



**Royal Australasian College of Surgeons
South Australian Audit of Perioperative Mortality**

**SAAPM
ANNUAL REPORT
2006**



Government of South Australia

Department of Health

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■ Chairman's Report

The South Australian Audit of Perioperative Mortality (SAAPM) is a new initiative designed to document and improve the quality of healthcare provided to surgical patients in South Australia. It is modelled on the highly successful Western Australian Audit of Surgical Mortality (WAASM), which itself was adapted from the Scottish Audit of Surgical Mortality (SASM), successfully running in Scotland since 1994. Both audits have clearly shown a reduction in the proportion of adverse events in Scotland and Western Australia.

South Australia has a long history of perioperative mortality audit, which commenced in the late 1970s with the South Australian Perioperative Mortality Committee (SAPOMC). This audit was instituted by the anaesthetic community and concentrated particularly on the events surrounding deaths of patients who had undergone anaesthesia within the previous 24 hours. The work of the SAPOMC continues, and over many years this has proven to be a very effective process, with death due to anaesthetic technical issues now an extremely rare event. Until now, however, there has not been a coordinated state wide approach to surgically related mortality. While all hospitals have their own mortality audits, these are generally restricted to reviews carried out within the hospital and results are not widely published.

SAAPM seeks to obtain data concerning all patients who are admitted under the care of a surgeon, whether an operation has been performed or not. The audit process gives the treating surgeon the opportunity to express his or her opinion on various aspects of the case, both prior to and during the admission. The data is then reviewed by the surgeon's peers, that is, one or more surgeons from another institution who have the opportunity to comment on any aspects of the case that they feel are noteworthy. The treating surgeon's own comments, combined with a review of the case notes when necessary, allows an independent assessor to form a much more detailed picture of the events surrounding each patient's treatment. The process is also carried out in a timely fashion, which allows for more accurate recall of events and recording of data. We believe that the particular strength of this audit lies in its involvement of the treating surgeon, the contemporaneous assessments by external peer reviewers, and the pooling of results on a state wide basis to identify trends in care.

This audit will also gather information on the demographics of patients who present for surgical care in this state. With an increasingly aged population, many patients with surgical illnesses also have medical co-morbidities, and require complex treatment decisions by multidisciplinary teams. In this setting the risk of an adverse clinical event increases. Through this mortality audit, it will be possible to identify the sorts of situations where problems may occur, and so reduce future patient risk.

It should be acknowledged that South Australia already has a safe, high quality healthcare system. Although this audit concentrates on patients who have died, it should be noted that most of the deaths surveyed were a result of the disease process, and could not be prevented. However, the implementation of this audit will give reassurance to patients and their families, health administrators and the medical profession itself, that there is a robust, ongoing mechanism of quality control being applied to the standard of surgical care within South Australia.

I commend the report to all with an interest in the safety and quality of healthcare. As the initial SAAPM report, we believe this to be a landmark document in the history of surgical audit in South Australia and we look forward to further expansion of the audit's activity over the next twelve months.

Paul Dolan
SAAPM Chairman

■ Invited Commentary

The South Australian Perioperative Mortality Committee (SAPOMC) is made up of a number of representatives from a variety of clinical areas, namely anaesthetics, surgery, pathology, intensive care and perioperative nursing.

This committee was pioneered by South Australian anaesthetists over 30 years ago and primarily reviews deaths which occur within 24 hours of any procedure involving anaesthesia. SAPOMC relies upon voluntarily reporting by anaesthetists in both the public and private sector.

The standing of SAPOMC was in some doubt when SAAPM commenced and there were discussions at a national level between the Royal Australasian Colleges of Surgeons (RACS) and the Australian & New Zealand College of Anaesthetists (ANZCA) to clarify the committee's status. SAPOMC has always been under the aegis of the South Australian Department of Health (SADH) and ANZCA has confirmed their approval of this position. As has been indicated, SAPOMC has a wide base of expertise and I feel that this strengthens any findings that may be made by the committee.

An increasing commitment to safety and quality in health care by the SADH has now provided regular funding to allow SAPOMC to continue its role. SAPOMC would like to formally acknowledge the commitment and dedication of the recently retired former Chairman Dr Peter Gartrell.

SAPOMC notes that there has been a steady fall in the number of cases reported, and the committee continues to encourage anaesthetists to voluntarily report their cases. There has been close collaboration between the surgical and anesthetic audits with representatives from each audit present on both SAPOMC and SAAPM committees. Both these audits continue to evolve and some trends have emerged. Death under anaesthesia is now extremely rare and it appears most perioperative deaths occur the first few days following surgery. The investigation of such cases is a high future priority.

SAAPM is a welcomed patient safety initiative and I congratulate the surgical committee and the SADH for establishing such an audit.

Prof D G Moyes
SAPOMC Chairman

■ Abbreviations

SA	South Australia
SAAPM	The South Australian Audit of Perioperative Mortality
RACS	The Royal Australasian College of Surgeons
FRACS	Fellows of the Royal Australasian College of Surgeons
SADH	The South Australian Department of Health
ANZCA	The Australian & New Zealand College of Anaesthetists
SAPOMC	The South Australian Perioperative Mortality Committee
SASM	The Scottish Audit of Surgical Mortality
ANZASM	The Australian and New Zealand Audits of Surgical Mortality
RACP	The Royal Australasian College of Physicians
RACDS	The Royal Australasian College of Dental Surgeons
RANZCO	The Royal Australian and New Zealand College of Ophthalmologists
RANZCOG	The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
ICU	Intensive Care Unit
HDU	High Dependency Unit
HITS	Heparin Induced Thrombocytopenia Syndrome
DVT	Deep Vein Thrombosis
PE	Pulmonary embolus
PM	Post mortem
LMWH	Low Molecular Weight Heparin

■ Executive Summary

The South Australian Audit of Perioperative Mortality (SAAPM) has been established to independently identify and review all surgically related deaths that occur in South Australian hospitals. The principal aim of SAAPM is to improve the quality of healthcare in South Australia by providing education to surgeons through feedback. The results generated by SAAPM have the potential to not only benefit surgeons but also patients, hospitals, the health service and the public in general.

SAAPM is an initiative of the Royal Australasian College of Surgeons (RACS) and the South Australian Department of Health (SADH) in collaboration with the Australian & New Zealand College of Anaesthetists (ANZCA). SAAPM is funded by the SADH. This is the first annual report compiled by SAAPM and the purpose of this report is to provide a summary of audit activities between 1 July 2005 and 30 June 2006.

During the reporting period SADH figures indicate that there were just over 25,000 surgical patients discharged from participating hospitals. This report analyses all 440 deaths reported from these hospitals during the audit period.

Surgeon Participation

- During the reporting period there were 440 patients under the care of 118 surgeons. Of these surgeons, 114 agreed to participate in the audit (97%).

Hospital Participation

- SAAPM successfully recruited seven hospitals to participate in the audit. Four of these are major metropolitan public hospitals, two are regional public hospitals and one is a metropolitan private hospital.

Proforma Completion

- A total of 440 surgical proformas were sent to treating surgeons for completion, of which 328 (75%) were completed and returned to the SAAPM office for the reporting period 1 July 2005 – 30 June 2006.

Patient Demographics

- Male and female patients aged between 71 and 90 years accounted for 60% of all reported deaths.
- A total of 84% of patients presented with one or more comorbidity, most commonly due to cardiovascular, age and respiratory factors.
- Fractured neck of femur was the most frequently occurring surgical diagnosis; it represented 11% of the diagnoses nominated by surgeons.

Operative and non-operative data

- The proportion of operative cases was 63% and the proportion of non-operative cases was 37%. For emergency admissions 181 (64 %) cases were operative and 102 (36%) cases were non-operative. For elective admissions 26 (96%) cases were operative and one (4%) case was non-operative.

Grade of surgeon operating

- In some cases patients required more than one operation. The proportion of consultant surgeons as the primary operator for subsequent operations progressively increased while the proportion of surgical trainees as the primary operator decreased.

ICU and HDU

- A proportion of patients required high level treatment sometime during admission. There were 145 (53%) of cases treated in the Intensive Care Unit (ICU) and 38 (13%) of cases treated in the High Dependency Unit (HDU).

Clinical Events

- There were 238 (80%) cases in which patient death occurred due to the disease process despite appropriate care.
- There were 58 (20%) cases in which clinical events were associated with patient management issues; 7 (2%) of these cases were associated with an adverse event.
- A total of 57 emergency admissions and 1 elective admission had clinical events that were associated with patient management issues.

DVT

- The number of patients who received Deep Vein Thrombosis (DVT) prophylaxis was 174 (59%). The use/non-use of DVT prophylaxis was deemed appropriate by assessors in 274 (93%) cases.

Post mortem examinations

- Post mortem (PM) examinations were only carried out in 49 (16%) cases. The majority of these cases were Coronal.

■ Conclusions and Recommendations

Clinical Management

During the reporting period, 1 July 2005 – 30 June 2006 SAAPM identified recurring clinical events associated with patient management issues in the following areas:

- Cases in which communication issues between treating teams resulted in a delay in either patient transfer or diagnosis.
- Cases where a fall in hospital contributed to patient death.

It is recommended that strategies be developed with the objective of improving these areas of clinical management. In response to clinical events that have been identified in a broad range of other areas, it is also recommended that strategies are developed and pursued in relation to postoperative care.

DVT Prophylaxis

During the reporting period SAAPM highlighted that there was high level of awareness of the need for DVT prophylaxis. During the reporting period surgeons indicated that there were 7 cases in total where pulmonary embolism (PE) was proven or considered as the final cause of death.

Identifying Cause of Death

During the reporting period SAAPM noted that post mortems would have contributed to more accurately identifying the cause of patient death. It is recognised that an increase in the number of post mortem examinations performed would ensure that feedback provided to surgeons and other clinical care groups was effective, timely and accurate.

It is recommended that the SADH consider strategies to:

- Increase post mortem rates to ensure that cause of death is accurately identified.
- Identify and remove barriers to ensure that surgeons receive either verbal or written post mortem reports in a timely manner.
- Improve the retrieval system for medical case notes from health services when case/s have been sent to the State Coroner's Office.

Audit Methodology

It is recommended that strategies be devised to improve the following areas of the audit process:

- To increase surgeon and hospital participation in both the public and private sectors and encourage more audit participants to be first and second line assessors.
- Ensure the timely and accurate completion of surgical case proformas and preparation of first and second line assessments through the development and implementation of a quality control process to ensure that the categorisation of clinical events is based on standardised definitions.
- To expand the audit to include deaths that occur within 30 days of a surgical procedure after the discharge of a patient.

Data Analysis

During the initial reporting period 1 July 2005 – 30 June 2006, SAAPM identified and reviewed all deaths that occurred while a patient was under the care of a surgeon in participating hospital. Conclusions relating this data to total hospital admissions state wide cannot yet be drawn due to limitations in obtaining such denominator data. It is therefore recommended that denominator data acquisition techniques be improved to ascertain the total number of all patient admissions under the care of a surgeon. It is recommended this be achieved through the SADH.

1 Introduction

In recent years improving the quality and safety of surgical care in Australia has become a high priority. Surgeons have increasingly incorporated audit activities in their practice to improve their surgical performance. In addition, there is greater public pressure for the medical community to optimise its performance. Consequently efforts to enhance the quality and safety of surgical services and practice have become an important strategy.

The South Australian Audit of Perioperative Mortality (SAAPM) was established by the Royal Australasian College of Surgeons (RACS) and the Public Health and Clinical Coordination, Clinical Systems Division of the South Australian Department of Health (SADH) in collaboration with the Australian & New Zealand College of Anaesthetists (ANZCA) to enhance and complement current safety and quality initiatives in South Australian hospitals. The principal aim of SAAPM is to improve the quality of surgical care through data analysis, education and feedback. The systematic peer review of these surgically related deaths and the identification of clinical events is used to highlight any potential areas that could lead to improvements in surgical practice.^{1,2}

1.1 Project Description and Background

SAAPM is a state wide audit that is responsible for identifying and independently reviewing all deaths that have occurred in South Australian hospitals while a patient was under the care of a surgeon, whether an operation has occurred or not. The auditing methods used by SAAPM are based on the model developed by the Scottish Audit of Surgical Mortality (SASM) which has been running successfully since 1994.³

The main objective of SAAPM is to identify areas of surgical and clinical practice that may require improvement. This is achieved through the collection and analysis of self-reported and peer-reviewed data. Positive improvement can then be achieved and sustained by providing feedback not only to surgeons but also to hospital and health service personnel, as well as the public in general. In this way SAAPM encourages the implementation of improvements, the benefits of which have the potential to be felt system-wide. As SAAPM was established as a body which is independent of individual hospitals, it is in the unique position of not only being able to identify system-wide problems, but also those areas that require improvement at specific institutions.

1.2 Project Governance Structure

The primary groups/individuals responsible for the audit on a state level are the SAAPM Project Staff, the SAAPM First Line Assessment Group, the SAAPM Steering Committee and the SA RACS Regional Manager. The governance structure for SAAPM is outlined in Figure 1.1. SAAPM is funded by the SADH and consequently the SAAPM Steering Committee is responsible for reporting to the SADH on the progress of the audit.

In the future RACS is aiming to achieve a bi-national approach to surgical mortality audits; this has resulted in the establishment of the Australian and New Zealand Audits of Surgical Mortality (ANZASM) Steering Committee. The ANZASM Steering Committee is responsible for overseeing the management of all regionally based surgical mortality audits and reports to the RACS Council. SAAPM is represented on the ANZASM Steering Committee by the Chair of SAAPM. This ensures that the ANZASM Steering Committee is abreast of all matters concerning SAAPM.

At present the audit has been successfully implemented in Western Australia^{4,5,6} and Tasmania⁷ and negotiations are continuing in other Australian regions and New Zealand to expand the audit so that a bi-national dataset that can be collected and compared across regions.

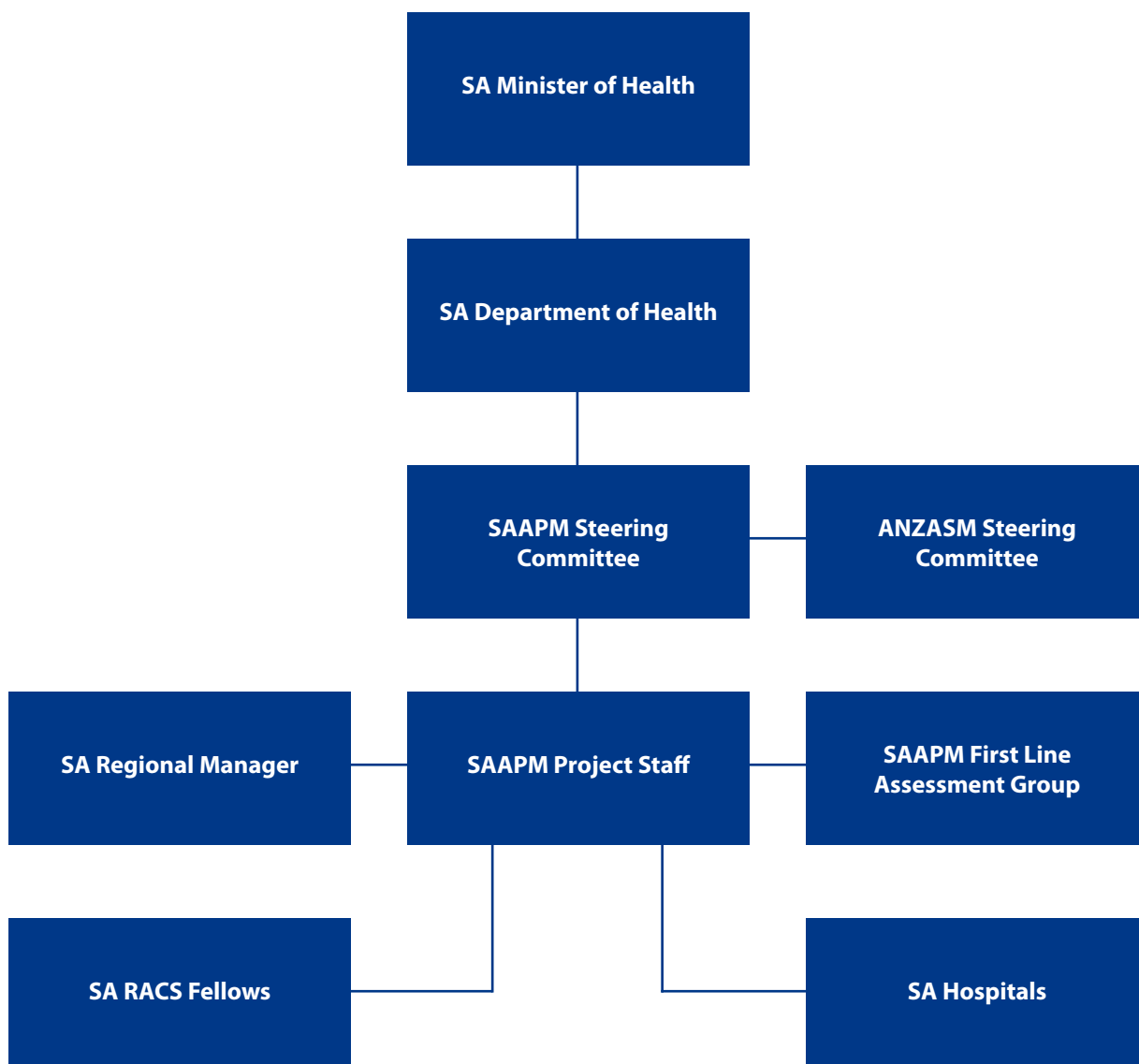


Figure 1.1 SAAPM governance structure

1.2.1 SAAPM Project Staff

The SAAPM office is located within the South Australian RACS regional office. Currently the staff at SAAPM consists of a surgical representative acting in the capacity of Chair and a Project Manager. The SA RACS Regional Manager provides administrative support to the SAAPM Project Staff.

The SAAPM Project Staff are responsible for:

- The day to day running of the audit.
- Encouraging surgeon participation in and support of the audit on a regional basis.
- Ensuring that all audit participants, SA RACS Fellows and hospitals are informed and understand the processes and requirements of the Audit as well as their responsibilities as stipulated under the South Australian Health Commission Act, 1976.
- Ensuring the timely reporting of audit activities to the SAAPM First Line Assessment Group and the SAAPM Steering Committee.

1.2.2 SAAPM First Line Assessment Group

The SAAPM First Line Assessment Group is made up of representatives from various surgical specialties as well as the SAAPM Project Staff. The Group's primary responsibilities are:

- To perform first line assessments of each perioperative death for which the SAAPM Project Staff receives notification.
- To review each death and determine if any clinical events have occurred.
- To recommend second line assessment of cases where appropriate.
- To improve the safety and quality of healthcare through feedback.

1.2.3 SAAPM Steering Committee

The SAAPM Steering Committee is made up of South Australian surgeons and anaesthetists as well as representatives from the SADH. The SAAPM Project Staff are also members of the SAAPM Steering Committee. The Committee is responsible for:

- Providing direction and support to the Project Staff and the First Line Assessment Group.
- Overseeing and maintaining all formal management processes relating to the audit at a state level.
- Ensuring the efficiency of the audit process by implementing improvements and monitoring audit progress and outcomes.
- Ensuring collaboration with the ANZASM Steering Committee and the National RACS Audit Projects Manager.

1.2.3.1 Anaesthetic Issues

SAAPM is working with the South Australian Perioperative Mortality Committee (SAPOMC) which is primarily concerned with anaesthetic mortality issues. SAPOMC reviews deaths that occur within 24 - 48 hours of the completion of a procedure. SAPOMC has been running for over 30 years and South Australian anaesthetists have been voluntarily reporting deaths associated with operations or procedures involving anaesthesia or sedation.⁸

SAAPM is currently working with SAPOMC so that the activities of both committees will complement one another. This currently involves a collaborative arrangement to exchange information and data generated by both audits in order to provide future complementary reporting that will help provide a more complete and accurate picture of the quality and safety of surgical care in South Australia.

2 Audit Processes & Methodology

SAAPM is a multi-step audit, where confidentiality is strictly protected and peer review of cases provides surgeons with a greater impetus to self report. Surgeons are able to provide case details and highlight events that may have contributed to a patient's death. The audit process begins when the SAAPM office is notified of a surgically related death by both the SADH and relevant hospital authorities. Each death is scrutinised to ensure it qualifies for inclusion in the audit.

2.1 Audit Inclusion Criteria

Deaths currently included in SAAPM are classified into two categories. These are as follows:

Category 1: Operative deaths

A death that occurs when a patient is admitted under a surgeon and has an operation/procedure during their last admission regardless of their length of stay in hospital or medical facility.

Category 2: Non-operative deaths

A death that occurs when a patient is admitted under a surgeon, does not have an operation/procedure and dies during their last admission regardless of their length of stay in hospital or medical facility.

2.2 Audit Exclusion Criteria

Deaths excluded from SAAPM are detailed below:

- Patients who died while under the care of a specialist from:
 - The Royal Australasian College of Dental Surgeons (RACDS)
 - The Royal Australian and New Zealand College of Ophthalmologists (RANZCO)
 - The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)
 - The Royal Australasian College of Physicians (RACP)
- Post-discharge deaths. A death that occurs when a patient is admitted under a surgeon, an operation/procedure is performed and the patient is discharged alive but dies within 30 days of being discharged. At present this data is not included in the audit. The SAAPM Project Staff are working closely with the SADH to improve and validate the data acquisition techniques used to identify admitting surgeons. Reporting on deaths after patient discharge is an important future priority of SAAPM.
- Terminal care cases. These cases are recorded but do not undergo the complete audit process. The number of terminally ill patients admitted for palliative care under the care of a surgeon is small.

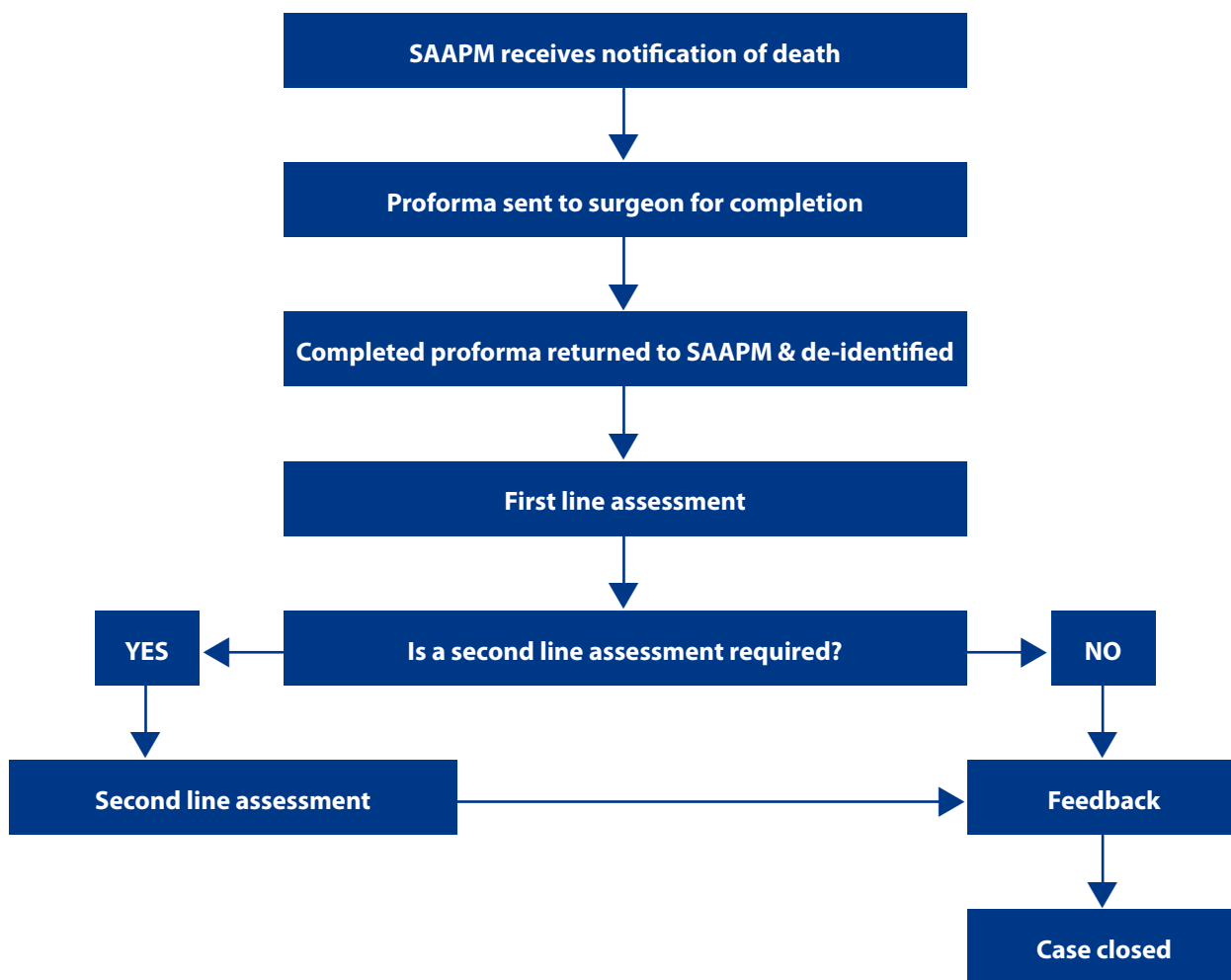


Figure 2.1 SAAPM audit process

2.3 Assessment

Once a surgical death has been deemed eligible for the audit, a data collection form, referred to as a surgical proforma, is sent to the consultant surgeon under whom the patient was admitted. Completed proformas are returned to the SAAPM office for assessment as highlighted in Figure 2.1.

2.3.1 First Line Assessment

When the surgical proforma is received by the SAAPM office, all identifiers are removed and the proforma is then sent to the SAAPM First Line Assessment Group. Proformas are assigned to First Line Assessor Group members according to the specialty of the surgeon who completed the proforma. The first line assessor completes a first line surgical assessor's form, providing comments on case management and the level of patient care. This includes providing comments on areas of concern or consideration and any adverse events that may have occurred. A feedback report is sent to the patient's surgeon at the end of the assessment. If the first line assessor considers that there is insufficient information on the proforma to come to any conclusion about the case, or if there appear to be factors that warrant further investigation, a second line assessment is requested.

2.3.2 Second Line Assessment

If a second line assessment is recommended following a first line assessment, a more detailed review of a patient's case notes is undertaken. The SAAPM office will request case notes from the relevant hospital or medical facility and these are forwarded with the proforma to a second line assessor. A second line assessor will assess cases within their surgical specialty that have occurred in a hospital or medical facility in which they do not practice. The second line assessor is asked to provide a one page summary of the case and to complete a second line assessor's form, providing their comments on the case management and the level of care provided to the patient.

2.4 Categorising Clinical Events

First and second line assessors are responsible for categorising patient death into one of two categories:

- **Cases related to disease process:** In these cases patient death occurred due to the disease process despite appropriate care, and assessors found no issues with patient management.
- **Cases with clinical events:** In these cases clinical events were identified that may have impacted on patient management. These events are divided into one of three categories:
 - **Area of consideration:** This is an area of care that an assessor believes could have been improved or different but recognises that it may be an area for debate.
 - **Area of concern:** This is an area of care that the assessor believes should have been better.
 - **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 at the time of discharge, or which contributes to or causes death.

Assessors also categorise these areas further based upon the impact and preventability of the clinical event as well as assessing which associated clinical team may have been responsible. Overall the assessors must determine if the impact of the clinical event either:

- Made no difference to the patient's outcome
- May have contributed to the patient's death
- May have caused the death of a patient who would otherwise have been expected to survive

Assessors must also give their opinion as to whether the clinical event was either:

- Definitely preventable
- Probably preventable
- Probably not preventable
- Definitely not preventable

Assessors must also indicate who was primarily associated with the clinical event:

- The audited surgical team
- Another clinical team
- The hospital
- Other

It is important to note that the analyses contained in this report are based on the opinions subscribed to cases by either first or second line assessors. In cases where assessors have identified more than one area of consideration, area of concern and/or adverse event, the analysis contained in this report has only been performed on the most significant clinical event identified.

2.5 Feedback of Audit Findings

A primary objective of SAAPM is education through detailed feedback. Feedback is provided not only to surgeons but also to hospital and health service personnel as well as the public in general. Feedback is provided in a number of ways:

- First line and second line case assessments
- Regular newsletters
- Regular de-identified case note reviews
- An annual report

2.6 Confidentiality

The SAAPM process is strictly confidential. The confidentiality of the audit is provided under section 64D of the South Australian Health Commission Act 1976. This authorisation covers the SAAPM Project Staff, the First Line Assessment Group and the Steering Committee, as well as surgeons acting in the capacity of second line assessors.

3 Audit Participation

Participation in SAAPM is voluntary and participants are required to be a specialist under the Medical Board of South Australia. Currently only Fellows of the Royal Australasian College of Surgeons (FRACS) are included in audit. The success of the SAAPM is highly dependent on surgeon participation and throughout the initial reporting period of the audit surgeons have been receptive and enthusiastic about being involved in this initiative.

South Australian hospitals have also embraced the audit. The progressive introduction of the audit across the state has focused mainly on engaging hospitals within the metropolitan area in the first phase of implementation. The response of hospital departments has been extremely positive. Every effort has been made to ensure the SAAPM office receives timely and accurate notifications of death as well as facilitating the retrieval of case notes when necessary. In the future, increasing the participation of metropolitan hospitals as well as regional hospitals in the audit will become a high priority.

3.1 Surgeon Participation

To be defined as an audit participant a surgeon must meet at least one of the following criteria:

- Have consented to participate and indicated his or her level of participation in the audit process.
- Have completed and returned at least one surgical proforma.

Of the 196 surgeons who were contacted there were 78 surgeons who had not yet been required to complete a proforma as they had not been associated with any deaths reported by participating hospitals since the audit's inception. It is anticipated that these surgeons will become active participants as the audit progresses and more hospitals are recruited.

A total of 118 surgeons were associated with the 440 deaths reported between 1 July 2005 and 30 June 2006. Of these 118 surgeons, 114 agreed to participate (97%).

3.2 Hospital Participation

During this initial reporting period SAAPM has successfully recruited seven hospitals to participate in the audit. Four of these are major public hospitals, two are regional public hospitals and one is a private metropolitan hospital.

The process of progressively introducing the audit to hospitals across the state is logistically challenging and time consuming. Consequently data collection initiation dates are not the same for each hospital. Data collection initiation dates depend on when a hospital is approached and how quickly a hospital can provide SAAPM with information and personnel contacts needed to ensure the timely delivery of notifications of deaths and case notes. Table 3.1 highlights the dates on which data collection was initiated in each hospital approached by SAAPM during the reporting period. It is important to note that for four hospitals the analysis presented in this report does not represent a full 12 months of perioperative data.

Hospital	Hospital Status				Data Collection Initiated
	Public	Private	Metro	Regional	
1	X		X		4 July 2005
2	X		X		11 July 2005
3	X		X		15 July 2005
4	X		X		1 September 2005
5		X	X		8 February 2006
6	X			X	10 April 2006
7	X			X	19 April 2006

Table 3.1 Data collection initiating dates and hospital status for all seven hospitals approached by SAAPM between 1 July 2005 – 30 June 2006.

4 Case Status

The audit process begins when the SAAPM office is notified of a surgically related death. For every death reported a proforma is sent to the treating consultant surgeon. Once a proforma is completed and returned to the SAAPM office it undergoes first line assessment. If there are factors that warrant further investigation, a second line assessment is then carried out.

4.1 Proforma Completion

Proforma status is classified into three categories:

- Completed
- Pending completion
- Not completed

Completed proformas include those that have been completed by surgeons agreeing to participate as well as proformas that have been completed by surgeons who have subsequently declined to participate in the audit. Pending proformas are in the process of being completed and are yet to be returned to the SAAPM office.

Proforma Completion: 1 July 2005 – 30 June 2006

440 reported surgical deaths and proformas sent out

328 proformas completed

99 proformas pending completion

The 118 surgeons who agreed to participate in the audit provided information on 427 deaths. Of the participating surgeons, 70 have completed and returned between 1 and 3 proformas. The number of proformas completed and returned by these surgeons is illustrated in Figure 4.1. The median time for a completed proforma to be returned is 25 days.

The proforma completion rate for the reporting period 1 July 2005 – 30 June 2006 is 75%.

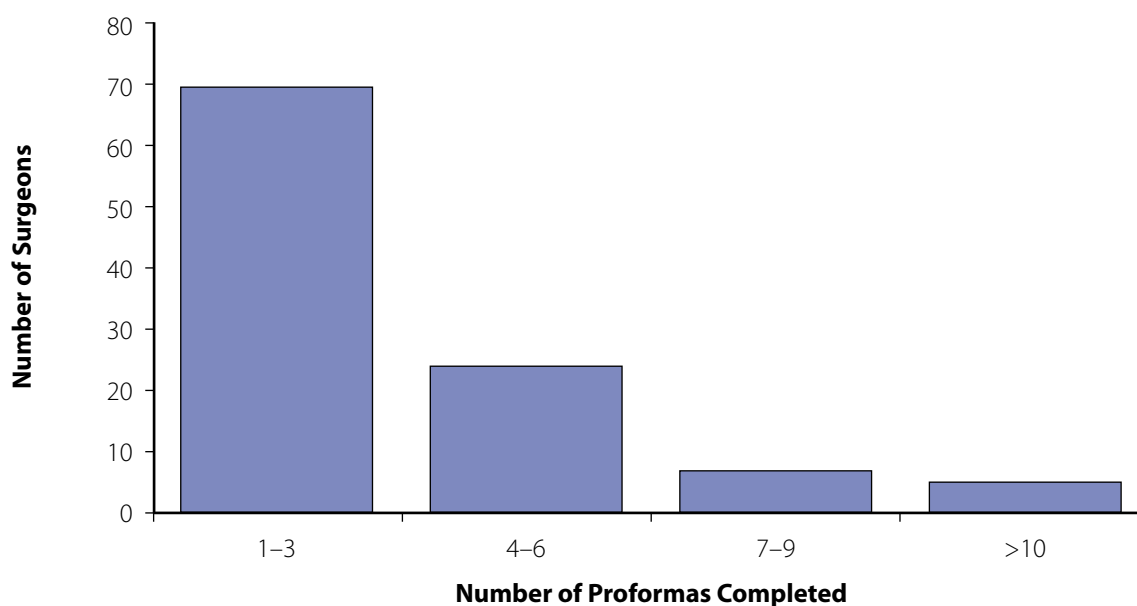


Figure 4.1 The number of proformas completed per surgeon

4.1.1 Coroner's Cases

At the cessation of data collection 30 June 2006, a total of 99 proformas were pending completion. Fourteen (14%) of these cases were under review by the South Australian Coroner's Office. As case notes are transferred to the Coroner's Office upon a reportable death, surgeons wishing to utilise the case notes in order to assist them with proforma completion can be disadvantaged. Unless a copy of the case notes has been made by the hospital concerned prior to their transfer under coronial jurisdiction, obtaining a copy of case notes through the Coroner's Office can be time consuming. Consequently there can be substantial delays in proforma completion as the return of case notes to the hospital concerned is dependent upon the finalisation of the Coronial review.

4.1.2 Proforma Completion by Specialty

The total number of proformas sent out to treating consultants by specialty is shown in Table 4.1. The status of these proformas by specialty is illustrated in Figure 4.2.

Specialty	Total
General Surgery	181
Orthopaedic	82
Neurosurgery	64
Vascular	50
Cardiothoracic	35
Plastic & Reconstructive	11
Urology	10
Otolaryngology Head & Neck	7
Total	440

Table 4.1 Number of proformas sent out by specialty

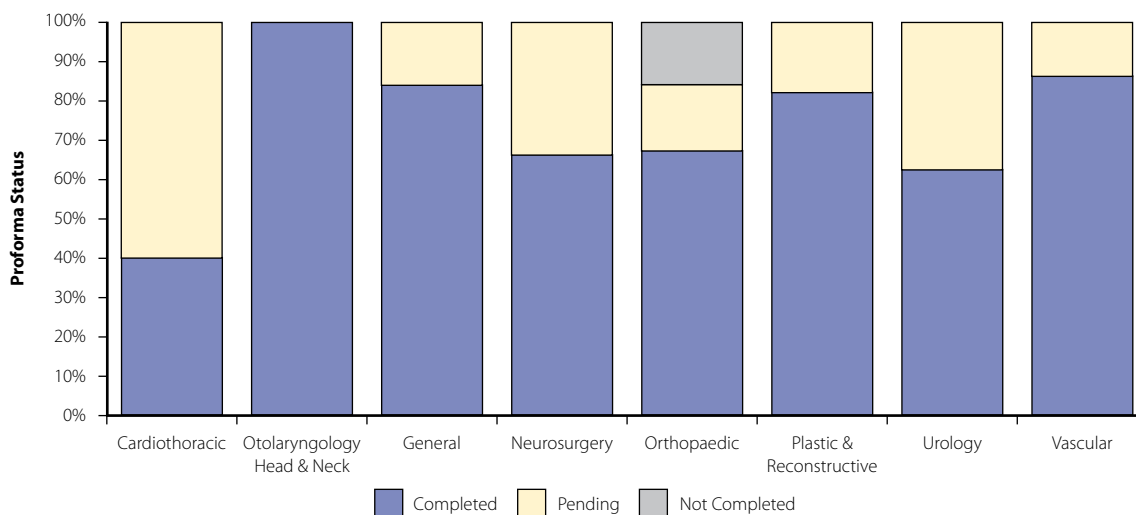


Figure 4.2 Proportion of proformas completed by specialty

4.1.2 Proforma Completion by Hospital

The completion of proformas by hospital is illustrated in Figure 4.3. Since data collection was initiated in hospitals 6 and 7 (Chapter 3, Section 3.2) no deaths have been reported.

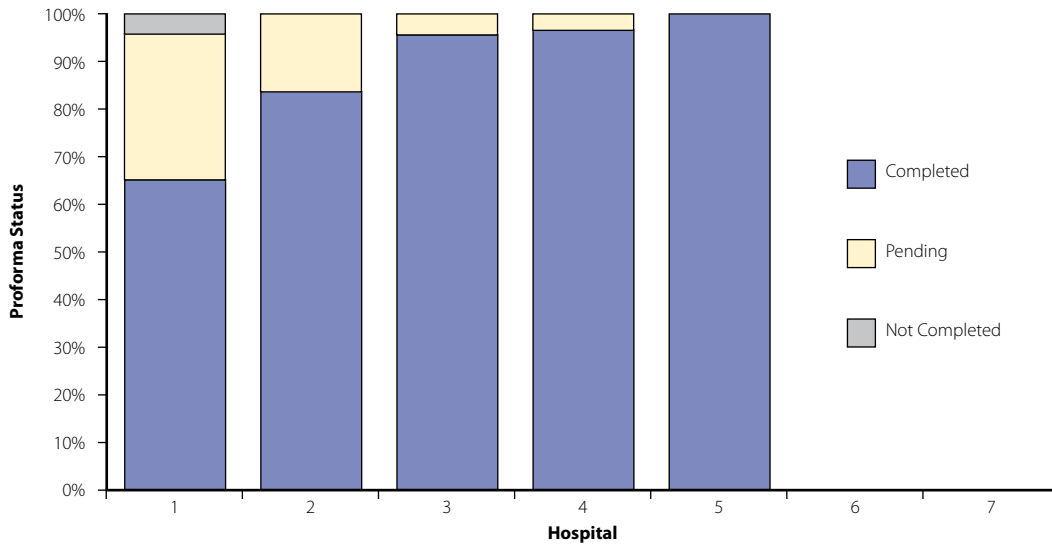


Figure 4.3 Proforma status by hospital

4.2 Assessment

As previously discussed (Chapter 1, Section 1.2.2) the primary role of the First Line Assessment Group is to assess each death notified to the SAAPM office. Currently the Group members represent a variety of surgical specialties. In the future, as the number of audit participants increases, additional surgical and anaesthetic representatives will be recruited to join the First Line Assessment Group as needed.

The nature of the Group’s membership, in conjunction with its reporting responsibilities and regular meetings ensures a consistently high completion of first line assessments and a limited number of recommendations for second line assessments.

Of the 328 cases returned, a total of 296 (90%) cases have been assessed and completed, and 32 cases were pending assessment. All 296 cases have undergone a first line assessment. After being assessed by a first line assessor 287 (88%) of these cases were regarded as completed and were closed as no issues in patient management were identified. A total of 9 (3%) cases were further assessed by a second line assessor prior to being closed. A case is closed once it has been assessed and the feedback loop is completed.

5 Patient Demographics

The age demographics for all 440 reported patient deaths are presented in this chapter. The data for the 328 completed cases relating to co-morbidity and diagnoses are also presented in this chapter. It is important to note that paediatric patients are currently not part of the audit.

5.1 Age Distribution

Of the 440 reported patient deaths; 222 patients were male and 218 were female. The age distribution for male and female patients is shown in Figure 5.1. Age data was unavailable for 2 male patients and 3 female patients. The median age of female patients was 82 years and the median age of male patients was 75 years.

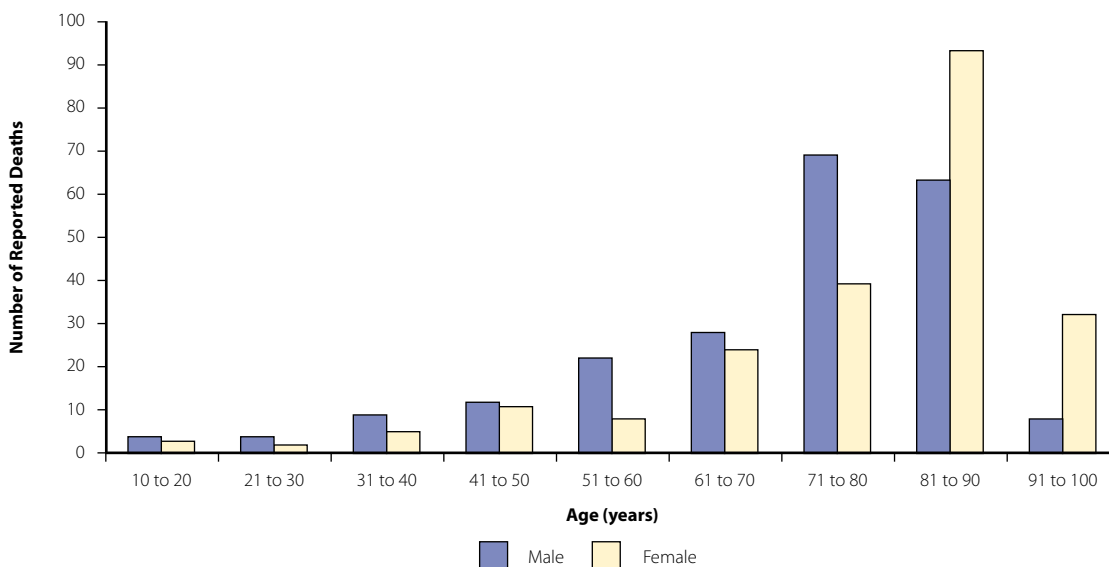


Figure 5.1 Age distribution of audited patient deaths by gender

Male and female patients aged between 71 and 90 years accounted for 60% of all reported deaths. The highest number (n=69) of reported deaths for males was for patients aged between 71 and 80 years (31%). The highest number (n=93) of reported deaths for females was for patients aged between 81 and 90 years (42%).

The number of deaths for both male and female patients aged between 71 and 90 years is expressed as a percentage of total reported deaths in Table 5.1. This finding is consistent with surgeons nominating age-related factors as a significant comorbidity that may have increased a patient's risk of death; age is second only to cardiovascular factors (Section 5.2, Figure 5.2).

Age range (years)	Patient numbers	
	Male, (n=222)	Female, (n=218)
71 to 80	69 (31%)	39 (18%)
81 to 90	63 (29%)	93 (42%)
Totals	132 (60%)	132 (60%)

Table 5.1 Gender distribution of deaths for patients aged between 71 to 90 years

5.2 Comorbidity

For the 328 proformas completed and returned, the percentage of audited patient deaths with comorbidities is shown in Figure 5.2. Of the 328 audited deaths, 277 (84%) patients presented with one or more comorbidity and 51 (16%) patients presented with no comorbidity.

The most frequently occurring comorbidity related to cardiovascular (n=183, 56%), age-related (n=156, 48%) and respiratory factors (n=124, 38%). A total of 18 cases were admitted for terminal care and hence excluded from the audit and subsequent analysis for this report (Chapter 2, Section 2.2 Audit Exclusion Criteria).

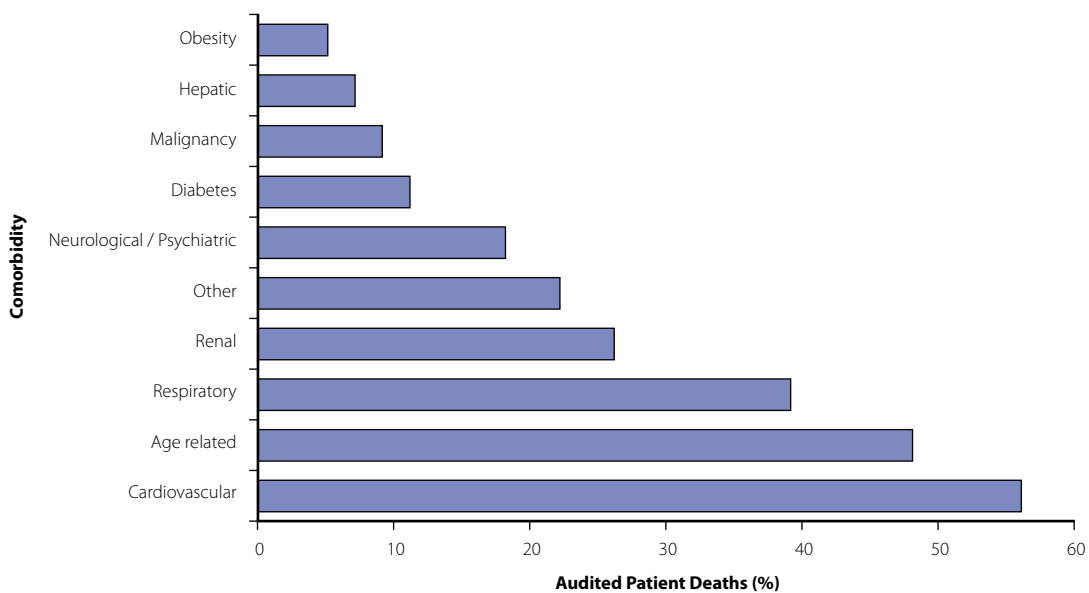


Figure 5.2 Comorbidity distribution

5.3 Surgical Diagnosis

The ten most frequent surgical diagnoses, as recorded by surgeons, are shown in Table 5.2. These ten diagnoses represent 64% of all diagnoses made for the 328 audited patients. Fractured neck of femur is the most frequently occurring surgical diagnosis; it represents 11% of all diagnoses.

Surgical Diagnosis	n	Percent of total audited deaths (n = 328)
Fractured neck of femur	36	11%
Intestinal obstruction	30	9%
Intracerebral haemorrhage	26	8%
Mesenteric ischaemia	24	7%
Peritonitis	21	6%
Abdominal aortic aneurysm	20	6%
Gallstone/biliary sepsis	16	5%
Peripheral vascular disease	15	5%
Gastrointestinal malignancy	14	4%
Pancreatitis	10	3%
Total	212	64%

Table 5.2 The ten most frequent surgical diagnoses

The observation regarding comorbidity and age distribution as reported above illustrate several important issues for health professionals, hospital administrators and the general public. When reviewing surgically related deaths in terms of age, 60% of patients were over 70 years of age and 35% were over the age of 80 years. In these elderly patients, 78% had one or more chronic health problem, of which cardiovascular disease was the most common. As highlighted in Table 5.2 many of these patients presented with diagnoses that are universally recognised as having high mortality rates.⁹

These findings illustrate that as the South Australian population ages, it is clear that more patients undergoing surgery will fall into high risk categories related to both their age and underlying comorbidity.

6 Operative and Non-operative Data

The operative and non-operative data relating to the 328 surgical deaths where proforma had been completed during the reporting period are presented in this chapter. It is notable that in 37% of cases no operation was performed, although the patients were admitted under the care of a surgeon.

6.1 Operative and non-operative cases by specialty

The numbers of operative and non-operative cases by specialty is shown in Table 6.1.

Specialty	Operation	
	Yes	No
General	95	57
Orthopaedic	42	13
Vascular	24	19
Neurosurgery	18	24
Cardiothoracic	13	1
Plastic & Reconstructive	7	2
Otolaryngology Head & Neck	5	2
Urology	3	3
Total	207	121*
* Includes 18 terminal care cases		

Table 6.1 Numbers of operative and non-operative cases by specialty

Out of 121 non-operative cases, 18 cases were specified as terminal care which excluded them from the audit process.

Surgeons documented their rationale for not operating in the remaining 103 cases. There was an active decision by the treating consultant not to operate in 69 (67%) of the 103 non-operative cases. Such decisions were typically based on the presenting diagnosis of patients and their co-existing medical conditions. In 20 (19%) cases, the patient's diagnosis was not believed to warrant surgical intervention. In 13 (13%) cases, there was rapid deterioration of the patient following admission that lead to death despite active medical treatment. There were 10 (10%) cases where patients or their family refused an operation. It is important to note in a number of cases surgeons nominated more than one reason why no operation was performed.

A summary of operative and non-operative data as they relate to admission type for the 328 audited cases is shown in Table 6.2.

Admission type	Operation		Total
	Yes	No	
Emergency	181	102	283 (86%)
Elective	26	1	27 (8%)
Terminal Care	0	18	18 (6%)
Total	207	121	328

Table 6.2 Operation status by admission type

6.2 Grade of surgeon operating

Patients are admitted to hospital primarily under the care of consultant surgeons, who are responsible for overall patient management. Consultants are involved in significant treatment decisions particularly in regard to whether an operation is necessary or advisable for an individual patient. As public hospitals are training institutions, operations may be performed by supervised trainee surgeons.

Trainee surgeons are doctors who are in the process of completing their specialist training in surgery. These surgeons take on increasing levels of responsibility during the course of their training. Consultant surgeons supervise trainees' decision making, and have a role in assisting trainees during operative procedures, until they have completed their specialist qualifications.¹⁰

The grade of surgeons performing first and subsequent operations for both elective and emergency admissions is shown in Figure 6.1. A category of "Other" is also represented in Figure 6.1. This category covers a variety of consultant specialists such as interventional radiologists and endoscopists.

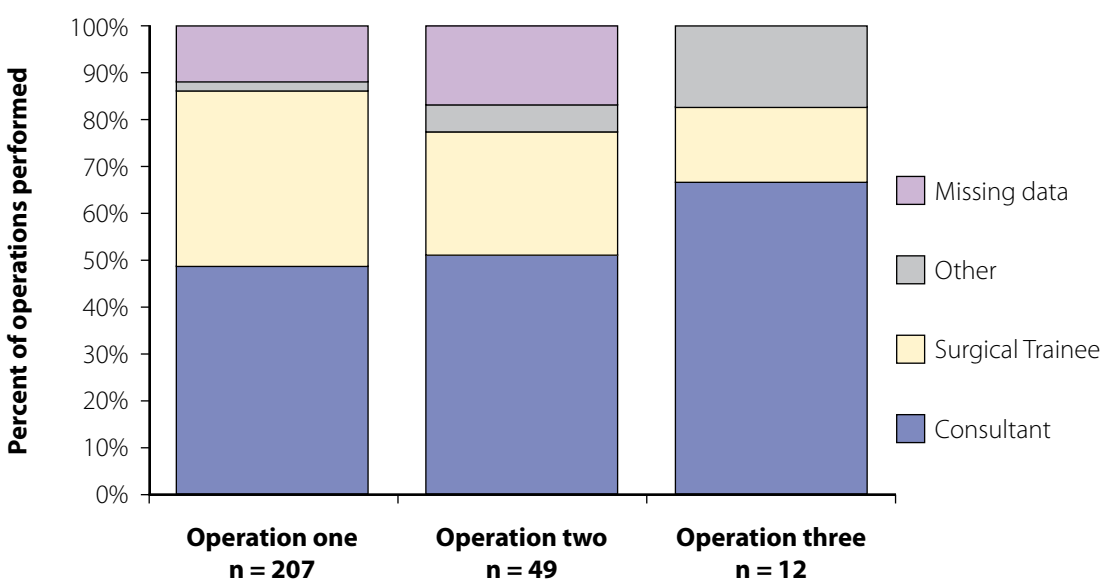


Figure 6.1 Grade of surgeon performing first and subsequent operations

For audited deaths where operation details were provided, the proportion of consultant surgeons performing each subsequent operation progressively increased. The first operation was performed by consultant surgeons in 101 (49%) of cases. The second and subsequent operations were performed by consultant surgeons in 25 (51%) and 8 (67%) cases respectively.

Figure 6.1 shows that for patients with more complex case management requiring more than one operation, the consultant involvement increases, with a corresponding decrease in the proportion of cases where the trainee surgeon is the primary operator. It is pleasing to note this trend, indicating strong consultant involvement in these often difficult cases.

It is the responsibility of the treating consultant to ensure that the operating surgeon is appropriately trained to carry out a given operation or that he/she has direct intra-operative assistance and supervision by a suitably qualified senior surgeon. Hospital administrations also carry responsibility for ensuring that surgeons, regardless of seniority, are appropriately credentialed and are only performing procedures for which they have been adequately trained.

6.3 ICU and HDU Utilisation

Details were provided by assessors for the 296 assessed cases regarding the use of intensive care unit (ICU) and high dependency unit (HDU) facilities by treating medical teams. As expected, a high proportion of patients required high level treatment, 145 (53%) cases were treated in the ICU and 38 (13%) cases were treated in the HDU.

ICU and HDU availability for preoperative and postoperative monitoring for severely ill patients will continue to be analysed in future.

7 Clinical Events

A primary objective of SAAPM is to provide education through feedback. Both first and second line assessors are responsible for categorising clinical events into areas of impact, preventability and responsible team/unit. A surgical assessor's form provides assessors with the opportunity to comment on case management and the level of care provided to a patient. The assessors' conclusions and recommendations for future care are fundamental to achieving the primary objectives of SAAPM.

7.1 Event Management

As highlighted in Chapter 2, Section 2.4 clinical events are categorised into areas of consideration, areas of concern and adverse events.

A total of 296 (90%) of the 328 audited cases were assessed between 1 July 2005 and 30 June 2006 (Chapter 4, Section 4.2). Of these cases, 58 (20%) were associated with a clinical event. The assessors evaluation of these clinical events, and their influence on patient outcome, preventability and the team/unit responsible are detailed in Tables, 7.1, 7.2 and 7.3.

Of 296 cases that have undergone assessment:

238 (80%)	Cases related to disease process
58 (20%)	Cases with clinical events
35 (12%)	Cases were associated with an area of consideration
16 (6%)	Cases were associated with an area of concern
7 (2%)	Cases were associated with an adverse event

7.1.1 Influence of Clinical Events on Patient Outcome

Of the 296 cases that have undergone assessment there were a total of 58 cases where an area of consideration, an area of concern or an adverse event were noted. Table 7.1 highlights that in 15 (5%) cases; assessors identified that these clinical events had no bearing on the patient's outcome. However in 36 (12%) cases, assessors indicated that these clinical events may have contributed to the patient's death. There were 5 (2%) cases in which an issue in patient management was identified as causing the death of a patient who would have otherwise been expected to survive.

In 2 of the 5 cases areas of consideration were identified:

- Pulmonary embolus with prophylaxis given
- Septicemia (MRSA sepsis) source unidentified despite investigation

In 1 of the 5 cases an area of concern was identified:

- Lack of communication by surgical trainee to consulting staff resulted in a delay in diagnosis

In 2 of the 5 cases adverse events were identified:

- Anastomotic leak
- Fall in hospital

Clinical Events	Made no difference to outcome	May have contributed to death	Caused the death of a patient who would otherwise be expected to survive	Missing data/No response	Total
Area of Consideration	14	17	2	2	35
Area of Concern	1	14	1	0	16
Adverse Event	0	5	2	0	7
Total	15 (5%)	36 (12%)	5 (2%)	2 (1%)	58

Table 7.1 Clinical events and their influence on patient outcome as ascribed by assessors

7.1.2 Preventability of Clinical Events

Of the 296 cases that have undergone assessment there were 58 cases where an area of consideration, an area of concern or an adverse event was noted. Assessors also determined whether these clinical events could possibly have been prevented. Table 7.2 highlights the number of these clinical events and their level of preventability as ascribed by assessors. In 6 (2%) cases assessors deemed that these clinical events were definitely preventable. These events were often related to falls in hospital and delays in various aspects in treatment. In 29 (10%) cases it was felt that some of these clinical events were probably preventable and in 21 (7%) cases the specified clinical events were unlikely to have been prevented.

Clinical Events	Preventable					Total
	Definitely	Probably	Probably not	Definitely not	Missing data/No response	
Area of Consideration	4	13	16	0	2	35
Area of Concern	2	11	3	0	0	16
Adverse Event	0	5	2	0	0	7
Total	6 (2%)	29 (10%)	21 (7%)	0	2 (1%)	58

Table 7.2 Clinical events and their preventability as ascribed by assessors

7.1.3 Team/Unit Primarily Responsible

In order to improve the safety and quality of healthcare it is important to recognise that the responsibility of patient care rests with a number of hospital teams/units. The categorisation by assessors of clinical events can not only highlight those areas where problems have occurred but it can also potentially identify system wide issues.

Table 7.3 provides data that indicates that in 19 (7%) cases the treating surgical team were thought to be primarily responsible for identified clinical events, but for the remaining 39 (13%) cases problems with patient care were associated with other clinical and hospital teams. Although many other causes were specified, the majority of these related to pre-admission or transfer events over which the surgical team had little control. This highlights the complex nature of the healthcare system by emphasising the fact that individual clinical teams may only be responsible for a proportion of problems related to patient deaths.

Clinical Events	Associated with					Total
	Surgical Team	Other Clinical Team	Hospital	Other	Missing data/No response	
Area of Consideration	13	7	6	9	0	35
Area of Concern	5	6	1	3	1	16
Adverse Event	1	2	3	1	0	7
Total	19 (7%)	15 (5%)	10 (3%)	13 (4%)	1 (1%)	58

Table 7.3 Clinical events and the responsible parties as ascribed by assessors

The most significant areas of consideration, concern and adverse events, as ascribed by the assessors, are categorised by admission type in the Tables 7.4, 7.5 and 7.6.

Admission Type	Area of Consideration	Frequency
Emergency	Delay in transfer	4
	HDU not used postoperatively (HDU full)	3
	Aspiration pneumonia	3
	Delay in diagnosis:	
	• Emergency department	2
	• Mesenteric ischaemia	1
	Surgeon too junior:	
	• Shorter operation time desirable	2
	Injury caused by fall in hospital	2
	DVT prophylaxis listed as compression only	1
	Anastomotic leak from colon after open surgery	1
	Diagnosis related complication:	
	• Surgical procedure required for diagnostic biopsy	1
	Urgent colonoscopy service unavailable	1
	Septicaemia:	
	• MRSA sepsis source unidentified despite investigation	1
	Fluid balance unsatisfactory	1
	Delay to surgery (earlier operation desirable)	1
	Transfer should not have occurred	1
	Preoperative assessment inadequate:	
• Endoscopy not performed	1	
Diagnosis missed by medical unit:		
• Emergency Department	1	
Operation better deferred to daytime	1	
Pulmonary embolus with prophylaxis given:		
• Pelvic fracture	1	
Septicaemia:		
• Intra-abdominal sepsis	1	
Potential general anaesthetic complications:		
• Myocardial infarction 24 hours postoperatively	1	
Delay in recognising anastomotic leak	1	
Premature discharge from ICU	1	
Poor communication between physician and surgeon	1	
Elective	Premature discharge from hospital	1
Total		35

Table 7.4 The most significant areas of consideration as ascribed by assessors to emergency and elective cases

Admission Type	Area of Concern	Frequency
Emergency	Delay in diagnosis:	
	• Lack of communication by registrar to consulting staff	2
	• Complication of diverticulitis	1
	• Large bowel obstruction not initially diagnosed by medical unit	1
	Delay in transfer	3
	Aspiration pneumonia	3
	Potential general anaesthetic complications:	
• Respiratory arrest in recovery	1	
• Hypotension while under anaesthesia	1	
Decision to operate	2	
Diagnosis related complication:		
• Inappropriate lumbar puncture at referring hospital	1	
Failure to recognise severity of illness:		
• Lack of communication by registrar to consulting staff	1	
Elective	No areas of concern	0
Total		16

Table 7.5 The most significant areas of concern as ascribed by assessors to emergency and elective cases

Admission Type	Adverse Event	Frequency
Emergency	Injury caused by fall in hospital	3
	Aspiration pneumonia	1
	Equipment related complication:	
	• Pneumothorax following CVC line insertion	1
	Displacement of tracheostomy tube	1
Anastomotic leak from colon after open surgery	1	
Elective	No adverse events	0
Total		7

Table 7.6 The most significant adverse event as ascribed by assessors to emergency and elective cases

As previously highlighted, the clinical events presented in Tables 7.4, 7.5 and 7.6 occurred in 58 (20%) of the 296 cases assessed. The most frequently occurring clinical events were related to delays in transfer and diagnosis as well as aspiration pneumonia and falls in hospital. The nature of these events indicates that many problems are the result of system wide issues rather than the responsibility of a single individual.

7.2 Additional Cases

In addition to the above events there were 6 assessed cases in total where patients died from potentially treatable causes, that were outside the control of the treating surgical team.

- In 2 cases patients who were Jehovah's Witnesses underwent treatment but declined blood transfusion as recommended by their treating staff. Both patients died, in situations where the medical staff felt that a blood transfusion would have been life saving.
- In 2 cases patients with severe injuries developed an idiosyncratic reaction to heparin medication that was given as DVT prophylaxis (Heparin Induced Thrombocytopenia Syndrome HITS). This reaction, whilst described, is uncommon and unpredictable, and caused a fatal outcome in both patients.
- In 2 cases patients undergoing diagnostic procedures (endoscopy and colonoscopy) at a non-participating hospital suffered a bowel perforation and were subsequently transferred to a participating hospital for management. Assessors regarded this as an adverse event that occurred prior to admission and therefore not primarily attributable to the receiving surgical team.

7.3 Admission Type

As highlighted in Chapter 4 Section 4.2, of the 328 cases returned and completed, a total of 296 (90%) cases had undergone assessment; 261 of these cases were emergency admissions, 22 were elective admissions and 13 cases were classified as terminal care.

Table 7.8 details how perceived clinical events can be related to hospital admission status. It is interesting to note that of the 261 emergency cases that were assessed, 57 (22%) were associated with a clinical event and of the 22 elective cases that were assessed, 1 (5%) was associated with such an event.

Admission type	Clinical Event*		Total Assessments
	Yes	No	
Emergency	57	204	261 (88%)
Elective	1	21	22 (8%)
Terminal Care	0	13	13 (4%)
Total	58	238	296

*Refers to an area of consideration, area of concern or an adverse event

Table 7.8 Admission type and clinical event associated with assessed cases

8 DVT Prophylaxis

A major area of interest in perioperative management is the prevention of deep vein thrombosis (DVT) and/or pulmonary embolism (PE).

DVT and PE are common complications of hospitalisation and can be fatal. Evidence-based guidelines provide health services with recommendations on the most appropriate use of prophylaxis to prevent DVT and PE. These guidelines/protocols primarily relate to elective cases; however, as highlighted in Chapter 6 Section 6.1, 86% of cases were emergency admissions. The type of DVT and PE prophylaxis utilised depends on the extent of patients' comorbidities and can involve pharmacological (e.g. subcutaneous heparin, warfarin, aspirin) and/or mechanical (e.g. compression devices, anti-embolism stockings) treatment measures.¹

DVT prophylaxis information was provided by surgeons in 296 of the 328 returned proformas. DVT information was incomplete on 32 proformas.

For the 296 audited cases, 174 (59%) patients received some form of DVT prophylaxis. Prophylaxis treatment modalities varied and in some cases more than one type of prophylaxis was used per patient. Further details of prophylaxis are shown in Table 8.1. In 10 cases surgeons recorded that DVT prophylaxis was used; however, they did not document the type of prophylaxis.

Heparin/ LMWH	Mechanical Compression	Warfarin	Anti-Embolism Stockings	Aspirin	Other
135	33	11	62	5	8

Table 8.1 Types of DVT prophylaxis used

Surgeons also provided details for cases where no DVT prophylaxis was used as well as information relating to the appropriateness of the treatment, noting any omissions or errors in DVT management.

The use/non-use of DVT prophylaxis as ascribed by assessors was deemed appropriate in 274 (93%) of the 296 cases assessed. The number of patients who did not receive DVT prophylaxis was 123 (41%). The reasons why DVT prophylaxis was not given are listed in Table 8.2. In 81 (66%) of these cases prophylaxis was deemed not appropriate and in 18 (15%) cases there was an active decision to withhold prophylaxis. In 5 (4%) cases, surgeons identified that prophylaxis had been omitted when it should have been given. However, review of these particular cases found no evidence that any of these patients sustained a PE or any adverse event as a result of the lack of prophylactic treatment. It is also important to note that for 19 (15%) cases surgeons recorded that DVT prophylaxis was not used however the reason for non-use was not specified.

Not appropriate	Active decision to withhold	Omission	Missing data/ no response
81	18	5	19

Table 8.2 Reasons why DVT prophylaxis was not given

In those cases where DVT prophylaxis was deemed inappropriate, various reasons were provided by surgeons, such as active bleeding, coagulopathy, admission for palliative measures and/or terminal care. The administration of subcutaneous heparin under these circumstances would generally be considered inappropriate.¹⁴

Assessors recognised that the appropriate use of DVT prophylaxis varies between surgical specialties. The risks of intra-cerebral haemorrhage in a neurosurgical patient¹⁵, or haemorrhage during revision hip surgery in orthopaedics¹⁶, may preclude the use of measures that would be appropriate in patients undergoing abdominal surgery for malignancy, for example.^{17,18}

There were 7 cases in total where PE was proven or considered as the final cause of death as indicated by surgeons.

- In 3 of these cases PE was proven by either post mortem examination or imaging prior to death and 2 of these patients had been given DVT prophylaxis.
- In the remaining 4 cases PE was strongly considered as the cause of death although there was no post mortem examination or imaging to confirm the diagnosis. In 3 of these 4 cases DVT prophylaxis had also been given.

DVT and PE are potentially preventable causes of mortality and morbidity in hospital patients.^{13,14} While the use of DVT prophylaxis can reduce the risk of these events, they cannot be fully eliminated, and there are recorded cases of fatal pulmonary embolus occurring in patients who have been adequately managed with DVT prophylaxis.¹⁴ However, it is important that medical staff remain vigilant about the use of DVT prophylaxis, which is relatively simple to arrange and ultimately very easy to audit. Similarly, nursing and perioperative staff need to be reminded about the importance of continued use of compression stockings in the post-operative patient until they are fully ambulant. While there is already a high level of awareness associated with the use of DVT prophylaxis, there is some room for improvement. It is hoped by pooling results from participating hospitals that the audit can focus attention on these issues.

9 Post Mortem Examination

Post mortem (PM) examinations were carried out in 49 cases (16%). In 46 of these cases the PM was performed by the Coroner's Office and in 3 cases the PM was performed in hospital. These details are summarised in Table 9.1.

There were 183 (61%) cases in which no PM examination was performed. There were 4 (1%) cases where a PM examination was said to have been refused, but notably there were 92 (30%) cases, where data was missing as no response had been provided.

Post mortem examination performed	Yes		No	Refused	Missing data/no response
	Hospital	Coroner			
		3	46	183	4

Table 9.1 Post mortem examinations in audited cases as identified by surgeons

The finding that PM examinations were performed under the direction of the Coroner's Office or hospitals in only 16% of audited cases is consistent with the decline in the total number of PM examinations being performed both nationally and internationally over recent years.^{19,20,21} Declining PM examination rates have been noted across the healthcare system for many years and are not specific to South Australia. There is data to suggest that in a significant number of cases a PM examination may reveal information which was not detected during a patient's final illness, although it is not clear whether this additional information would have prevented the patient's death.²² In cases where patients have been hospitalised for a long period of time or have undergone recent surgery and the diagnosis is clearly known, a PM examination may be of little value. However, when patients die suddenly or unexpectedly following surgery, the case for a PM examination is much stronger.²³ The true incidence of conditions such as fatal pulmonary embolus or sudden cardiac events for example cannot really be established without a PM examination.^{24,25}

There was only one case in which a surgeon indicated that a PM examination report had been received, despite 49 PM examinations being performed. This highlights a system issue regarding the availability of reports to treating surgeons. The PM examination is itself a form of audit of the patient's medical treatment, and consequently the barriers that prevent surgeons from receiving either verbal or written post mortem reports in a timely manner need to be identified and removed.

It is hoped that this audit will raise awareness of the importance of PM examinations. Ultimately an increase in the number of PM examinations performed is only likely to occur if there is increasing awareness of this issue, both in the general community and at all levels in the healthcare profession.^{26,27}

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 - Mr Paul Dolan SAAPM Chair
 - Ms Natasha Stabile SAAPM Project Manager

■ Bibliography

- [1] Thompson, A.M., Stonebridge, P.A. (2005), Building a framework for trust: critical event analysis of deaths in surgical care, *British Medical Journal*, 330: 1139-1142.
- [2] Semmens, J.B. et al. (2005), The Western Australian Audit of Surgical Mortality: advancing surgical accountability, *Medical Journal of Australia*, 183(10):504-508.
- [3] Conference of the Royal Colleges. (2006), Scottish Audit of Surgical Mortality, *Conference of the Royal Colleges*, Paisley, Scotland, www.sasm.org.uk.
- [4] University of Western Australia. (2003), Western Australian Audit of Surgical Mortality Annual Report 2003, *University of Western Australia*, Perth, Western Australia, Australia.
- [5] University of Western Australia. (2005), Western Australian Audit of Surgical Mortality Annual Report 2005, *University of Western Australia*, Perth, Western Australia, Australia.
- [6] The Royal Australasian College of Surgeons. (2006), Western Australian Audit of Surgical Mortality Annual Report 2006, *Royal Australasian College of Surgeons*, Perth, Western Australia, Australia.
- [7] Royal Australasian College of Surgeons. (2006), Tasmanian Audit of Surgical Mortality Annual Report 2006, *Royal Australasian College of Surgeons, The Tasmanian Department of Health & University of Tasmania*, Hobart, Tasmania, Australia.
- [8] The South Australian Perioperative Mortality Committee. (2000), Perioperative Deaths in South Australia and Northern Territory 1998 to 2000, *The South Australian Department of Health, Division of Human Services*, Adelaide, South Australia, Australia.
- [9] Fromme, E.K. et al. (2006), Survival, mortality and location of death for patients seen by hospital-based palliative care team, *Journal of Palliative Medicine*, 9(4): 903-911.
- [10] The Royal Australasian College of Surgeons. (2006), www.surgeons.org.
- [11] Franchini, M. (2005), Heparin-induced thrombocytopenia: an update, *Thrombosis Journal*, 3(14).
- [12] Bartholomew, J.R. et al. (2005), Heparin-induced thrombocytopenia: Principles for early recognition and management, *Cleceland Clinic Journal of Medicine*, 72(1): S31-S36.
- [13] Tooher, R. et al. (2005), A systematic review of strategies to improve prophylaxis for venous thromboembolism in hospitals, *Annals of Surgery*, 241: 397-415.
- [14] Geerts, W.H. et al. (2004), Prevention of venous thromboembolism: The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy, *Chest*, 126:338S-400S.

- [15] Browd, S.R. et al. (2004), Prophylaxis for deep venous thrombosis in neurosurgery: A review of the literature, *Neurosurgical Focus*, Oct 15; 17(4):E1. Review.
- [16] Handoll, H.H.G. et al. (2002), Heparin, low molecular weight heparin and physical methods for preventing deep vein thrombosis and pulmonary embolism following surgery for hip fractures, *Cochrane Database System Reviews*, 2002;(4):CD000305. Review.
- [17] Bergqvist, D. (2004), Low molecular weight heparin for the prevention of venous thromboembolism after abdominal surgery, *British Journal of Surgery*, 91:965-974.
- [18] Yap, K.P.L., McCready, D.R. (2004), Deep Vein Thrombosis and Malignancy: A surgical oncologist's perspective, *Asian Journal of Surgery*, 27(3):249-254.
- [19] The Royal College of Pathologists of Australasian Autopsy Working Party. (2004), The decline of the hospital autopsy: a safety and quality issue for healthcare in Australia, *Medical Journal of Australia*, 180:281-285.
- [20] Jeganathan, V.S., Walker, S.R., Lawrence, C. (2006), Resuscitating the autopsy in Australian hospitals, *Australian and New Zealand Journal of Surgery*, 76(4):205-207.
- [21] Carr, U., Bowker, L., Ball, R.Y. (2004), The slow death of the clinical post-mortem examination: implications for clinical audit, diagnostics and medical education, *Clinical Medicine*, 4(5):417-423.
- [22] Silfvast, T. et al. (2003), Characteristics of discrepancies between clinical and autopsy diagnoses in the intensive care unit: a 5 year review, *Intensive Care Medicine*, 29:321-324.
- [23] Dimopoulos, G. et al. (2004), Post mortem examination in the intensive care unit: still useful?, *Intensive Care Medicine*, 30:2080-2085.
- [24] Nashelsky, M.B., Lawrence, C.H. (2003), Accuracy of cause of death determination without forensic autopsy examination, *The American Journal of Forensic Medicine and Pathology*, 24(4):313-319.
- [25] Combes, A. et al. (2004), Clinical and autopsy diagnoses in the intensive care unit: a prospective study, *Archives of Internal Medicine*, 164(4):389-92.
- [26] The South Australian Department of Health. (2002), The National Code of Ethical Autopsy Practice, The Australian Health Ministers' Advisory Council, Subcommittee on Autopsy Practice, *Department of Human Services*, www.health.gov.au/code.pdf.
- [27] The National Confidential Enquiry into Patient Outcome and Death (2002), Functioning as a team? The 2002 report of the National Confidential Enquiry into Perioperative Deaths, *The National Confidential Enquiry into Patient Outcome and Death*, www.ncepdo.org.uk/2002.