgeons involved in operation (%)			
	Deciding	Operating	Assisting	In theatre
Consultant	92	62	23	59
Fellow	4	16	17	7
Service registrar	1	4	18	10
SET trainee*	4	17	38	24
IMG**	0	0	2	1
GP Surgeon	0	0	2	0
Total	100	100	100	100

**Surgical Education and Training; **International medical graduate*
Note: Data missing in 44 cases for Deciding, 75 cases for Operating, 232 cases for Assisting and 379 cases for In theatre.

The 2012 reporting period demonstrated an increase in the proportion of first operations in which the consultant operated (63%, compared with 55% in 2010 and 51% in 2011) and a decrease in consultants operating for the third or subsequent operation (59% compared with 70% in 2010 and 84% in 2011) (Figure 19).

Figure 19 Grade of surgeon operating



Note: Other refers to overseas Fellow, specialist Fellow or additional consultant.

4.13 Critical care

KEY POINTS

- **Critical care was used in 64% of all cases.**
- **In the 170 cases that did not receive critical care, the assessors considered that 6 (4%) of these patients would have benefited from critical care.**

The treating surgeon was asked whether critical care (intensive care unit or high-dependency unit) was used. Critical care was used in 64% of cases. In the majority of these cases (97%), the surgeon was satisfied with the treatment the patient received while in critical care.

Comment

According to the first- and second-line assessors who answered this question, 6 patients (4%) among 170 cases that did not receive critical care may have benefited from its use.

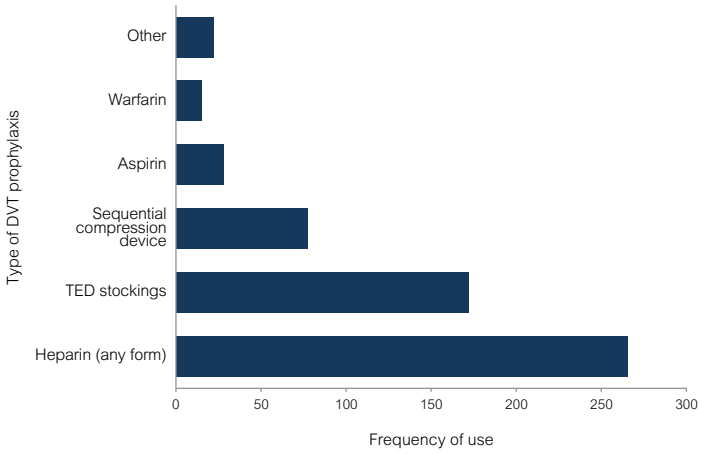
4.14 Deep vein thrombosis prophylaxis

KEY POINTS

- **Deep vein thrombosis (DVT) prophylaxis was used in 74% of all audited cases.**
- **The most frequently used DVT prophylactic treatments were heparin and thromboembolic deterrent (TED) stockings.**
- **There were four cases (1%) reported where the assessors felt that the administration or non-administration of DVT prophylaxis was inappropriate.**
- **The most common reason for not using DVT prophylaxis was that it was not considered appropriate.**

DVT prophylaxis was used in 74% of cases, a proportion similar to previous years (71% in 2011 and 69% in 2010). Of the 354 patients who received DVT prophylaxis, heparin and TED stockings were the most common types used (Figure 20).

Figure 20 Types of DVT prophylaxis used



Note: Other includes clopidogrel, enoxaparin and Clexane. Data missing in 13 cases.

DVT prophylaxis was not used in 125 cases and a reason for not using DVT prophylaxis was given for 109 of these: 28 (26%) were associated with an active decision to withhold treatment, 76 (70%) were deemed inappropriate to receive DVT prophylaxis and 5 (5%) were not considered for DVT prophylaxis.

Surgeons were also asked to provide further detail on why DVT prophylaxis was not used. Out of the the 72 cases where further details were provided, 27 (38%) patients were coagulopathic, 16 (22%) had a clinical diagnosis which contraindicated anti-coagulation, and 13 (18%) were treated palliatively (Table 11).

Table 11 Reasons for not using DVT prophylaxis

Reason	Number of cases (%)
Coagulopathic	27 (38)
Clinical diagnosis contra-indicated anti-coagulation	16 (22)
Palliation	13 (18)
Nil clinical risk of DVT	10 (14)
Rapid death	6 (8)
Total	72 (100)

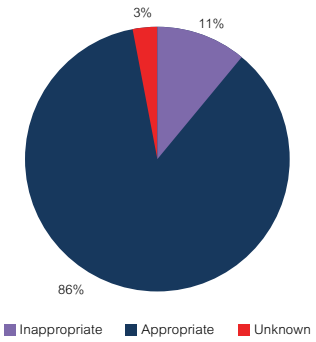
Note: No answer was given in 53 cases.

The assessors considered that DVT prophylaxis was appropriate in 91% of cases. There were four cases recorded where the assessors felt that the administration or non-administration of DVT prophylaxis was inappropriate (1%). The assessors could not come to a conclusion in 8% of cases as to whether DVT prophylaxis treatment was appropriate.

4.15 Fluid balance

There were 463 cases with information on fluid balance management (data missing for 16 cases and 13 cases where the surgeon was unsure). The treating surgeon noted that fluid balance was an issue in 54 cases (11%) (as shown in Figure 21), similar to the proportion reported in 2011 where there was an issue with fluid balance in 38 of the 347 (11%) operative cases (data missing from 3 operative cases).

Figure 21 Fluid balance management



Note: Data missing in 16 cases.

Comment

Fluid balance in the surgical patient remains problematic and is often managed by relatively junior staff - continuing education and use of appropriate guidelines is to be encouraged. There have been a number of publications seeking to increase knowledge and improve practice in this area, including the Scottish Intercollegiate Guidelines Network guideline on postoperative management[3] and, more recently, the British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients.[4]

4.16 Unplanned events

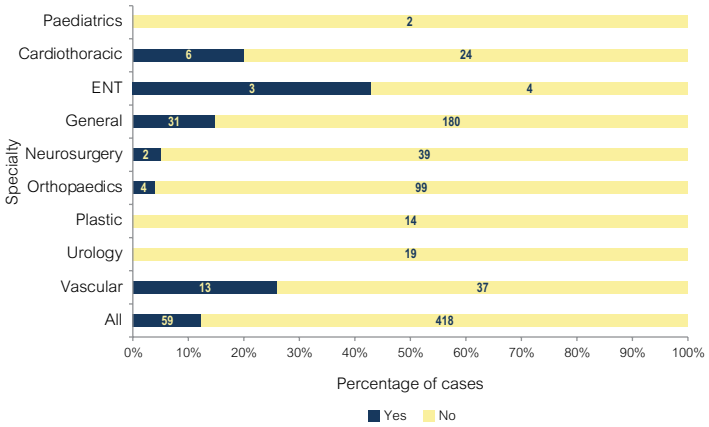
Reporting surgeons identified that, out of 477 cases (15 cases were missing data), there were 95 (20%) unplanned admissions to the intensive care unit, 20 (4%) unplanned readmissions to hospital and 59 (12%) unplanned returns to theatre (Table 12).

Table 12 Frequency of unplanned events

Unplanned action	Number	% of cases
Admission to ICU	95	20
Return to theatre	59	12
Readmission	20	4

Of the 59 unplanned returns to theatre, 22 (37%) were elective admissions and 37 (63%) were emergency admissions. The breakdown of the unplanned returns to theatre by surgical specialty is shown in Figure 22.

Figure 22 Unplanned returns to theatre by surgical specialty



Note: The number of cases is shown in the chart.
Data missing in 15 cases.

- The most common complications for return to theatre included respiratory issues (21%), postoperative bleeding (18%), wound infection (14%) and cardiac issues (14%).

4.17 Postoperative complications

Postoperative complications are considered to be a major source of mortality in surgical patients.

- 125 of 349 (36%) patients had a postoperative complication (The question was not answered for one operative case).
- There were 141 postoperative complications noted for 125 patients (Table 13).

Table 13 Most frequently occurring postoperative complications

Complication	Frequency	% of cases
Respiratory	25	20%
Postoperative bleeding	22	18%
Procedure-related sepsis	17	14%
Cardiac	17	14%
Gastro intestinal leak	14	11%
Tissue ischaemia	14	11%
Central nervous system	11	9%
Other*	8	6%
Renal or hepatic failure	8	6%
Multi-organ failure	5	4%
Total	**141**	

Note: Other complications included ascites, removal of the PTC tube, hypothermia and confusion

4.18 Surgical diagnoses

The main surgical diagnoses reported by surgeons are shown in Table 14. The top ten categories are listed, which account for 86% of all confirmed surgical diagnoses reported. The most frequently reported surgical diagnoses were acute abdominal events and femoral neck fracture.

Table 14 Most frequently reported surgical diagnoses

Surgical diagnosis	Frequency	% of total cases
Acute abdominal event	181	37
Femoral neck fracture	72	15
Intracranial haemorrhage	40	8
Severe infection	32	7
Malignant neoplasm (non-abdominal)	30	6
Bone fracture (excl. femoral neck)	26	5
Cardiovascular disease	19	4
Abdominal aortic aneurysm	15	3
Peripheral vascular disease	14	3
Acute cardiac event	13	3
Total	**442**	

Note: Some cases had more than one surgical diagnosis.

4.19 Management issues in patient care

The reporting surgeon and the assessor were asked whether there were any patient management issues during the admission of the patient (Table 15).

Table 15 Comparison of management issues identified by the reporting surgeon and assessor

	Surgeon (% of total cases)	Assessor (% of total cases)
Preoperative management	7	7
Decision to operate	6	5
Choice of operation	1	3
Operation timing	1	4
Intraoperative management	2	2
Grade of surgeon deciding	0	0
Grade of surgeon operating	1	1
Postoperative care	6	8

Comment

Under each of the categories listed, concerns were identified by surgeons and assessors in less than 9% of cases. However, the assessors identified a larger number of cases with management issues than surgeons. Only the category of 'decision to operate' was identified as a greater area of concern by the treating surgeon, compared with the assessor (6% versus 5%).

4.20 Postmortem

No data was entered on postmortem examinations for eight of the 488 assessed cases. In 144 (30%) cases, the reporting surgeon did not know whether a post-mortem occurred. Of the remaining 336 cases, 76 (23%) underwent a postmortem, all of which were performed by the Coroner's office (Table 16). A postmortem was not conducted for 258 (77%) cases. In 1% of cases, a postmortem was refused.

Table 16 Postmortem examinations

Postmortem performed	Number of cases
Yes	76
No	258
Refused	2
Unknown	144
Missing	8

4.21 In retrospect

Surgeons were asked whether, in retrospect, they would have done anything differently. Among the 471 responses, 46 (10%) surgeons indicated that they would have taken a different course of action. The question was not answered in 17 cases. Qualitative analysis revealed the following themes:

- Postoperative care issues
- Inappropriate timing of operation
- Preoperative care issues
- Inappropriate type of operation
- Inappropriate decision to operate
- Communication issues
- ICU should have been used

4.22 Clinical incidents

KEY POINTS

- **5% of cases were subjected to SLA.**
- **18% of cases were associated with a clinical incident, with 11% of all assessed cases having an area of concern or an adverse event (data not shown). Note that there may be more than one clinical incident per case.**
- **The most frequent area of concern related to the decision to operate.**
- **Adverse events were most likely to occur in the postoperative period.**
- **The proportion of areas of concern or adverse events was higher in elective admissions (27%) than in emergency admissions (8%).**
- **25% of areas of concern or adverse events were thought to have caused the death of the patient: 12% of these incidents were classified as definitely preventable, 64% as probably preventable and 24% as not preventable.**

Of the 484 cases in which the data was available, 397 cases (82%) had no clinical incidents associated with them, and death was a result of the disease process.
There were 87 cases (18%) where a clinical incident was identified by the assessor. These comprised 7% in which an incident was classified as an area of consideration, which was similar to the proportion in the 2011 report (8%), and 11% in which an event was more seriously categorised as an area of concern or an adverse event (data not shown).

There were 18 cases that had more than one clinical incident associated with the care of the patient. The total number of clinical incidents is shown in Table 17.

Table 17 Total number of clinical incidents (n=108 clinical incidents)

Incident area	Number
Area of consideration	47
Area of concern	41
Adverse event	20

Note: Some cases had more than one incident.

Serious clinical incidents (areas of concern and adverse events) were more common in elective cases (27%) than in emergency admissions (8%) (as shown in Table 18).

Table 18 Areas of concern and adverse events in elective and emergency admissions

	Serious Clinical Incident				
Admission type	**Yes (n)**	**No (n)**	**Total**	**Yes (%)**	**No (n)**
Emergency	33	373	**406**	8	92
Elective	19	52	**71**	27	73
Total	**52**	**425**	**477**		

For the 61 clinical events that were categorised into areas of concern or adverse events, surgeons were asked whether the event caused or contributed to the patient's death, and whether the event could have been prevented (data missing for 4 incidents).

12 (21%) caused the death of the patient
- 4 (33%) were definitely preventable
- 3 (25%) were probably preventable
- 4 (33%) were probably not preventable
- 1 (8%) was definitely not preventable

38 (67%) may have contributed to the death of the patient
- 8 (21%) were definitely preventable
- 25 (66%) were probably preventable
- 5 (13%) were probably not preventable

7 (12%) made no difference to the outcome of the patient

Tables 19, 20 and 21 relate clinical incidents to patient outcome, preventability and the responsible clinical unit. The majority of incidents noted (81%) were not classified as adverse events. However, 20 adverse events were identified, of which 12 (60%) may have contributed to the death of the patient and 8 (40%) caused the death of a patient who would have otherwise been expected to survive (as shown in Table 19).

Twenty-four events were assessed as being definitely preventable, while 27 events were deemed to be either probably not preventable or definitely not preventable, as shown in Table 20.

Table 19 Patient outcome associated with areas of consideration, concern or adverse events

Clinical Incident	Made no difference	May have contributed to death	Caused the death of a patient	Missing data	Total
Area of consideration	20	20	4	3	**47**
Area of concern	7	26	4	4	**41**
Adverse event	0	12	8	0	**20**
Total	**27**	**58**	**16**	**7**	**108**

Table 20 Preventability associated with areas of consideration, concern or adverse events

Clinical Incident	Preventability					Total
	Definitely	Probably	Probably not	Definitely not	Missing data	
Area of consideration	9	16	13	1	8	47
Area of concern	12	23	3	1	2	41
Adverse event	3	8	8	1	0	20
Total	**24**	**47**	**24**	**3**	**10**	**108**

Table 21 Responsible unit associated with areas of consideration, concern or adverse events

Clinical Incident	Association*					Total
	Surgical unit	Another clinical unit	Hospital	Other	Missing data	
Area of consideration	28	8	4	5	8	53
Area of concern	20	19	2	2	3	46
Adverse event	13	4	0	4	1	22
Total	**61**	**31**	**6**	**11**	**12**	**121**

**Some clinical incidents were associated with more than one team.*

Of the 108 incidents, 56% were attributed to the audited surgical team.

The majority of areas of consideration were in the preoperative period. The most frequently identified areas included the following:

- Decision to operate
- Delay in diagnosis
- Delay to surgery
- Different operation desirable
- Inadequate preoperative care
- Failure to use critical care
- Fluid balance
- Inadequate preoperative assessment

Tables 22 and 23 provide details regarding the areas of concern and adverse events as determined by the assessors.

Table 22 Areas of concern in emergency and elective cases

Operative status	Area of concern	Frequency
Preoperative	Delay in diagnosis	6
	Inadequate preoperative assessment	3
	Decision to operate	9
	Transfer delay	3
	Delay in treatment	2
	Operation should have been delayed	1
	Communication failures relating to transfer	1
	Transfer should have occurred preoperatively	1
Intraoperative	Communication failures	1
	Anaesthetic complications	1
Postoperative	Complications	6
	Delay recognising complications	3
	Fluid balance	2
	Unsatisfactory postoperative care	2
Total		

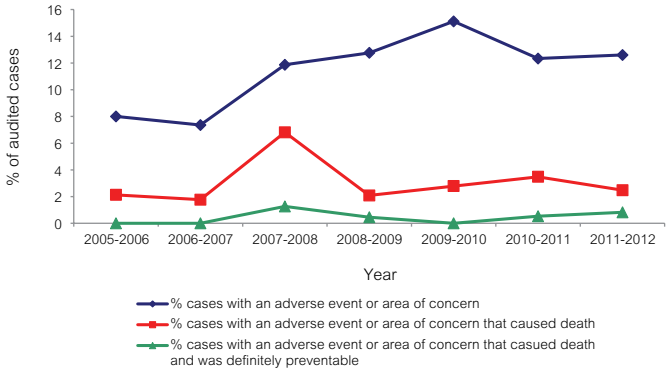
Table 23 Adverse events in emergency and elective cases

Operative status	Adverse Event	Frequency
Preoperative	Communication failure	1
	Fall in hospital	1
	Problems during transfer	1
Intraoperative	Perforation of hollow viscus	2
	Cardiac arrest	1
Postoperative	Postoperative bleeding	1
	Infection	2
	Delay in recognising complications	2
	Other complication	6
	Fluid balance	1
	Unsatisfactory postoperative care	2
Total		**20**

An analysis of all serious clinical incidents (adverse events or areas of concern) that have occurred since the audit's inception was conducted.

Events that caused the death of the patient but were definitely preventable are shown in Figure 23.

Figure 23 Cases with a serious clinical incident (2005-2012)



5 PERFORMANCE REVIEW

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

SAAPM has regularly contributed to the ongoing professional development of surgical teams throughout Australia by contributing de-identified cases to the National Case Note Review Booklet. As the audit grows and develops, the ability to identify trends, within SA and across Australia, will further add to the ongoing knowledge of the participants and potentially lead to better outcomes for all surgical patients.

Achievements

1. Peer-reviewed feedback has been provided directly to individual surgeons via assessors' comments on individual cases. This is an essential component of the audit as it provides specific targeted information on a case by case basis.

2. SAAPM contributed to the national *ANZASM Surgical Mortality National Report 2011*, and also contributed de-identified cases to the biannual national *Case Note Review* booklets. These cases were identified as offering clinical insights, and have been well received by the surgical community.

3. Ongoing use of the web-based *Fellows Interface* system has enabled surgeons to access and submit information electronically for both surgical case forms and first-line assessments. This minimises data entry time and the risk of errors in data entry, and hastens turnaround time. The number of fields completed on Fellows Interface was noticeably higher than in previous years. SAAPM encourages surgeons to move to the electronic submissions format.

4. The use of interstate-registered assessors has been necessary for some second-line assessments to ensure the independence of the peer-review process within the state.

5. Improvements have been made to the surgical case form in order to collect more detail around a patient mortality with infection.

6. Improvement in the quality and effectiveness of communication within the clinical team, and with other teams involved in the patient's care, was identified as an area for future improvement and education.

7. Risk management involving DVT prophylaxis was utilised appropriately in 74% of cases. The 26% of cases where it was not used were deemed to be appropriate due to patient condition or timing.

8. The audit has initiated a collaboration with the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG). Looking into the future, we look forward to encouraging the Fellows from RANZCOG to actively participate in the audit process, with gynaecological cases only.

6 ACKNOWLEDGEMENTS

The South Australian Audit of Perioperative Mortality wishes to acknowledge the contribution and support provided by the following individuals and institutions:

- all participating surgeons
- all first-line assessors
- all second-line assessors
- medical records, safety and quality, and risk management departments in all participating hospitals
- the South Australian Department for Health and Ageing for funding and ongoing support:
  - Public Health and Coordination, Clinical Systems Division
  - Health System Management, Information and Communication Technology Services
- the South Australian State Committee of the Royal Australasian College of Surgeons
- staff in the Research, Audit and Academic Surgery (RAAS) Division of the Royal Australasian College of Surgeons, particularly
  - **Professor Guy Maddern**
    Chair, ANZASM Steering Committee
  - **Assoc.Prof. Wendy Babidge**
    Director, RAAS Division
  - **Mr Gordon Guy**
    ANZASM Manager
- members of the South Australian Audit of Perioperative Mortality Management Committee:
  - **Mr Glenn McCulloch**
    Clinical Director, SAAPM Chair and Surgical Representative
  - **Mr David Walsh**
    Surgical Representative
  - **Mr Paul Dolan**
    Surgical Representative
  - **Dr John Russell**
    Anaesthetist Representative
  - **Dr Marie Gould**
    Anaesthetist Representative
  - **Dr Stephen Christley**
    South Australian Department for Health and Ageing
  - **Ms Michele McKinnon**
    South Australian Department for Health and Ageing
  - **Ms Elaine Golding**
    Community Representative
  - **Ms Sasha Stewart**
    SAAPM Project Manager

7 APPENDIX

Review of Orthopaedic cases 2005/06 to 2011/12

Purpose of this review

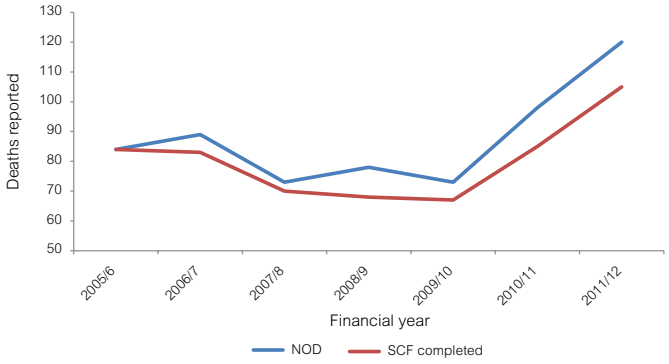
Each annual report we have tried to look at one aspect of the audit and see if further information can be obtained. This year an attempt was made to look at the deaths from fractured neck of femur and compare them with international standards.

Total Orthopaedic deaths

Figure 24 below shows the annual number of Orthopaedic surgical deaths reported to SAAPM (notifications of death - NODs) and the number of associated surgical case forms (SCFs) received for the period 2005/06 to 2011/12. It can be seen that there was an initial decrease in the annual number of Orthopaedic deaths reported, followed by a sharp increase in recent years. This is most likely to reflect an increase in reporting due to a higher number of participating hospitals. It is also apparent that the number of SCFs completed falls short of the total Orthopaedic deaths – over the seven year period, 9% of Orthopaedic

SCFs were not completed. In 2011-2012, 105 of 120 SCFs were completed (88%); from previous years' experience we know that this completion rate will increase over the next 12 months as more forms are returned.

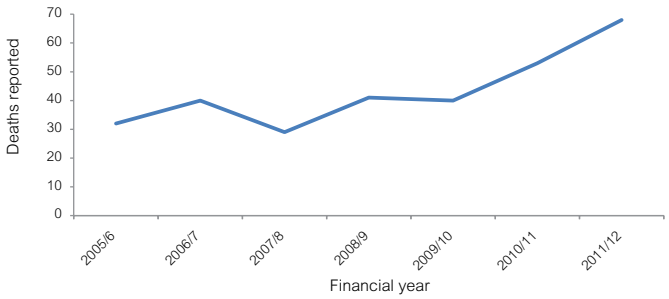
Figure 24: Number of Orthopaedic cases reported to SAAPM 2005/6 to 2011/12 (NOD 615; SCF 562 91%)



Surgical diagnosis of Fracture of Neck of Femur

Figure 25 below shows the number of SCFs received with the surgical diagnosis 'Fracture of NOF', for the period 2005/06 to 2011/12. It can be seen that the number of cases with this surgical diagnosis has been increasing in recent years, reflecting an increase in the number of Orthopaedic surgical deaths reported. It should be noted that surgical diagnosis data is only captured through SCFs (not NODs), so this is likely to be an underestimate as 9% of these forms have not been returned.

Figure 25: Number of cases with surgical diagnosis 'Fracture of NOF' reported to SAAPM 2005/6 to 2011/12 (total 303)



Deficiencies of care associated with Fracture of Neck of Femur

From 1st July 2005 to 30th June 2012, there were six cases (2%) out of a total of 303 deaths with the surgical diagnosis 'Fracture of Neck of Femur' for which areas of concern or adverse events were identified by the reporting surgeon, the first-line assessor or the second-line assessor. Details of these cases are outlined below.

Case A

This elderly man with a history of metastatic prostate cancer suffered a pathological fracture of the neck of femur. During reconstruction and femoral nailing his BP fell to un-recordable levels when the surgeon first started to ream. The treating surgeon thought that this was a likely fat or tumour embolism. The patient recovered but subsequently the BP decreased again during the operation and the patient required inotropes. The operation was prolonged due to cancer involving the entire femur and the need for re-canalising the entire femur to allow for passage of the nail. The end result was increased blood loss with delay in transfusion.

The first-line assessor agreed with the views of the surgeon. However a review of the case notes did not provide any strong evidence of a marked delay in transfusion. Consequently the final assessment was that there was an area of concern (possible delay in transfusion) that may have contributed to the death, which was preventable and was associated with another team.

Case B

This case was a very elderly patient who suffered a left neck of femur fracture after a fall. A cemented hemi-arthroplasty was performed. The patient became generally septic with pseudomonas grown from throat and sputum cultures. A wound infection followed, requiring surgical drainage.

During a period of delirium the patient suffered a fracture of the opposite neck of femur whilst an inpatient. An un-cemented hemi-arthroplasty was performed but further infection with a Vancomycin resistant enterococcus (throat and gut) resulted in multi-system failure and death.

The first-line assessment (FLA) indicated that the wound infection was an adverse event but not preventable and not the cause of death. It is to be noted that the rate of deep wound infection in large series of fractured neck of femur patients is in the order of 2-6%. It would be fair to state that deep wound infection does occur even in the best of units and with the best of care and this adverse event is not necessarily preventable.

The FLA also stated that the fall in hospital and the new fracture was an adverse event that probably caused the death of the patient, was preventable and attributable to another team (not the surgical team). This seems to be a reasonable assessment.

Case C

This is a puzzling case of an elderly patient who presented with a fractured left hip following a fall. There was a past history of dementia, GORD and hypothyroidism. The operation (cemented hemi-arthroplasty) and anaesthetic was uneventful. The patient simply did not wake up after the GA – the exact cause was not apparent. The anaesthetists were certain that it was not a drug effect, based on the medications used and the proper use of reversal agents.

The thought was that it may have been a cardiac event but in the notes supplied there was no evidence of cardiac investigations which had been performed (as is so often the case the lab results were not included). The increasing carbon dioxide levels, despite increased oxygen, were seen as evidence of a possible cardiac event.

There was one entry that seemed to imply a neurological event. About 24 hours after the operation the chart records severe weakness in the arms and extension movements in the legs. There is only one recording on the sheet and no other mention of this finding elsewhere. The second line assessor thought that possibly the patient had a brain stem stroke.

No coroner's autopsy was done and so one cannot be certain of the cause. However there appears to be no surgical misadventure contributing to the death.

Case D

This elderly patient with multiple co-morbidities (including advanced malignancy) developed several pressure sores during the post-operative period. The treating surgeon and the first-line assessor both thought that this was an adverse event that was probably not preventable, was not the cause of the death and was associated with another surgical team. The death was from pneumonia.

Case E

In this patient the operation was delayed as a dose of Clexane had incorrectly been given the morning of the planned operation. A spinal anaesthetic had been planned and so the anaesthetists delayed the operation. The death was due to pneumonia in a patient with severe pre-existing COPD. The clinical incident was classed as an area of concern, associated with another clinical team and was not a factor in the death of the patient.

Case F

This patient had multiple co-morbidities and was displaced from the emergency list. The treating surgeon and the assessor thought that this lengthy delay may have been a factor in the subsequent development of a DVT and PE. The patient died from multi-organ failure. The clinical incident was classed as an area of concern which may have contributed to the death and was preventable and associated with the hospital systems.

SUMMARY OF CASES

It is remarkable that although six patients had identified clinical incidents closer examination suggests that in none of the cases was there a clear surgical or treatment error that contributed to the death of the patient. Considering the population group with many serious co-morbidities this is a remarkable achievement. One could argue that the data is not complete (9% of death notifications did not have their case forms filled out) but only a severe skewing of the data would alter the conclusion.

OVERALL MORTALITY

It is all very well to be pleased that no serious incidents have occurred, but the question that also demands an answer is whether the mortality rate of patients with fractured NOF is comparable to other units and world standards. As SAAPM looks only at death as an outcome, one must turn to other sources of data to see how many patients have a procedure for a fractured NOF and do not die. The South Australian Department for Health and Ageing maintains such records. Their database suggests that, in the year 2010–11, there were 824 patients with a diagnosis of various forms of fractured NOF. Using this figure as the denominator, the 53 deaths recorded by SAAPM equates to a death rate of 6.4%.The question arises whether there are any similar Australian studies that can be used as a bench-mark. Boufous et al.[5] reported on fractured NOF in NSW and noted a death rate of 4.7% to 5.1% over a 10-year period. The SA figures are slightly higher.

Allaf et al.[6] reported that annual fractured NOF death rates from eight NHS Trusts varied greatly, ranging from 3.9% to 17.7%. The purpose of their paper was to assess whether a 5-year average is a better indicator of the true situation. The paper presents 5 years of raw data for one of the Trusts, the South Manchester University Healthcare Trust, which indicates an average annual mortality rate of 7.7% between 1997 and 2001, slightly higher than the SA figures.

CONCLUSION

The data collected by SAAPM would support the view that, in South Australia, the quality of care for patients with fractured neck of femur is similar to elsewhere in Australia and overseas. As the data collection continues, the data held by the audits in the various regions will provide a valuable source of information.

REFERENCES

1. Scottish Audit of Surgical Mortality.Scottish Audit of Surgical Mortality Annual Report 2010 (reporting on 2009). Edinburgh: National Services Scotland, 2009. Available from: http://www.sasm.org.uk/

2. South Australian Audit of Perioperative Mortality. SAAPM Annual Report 2011. North Adelaide: Royal Australasian College of Surgeons, 2011 [cited 2013 March 15]. Available from: http://www.surgeons.org/SAAPM

3. Scottish Intercollegiate Guidelines Network (SIGN). 77: Postoperative management in adults: a practical guide to postoperative care for clinical staff. Edinburgh: Royal College of Physicians, 2004 [cited 2013 March 15]. Available from: http://www.sign.ac.uk/pdf/sign77.pdf

4. Powell-Tuck P, Gosling P, Lobo D, Allison S, Carlson G, Gore M, et al. The British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients (GIFTASUP). London: National Library of Health, 2009 [cited 2013 March 15]. Available from: http://www.bapen.org.uk/pdfs/bapen_pubs/giftasup.pdf

5. Boufous S, Finch C F, & Lord S R (2004). Incidence of hip fracture in New South Wales: are our efforts having an effect?. Medical Journal of Australia, 180, 623-626.

6. Allaf N, & Lovell M (2004). Annual review of fractured neck of femur mortality rates: is this a true picture?. Annals of the Royal College of Surgeons of England, 86(5), 347-348.

SAAPM

South Australian Audit of Perioperative Mortality

Telephone: +61 8 8239 1144
Facsimile: +61 8 8239 1244
Email: saapm@surgeons.org
Address: PO Box 3115, Melbourne St, North Adelaide SA 5006
Web: www.surgeons.org

Royal Australasian College of Surgeons

Government of South Australia

SA Health