



SAAPM

South Australian Audit
of Perioperative Mortality



ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS

2011
ANNUAL
REPORT



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SA Health



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- 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 SA Health 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).

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ABBREVIATIONS

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anaesthesiologists
CCU	critical care unit
CPD	Continuing Professional Development
DVT	deep vein thrombosis
ENT	Ear, Nose and Throat
FLA	first-line assessment
HDU	high-dependency unit
GP	general practitioner
ICU	intensive care unit
IQR	interquartile range
RAAS	Research, Audit and Academic Surgery
SA	South Australia
SAAPM	South Australian Audit of Perioperative Mortality
SA Health	South Australian Health Department
SCF	surgical case form
SLA	second-line assessment
TED	thromboembolic deterrent



CHAIRMAN'S REPORT

It is with pleasure that I recommend to all surgeons, all surgical trainees in South Australia and all interested parties, this 2011 Annual Report from the South Australian Audit of Perioperative Mortality (SAAPM). It represents a huge body of work for all involved - the surgeons who have reported the cases, the assessors and the staff of SAAPM.

The aim of SAAPM is the improvement of surgical care. This aim will not be achieved simply by presenting data of this nature. It will only be achieved by surgeons taking heed of the lessons contained within this report, and by hospital and health systems identifying and acting on areas that need improvement. It will not be achieved by putting this report in the bottom drawer, nor will it be achieved by ignoring requests from this office for the completion of surgical case forms.

Whether we like it or not, we are increasingly subject to oversight in our professional activities. In the College we have a unique opportunity to lead the way by monitoring our performance, rather than by an outside body. We should grasp this opportunity. If we do not, I suspect that in a few years this opportunity will be taken from us and moved elsewhere.

As most would be aware, the Medical Board of Australia now requires involvement in a suitable Continuing Professional Development (CPD) program as a condition of medical registration. The College CPD program is such an activity - SAAPM is one essential component of the CPD program.

Finally, I must thank all those involved in SAAPM: SA Health for the funding and ongoing oversight of this project, the many surgeons involved in reporting and assessing cases, the South Australian Coroner's Office for providing answers to surgical conundrums that cannot be solved without an autopsy report and my hard working and conscientious colleagues, Dr Ken Lang and Ms Heather Martin. Without all these people there would be no report.

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 Health Department (SA Health). 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 an 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 for consideration* — where the surgeon believes an area of care could have been improved or different but recognises that there may be debate about this.
- *area of concern* — where the surgeon believes that an area of care should have been better managed.
- *adverse event* — where an unintended injury is caused by medical management, rather than by the disease process, that 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 a 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

Fifty-eight hospitals in South Australia participated in SAAPM in 2010-2011, which represents an increase of 31 hospitals from last year. The number of deaths reported to SAAPM in this reporting period was 549. This represents a decrease of 1% from the 2009-2010 report where 554 deaths were reported, and a 5% decrease from the 2008-

2009 report where 579 deaths were reported. The number of surgical case forms returned to SAAPM has remained steady. At the time of writing, 85% of surgical case forms had been returned for this audit period, compared with 87% in the 2009-2010 reporting period.

Assessments

Of the 549 surgical case forms sent to surgeons, 468 were returned between the census period of 1 July 2010 and 30 June 2011. From the cases returned, 82 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 386 cases were subjected to FLA and, of those, 27 cases (7%) were recommended for SLA, which is slightly higher than for the 2009-2010 reporting period (5%). In total, 371 cases (15 FLAs and 5 SLAs were pending) completed either first- or second-line assessment during the census period.

Analysis of completed cases

Data analysed for this report covered cases reported to SAAPM from 1 July 2010 to 30 June 2011 that had completed the audit process by 24 October 2011. SAAPM analysed areas of concern or adverse events ascribed to the cases by the first- or second-line assessors. In cases associated with more than one event, the most serious event was included in the analysis.

Patient sample demographics

The median age at death was 80.5 years (interquartile range 70.4-86.8). Of the 549 patients who died, 56% were male and 59% had an American Society of Anaesthesiologists (ASA) grade of four or more. In 91% of cases there was at least one significant comorbidity present that increased the patient's risk of death.

Areas of consideration, concern and adverse events

The proportion of cases (13%) associated with areas of concern or adverse events were similar to the 2009-2010 reporting period (14%) but higher than the 10% recorded during the 2008-2009 reporting period. Overall, assessors found that an adverse event caused the death of a patient in 5% of the 371 audited cases, compared with 3% in the previous year. The assessor found that 2 of the 17 cases (<1% of all cases) with an adverse event or area of concern that caused the death of the patient were thought to be definitely preventable, while 11 (3% of all cases) were probably preventable. The most frequently reported adverse events were postoperative bleeding and perforation of hollow viscera.

Admissions

The proportion of emergency admissions was 86%, whereas 14% were elective admissions. This was similar to the 89% emergency and 11% elective admissions reported in 2009-2010.

Operative and non-operative deaths

In 31% of audited deaths, no operation was performed. The proportion of cases where surgeons made an active decision not to operate was similar to that reported for previous audit periods (approximately 26%).

In 6% of operative cases the operation was abandoned because a terminal situation was found. Sixty-three audited patients underwent two or more operations. In 9% 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 55% of the reported procedures. When a patient underwent multiple operations, consultant involvement in the subsequent operations increased to over 68%.

DVT prophylaxis

Surgeons reported that DVT prophylaxis was used in 71% of the 371 cases that completed FLA, which was higher than the 69% recorded for the previous reporting period. Assessors identified 2 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 SA Health to allow for cross-checking of deaths 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.

Hospital participation

Complete the enrolment of all public and private hospitals throughout South Australia. Continue to support participating hospitals to facilitate accurate reporting of relevant cases.

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. CPD certificates of participation will be sent to all complying surgeons at the end of the audit year. 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.

Promote the awareness of early assessment of the deteriorating patient by holding a symposium with high calibre speakers to educate the surgical community.

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 SA Health.

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 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 1 July 2010 to 30 June 2011, as audited on 24 October 2011.**
- **The main role of SAAPM is to feedback to inform, educate, facilitate change and improve 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 Health Department (SA Health), and its methodology is based on the Scottish Audit of Surgical Mortality.¹

The timeline for the project was as follows:

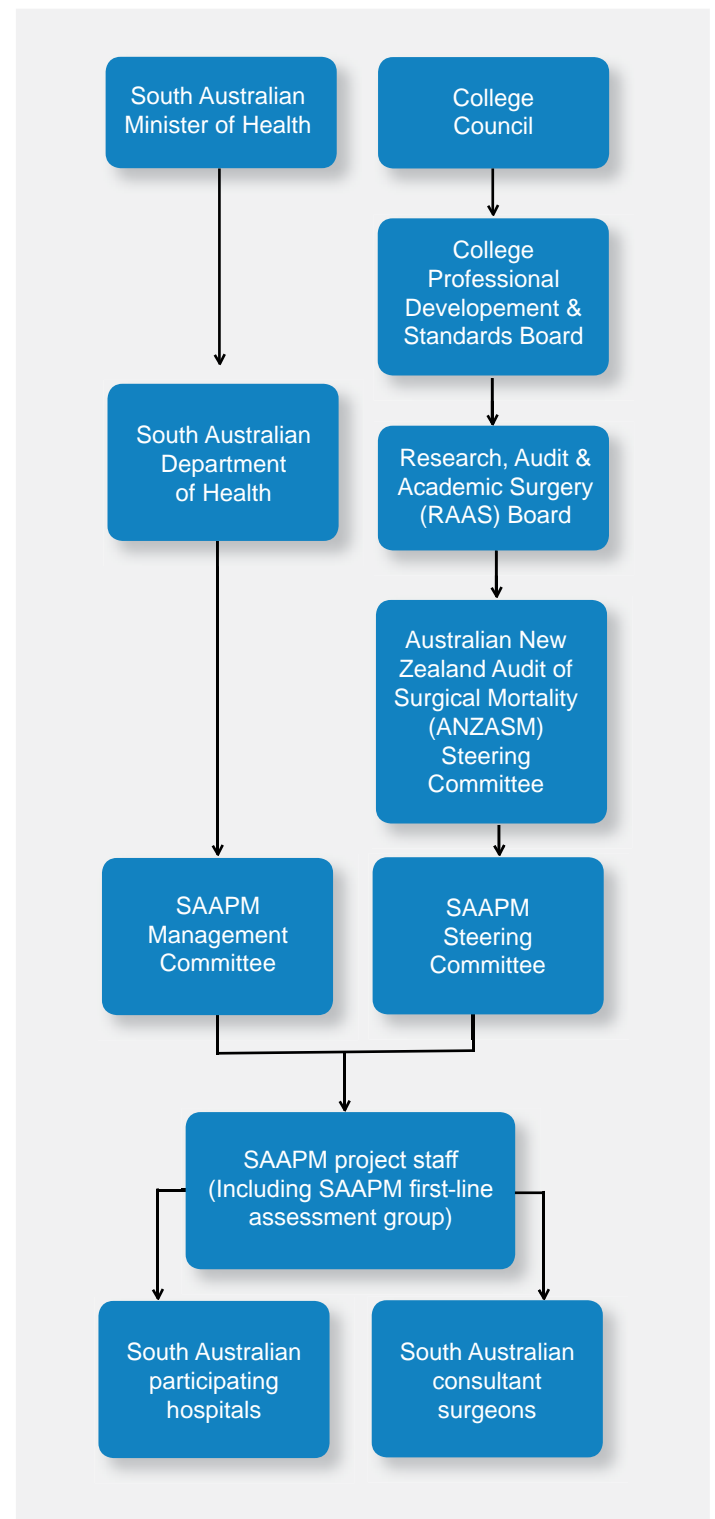
- SAAPM started data collection on 1 July 2005.
- The Royal Australasian College of Surgeons formed the Australian and New Zealand Audit of Surgical Mortality (ANZASM) in 2005 and took over the management of the Western Australian Audit of Surgical Mortality, which was established in 2001.
- All states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

1.2 Project governance

The project governance structure is illustrated in Figure 1. SAAPM has protection under both state and federal legislation.

The SAAPM Steering Committee and Management Group are registered 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). Also, ANZASM has protection under the Commonwealth Qualified Privilege Scheme, under Part VC of the Health Insurance Act 1973 (gazetted 23 August 2011).

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 SA Health or Country Health South Australia. 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.

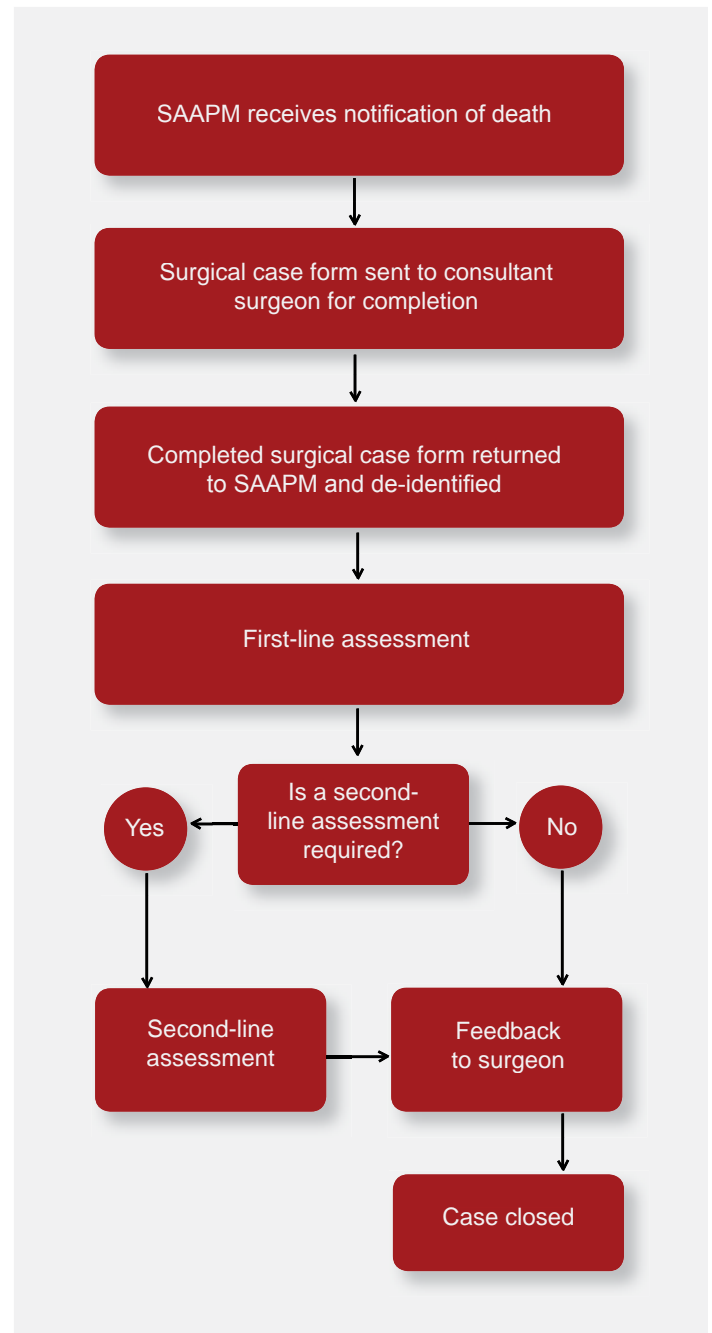
The consultant surgeon associated with the case is sent a surgical case form to complete. When the completed surgical case form is returned to the SAAPM office, it is de-identified and then assessed by a first-line assessor who will either close the case or advise that it undergo further analysis through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

Currently, cases which fall under the care of specialists from the following Colleges are excluded from the audit:

- the Royal Australasian College of Dental Surgeons
- the Royal Australasian College of Physicians
- the Royal Australian and New Zealand College of Obstetricians & 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.

2.4 Reporting conventions

2.4.1 Reporting clinical incidents

In 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 two following 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;
- who the incident or event was associated with - 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 were 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 2011 annual report covers deaths reported to SAAPM from 1 July 2010 to 30 June 2011 that had completed the audit process by 24 October 2011. 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 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 2010 SAAPM report.² An important measure of the success of SAAPM is whether these recommendations have been addressed or achieved. These recommendations and 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 decreased slightly from last year.**

3.1 Overview of participation

3.1.1 Deaths reported to SAAPM

Participation in SAAPM is now mandatory for Fellows as part of the College's Continuing Professional Development program of the Royal Australasian College of Surgeons 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

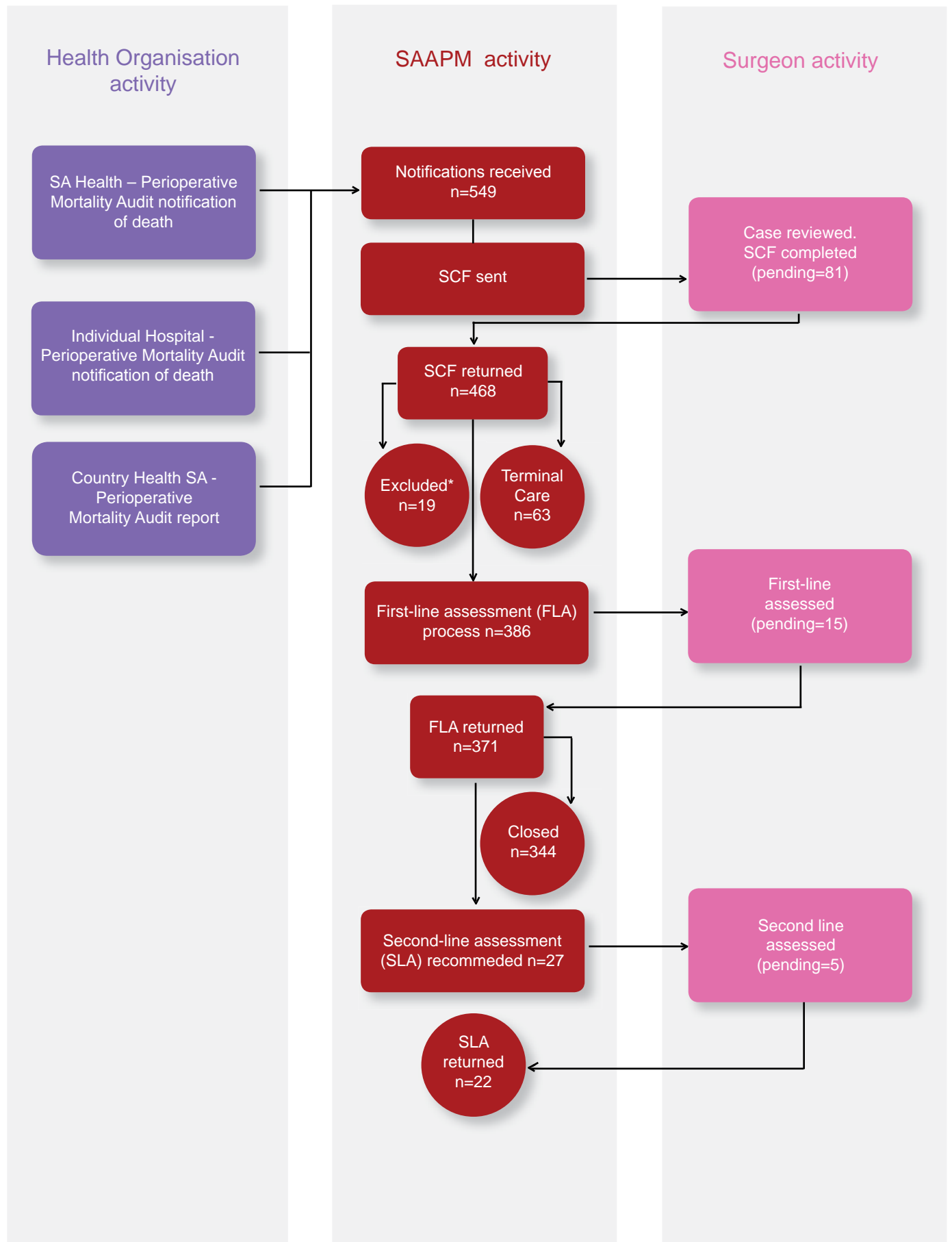
Surgical Specialty	Number of patients	% of total
Cardiothoracic surgery	32	6
ENT	11	2
General surgery	245	45
Neurosurgery	69	12
Orthopaedic surgery	92	17
Plastic surgery	11	2
Urology	24	4
Vascular surgery	65	12
Total	549	100

Comment

The average number of deaths per annum reported to SAAPM since the project's inception in 2005 was 531. At the time of analysis, 85% of surgical case forms had been returned to the SAAPM office for the 2011 audit period. The number of deaths reported to SAAPM was similar to last year. The proportion of cases which have completed the audit process has remained relatively steady at 85%, compared with 87% for the 2010 annual report.²



Figure 3 Deaths reported to SAAPM between 1 July 2010 and 30 June 2011



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

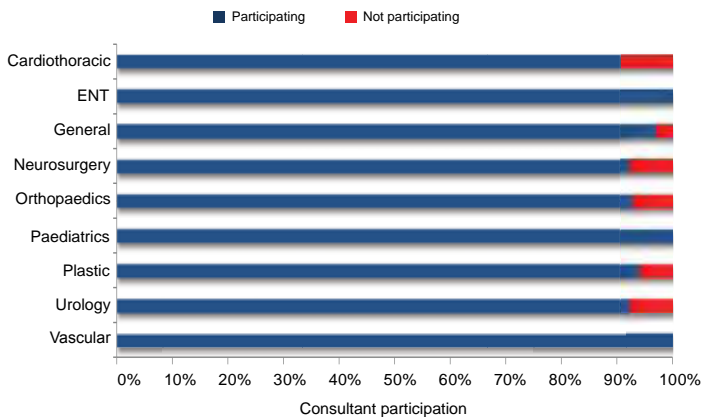
3.2 Surgeon participation in SAAPM

KEY POINTS

- Participation of surgeons in the audit as first- and/or second-line assessors has continued to increase during 2010.
- 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 forms 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



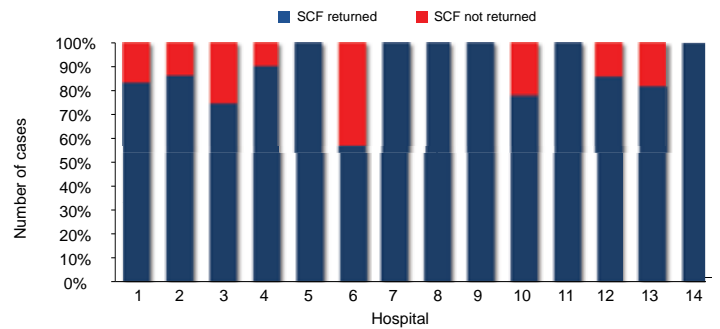
3.3 Hospital participation

KEY POINTS

- 58 hospitals within South Australia participated in the audit.
- 81% of deaths occurred in three public hospitals.

At the end of the reporting period, 58 hospitals in South Australia were participating in the audit. This included 48 public hospitals and 10 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: 44 Participating hospitals did not record a surgical death during the reporting period.

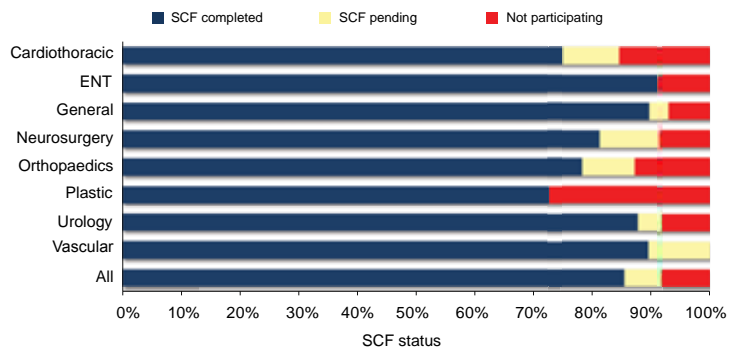
3.4 Surgical case form completion

KEY POINTS

- The number of surgical case forms returned was similar to last year (85%).
- The 549 notifications of death were associated with 156 surgeons.
- Consultants completed more than 62% of the surgical case forms.

In the 2010-2011 audit period there were 549 deaths reported. These deaths were associated with 156 surgeons, 141(90%) of whom were considered to be participating in the audit as they had completed their surgical case forms within 3 months of issue. This participation rate was lower than that reported for 2010 because the College mandated participation in the audit and expanded the criteria for audit participation. The completion rate of surgical case forms in this reporting period for each surgical specialty is shown in Figure 6.

Figure 6 Proportion of surgical case forms completed by specialty



Comment

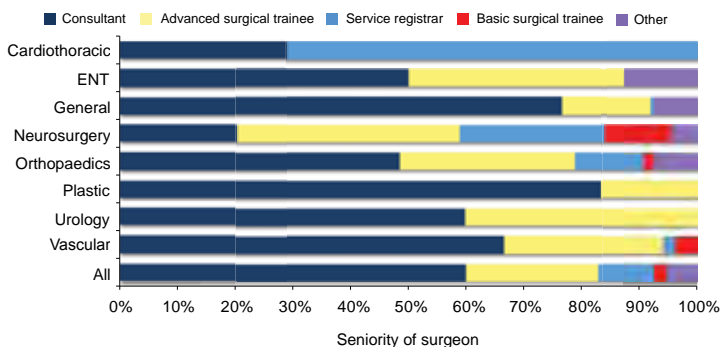
There was a marked increase in the number of forms returned by the Cardiothoracic specialty during this reporting period (75%), compared with the previous year (30%).

Of the 549 surgical case forms sent to surgeons during the period from 1 July 2010 to 30 June 2011, 468 were returned by the closure date (24 October 2011) for this data analysis.

Sixty-three cases were excluded because the patients were admitted for terminal care and therefore, did not proceed through the audit. There were 81 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 (Figure 7).

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 371 cases, 27 (7%) progressed to SLA: this comprised 2% that required further investigation and 5% which had insufficient information in the surgical case form.**
- **The number of cases recommended for SLA increased during this reporting period owing to an increase in cases with insufficient information.**

During the reporting period 468 surgical case forms were returned. Of these, 82 were excluded from the audit because the patient was admitted for terminal care, the hospital data systems could not identify the correct treating

surgeon or there was a need to wait for information from the Coroner's office. Therefore, 386 eligible cases were sent for FLA. Fifteen FLA cases were outstanding at the census end date. Following FLA, 27 out of 371 cases (7%) progressed to SLA: these cases comprised 5% that underwent SLA due to a lack of information and 2% 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	14	8
ENT	7	2
General surgery	175	10
Neurosurgery	43	0
Orthopaedic surgery	64	1
Plastic surgery	6	0
Urology	14	3
Vascular surgery	48	3
Total	371	27

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

Comment

Over the 6 years of data collection, a relatively consistent number of cases have undergone SLA each year. The number of cases closed after FLA has remained steady at 94% since the 2008-2009 period, and the number of cases requiring SLA has remained constant at 6% of the assessed cases. The need for SLA can often be further reduced. It is SAAPM's aim to remove the need for case note reviews due to inadequate information on the surgical case form. Surgeons can help achieve this goal by providing a detailed history on the case form, possibly by attaching a death summary.

Table 3: Cases which have undergone assessment (2005-2011)

	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(%)
Cases for FLA	432	505	549	433	431	381
Cases closed after FLA	356 (84)	373 (74)	377 (69)	406 (94)	405 (94)	360 (94)
SLA completed	19 (4)	20 (4)	20 (4)	25 (6)	25 (6)	21 (6)

4 RESULTS

4.1 Overview and patient sample demographics

KEY POINTS

- SAAPM was notified of 549 deaths during the census period.
- 386 surgical case forms were completed during the census period.
- The median age of patients at death was 80.5 years.
- 56% of all cases were male.
- In 59% of cases an American Society of Anaesthesiologists (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

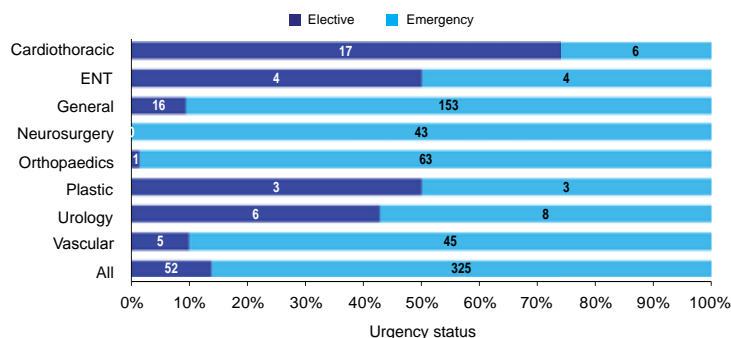
KEY POINTS

- Of the 386 admissions, 14% were elective and 86% were emergencies.
- 86% of cases were admitted under the care of a surgeon.
- 69% of cases underwent at least one operation.
- 93% of the 52 elective admissions underwent an operation.
- 55% of the 325 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. Data missing for 9 cases.

Comment

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

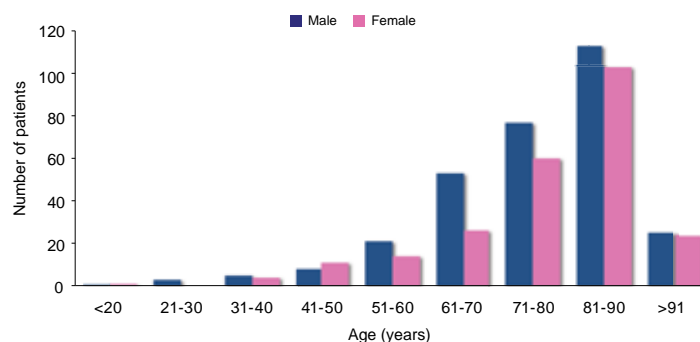
4.3 Age distribution

KEY POINTS

- The median age of patients at death was 80.5 years.
- 56% of all deaths occurred in males.
- The majority of deaths occurred in patients aged between 81 and 90 years.

In the current reporting period there were 549 recorded deaths, comprising 306 (56%) males and 243 (44%) 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 65% of all cases. Patients aged from 81 to 90 years remain 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.

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

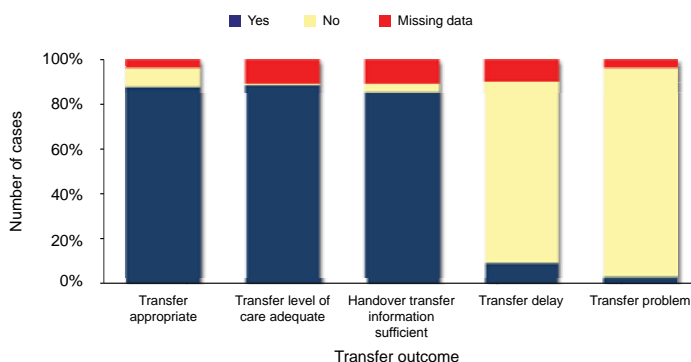
Surgical Speciality	Median age (years)	IQR (25 - 75%) (years)
Cardiothoracic surgery	71.8	66.6 - 79.4
ENT	81.6	61.2 - 87.6
General surgery	80.5	71.9 - 86.4
Neurosurgery	68.7	56.4 - 79.6
Orthopaedic surgery	86.5	81.7 - 89.9
Plastic surgery	78.9	61.7 - 85.6
Urology	81.4	73.7 - 85.5
Vascular surgery	80.3	73.2 - 86.2
Total	80.5	70.4 - 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 younger age groups.

4.4 Transfers

Figure 10 Patient care issues associated with patient transfer



Note: Data missing for 18 cases.

Comment

- The transfer was considered to be appropriate in 91% of cases.
- The level of care during transfer was adequate in 99% of cases.
- There was a delay in transfer in 10% of cases.

4.5 American Society of Anaesthesiologists (ASA) grades

KEY POINTS

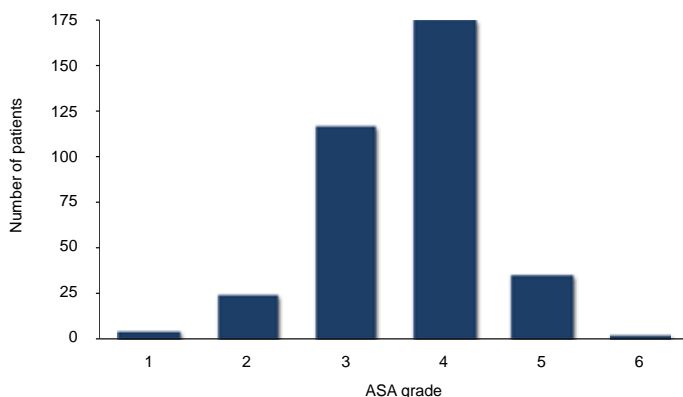
- **Most patients had an ASA grade of 3 or 4.**
- **The Urology and ENT specialties had the highest percentage of deaths among patients with an ASA grade of 1 or 2.**
- **The Vascular and Neurosurgery specialties had the highest percentage of patients assessed as an ASA grade 5 or 6.**

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 speciality is shown in Figure 12.

Table 5 ASA grades

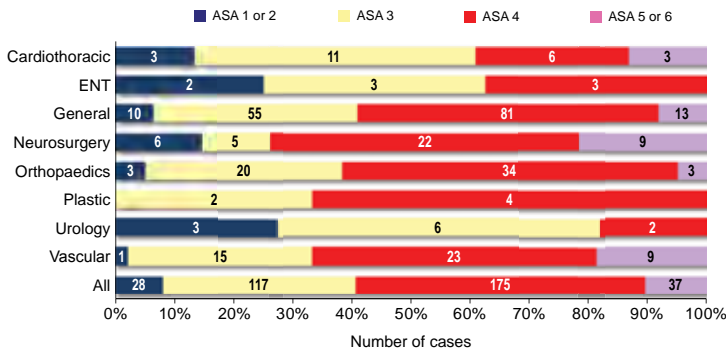
ASA Grade	Characteristics
1	A normal healthy patient
2	A patient with mild systemic disease and no functional limitation
3	A patient with moderate systemic disease and definite functional limitation
4	A patient with severe systemic disease that is a constant threat to life
5	A moribund patient unlikely 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 29 cases.

Figure 12 ASA grade by surgical specialty



Note: The number of cases is shown in the chart. Data missing for 29 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 8% of the forms returned.

An ASA grade of either 3 or 4 was assigned to 82% of patients, meaning that they were assessed as having either a moderate or severe degree of systemic disease upon admission to hospital.

The Urology and ENT specialties had the highest percentage of deaths among patients with an ASA grade of 1 or 2. However, this data should be analysed with care owing to the small number of patients reported for these specialties. The Neurosurgery and Vascular specialties had the highest percentage of patients with an ASA grade of 5 or 6.

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 59%. Metastatic disease was present in 56% of the cases with malignancy.

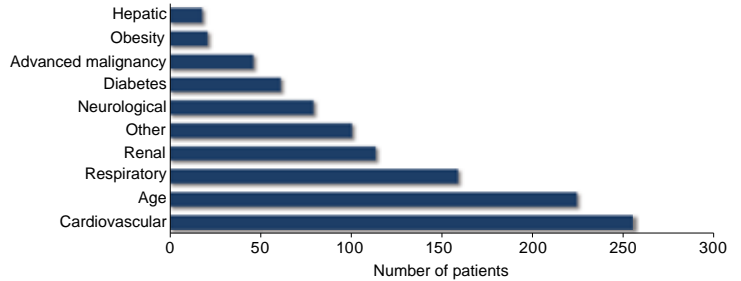
4.7 Comorbidity

KEY POINTS

- There were 1,076 comorbidities among 384 patients.
- The most common comorbidities were cardiovascular disease, advanced age and respiratory problems.
- The most common number of comorbidities per patient was three.
- The Neurosurgery specialty had the most patients with zero or one comorbidity.
- The Cardiothoracic and ENT specialties had the highest percentage of patients with 5 or more comorbidities.

A total of 1,076 comorbidities were reported among 384 patients (Figure 13). The most frequently occurring factors were cardiovascular problems (24%), advanced age (21%) and respiratory disease (15%). The numbers comorbidities reported for patients by surgical specialty is shown in Figure 14.

Figure 13 Comorbidities present by frequency

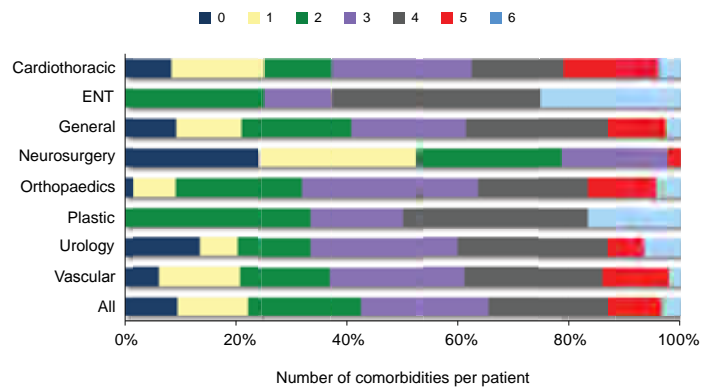


Note: Other includes hepatitis, dementia, immunosuppression, alcohol abuse, polymyalgia and hypertension.

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 Neurosurgery specialty had the highest proportion of patients (52%) with zero or one comorbidity, whereas the ENT and Cardiothoracic specialties had the highest proportion of patients with 5 or more comorbidities (25% and 21%, respectively). The data from ENT should be interpreted cautiously owing to the small number of patients (n=8) reported for this specialty.

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 8% of cases. Of these 33 cases, 8 (24%) were associated with the surgical unit (Table 6).

Table 6 Association of preoperative delays

Associated with:	n (%)
Surgical unit	8 (24)
Medical unit	13 (40)
General practitioner	2 (6)
Other - hospital	5 (15)
Emergency	3 (9)
Data missing	2 (6)
Total	33 (100)

Note: There may be more than one response per case. Other includes delayed presentation to the hospital or transferring hospital.

Preoperative delays were caused by inexperienced staff (19%), incorrect tests being performed (7%) and the misinterpretation of results (9%) (Table 7).

Table 7 Cause of preoperative diagnostic delays

Cause	n (%)
Inexperienced staff	8 (19)
Incorrect test	3 (7)
Misinterpretation of results	4 (9)
Results not seen	0 (0)
Unavoidable	9 (21)
Other	19 (44)
Total	43 (100)

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

4.9 Operative and non-operative cases

KEY POINTS

- **268 patients underwent a total of 374 operations.**
- **6% of the 268 operative cases were abandoned because the patient's situation was found to be terminal.**
- **13% of operative cases had an unplanned return to theatre.**
- **31% of cases did not undergo an operation.**
- **The most common reason for no operation was an active decision not to operate.**
- **In 33% of non-operative cases, the reason for not operating was unclear.**

There were 374 operations performed on 268 patients (Table 8). The reasons for not operating are shown in Table 9.

Table 8 Operations performed

Number of operations	n	%
No operation	118	31% of all cases
Operation performed	268	69% of all cases
1 operation	205	76% of operated cases
2 operations	39	15% of operated cases
3 operations	19	7% of operated cases
4 operations or more	5	2% of operated cases

Table 9 Reasons for not operating (n=135 in 118 patients)

Reason for non-operation	n	%
Not a surgical problem	30	22
Active decision not to operate	36	27
Patient refused operation	10	7
Rapid death	6	4
Active decision to limit treatment	9	7
Data missing	44	33
Total	135	100

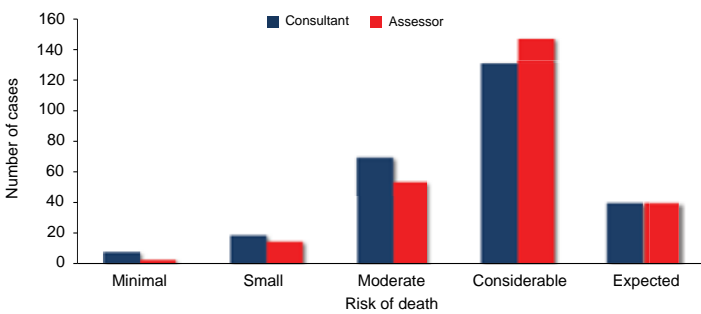
Note: Some cases had more than one response.

4.10 Risk of death before surgery

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

- Surgeons estimated that 64% of patients had either a considerable risk or an expected risk of death.
- Assessors estimated that 72% 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).

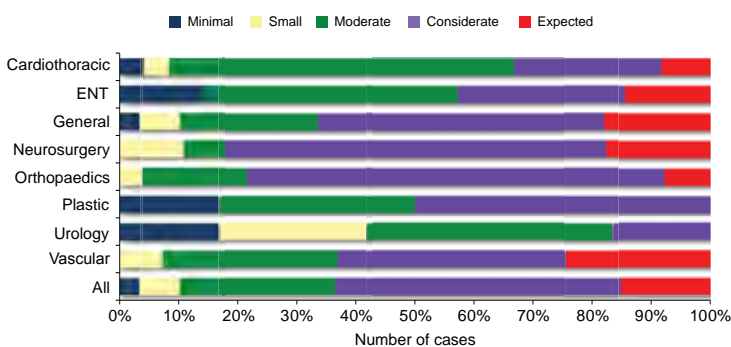
Figure 15 Risk of death before surgery



Comment

The Urology specialty had the highest rate of deaths associated with the lower levels of risk of death assessment (Figure 16).

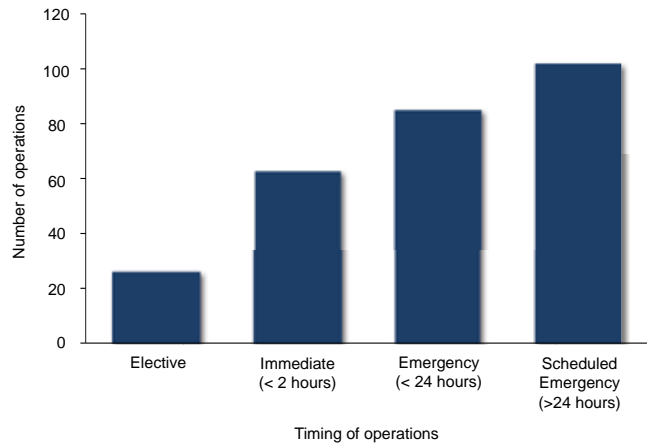
Figure 16 Risk of death before surgery by surgical specialty



4.11 Timing of emergency procedures

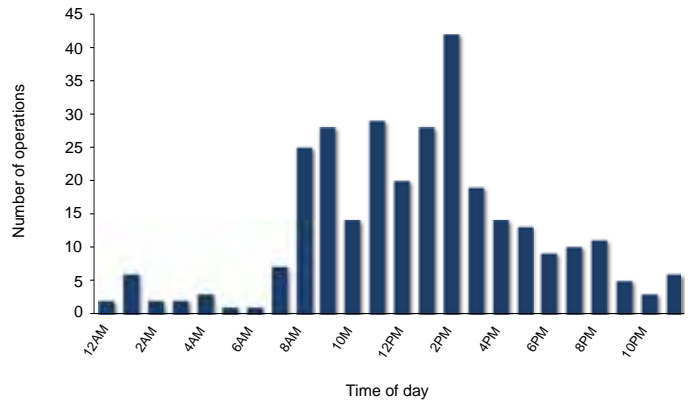
- The treating surgeon was asked to report on the timing of the procedure after admission and the time of day the operation was commenced.
- During the reporting period there were 325 emergency admissions. Of these admissions, 211 patients underwent 284 operations.
- Operations were most commonly initiated more than 24 hours after the patient was admitted (Figure 17).
- Most operations occurred between normal working hours (Figure 18).

Figure 17 Timing of operation for emergency admissions



Note: Data is missing for 8 cases.

Figure 18 Time of operation



Note: Data missing in 85 cases.

Comment

Operations were most commonly performed between 8am and 7pm. Consultant surgeons are usually present during these times. Only a small percentage of operations (17%) 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 making the operative decision, performing the operation and directly assisting during the operation (Table 10).

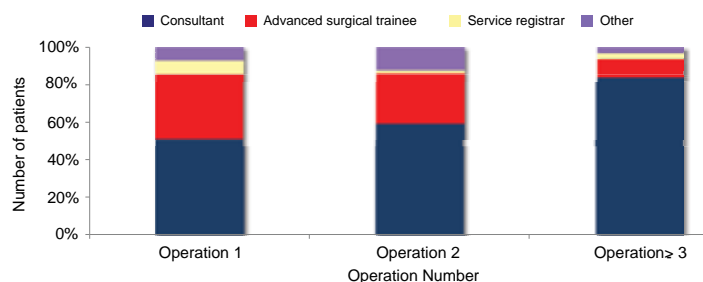
In the 2009 annual report, the consultant operating had decreased for the third operation to 47%, compared with 51% and 69% for the first and second operation.³ During the 2010 reporting period, consultant involvement as the operating surgeon at the first and second operation was similar (55% and 64% respectively), but with a notably higher involvement in the third or subsequent operations than in the previous reporting period. The 2011 reporting period demonstrated similar consultant involvement during the first and second operations (51% and 59% respectively) and an increase in the third or subsequent operation (47% in 2009, 70% in 2010 and 84% in 2011) (Figure 19).

Table 10 Grade of surgeon involved in the operative process

	Percentage of Operations			
	Deciding	Operating	Assisting	In theatre
Consultant	86	55	16	56
Advanced surgical trainee	11	31	42	26
Service registrar	<1	6	28	12
Basic surgical trainee	0	0	7	2
GP surgeon	0	0	0	0
Other	3	8	7	4
Total	100	100	100	100

Note: Data missing in 45 cases for Deciding, 46 cases for Operating, 193 cases for Assisting and 291 cases for In theatre. Other refers to overseas Fellow, specialist Fellow or additional consultant.

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 60% of all cases.
- In the 151 cases that did receive critical care, the assessors considered that 10 (7%) of these patients would have benefited from critical care.

Comment

According to the first- and second-line assessors, 10 patients (7%) among the 151 cases that did receive critical care may have benefited from its use.

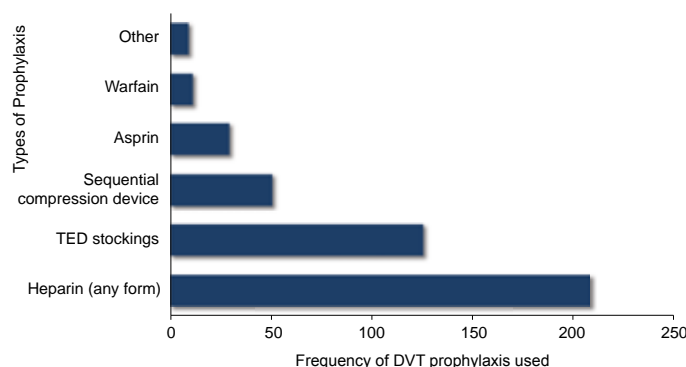
4.14 Deep vein thrombosis prophylaxis

KEY POINTS

- Deep vein thrombosis (DVT) prophylaxis was used in 71% of all audited cases.
- The most frequently used DVT prophylactic treatments were heparin and thromboembolic deterrent (TED) stockings.
- There were two cases reported where the assessors felt that the 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 71% of cases, which is a slight increase from previous years (69% in 2010 and 63% in 2009). In the 264 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 14 cases.

No information was available for 18 of the 108 cases that did not receive DVT prophylaxis. For the remaining 90 cases, 25 (28%) were associated with an active decision to withhold treatment, 58 (64%) were deemed inappropriate to receive DVT and 7 (8%) were not considered for DVT.

In the 108 cases where the surgeon reported no DVT prophylaxis, 25 (23%) had a clinical diagnosis which contraindicated anti-coagulation, 22 (20%) were coagulopathic and 11 (10%) had died rapidly (Table 11).

Table 11 Reasons for not using DVT prophylaxis

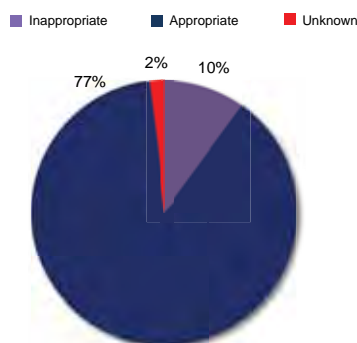
Reason	Number of cases (%)
No answer	42 (39)
Clinical diagnosis contraindicated anti-coagulation	25 (23)
Coagulopathic	22 (20)
Rapid death	11 (10)
Palliation	5 (5)
Medication error	3 (3)
Total	108 (100)

The assessors considered that DVT prophylaxis was appropriate in 91% of cases. There were two cases recorded where the assessors felt that the 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 362 cases with information on fluid balance management (data missing for 24 cases and 6 cases where the surgeon was unsure). Of these, the treating surgeon noted an issue with fluid balance in 36 cases (10%) (Figure 21). This is a slight increase from the 9% noted in the previous reporting period. There was an issue with fluid balance in 24 of the 255 (9%) operative cases (data missing from 13 operative cases).

Figure 21 Fluid balance management



Note: Data missing in 24 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 management⁴ and, more recently, the British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients.⁵

4.16 Unplanned events

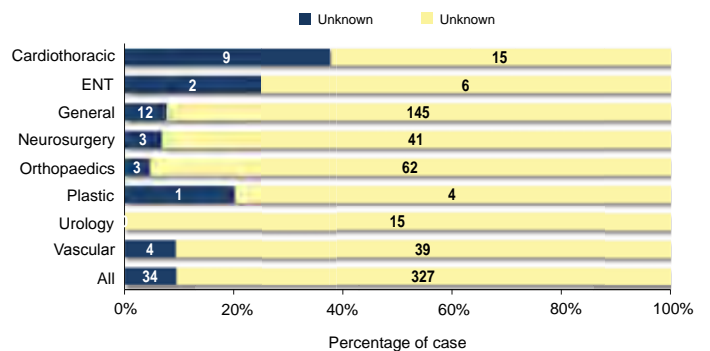
Reporting surgeons identified that there were 56/362 (15%) unplanned admissions to the intensive care unit, 11/362 (3%) unplanned readmissions to hospital and 34/363 (9%) unplanned returns to theatre (Table 12). Data was missing for 24, 24 and 23 cases, respectively.

Table 12 Frequency of unplanned events

Unplanned action	Number	% of cases
Admission to ICU	56	15
Return to theatre	34	9
Readmission	11	3

Of the 34 unplanned returns to theatre, 12 (35%) were elective admissions and 22 (65%) 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 24 cases.

The reasons for returns to theatre were postoperative bleeding (26%), tissue ischaemia (18%), wound breakdown (6%), viscus perforation (6%), anastomotic leak (6%), vascular injury (6%), fistula (3%) and other (29%), including cardiac arrest, respiratory complications and renal failure.

4.17 Postoperative complications

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

- 81 of 266 (30%) patients had a postoperative complication (The question was not answered for two operative cases).
- There were 106 postoperative complications noted for 81 patients.

Table 13 Most frequently occurring postoperative complications

Complication	Frequency	% of total cases
Anastomotic leak:		
• Small bowel	1	1%
• Colorectal	1	1%
• Gastric	1	1%
Cardiac arrest/ hypotension	19	18%
Other*	26	25%
Procedure-related sepsis	13	11%
Respiratory complications (including pneumonia)	19	18%
Significant postoperative bleeding	18	17%
Tissue ischaemia	7	7%
Vascular graft occlusion	1	1%
Total	106	100%

Note: * other includes renal failure (8), neurological complications (4), vascular issues (4), viscus leakage/injury (3), infection (2), liver failure (1), wound healing problems (1), fluid balance complications (1), haemorrhage (1) and gastrointestinal complications (1).

4.18 Surgical diagnoses

The main surgical diagnoses reported by surgeons are shown in Table 14. The top ten categories are listed for 236 cases, which represents 61% of all confirmed surgical diagnoses reported from the 386 returned surgical case forms. The most frequently reported surgical diagnosis was femoral neck fracture and intestinal vascular insufficiency.

Table 14 Most frequently reported surgical diagnoses

Surgical diagnoses	Frequency	% of total cases
Femoral neck fracture	48	12
Intestinal vascular insufficiency	31	8
Intracranial haemorrhage	27	7
Bone fracture	24	6
Abdominal aortic aneurysm	15	4
Multiple trauma	14	4
Peripheral vascular disease	10	3
Carcinoma - colon	10	3
Acute pancreatitis	9	2
Total	236	

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	Assessor
Preoperative management	7	10
Decision to operate	6	6
Choice of operation	2	5
Operation timing	6	3
Intraoperative management	2	4
Grade of surgeon deciding	1	1
Grade of surgeon operating	1	1
Postoperative care	5	8

Comment

Management issues identified by surgeons and assessors were less than 11% for each category. However, the assessors identified a larger number of cases with management issues. Only the category of operation timing was identified as a greater area of concern by the treating surgeon, compared with the assessor (6% versus 3%).

4.20 Postmortem

No information was available on postmortem examinations for 3 of the 386 cases. Fifty of the remaining 383 cases underwent a postmortem, of which 2 (<1%) were performed by the hospital and 48 (13%) were performed by the Coroner's office (Table 16). A postmortem was not conducted for 217 of the 383 (57%) cases. In 116 cases (30%) it was unknown whether a postmortem had occurred.

Table 16 Postmortem examinations

Postmortem performed	Number of cases
Yes - Hospital	2
Yes - Coroner	48
No	217
Refused	0
Unknown	116
Missing	3

4.21 In retrospect

Surgeons were asked whether, in retrospect, they would have done anything differently. Among the 372 responses, 38 (10%) surgeons indicated that they would have taken a different course of action. The question was not answered in 14 cases. Qualitative analysis revealed the following themes:

- preoperative care and operative decision making
- technical management
- postoperative care issues
- administrative issues
- decisions based on multiple social factors.



4.22 Clinical incidents

KEY POINTS

- **7% of cases were subjected to SLA.**
- **21% of cases were associated with a clinical incident, with 13% of all assessed cases having an area of concern or an adverse event.**
- **The most frequent area of concern related to delayed initial diagnosis.**
- **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 (48%) than in emergency admissions (9%).**
- **25% of areas of concern or adverse events caused the death of the patient: 12% of these incidents were classified as definitely preventable, 64% were probably preventable and 24% were not preventable.**

Of the 371 cases that had completed FLA or SLA, 293 cases (79%) had no clinical incidents associated with them, and death was a result of the disease process.

There were 78 cases (21%) where a clinical incident was identified by the assessor. These comprised 8% in which an incident was classified in the area of consideration, which was lower than in previous reports, and 13% in which an event was associated with the more serious categories of areas of concern and adverse events.

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

Incident area	Number
Area of consideration	50
Area of concern	50
Adverse event	21
No Issues	293

Note: Some cases had more than one incident.

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

Admission type	Clinical Incident				
	Yes (n)	No (n)	Total	Yes (%)	No (%)
Elective	26	16	42	62	38
Emergency	52	264	316	16	84
Total	78	280	358		

Clinical incidents (areas of concern and adverse events) were more common in elective cases (48%) than in emergency admissions (9%) (Table 18).

Of the 71 clinical events that were categorised into areas of concern or adverse events, data were missing for two cases. The following categories were applied to the remaining 69 cases:

- 17 (25%) caused the death of the patient
 - 2 (12%) were definitely preventable
 - 11 (64%) were probably preventable
 - 4 (24%) were probably not preventable
 - 0 were definitely not preventable

- 41 (59%) may have contributed to the death of the patient (data were missing for 2 of these cases)
 - 10/39 (26%) were definitely preventable
 - 25/39 (64%) were probably preventable
 - 4/39 (10%) were probably not preventable
- 11 (16%) 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 (82%) were not classified as adverse events. However, 21 adverse events were identified, of which 4 (19%) may have contributed to the death of the patient and 14 (67%) caused the death of a patient who would have otherwise been expected to survive.

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	18	29	1	2	50
Area of concern	9	37	3	1	50
Adverse event	2	4	14	1	21
Total	29	70	18	4	121

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	8	19	17	0	6	50
Area of concern	11	31	4	0	4	50
Adverse event	4	12	5	0	0	21
Total	23	62	26	0	10	121

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	30	8	2	4	6	50
Area of concern	27	15	1	4	3	50
Adverse event	12	8	0	1	0	21
Total	69	31	3	9	9	121

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

Of the 121 incidents, 57% were attributed to the audited surgical team.

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

- different operation desirable
- decision to operate

- delay to surgery
- communication issues
- inadequate preoperative assessment
- wound infection
- unsatisfactory postoperative care
- surgeon was too junior

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

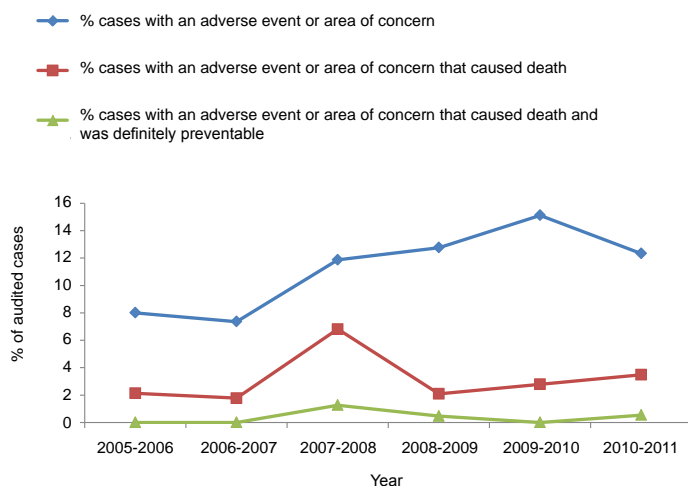
Operative status	Area of concern	Frequency
Preoperative	Delay in diagnosis	7
	Inadequate preoperative assessment	6
	Decision to operate	5
	Delay in treatment	3
	Transfer delay	2
	Delayed presentation	1
Intraoperative	Different operation preferred	4
	Junior surgeon	3
Postoperative	ICU/HDU admission/discharge problems	4
	Delay recognising complications	3
	Postoperative bleeding	3
	Failure to use DVT prophylaxis	2
	Fluid balance	2
	Communication failures	2
	Failure to use antibiotic prophylaxis	1
	Unsatisfactory nutritional care	1
	Unsatisfactory postoperative care	1
Total		50

Table 23 Adverse events in emergency and elective cases

Operative status	Adverse event	Frequency
Preoperative	Delay in transfer to hospital	1
	Decision to operate	1
	Inadequate preoperative care	1
Intraoperative	Perforation of hollow viscus	3
	Respiratory complication	1
	Arterial puncture	1
Postoperative	Postoperative bleeding	5
	Infection	2
	Drug error	2
	Other complication	2
	Inadequate anticoagulation	1
	Unsatisfactory postoperative care	1
Total		21

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 that caused the death of the patient and was definitely preventable (2005-2011)



Cases with clinical incidents (adverse events or areas of concern) that caused or contributed to the death of the patient and were definitely preventable or were definitely or probably preventable are shown for the 2005-2011 period in Figures 24 and 25.

Figure 24 Cases with a serious clinical incident that caused or contributed to the death of the patient and was definitely preventable (2005-2011)

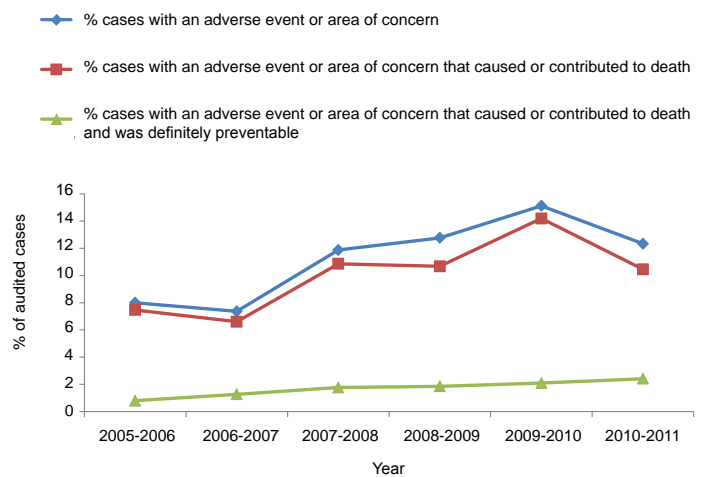
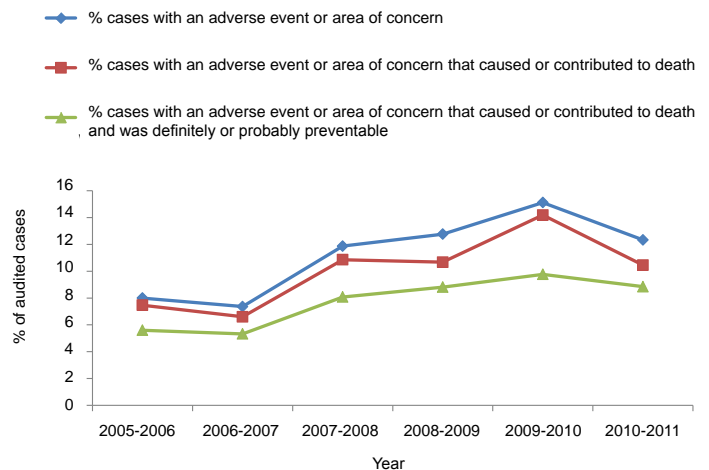
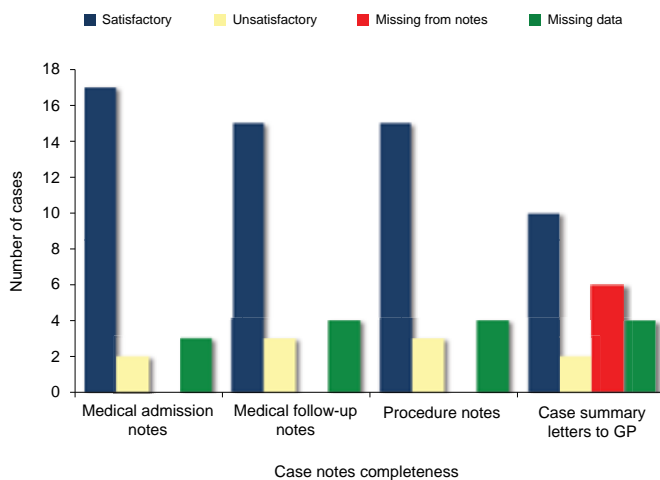


Figure 25 Cases with a serious clinical incident that caused or contributed to the death of the patient and was definitely or probably preventable (2005-2011)



4.23 Second-line assessor review of case note record keeping

Figure 26 Assessment of case note completeness



Comment

Second-line assessors were asked to comment on the adequacy of the hospital case notes.

- In 6 (27%) of 22 SLAs, at least one aspect was deemed unsatisfactory. These were in the areas of medical admission notes and medical follow-up notes or procedure notes.
- In 6 (27%) of 22 assessments, the letter to the general practitioner was missing.

5 PERFORMANCE REVIEW

This section reviews progress made on each of the recommendations of the 2010 SAAPM annual report.²

5.1 Improve hospital data systems to allow for accurate tracking of the responsible clinician

SAAPM, in collaboration with SA Health, has established cross-reference reports for all surgical deaths occurring in all public metropolitan and country hospitals to allow for a more robust reporting system. The number of cases excluded because of the inability to identify the treating surgeon has remained constant from the last reporting period. This is an area for ongoing monitoring and improvement.

5.2 Engage non-participating private and public hospitals

During this reporting period an additional 31 hospitals participated in the audit, bringing the total to 58 hospitals. This represents an increase of 27 public hospitals (3 metropolitan and 24 country) and 4 private hospitals contributing to the audit data. Thus, the 2010 goals have largely been achieved in this area.

5.3 Encourage surgeon participation in the audit

Surgeon participation in SAAPM is mandated by the College Council and is an essential component of the College's CPD program. Surgeons who actively choose not to participate or who have not returned outstanding surgical case forms within 3 months are considered non-participating. This change in criteria for non-participation has resulted in an increase in the number of non-participating surgeons for this reporting period. As this criterion is further explained to surgeons, it is likely that the number of non-participating surgeons will decrease.

5.4 Monitor preoperative care, such as transfers and diagnosis delays

Issues identified in the preoperative stage were relatively consistent between this reporting period and the previous reporting period. Although the rates of transfer and diagnostic delays remained constant, it was noted that diagnostic delays caused by inexperienced staff had increased by 7% between the two reporting periods. Monitoring of trends in this area will continue.

5.5 Monitor postoperative care and promote awareness of the deteriorating patient

Postoperative care, such as nutritional care and fluid balance, remains an area of continual monitoring, with no change being noted from the previous reporting period. Postoperative complications rose slightly to 30%, with a concomitant increase in postoperative bleeding. Anastomotic leaks had decreased from 11% in 2010 to 3% in the 2011 reporting period.

SAAPM and SA Health see that recognition of the deteriorating patient is an area that demands attention. Consequently, SAAPM and SA Health held a seminar in February 2012 with presentations from senior surgical consultants, other consultants and nurses to promote awareness of how to recognise the deteriorating patient.

5.6 Monitor incidents in elective surgery

Clinical incidents identified in elective surgery will continue to be monitored. No significant difference was identified between the 2010 and 2011 reporting periods.

5.7 Continue to monitor the use of DVT prophylaxis

The use of DVT prophylaxis in patients was slightly higher than in previous years - two cases were identified where the use of DVT prophylaxis was inappropriate. SAAPM will continue to monitor trends in the use of DVT prophylaxis, particularly the reasons why it is not used. This area will be closely monitored to assess changes in trends after the release of a new DVT prophylaxis guideline by SA Health in the near future.

5.8 Continue to monitor the use of critical care

The number of cases in which critical care was not used appropriately was similar to previous years. SAAPM will continue to monitor the use of critical care in high-risk patients.

5.9 Improve audit activities, such as collecting denominator data, participate in a national report, develop yearly trends and provide an individual surgeon report to surgeons for benchmarking

SAAPM has contributed to the National Surgical Mortality Report and continues to develop data trend analyses. During 2011, it provided an individual surgeon report to all surgeons who had a death occur under their care and had returned a surgical case form in 2010.

SAAPM, in collaboration with SA Health, has gained access to databases providing denominator data. However, this information requires further analysis and decoding before detailed statistics can be provided.

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- all second-line assessors

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APPENDIX: BASELINE DATA COMPARISON FOR ABDOMINAL AORTIC ANEURYSM (AAA)

KEY POINTS

- **The rates of death from ruptured AAA in the SAAPM and SA Health mortality data are similar.**
- **South Australian hospitals treating patients with ruptured AAA have mortality rates that are consistent with published mortality figures.**

From this report it is possible to see how many perioperative deaths have occurred. To determine whether the number of deaths that occurred as a result of a specific surgical condition is in the acceptable range or not, it is essential to know how many patients have been treated and have not died.

Consequently, SAAPM sought further information regarding a common condition, ruptured AAA—the limited information available is produced below. SAAPM data indicates that there were 15 deaths with a diagnosis of ruptured AAA during the reporting census period. Data from SA Health suggests that there were 24 deaths with a diagnosis of ruptured AAA in metropolitan public hospitals during the same time frame.

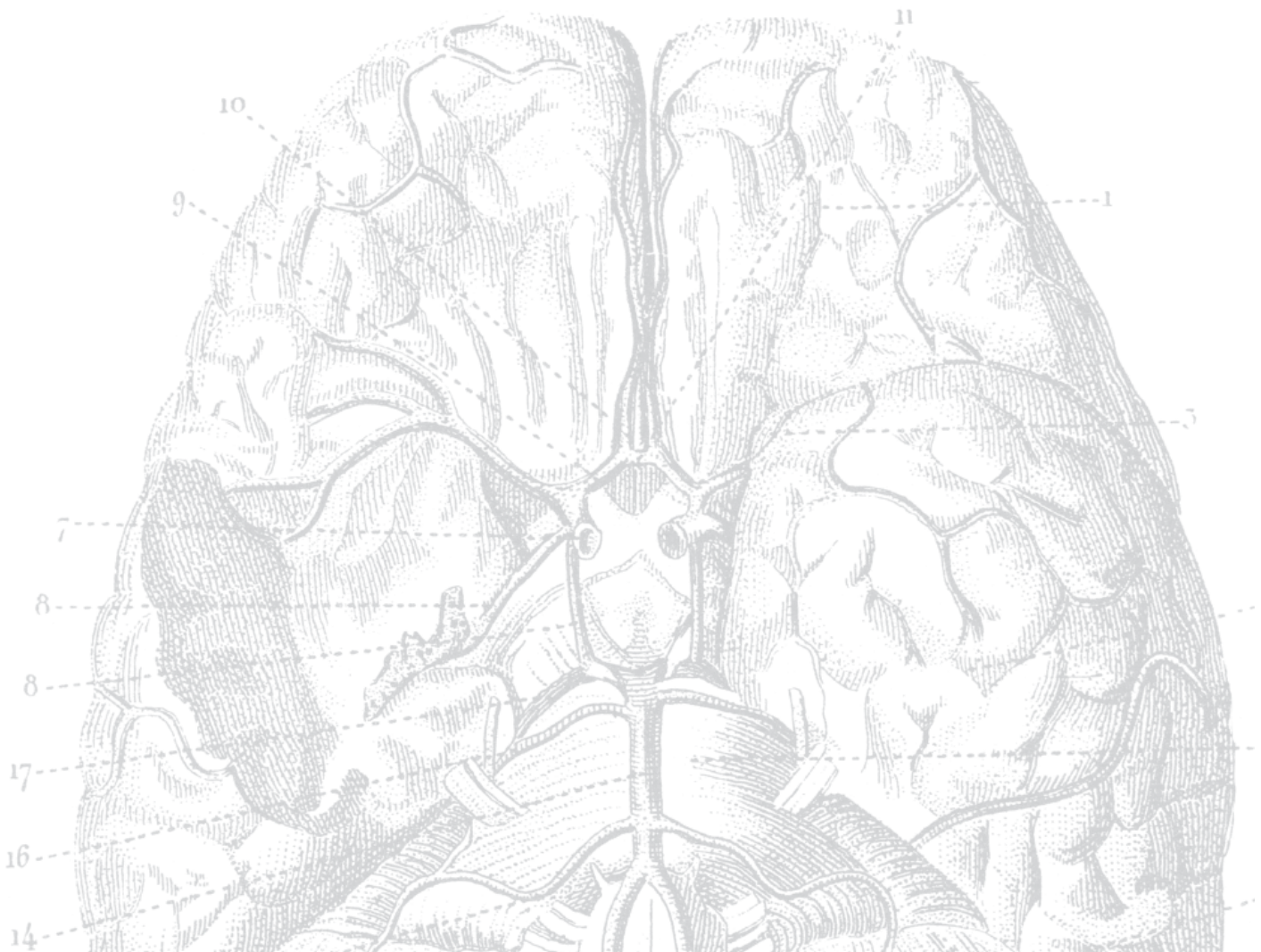
Is this data consistent? On superficial examination it appears that it is not. However, only 85% of surgical case forms are filled in by the census end date. There could, therefore, be another four deaths from ruptured AAA that have not yet been reported and assessed.

This leaves a shortfall of five cases. There may be a few deaths from ruptured AAA that are not admitted under a surgeon: patients who die rapidly in the emergency department or under another bed card. Perhaps it is more relevant to ask whether the vascular units have an operative mortality rate for ruptured AAA that is consistent with that found in the rest of the world. Looking at the SA Health data, and only at the diagnosis data, there were 24 deaths caused by ruptured AAA out of 53 patients: a mortality rate of 45%.

In New Zealand, a retrospective review of ruptured AAA from 1993 to 2005 was conducted, which found an in-hospital mortality rate of 48.3%.⁶ A limited attempt has also been made to answer this question by seeking data from the units themselves. In general, the units that supplied data reported similar figures. Thus, it appears that the vascular units have an operative mortality rate for ruptured AAA that is consistent with the general mortality figures available.

REFERENCES

1. Scottish Audit of Surgical Mortality, Scottish Audit of Surgical Mortality: Summary report 2009 data, Edinburgh: National Services Scotland, 2009. Available from <<http://www.sasm.org.uk/>>.
2. South Australian Audit of Perioperative Mortality, SAAPM Annual Report 2010, North Adelaide: Royal Australasian College of Surgeons, 2010. Available from <<http://www.surgeons.org/SAAPM>>.
3. South Australian Audit of Perioperative Mortality, SAAPM Annual Report 2009, North Adelaide: Royal Australasian College of Surgeons, 2009. Available from <<http://www.surgeons.org/SAAPM>>.
4. 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. Available from <<http://www.sign.ac.uk/pdf/sign77.pdf>>.
5. Powell-Tuck P, Gosling P, Lobo D, Allison S, Carlson G, Gore M, Lewington A, Pearse R, Mythen M, The British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients (GIFTASUP), London: National Library of Health, 2009. Available from <http://www.bapen.org.uk/pdfs/bapen_pubs/giftasup.pdf>.
6. Grant MW, Thomson IA, van Rij AM, In-hospital mortality of ruptured abdominal aortic aneurysm, ANZ Journal of Surgery, 2008, 78(8):698-704.







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