

SAAPM

South Australian Audit
of Perioperative Mortality

2010 ANNUAL REPORT



ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS



Government
of South Australia

SA Health



CONTACT

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 Paul Dolan (until May 2011)
Mr Glenn McCulloch (from May 2011)
Phone: 08 8239 1144
Fax: 08 8239 1244

Project Manager

Dr Ken Lang
Phone: 08 8239 1144
Fax: 08 8239 1244

Project Officer

Ms Heather Martin
Phone: 08 8239 1144
Fax: 08 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 SA Health Act 2008 under Part 7 (Quality improvement and research) and Part 8 (Analysis of adverse incidents).
- 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 6 November 2006).

CONTENTS

LIST OF TABLES	6
LIST OF FIGURES	7
ABBREVIATIONS	8
CHAIRMAN'S REPORT	9
EXECUTIVE SUMMARY	10
RECOMMENDATIONS	12
1. INTRODUCTION	13
1.1 Background	13
1.2 Project governance	13
1.3 Confidentiality	13
2. THE AUDIT PROCESS	14
2.1 Methodology	14
2.2 Providing feedback	14
2.3 Categories of deaths investigated	15
2.4 Reporting conventions	15
2.4.1 Reporting clinical incidents	15
2.4.2 Analysis of clinical incidents	16
2.5 Data analysis	16
2.6 Performance review	16
3. AUDIT PARTICIPATION & ASSESSMENT	16
3.1 Overview of participation	16
3.1.1 Deaths reported to SAAPM	16
3.2 Surgeon participation in SAAPM	18
3.3 Hospital participation	18
3.4 Surgical case form completion	19
3.5 Assessments	20



CONTENTS

4. RESULTS	21
4.1 Overview and patient sample demographics	21
4.2 Admissions	21
4.3 Age distribution	21
4.4 Transfers	22
4.5 American Society of Anaesthesiologists (ASA) grades	23
4.6 Malignancy	23
4.7 Comorbidity	24
4.8 Preoperative diagnostic delays	24
4.9 Operative and non-operative cases	25
4.10 Risk of death before surgery	25
4.11 Timing of emergency procedures	26
4.12 Grade of surgeon	26
4.13 Critical care	27
4.14 Deep vein thrombosis prophylaxis	28
4.15 Fluid balance	28
4.16 Unplanned events	29
4.17 Postoperative complications	29
4.18 Surgical diagnoses	29
4.19 Management issues in patient care	30
4.20 Postmortem	30
4.21 In retrospect	31
4.22 Clinical incidents	31
4.23 Second line assessors review of case note record keeping	34
4.24 Concordance between treating surgeon and second line assessor	35
5. PERFORMANCE REVIEW	35
ACKNOWLEDGMENTS	36
APPENDIX	
COMPARISON OF EMERGENCY AND ELECTIVE ADMISSIONS (2007-2010)	37
REFERENCES	44

TABLES

Table 3.1	Number of death notifications by specialty	16
Table 3.2	Referral for second line assessment by surgical specialty	20
Table 3.3	Cases which have undergone assessment (2005-2010)	20
Table 4.1	Median death age by surgical specialty	22
Table 4.2	ASA grades	23
Table 4.3	Association of preoperative delays	24
Table 4.4	Cause of preoperative diagnostic delays	25
Table 4.5	Operations performed	25
Table 4.6	Reason for non-operation (n=173 in 137 patients)	25
Table 4.7	Consultant surgeon involvement in the operative process (n=409 operations on 284 patients)	27
Table 4.8	Reasons for non-use of DVT prophylaxis	28
Table 4.9	Frequency of unplanned events	29
Table 4.10	Most frequently reported surgical diagnoses	30
Table 4.11	Postmortem examinations	30
Table 4.12	Total number of clinical incidents	31
Table 4.13	Areas of concern and adverse events in elective and emergency admissions	31
Table 4.14	Patient outcome associated with areas of consideration, concern or adverse events	32
Table 4.15	Preventability associated with areas of consideration, concern or adverse events	32
Table 4.16	Responsible unit associated with areas of consideration, concern or adverse events	33
Table 4.17	Areas of concern in emergency and elective cases	33
Table 4.18	Adverse events in emergency and elective cases	34
Table A1	Most frequent surgical diagnoses in elective and emergency admissions	39
Table A2	Consultant involvement in elective and emergency cases	39
Table A3	Clinical incidents in elective admissions	43

FIGURES

Figure 1.1	Project governance structure	13
Figure 2.1	The SAAPM audit process	14
Figure 3.1	Deaths reported to SAAPM between 1 July 2009 and 30 June 2010	17
Figure 3.2	Participation status of surgeons by specialty	18
Figure 3.3	Return rates of surgical case forms by hospital	18
Figure 3.4	Number of surgeons completing one or more surgical case forms (n=451 cases returned)	19
Figure 3.5	Proportion of surgical case forms completed by specialty (n=451 cases returned)	19
Figure 3.6	Seniority of surgeon completing the surgical case form	19
Figure 4.1	Admission state of audited patients by surgical specialty	21
Figure 4.2	Age distribution by gender	22
Figure 4.3	Patient care issues associated with patient transfer	22
Figure 4.4	ASA grade of patient prior to surgery	23
Figure 4.5	ASA grade by surgical specialty	23
Figure 4.6	Comorbidities present by frequency	24
Figure 4.7	Number of comorbidities per patient by surgical specialty	24
Figure 4.8	Risk of death before surgery	26
Figure 4.9	Risk of death before surgery by surgical specialty	26
Figure 4.10	Timing of operation for emergency admissions	26
Figure 4.11	Time of operation	26
Figure 4.12	Grade of surgeon operating	27
Figure 4.13	Critical care unit (CCU) appropriateness when not used	27
Figure 4.14	Types of DVT prophylaxis used	28
Figure 4.15	Fluid balance management	28
Figure 4.16	Unplanned return to theatre by surgical specialty	29
Figure 4.17	Management issues identified by the reporting surgeon	30
Figure 4.18	Management issues identified by the assessor	30
Figure 4.19	Cases associated with adverse events or areas of concern (2005-2010)	34
Figure 4.20	Assessment of case note completeness	34
Figure A1	Breakdown of admission status by surgical specialty from 1 July 2007 to 1 July 2010	37
Figure A2	Age at death of elective and emergency cases	37
Figure A3	ASA grade in elective and emergency cases	38
Figure A4	Types and frequencies of comorbidities in elective and emergency admissions	38
Figure A5	Number of comorbidities per patient in elective and emergency admissions	38
Figure A6	Risk of death in elective and emergency admissions	38
Figure A7	Types of postoperative complications in elective and emergency admissions	40
Figure A8	Use of DVT prophylaxis in elective and emergency admissions	40
Figure A9	Assessor perception of appropriateness of DVT prophylaxis use in elective and emergency cases	41
Figure A10	Types of DVT prophylaxis given in elective and emergency admissions	41
Figure A11	Areas where patient management could have been improved	41
Figure A12	Frequency of clinical incidents in elective and emergency admissions	41

ABBREVIATIONS

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ANZASM SC	Australian and New Zealand Audit of Surgical Mortality Steering Committee
ANZCA	Australian and New Zealand College of Anaesthetists
ASA	American Society of Anaesthesiologists
AST	Advanced Surgical Trainee
BAS	Bi-National Audit System
CCU	critical care units
CPD	Continuing Professional Development
DIC	disseminated intravascular coagulation
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
PEG	percutaneous endoscopic gastrostomy
RAAS	Research, Audit and Academic Surgery
RACDS	Royal Australasian College of Dental Surgeons
RACP	Royal Australasian College of Physicians
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
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



This is the fifth annual report of the South Australian Audit of Perioperative Mortality (SAAPM), and covers reported deaths from 1 July 2009 to 30 June 2010. We are continuing to build on the database which we have established since the audit commenced in 2005.

While the number of surgeons involved with the audit has continued to increase, there are still a small number of private hospitals who have yet to join the process. Our negotiations with these hospitals are ongoing, and we anticipate that they will be included in the audit within the coming year.

The results continue to confirm that surgical practice in South Australia is of a high standard, with most of the reported deaths occurring in complex emergency patients, usually in conjunction with multiple comorbidities.

This year we have also chosen to analyse deaths in elective surgical patients, a group which usually comprises about 10% of reported cases. Although these patients have had elective procedures, it appears that they also have considerable comorbidity, and the operations are usually being performed out of necessity, for example, to treat malignancy or life-threatening cardiac disease.

Our data on areas of concern and adverse events shows a trend which suggests that many of the identified problems occur in the postoperative period. At a national level, there is increasing recognition of the concept of the 'deteriorating patient' in hospital wards, and the need for these patients to be recognised early and treated actively if preventable deaths are to be avoided. The area of postoperative care, including the intensive care unit (ICU) and the high dependency unit (HDU) input, will continue to be monitored in future reports.

Finally, I would like to thank all the surgeons who have contributed their cases; our assessors, who give so much of their time to support the process; and the hospital records staff, on whom we rely for timely case reporting. My personal thanks also go to our Project Manager, Dr Ken Lang, and Project Officer, Ms Heather Martin, for their daily efforts in maintaining the audit process.

Paul Dolan

SAAPM 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 (ANZASM SC) and has protection at a state level under the Health Care Act 2008 (Part 7: Quality improvement and research) in addition to federal coverage under ANZASM through the Commonwealth Qualified Privilege Scheme, Part VC of the Health Insurance Act 1973 (Gazetted 6 November 2006).

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 a 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.
- adverse event — an unintended injury caused by medical management, rather than by the disease process, which is sufficiently serious to:
 - lead to prolonged hospitalisation.
 - lead to temporary or permanent impairment or disability of the patient.
 - contribute to or cause death.

The completed surgical case form is de-identified and reviewed by another consultant surgeon from the same speciality (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 not sufficient 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

Twenty seven (27) hospitals in South Australia participate in SAAPM. The number of deaths reported to SAAPM in this reporting period was 554. This represents a decrease of 4% from the 2008/2009 report where 579 deaths were reported and a 2% increase from the 2007/2008 report when 545 deaths were reported. The number of surgical case forms returned to SAAPM has increased during this reporting period. At the time of this analysis, 87% of surgical case forms had been returned from this audit period, compared with 78% in the 2008/2009 reporting period.

Assessments

Of the 554 surgical case forms sent to surgeons, 480 were returned from the census period of 1 July 2009 to 30 June 2010. From the cases returned, 66 cases were excluded for a variety of reasons, usually in cases where the patient was admitted for terminal care, or in some cases where the hospital data systems could not identify the appropriate treating surgeon. The remaining 414 cases were subjected to FLA and, of those, 20 cases (4.8%) were recommended for SLA, which is comparable to the 2008/2009 reporting period (4.9%). In total, 410 (4 pending first line assessments) cases 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 2009 to 30 June 2010 that had completed the audit process by 13 October 2010. SAAPM analysed areas of concern or adverse events ascribed to the case by the first or second line assessors. In cases which were associated with more than one event, the most serious event was included in the analysis.

Patient sample demographics

Of the 554 reported deaths, the median age was 79.5 years, with an interquartile range (IQR) of 69.2–85.4. A total of 53% of cases were male. Sixty per cent had an American Society of Anaesthesiologists (ASA) grade of four or more. Ninety per cent of cases were associated with one or more significant comorbidities that increased the risk of death of the patient.

Areas for consideration, of concern and adverse events

The proportion of cases associated with areas of concern or adverse events has increased in this reporting period to 14% compared with 10% in 2007/2008 and 2008/2009. Overall, assessors found that an adverse event caused the death of a patient in 3% of the 410 audited cases compared with 1% last year. The assessor found that none (0/13) of the cases with an adverse

event or area of concern that caused the death of the patient were thought to be definitely preventable but 3/13 (<1% of all cases) were probably preventable. The most frequent adverse events reported were wound infection and wound breakdown.

Admissions

The proportion of emergency admissions was 89% with the remaining 11% elective admissions. This is similar to admission status data from 2008/2009 of 90% and 10% of emergency and elective admissions, respectively.

Operative and non-operative deaths

In 33% of audited deaths, no operation was performed. The proportion of cases where surgeons made an active decision not to operate was similar to previous reporting periods (approximately 30%). In 6% of operative cases the operation was abandoned due to finding a terminal situation. Eighty three audited patients underwent two or more operations. In 17% of operative cases, the surgeon reported an unplanned return to theatre. The more operations performed, the more likely the cases were to be associated with an area of concern or adverse event.

Grade of surgeon

The frequency of the consultant operating in all reported procedures was approximately 60%. When a patient underwent multiple operations, consultant involvement in subsequent operations increased to over 70%.

DVT prophylaxis

Of the 410 cases that completed FLA, surgeons reported that DVT prophylaxis was used in 69% of cases which is an increase on the previous reporting period (63%). Assessors did not identify any cases 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. 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 hospitals throughout South Australia and continue to engage the private hospitals with the audit. Continue to support participating hospitals to facilitate accurate reporting of relevant cases.

Surgeon participation

Encourage the participation of all surgeons in the audit process in light of the changes to the College Continuing Professional Development (CPD) program effective from January 2010. Audit participation is a mandatory requirement for surgeons working in hospitals which participate in a mortality audit. Surgeon participation requires timely (within 3 months) and detailed completion of the surgical case forms to ensure accurate data collection.

Preoperative care

Monitor delays in patient transfer and patient diagnosis and in particular ensure that 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.

Elective surgery

Monitor elective surgery mortality specifically related to preventable clinical incidents.

Clinical management

Continue to monitor DVT prophylaxis, particularly in relation to reasons it is not being used during a patient admission.

ICU/HDU

Continue monitoring intensive care unit/high dependency unit (ICU/HDU) use, to assess whether current bed allocation practices are appropriate.

Reporting

To access and collect denominator data for the total numbers of surgical admissions in South Australia to put mortality rates into perspective.

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



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 2009 to 30 June 2010, as audited on 13 October 2010.**
- **The main role of SAAPM is to feed-back information to inform, educate, facilitate change and improve quality of 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

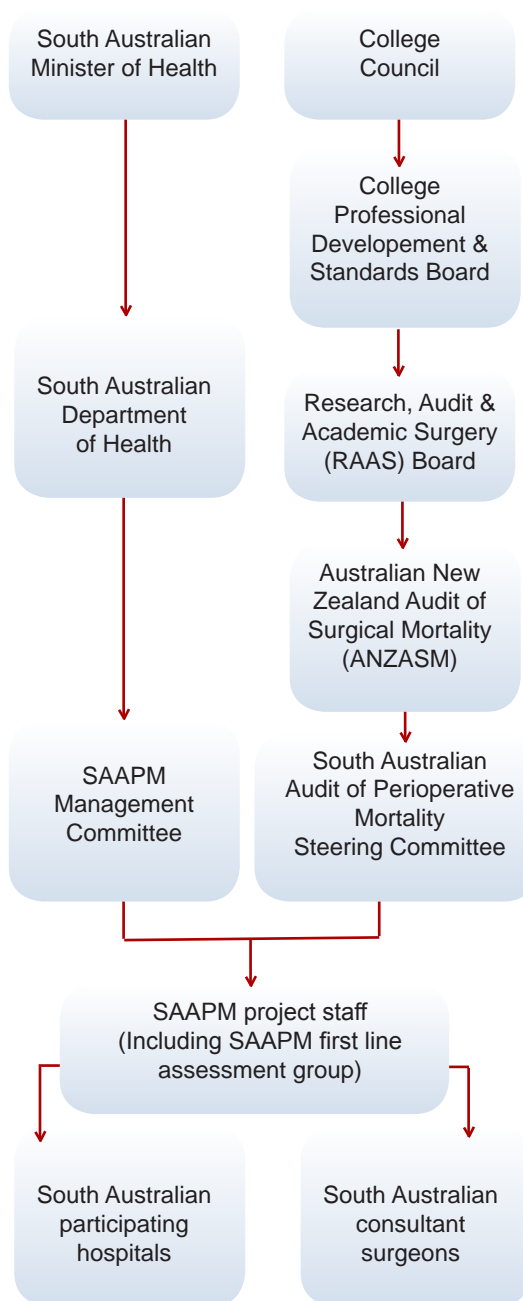
The timeline for the project was as follows:

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

1.2 Project governance

The project governance structure is illustrated in Figure 1.1. SAAPM has protection under both state and federal legislation. The SAAPM Management Committee is registered under the South Australian Health Care Act 2008 under Part 7 (Quality improvement and research) and Part 8 (Analysis of adverse incidents). Also, ANZASM has protection under the Commonwealth Qualified Privilege Scheme, under Part VC of the Health Insurance Act 1973 (gazetted 6 November 2006).

Figure 1.1 Project governance structure



1.3 Confidentiality

SAAPM is a confidential project with legislative protection at a state level under the SA Health Care Act 2008 under Part 7 (Quality improvement and research) and Part 8 (Analysis of adverse incidents), in addition to federal coverage under ANZASM through the Commonwealth Qualified Privilege Scheme, Part VC of the Health Insurance Act 1973 (gazetted 6 November 2006). 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 individual hospital medical record department or safety and quality unit of the participating hospital, or directly from SA Health. 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.

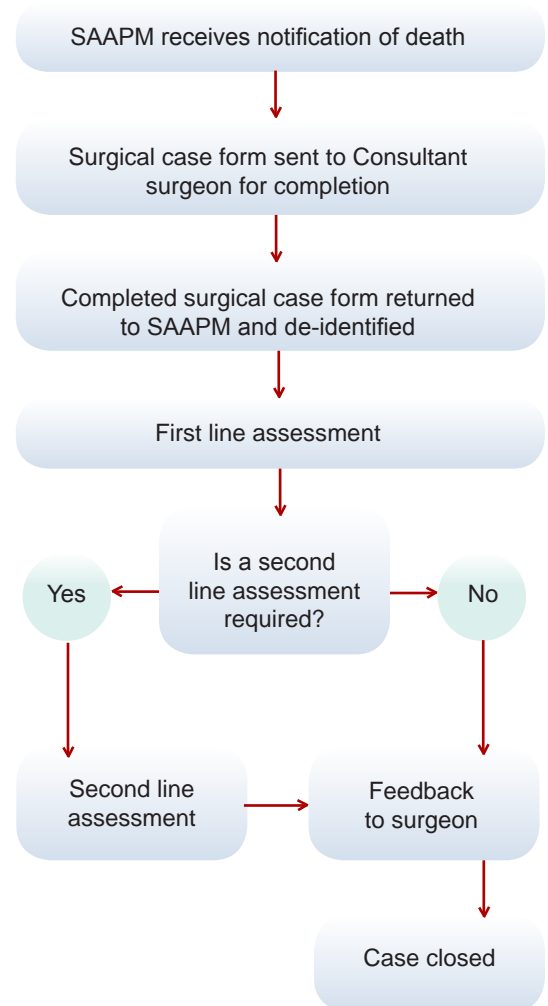
The consultant surgeon associated with the case is sent a surgical case form for completion. When the completed surgical case form is returned to the SAAPM office, it is de-identified and then assessed by a first line assessor. The first line assessor will either close the case or advise that the case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

Cases may be referred for SLA if:

- areas of concern or adverse events are thought to have occurred during the clinical care of the patient that warrants further investigation.
- a report could usefully draw attention to lessons to be learned, either for clinicians involved in the case or as part of a collated assessment (case note review book) for wider distribution.
- the surgical case form lacks sufficient information to make an informed judgement.

Second line assessors are consultant surgeons who work in the same specialty as the reporting surgeon, but in a different hospital to that in which the death occurred. The process of the audit process is shown in Figure 2.1.

Figure 2.1 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 practice. Feedback is provided directly to the consultant surgeon after the completion of a first line assessment (FLA) or second line assessment (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 contains the analysis and commentary of data covering all surgical specialties to provide an overview of the project to surgeons and the wider community.

2.3 Categories of deaths investigated

Deaths currently included in SAAPM are classified into two categories:

- **Category 1: Operative deaths** A death that occurs when a patient is admitted under the care of a surgeon and has an operation/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, does not have an operation/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 (RACDS)
- the Royal Australasian College of Physicians (RACP)
- the Royal Australian and New Zealand College of Obstetricians & Gynaecologists (RANZCOG).

Deaths that are identified as terminal care cases by the reporting surgeon are recorded but 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 two categories:
 - Cases related to disease progression: In these cases, patient death occurred due to the disease process, despite appropriate care with no issues identified with patient management.

- Cases with clinical incidents: In these cases, clinical incidents were identified that may have impacted on patient management. These events are divided into 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 as well as 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
 - caused the death of a patient who would otherwise have been expected to survive.
- give their opinion as to whether the incident was either:
 - definitely preventable
 - probably preventable
 - probably not preventable
 - definitely not preventable
- indicate who the incident/event was associated with:
 - audited surgical team
 - another clinical team
 - hospital
 - other

First and second line assessors also complete the same assessment matrix. The analyses contained in this report are based on the opinions subscribed 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. Data regarding areas for consideration are collected, but these are considered to be 'less serious events' that have little impact on the overall care of the patient. Therefore, these cases are generally excluded from the analysis because they typically make no difference to the outcome of the patient.

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 2010 annual report covers deaths reported to SAAPM from 1 July 2009 to 30 June 2010 that had completed the audit process by 13 October 2010. Numbers in previous annual reports may vary from this report because some cases are 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 (2003) and Microsoft Office Excel (2003). Numbers in parentheses in the text (n) represent the number of cases analysed. As not all data points were completed, the total number of cases used in the analyses varies, and these numbers are provided for all tables and figures in the report.

2.6 Performance review

Recommendations were included in the 2009 SAAPM report.² An important measure of the success of SAAPM is whether these recommendations have been addressed or achieved. A list of recommendations and progress against these are listed in Section 5 of this annual report.

3. AUDIT PARTICIPATION & ASSESSMENT

KEY POINTS

- **The number of deaths under the care of surgeons showed a slight decrease from last year.**

3.1 Overview of participation

3.1.1 Deaths reported to SAAPM

Participation in SAAPM by the Fellows of the Royal Australasian College of Surgeons is now considered to be mandatory when working in a hospital where a mortality audit is available to them:

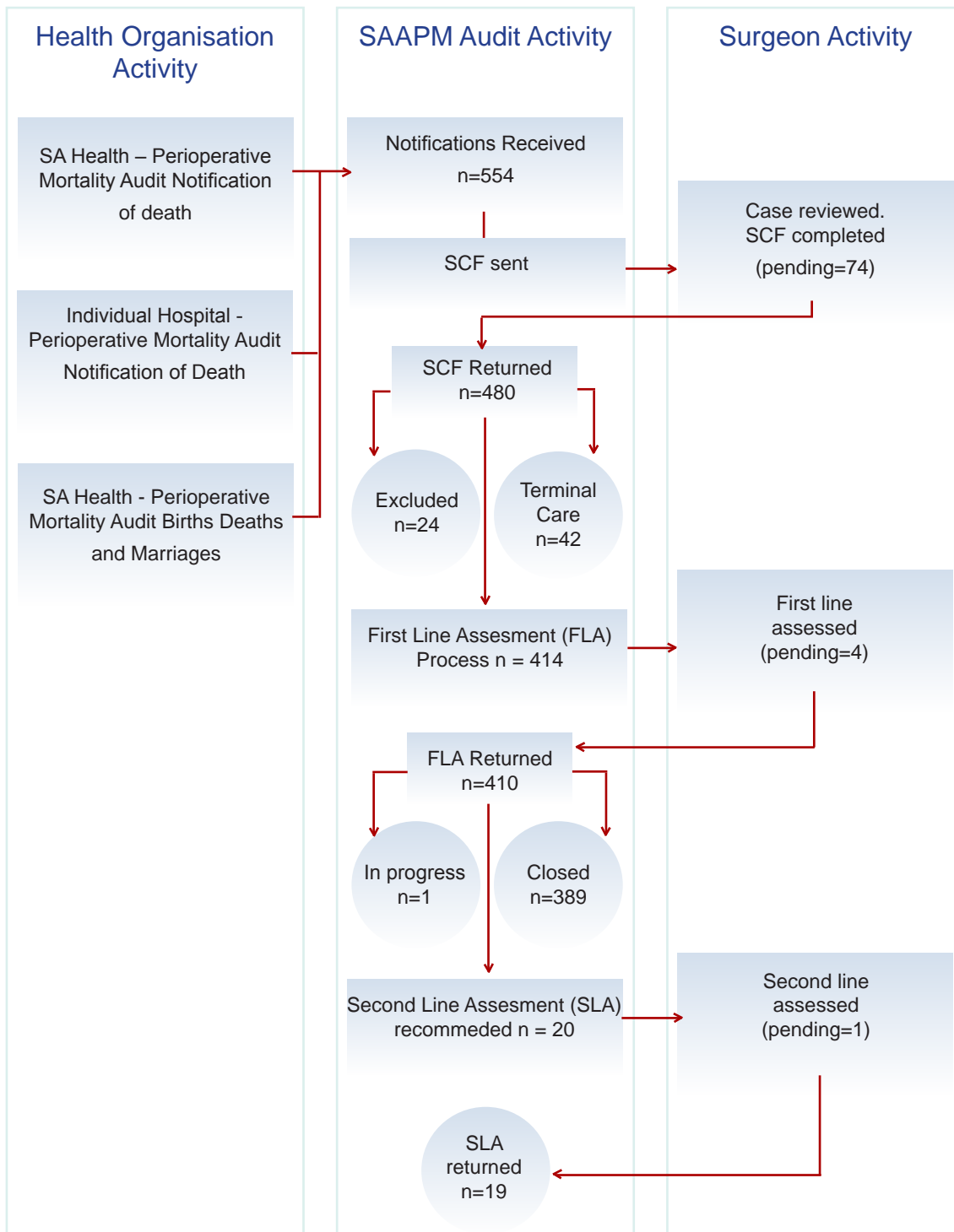
- Surgeons register to participate by signing a participation agreement form sent by the SAAPM office.
- On notification of a death from a hospital, a surgical case form is forwarded to the responsible surgeon.

Within this report, the number of cases is represented by the letter (n). Figure 3.1 describes the number of deaths and the surgical case form (SCF) return and assessment rate, indicating the number of cases which have completed the audit process. Table 3.1 shows the number of notifications of death by surgical speciality.

Table 3.1 Number of death notifications by speciality

Surgical Speciality	Number of patients	% of total
Cardiothoracic	40	7
Ear, nose & throat (ENT)	9	2
General	243	44
Neurosurgery	87	16
Orthopaedics	72	13
Plastic surgery	12	2
Urology	25	4
Vascular	66	12
Total	554	100

Figure 3.1 Deaths reported to SAAPM between 1 July 2009 and 30 June 2010



Comment

The average number of deaths reported to SAAPM since inception of the project in 2005 is 522 per annum with 79% of surgical case forms returned to the office. From the previous reporting year (2009), deaths reported to SAAPM have fallen from

579 to 554 in 2010, a decrease of 4%. The number of cases which have completed the audit process has risen to 87%, an increase of 9% over the 2009 annual report.²

3.2 Surgeon participation in SAAPM

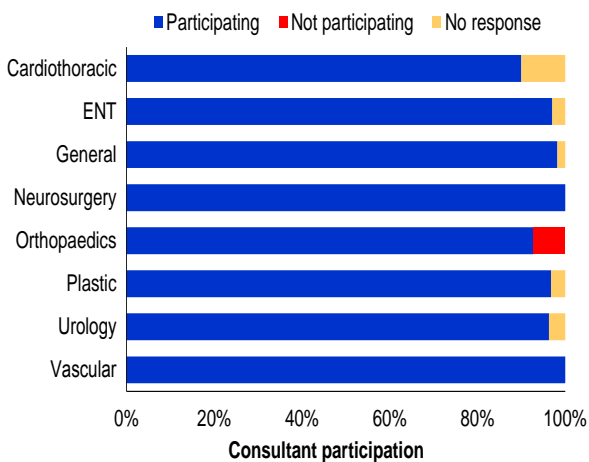
KEY POINTS

- Surgeon participation and agreement to be a first and/or second line assessor in the audit has continued to increase during 2010.
- Participation in the audit is now considered mandatory for CPD recertification when a death is reported by a participating hospital.

Recently 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 by either actively agreeing to participate through a signed consent form or upon the completion of a surgical case form.

Figure 3.2 shows the current participation status of surgeons by surgical specialty.

Figure 3.2 Participation status of surgeons by specialty



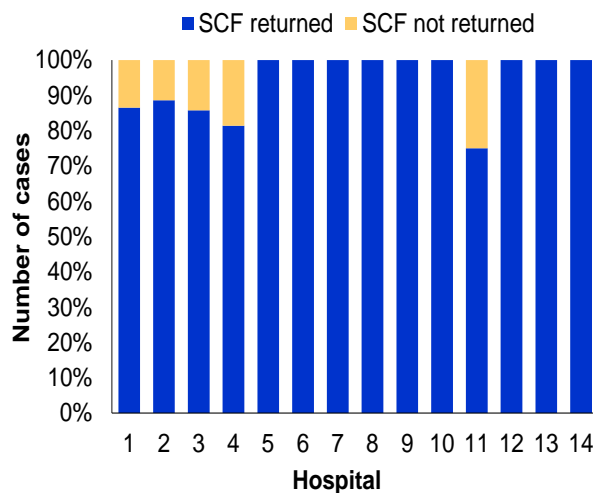
3.3 Hospital participation

KEY POINTS

- 27 hospitals within South Australia are participating in the audit.
- 71% of deaths occurred in three public hospitals.

At the end of the reporting period, 27 hospitals within South Australia were participating in the audit. This includes 21 public hospitals and 6 private hospitals. Of the 21 public hospitals participating in the audit, 15 are from regional centres. The percentage of forms sent and returned for each hospital is shown in Figure 3.3.

Figure 3.3 Return rates of surgical case forms by hospital



Note: Not all participating hospitals reported deaths in the reporting period



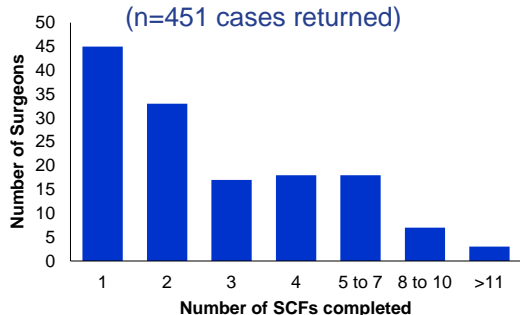
3.4 Surgical case form completion

KEY POINTS

- **The number of surgical case forms returned was higher than previous years (87%).**
- **The 554 notifications of death were associated with 141 surgeons.**
- **Consultants complete more than 65% of surgical case forms.**

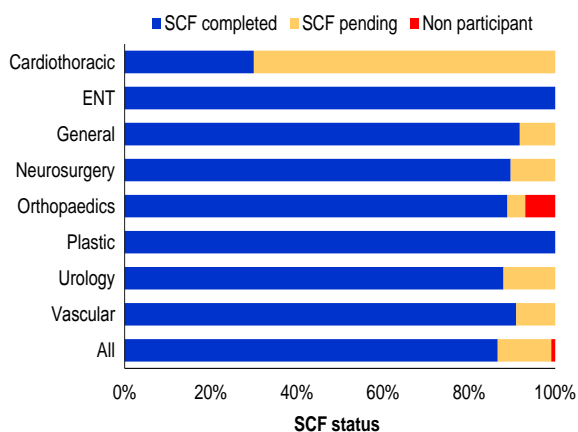
In the 2009/2010 audit period, there were 554 deaths reported which were associated with 141 surgeons. Of these, 140 surgeons agreed to participate (99%). This is consistent with the 2009 participation rate. The number of surgeons completing one or more surgical case forms is summarised in Figure 3.4.

Figure 3.4 Number of surgeons completing one or more surgical case forms (n=451 cases returned)



As indicated in the above graph, there are a small number of surgeons who have completed more than 11 surgical case forms during the reporting year. These surgeons tend to work in specialties with a high number of emergency admissions in the main teaching hospitals with a major trauma load. This observation is consistent with the findings from the interstate mortality audits. The completion rate of surgical case forms was measured for each surgical specialty for this reporting period (Figure 3.5).

Figure 3.5 Proportion of surgical case forms completed by specialty (n=451 cases returned)

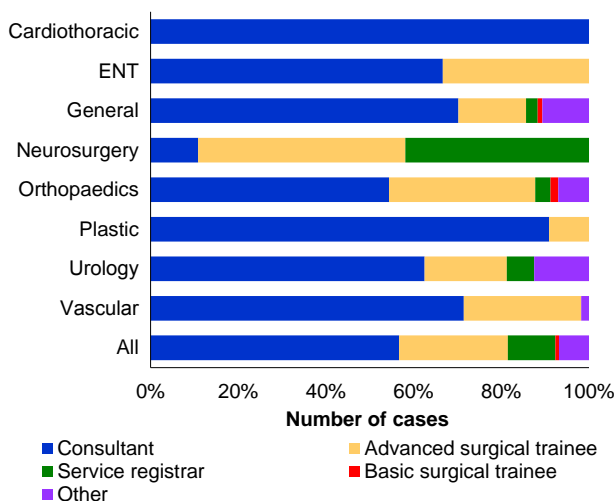


Of the 554 surgical case forms sent to surgeons during the period of 1 July 2009 to 30 June 2010, 480 were returned by the closure date (13 October 2010) for this data analysis. This return rate of 87% is at least 9% greater than all previous reporting periods.

Twenty four (24) cases were excluded as these patients were admitted for terminal care and therefore did not proceed through the audit. There were 74 surgical case forms pending at the censor date.

The seniority of the surgeon completing the surgical case form was measured and each surgical specialty was compared to the average across all specialties (Figure 3.6).

Figure 3.6 Seniority of surgeon completing the surgical case form



Note: Other includes surgical fellow, senior registrar, surgical resident or RMO.

3.5 Assessments

KEY POINTS

- **5% of cases progressed to SLA, with 2% for further investigation and 3% due to insufficient information.**
- **The number of cases recommended for SLA has remained consistent for the last three years.**

During the reporting period there were 480 surgical case forms returned. Sixty six (66) returned cases 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. From this total, 414 eligible cases were sent for FLA. Four FLA cases were outstanding at the census date. Following FLA, 20 out of 410 cases (5%) progressed to SLA. Of these cases, 3% underwent SLA due to a lack of information and 2% for further investigation.

The number of cases that were recommended for SLA per surgical specialty is shown in Table 3.2.

Table 3.2 Referral for second line assessment by surgical specialty

Surgical specialty	Number of cases	
	Total	For SLA
Cardiothoracic	12	1
ENT	7	2
General	182	9
Neurosurgery	72	0
Orthopaedics	57	5
Plastic	10	1
Urology	15	2
Vascular	55	0
All	410	20

Comment

Over the 5 years of data collection there has been a decline (from 11% to 4%) in the number of cases that require SLA which is encouraging. Since the 2007/2008 period, the number of cases requiring SLA has remained constant at 4%. The need for SLA can often be avoided if the consultant completes the SAAPM surgical case form in full and attaches any relevant letters or documentation.

Table 3.3 shows the number and percentage of cases that have been recommended for SLA over time.

Table 3.3: Cases which have undergone assessment (2005-2010)

	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010
	n(%)	n(%)	n(%)	n(%)	n(%)
Returned SCFs	328	387	418	451	451
First line assessment completed	296 (90)	329 (85)	362 (87)	350 (78)	410 (91)
Second line assessment completed	37 (11)	26 (7)	17 (4)	17 (4)	19 (4)

Note: Terminal care cases were excluded.

4. RESULTS

4.1 Overview and patient sample demographics

KEY POINTS

- **554 deaths were notified to SAAPM during the censor period.**
- **420 surgical case forms were completed during the censor period.**
- **The median death age was 80 years.**
- **Males made up 53% of all cases.**
- **60% of patients had an American Society of Anaesthesiologists (ASA) grade of at least 4.**
- **90% of cases were associated with at least one comorbidity that surgeons considered contributed to death.**

4.2 Admissions

KEY POINTS

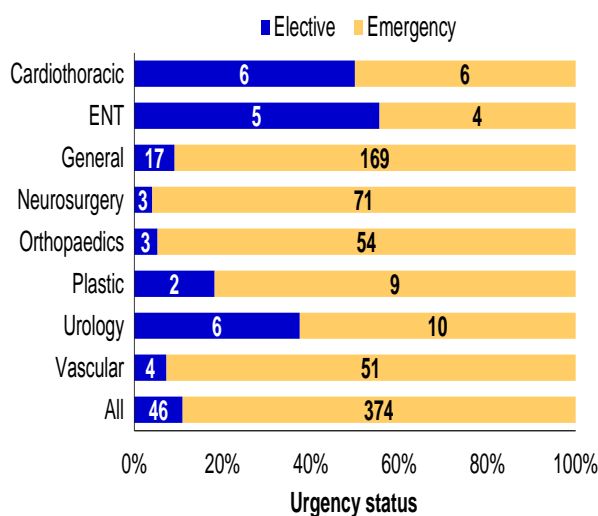
- **11% of all admissions were elective.**
- **67% of the 420 cases underwent at least one operation.**
- **96% of the 46 elective admissions underwent an operation.**
- **64% of the 374 emergency admissions underwent an operation.**

Data on the area of admissions is concerned with:

- The type of admission (emergency or elective)
- Whether the patient underwent an operation (operative or non-operative).

Operative cases are shown in Section 4.9.

Figure 4.1 Admission state of audited patients by surgical specialty



Note: The number of cases (n) for each specialty making up 100% is shown in the chart.

Comment

The majority of audited deaths occurred in patients admitted as emergencies for acute life-threatening conditions.

4.3 Age distribution

KEY POINTS

- **The median age of death was 80 years.**
- **Males made up 53% of all deaths.**
- **The majority of deaths occurred in the 81-90 year age range.**

In the current reporting period, there were 554 reported deaths. This group was made up of 291 males (53%) and 263 females (47%).

Figure 4.2 indicates the age and sex distribution of all reported cases. Patients between the age of 71 and 90 years account for approximately 65% of all cases. The 81-90 year range remains the predominant group in the sample. Males had the highest number of deaths in the 71-80 age range whereas females had the most number of deaths in the 81-90 year age range.

Figure 4.2 Age distribution by gender

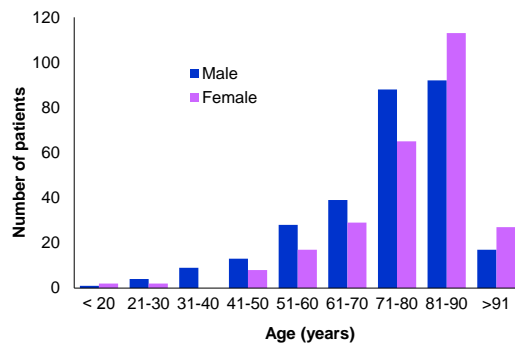


Figure 4.2 shows the distribution of age by gender, while Table 4.1 shows the median age and interquartile range (IQR) of the audited patients per surgical speciality.

Table 4.1 Median death age by surgical speciality

Surgical speciality	Median age (years)	IQR (25-75%) (years)
Cardiothoracic	74	64 - 81
ENT	68	58 - 83
General	80	71 - 86
Neurosurgery	73	58 - 81
Orthopaedics	85	79 - 88
Plastic	75	56 - 84
Urology	83	63 - 85
Vascular	82	77 - 88
All	80	69 - 85

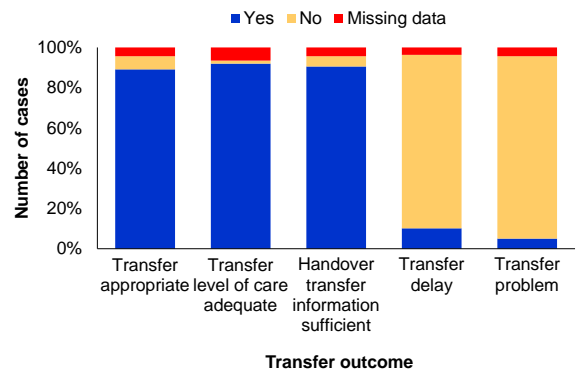
Comment

Age at death by speciality is as would be expected when the casemix of the individual specialties is considered.

4.4 Transfers

A total of 138/411 (34%) of patients were recorded as being transferred between hospitals (data missing in 9 cases). Transfer typically occurs when a higher level of care or specific expertise is needed.

Figure 4.3 Patient care issues associated with patient transfer



Note: Data missing for 9 cases.

Comment

- The transfer was considered to be appropriate in 93% of cases.
- Level of care during transfer was adequate in 98% of cases.
- There was a delay in transfer in 11% of cases.

4.5 American Society of Anaesthesiologists (ASA) grades

KEY POINTS

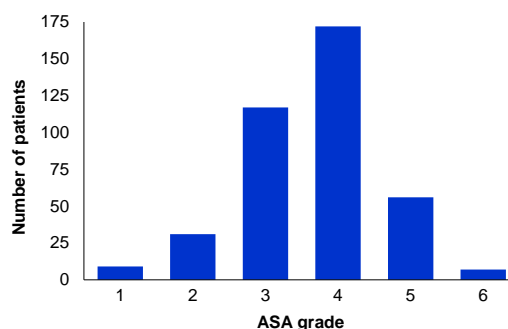
- Most patients had an ASA grade of 3 or 4.
- Electively admitted patients tended to have lower ASA grades than emergency admissions.
- Neurosurgery had the highest percentage of deaths associated with ASA grade 1 or 2.
- Vascular surgery and neurosurgery had the highest percentage of patients assessed as ASA grade 5 or 6.

The American Society of Anaesthesiologists (ASA) grade (Table 4.2) is an internationally recognised classification of perioperative risk. ASA grade 4 is the most frequently reported grade across all years of the audit. These patients have one or more chronic underlying medical conditions which significantly increases risk during anaesthesia and surgery. The ASA grade of the patient prior to surgery is shown in Figure 4.4 and the breakdown of ASA grades by surgical specialty is shown in Figure 4.5.

Table 4.2 ASA Grades

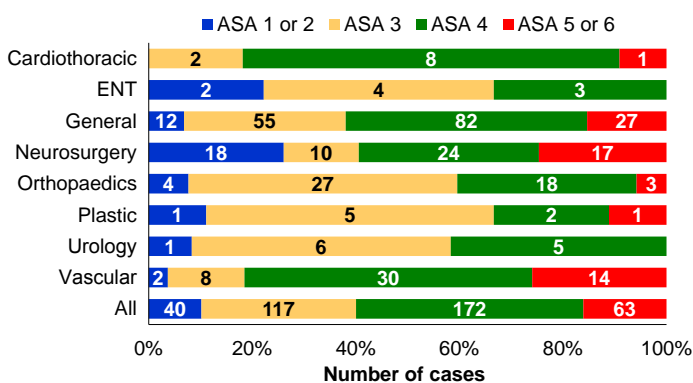
ASA Grade	Characteristics
1	A normal healthy patient
2	A patient with mild systemic disease and no functional limitation
3	A patient with moderate systemic disease and definite functional limitation
4	A patient with severe systemic disease that is a constant threat to life
5	A moribund patient unlikely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

Figure 4.4 ASA Grade of patient prior to surgery



Note: Data missing for 28 cases.

Figure 4.5 ASA grade by surgical specialty



Note: Data missing for 28 cases, the number of cases (n) is shown in the chart.

Comment

Seventy four per cent (74%) of patients have an ASA grade of either 3 or 4, meaning that they were assessed as either having a moderate or severe degree of systemic disease upon admission to hospital. ASA grade is a simple but important measure of comorbidity and is routinely recorded on the anaesthetic record. This important data point was missing in 13% of the forms returned.

ASA grades tend to be lower in elective cases when compared to emergency patients. Neurosurgery had the highest percentage of deaths associated with ASA grade 1 or 2. Neurosurgery and vascular surgery had the highest percentage of patients with ASA grade 5 or 6.

4.6 Malignancy

The presence of malignancy in a patient may complicate the presenting condition of the patient and may contribute to the death of the patient.

- Malignancy was present in 29% of cases.
- Of those cases, malignancy contributed to death in 62% of cases.

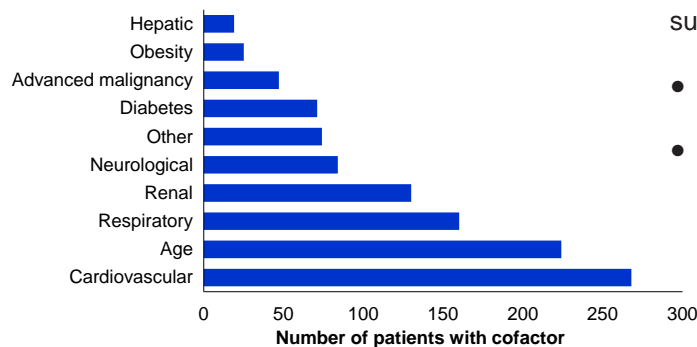
4.7 Comorbidity

KEY POINTS

- 1102 comorbidities were reported for 420 patients.
- The most common comorbidities were cardiovascular disease, advanced age and respiratory problems.
- The most frequent number of comorbidities per patient was three.
- Neurosurgery and plastic surgery had the most number of patients with zero or one comorbidity.
- Orthopaedics and ENT surgery had the highest percentage of patients with 5 or more comorbidities.

The total number of comorbidities indicated by surgeons was 1102 in 420 patients (Figure 4.6). The most frequently occurring factors were cardiovascular problems (24%), advanced age (20%) and respiratory disease (15%).

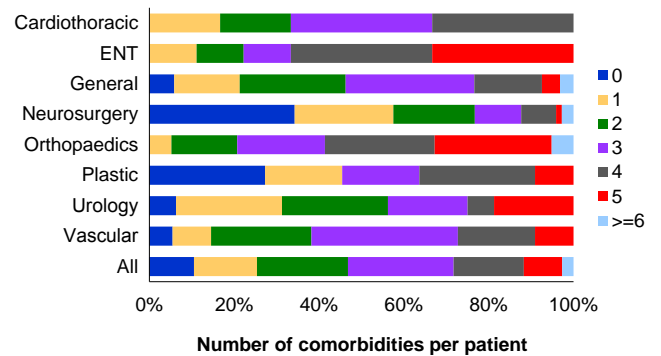
Figure 4.6 Comorbidities present by frequency



Comment

- The median number of comorbidities per patient was three, with 10% of patients not having a significant comorbidity.
- 'Other' comorbidities ranged from sepsis, malnutrition, alcohol abuse, dementia, motor neurone disease, HIV and rheumatoid arthritis.

Figure 4.7 Number of comorbidities per patient by surgical specialty



Comment

Neurosurgery and plastic surgery had the highest number of patients that had zero or one comorbidity (57% and 45%, respectively). ENT and orthopaedics had the highest proportion of patients with 5 or more comorbidities (33% for each). The interpretation of data from ENT should be taken with caution due to the low number of cases (9) within this specialty.

4.8 Preoperative diagnostic delays

The cause of any preoperative delay was measured when identified by the reporting surgeon.

- 7% of cases had a preoperative delay identified by the treating surgeon.
- Table 4.3 shows that 10/32 cases (31%) were associated with the surgical unit.

Table 4.3 Association of preoperative delays

Associated with:	n (%)
Surgical unit	10 (31)
Medical unit	7 (22)
General practitioner (GP)	4 (13)
Other - hospital	4 (13)
No Answer	7 (21)
Total	32 (100)

Note: there may be more than one response per case. Other includes the emergency department and radiology.

Preoperative delays were caused by inexperienced staff (12%), incorrect tests performed (12%) and the misinterpretation of results (6%) (Table 4.4).

Table 4.4 Cause of preoperative diagnostic delays

Cause	n (%)
Inexperienced staff	4 (12)
Incorrect test	4 (12)
Misinterpretation of results	2 (6)
Results not seen	5 (16)
Unavoidable	8 (24)
Other	8 (24)
No answer	2 (6)
Total	33 (100)

Note: there may be more than one response per case.

Some of the 'other' reasons associated with preoperative delays included:

- lack of investigation
- results difficult to interpret
- availability of operating theatres.

4.9 Operative and non-operative cases

KEY POINTS

- **6% of the 284 operative cases were abandoned due to finding a terminal situation.**
- **17% of operative cases had an unplanned return to theatre.**
- **284 patients underwent a total of 409 operations.**
- **33% of cases did not undergo an operation.**
- **The most common reason for no operation was an active decision not to operate.**

There were 409 operations performed on 284 patients (Table 4.5). The reason for no operation is shown in Table 4.6.

Table 4.5 Operations performed

Number of operations	Number of cases	Percentage
No operation	137	33% of all cases
Operation performed	409	67% of all cases
1 operation	201	70% of operated cases
2 operations	52	18% of operated cases
3 operations	22	8% of operated cases
4 operations or more	9	2% of operated cases

Table 4.6 Reason for non-operation (n=173 in 137 patients)

Reason for non-operation	n	%
Not a surgical problem	24	14
Active decision not to operate	56	32
Patient refused operation	11	6
Rapid death	10	6
Active decision to limit treatment	25	15
Data missing	47	27
Total	173	100

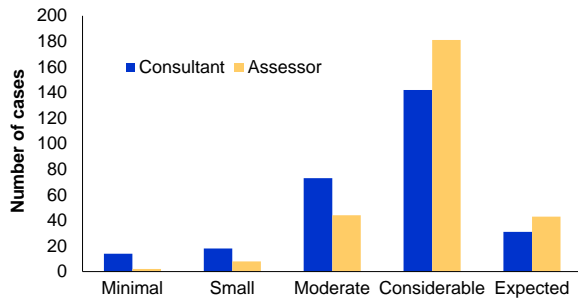
Note: Some cases had more than one response.

4.10 Risk of death before surgery

Surgeons and assessors were asked to measure the risk of death prior to surgery on the patient.

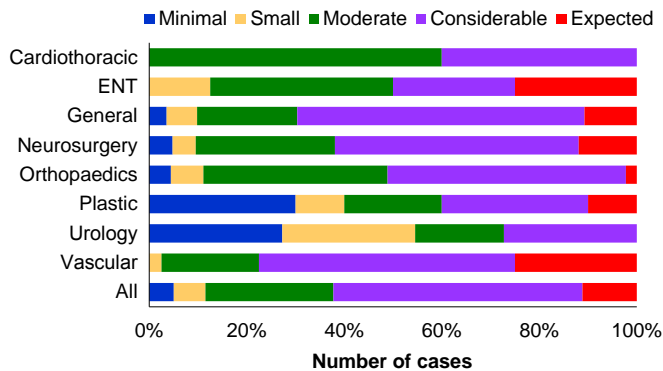
- Surgeons estimated that 62% of patients were either at considerable risk or expected risk of death.
- Assessors estimated that 81% of patients were either at considerable risk or expected risk of death.
- Assessors in general estimated the risk of death in the patient was higher than that estimated by the treating surgeon (Figure 4.8).

Figure 4.8 Risk of death before surgery



Urology and Plastic surgery had the highest percentage of deaths associated with the lower levels of risk of death assessment (Figure 4.9).

Figure 4.9: Risk of death before surgery by surgical speciality

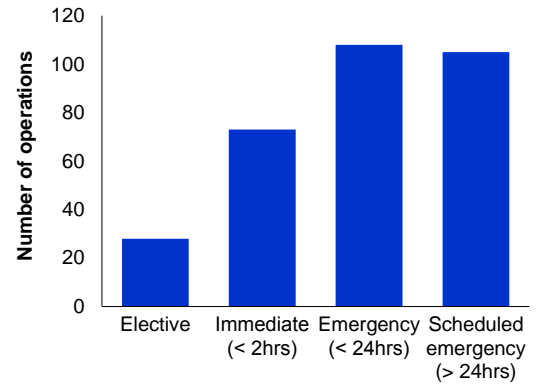


4.11 Timing of emergency procedures

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

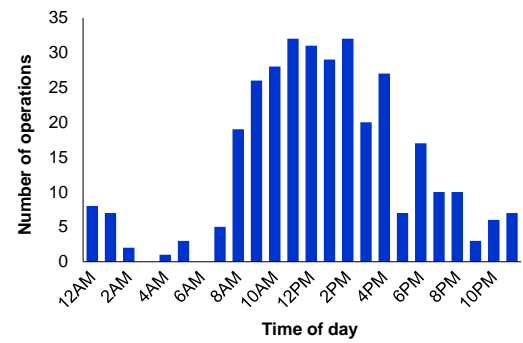
- During the reporting period, there were 374 emergency admissions.
- Of these admissions, 236 patients underwent 329 operations (data missing for 15 cases).
- The most frequent timing of operation after admission was less than 24 hours (Figure 4.10).
- Most operations occur during normal working hours (Figure 4.11).

Figure 4.10 Timing of operation for emergency admissions



Note: Data missing from 15 cases.

Figure 4.11 Time of operation



Note: Data missing in 79 cases.

Comment

The most common time of the day for an operation to occur was between 9am and 7pm. During this time, consultant surgeons would usually be present, with only a small percentage of operations (16%) 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 4.7).

Table 4.7 Consultant surgeon involvement in the operative process
(n=409 operations on 284 patients)

	Number of operations (%)			
	Deciding	Operating	Assisting	In theatre
Consultant	87	58	20	57
Advanced surgical trainee	9	29	52	30
Service registrar	1	5	16	6
Basic surgical trainee	<1	1	5	2
GP surgeon	0	0	2	1
Other#	3	7	5	4
Total	100	100	100	100

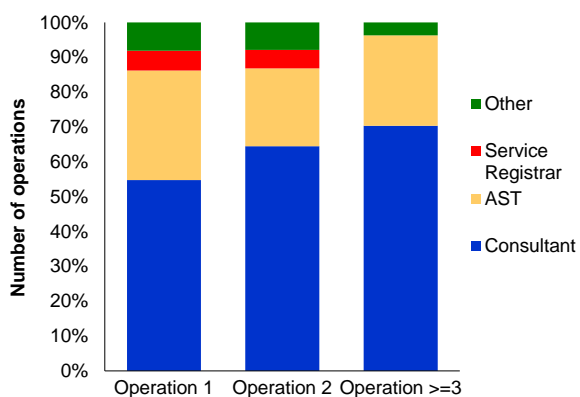
Note: Data missing in 56 cases for Deciding, 43 cases for Operating, 202 cases for Assisting and 336 cases for In theatre;

Other# refers to overseas Fellow, specialist Fellow or additional consultant.

In the previous 2009 annual report, the consultant involvement as the operating surgeon had decreased for the third operation to levels of 47%, compared with 51% and 69% for the first and second operation, respectively.

During the 2010 reporting period, consultant involvement as the operating surgeon at the first and second operation was similar (55% and 64%, respectively), with a notably higher involvement in the third or subsequent operations than the previous reporting period (70% versus 47%; Figure 4.12).

Figure 4.12 Grade of surgeon operating



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

4.13 Critical care

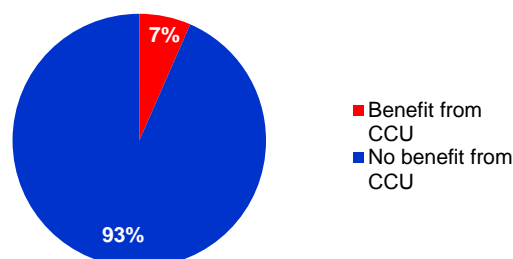
KEY POINTS

- **Critical care was used in 42% of all cases.**
- **Of the 277 cases that did not use critical care, in the assessor's opinion the patient would have benefited from critical care in 18 of 277 cases (7%).**

The treating surgeon was asked whether critical care (ICU/HDU) was used. Critical care was used in 42% of cases and not used either pre- or postoperatively in 58% of cases.

First and second line assessors were asked their opinion of whether they thought the use of critical care was appropriate. According to the assessors, of the 277 cases that did not use critical care, there were 18 cases (7%) where the patient may have benefited from its use (Figure 4.13).

Figure 4.13 Critical care unit (CCU) appropriateness when not used



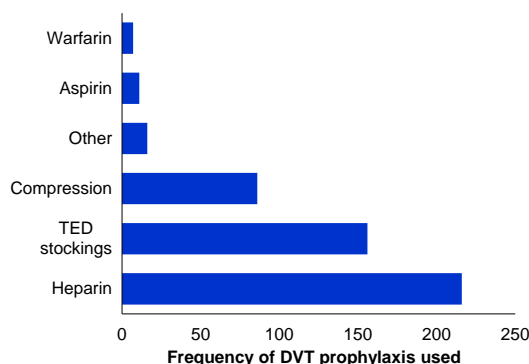
4.14 Deep vein thrombosis prophylaxis

KEY POINTS

- **Deep vein thrombosis (DVT) prophylaxis was used in 69% of all audited cases.**
- **The most frequently used DVT prophylaxis treatments were heparin and thromboembolic deterrent (TED) stockings.**
- **There were no cases reported where the assessor felt that DVT prophylaxis treatment was inappropriate.**
- **The most common reason for DVT prophylaxis not being used was that it was not appropriate.**

DVT prophylaxis was used in 69% of cases, which is a slight increase from previous years (63% in 2009 and 65% in 2008). There were 40 cases in which data was missing. In 285 patients that had DVT prophylaxis, heparin and TED stockings were the most common types used (Figure 4.14).

Figure 4.14 Types of DVT prophylaxis used



Note*: Other agents recorded were Clopidogrel, Enoxaprin, Clexane, Fragmin, Plavix, Croxapain, and Lipirudin.

In the 126 cases where DVT prophylaxis was not used, 26% (28/108) said it was an active decision to withhold treatment; 74% (80/108) stated it was not appropriate and in 18 cases no information was provided.

In cases where the surgeon reported no DVT prophylaxis treatment, 13% (17/126) of patients presented with haemorrhage, 10% (12/126) were coagulopathic, and 8% (10/126) were treated with palliative measures only. Table 4.8 summarised the findings.

Table 4.8 Reasons for non-use of DVT prophylaxis

Reason	Number of cases (%)
No answer	66 (52)
Haemorrhage	17 (13)
Coagulopathy / DIC	12 (10)
Palliation	10 (8)
Already on treatment	5 (4)
Moribund	5 (4)
Not appropriate	4 (3)
Not required	4 (3)
Not known	2 (2)
Patient refused	1 (1)
Total	126 (100)

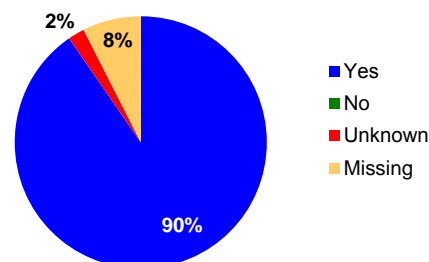
Note: DIC=disseminated intravascular coagulation.

The assessors considered that DVT prophylaxis treatment was appropriate in 90% of cases. There were no cases recorded where the assessor felt that DVT prophylaxis usage was inappropriate. The assessors noted that it was unknown if DVT prophylaxis treatment was appropriate in 2% of cases. The assessor did not indicate whether or not DVT prophylaxis treatment was appropriate in 33 cases.

4.15 Fluid balance

During the reporting period, there were 37/408 cases (9%) (data missing in 12 cases) where the treating surgeon felt there was an issue with fluid balance (Figure 4.15). This is a slight decrease from the previous reporting period (12%). Of operative cases, there was an issue with fluid balance in 28/273 cases (10%) (data missing in 11 cases).

Figure 4.15 Fluid balance management



Comment

Fluid balance in the surgical patient remains problematic, often managed by relatively junior staff and 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 including the SIGN guideline no. 771⁽³⁾ and more recently the British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients.⁽⁴⁾

4.16 Unplanned events

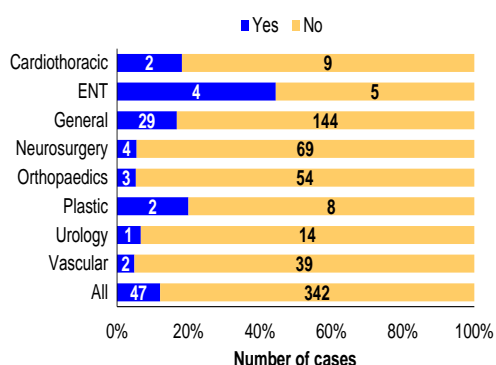
Reporting surgeons identified that there were 20% (79/390) of unplanned admissions to ICU, 1% (5/386) of unplanned readmission and 12% (47/390) unplanned return to theatre (Table 4.9). Data was missing for 61, 65 and 61 cases, respectively.

Table 4.9 Frequency of unplanned events

Unplanned action	Number	%
Admission to ICU	79	20
Return to theatre	47	12
Readmission	5	1

Of the 47 unplanned returns to theatre cases, ten cases (21%) were associated with elective admissions and the remaining 37 cases (79%) were emergency admissions. The breakdown of an unplanned return to theatre by surgical speciality is shown in Figure 4.16.

Figure 4.16 Unplanned return to theatre by surgical speciality



Note: The numbers of cases are shown in the chart. Missing data = 62 cases.

The most common reason for return to theatre included post-op bleeding (26%), ischaemic bowel (19%), wound infection (15%), investigative laparotomy (11%), wound dehiscence (6%), anastomotic leak (6%), vascular graft occlusion (4%) and other (13%).

4.17 Postoperative complications

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

- 58/234 (25%) of cases had a postoperative complication. (The question was not answered for 50 operative cases.)
- There were 112 postoperative complications noted for 58 patients.

The postoperative complications were:

- anastomotic leaks 12
 - small bowel 6
 - colorectal 3
 - oesophageal 2
 - pancreas / biliary 1
- vascular graft occlusion 4
- tissue ischaemia 11
- significant postoperative bleeding 12
- procedure related sepsis 14
- other: 59
 - Includes pneumonia (7), myocardial infarction (5), aspiration (3), multiple organ failure (2) and atrial fibrillation (2).

4.18 Surgical diagnoses

The main surgical diagnoses reported by surgeons are shown in Table 4.10. The top ten categories are listed for 196 cases and represents 45% of all confirmed surgical diagnoses reported from the 436 returned surgical case forms. The most frequent surgical diagnosis for the reporting period was fracture of neck of femur.

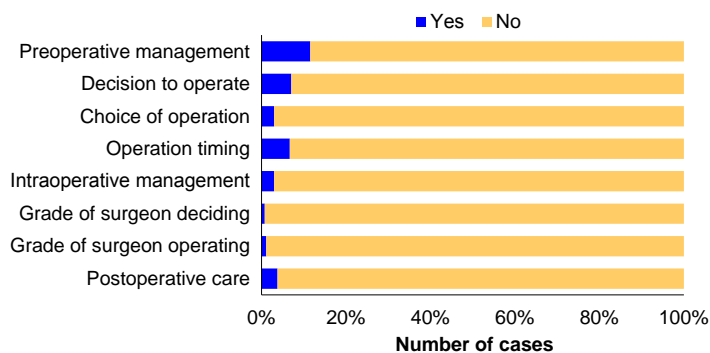
Table 4.10 Most frequently reported surgical diagnoses

Surgical Diagnosis	Frequency	% of cases
Fracture of neck of femur	42	10
Intestinal obstruction	37	8
Subarachnoid haemorrhage	22	5
Peripheral vascular disease	20	5
Intracerebral haemorrhage	18	4
Vascular insufficiency of the intestine	14	3
Subdural haematoma	14	3
Abdominal aortic aneurysm (AAA)	11	3
Septicaemia	10	2
Multiple trauma	8	2
Total	196	

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. The accumulated data from the reporting surgeon is shown in Figure 4.17 and the data from the assessors is shown in Figure 4.18.

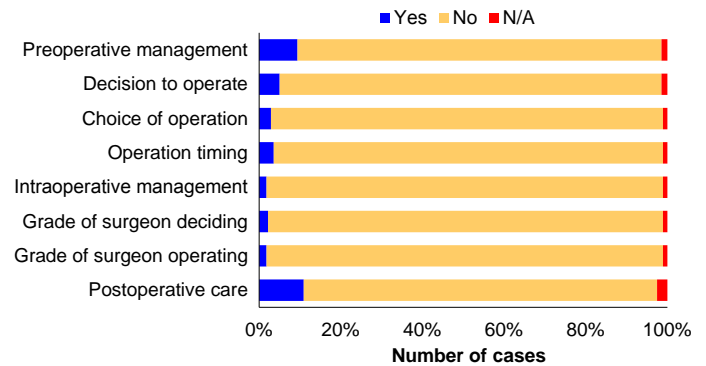
Figure 4.17 Management issues identified by the reporting surgeon



Comment

Management issues identified by surgeons were consistently less than 15% for each category. Preoperative management, the decision to operate and the timing of the operation were the areas where management issues were identified.

Figure 4.18 Management issues identified by the assessor



Comment

The assessors identified a larger number of cases with management issues only in the area of postoperative care compared with surgeon assessment (11% versus 4%). The number of cases with management issues was less than 11% for all criteria measured.

4.20 Postmortem

The rate of postmortem for this reporting period was 54/419 (13%) with 2/419 (<1%) performed by the hospital and 52/419 (12%) performed by the Coroner's office (Table 4.11). Of the 419 cases, 63% (265/419) of cases did not have a postmortem and 1% of cases (2/419) refused examination. Surgeons reported that it was unknown whether a postmortem occurred in 24% of cases (102/419). No information was provided for 1 case.

Table 4.11 Postmortem examinations

Postmortem performed	Number of cases
Yes - Hospital	2
Yes - Coroner	52
No	261
Refused	2
Unknown	102
Missing	32

4.21 In retrospect

Surgeons were asked: 'In retrospect, would you have done anything differently?' In the responses, 53/395 (13%) indicated they would have taken a different course of action. The question was not answered in 25 cases. Qualitative analysis revealed a number of themes:

- postoperative care
- transfer of patient issues
- decision to operate
- communication issues
- timing of operation
- type of operation
- preoperative care
- usage of ICU
- management of postoperative bleeding.

4.22 Clinical incidents

KEY POINTS

- **5% of cases were subjected to SLA.**
- **25% of cases were associated with a clinical incident, with 16% of all assessed cases having an area of concern or adverse event.**
- **The most frequent area of concern related to delayed initial diagnosis.**
- **Adverse events are most likely to occur in the postoperative period.**
- **The proportion of areas of concern or adverse events was higher in elective admissions (41%) compared to emergency admissions (15%).**
- **18% of areas of concern or adverse events caused the death of the patient with none of these incidents classified as definitely preventable, 23% of cases probably preventable and 77% not preventable.**

From the 410 cases that had completed FLA and/or SLA, 287 cases (70%) had no clinical incidents associated with them and death was as a result of the disease process.

There were 111 cases (27%) where a clinical incident was identified by the assessor. In all cases, 13% had an incident classified in the area of consideration which is consistent with previous reports, and 14% of cases had an event associated in the more serious categories of areas of concern or adverse events. There were 13 cases that had more than one clinical incident associated with the care of the patient and the total number of clinical incidents is shown in Table 4.12.

Table 4.12 Total number of clinical incidents

Incident area	Events
Area of consideration	51
Area of concern	44
Adverse event	29
No Issues	297

Note: Some cases had more than one incident.

Clinical incidents (areas of concern and adverse events) were higher in elective cases (41%) compared to emergency admissions (15%) (Table 4.13).

Table 4.13 Areas of concern and adverse events in elective and emergency admissions

Admission type	Clinical Incident				
	Yes (n)	No (n)	Total	Yes (%)	No (%)
Emergency	55	319	374	15	85
Elective	18	28	46	41	59
Total	73	347	420		

Of the clinical events that were categorised into areas of concern or adverse events (73 in total):

- 13/73 (18%) caused the death of the patient
 - 0/13 (0%) were definitely preventable
 - 3/13 (23%) were probably preventable
 - 6/13 (46%) were probably not preventable
 - 4/13 (31%) were definitely not preventable

- 56/73 (77%) may have contributed to the death of the patient
 - 9/56 (16%) were definitely preventable
 - 33/56 (59%) were probably preventable
 - 14/56 (25%) were probably not preventable

- 4/73 (5%) made no difference to the outcome of the patient

Seventeen events were assessed as being definitely preventable while 38 events were deemed either probably not preventable or definitely not preventable.

Tables 4.14, 4.15 and 4.16 relate clinical incidents to patient outcome, preventability and responsible clinical unit. The majority of incidents noted (77%) were not classified as adverse events.

However 29 adverse events were identified of which 16 (55%) may have contributed to the death of the patient and 13 (45%) caused the death of a patient who would have otherwise been expected to survive.

Table 4.14 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	24	24	1	2	51
Area of concern	4	40	0	0	44
Adverse event	0	16	13	0	29
Total	28	80	14	2	124

Table 4.15 Preventability associated with areas of consideration, concern or adverse events

Clinical incident	Preventability				Missing data	Total
	Definitely	Probably	Probably not	Definitely not		
Area of consideration	6	27	13	1	4	51
Area of Concern	10	27	7	0	0	44
Adverse Event	1	11	15	2	0	29
Total	17	65	35	3	4	124

Table 4.16 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	34	9	3	3	4	51
Area of concern	25	13	2	6	0	46
Adverse event	15	8	5	3	0	31
Total	74	30	10	12	4	130

*Note: some clinical incidents were associated with more than one team.

Fifty eight per cent of cases were attributed to the audited surgical team.

The majority of areas of consideration were in the preoperative and postoperative period, with the most frequently identified areas including:

- delay to surgery
- different operation desirable
- decision to operate
- inadequate preoperative assessment
- coagulation problems
- fluid balance issues
- postoperative critical care usage.

Table 4.17 and 4.18 provide details regarding the areas of concern and adverse events as determined by the assessors.

Table 4.17 Areas of concern in emergency and elective cases

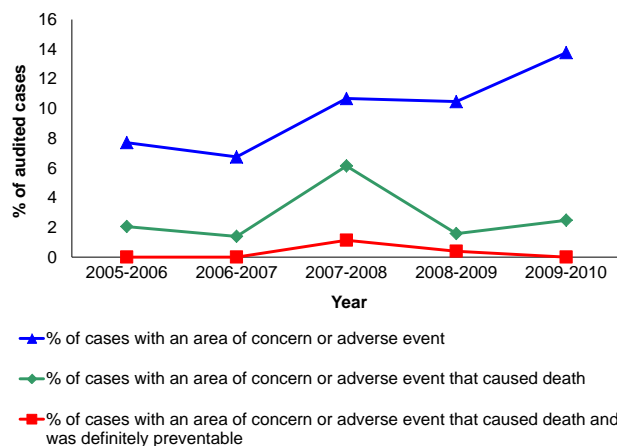
Operative status	Area of concern	Frequency
Preoperative	Preoperative assessment inadequate	4
	Delayed transfer	4
	Communication issues	3
	Delayed diagnosis	3
	Decision to operate	3
	Delay to theatre	2
	Delayed presentation	1
Intraoperative	Other procedure preferred	3
	Junior surgeon	3
	Anaesthetic complications	2
	Equipment availability	1
Postoperative	Critical care usage	5
	Fluid balance	3
	Nutritional care unsatisfactory	2
	Aspiration pneumonia	1
	Intravenous line sepsis	1
	Delay in recognising complications	1
	Drug overdose	1
	Tracheostomy problems	1
Total		44

Table 4.18 Adverse events in emergency and elective cases

Operative timing	Adverse event	Frequency
Preoperative	Delay in transfer to hospital	1
	Delay in transfer to ICU	1
	Delay in theatre	1
Intraoperative	Drug anaphylaxis	2
	Cardiac event under anaesthesia	1
	Bowel injury	1
Postoperative	Wound infection	3
	Wound breakdown	3
	Haemorrhage	2
	Anastomotic leak	2
	Pulmonary embolus	2
	Percutaneous endoscopic gastrostomy leakage	2
	Postoperative patient falls (fractured neck of femur)	2
	Accidental drain removal	1
	Delayed decision to reoperate	1
	Tracheostomy blockage	1
	Pressure ulcer	1
	Postoperative psychosis	1
	Pancreatitis (unrelated to other treatment)	1
	Total	

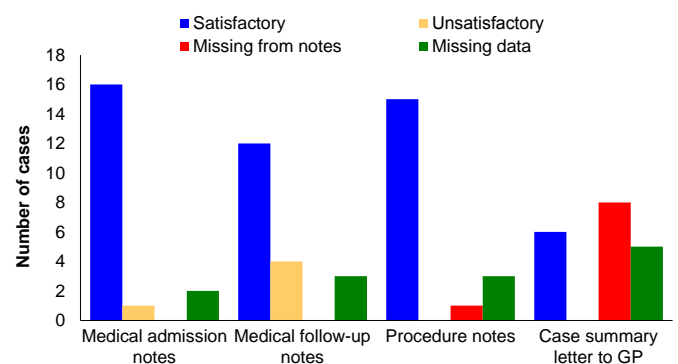
An analysis of serious clinical incidents (adverse events or areas of concern) were analysed for those events that caused the death of the patient and those that were definitely preventable since the commencement of data collection (Figure 4.19).

Figure 4.19 Cases associated with adverse events or areas of concern (2005-2010)



4.23 Second line assessors review of case note record keeping

Figure 4.20 Assessment of case note completeness



Comment

- Second line assessors are asked to comment on the adequacy of the hospital case notes.
- In 5 (26%) of 19 SLAs, at least one aspect was deemed unsatisfactory. These were in the areas of medical admission notes and medical follow-up notes.
- In 8 cases (42%) of 19 assessments, the letter to the general practitioner was missing.



4.24 Concordance between treating surgeon and second line assessor

KEY POINTS

- **Assessors reported more areas of concern or adverse events than the reporting surgeon.**

Incidents reported by the treating surgeon and second line assessor were analysed. During this reporting period, of the cases that went to SLA, the treating surgeon identified eight clinical incidents (areas of consideration, concern or adverse events). The assessors identified 22 clinical incidents from the same cases.

- The treating surgeon and assessor were in agreement with 5 clinical events.
- In 2 cases, neither the surgeon nor assessor found any clinical incident.
- The assessor found a clinical incident in 11 cases (19 events) in which the treating surgeon did not identify any events.
- The treating surgeon identified 4 events in 2 cases, which in the assessor's opinion there was no clinical incident.

5 PERFORMANCE REVIEW

This section reviews progress made on each of the recommendations of the 2009 SAAPM annual report.

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

The number of cases excluded because of the inability to identify the treating surgeon has decreased from the previous reporting period. This is a continual area for improvement.

5.2 Engage non-participating private and public hospitals.

During this reporting period several private and public hospitals were approached to encourage participation. Progress has been made in increasing the number of hospitals participating in the audit, with more hospitals to participate during the course of 2011.

5.3 Encourage surgeon participation in the audit.

Surgeon participation in SAAPM has now been mandated by the College Council and will form an essential component of the College's Continuing Professional Development program. This should increase surgeon participation as hospital participation increases in the future.

5.4 Provide feedback to surgeons.

The launch of the electronic Fellows Interface allows surgeons to access information on surgical case forms completed and FLAs and SLAs completed.

5.5 Formalise FLAs and SLAs for specialties with small numbers.

ANZASM has approached several specialties to formalise interstate SLAs. A number of the surgical specialities have supported this concept. SAAPM has approached other states for FLAs and SLAs of small specialties and this process is ongoing.

5.6 Continue to monitor DVT prophylaxis usage.

The use of DVT prophylaxis in patients was slightly higher than in previous years and no cases were identified where DVT prophylaxis was inappropriate. SAAPM will continue to monitor trends in the use of DVT prophylaxis and in particular the reasons why it was not used.

5.7 Continue to monitor critical care usage (CCU).

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

5.8 Improve audit activities such as collecting denominator data, participate in a national report, develop yearly trends, ongoing enhancements of the web-based electronic interface.

SAAPM has contributed to the inaugural National Surgical Mortality Report. SAAPM continues to develop data trend analysis and, in collaboration with SA Health, will gain access to databases providing denominator data. The electronic web-based interface was released in the third quarter of 2010.

A growing number of surgeons have elected to use this system which allows them to enter their own surgical case forms electronically.

ACKNOWLEDGMENTS

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 of Health for funding and ongoing support:
 - Public Health and Coordination, Clinical Systems Division
 - Health System Management, Information and Communication Technology Services

- the South Australian Royal Australasian College of Surgeons State Committee
- the South Australian Royal Australasian College of Surgeons, Division of Research, Audit & Academic Surgery (RAAS) staff, particularly:

Professor Guy Maddern
Chair ANZASM Steering Committee

Dr Wendy Babidge
Director, RAAS Division

Mr Gordon Guy
ANZASM Manager

The South Australian Audit of Perioperative Mortality Group members:

Mr Paul Dolan
SAAPM Clinical Director &
General Surgery Representative

Mr David Walsh
General Surgery Representative

Mr Adrian Anthony
General Surgery Representative

Mr Andrew Chew
General Surgery Representative

Mr Michael Eaton
General Surgery Representative

Dr Cindy Molloy
Neurosurgical Specialty Representative

Mr Rob Fitrige
Vascular Specialty Representative

Mr Michael Berce
Vascular Specialty Representative

Mr Gordon Morrison
Orthopaedic Specialty Representative

Mr Alan Stapleton
Urological Specialty Representative

Mr Guy Rees
ENT Specialty Representative

Mr Simon Carney
ENT Specialty Representative

Dr John Russell
Anaesthetist Representative

Dr Marie Gould
Anaesthetist Representative

Dr Ken Lang
SAAPM Project Manager

Ms Heather Martin
SAAPM Project Officer

The South Australian Audit of Perioperative Mortality Steering Committee members:

Mr Paul Dolan
Clinical Director, SAAPM Chair,
Surgical Representative

Mr David Walsh
Surgical Representative

Mr Glenn McCulloch
Surgical Representative

Dr John Russell
Anaesthetist Representative

Dr Marie Gould
Anaesthetist Representative

Dr Stephen Christley
South Australian Department of Health

Ms Michele McKinnon
South Australian Department of Health

Dr Ken Lang
SAAPM Project Manager.

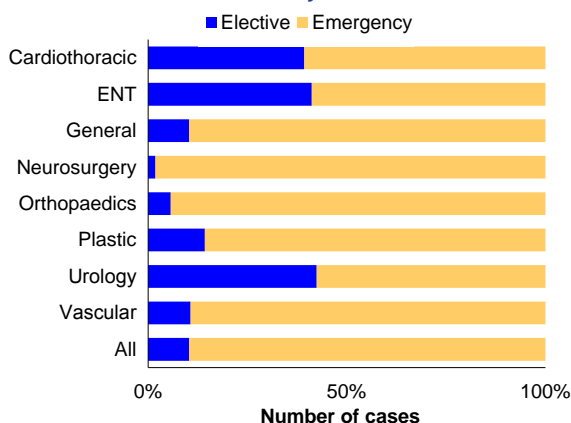
APPENDIX COMPARISON OF EMERGENCY AND ELECTIVE ADMISSIONS (2007-2010)

KEY POINTS

- Elective admissions make up 10% of all cases.
- Age of death is similar between elective and emergency admissions.
- ASA grades tend to be lower in elective patients and higher in emergency.
- The risk of death is considered to be lower in elective admissions.
- The consultant operates in a higher percentage of elective (72%) cases compared to emergency (49%) cases.
- An unplanned return to theatre is higher in elective admissions (26%) compared with emergency (10%) cases.
- Clinical incidents are higher in elective admissions compared with emergency.

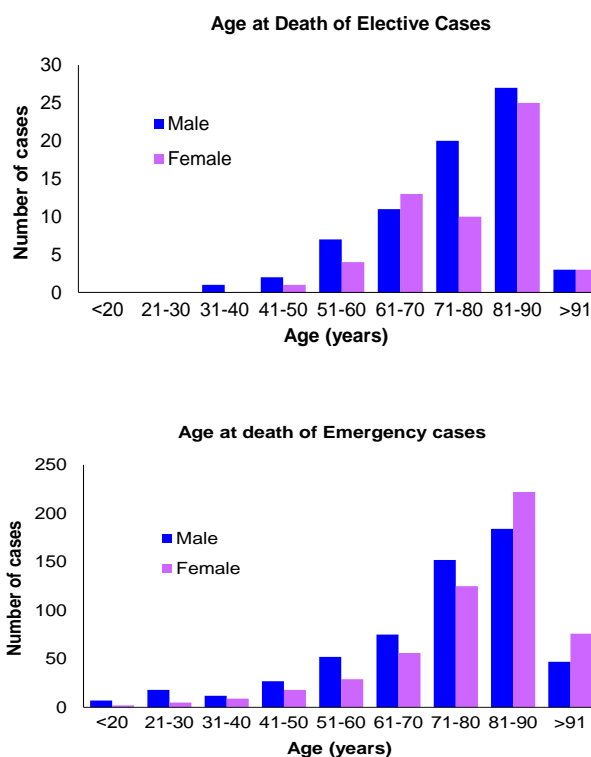
Elective admission of patients that resulted in death was assessed and compared to emergency admissions from a 3 year audit period (1 July 2007 to 1 July 2010). During this period, a total of 1250 cases were returned consisting of 129 (10%) elective admissions and 1121 (90%) emergency. The breakdown of admissions for each specialty during the census period is shown in Figure A1.

Figure A1 Breakdown of admission status by surgical specialty from 1 July 2007 to 1 July 2010.



The median age of death for elective and emergency admissions was 80 years. The median age for elective admissions in females was 81 years and slightly lower in males at 78 years. This data was similar for emergency patients where the median age in females was 82 years and 77 in males. The distribution of age at death for elective and emergency cases is shown in Figure A2.

Figure A2 Age at death of elective and emergency cases



Comment

- The age distribution of patients is similar for elective and emergency admissions.
- There are a larger number of cases in the lower age groups for emergency admissions.
- The largest number of deaths for females and males was in the 81-90 age range for both elective and emergency admissions.

A higher percentage of elective admissions underwent an operation (94%) compared to emergency admissions (61%), which is consistent with previous SAAPM annual reports.

The surgeon's perception of risk was measured by assessing the patient's ASA grade (Figure A3), types of comorbidities in the audit patients (Figure A4) and the number of comorbidities per patient (Figure A5).

Figure A3 ASA grade in elective and emergency admissions

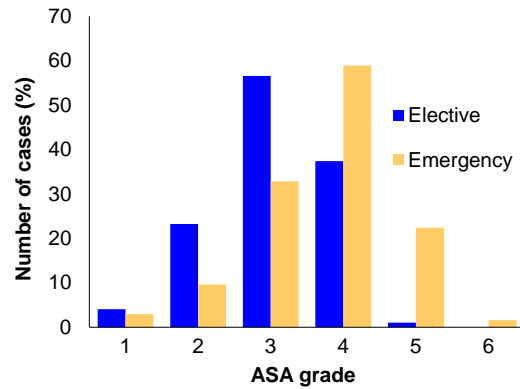
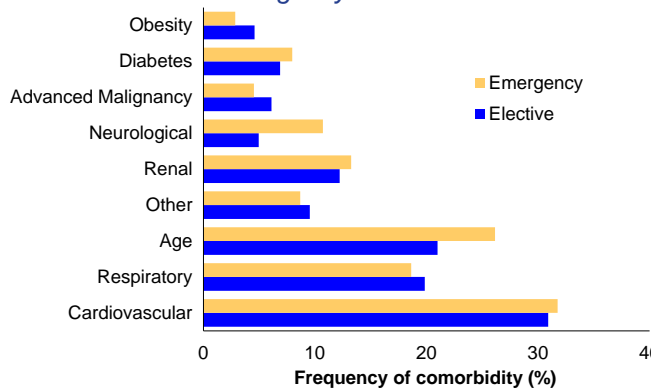
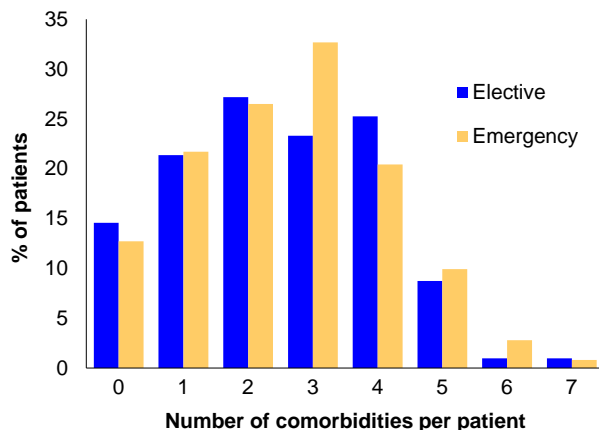


Figure A4 Types and frequencies of comorbidities in elective and emergency admissions



Note: "Other" comorbidities included sepsis, malnutrition, alcohol abuse, dementia, motor neurone disease, HIV and rheumatoid arthritis.

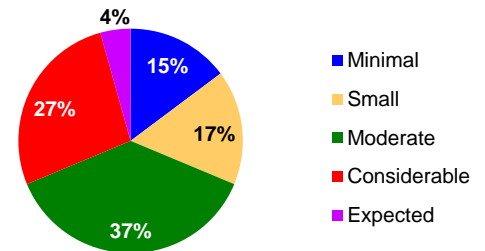
Figure A5 Number of comorbidities per patient in elective and emergency admissions



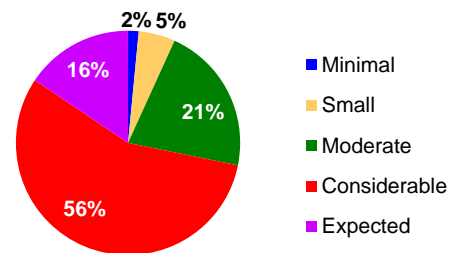
The risk of death before surgery was measured by the treating surgeon and is shown in Figure A6.

Figure A6 Risk of death in elective and emergency admissions

Risk of death in elective admissions



Risk of death in emergency admissions



Comment

- The number of patients with a low ASA grade (1, 2 or 3) was higher in elective admissions.
- There were a larger number of patients with an ASA grade of 4, 5 or 6 in emergency admissions with the most frequent number of patients with an ASA grade of 4.
- The most frequently reported comorbidity was cardiovascular disease, with no difference in comorbidity incidence between elective and emergency admissions.
- The most frequent number of comorbidities per patient was 2 in elective patients and 3 in emergency admissions.
- The risk of death before surgery showed a marked difference between elective and emergency patients; Sixty nine percent (69%) of elective admissions having a risk of death classified as moderate or lower, whereas 72% of emergency patients had a risk of death of considerable or expected.

The most frequent surgical diagnosis from elective and emergency admissions is shown in Table A1.

Table A1 Most frequent surgical diagnoses in elective and emergency admissions

Admission type	Surgical diagnosis	n	Percentage of cases
Elective	Advanced cancer	37	29%
	Colorectal cancer	16	12%
	Cardiac valve disease	9	7%
	Renal failure	6	5%
	Aortic aneurysm	6	5%
	Fistula	4	3%
	Osteoarthritis	4	3%
	Bowel obstruction	4	3%
	Vascular disease	3	2%
	Ischaemic gut	2	2%
	Total	91	
Emergency	Intracranial haemorrhage*	184	16%
	Fractured neck of femur	104	9%
	Bowel obstruction	95	8%
	Bowel haemorrhage / perforation	60	5%
	Peripheral vascular disease	56	5%
	Abdominal aortic aneurysm	56	5%
	Ischaemic gut	43	4%
	Septicaemia	33	3%
	Peritonitis	26	2%
	Pancreatitis	25	2%
Total	682		

*Note: Intracranial haemorrhage includes subarachnoid haemorrhage, intracerebral haemorrhage, subdural haematoma and head injury.

Critical care was used in 71% of elective cases (82/115) and not used either pre- or postoperatively in 29% of cases (data missing for 14 cases). These numbers were consistent with emergency admissions, with critical care used in 76% of cases (479/629) and not used in 24% (150/629) of cases (data missing for 492 cases).

The grade of surgeon deciding, operating, assisting and in theatre was analysed for elective and emergency admissions and is shown in Table A2.

Table A2 Consultant involvement in elective and emergency cases

Elective	Number of operations (%)			
	Deciding	Operating	Assisting	In theatre
Consultant	92	72	34	65
Advanced surgical trainee	8	26	49	27
Service registrar	0	0	5	2
Basic surgical trainee	0	0	4	4
GP Surgeon	0	0	4	2
Other	0	2	4	0
Total	100	100	100	100

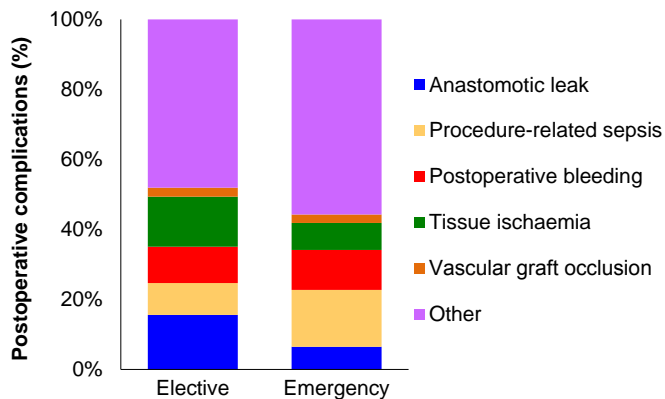
Emergency	Number of operations (%)			
	Deciding	Operating	Assisting	In theatre
Consultant	87	49	17	52
Advanced surgical trainee	9	34	46	29
Service registrar	1	6	18	10
Basic surgical trainee	0	1	11	4
GP Surgeon	0	0	1	0
Other	3	10	7	5
Total	100	100	100	100

Note: Other includes surgical fellow, senior registrar, surgical resident or RMO.

Comment

- The consultant decides on the operation in a large proportion of cases in both elective and emergency cases.
- The consultant operates in a higher percentage of elective cases (72%) compared to emergency (49%).

Figure A7 Types of postoperative complications in elective and emergency admissions

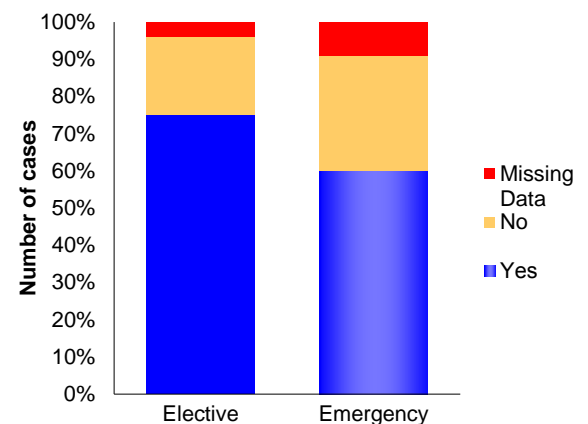


Note: Other includes aspiration pneumonia, myocardial infarction, respiratory failure, renal failure and wound breakdown or infection.

Comment

- Anastomotic leaks make up a higher proportion of postoperative complications in elective admissions.
- The incidence of postoperative complications was higher in elective admissions (58% - 68/118; data missing in 11 cases) compared to 33% (230/693; data missing in 428 cases) in emergency admissions (data not shown in Figure A7).

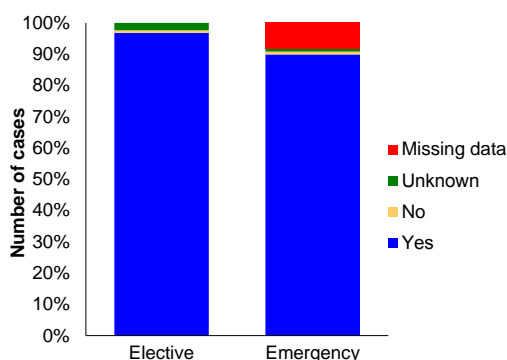
Figure A8 Use of DVT prophylaxis in elective and emergency admissions



The use of DVT prophylaxis was similar in elective and emergency cases. In elective admissions, there were 26 cases where DVT prophylaxis was not given. The reasons stated for this were: not appropriate (18/19; 95%) and an active decision to withhold treatment (1/19; 5%). Data was missing for 7 cases. In emergency admissions, there were 339 cases in which DVT prophylaxis was not given. In 243/316 cases (77%) treatment was considered not appropriate, in 67/316 cases (21%) there was an active decision to withhold treatment and in 6/316 cases (2%) DVT prophylaxis was not considered. Data was missing for 23 cases.

The appropriateness of DVT prophylaxis usage was measured by the assessors (Figure A9).

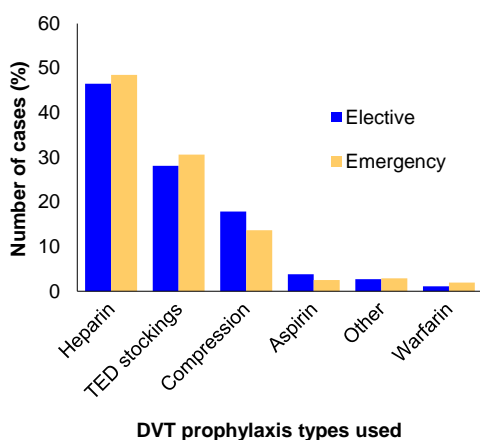
Figure A9 Assessor perception of appropriateness of DVT prophylaxis use in elective and emergency cases



Comment

Assessors perceived patient management of DVT treatment appropriateness was greater than 90% for elective and emergency admissions.

Figure A10 Types of DVT prophylaxis given in elective and emergency admissions



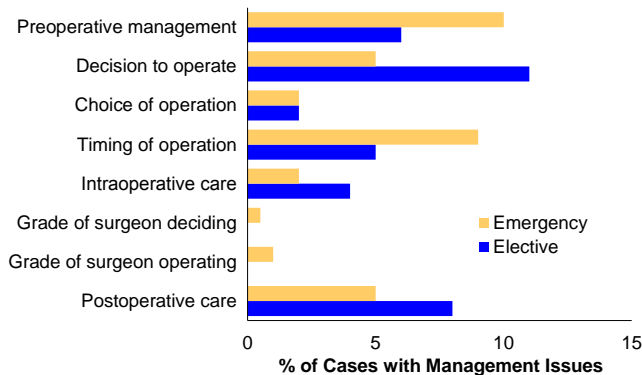
Note: Other agents recorded were Clopidogrel, Enoxaprin, Clexane, Fragmin, Plavix, Croxapain, and Lipirudin.

Comment

- The types of DVT prophylaxis given was similar between elective and emergency patients.
- Heparin and TED stockings are the most frequently used DVT prophylaxis agents used.

The appropriate management of patients was measured in elective and emergency admitted patients (Figure A11).

Figure A11 Areas where patient management could have been improved



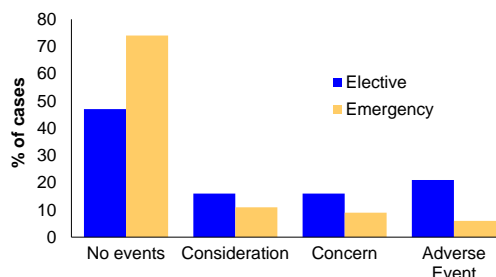
Comment

- The grade of surgeon deciding and operating was only an issue in emergency cases.
- Postoperative care and the decision to operate were the most common issue in patient management for elective patients.
- Preoperative management and the timing of operation were the largest patient management issues identified in emergency admissions.

An unplanned return to theatre was assessed with 26% of elective cases (32/123; data missing in 6 cases) having an unplanned return to theatre. Emergency admitted patients had a lower incidence of an unplanned return to theatre, of 10% (98/1023; data missing from 98 cases).

The number of clinical incidents associated with elective and emergency cases is shown in Figure A12.

Figure A12 Frequency of clinical incidents in elective and emergency admissions



Comment

- Less than half of elective cases were incident free.
- There was a higher frequency of clinical incidents in elective admissions compared with emergency admissions.

Further analyses of the clinical incidents (areas of concern and adverse events) in elective admissions are shown:

- Patient outcome
 - 3/48 (6%) made no difference to the outcome of the patient
 - 30/48 (63%) may have contributed to the death of the patient
 - 15/48 (31%) caused the death of a patient otherwise expected to survive.
- Preventability
 - 10/48 (21%) of events were definitely preventable
 - 19/48 (39%) of events were probably preventable
 - 18/48 (38%) of events were probably not preventable
 - 1/48 (2%) of events were definitely not preventable

- Responsible unit
 - 36/50 (72%) were associated with the audited surgical team
 - 8/50 (16%) were associated with another clinical team
 - 3/50 (6%) were associated with the hospital
 - 3/50 (6%) were associated with other (including GP, ICU and anaesthesiology).

Note: More than one unit may have been associated with a clinical incident.

Of the cases that caused the death of the patient (15/48; 31%), one of these was considered to be definitely preventable. When comparing all elective cases audited, this accounts for 1/129 (<1%).

A grouping of the clinical incidents in elective surgery are listed in Table A3.

Table A3 Clinical incidents in elective admissions

Clinical incident	Operative timing	Event	Frequency	
Adverse event	Preoperative		0	
	Intraoperative	Drug anaphylaxis (anaesthetic)	1	
		Bleeding (laparotomy to open)	1	
		Small bowel injury during laparoscopy	1	
	Postoperative	General anaesthetic technique	1	
		Haemorrhage	6	
		Anastomotic leak	3	
		Fistula	2	
		Wound infection/breakdown	2	
		Delay in recognising anastomotic leak	1	
		Drain removed accidentally	1	
		Vascular anastomosis thrombosed	1	
		Pulmonary embolus	1	
		Fluid balance	1	
	Other	4		
		Total	26	
	Concern	Preoperative	Decision to operate	3
Preoperative assessment			2	
Delay in transfer to hospital			1	
Delay to theatre			1	
Unnecessary operation			1	
Intraoperative		Different procedure preferable	2	
		Junior surgeon	1	
		Delay in obtaining blood products	1	
Postoperative		Inadequate postoperative assessment	2	
		Fluid balance	2	
		Aspiration	2	
		Nutrition	1	
		Delay in transfer to HDU	1	
		Respiratory depression	1	
		No postmortem performed	1	
			Total	22

REFERENCES

1. Scottish Audit of Surgical Mortality, Scottish Audit of Surgical Mortality: Summary report 2008 data, Edinburgh: National Services Scotland. Available from <<http://www.sasm.org.uk/>>.
2. South Australian Audit of Perioperative Mortality, SAAPM Annual Report 2009, Royal Australasian College of Surgeons, North Adelaide, 2009, 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, Royal College of Physicians, Edinburgh, 2004, Available from <<http://www.sign.ac.uk/pdf/sign77.pdf>>.
4. 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), National Library of Health, London, 2009, Available from <<http://www.ics.ac.uk>>.





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

