



ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS



AUSTRALIAN AND NEW ZEALAND
AUDIT OF SURGICAL MORTALITY



NATIONAL REPORT 2009





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Chairman's Report

Australian and New Zealand Audit of Surgical Mortality First annual report

Since the inception of the Audit of Surgical Mortality in Western Australia over seven years ago there has been great support and enthusiasm for a national Audit of Surgical Mortality. As a result, audits have now commenced in every state and territory in Australia. The audit has been able to maintain a constant dataset within all these jurisdictions, making it possible to provide national figures as well as comparisons over time of trends as information becomes available. Each region continues to have its own autonomy and a clinical director capable of interacting with the surgeons, hospitals and their jurisdiction to ensure that the reports produced are relevant to their needs and requirements.

There have, of course, been different agendas at different times. State governments have often wished to avoid a repeat of the problems in Bundaberg, while surgeons are more interested in making sure that problems of management and infrastructure are appropriately addressed to ensure that mortality is kept to a minimum in the surgical arena. Over the years, regions have highlighted the need for deep vein thrombosis prophylaxis, adequate resources in intensive care, the ability to transfer patients in a timely fashion and the need for great care in fluid resuscitation of acutely unwell patients. These lessons are invaluable and have much greater relevance when supported by hard data from the local region.

The regional Audits of Surgical Mortality will continue to operate as local audits; however, as it is now possible to provide a national overview, this is also being introduced. This first report is an early attempt at gaining a snapshot of the causes behind mortality associated with surgical patients. As regions come online it will result in a very large and powerful dataset. One of the important challenges that remain is to incorporate all of the private hospitals into such an audit system. This has not been embraced by all regions and certainly leaves an important segment of the care of surgical patients unrecorded. Recruitment of the private sector is improving with time.

The Royal Australasian College of Surgeons can be rightly proud of this important initiative and in collaboration with the jurisdictions has provided a significant dataset. Aggregated information will be available to surgeons in order to ensure not only that the care is appropriate but that it can improve as more information becomes available. While much can be learnt from overseas reports, there is even more than can be learnt from well directed Australian databases. This is one such database and deserves the full support of surgeons and others involved in healthcare in Australia. There is hope that it can be further introduced into New Zealand; however, this has proven to be a greater challenge and it will perhaps take several more years until the New Zealand Ministry of Health recognizes the importance of the data being provided. In the meantime, they can certainly benefit from the Australian experience.

A handwritten signature in black ink, appearing to read 'Guy Maddern'.

Professor Guy Maddern

Chairman,
Australian and New Zealand Audit of Surgical Mortality



Abbreviations

ACT	Australian Capital Territory
ACTASM	Australian Capital Territory Audit of Surgical Mortality
ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anaesthesiologists
ASM	Audit of Surgical Mortality
CHASM	Collaborating Hospitals' Audit of Surgical Mortality
CPD	Continuing Professional Development
CRF	case record form
DVT	deep vein thrombosis
FLA	first-line assessment
HDU	high dependency unit
ICU	intensive care unit
IQR	interquartile range
NT	Northern Territory
QASM	Queensland Audit of Surgical Mortality
RAAS	Research, Audit and Academic Surgery Division
SAAPM	South Australia Audit of Peri-operative Mortality
SD	standard deviation
SLA	second-line assessment
SPSS	Statistical Package for Social Sciences
SQL	Structured Query Language
TASM	Tasmanian Audit of Surgical Mortality
VASM	Victorian Audit of Surgical Mortality
VTE	Venous thromboembolism
WAASM	Western Australian Audit of Surgical Mortality
WADH	Western Australian Department of Health
WARM	Western Australian Review of Mortality



Executive Summary

Background

The Australian and New Zealand Audit of Surgical Mortality (ANZASM) is an independent external peer review of surgical mortality in all states and territories of Australia. Each Audit of Surgical Mortality (ASM) is funded by its state or territory Department of Health (Western Australia, Victoria, South Australia, Queensland, Tasmania, Australian Capital Territory and Northern Territory). New South Wales provides comparable data to ANZASM but is independently managed by the Clinical Excellence Commission (CEC) of NSW.

Surgeon participation

Surgeon participation in the ASMs over the 2009 audit period was **63% (3241 of 5116 College Fellows)**. This number includes Fellows who may work in hospitals not yet covered by the ASMs, but excludes Fellows from Australian Capital Territory and Northern Territory as these projects only came on board during the course of 2010.

Analysis

This report contains an analysis of cases reported to ANZASM from January to December 2009. Some data is missing due to incomplete information provided in surgical case forms (SCFs) and where this occurs it is noted in the text.

Audit numbers

From 1 January to 31 December 2009 a total of **5777** deaths were reported to the ASMs. Of the **5777** case record forms sent to treating surgeons, **3642 (63%)** had been completed and returned by the census date (1/2/2010). A number of cases were excluded by the predefined ANZASM exclusion criteria, namely that the surgeon is not participating in the audit process in **121 (2%)** or that the patient is admitted for terminal care in **180 (3%)**. A total of **2347 (41%)** cases had been assessed and thus completed the full audit (peer review) process by the census date.

Second-line assessment

The number of cases referred for second-line assessment (case note review) during the audit period was **197 (8%)** of **2347** audited cases.

Referral for second-line assessment varied among states (**3% to 12%**). The rate of second-line assessment is not a reliable measure of the incidence of clinical issues, as referral for second-line assessment is often required due to inadequate information in the surgical case form.

Demographic profile of audited cases

Of the **2347** audited cases, the mean (SD) age was **75(+/-16)** years. The age range varied from **2** days old to **103** years. Males represented **54%** of cases while **46%** were female. The median age for males and females was **74 years** and **78 years** respectively.

Risk profile of audited cases

The majority of deaths occurred in patients with significant coexisting illness. In **76%** of cases at least two preexisting medical conditions (comorbidities) were recorded.

Risk management

The review process suggests that venous thromboembolism (VTE) prophylaxis strategies are being applied in most cases where it is felt to be appropriate.

Most patients deemed to require critical care support do receive it. There are still some patients who it was felt should have received such care but did not. The current audit dataset does not allow us to identify the reasons behind this.

Profile of operative intervention

Of the audited cases **72%** of patients underwent a surgical procedure. The majority of operative procedures (**69%**) were performed by a consultant surgeon. This is appropriate when the risk profile of the patient is considered.

In **10%** of operative cases, there had been an unplanned return to the operating theatre for complications.

Peer review outcomes

Second-line assessment was requested in **8%** of cases. Lack of adequate clinical information was the trigger in a quarter of these.

The most common criticism made by assessors was delay in delivering definitive treatment. Only half of these delays were attributed to the surgical team, however. The major cause of delay was failure to establish the true diagnosis or detect adverse clinical trends.

Clinical issues described as areas of concern or adverse events represent significant criticism of patient care. When we consider the impact these issues identified were perceived to have had on the outcome, only **4%** of these management issues were felt to have probably contributed to the outcome.

Significant criticism of patient management was made in **10%** of cases referred for second-line assessment, representing less than **1%** of all cases reported.

Recommendations and key points

The recommendations are as follows:

- recruitment of all surgeons into the ANZASM audit program
- recruitment of all Australian hospitals into the audit (with a view to recruiting any place that performs a surgical procedure – e.g. day surgery clinics).



1. Introduction

KEY POINTS

- ANZASM is an external independent peer-reviewed audit of the process of care associated with all patients under the care of a surgeon in Australia.
- This annual report covers the period 1 January 2009 to 31 December 2009, as audited on 1 March 2010 from all notifications of death reported to the audit offices.
- ANZASM's main role is to feed back information to inform, educate, facilitate change and improve quality of practice.
- This annual report is an analysis of the **2347** cases that completed the full audit process.

1.1 Background

The Royal Australasian College of Surgeons became responsible for the management of the Western Australian Audit of Surgical Mortality (WAASM) in 2005 following its establishment in 2001. WAASM was modeled on the Scottish Audit of Surgical Mortality which has been operating successfully since 1988. The College then expanded the program to other states and territories under the umbrella of the Australian and New Zealand Audit of Surgical Mortality (ANZASM).

This report only includes data from Western Australia, South Australia, Tasmania, Victoria, New South Wales and Queensland. The Australian Capital Territory and Northern Territory did not join the program until 2010.

1.2 Objectives

The primary objective is peer review of all deaths associated with surgical care. The audit process is designed to highlight system and process errors and trends in surgical mortality. It is intended as an educational rather than a punitive process.

1.3 Structure and governance

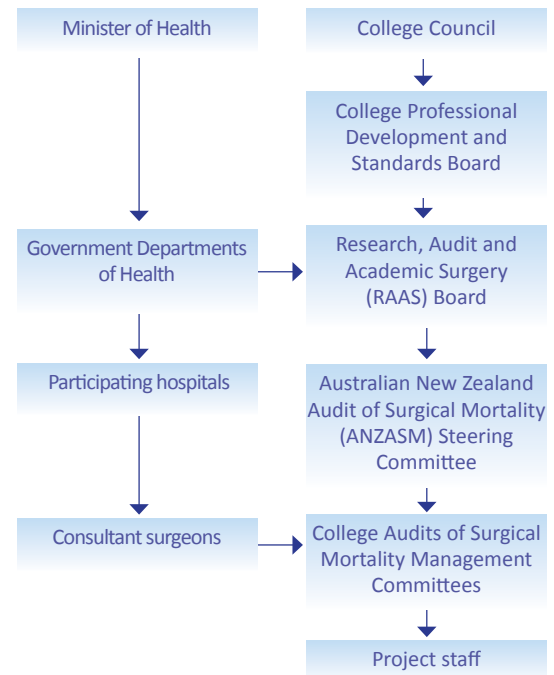
ANZASM is managed by the Research, Audit and Academic Surgery (RAAS) Division of the Royal Australasian College of Surgeons (the College). ANZASM oversees the implementation and standardization of each regional audit to ensure consistency in audit processes and governance structure across all jurisdictions involved.

The individual state audits are funded by their Departments of Health. The Royal Australasian College of Surgeons provides infrastructure support and oversight to the project.

Participation by surgeons was voluntary in 2009 but it has now been mandated as part of the College's Continuing Professional Development (CPD) program.

ANZASM receives protection under the Commonwealth Qualified Privilege Scheme; part VC of the *Health Insurance Act 1973* (gazetted 6 November 2006).

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



1.4 Methodology

Detailed methodology of the ANZASM audit process is contained in the 2003 to 2007 WAASM annual reports, which are available on the College website: <http://www.surgeons.org/waasm>

In brief, individual state audits of surgical mortality are notified of in-hospital deaths associated with surgical care under the care of a surgeon. The method of notification varies by state. All cases in which a surgeon was responsible for, or had significant involvement in, the care of a patient are included in the audit, whether or not the patient underwent a surgical procedure.

The clinical details pertaining to the management of each case are collected by a standard, structured proforma (called a surgical case form (SCF)), completed by the consultant surgeon (treating surgeon) associated with the case. The completed case record form is returned to the appropriate audit of surgical mortality (ASM) office where it is de-identified and sent for first-line assessment by a surgeon from the same surgical specialty but from a different hospital. This means the first-line assessor is unaware of the name of the deceased, the treating surgeon or the hospital where the death occurred.

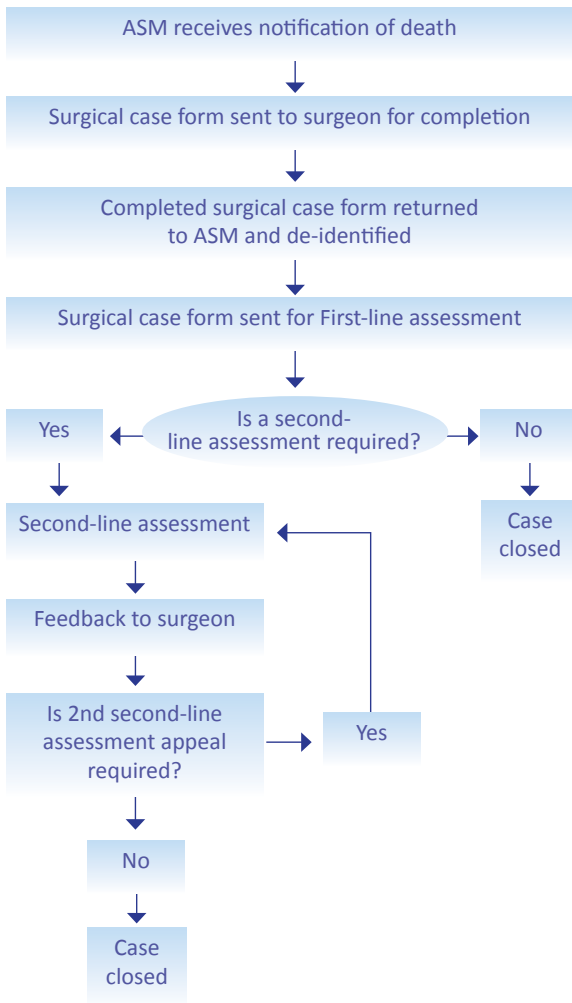
There are two possible outcomes of this first-line assessment:

- The information provided by the treating surgeon was adequate to reach a conclusion about the management of the case and to identify any issues of management, if present.
- A further, in depth, assessment (second-line assessment or case note review) is necessary either:
 - to clarify issues of patient management identified or suspected by the first-line assessor, or
 - because the information provided by the treating surgeon was inadequate to reach a conclusion.

Second-line assessors are selected using the same criteria as for first-line assessors. The audit process is outlined in Figure 2.



Figure 2: The audit process



1.5 Providing feedback

The principal aim of ANZASM is education as a component of continuing professional development of surgeons. This is achieved by providing commentary obtained during the audit process directly back to the treating surgeon as well as deidentified cases in a National Case Note Review booklet. The individual states audits also provide their own annual reports as well as Case Note Review series, which highlight particular issues in patient management.

1.6 Reporting conventions

1.6.1 Reporting clinical incidents

In the structured 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:

- report on the perceived impact of the incident on the outcome, that is, whether the incident:
 - made no difference to outcome
 - may have contributed to death
 - caused the death of a patient who would otherwise have been expected to survive
- provide their perception as to preventability, using the following categories:

- definitely preventable
- probably preventable
- probably not preventable
- definitely not preventable
- indicate area most responsible for the incident/event:
 - audited surgical team
 - another clinical team
 - hospital
 - other.

First- and second-line assessors also complete the same assessment matrix.

1.6.2 Analysis of clinical incidents

A primary objective of the ASM peer-review process is ascertaining if death was a direct result of the disease process alone, or if aspects of management of the patient might have contributed to that outcome. Where there is a perception that the clinical management may have contributed to death, ANZASM specifies a spectrum of criticism to be used by assessors:

- An area for consideration: Where the assessor believes an area of care **could** have been improved or different, but recognises that the issue is perhaps debatable.
- An area of concern: The assessor believes that an area of care **should** have been better.
- An adverse event occurred: This is defined as an unintended injury or event that was caused by the medical management of the patient rather than by the disease process, and which was sufficiently serious to lead to prolonged hospitalisation, or to temporary or permanent impairment or disability of the patient at the time of discharge, or which contributed to or caused death.

1.6.3 Data analysis

The 2009 annual report covers deaths reported to ANZASM from 1 January 2009 to 31 December 2009, censored on 1 March 2010. Completion of the full audit process can take up to an average of 2 months from notification of death. This means some cases are still under review and their outcomes are not available for this report. Patients admitted for terminal care are excluded from the full audit process.

For the purposes of collating data for this national report, data is encrypted and sent to and stored in a central Structured Query Language (SQL) server database which includes a reporting engine. All transactions are time-stamped. All changes to audit data are recorded in an archive table enabling a complete audit trail to be created for each case. An integrated workflow rules engine supports the creation of letters, reminders and management reports. This system is designed and supported by Alcidion Corporation (Adelaide).

The data is analyzed using the Statistical Package for Social Sciences (SPSS), version 15.0, statistical package STATA version 10.1, and Microsoft Office Excel (2003). Numbers in the parentheses in the text (n) represent the number of cases analyzed. As not all data points were completed, the total number of cases used in the analyses varies. The total number of cases included in the analyses is provided in all tables and figures in the report.



2. Audit participation

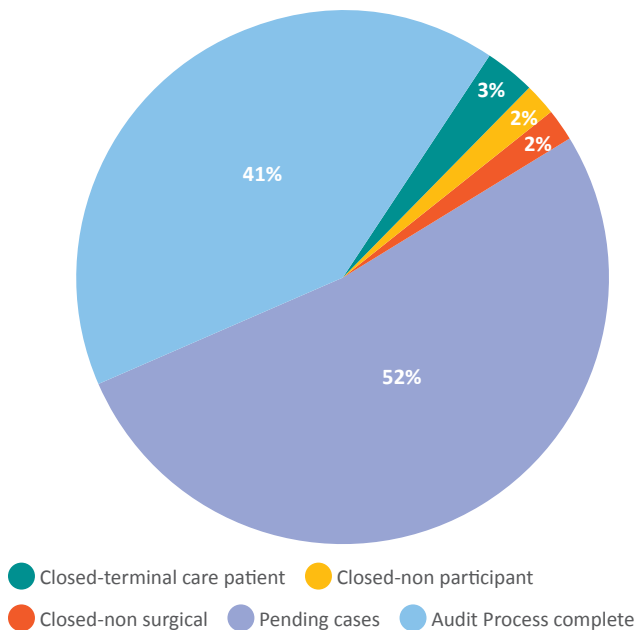
KEY POINTS

- Surgeon participation nationally is 63%. However this may be an underestimate of true intent to participate as the audit is not yet available in all hospitals, particularly in the private sector.
- It is disappointing that 26% of surgeons have refused to participate in this audit. Since January 2010 participation in ANZASM has been made a mandatory component of Continuing Professional Development (CPD). It is expected that this will encourage more surgeons to participate.
- The surgical case form return rate at census date for those participating surgeons is a credible 63%.
- As evidence that hospitals have embraced this quality project, only 3% of hospitals approached have elected not to participate.

2.1 Audit numbers

During the period January to December 2009, ANZASM received 5777 notifications of death associated with surgical care.

Figure 3: Audit status at census date (n=5777)



Comment

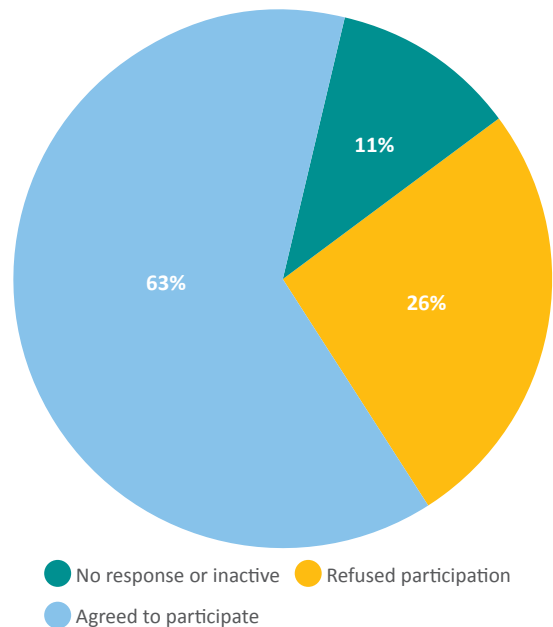
- 3642 (63%) of 5,777 case record forms sent to treating surgeons had been completed and returned to the ASM by the census date.
- 180 (3%) cases were recorded as admissions for terminal care and excluded from the review process.
- 123 (2%) cases had been wrongly attributed to a surgical unit and were also excluded.

- 121 (2%) cases could not be audited as the treating surgeon had elected not to participate.
- 2347 (41%) cases had completed the full audit process by the census date.
- As basic clinical information on each death requires the treating surgeon to complete a surgical case form, data available for this analysis comes entirely from the 3642 completed surgical case forms.
- Outcomes from the actual peer review process are restricted to the 2347 deaths in which this process has been completed.

2.2 Surgeon participation

The audit process relies on surgeons not just agreeing to participate, but to complete and return surgical case and assessment forms in a timely manner.

Figure 4: Participation by surgeons (n=5116)



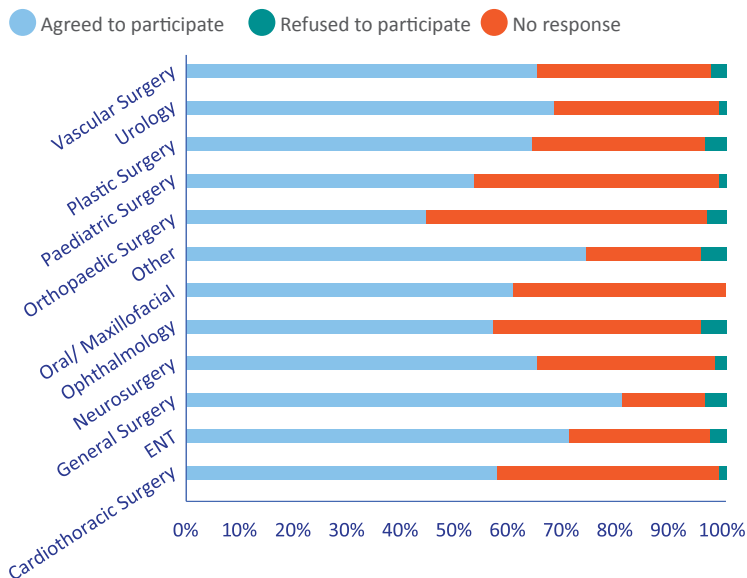
Comment

- 3241 (63%) of the 5116 eligible Fellows in states submitting data to this audit have agreed to participate. (Included in this number it is worth noting that there were 202 surgeons that did not consent to the audit process but nevertheless have submitted case record proformas).
- 1875 (37%) of the 5116 surgeons have yet to agree to participate. Of this number, there was no response from 374 (7%) surgeons and 187 (4%) surgeons have been identified inactive in that they have ceased practice or practicing overseas.
- The rate of participation by surgeons is less than desirable. Since January 2010 participation in ANZASM has been made a mandatory component of Continuing Professional Development (CPD). This should encourage more surgeons to participate.
- Reasons for non-participation range from private hospitals and surgeons operating from hospitals that are currently



not participating in the audit process, ACT and NT surgeons (where the audits only commenced from 2010) and possibly surgeons who operate in specialties, such as cosmetic surgery, which have no deaths.

Figure 5: Surgeon agreement to participate by surgical specialty (n=5116)



Comment

- Participation rates demonstrate minor variations in intention to participate among the specialties.
- The category 'other' covers the following specialties: Trauma and Transplant, Intensive Care Unit (ICU) and Anaesthesia.

2.3 Hospital participation

The majority of public hospitals in participating states have been recruited to the audit program. Only 3% of hospitals invited to participate have not agreed to be involved.

Private hospital participation varies among states and is a feature of individual funding arrangements within these states. ANZASM intends to have more widespread private sector participation, and is actively pursuing this goal.





3. Demographic profile of audited cases

KEY POINTS

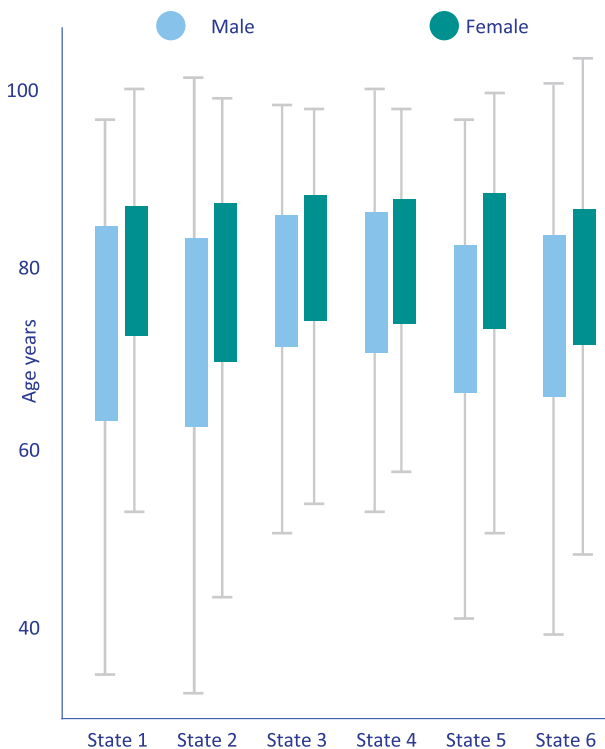
- 87% of audited deaths occurred in patients admitted as emergencies with acute conditions.
- The high mean age of these patients indicates surgical mortality is predominantly in the elderly.

Figures 6, 7 and 9 are box and whisker plots, in which:

- The central box represents the values from the lower to upper quartile (25-75 percentiles).
- The middle line represents the median value.
- The vertical line extends from the minimum value to the maximum value, excluding outliers and extreme values (i.e. values larger than the upper quartile and plus 1.5 or 3 times the inter-quartile range).

3.1 Age and gender

Figure 6: Age distribution of deaths by gender and state



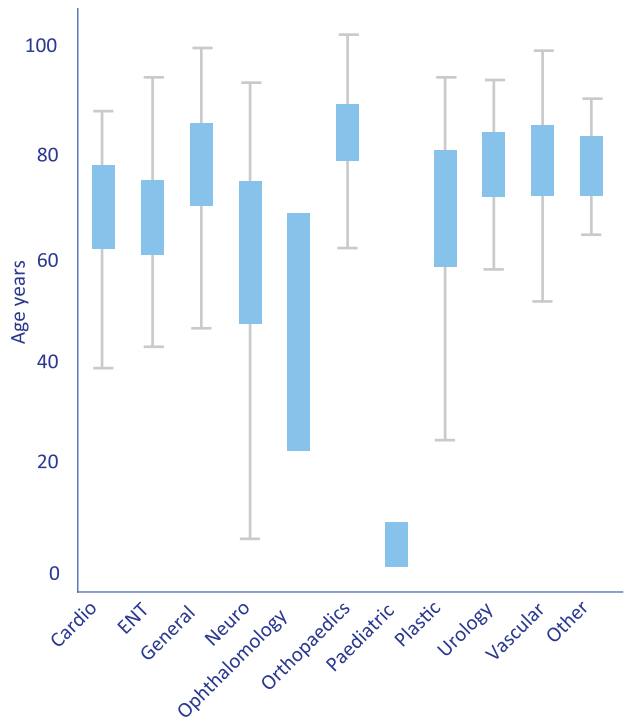
Note: Extreme values can be displayed at separate points but for the purposes of this diagram have been excluded.

Comment

- The gender distribution of audited deaths was similar across the states.
- The gender ratio of audited deaths was 54% male and 46% female.

- The median (IQR) age for females and males was 78 years and 74 years respectively.
- Females predominate in the 81-90 and >90 year age ranges, whilst males predominate in the 71-80 year age range (data not shown in this graph).

Figure 7: Age distribution of deaths by surgical speciality (n=2347)



Note: Extreme values can be displayed at separate points but for the purposes of this diagram have been excluded. .
Notes: Other – trauma & transplant, otology, otolaryngology, anaesthesia, general practitioners.

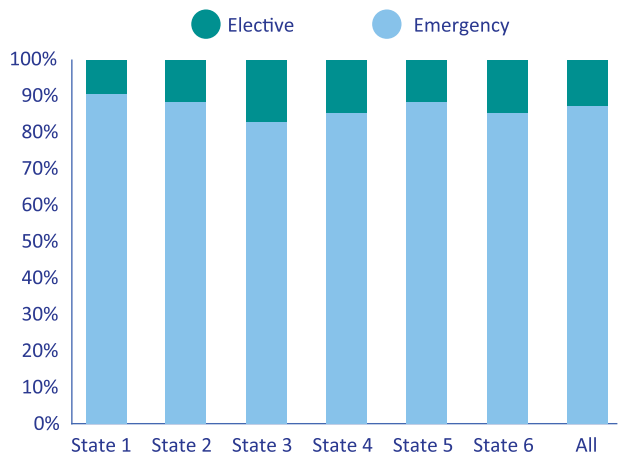
Comment

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

3.2 Acuity of audited cases

The 'acuity' status of audited cases indicates whether they were admitted electively or as emergencies for acute conditions.

Figure 8: Acuity of cases (n=2347)

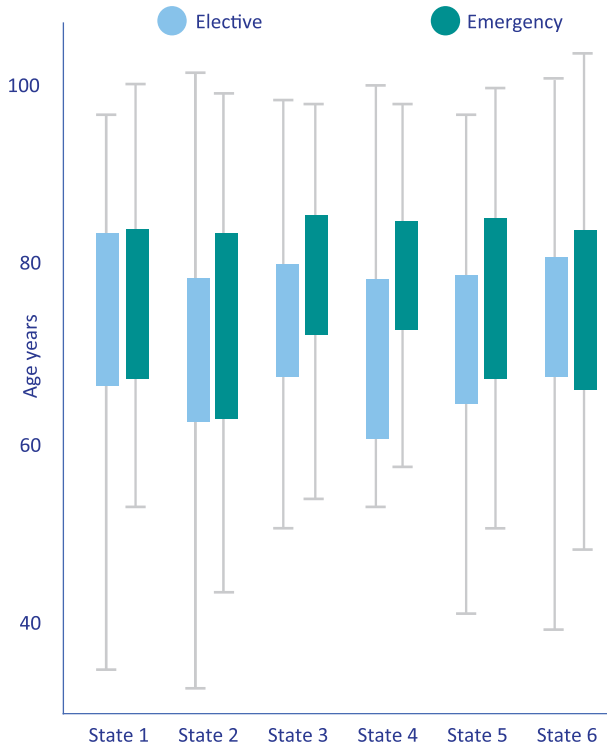




Comment

- The majority (87%) of audited deaths occurred in patients admitted as emergencies for acute life threatening conditions.

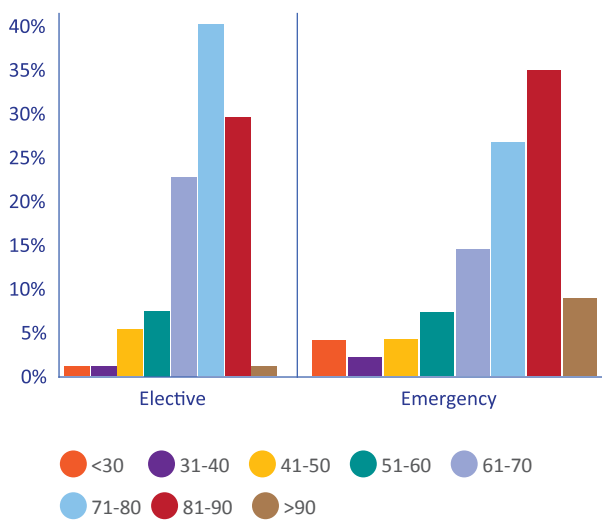
Figure 9: Age distribution of deaths by acuity by state (n=2347)



Comment

- Deaths associated with emergency admission tended to be older than those admitted electively (P value=0.002 emergency vs. elective).

Figure 10: Age distribution by admission type (n=2347)



Comment

- The distribution of mortality by age between elective and emergency surgery is relatively similar. Emergency surgery in the over 80 year's age group is associated with greater mortality.





4. Risk profile of audited cases

This section reviews the risk profile of audited cases. This includes the American Society of Anaesthesiologists (ASA) status, reported comorbidities and the treating surgeon's perception of risk of death.

KEY POINTS

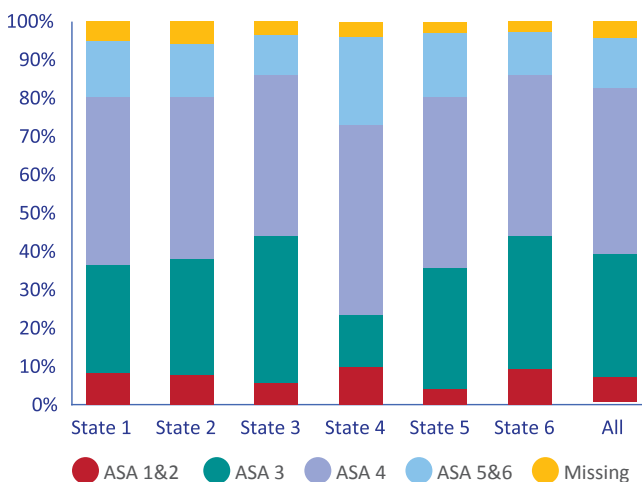
- The clinical risk profile indicates that the majority of deaths occurred in patients with coexisting illness presenting with acute life-threatening conditions.
- 76% of cases in this audited series were reported to have at least two preexisting medical conditions (comorbidities).

4.1 American Society of Anesthesiologists status

The American Society of Anesthesiologists (ASA) status is an international measure of patient risk used by anesthetists. ASA grade characteristics:

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

Figure 11: % ASA by state (n=2347, missing n=97)

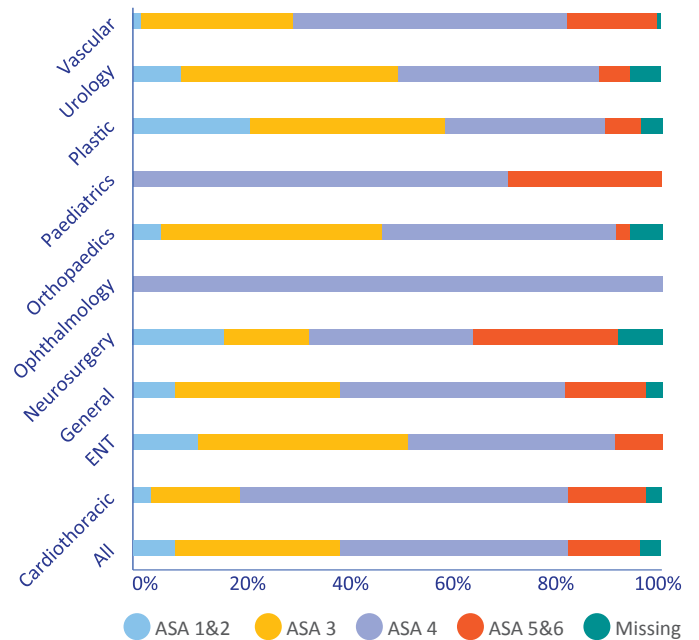


Comment

- 88% of patients had an ASA grade of 3 and 4, indicating a moderate to severe degree of intercurrent systemic disease at time of treatment.
- The risk status as indicated by the ASA score is similar among states.
- The large preponderance of high ASA grades suggests that most

deaths have occurred in patients assessed as high risk by the anaesthetic team.

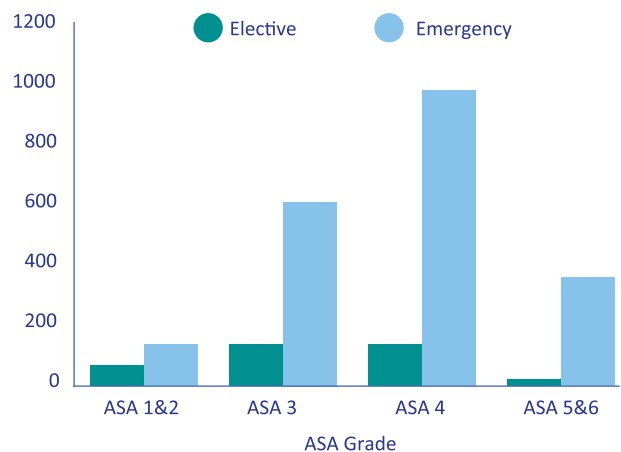
Figure 12: % ASA grades by surgical specialty (n=2347) (Missing n=97)



Comment

- There is some variation in the ASA assessment of risk among deaths in the subspecialties. This reflects the casemix of the individual specialties.

Figure 13: % ASA grades by admission status (n=2347)



Comment

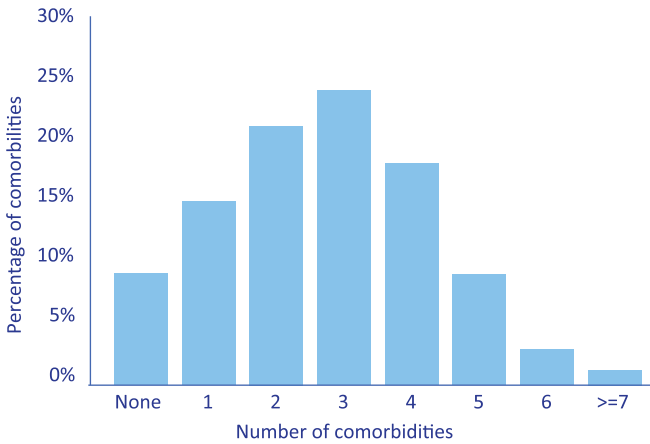
- Patients with ASA 3 to 6 had a higher proportion of admissions as emergencies (82%) than those with ASA 1 and 2 (6%).



4.2 Comorbidity

Surgeons are asked to record all known comorbidities (coexisting medical conditions) additional to the primary problem.

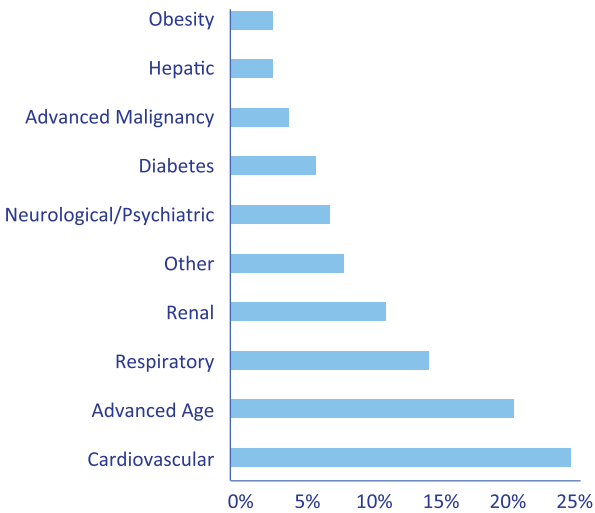
Figure 14: Frequency of multiple comorbidities in individual patients (n=6336 comorbidities in 2151 of 2347 patients)



Comment

- In 91% of 2151 audited cases comorbidities were reported.
- Most patients (76%) had at least two comorbidities. This is further evidence of significant preexisting illness in this group of audited deaths.

Figure 15: Frequency of comorbidities (n=6336 in 2151 of 2347 patients)



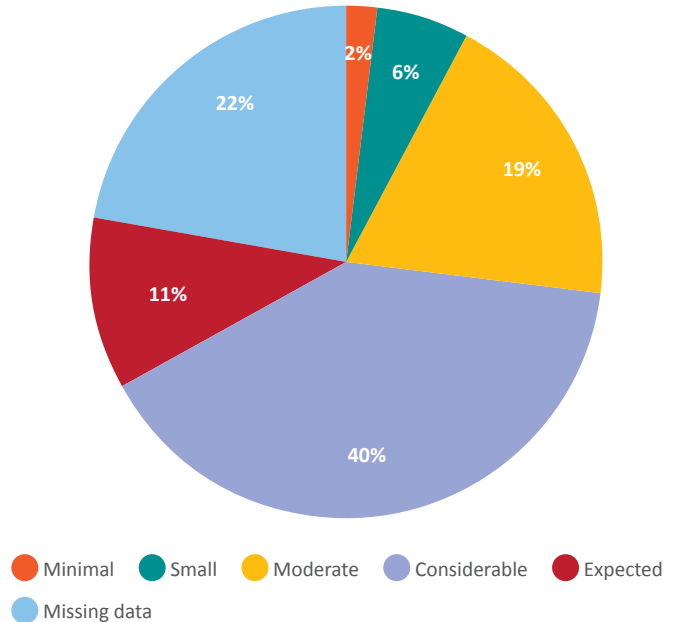
Comment

- The most common comorbidities were similar in both male and female patients and were cardiovascular disease and advanced aged.
- "Other" comorbidities ranged from sepsis, malnutrition, alcohol abuse, dementia, motor neurone disease, HIV and rheumatoid arthritis.

4.3 Surgeons perception of risk status

The treating surgeon is asked to record their perception of risk of death at the time of treatment (It should be acknowledged that this perception of risk may be influenced by the actual outcome).

Figure 16: Risk of death as perceived by treating surgeon (n=2347)



Comment

- The perceived risk of death, as reported by surgeons, was considerable or expected in 51% of cases and small or minimal in only 8% of cases.
- This is further evidence of the high risk profile suggested by the mean age, ASA score and associated comorbidity.
- Missing data is at an unsatisfactory level.





5. Risk management strategies

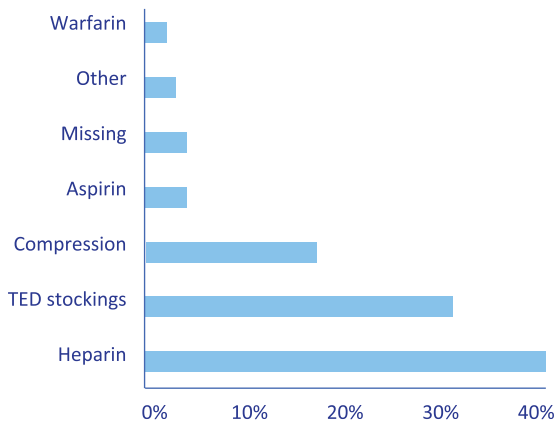
5.1 Prophylaxis for venous thromboembolism (VTE)

KEY POINTS

- In this audited series of deaths VTE prophylaxis was generally deemed as appropriate. However in 28% of cases where prophylaxis was consciously withheld by the treating surgical team, assessors disagreed with the decision to withhold.
- In the majority of instances, those patients perceived to benefit from critical care support received it. The review process suggested that some 14% of cases who did not receive treatment in an ICU and 16% of cases not treated in a high dependency unit (HDU) would most likely have benefited from it.
- Fluid balance in the surgical patient is an ongoing challenge. In this series 7% of cases were perceived to have had poor management of their fluid balance.

The treating surgeon has to record if deep vein thrombosis (VTE) prophylaxis was given and what prophylaxis was actually used. If not given, the reason it was withheld is requested. During the audit process, assessors review the appropriateness of these decisions.

Figure 17: Type of VTE prophylaxis used (n=1712 in 2347 patients, missing n=65)



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

Table 1: Type of VTE prophylaxis used by state (n=1712 in 2347 patients)

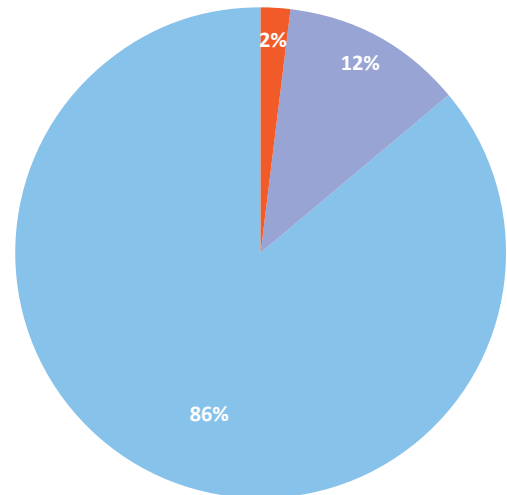
VTE prophylaxis agents used	State 1	State 2	State 3	State 4	State 5	State 6
Heparin	45%	37%	43%	43%	47%	39%
TED stockings	32%	34%	35%	26%	33%	31%
Compression	17%	20%	9%	23%	10%	23%
Aspirin	2%	4%	6%	5%	4%	3%
Other *	2%	3%	5%	2%	4%	2%
Warfarin	2%	2%	2%	1%	2%	2%

Note*: Other agents: Clopidogrel, Enoxaprin, Clexane, Calf pumps, Fragmin, Plavix, Croxapain, Lipirudin

Comment

- VTE prophylaxis was used in 1712 of 2347 (73%) patients and this varied from 68% to 78% across the states.
- There are variations in the use of certain forms of prophylaxis across the states, particularly compression, TED stockings and Heparin.

Figure 18: Stated reason for non-use of VTE prophylaxis (n=561 in 2347 patients)

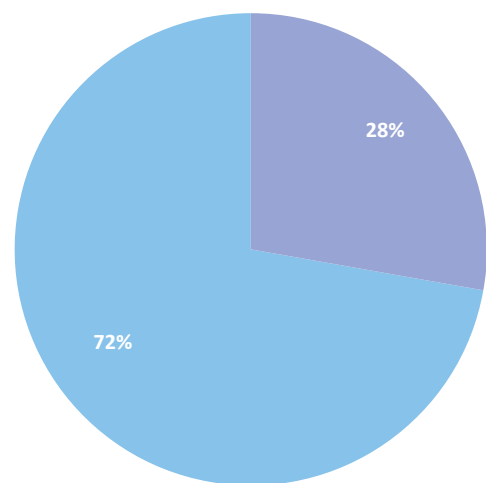


● Not appropriate/Decision to withhold ● Omission ● Missing data

Comment

- In the 27% of cases where VTE prophylaxis was not given, the treating surgeon was asked to provide the reason for withholding.
- In only 10 cases (2%) was this due to error or omission. In the majority of instances prophylaxis was withheld for clinical reasons.

Figure 19: Assessor perception of appropriateness of decision to withhold VTE prophylaxis (n=197 in 2347)



● Appropriate ● Not appropriate

Comment

- Assessors perceived the decision to withhold DVT prophylaxis had been appropriate in 72% of the 2347 audited cases.



5.2 Provision of critical care support to patients

The treating surgeon is asked to record if a patient received critical care support in an intensive care or high dependency unit before or after surgery. The first- and second-line assessors review the appropriateness of the use of critical care support. It is recognized that this is a subjective assessment of needs and potential benefit.

Table 2: Use of ICU management (n=2893 operative procedures in 2347 patients)

	Yes		No		Missing data	
Preoperative ICU	596	(21%)	1089	(37%)	1208	(42%)
Postoperative ICU	956	(33%)	440	(15%)	1497	(52%)

Table 3: Use of HDU management (n=2983 operative procedures in 2347 patients)

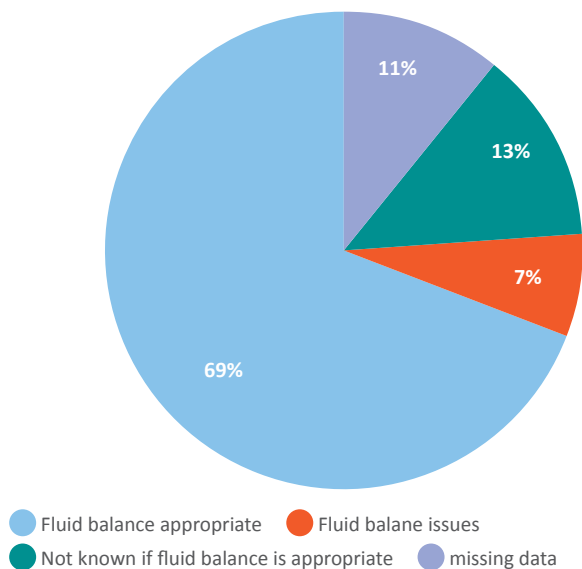
	Yes		No		Missing data	
Preoperative HDU	120	(4%)	924	(32%)	1849	(64%)
Postoperative HDU	167	(6%)	442	(15%)	2284	(79%)

Comment

- ICU was used in **21%** of cases preoperatively and **33%** postoperatively. HDU was used in **4%** of preoperative cases and **6%** of postoperative cases. The high volume of missing data prevents interpretation of this data.
- The assessor's view on whether patients who did not receive critical care support might have benefited suggested **14%** and **16%** of these cases would have benefited from ICU and HDU respectively. The reason why these patients did not receive critical care support is unknown.
- The surgical case form was revised in August 2010 to identify the reasons why patients did not receive critical care support and to overcome the large amount of missing data in this section. It is hoped that this revised and improved question will encourage surgeons to complete the form and thus ensure sufficient data for analysis in this area of care.

5.3 Fluid management

Figure 20: Fluid management (n=2347, missing n=260)



Comment

- This section deals with the appropriateness of fluid balance in **2347** patients. In **7%** of cases surgeons felt that there was an issue with fluid balance and this figure varied between **3%** and **9%** across the states. In **13%** of cases it is not known if fluid balance was appropriate.
- Fluid balance in the surgical patient remains problematic, often managed by relatively junior staff. Continuing education and use of appropriate guidance is to be encouraged. There have been a number of publications seeking to increase knowledge and improve practice including the SIGN guideline no. 771⁽¹⁾ and more recently the British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients.⁽²⁾





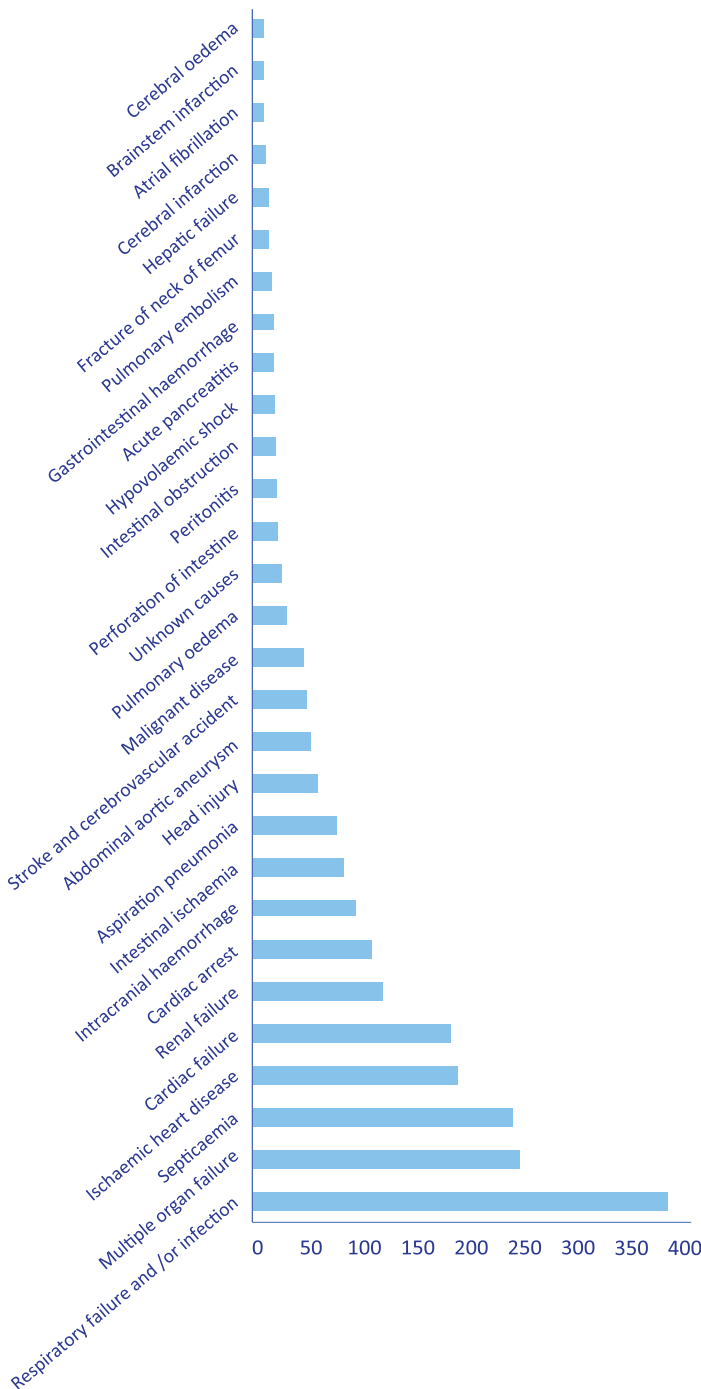
6. Cause of death

6.1 Frequency of causes of death reported in audited cases

KEY POINTS

- The most frequent causes of death were respiratory failure, multi-organ failure and septicæmia.

Figure 21: Cause of death if n>=10 (n=2347)



Comment

- Only diagnoses with a frequency >10 are shown as cases <10 instances are potentially identifiable.

6.2 Establishing cause of death

The cause of death recorded by the treating surgeon is based on the clinical course of the patient and any relevant supporting evidence from investigations. Where doubt exists around the circumstances leading to death, the case will be referred to the coroner. In other instances, where the cause of death is not clear, a postmortem examination may be requested. This latter method of confirming cause of death is requested with decreasing frequency.

Figure 22: Overview of postmortems performed (n=2347 patients, missing n=31)

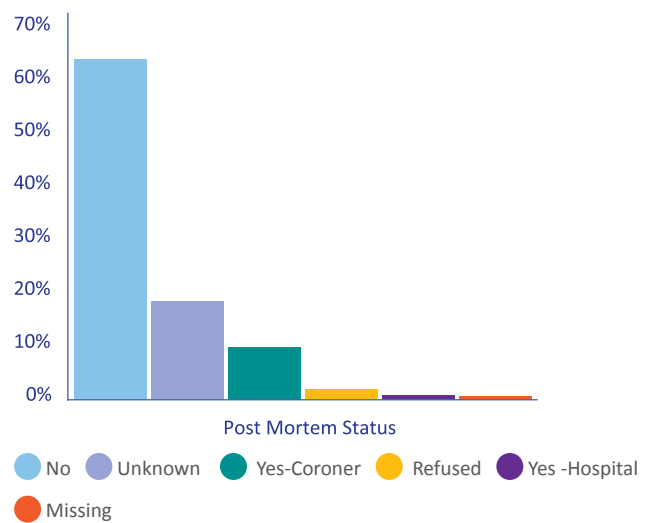


Table 4: % Overview of postmortems performed by state (n=2347 patients, missing n=31)

	Postmortem					
	State 1	State 2	State 3	State 4	State 5	State 6
No	69%	67%	70%	73%	57%	60%
Unknown	21%	19%	17%	13%	20%	23%
Yes-Coroner	9%	9%	8%	8%	14%	14%
Refused	1%	3%	5%	6%	6%	2%
Yes-Hospital	0%	2%	0%	0%	3%	1%

Comment

- In only 6% of cases preference for postmortem was recorded but did not occur.
- The majority of postmortems carried out were Coronial. The need for Coronial input varied among states.
- The low rate of postmortems limits confirmation of cause of death.



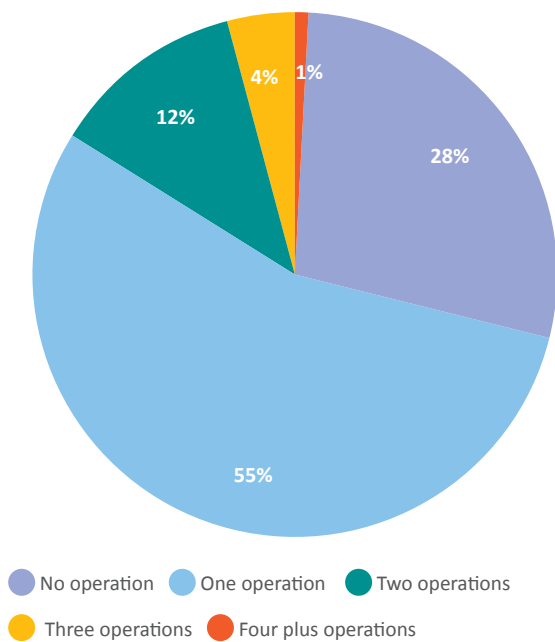
7. Profile of operative intervention

KEY POINTS

- A total of **2983** multiple operative procedures were performed on **1692** patients.
- **28%** of patients did not undergo surgery.
- The majority (**89%**) of operative procedures were performed by a consultant surgeon. This bias towards consultant surgeons is appropriate when the risk profile of this group of patients is considered.
- The rate of subsequent (unplanned) returns to theatre was **10%**. This often is as a result of multiple returns to surgery.
- The most common postoperative complications recorded were procedure-related sepsis, postoperative bleeding, tissue ischemia and anastomotic leaks after bowel surgery.

7.1 Operative rate

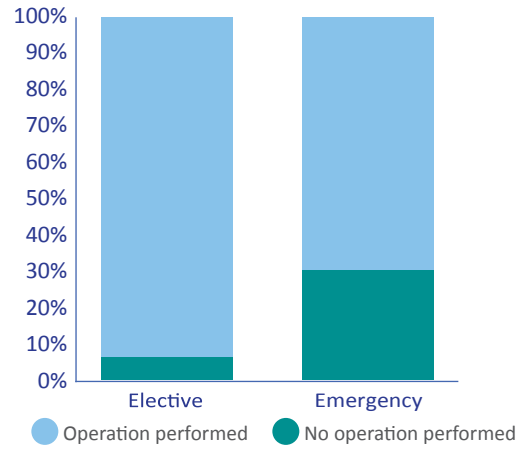
Figure 23: Frequency of multiple operations on individual patients (n= 1692 patients having 2983 operative procedures)



Comment

- The majority of patients (**55%**) had one operation.
- **28%** of patients in this audited series did not undergo an operative procedure during their final inpatient episode.
- **17%** of patients had more than one operative procedure during their final inpatient episode.

Figure 24: Operative procedures by urgency type (n=2983 operative procedure in 2347 patients)

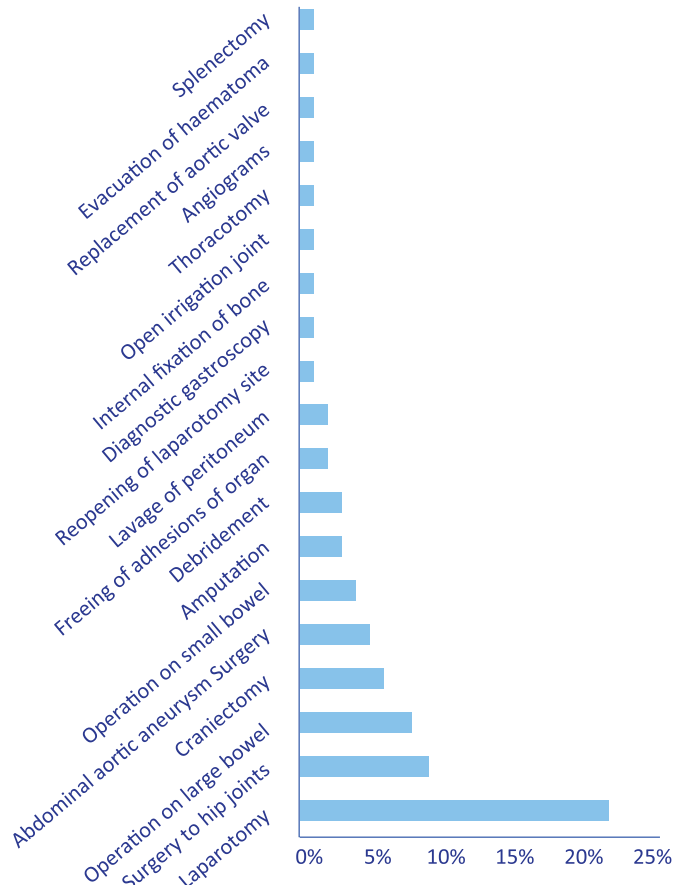


Comment

- Deaths where no procedure occurred were mainly **627 (27%)** patients admitted as an emergency and were associated with an active decision not to operate.

7.2 Frequency of operative procedures

Figure 25: Types of operations where n>=10 (2983 operative procedure in 1692 patients of the 2347 audited cases)



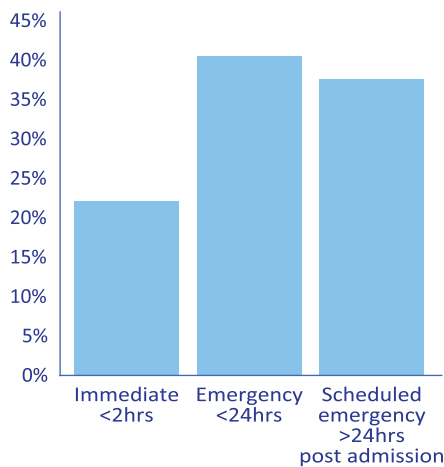


Comment

- A patient can undergo multiple procedures during the same admission and at the same surgical session.
- The procedures with the highest listed frequency are usually associated with emergency admission for trauma or other acute pathology.
- Diagnostic gastroscopy is often performed when blood loss complicates the clinical cause. The procedure itself is rarely the cause of death.

7.3 Timing of emergency procedures

Figure 26: Timing of emergency procedures (n=2320 of the 2983 operative procedures in the 2347 audited cases)



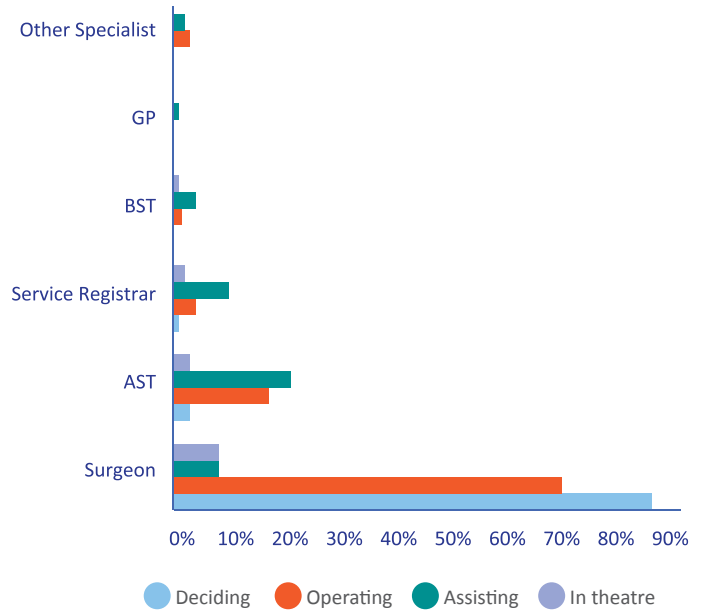
Comment

- The time criticality of a patient’s condition predicts the timing of emergency surgery. Of **2320** emergency admissions, **542 (23%)** had surgery within 2 hours of admission, **903 (39%)** had surgery within 24 hours and **875 (38%)** after 24 hours.
- This means **1445 patients (62%)** of emergency admissions to a surgical unit required surgery within 24 hours of admission. The scheduling problems associated with managing these urgent cases and the elective caseload is an increasing issue for hospitals.
- The majority of emergency surgery is performed in the public sector.

7.4 Seniority of surgeon performing surgery

The treating surgeon has to record the seniority of the surgeon who made the clinical decision to operate and who performed the surgery.

Figure 27: Seniority of consultant involvement in performing surgery (n= 2983 operative procedures performed)

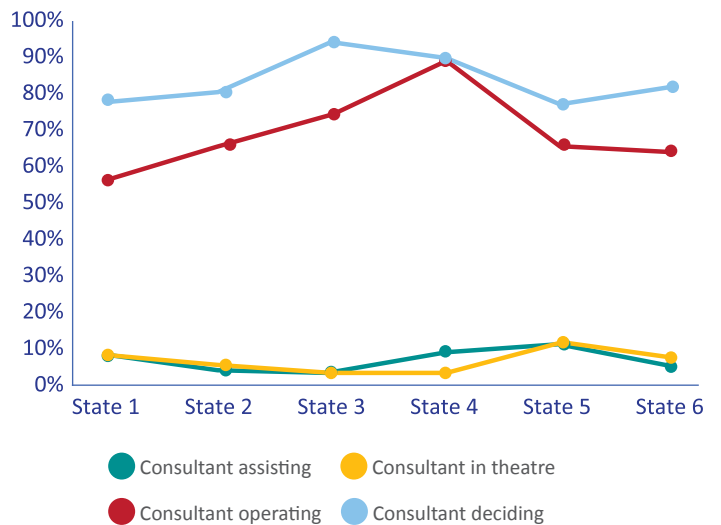


Notes: GP – General Practitioner, BST –Basic Surgical Trainee, AST – Advanced Surgical Trainee

Comment

- In nearly **85%** of cases the consultant surgeon made the decision about operating and in approximately **69%** of cases they performed the operation.
- A consultant anaesthetist was present in **2671 (90%)** of the **2983** procedures.

Figure 28: % Consultant involvement by state in performing surgery (n= 1692 patients with 2983 operative procedures performed)



Comment

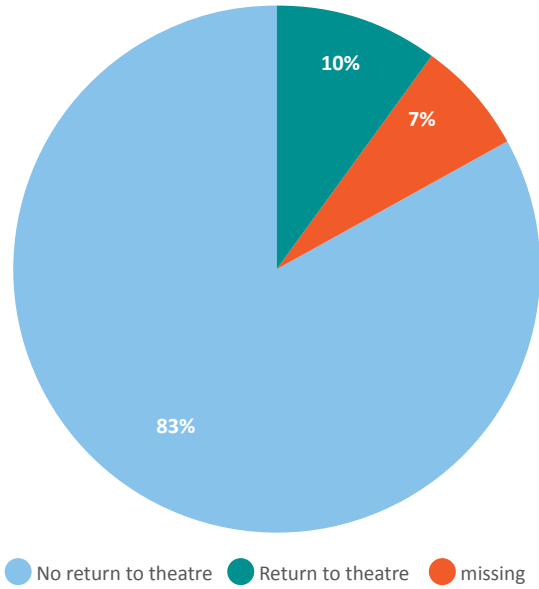
- There are small variances among states in consultant involvement in performing surgery



7.5 Unplanned return to theatre

The treating surgeon has to indicate if there was an unplanned return to the operating theatre following the initial procedure.

Figure 29: % Patients requiring unplanned return to theatre (n=240 in 2347 patients, missing data = 150)



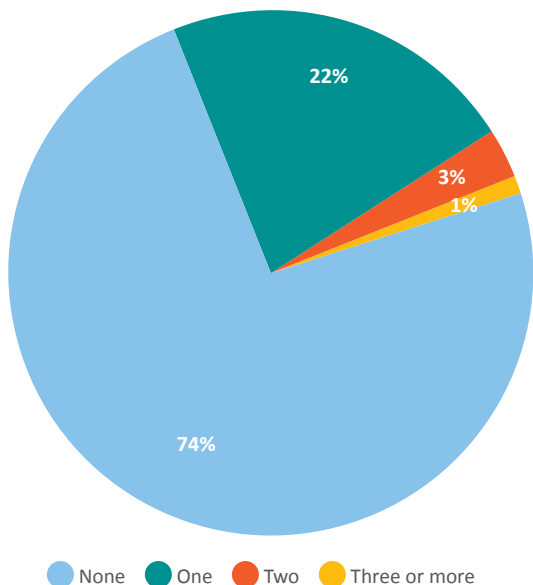
Comment

- In 10% of audited cases that underwent a surgical procedure, there was a requirement of subsequent, unplanned returns to theatre.

7.6 Postoperative complications

The treating surgeon has to record any complications that occurred following a surgical procedure.

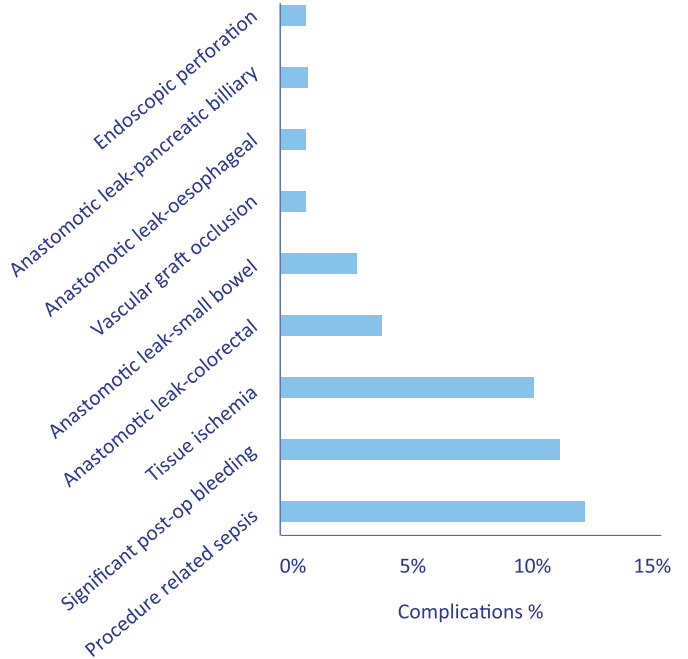
Figure 30: Patients developing postoperative complications nationally (n=592 in 2347 patients)



Comment

- Postoperative complications were reported in 592 (25%) of 2347 audited cases where a surgical procedure had been performed.

Figure 31: Frequency of post-operative complications where frequency >=10 (n=592 in 2347 patients)

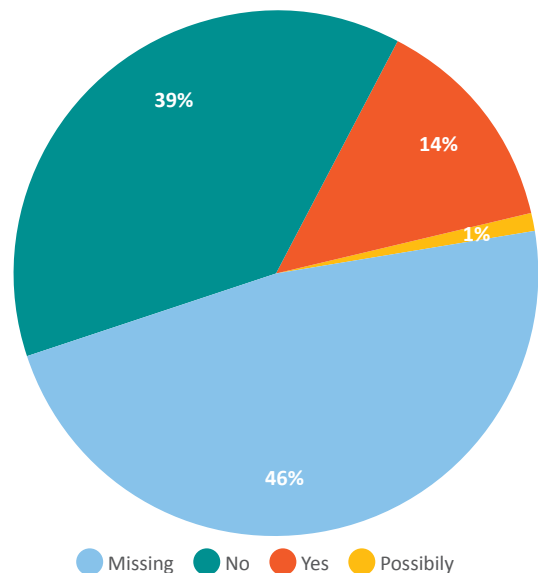


Comment

- There was a large group of 'Other' complications not shown here (n=383). These are not included as individual frequency <10.
- The most common postoperative complications were procedure-related sepsis, postoperative bleeding, tissue ischemia and anastomotic leaks after bowel surgery.

7.7 Anaesthetic problems

Figure 32: Patients recoded as having anaesthetic problems (n=335 in 2347 patients)





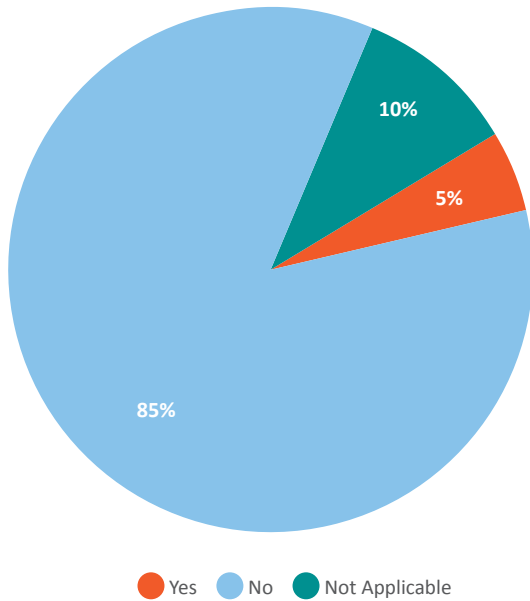
Comment

- A small percent of deaths (14%) in 2347 cases were attributed to anaesthesia.

7.8 Operative procedure abandoned

The treating surgeon has to record if they abandoned any surgical procedure and the reasons for doing so.

Figure 33: % Abandoned operations (n=124 in 2347 patients, missing = 760)



Note: Missing data has been excluded from the graph.

Comment

- This reflects the finding of incurable and untreatable disease leading to a decision to abandon the operative procedure. Such a finding led to the operative procedure being abandoned in 5% of cases.



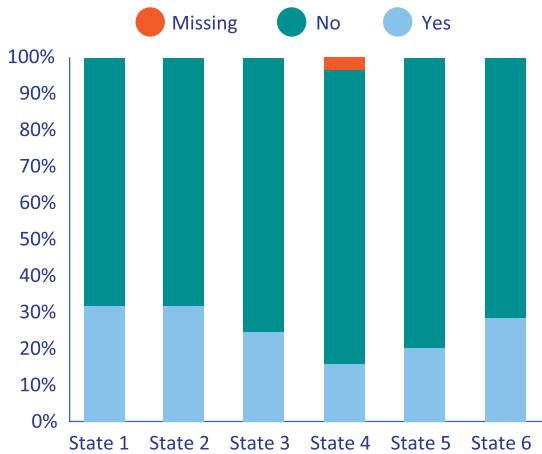


8. Patient transfer issues

8.1 Frequency of need for transfer

The number of patients requiring transfer between hospitals is recorded. This is typically necessitated by the need for a higher level of care or specific expertise.

Figure 34: Frequency of need for transfer to another hospital, by state (n=631 in 2347 patients, missing= 41)



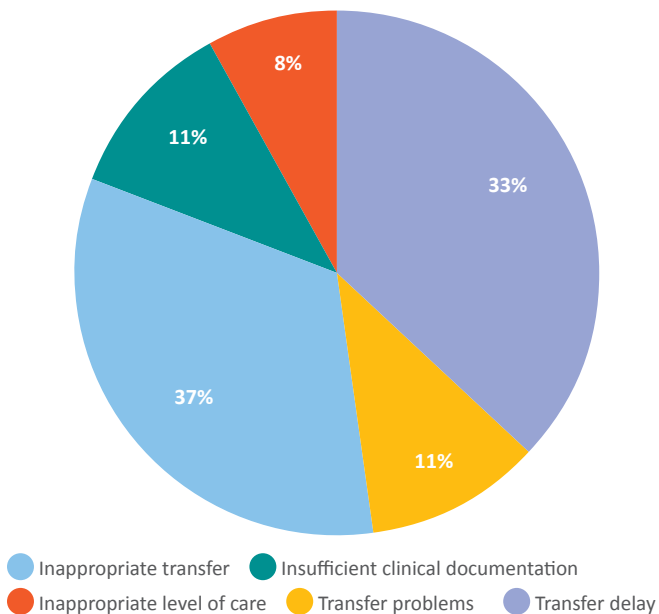
Comment

- On average, **27%** of audited cases patient transfer between hospitals was necessary.
- There is little difference between the states.

8.2 Issues associated with patient transfer

The treating surgeon is asked to record any issues associated with patient transfer between hospitals.

Figure 35: % Type of transfer issues n=631 in 2347 patients



Comment

- The most common issues raised were inappropriateness of transfer (**37%**) and delay in transfer (**33%**).
- The insufficient clinical information provided by transferring hospitals is a concern. Such communication between clinicians is essential to ensure a complete picture of a patient's health status is known.





9. Peer review outcomes

KEY POINTS

- Second-line assessment was only requested in 8% of audited cases. Lack of adequate information provided by treating surgeons was responsible for a quarter of these.
- The most common cause of an area of concern, area of consideration or adverse event recorded by the ASM was delay in definitive treatment.
- From 1 January 2009 to 31 December 2009 ANZASM identified that 8% of cases had some form of delays. Surgeons were deemed responsible for 3% of delays, 2% were attributed to non-surgeons in a hospital and 1% of cases were attributed to the general practitioner. The other 2% of cases with delays were attributed to distance, issues with the emergency department, inappropriate diagnosis, private sector transfer, patient declining transfer, radiology issues and communication issues.
- The major causes for delay were failure to establish the true diagnosis or recognize adverse clinical trends.
- Significant criticism of patient management was made in 10% of cases in this audited series.
- In only 4% of cases in the audited series were these management issues felt to have probably contributed to the outcome. The assessors felt that only 33% of the clinical issues raised were actually attributable to the surgical care.

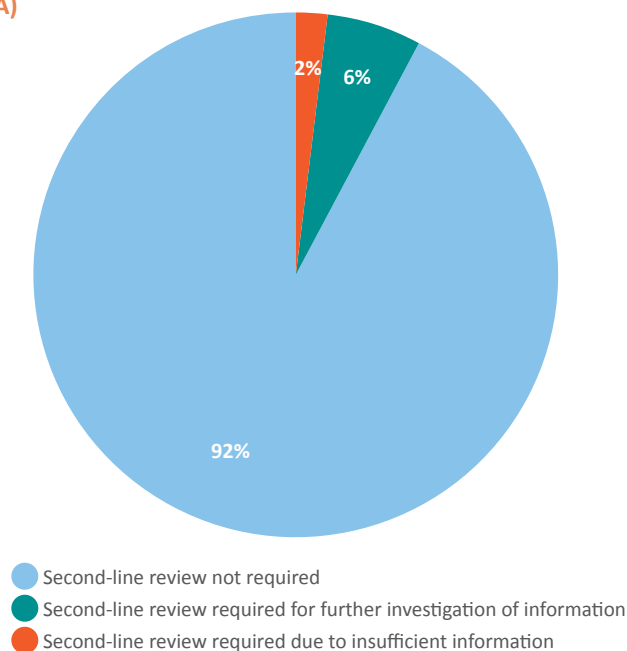
9.1 Second-line assessments

The peer review process is a retrospective examination of the clinical management of patients who died whilst under the care of a surgeon. All assessors (first and second-line) must decide if the death was a direct result of the disease process alone, or if aspects of the management of the patient may have contributed to the outcome. A total of 2347 cases have completed first-line assessment (FLA). The first-line assessor has to decide if the treating surgeon has provided enough information to allow them to reach an informed decision on appropriateness of management of the case. If inadequate information was provided then the first-line assessor requests a second-line assessment (SLA) or case note review. Other triggers for requesting second-line assessment are:

- A more detailed review of the case could better clarify events leading up to death and any lessons emanating from the case under review.
- Death was quite unexpected, for example in a young fit patient with benign disease or day surgery case.

The number of second-line assessments required because of a lack of information provided in the surgical case form is an indirect measure of surgeon compliance in the audit process. Second-line assessments required for the other triggers are more likely to represent suspected issues of clinical management.

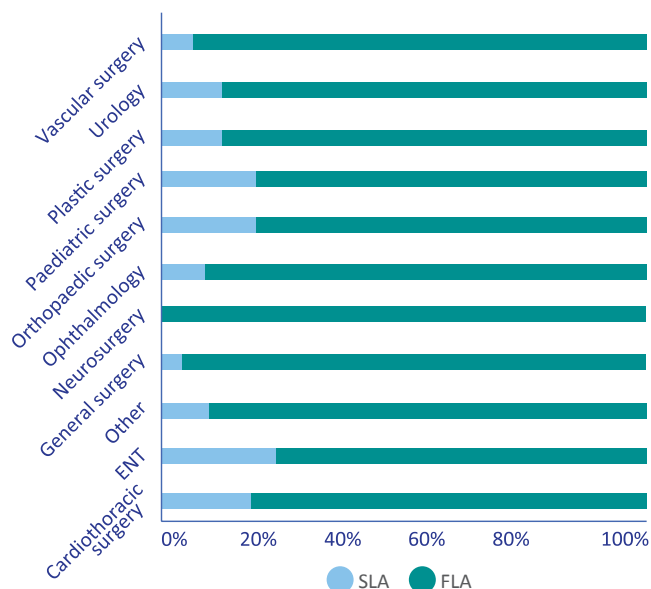
Figure 36: Reason for referral for Second-Line Assessment (SLA)



Comment

- Second-line assessment was requested in 8% of audited cases. Lack of adequate information provided by the treating surgeon in the surgical case form was the trigger in a quarter of these SLAs.
- The need for a second-line assessment can often be avoided if the surgeon completes the case record form properly and provides adequate information.

Figure 37: Frequency of need for SLA among surgical specialties (n= 236 in 2347 cases)



Note: The category 'Other' covers the following specialties: Trauma and Transplant, Maxillofacial, Trauma, Obstetrics and Gynaecology, Otolaryngology, ICU and Anaesthesia



Comment

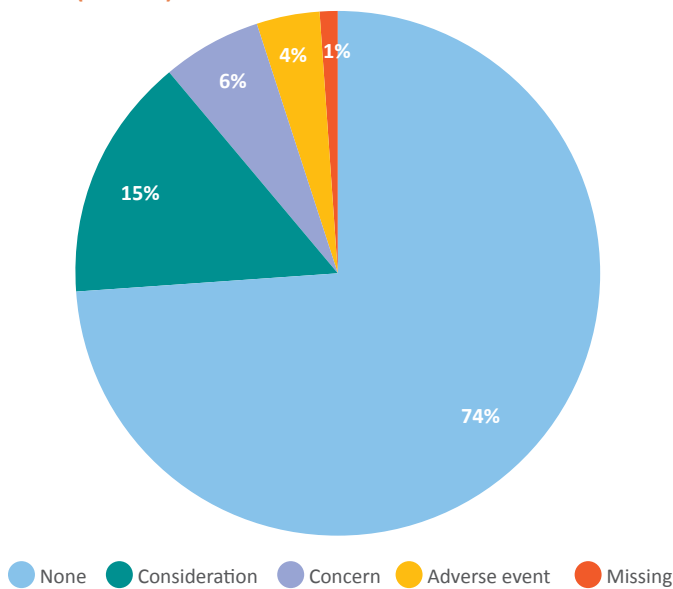
- There is some variation in the SLA rate among specialties. The reasons for this are not obvious.

9.2 Clinical management issues

A primary objective of the peer review process is ascertaining if death was a direct result of the disease process alone, or if aspects of the management of a patient might have contributed to that outcome. There are two possible outcomes. Either the death was a direct outcome of the disease process and the clinical management had no impact on the outcome or there was a perception that aspects of patient management may have contributed to the death of the patient. Where there is a perception that the clinical management may have contributed to death, ANZASM has specified a spectrum of criticism from which the assessor can choose:

- An area for consideration exists: This is where the assessor believes an area of care could have been improved or different, but recognizes that the issue is perhaps debatable. It represents very minor criticism.
- An area of concern exists: The assessor believes that an area of care should have been better.
- An adverse event occurred: This is defined as an unintended injury or event that was caused by the medical management of the patient rather than by the disease process, and which was sufficiently serious to lead to prolonged hospitalization, or to temporary or permanent impairment or disability of the patient at the time of discharge, or which contributed to or caused death. In addition there are predetermined outcomes classified as adverse event e.g. anastomotic leak.

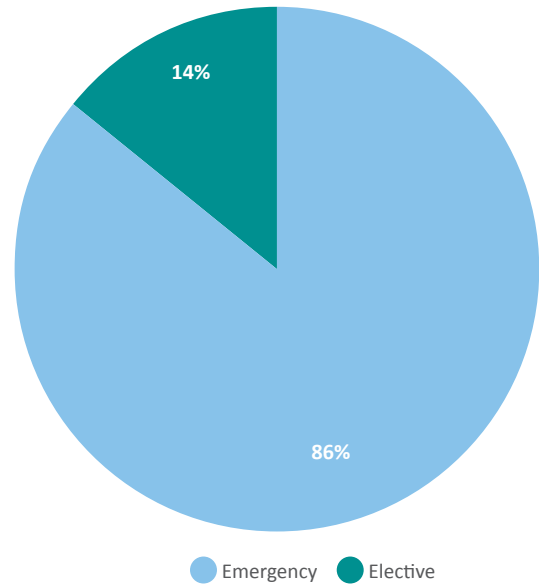
Figure 38: Frequency and spectrum of clinical management issues (n=2347)



Comment

- In 89% of audited cases, assessors felt there were either no or very minor issues with the clinical management.
- If an assessor flags an area of concern or adverse event this implies significant criticism. In this audited series such significant criticism was made about clinical management in 10% of audited deaths.
- ANZASM primarily focuses upon areas of concern and adverse events. Data on areas of consideration are collected, but as they are minor criticisms with minimal impact on patient outcome, they are excluded from further analysis.

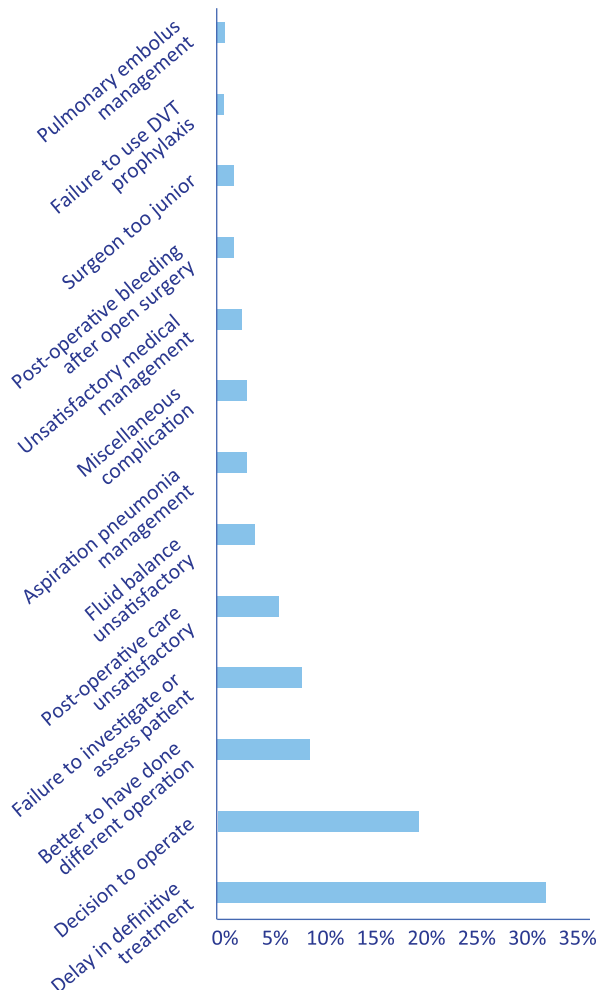
Figure 39: Frequency of clinical management issues by admission type (n= 603 in 2347 patients)



Comment

86% of clinical management issues occurred in emergency admissions and 14% in elective admissions

Figure 40: Frequency of specific clinical management issues if n>=10 (n=571 in 2347 cases)

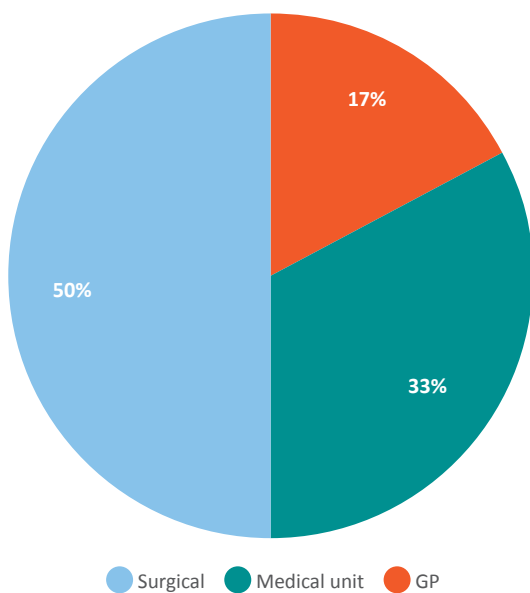




Comment

- Delays in diagnosis and definitive treatment (surgery) are frequently perceived criticisms of patient management. These delays can be due to a number of issues, not all the responsibility of the treating surgeon. These include geographical issues, diagnostic problems in the emergency department, inappropriate diagnosis, need for transfer, availability of theatre and communication issues.
- The decision to proceed to surgery and the choice of operative procedure adopted are issues frequently debated in the assessment process.
- The Critical Care of the Ill Surgical Patient (CCriSP) course, mandatory for Australasian surgical trainees, was specifically created to educate trainees to recognise adverse trends (deterioration) in a patient’s clinical condition.
- In 2005, the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) reported that the ‘clinical indicators of acute deterioration are not infrequently overlooked’.⁽³⁾ In other studies there is much evidence to show that those in whom there is delay prior to an unplanned admission to ICU have a worse outcome. The Patient Safety First Campaign in the UK has identified the ‘deteriorating patient’ as one of the first five interventions that it is supporting.⁽⁴⁾
- The Australian Commission for Safety and Quality in Healthcare now also has a consensus statement on “Recognizing and Responding to Clinical Deterioration”, and many states have corresponding programs. In April 2010, the Australian Health Ministers endorsed the *National Consensus Statement: Essential Elements for Recognising and Responding to Clinical Deterioration*, as the national approach for recognising and responding to clinical deterioration in Australia.⁽⁵⁾

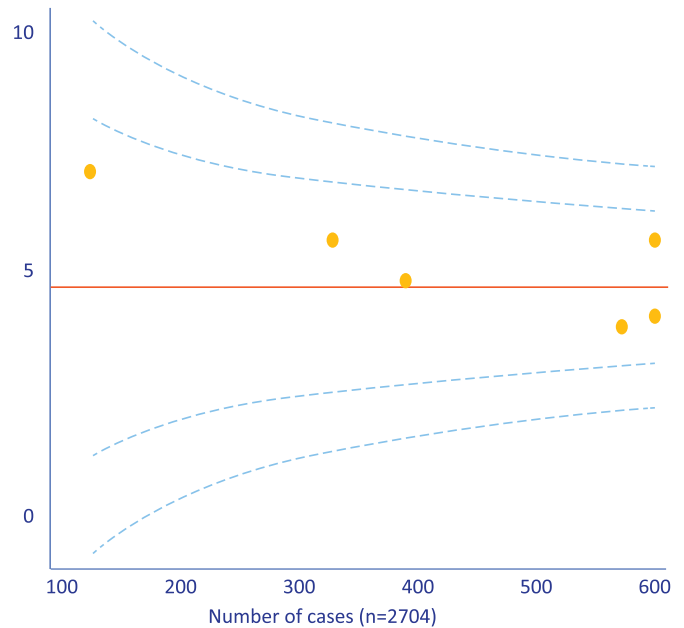
Figure 41: Attribution of responsibility for treatment delays (n=187 in 2347 patients)



Comment

- The surgeon was responsible for half the instances of delay in providing definitive surgical treatment. Delays in referral to a surgeon, where surgery was the agreed definitive course of action, were usually due to failure to make the correct diagnosis.

Figure 42: % Adverse events and area of concern by state (n=249 in 2347 patients)



Comment

- This analysis compares the incidence of significant clinical issues (areas of concern and adverse events) in the individual states.
- Funnel plots are a visual tool for investigating bias in meta-analysis. They are scatter plots of the analysis effects estimated from individual studies (horizontal axis) against a measure of study size (vertical axis). The name funnel plot is based on the precision in the estimation of the underlying treatment effect increasing as the sample size of component studies increases.
- The individual incidences are all within 1 Standard Deviation. In this audited series, the number of mortalities differs for each state based on population figures. However, the incidence of significant management issues is similar among states.

9.3 Perceived impact of clinical management issues

First and second-line assessors have to indicate:

1. the impact these perceived issues with patient management might have had on the clinical outcome
2. whether or not they were preventable
3. which clinical team was responsible for them.

A three- or five-part ‘Likert’ scale is used to stratify responses to questions 1 and 2. The clinical teams felt to be responsible for management issues identified are recorded in question 3.

First and second-line assessors may identify more than one issue of clinical management in each patient under review. It is important therefore that the impact of any of these differences of views on an individual patient’s outcome be analysed and compared. In the tables below all patients associated with an area of concern or adverse event are presented. Tables 5, 6 and 7 show data that is patient-focused rather than incident-focused. Table 8 looks at attribution of responsibility for the clinical issues reported.



- In less than **8%** of cases surgeons felt that a different course of action should have been taken.
- In less than **3%** of cases there was an unplanned return to theatre.
- In approximately **3%** of cases it was felt that there was a delay in the diagnosis reported by the treating surgeon.

Table 5: % Degree of criticism of patient management (n=2347 patients)

Degree of Criticism of patient management	Number of patients	(%) of audited series (n=2347)
No issue of management	1731	(74%)
Area of consideration	354	(15%)
Area of concern	142	(6%)
Adverse event	107	(4%)
Missing data	13	(1%)
Total	2347	100%

Comment

- There was significant criticism (area of concern or adverse event) of clinical management in **10%** of cases in this audited series.

Table 6: % Perceived impact on clinical outcome in the Consideration, Concern and Adverse Event group (n=616 in 2347 patients)

Perceived impact on clinical outcome	Number of patients	(%) of audited series (n=2347)
Did not affect clinical outcome	112	(5%)
May have contributed to death	380	(16%)
Probably contributed to death	83	(4%)
Missing data	41	(1%)
Total	616	26%

Comment

- This table indicates the perceived impact of an area of consideration, concern or adverse event on the clinical outcome.
- In only **4%** of patients in this audited series were there issues of clinical management felt to have probably contributed to the clinical outcome.
- In a further **16%** of patients, assessors felt the issues of clinical management may have made some contribution to the clinical outcome, of these **5%** were associated with areas of concern or adverse events.

Table 7: % Perceived preventability of clinical issues in the Consideration, Concern and Adverse Event group (n= 616 in 2347 patients)

Perceived preventability of clinical issues	Number of patients	(%) of audited series (n=2347)
Definitely preventable	91	(4%)
Probably preventable	291	(12%)
Probably not preventable	151	(6%)
Definitely not preventable	19	(1%)
Missing data	64	(3%)
Total	616	26%

Comment

- This table details the preventability of clinical management issues as indicated by reviewers.
- The assessors felt that **16%** of clinical incidents detected were preventable.
- In the concern and adverse event group **10%** clinical incidents detected were preventable.

Table 8: % Clinical team felt to be responsible in the Consideration, Concern and Adverse Event group (n= 616 in 2347 patients)

Clinical team felt to be responsible	Number of patients	(%) of audited series (n=2347)
Surgical team	225	(10%)
Clinical team	193	(8%)
Hospital issue	90	(4%)
Other	94	(4%)
Total	616	26%

Note: 'Other' means the transferring hospital, blood bank/ transfusion services, the emergency department, the GP or referring doctor, the ambulance service, remote areas or lack of sufficient staff.

Comment

- First and second-line assessors indicated that the surgical team caring for the patient was responsible for **10%** of the cases; this embodies **33%** of the total the clinical management issues identified.





10. Conclusions

1. The audit has had wide acceptance and cooperation from the surgeons; however, more has to be done to ensure wider surgical participation. The mandatory nature of the mortality audit process through the College's CPD program from January 2010 should improve compliance.
2. The inclusion of private hospitals nationwide should also improve data collection and analysis.
3. Improved completeness of the surgical case form will ensure more rigorous analysis of the dataset.
4. The use of statewide and interstate participating assessors, rather than a small panel of assessors, will spread the workload and involve the majority of the Fellows.
5. Surgeons who disagree with their second-line assessment have the right of appeal and can obtain another assessment from a different surgeon in that specialty.
6. A case note review booklet containing illustrative surgical cases is produced at least twice a year for distribution to surgeons and trainees (where requested). The cases are based on assessors' comments and all have a clinical message. This has been well received by the surgical community.

11. References

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