



Victorian Audit of Surgical Mortality



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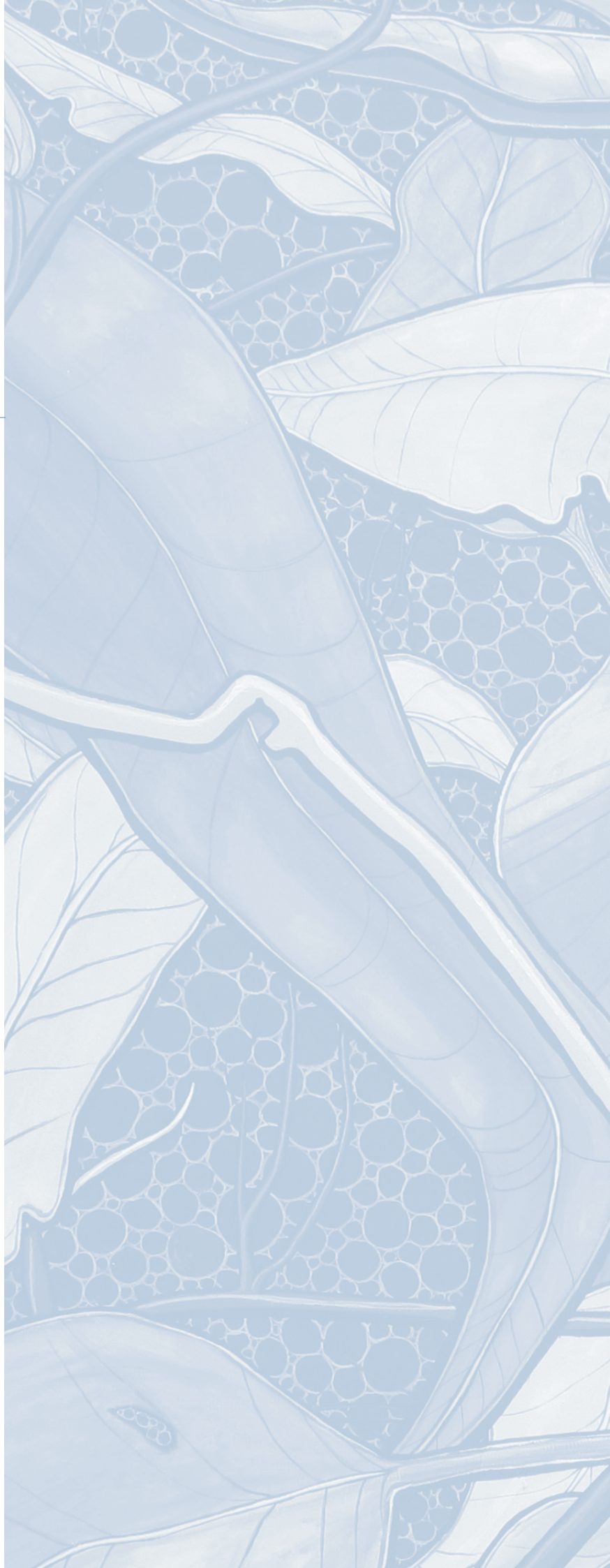
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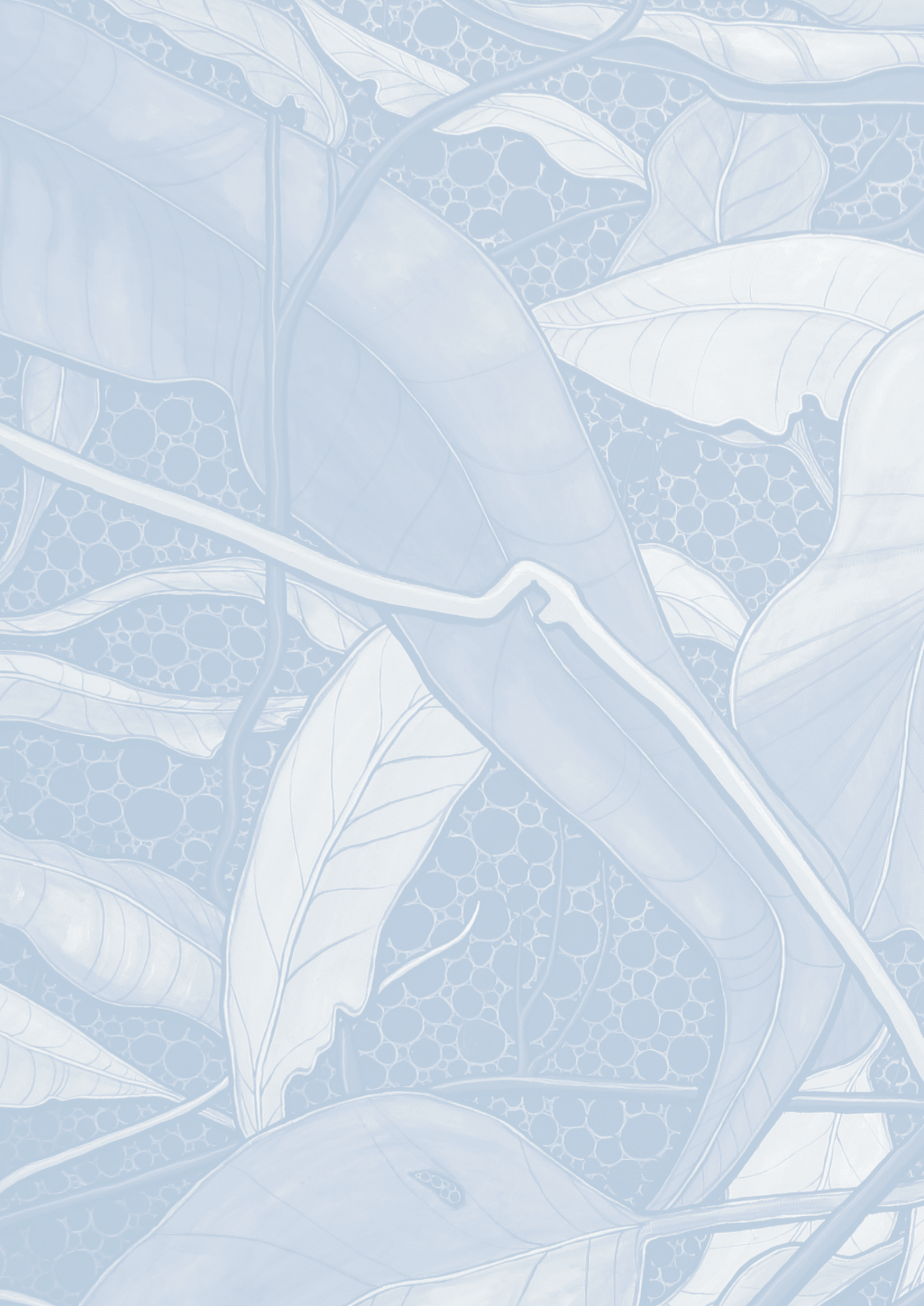
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## Clinical Director's report

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### **The death of a patient can be a learning experience.**

This is the fifth annual report since data collection for the Victorian Audit of Surgical Mortality (VASM) commenced in 2007. Four case note review booklets have been disseminated which, together with the annual reports, have proven to be a popular tool with the surgical readership. In this report we present the outcomes of the review of 2,862 deaths.

It confirms the importance of addressing prominent failings in clinical management. This is consistent with our goal of education. We and other states have persistently identified delay in implementation of definitive care as an ongoing major issue. There is an increasing rate of participation in VASM by surgeons and it is encouraging to note a decreasing incidence of clinical management issues as progressive reports are published. This validates the value of the audit in overall patient care.

We have 100 percent public hospital participation and in the latter half of 2011 we commenced recruitment of the private hospital sector into the audit. We thank the 85 percent of private hospitals that have already come on board, and we have conducted a seminar to address the benefits of participation in VASM to hospitals and other stakeholders. Exciting developments in the audit include the inclusion of our Gynaecological colleagues into ANZASM and the slow but steady increase of private hospital participation, with a goal of 100 per cent participation in the future. The anticipated increased uptake of the web-based electronic Fellow's Interface will facilitate and accelerate the VASM process.

There continues to be a decline in identified clinical issues, a finding which reinforces the benefit VASM confers to both surgeons and patients. When you read this report, I am sure that you will be amazed at the depth of valuable data that is obtained from the process which, although appearing fairly simple, amasses vast amounts of analysable information.

The success of VASM is dependent upon a highly efficient, motivated and hard-working team. Their attention to detail and adherence to protocol is the solid foundation on which the audit is built. With their help, and the support we receive from many others, I remain confident about the future of VASM, which has been so expertly nurtured from its embryonic state to the well-oiled machine it now is. This is due to the committed leadership of my predecessor, Associate Professor Colin Russell and the project manager, Claudia Retegan and her team. The support of the Victorian State Government, the Victorian Department of Health and the Victorian Surgical Consultative Council (VSCC) have enabled and facilitated VASM's inception and progress. The Royal Australasian College of Surgeons provides valuable support.

Mr Barry Beiles MB.BCh, FRACS(Vasc)

Clinical Director, VASM





## Shortened forms

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ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
CCU	critical care unit
CI	confidence interval
CPD	Continuing Professional Development
CRF	case record form
DRG	disease-related group
DVT	deep vein thrombosis
FLA	first-line assessment
GI	gastrointestinal
GP	general practitioner
HDU	high dependency unit
ICU	intensive care unit
ID	identifier
IMG	International Medical Graduate
LGA	local government area
OR	operating room
RAAS	Research Audit and Academic Surgery Division
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SD	standard deviation
SLA	second-line assessment
TED	thromboembolic deterrent
VAED	Victorian Admitted Episodes Dataset
VASM	Victorian Audit of Surgical Mortality
VSCC	Victorian Surgical Consultative Council
VTE	venous thromboembolism
VMIA	Victorian Managed Insurance Authority



## Executive summary

### Audit participation

There has been increasing participation in the Victorian Audit of Surgical Mortality (VASM) by Victorian Fellows. Intention to participate has risen from 60 percent in 2008 to 88 percent in 2012. This increase in intention to participate is supported by evidence of actual participation. The return of case record forms (CRFs), a pivotal step in the audit process, varies between 85 percent and 90 percent. This appears to have reached a steady level and is similar to other regions. Compliance in completing all necessary data fields (data quality) has improved but is still less than satisfactory. The treating consultant, rather than a junior member of the team, has provided the information as outlined in section two of the report. This indicates an ongoing high level of personal involvement by participating surgeons.

All public hospitals with relevant surgical activity continue to participate and provide notifications of death associated with surgery. Funding has been increased to recruit the private sector to the audit. This is an important step to ensure that all surgical mortality undergoes peer review. Private hospital participation has reached 85 percent and continues to improve.

The majority of hospital deaths do occur in the public sector. This is not a reflection on the level of care provided in the public sector, but is a result of the less complex casemix generally receiving care in the private hospital sector.

It is beneficial to put these deaths in some perspective by reviewing the number of surgical procedures performed in Victoria over this period. We interrogated the Victorian Admitted Episode Dataset (VAED) to establish that during the audit period a total of 2,400,542 patients underwent surgical procedures in Victoria. Over the same period VASM have been notified of 5,585 deaths associated with surgical care. This is a very small percentage (0.2%) of the patients who underwent surgery over the audit period.

VAED indicates that in a single year (1 July 2011 to 30 June 2012) 626,628 patients underwent surgical procedures in both the public and private sector. The number of deaths attributed to surgery as recorded by VAED was 1,995 (0.3% of all patient who had surgery in that year). Of the 1,995 patients captured in the VAED, 1,367 were reported to VASM (0.2%). When the number of deaths reported to VASM in 2011–2012 is compared with the Victorian Admitted Episode Dataset (VAED) figures, VASM is capturing an increasing percentage of recorded state deaths (currently 69%).

Overall, 2,862 (51%) of the 5,585 deaths had completed the audit process by the census on 30 June 2012. The clinical information from these 2,862 cases forms the basis of this report. The remaining cases were not included in the audit for the following reasons: excluded due to admission for terminal care; inappropriately attributed to surgical care; treated by non-participating surgeons; or had not completed the audit process by the census date. This latter group should of course be available by the next census date.

### Demographic and risk profile

Review of the demographic and risk profiles of all cases that had completed the audit process (2,862) confirms the trends described in previous reports. The majority of surgical deaths have occurred in elderly patients with underlying health problems, who have been admitted as an emergency with an acute life-threatening condition that often requires surgery. The actual cause of death was often linked to their pre-existing health status, in that the cause of death frequently mirrored the pre-existing illness. Death was most often adjudged to be not preventable, and to be a direct result of the disease processes involved rather than of the treatment provided. The most common causes of death reported are cardiac and respiratory failure. This is congruent with the most common comorbidities in this series of patients.





## Risk management

Risk management strategies for this generally elderly, frail group of patients are especially important. The audit looks at three parameters: venous thromboembolism (VTE) prophylaxis to reduce the likelihood of pulmonary embolus, use of critical care facilities and fluid balance management.

- **VTE prophylaxis:** Prophylaxis was provided in over two-thirds of audited deaths. A conscious decision to withhold prophylaxis was the reason given for non-provision for most of the remaining cases. This was generally necessitated by some clinical contraindication to prophylaxis. Inadvertent omission of prophylaxis was rare, only occurring in 2 percent of audited cases.

When the appropriateness of withholding prophylaxis was reviewed, there was generally agreement by assessors that the decision was correct. However, in 8 percent of cases where it was withheld, assessors felt the decision was questionable, although the decision did not affect the final outcome.

- **Use of critical care facilities:** More than half of the patients in this audited series received critical care support during the course of their hospital stay. This is significantly higher than previous years. In only a small percentage of cases not receiving critical care (6%) did assessors feel that this may have been inappropriate.
- **Fluid balance during treatment:** There was a perception that this may have been an issue of management in only 5 percent of cases reviewed.

## Operative profile

Twenty percent of the 2,862 patients had no operative intervention. This was most commonly an active decision not to proceed and usually occurred in patients admitted as an emergency for an irretrievable clinical problem. A total of 3,198 separate episodes of surgery occurred in 2,862 patients. In these surgical episodes, 2,273 operative procedures were recorded. The most frequent operative procedures described were for trauma or acute abdominal pathology. This reflects the high percentage of patients admitted as emergencies (82%) in this series. A consultant performed the surgery in 66 percent of instances and made the decision to proceed to surgery in 84 percent.

There was an unplanned return to the operating room (OR) in 348 (15%) of the 2,273 patients who underwent a surgical procedure.

Unplanned return to the OR is often, but not always, necessitated by a complication of the initial procedure and is associated with increased risk of death. Consultant involvement in such cases is highly desirable. Direct consultant involvement in such cases has risen from around 30 percent in 2007-08 to 75 percent in 2011-12. This recognition of the need for direct consultant involvement is to be commended.

The demand for time in the OR to manage emergency cases remains a significant problem for hospitals. The issue is well recognised in this and other countries.

There continues to be a low rate of postoperative complications as reported by treating surgeons.

## Inter-hospital transfers

Twenty-three percent of cases in the audited series required inter-hospital transfer. Such transfers were



usually necessitated by the need for higher levels of care. Issues of patient care related to transfer were raised in a third of these cases. The most common criticism was that transfer occurred at an inappropriately late point in the course of the patient's illness.

### Peer-review outcomes

First and second-line assessors review and appraise the appropriateness of the clinical care provided to each case reported to VASM. All cases undergo first-line assessment (FLA).

- **Second-line assessments (SLA):** The frequency of need for SLA could be seen as an indirect measure of quality of care. SLAs are requested for cases in which the clinical care needs to be looked at more closely or the treating surgeon did not provide sufficient information to reach a conclusion. Importantly, the rate of second-line referral has decreased from 25 percent in 2007-2008 to 9 percent in 2011-2012 and this rate is similar to other states.

It is encouragingly notable that SLA was most commonly required because the clinical information provided by the treating surgeon was inadequate, 372 (67%) in 555 instances. The need for SLA was similar among surgical specialties, and between metropolitan and rural hospitals.

- **Clinical management issues:** Assessors use a standard spectrum of criticism to convey their perceptions of appropriateness of care. These are described in detail in section 3.2 of this report.

In 85 percent of audited deaths no, or only minor, issues of patient care were perceived. However, in 15 percent of cases more major issues of care were identified (areas of concern and adverse events). Over the entire audit period (2008-2012), there has been a significant decrease in the frequency with which assessors identify clinical management issues. The incidence of more major criticisms of clinical care is similar among the surgical specialties.

There is no clear evidence that specific hospitals or surgical specialties have attracted higher rates of criticism than others. It is important to remember that criticism of clinical care is not always attributable to the surgical team. A third of the issues identified were attributed to other specialty areas.

- **Perceived impact of identified issues on clinical outcome:** There was a perception that the clinical management might have been better in 27 percent of the 2,862 audited deaths. In only 146 patients (5% of the audited series) the clinical management was deemed likely to have contributed to the adverse outcome. The perceived relationship of clinical management to outcome was less clear in the remaining cases.
- **Frequency of specific issues of clinical management:** The most common clinical issue among the 2,114 specific issues identified was delay in delivery of definitive care. This occurred at multiple levels in the care pathway. The underlying problem was usually delay in establishing the true diagnosis, leading to late referral, and delay in implementing definitive treatment. A similar pattern has been reported in the recent national report (ANZASM 2012 Report).<sup>(1)</sup>
- **Data quality:** This is an essential component of this and other audits. We have looked at the frequency of missing data in this audit. There has been a slight improvement in some sections of the data collection forms. The volume of missing data is most prevalent in a few sections. We have recently reformatted two of these sections to make the audit forms more user-friendly.

We take this opportunity to emphasise the importance of accuracy and completeness of all clinical information provided to VASM.





## Recommendations

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Many of the recommendations made in previous years have been implemented. Collaboration between the Victorian Department of Health, Victorian Surgical Consultative Council (VSCC), Coroner's Office, hospitals and health services continues to facilitate our progress.

Objectives for the coming year are:

- Continue to improve the return rate of CRFs and increase surgeon participation.
- Continue to collaborate with VSCC and other agencies such as the Coroner's Office.
- Continue to disseminate important messages emanating from the audit.
- Enhance the electronic interface to allow Fellows to complete assessments online.
- Enhance analysis techniques.
- Facilitate communication and information sharing with other state mortality audits.
- Contribute to the development of a national mortality audit report.
- Implement recommendations that resulted from the external evaluation of the audit program.
- Continue to coordinate and collaborate in educational seminars.



## 1. Introduction

### 1.1. Background

The Victorian Audit of Surgical Mortality (VASM) is part of the Australian and New Zealand Audit of Surgical Mortality (ANZASM), a bi-national network of regionally based audits of surgical mortality that aim to ensure the highest standard of safe and comprehensive surgical care.

### 1.2. Objectives

The objective of the audit is 'peer review of all deaths associated with surgical care'. This includes:

- Deaths that occur in hospital following a surgical procedure.
- Deaths that occur in hospital while under the care of a surgeon, even though no procedure was performed.

If VASM receives notifications of deaths that have occurred following discharge from hospital but within 30 days of a procedure or inpatient stay under a surgical unit, these cases will also be reviewed.

The audit process is designed to highlight system and process errors and trends in deficiencies of care. It is intended as an educational rather than a punitive exercise.

### 1.3. Performance review

Recommendations were included in the 2011 annual report. An important measure of the success of VASM is whether these recommendations have been subsequently addressed or achieved. Most key performance indicators, recommendations and progress against the indicators have been achieved.

### 1.4. Structure and governance

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

Participation is now a mandatory component of attaining Continuing Professional Development (CPD) recertification. Surgeons and assessors gain points in Category 1: 'Clinical Governance and Evaluation of Patient Care' of the CPD program for their participation.

VASM is funded by the Quality, Safety and Patient Experience Branch of the Victorian Department of Health. The College provides infrastructure support and conducts the oversight of the project. VASM works closely with the Victorian Surgical Consultative Council (VSCC) and provides regular reports to ANZASM, VSCC, hospitals, surgeons and the Victorian Department of Health (see Figure 1).

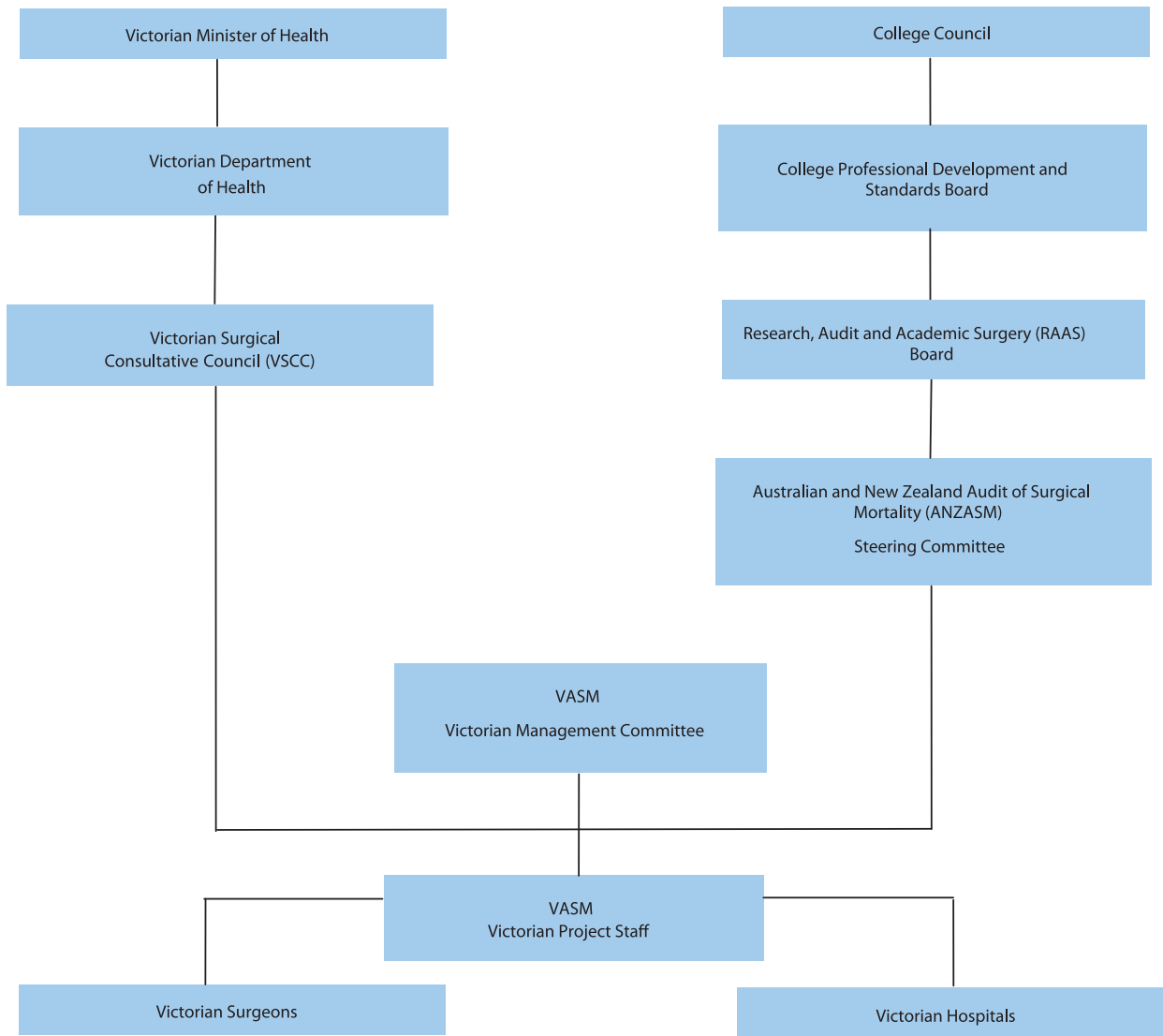
The VSCC was established by the state government in 2001 to review causes of avoidable mortality and morbidity associated with surgery, and to provide feedback to the medical profession on any systemic issues identified. VASM staff informs the VSCC of trends in surgical mortality and assists with the development of processes to enable the surgical community and healthcare providers to address system issues.





The VSCC receives de-identified second-line assessment (SLA) and aggregated reports from VASM that summarise all cases reviewed. The VSCC informs the surgical community about important issues arising from the collection and analysis of mortality and morbidity data. Along with the VSCC, VASM aims to support further improvements in patient care in Victoria.

Figure 1: Victorian Audit of Surgical Mortality (VASM) project governance structure





## 1.5. Data management and statistical analysis

All deaths occurring in Victorian hospitals while the patient is under the care of a surgeon that are notified to VASM are audited. Cases admitted for terminal care and deaths incorrectly attributed to surgery are excluded from the full audit process. This 2011-2012 annual report includes deaths reported to VASM since data collection commenced on 1 January 2008 up to 30 June 2012. As the multiple rate-limiting steps in the audit process result in a mean time to completion of three months, information on some deaths that occurred during the reporting period are still under review and not available for inclusion.

Data is encrypted in the web database. This data is sent to, and stored in, a central Structured Query Language server database that includes a reporting engine. All transactions are time-stamped. All changes to audit data are written to 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 Alcideon Corporation. All communications are encrypted with Secure Sockets Layer certificates.

Data is downloaded from the secure database and then analysed using the statistical package Stata version 10.1, Microsoft Office Excel (2010) and mapping special analysis ArcGIS version 9. Demographic data and summary statistics have been presented. Continuous variables have been compared using Student's t-test or the non-parametric Ranksum test as appropriate. Categorical variables have been compared using Pearson's chi-square test. Variables have also been tested for yearly trends. Concordance and kappa scores have been used as measures of agreement. Funnel plots have been used to explore heterogeneity and have been presented with upper and lower two and three standard deviation (SD) limits.

Numbers in the parentheses in the text (n) represent the number of cases analysed. As not all data fields have been completed by surgeons, these numbers vary.

### 1.5.1 Interpretation of kappa scores

The kappa score is used to understand the difference between agreement levels beyond chance where:

- <0 = no agreement
- 0.0-0.19 = poor agreement
- 0.20-0.39 = fair agreement
- 0.40-0.59 = moderate agreement
- 0.60-0.79 = substantial agreement
- 0.80-1.00 = almost perfect agreement

### 1.5.2 Interpretation of p-values

A p-value <0.05 is considered statistically significant.

### 1.5.3 Interpretation of funnel plots

Funnel plots are a visual tool to investigate bias in meta-analysis. These have been modified for an easily visualised graph of health outcome data. They are scatter plots of the adverse outcome estimated from individual studies expressed as a percentage (y-axis), against a measure of study size (x-axis). On the scatter plot, 95 percent and 99 percent confidence limits are superimposed. The funnel plot is based on the precision in the estimation of the underlying treatment effect increasing as the sample size of component studies increases. This is why the smaller sized samples have wider confidence intervals.





#### *1.5.4 Interpretation of geographic mapping*

Geographic Information System provides a common analytical framework in which data can be geographically displayed.

#### *1.5.5 Exclusion of identifiable data*

Labels and data that might identify surgical groups, patients, hospitals and extreme values have been excluded from this report.



## 2. Audit results

### 2.1. Audit numbers

From its commencement on 1 January 2008 to the end of the current audit period on 30 June 2012, the VASM received 5,585 notifications of death that have been associated with surgical care.

It is beneficial to put these deaths in some perspective by reviewing the number of surgical procedures performed in Victoria over this period. We interrogated the Victorian Admitted Episode Dataset (VAED) to establish that during the audit period a total of 2,400,542 patients underwent surgical procedures in Victoria.

VAED indicates that in a single year (1 July 2011 to 30 June 2012) 626,628 patients underwent surgical procedures in both the public and private sector. The number of deaths attributed to surgery as recorded by VAED was 1,995 is therefore a very small percentage (0.3) of the number of patients who actually underwent surgery over the same period and of these 1,367 were reported to VASM (0.2%).

It should be noted that a small percentage of reported deaths emanate from the private sector totalling 176 (13%) of the 1,367 total cases reported from July 2011 to June 2012. This is predictable from the known casemix of the two sectors. This is compounded by recent and ongoing recruitment of the private sector that only commenced in 2012 thus decreasing numbers further. In subsequent sections, private and public deaths have not been reviewed separately but as one group.

Figure 2: Synopsis of audit numbers over sequential audit periods



Note: Total n = 5,585.

CRF: case record form; FLA: first-line assessment; SLA: second-line assessment.

Regarding the audit status of the 5,585 deaths reported to VASM (see Figure 2):

- Clinical information and completed assessment reviews were available on 2,862 (51%) of the 5,585 reported cases.
- A total of 432 (8%) of these 5,585 cases were recorded as admissions for terminal care and therefore excluded from the review process.
- Additionally, 203 (4%) of these 5,585 cases had been wrongly attributed to a surgical unit.
- A total of 342 (6%) of these cases were deemed lost to follow up due to surgeon moving interstate, abroad, retiring or medical records unattainable therefore were excluded from the analysis.



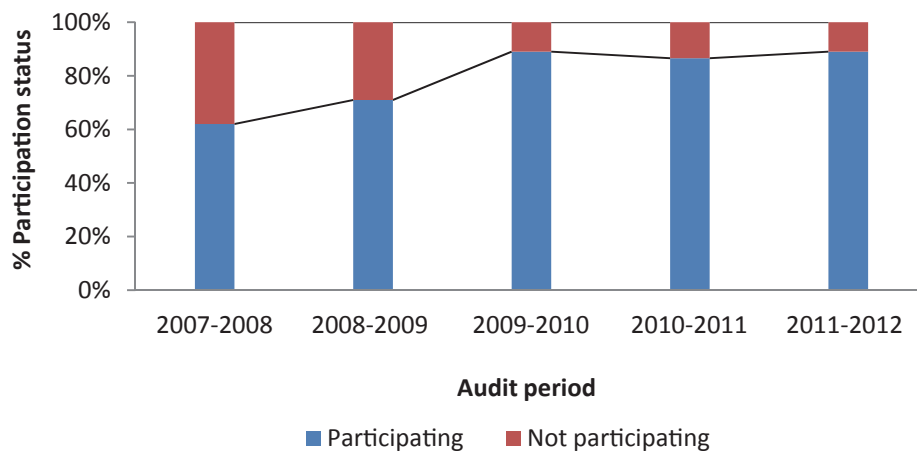
- A total of 1,096 (20%) cases could not proceed in the audit process as the treating surgeon had elected not to participate.
- A total of 650 (12%) cases are pending response from the treating surgeon, first-line assessor or the second-line assessor.
- By the census date, only 2,862 deaths had been fully audited, and the outcomes from the peer review process are restricted to these deaths and are the focus of this report. The outcomes of the remaining 650 (12%) cases still pending response from the treating surgeon or the assessor should be available in the next audit report.

## 2.2. Audit participation rates

To comply with the audit process, surgeons must not only agree to participate but also return completed CRFs and assessment forms in a timely and accurate manner. The hospitals in which they work must provide notification of deaths on a regular basis, as this is the main trigger for the audit process to begin. The percentage of eligible College Fellows in Victoria who have agreed to participate in the audit is depicted in Figure 3.

## 2.3. Participation by Fellows

Figure 3: Surgeon agreement to participate as percentage of eligible College Fellows in Victoria



Note: Total n = 1,082.

### Comments:

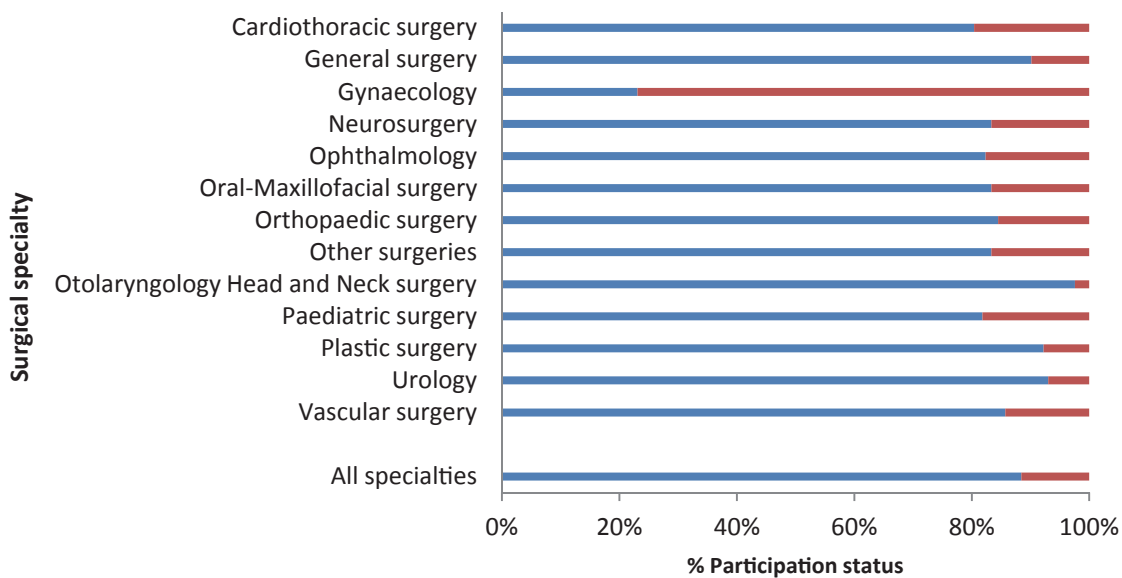
- A total of 957 (88%) of the eligible 1,082 Victorian Fellows registered in the College database are currently participating.
- Currently 30 percent of the 430 obstetric and gynaecological specialists invited to participate in August 2012 have now enrolled in the VASM audit (data not shown in this graph).
- The increase in participation rate from 60 percent in 2008 to the current level of 89 percent is encouraging.
- There are 125 (12%) Fellows who have refused to participate.
- Some 598 (57%) Fellows have also agreed to be first and/or second-line assessors.





- There are 376 (35%) Fellows registered in the audit database who are submitting data electronically.
- The College Council has delivered strong support to ANZASM by requiring surgeons to participate in their state’s mortality audit as a compulsory component of the CPD program since January 2010.
- In 2012, surgeons who refused to participate have been reinvited into the program and actively non-compliant surgeons have been made non-participants.
- The College CPD program conducts annual verification audits on compliance of surgeons for their CPD requirements. This requires confirmation of participation in VASM, which has been provided to 56 (5%) surgeons for verification purposes. From 2013 the audit verification pool will be raised from 5 percent to 7 percent of all Fellows.

Figure 4: Surgeon agreement to participate by surgical specialty



Note: Total n = 1,512.

■ Participating ■ Not participating

‘Other surgeries’ includes trauma, transplant and oncology.

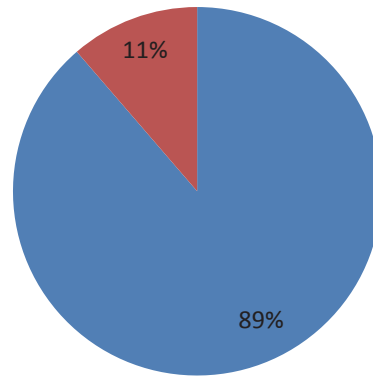
The percentage of surgeons participating in each surgical specialty is depicted in Figure 4.

**Comments:**

- Participation in the surgical specialties rates ranges from 82 percent to 98 percent. This range excludes the newly invited group of Gynaecologists.
- In August 2012 the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) board approved a formal collaboration with the Australian and New Zealand Audit of Surgical Mortality (ANZASM), which is the reason for the lower participation rate under this specialty while registration of participants is progressing.
- The VASM audit will collect all deaths occurring after a gynaecological surgical procedure. The Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) will continue to review all perinatal, paediatric and maternal deaths in Victoria to consider clinical features of each case and to assess preventability.



Figure 5: Case record form return rate to VASM



Note: Total n = 3,758.

■ CRF returned ■ CRF pending

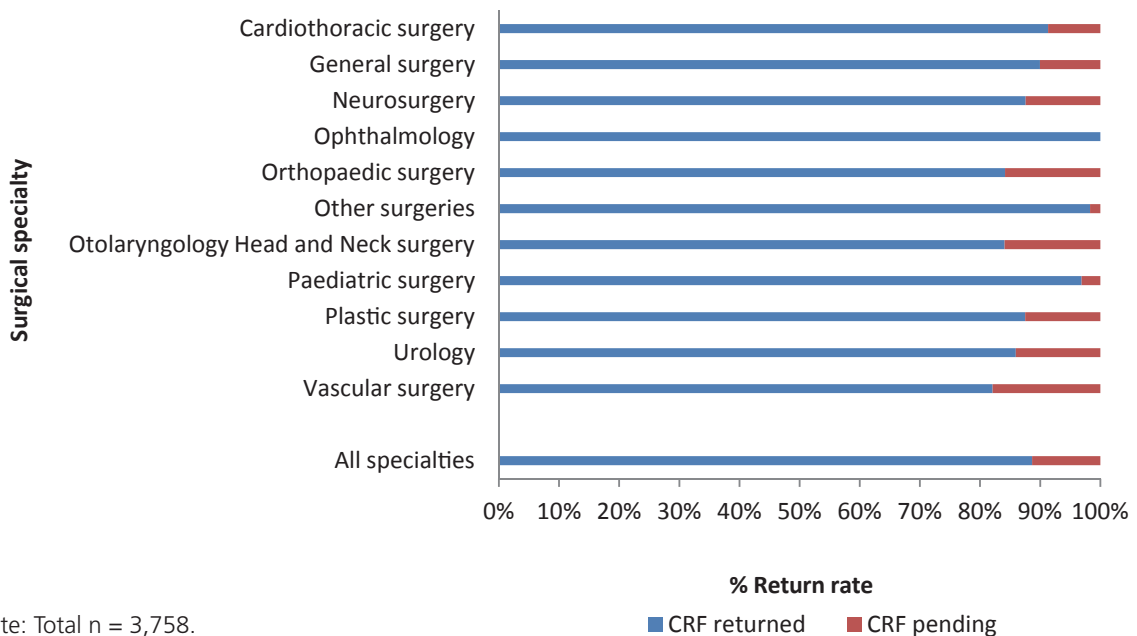
This graph excludes cases with the following status: lost to follow up, non-participant and reported in error.

A CRF was sent to each surgeon nominated as the treating surgeon in all instances of death reported to VASM. The surgeon was asked to complete the form and return it to the VASM office (see Figure 5).

**Comments:**

- Allowing two months from notification of death to receipt of the CRF, the return rate is 89 percent.
- The return rate across other states and territories varies between 70 percent and 95 percent.<sup>(1)</sup>
- The return rate in the Scottish Audit of Surgical Mortality Annual Report 2010 is 78 percent.<sup>(2)</sup>

Figure 6: Case record form return rate by surgical specialty



Note: Total n = 3,758.

■ CRF returned ■ CRF pending

This graph excludes cases with the following status: lost to follow up, non-participant and reported in error. 'Other surgeries' includes trauma, transplant, oncology, obstetrics and gynaecology.

**Comments:**

- There is some variation in return rates between specialties, ranging from 85 percent to 100 percent with an overall rate of 89 percent (see Figure 6).



Figure 7: Case record form return rate by hospital



Note: Total n = 3,758.

This graph excludes cases with the following status; lost to follow up, non-participant and reported in error.

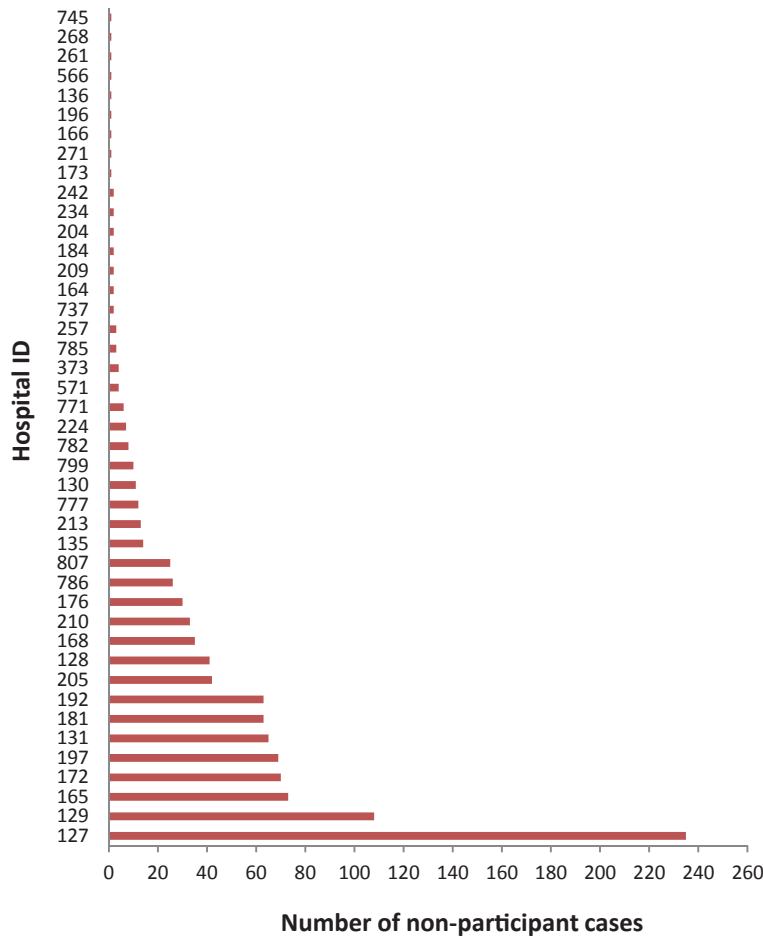
Comments:

- Compliance with the audit process as assessed by CRF return rates varies between hospitals (see Figure 7).
- It should be noted that return rates are expressed as a percentage and could seem inappropriately low in recently recruited hospitals with small case number deaths.





Figure 8: Hospital origin of cases that could not be reviewed due to non-participation



Note: Total n = 1,096.

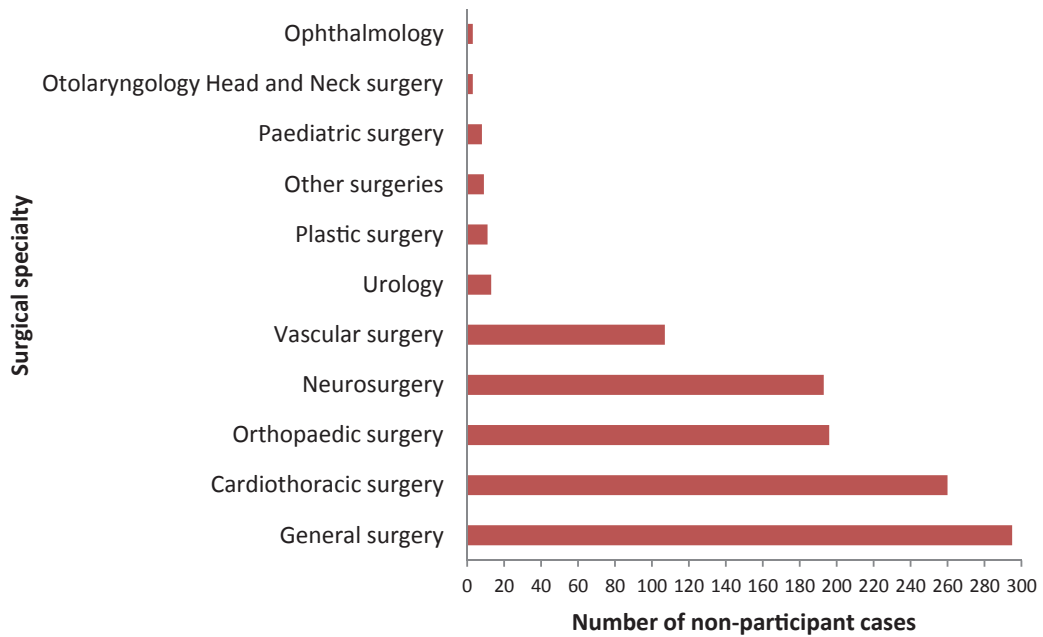
ID: identifier.

**Comments:**

- Surgeons electing not to participate seem to be focused in only a few hospitals (see Figure 8). This distribution has been relatively constant with time.
- In each instance, the hospital has agreed to participate and has notified deaths to VASM, but the surgeons responsible have not returned the CRFs. The audit process cannot proceed if the surgeon does not actively participate.
- Since January 2010, participation in ANZASM has been made a mandatory component of CPD. It is hoped that this will lead to the full participation of treating surgeons.
- VASM would like to encourage those hospitals that have a high number of cases of non-participating surgeons to review the approach to VASM adopted by their surgical staff.



Figure 9: Specialty origin of cases that could not be reviewed due to non-participation by treating surgeon



Note: Total n = 1,096.

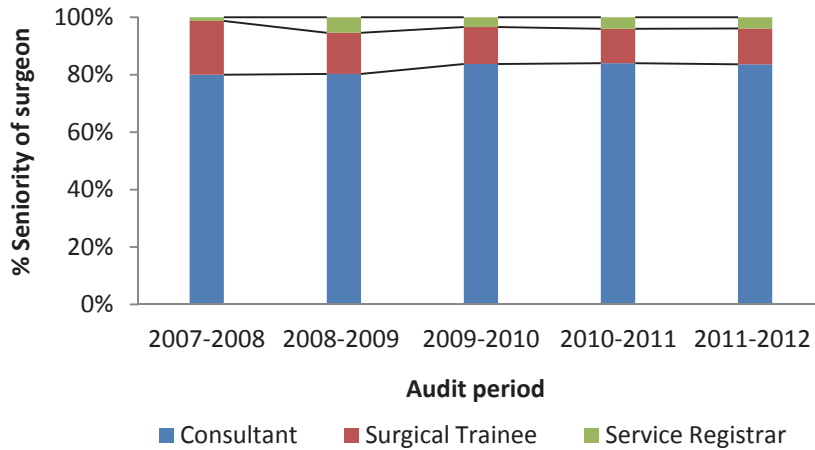
'Other surgeries' includes trauma, transplant, oncology, obstetrics and gynaecology.

**Comments:**

- The specialties with the greatest degree of non-compliance are general surgery, cardiothoracic surgery, orthopaedic surgery, neurosurgery and vascular surgery (see Figure 9). These account for two-thirds of deaths that could not be audited due to surgeon non-participation.
- VASM would like to encourage these specialty boards that have a high number of cases with non-participating surgeons to review the approach to VASM adopted by their Fellows.



Figure 10: Seniority of surgeons completing the case record form

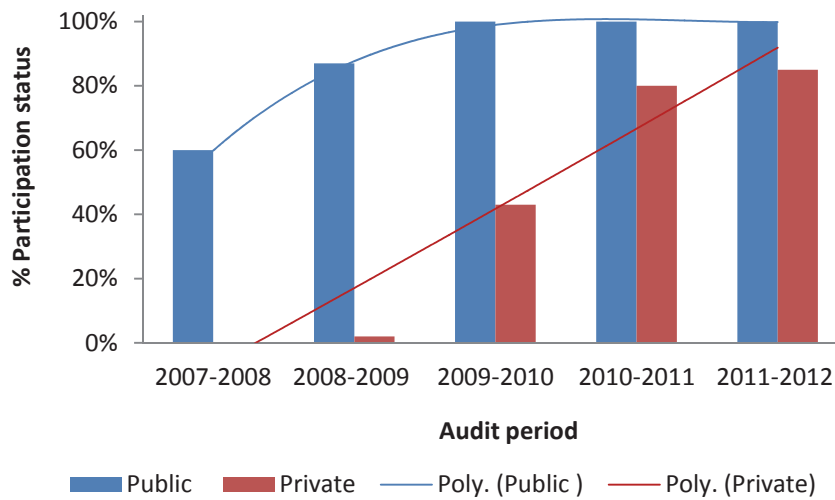


Note: Total n = 2,862.

Comments:

- The completion rate of the CRF by consultants increased from 77 percent in 2008 to 84 percent in 2012, which is commendable (see Figure 10).

Figure 11: Hospitals participating in the audit



Note: The polynomial trend shows the rise and relationship between private and public enrolments. The graph also indicates the number of years of their participation in the audit.

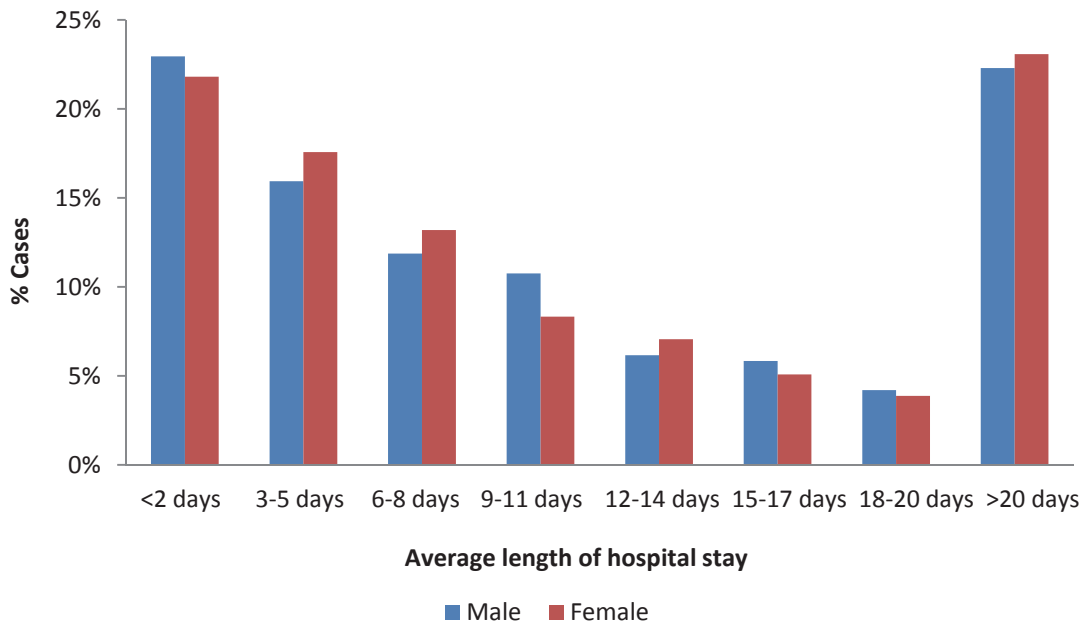
Comments:

- All Victorian public hospitals and 85 percent of the private hospitals providing relevant surgical services are now participating and providing notifications of death (see Figure 11).
- Hospitals that joined the audit after 30 June 2012 and where no mortalities occurred or where deaths have not been reported have been excluded from analysis.





Figure 12: Length of hospitalisation



Note: Total n = 2,862.

The length of stay in hospital by gender is depicted in Figure 12.

**Comments:**

- There were 1,995 (70%) patients whose stay in hospital was less than two weeks.
- In total 667 (23%) patients had a stay over 20 days with the longest patient admission of one year, which was predominately a medical admission while awaiting fitness for surgery.

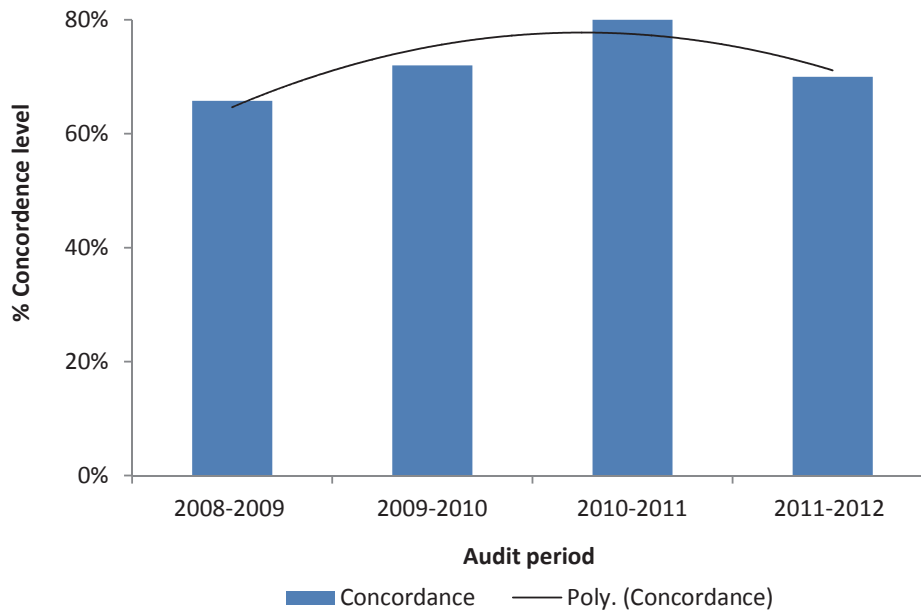
**2.4. Verification of audit numbers**

The audit process is dependent on receiving notifications of death from participating hospitals. This requires each hospital to prepare and submit a list of deaths that have occurred while under the care of a surgeon. This generally means the discharge unit has been recorded as surgical. In some instances, patients who have received surgical care may not be under the care of a surgeon at the time of discharge. It can therefore be seen that the attribution of care to surgery or another specialty is not exact.

In parallel with our process, hospitals must submit data to the VAED which is maintained by the Victorian Department of Health. This is a robust database providing casemix information required for hospital funding. The information allocates individual patient episodes to Disease Related Groups (DRGs). These DRGs are specialty-specific and can therefore provide an alternative source of mortality data. The Health department has provided VASM with a list of deaths that occurred in patients with surgical DRGs over the period 1 July 2011 to 30 June 2012.



Figure 13: Comparison of mortalities reported by VAED and VASM



VAED: Victorian Admitted Episode Dataset; VASM: Victorian Audit of Surgical Mortality.

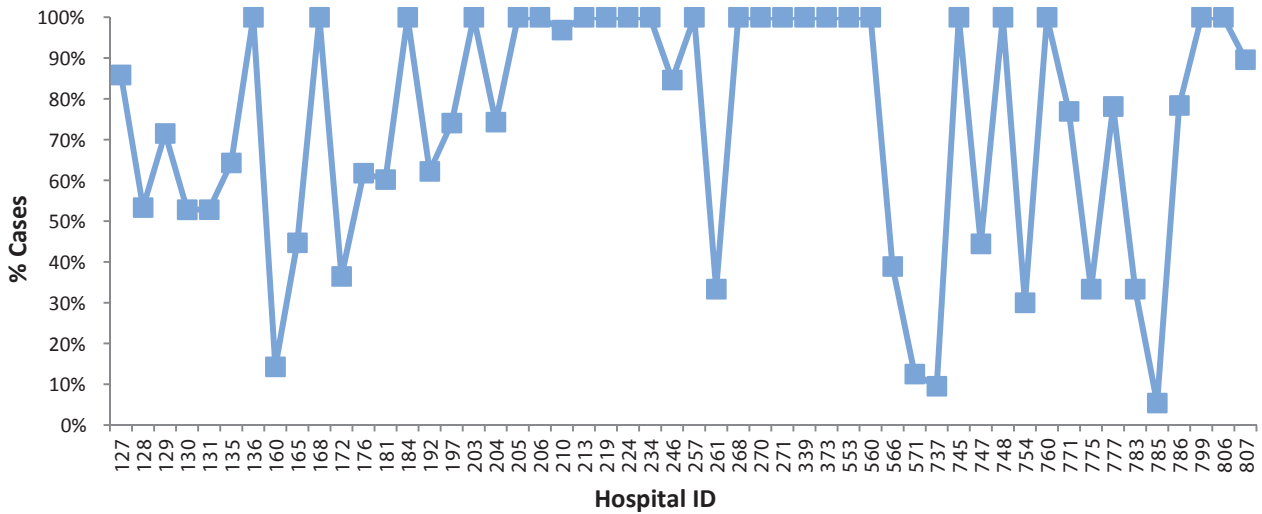
A comparison of the number of mortalities reported by VAED and VASM is depicted by the black line in Figure 13.

**Comments:**

- VAED indicates that during the audit period 2,400,542 patients received surgical care in the Victorian public and private hospitals and of these 5,585 (0.2%) resulted in auditable mortalities reported to VASM.
- In 2012 there was a slight decrease in the match of VASM versus VAED data, as some hospitals experienced difficulties in reporting mortalities in a timely manner due to upgrades in their electronic health information systems. In addition some gaps can be attributed to the further recruitment phase of private hospitals and the gynaecological surgical Fellows into the VASM audit.
- It should be noted that the two methods of assessing mortality (VASM and VAED) have different sources and might therefore be considered as complementary rather than parallel.



Figure 14: Comparison of mortalities reported by VAED and by hospital



ID: identifier; VAED: Victorian Admitted Episodes Dataset; VASM: Victorian Audit of Surgical Mortality.

Figure 14 shows a comparison of data collected between 1 July 2011 and 30 June 2012 on 1,367 deaths reported by VASM.

**Comments:**

- VAED indicates that in a single year (2011-12) 628,628 patients received surgical care in the Victorian public and private hospital sector; of these, 1,995 resulted in mortalities (0.3%).
- The match for the surgical mortality data reached 69 percent (1,367 VASM-reported deaths versus 1,995 VAED-surgical deaths identified). However, 176 VASM cases were from private hospitals.
- Hospitals where no mortalities occurred or where deaths have not been reported have been excluded from further analysis.

**Key points**

- There has been an increase in the percentage of eligible Victorian Fellows agreeing to participate in the audit between 2008 and 2012 (60% to 88%). Of these, 35 percent have adopted the new electronic interface to transfer data to VASM.
- Over half of participants have also agreed to be first or second-line assessors.
- The CRF return rate in 2012 remains constant at 89 percent.
- All Victorian public hospitals providing relevant surgical services are now participating and providing notifications of death.
- Recruitment of the private sector commenced in August 2010 and currently 85 percent of Victorian private hospitals have enrolled in the audit program.
- The match between deaths reported to VASM and those recorded by VAED is 69 percent.





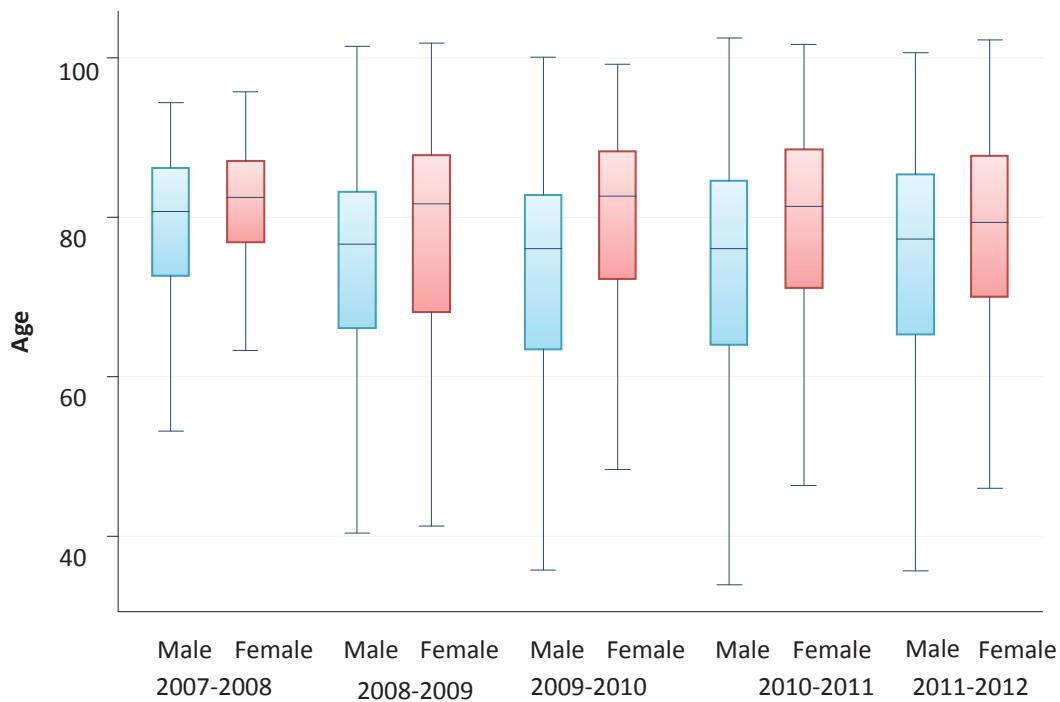
## 2.5. Demographic profile of audited cases

### 2.5.1 Age profile

Figures 15-17 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, that is, values larger than the upper quartile and plus 1.5 or 3 times the interquartile range.

Figure 15: Gender and age distribution of deceased



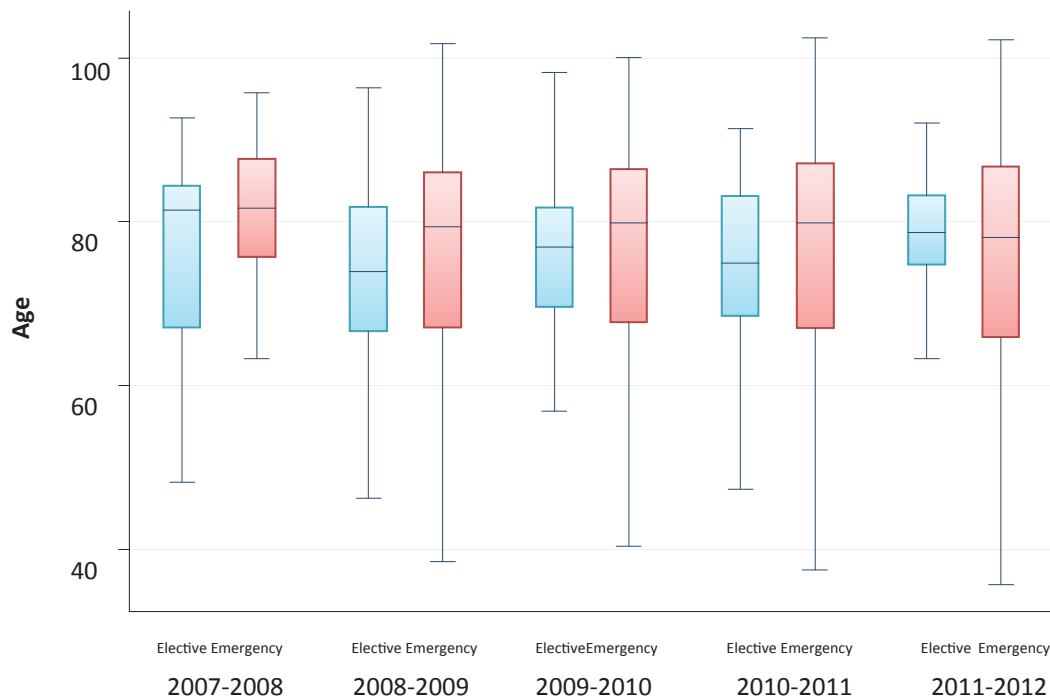
Note: Total n = 2,862.  
Excludes outliers.

#### Comments:

- There were 2,862 audited cases with a mean (SD) age of 80 (75-85) years. The age range varied from one-day-old to 102-years-old.
- The median age for 1,337 (47%) females was 82 years compared to 77 years for the 1,525 (53%) males, ( $p < 0.001$ ). Extreme values have not been displayed in Figure 15.
- This age and discharge summary profile is consistent with the ageing general population.
- The high mean age of 79 years of these patients indicates that surgical mortality predominantly occurs in the elderly.



Figure 16: Age distribution of deceased by admission status



Note: Total n = 2,862.

Missing data: n = 40 (1%).

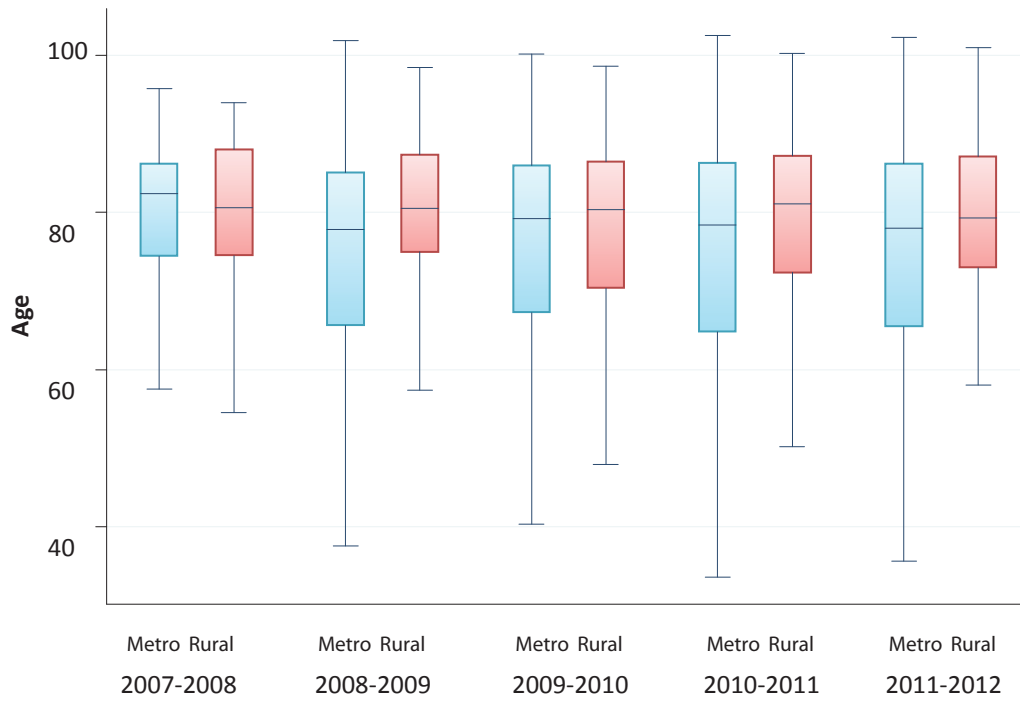
Excludes outliers.

#### Comments:

- Extreme values have not been displayed in Figure 16.
- The age profile by admission status was similar across the audit period.
- The patients admitted as emergency cases were generally older than those admitted electively.
- In a recent report on waiting times for emergency department care and elective surgery at Australian hospitals, which highlighted delays at the patient's initial presentation for acute conditions, it was stated that 'potentially avoidable GP-type presentations accounted for almost 39 percent of all presentations to emergency department in hospitals within major cities'.<sup>(3)</sup>



Figure 17: Age distribution of deceased by region



Note: Total n = 2,862.

Metro: metropolitan.

Excludes outliers.

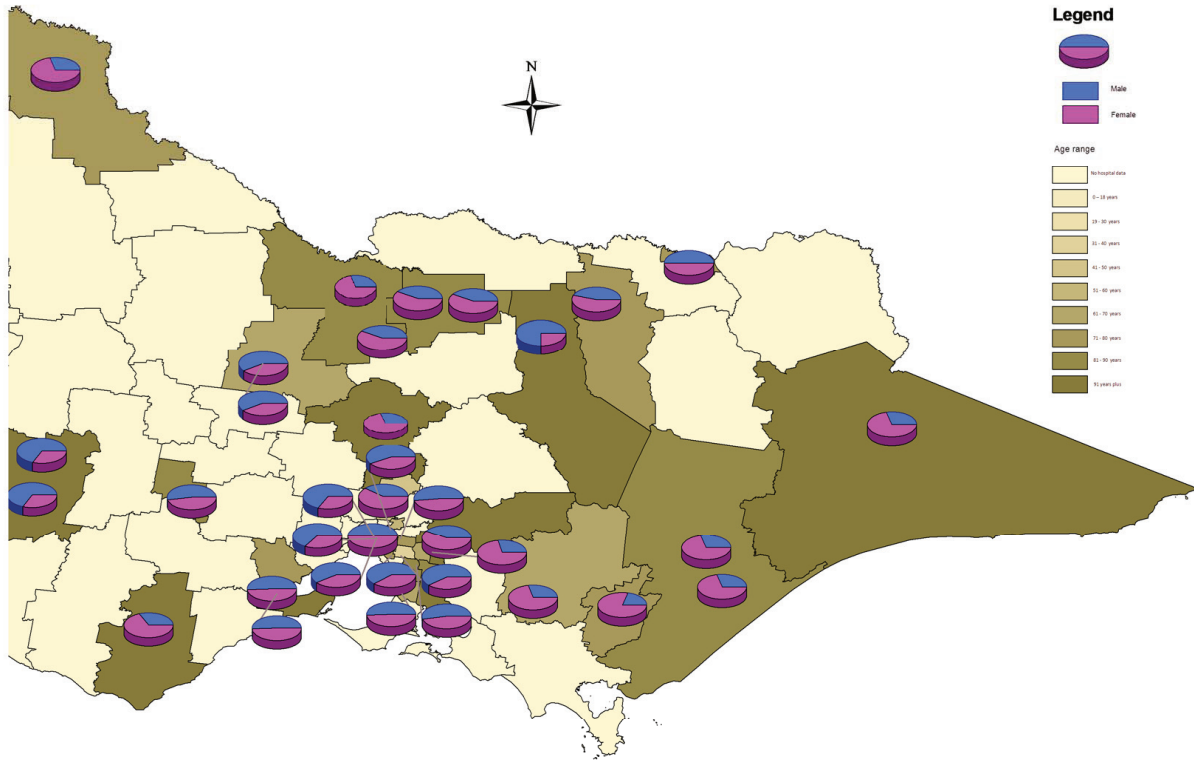
**Comments:**

- Extreme values have not been displayed in Figure 17.
- The median age for rural and metropolitan areas was similar 79 and 80 years respectively.





Figure 18: Age and gender of deceased by local government area



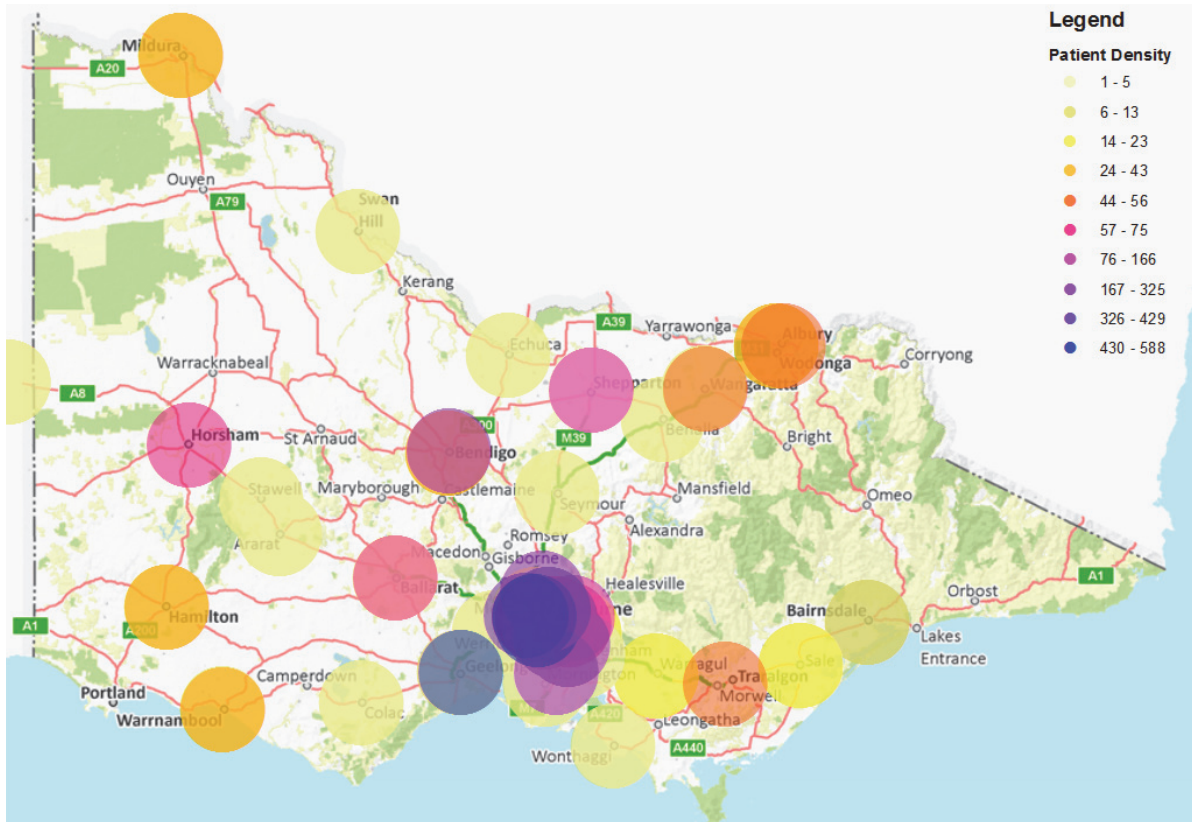
Note: Total n = 2,862.

**Comments:**

- Figure 18 is a pictorial view of the gender and mean age distribution of reported deaths by local government area (LGA). The points displayed represent the male to female ratio per hospital and have been placed in their relevant LGA. Individual points do not indicate where a death occurred, only the LGA in which death occurred.



Figure 19: Patient distribution by local government area



Comments:

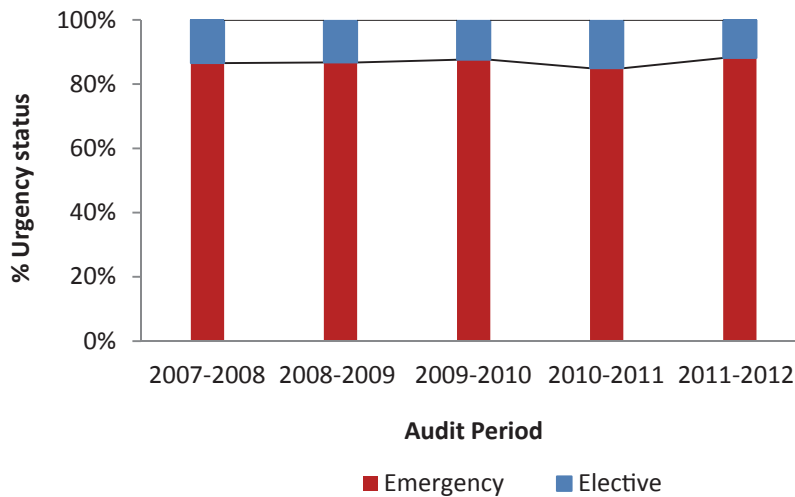
- Figure 19 is a pictorial view patient distribution by density of reported deaths. Only LGAs where a surgical death has occurred have data points or shading.



### 2.5.2 Urgency status of patients

The urgency status of a patient records whether that patient was admitted electively or as an emergency for an acute condition (see Figure 20).

Figure 20: Urgency status of deceased over sequential audit periods



Note: Total n = 2,862.  
Missing data: n = 40 (1%).

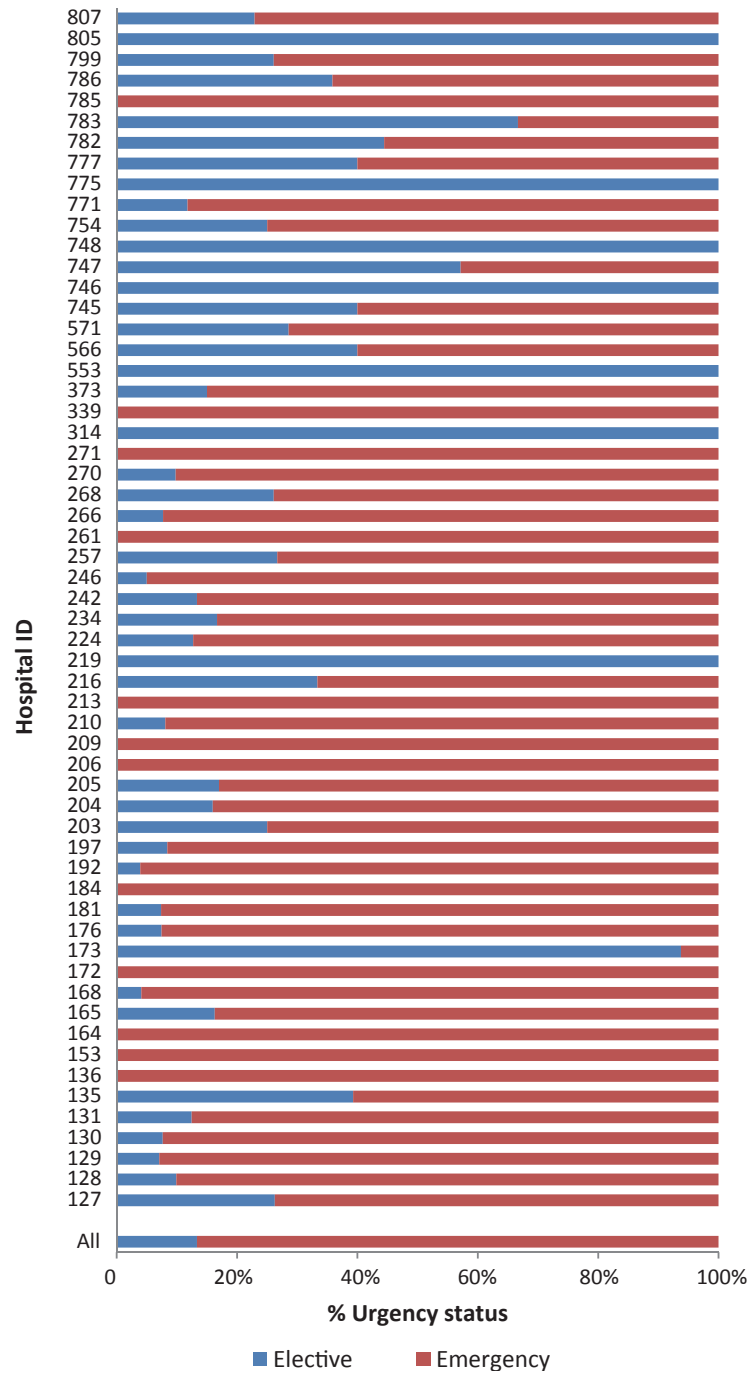
**Comments:**

- A total of 2,446 of 2,862 (85%) patients admitted as emergencies had acute conditions. The high percentage of patients admitted as emergencies with acute conditions has been constant over time.
- The larger distribution of emergency versus elective cases makes it difficult to compare clinical data among the two groups.
- A recent Western Australian study on hospital and emergency department use in the last year of life found that 'seventy percent of the 1,071 decedents had at least one emergency presentation'.<sup>(4)</sup>
- In a report by the Australian Institute of Health and Welfare, there were 'almost 6.2 million emergency department presentations to major public hospitals. Between 2009-10 and 2010-2011, emergency department presentations increased in all states and territories'.<sup>(3)</sup>





Figure 21: Urgency status of deceased by hospital



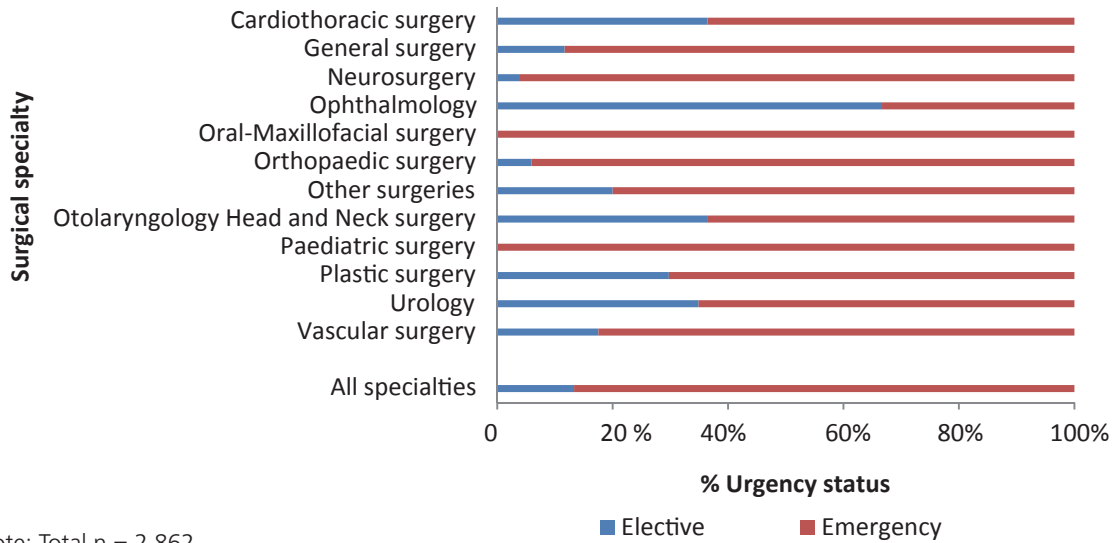
Note: Total n = 2,862.  
Missing data: n = 40 (1%).  
ID: identifier.

Comments:

- The proportion of audited cases admitted as emergencies varied among hospitals (see Figure 21). Some hospitals do not have emergency departments and provide very limited access for emergency services.
- This high rate of emergency admissions is similar among the states and territories.<sup>(1)</sup>



Figure 22: Urgency status of deceased by surgical specialty



Note: Total n = 2,862.

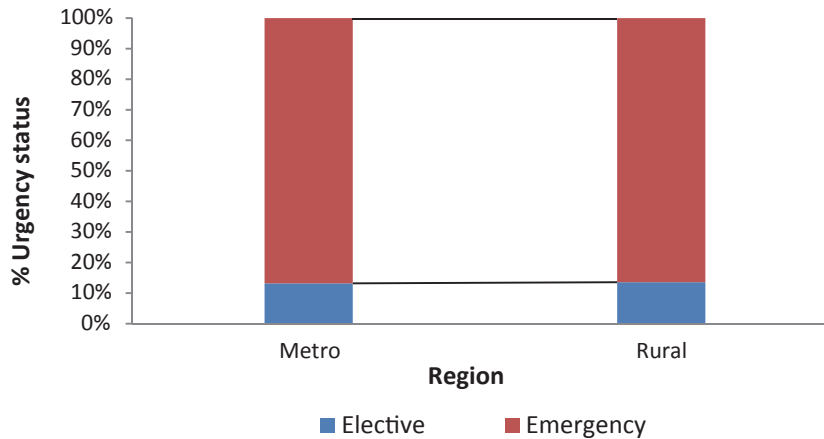
Missing data: n = 40 (1%).

'Other surgeries' includes trauma, transplant, oncology, obstetrics and gynaecology.

Comments:

- The proportion of audited cases admitted as emergencies varied among specialties (see Figure 22). In some instances this is a reflection of the expected casemix of the individual specialties.

Figure 23: Urgency status of deceased by region



Comments:

- The urgency profile was similar across metropolitan and rural hospitals (see Figure 23).

Key points

- A total of 85 percent of deaths in this audited series occurred in patients who were admitted as emergencies with acute conditions.
- The high mean age of these patients indicates that surgical mortality occurs predominantly in the elderly.



## 2.6. Risk profile and cause of death in audited cases

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

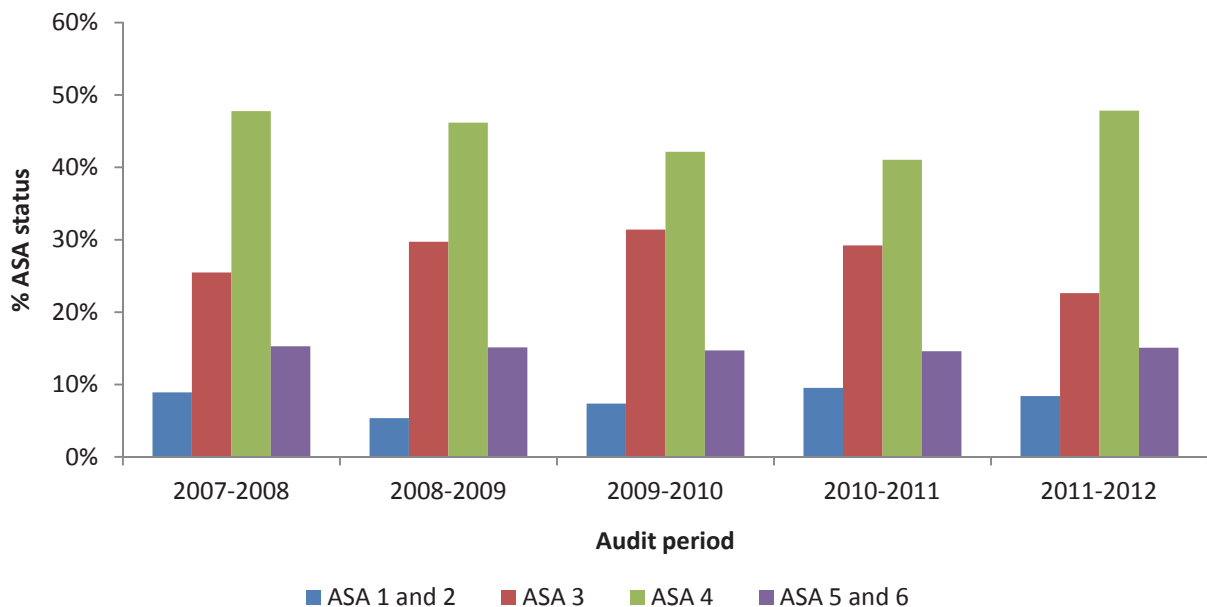
### 2.6.1 ASA status of patients

The ASA physical status is an international measure of patient risk used by anaesthetists.<sup>(5)</sup>

ASA grade characteristics:

1. A normal healthy patient.
2. A patient with mild systemic disease.
3. A patient with severe systemic disease.
4. A patient with severe systemic disease that is a constant threat to life.
5. A moribund patient who is not expected to survive without the operation.
6. A declared brain-dead patient whose organs are being removed for donor purposes.

Figure 24: ASA grades of deceased over sequential audit periods



Note: Total n = 2,862.

Missing data: n = 134 (5%).

ASA: American Society of Anesthesiologists.

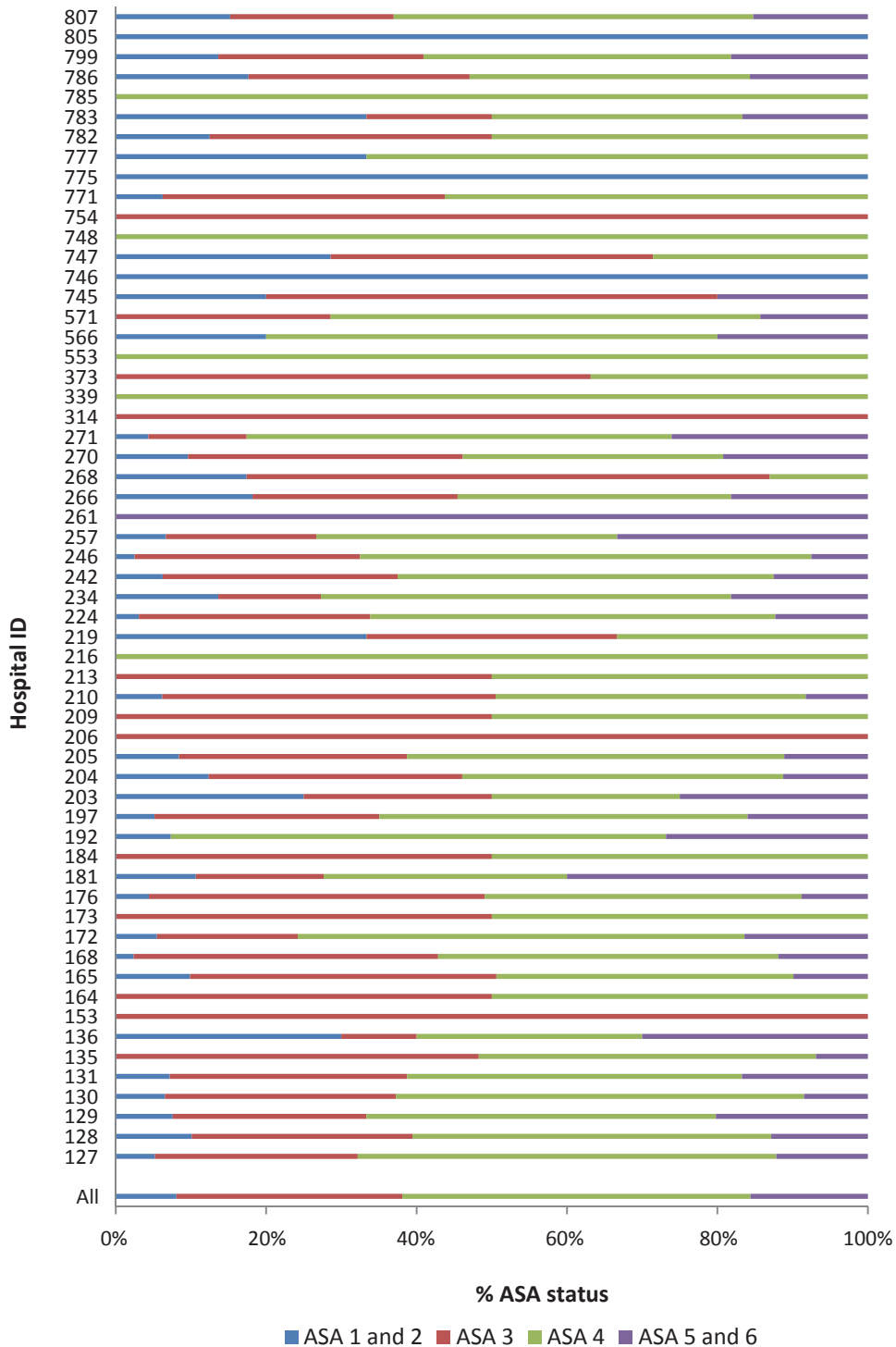
The ASA grades of deceased patients over sequential audit periods is depicted in Figure 24.

#### Comments:

- The preponderance of moderate and high ASA grades has been consistent over time.
- The frequency of high ASA grades suggests that most deaths have occurred in patients assessed as high risk by the anaesthetic team. The distribution of ASA grades has remained relatively constant over time.
- It is perceived that the casemix managed in the private sector is different, with a greater preponderance of younger, fitter patients. Any impact due to this will not be seen for a few years, when more data from the private sector has been collected.



Figure 25: ASA grades of deceased by hospital



Note: Total n = 2,862.  
 Missing data: n = 134 (5%).  
 ASA: American Society of Anesthesiologists; ID: identifier.

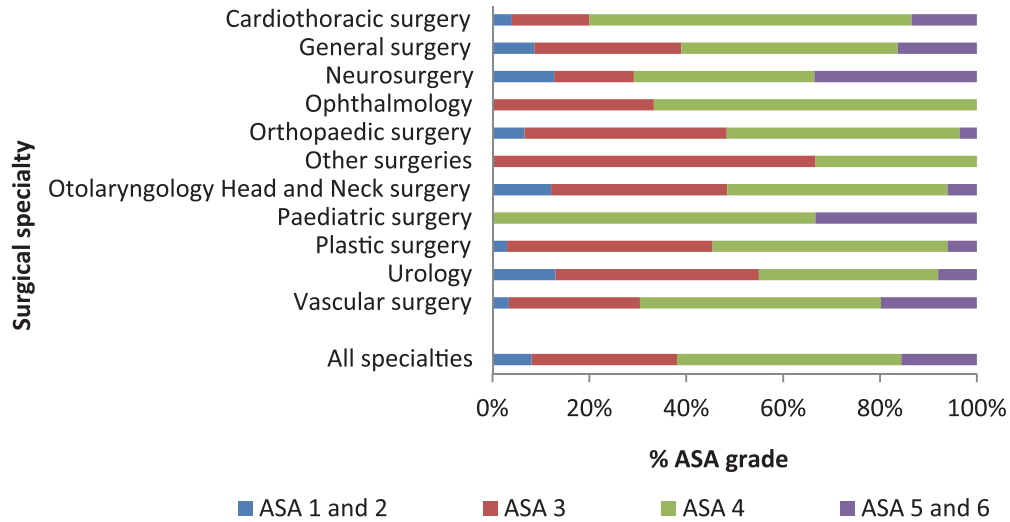
**Comments:**

- ASA status varies among hospitals (see Figure 25), which may be a reflection of their individual casemix.





Figure 26: ASA grades of deceased by surgical specialty



Note: Total n = 2,862.

Missing data: n = 134 (5%).

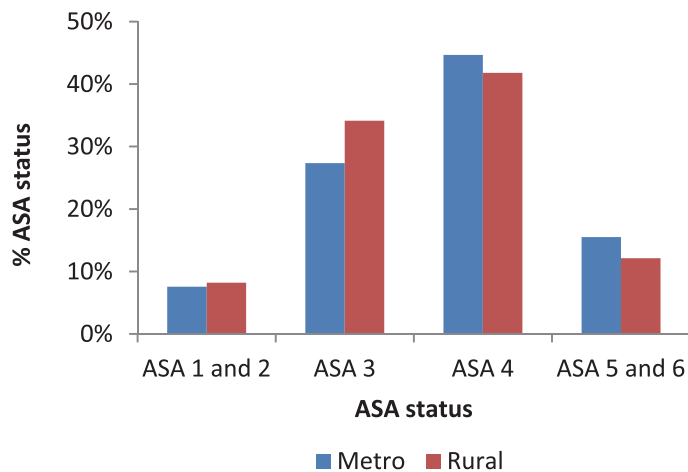
ASA: American Society of Anesthesiologists.

'Other surgeries' include trauma, transplant, oncology, obstetrics and gynaecology.

**Comments:**

- The variation in severity of ASA grades among specialties (see Figure 26) is a reflection of the risk profile inherent in their casemix.

Figure 27: ASA grades of deceased by region



Note: Total n = 2,862.

Missing data: n = 134 (5%).

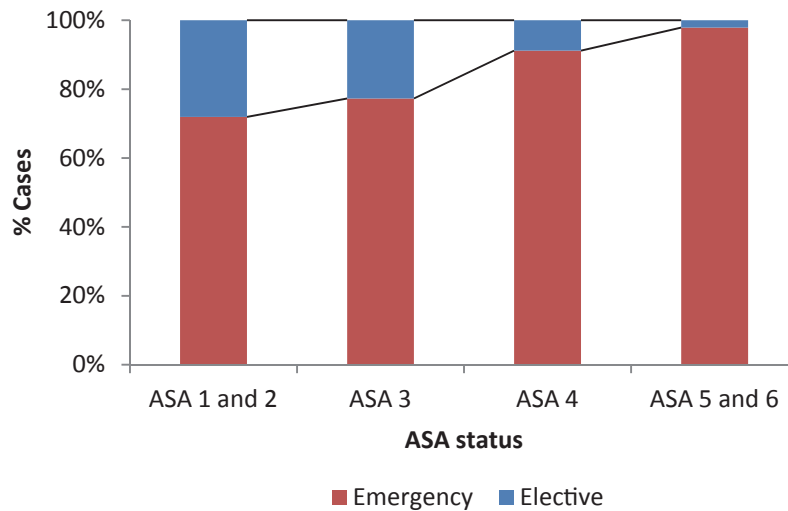
ASA: American Society of Anesthesiologists; Metro: metropolitan.

**Comments:**

- Figure 27 demonstrates a high mean ASA grade in both metropolitan and rural regions. This again suggests that the majority of deaths occurred in patients with significant comorbidity.



Figure 28: ASA grades of deceased by urgency status



Note: Total n = 2,862.

Missing data: n = 40 (1%).

ASA: American Society of Anesthesiologists.

#### Comments:

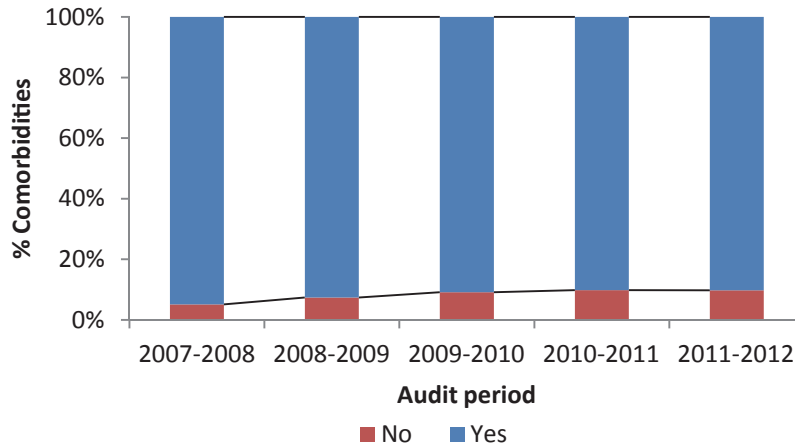
- A high proportion of emergency admissions had ASA grades 4, 5 or 6 (see Figure 28). This could be expected, as elective cases with ASA 4 often do not proceed to surgery when risk versus benefit is considered.<sup>(6)</sup>
- Cases with an ASA > 4 were significantly ( $p < 0.001$ ) more likely to be referred for SLA (full case note review). The reason for this is not obvious (data not shown in Figure 28).
- ASA 1 and 2 emergency cases represent the lack of systemic disease in these patients who are mainly trauma or acute neurosurgery presentations in fit patients.



### 2.6.2 Comorbidities

Comorbidity describes coexisting medical conditions or disease processes that are additional to the primary diagnosis.

Figure 29: Prevalence of comorbidities over sequential audit periods



Note: Total n = 2,862.  
Missing data: n = 3 (<1%).

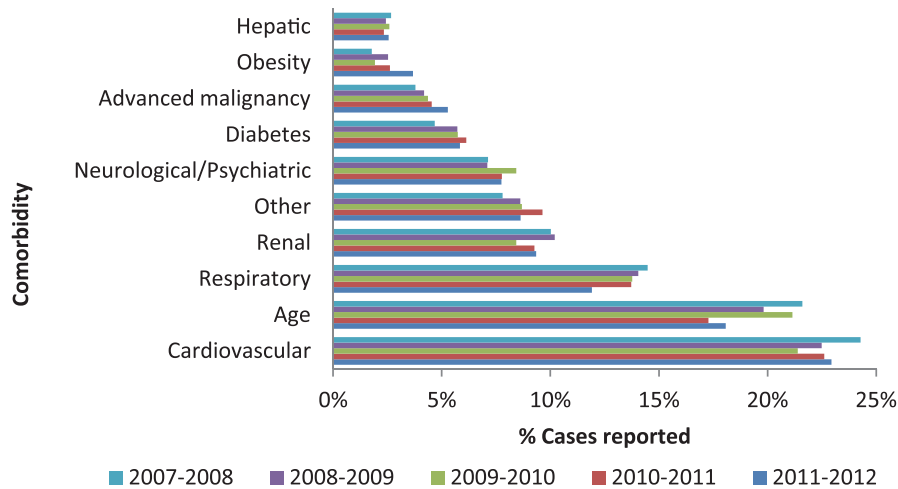
The prevalence of comorbidities over sequential audit periods is presented in Figure 29.

#### Comments:

- The majority of the 2,862 audited cases were reported to have had comorbidities (2,590; 90%). This high rate was consistent across the audit periods.
- There were 7,903 comorbidities reported in the 2,862 cases that had completed review.
- The apparent small increase in deaths without associated morbidity in 2011-12 was not statistically significant ( $p=0.1$ ) compared with other audit periods.



Figure 30: Prevalence of individual comorbidities over sequential audit periods



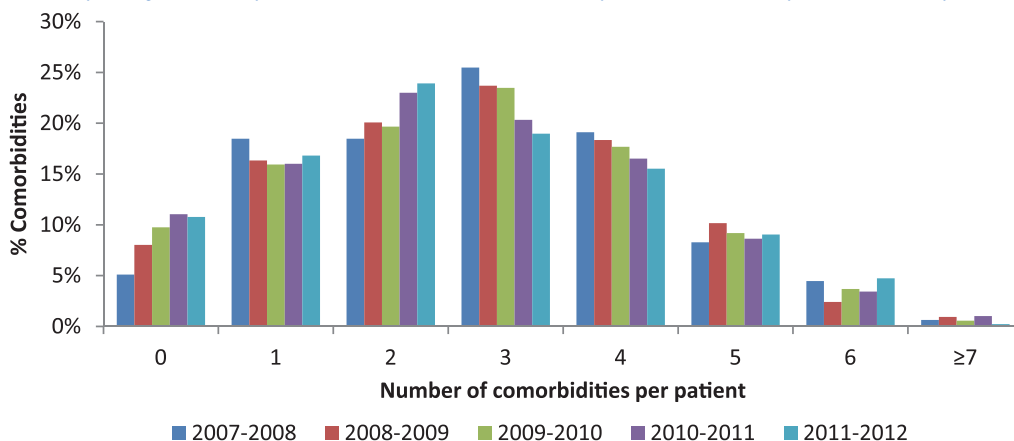
Note: Total number of comorbidities was 7,903 in 2,862 patients.  
Missing data: n = 274 (3%) from the pool of total comorbidities.

The prevalence of individual comorbidities over sequential audit periods is presented in Figure 30.

**Comments:**

- The comorbidity profile associated with audited deaths appeared to be similar across metropolitan and rural regions (data not shown in Figure 30) and has remained constant over time.
- The most common risk factors notified were cardiovascular (1,772; 22%), age (1,524; 19%), respiratory (1,073; 14%) and renal (740; 9%), and these have remained similar over time.
- This profile is similar to that reported in the 2012 ANZASM National Report.<sup>(1)</sup>
- The ‘other’ comorbidity category includes factors such as alcohol abuse, dementia, anorexia, malnutrition, chronic lymphatic leukaemia, chronic mesenteric ischaemia, coagulopathy, haemophilia, Crohn’s disease, drug abuse, rheumatoid arthritis, epilepsy, extreme prematurity, Jehovah’s Witness refusing transfusion, leukaemia, myelofibrosis, osteoporosis, scleroderma, thyrotoxicosis and spina bifida.

Figure 31: Frequency of multiple comorbidities in individual patients over sequential audit periods



Note: Total number of comorbidities was 7,903 in 2,862 patients.  
Missing data: n = 3 (<1%).

The frequency of multiple comorbidities in individual patients over sequential audit periods is shown in Figure 31.

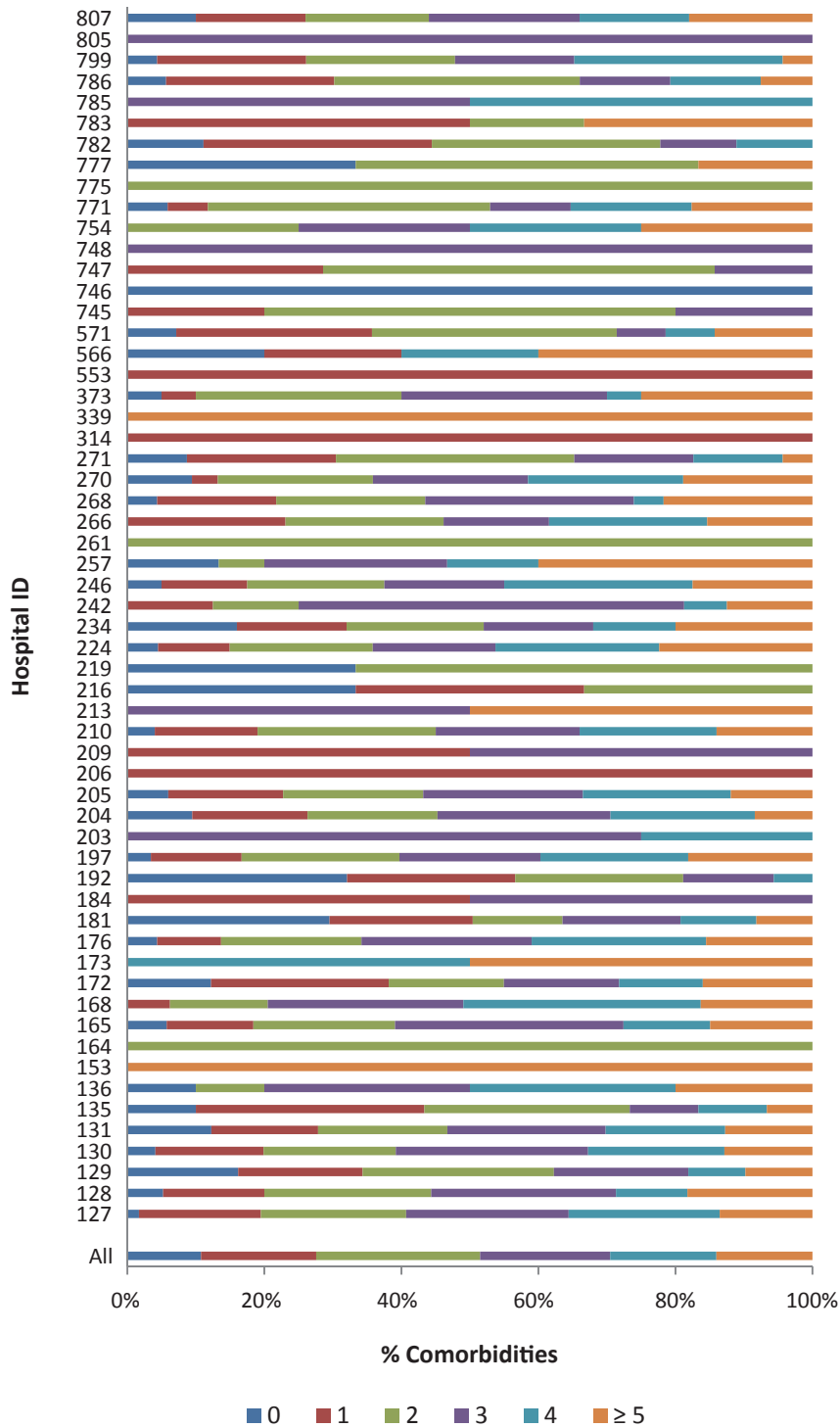
**Comments:**

- In this audited series, 2,590 (90%) cases were reported to have some comorbidity, with a mean of two comorbidities reported per patient.
- This reflects the presence of significant pre-existing illness in this cohort of deaths.





Figure 32: Frequency of comorbidities reported by hospitals



Note: Total n = 2,862.  
 Missing data: n = 3 (<1%).  
 ID: identifier.

Figure 32 shows the comorbidity profile in surgical deaths across hospitals.

**Comments:**

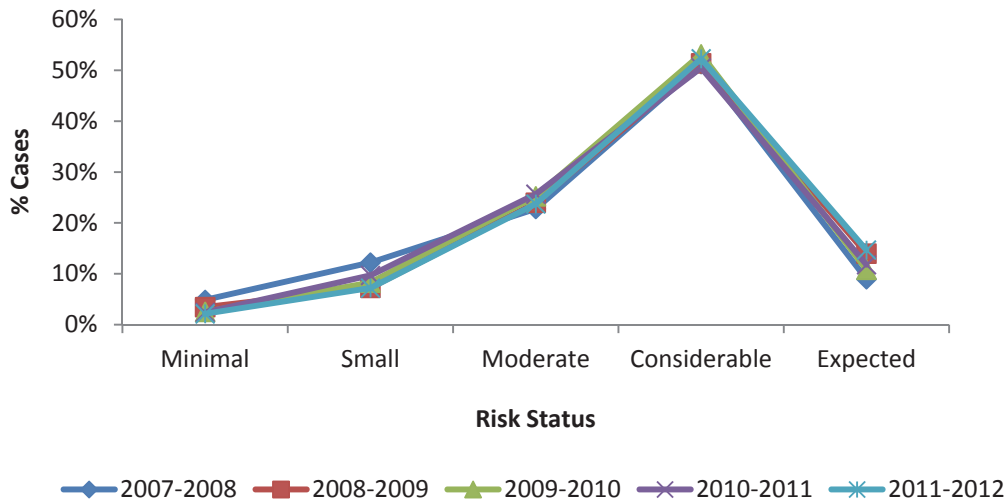
- The incidence of reported comorbidity varied among hospitals.



### 2.6.3 Surgeon's perception of risk status

Treating surgeons were asked to record their perception of risk of death of their patient at the time of treatment (see Figure 33).

Figure 33: Surgeon's perception of risk of death over sequential audit periods



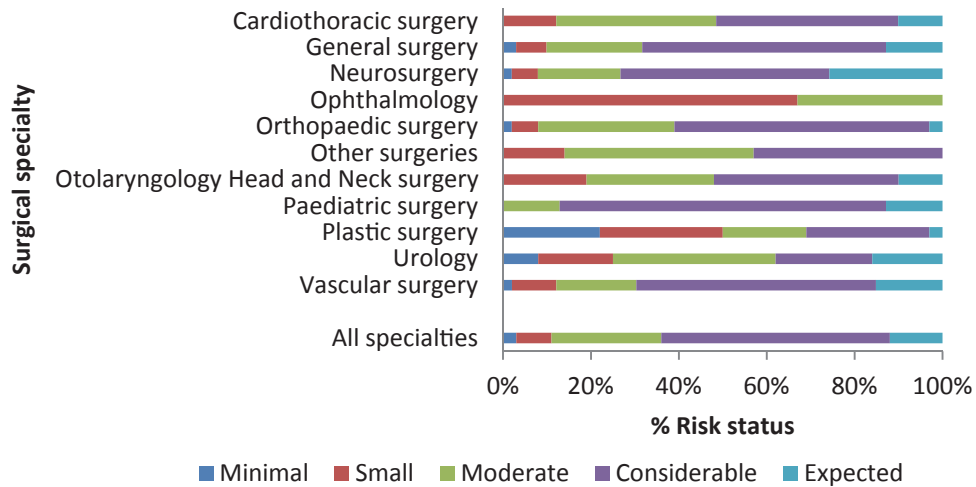
Note: Total n = 2,273 operative cases.  
Missing data: n = 20 (<1%).

**Comments:**

- The treating surgeon assessed the risk of death as considerably high in the majority of cases. This casemix reflects only patients who had surgery. This remained constant over time during the five years audit period.
- The overall perception of risk of death by hospital as identified by surgeons was similar to the aggregate findings and is reflective of the risk profile associated with the casemix of the individual hospital (data not shown in Figure 33).
- This supports the high risk profile suggested by the mean age, ASA score and associated comorbidity.



Figure 34: Surgeon's perception of risk of death by surgical speciality



Note: Total n = 2,273 operative cases.

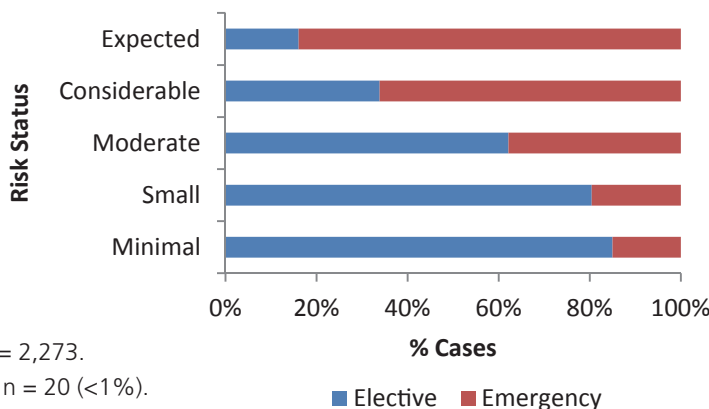
Missing data: n = 20 (<1%).

'Other surgeries' include: trauma, transplant, oncology, oral/maxillofacial, obstetrics and gynaecology.

Comments:

- The surgeon's perception of risk of death among surgical specialties was similar to the aggregate findings (see Figure 34).
- In cardiothoracic surgery, general surgery, orthopaedic surgery, neurosurgery, urology and areas of paediatric surgery, surgeons perceived a higher risk of death than in other specialties. For example, cardiothoracic surgery patients would have serious heart conditions, with generally poor health and thus were at greater risk of complications following surgery.<sup>(7)</sup>

Figure 35: Surgeon's perception of risk of death by admission status



Note: Total n = 2,273.

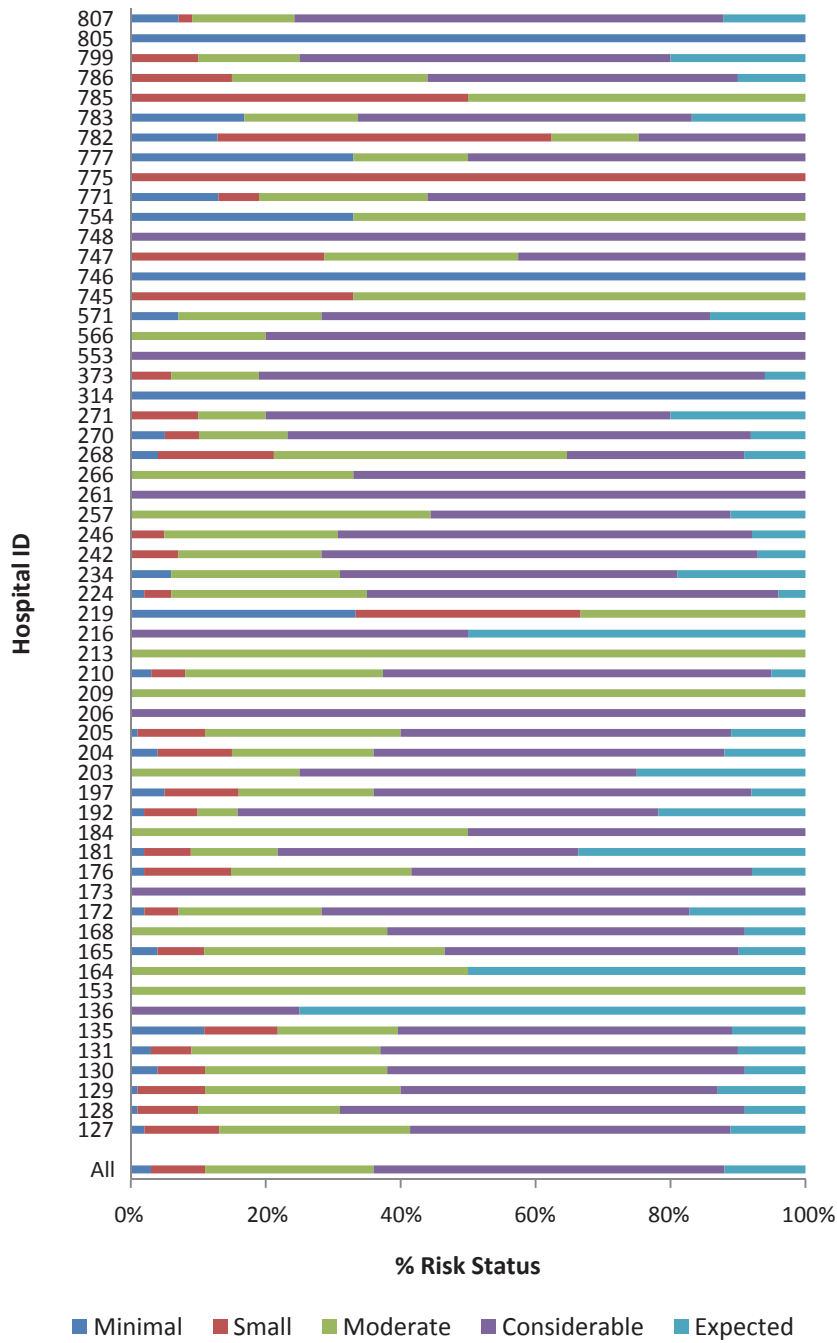
Missing data: n = 20 (<1%).

Comments:

- As shown in Figure 35, patients admitted as an emergency were perceived to be at a significantly greater risk of death than elective admissions (p<0.001).
- In a Victorian study, 'Acute Myocardial Infarction and cerebrovascular disease', researchers identified a potential increase in the risk of suffering an adverse event in patients with comorbidities admitted as emergency patients in comparison to patients without any comorbidities'.<sup>(8)</sup>
- It is to be expected that elective patients will have a lower perceived risk of death.



Figure 36: Surgeon's perception of risk of death by hospital



Note: Total n = 2,273 operative cases.  
 Missing data: n = 20 (<1%).  
 ID: identifier.

The surgeon's perception of risk of death by hospital is depicted in Figure 36.

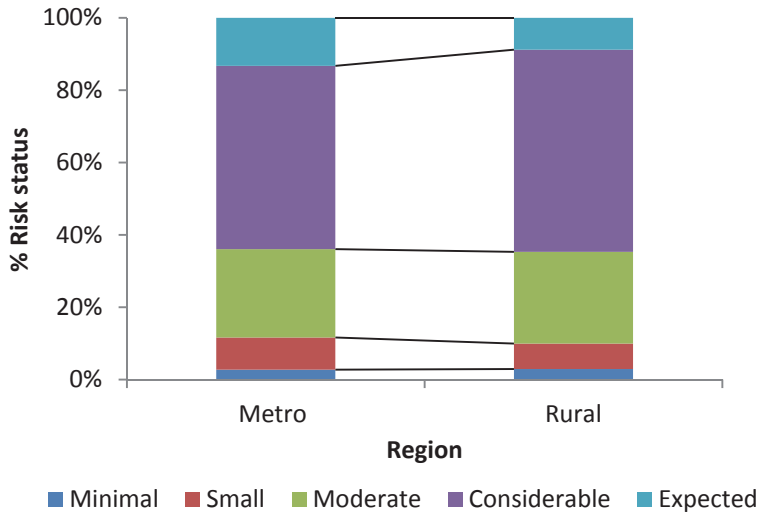
**Comments:**

- The overall perceived risk of death in this series was high, with variances as expected between hospitals with differing casemix.
- The surgeon's perception of risk of death by hospital was similar to the aggregate findings and reflective of the risk profile associated with the casemix of the individual hospital.





Figure 37: Surgeon's perception of risk of death by region



Note: Total n = 2,273 operative cases.  
Missing data: n = 20 (<1%).  
Metro: metropolitan.

Comments:

- The treating surgeon's perception of risk of death was similar in metropolitan and rural hospitals (see Figure 37).

Key points

- The clinical risk profile of this audited series confirms that the majority of deaths have occurred in patients perceived to have a low possibility of surviving their current illness.
- Ninety percent of patients had at least one pre-existing illness affecting their chance of recovery. The most frequent conditions cited were cardiovascular and respiratory.
- These findings are not surprising when considering the high mean age of patients in the series.



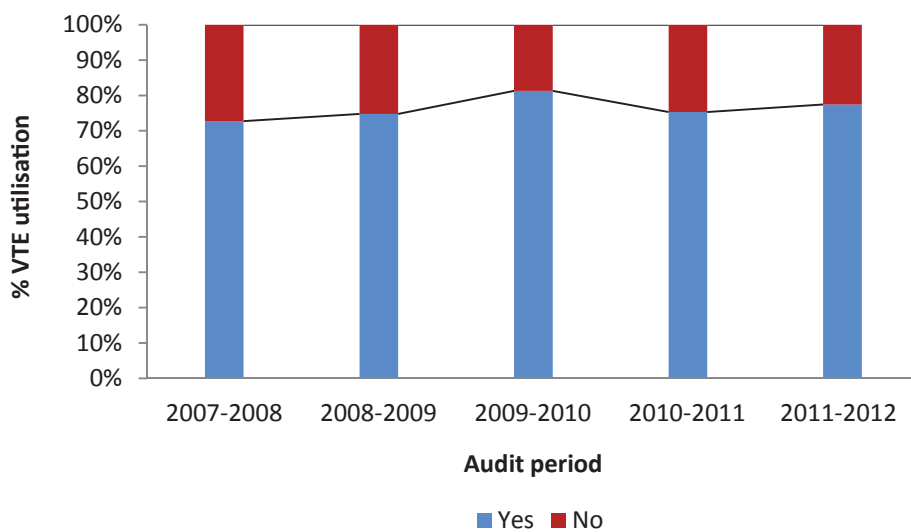
## 2.7. Risk management strategies

The following sections document application of clinical risk minimisation strategies.

### 2.7.1 Prophylaxis for venous thromboembolism

The treating surgeon has to record if venous thromboembolism (VTE) prophylaxis was given (see Figure 38) and what type of prophylaxis was actually used (see Figure 39). The reasons given for not providing VTE prophylaxis are displayed in Figure 40.

Figure 38: VTE prophylaxis use during the audit period



Note: Total n = 2,273 operative cases.

Missing data: n = 44 (2%).

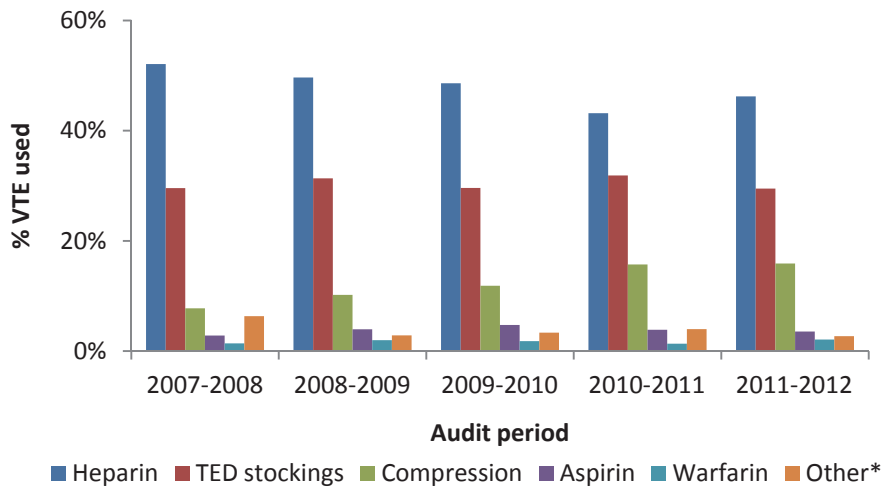
VTE: venous thromboembolism.

#### Comments:

- The use of VTE prophylaxis has risen slightly from 72 percent in 2008 to 76 percent in 2011-12 ( $p = 0.002$ ).
- The use of VTE prophylaxis is similar among metropolitan and rural sectors, and in elective and emergency cases (data not shown in Figure 38).



Figure 39: Type of VTE prophylaxis used



Note: Total n = 2,944.

Missing data: n = 44 (2%).

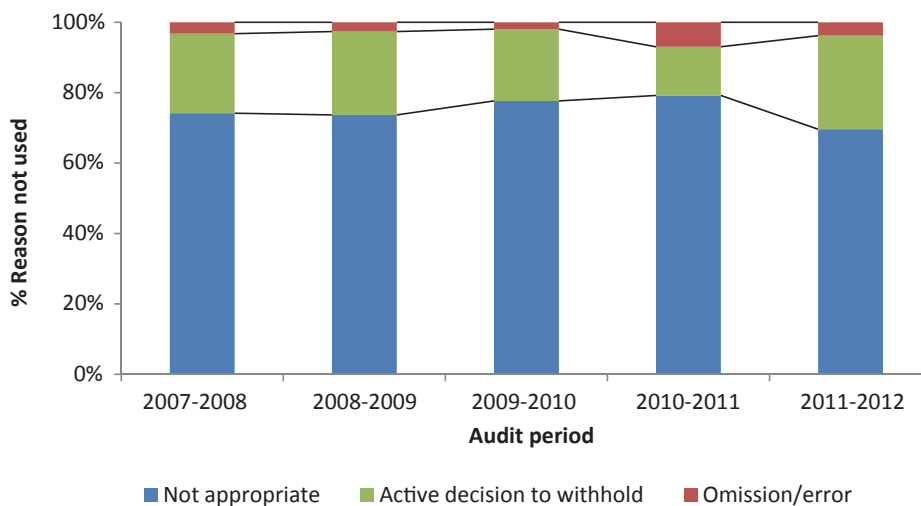
TED: thrombo-embolic deterrent stockings; VTE: venous thromboembolism.

\*'Other' prophylaxis included calf stimulators, Clexane, Fragmin, clopidogrel, enoxaparin, epidural, full anticoagulation for non-ST segment elevation myocardial infarction, and inferior vena cava filter and infusion.

Comments:

- The spectrum of VTE prophylaxis used has been consistent over time.
- There was no difference between metropolitan and rural sectors (data not shown in Figure 39).

Figure 40: Reasons given by treating surgeon for not providing VTE prophylaxis



Note: Number of patients not receiving prophylaxis was 503 in a total of 2,273 operative cases.

Missing data: n = 44 (2%).

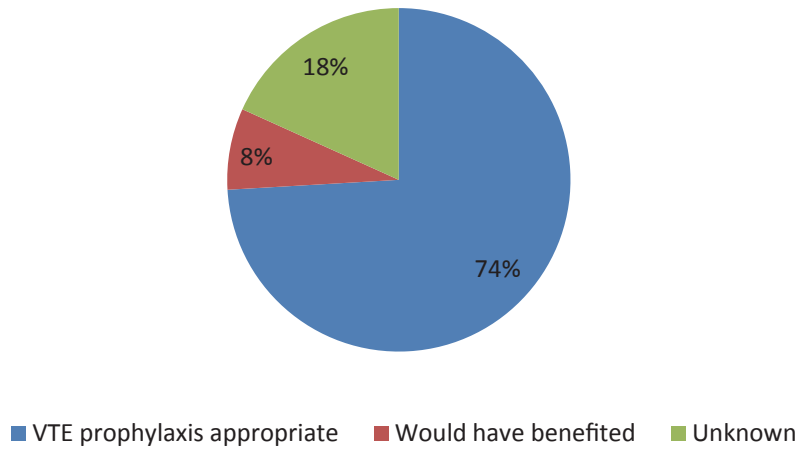
VTE: venous thromboembolism.

Comments:

- Overall, 503 (22%) of the 2,273 audited patients received no prophylaxis.
- In the majority of these cases this was a conscious decision by the treating team. The inadvertent omission rate has remained low at 2 percent across the audit period, except for the 2010-11 period when it was 7 percent.



Figure 41: Assessor perception of appropriateness of decision to withhold VTE prophylaxis



Note: Number of patients not receiving prophylaxis was 503 in a total of 2,273 operative cases.  
 Missing data: n = 44 (2%).  
 VTE: venous thromboembolism.

Assessors were asked to comment on the appropriateness of withholding prophylaxis (see Figure 41).

**Comments:**

- Assessors felt the decision to withhold on clinical grounds was appropriate in the majority (74%) of cases.
- In only 8 percent of cases, assessors felt that patients who did not receive VTE prophylaxis would have benefited from it.
- In 378 (68%) cases where VTE data was available and where a first-line assessment (FLA) and second-line (SLA) had been performed, the findings were compared. Agreement between first and second-line assessors on appropriateness was fair, at 67 percent (kappa score 0.11). This result is expected, as second-line assessors have the patient’s full medical record available for review.

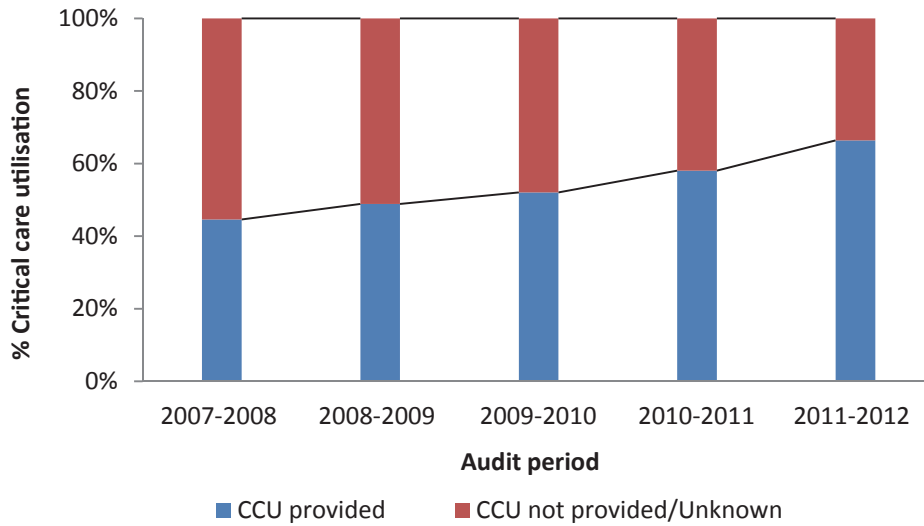




### 2.7.2 Adequacy of provision of critical care support to patients

The treating surgeon was asked to record if their patient received critical care support before or after surgery (see Figure 42). The first and second-line assessors reviewed the appropriateness of the use of critical care facilities for patients.

Figure 42: Provision of critical care support during the audit period



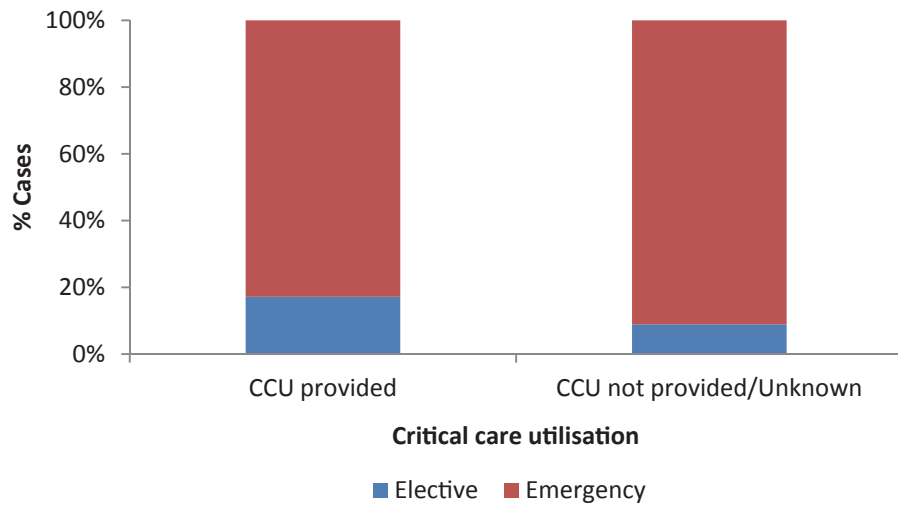
Note: Total n = 2,862.  
Missing data: n = 722 (25%).  
CCU: critical care unit.

#### Comments:

- This question was reframed in 2010 to make it more informative and reduce the amount of missing data.
- A total of 55 percent per cent of cases (1,568 of 2,862) received critical care support during their inpatient stay.
- The utilisation of critical care support has significantly increased from 45 percent in 2008 to 67 percent in 2011-12 ( $p < 0.001$ ).



Figure 43: Provision of critical care support by admission type



Note: Total n = 2,862.  
 CCU: critical care unit.

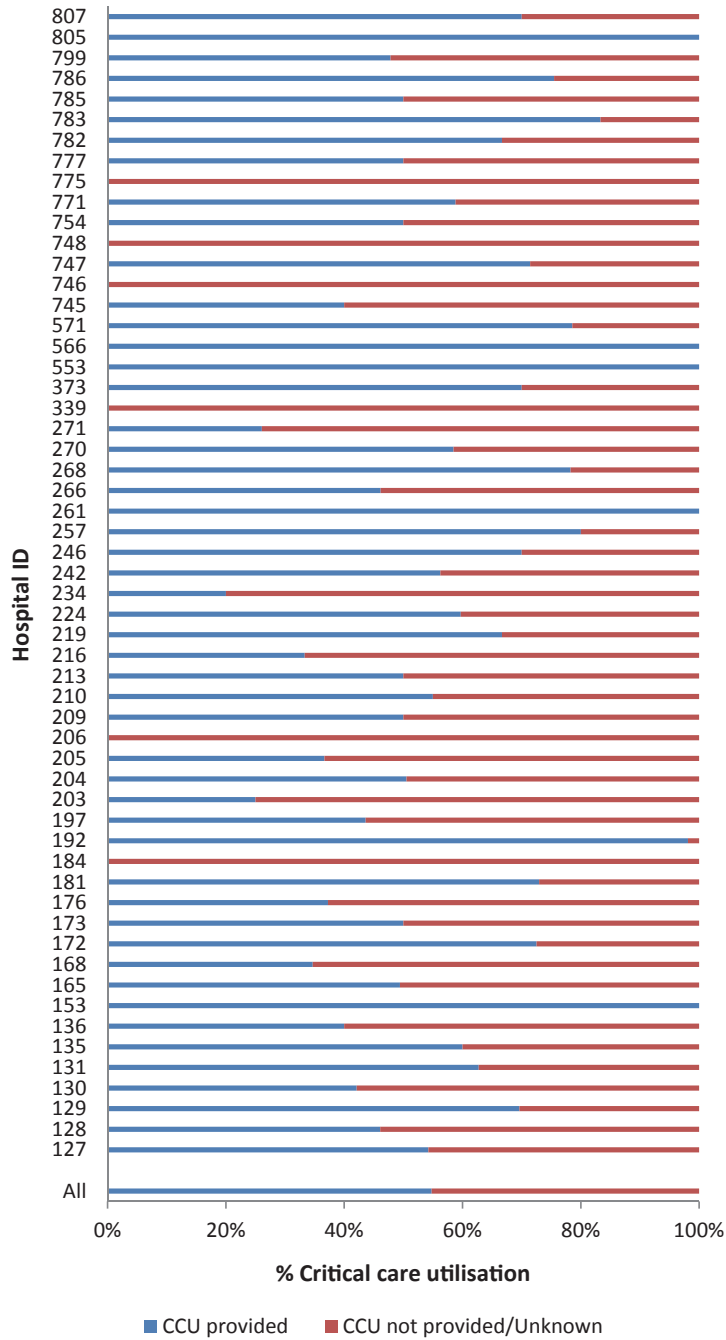
**Comments:**

- Not all patients require critical care support.
- The use and need for critical care is higher in emergency cases (see Figure 43).





Figure 44: Provision of critical care support by hospital



Note: Total n = 2,862.

CCU: critical care unit; ID: identifier.

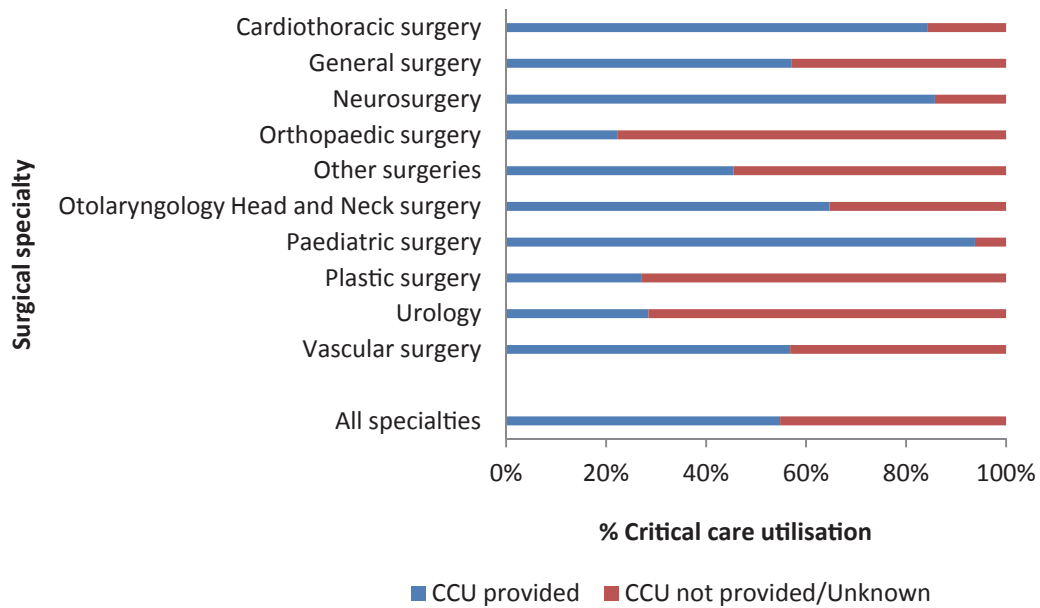
The provision of critical care support by the hospital is shown in Figure 44.

**Comments:**

- It should be acknowledged that not all hospitals have critical care services and therefore triage patients accordingly.
- There is no difference in the provision of critical care support between metropolitan and rural regions (data not shown in Figure 44).



Figure 45: Provision of critical care support to patients by specialty



Note: Total n = 2,862.

CCU: critical care unit.

Other surgeries include trauma, transplant, oncology, oral/maxillofacial, obstetrics and gynaecology.

**Comments:**

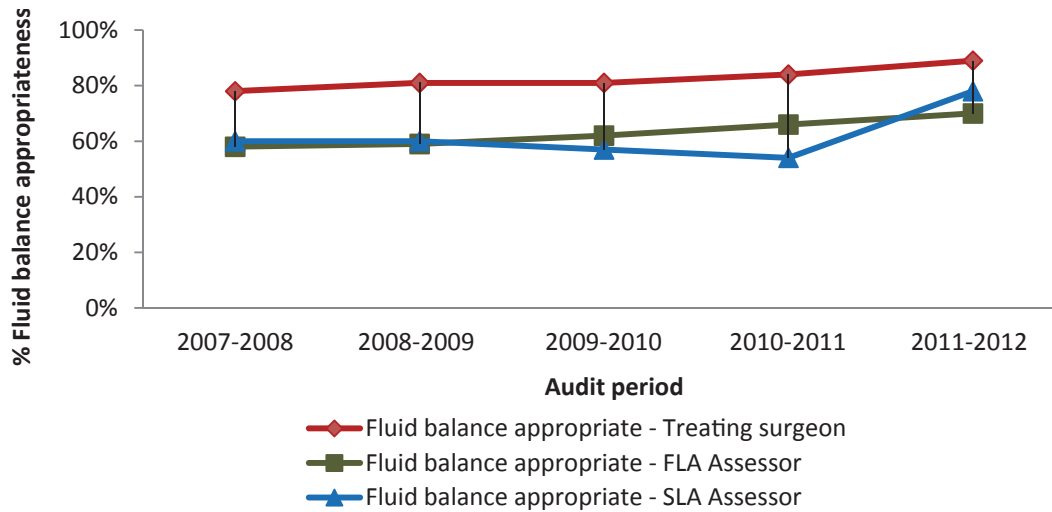
- Similar to previous years, orthopaedic patients have low referral rates for critical care support. This is again postulated to be due to the high number of elderly patients with fractured necks of femur admitted from high-level care institutions.
- The treating surgeon perceived that lack of provision of critical care support to their patients was a potentially an issue in only a very small percentage (<1%) of their cases.
- The peer-review process (FLA and SLA) suggested that only 111 (6%) of patients who did not receive critical care support would likely have benefited from it (data not shown in Figure 45).





2.7.3 Issues with fluid balance

Figure 46: Perception of fluid balance appropriateness



Note: Total n = 2,862.  
 Missing data: n = 147 (5%).  
 FLA: first-line assessment; SLA: second-line assessment

The treating surgeon and all assessors are asked to comment on the appropriateness of fluid balance during the episode of care (see Figure 46).

Comments:

- Across the audit period from 2008 to 2012, in 83 percent of the audited cases the treating surgeon felt that fluid balance had been managed appropriately by their clinical team.
- Overall, the first-line assessors made no adverse comment on fluid balance management in 72 percent of the audited cases compared to the second-line assessors' figure of 59 percent. This gap between appropriateness of perception of fluid balance between treating surgeon and assessors is noteworthy.
- Fluid balance was assessed as inappropriate by first and second-line assessors in only 26 (5%) of the combined assessed cases.

From a recent study on the interaction between fluid balance and disease severity of the critically ill patients, it was found that 'early adequate fluid resuscitation together with conservative late fluid management may provide better patient outcomes'.<sup>(9)</sup>

Key points

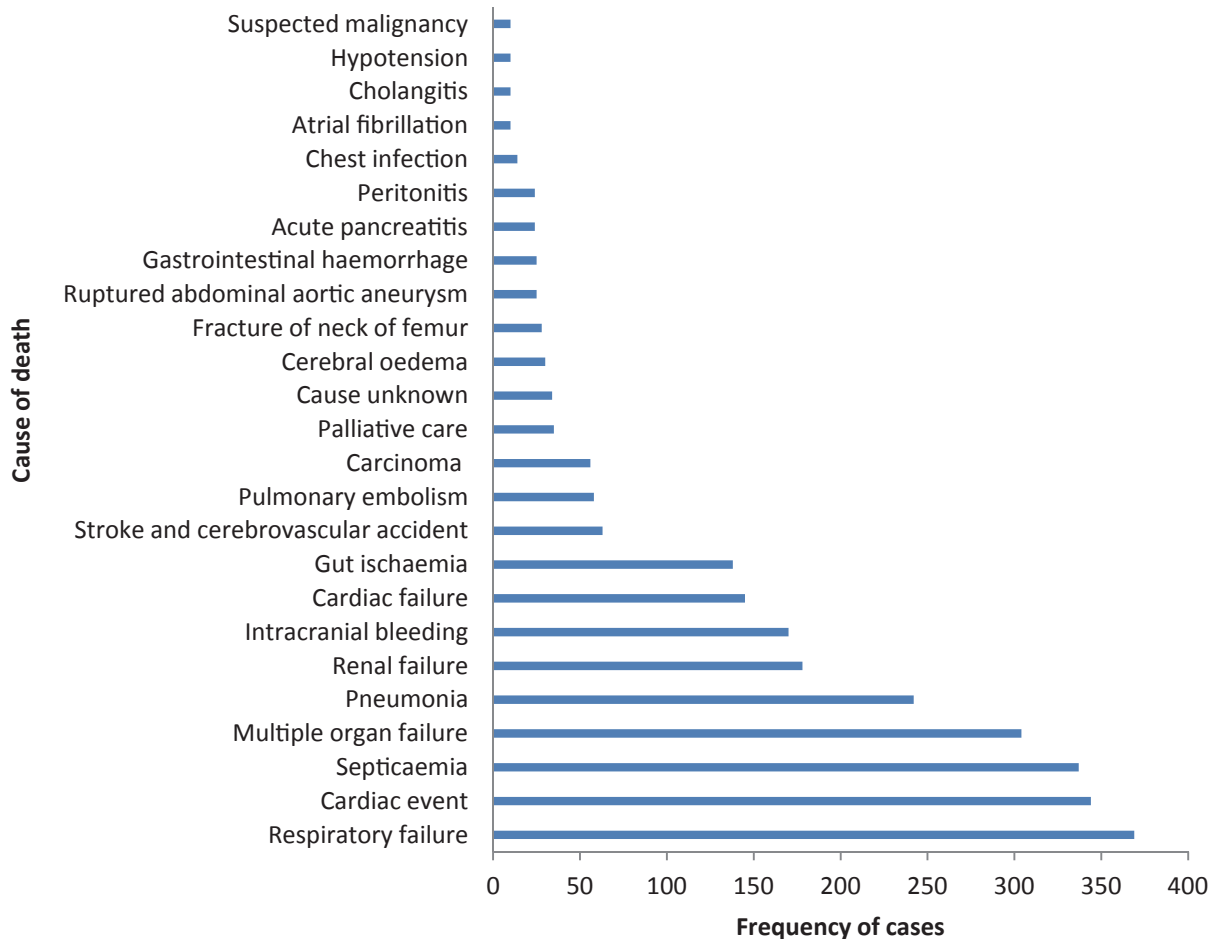
- It is important that surgical patients receive VTE prophylaxis where appropriate. The provision of VTE prophylaxis has improved, with some form of VTE prophylaxis being provided in 76 percent of cases. Inadvertent omission of prophylaxis was rare, only occurring in 2 percent of cases.
- In the majority of cases where VTE prophylaxis was withheld, the assessor agreed with the decision.
- In total, 1,568 (55%) of the 2,862 patients in this audited series received critical care support during the clinical course of their illness. In the majority of instances, those who were perceived to have been likely to benefit from critical care support received it.
- There was a perception by assessors that only 5 percent of the cases who did not receive critical care support might have benefited from such support. The first-line assessors perceived this to be the case less frequently than the second-line assessors.
- Assessors have provided some criticism of fluid balance management in 5 percent of the combined assessment pool.



### 2.8. Causes of death reported in audited cases

The treating surgeon records the probable cause of death as evidenced by the clinical features leading up to death (see Figure 47).

Figure 47: Frequency of reported causes of death



Note: Total n = 2,683 causes of death reported for n = 2,273 patients. Cause of death has been included in this graph if the total count was ≥10.

**Comments:**

- A total of 2,683 conditions were perceived to be responsible for death in 2,273 cases.
- The most frequently cited causes of death were respiratory failure (369, 14%), cardiac factors including heart failure, cerebrovascular incident, ischaemic heart disease, cardiorespiratory failure and cardiac event (344, 13%), septicaemia (337, 13%) and multiorgan failure (304, 11%). Death was attributed to these conditions in over half (1,354) of the 2,273 cases.
- Other causes for death were reported, but as the individual frequencies of each in the remainder were ≥10, these have not been listed.

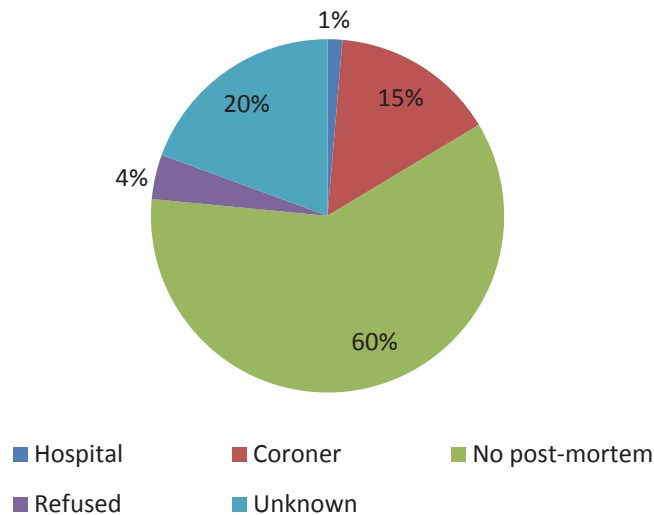


## 2.9. Establishing the cause of death

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.

### 2.9.1 Postmortem rate

Figure 48: Postmortem utilisation



Note: Total n = 2,862.  
Missing data: n = 43 (2%).

#### Comments:

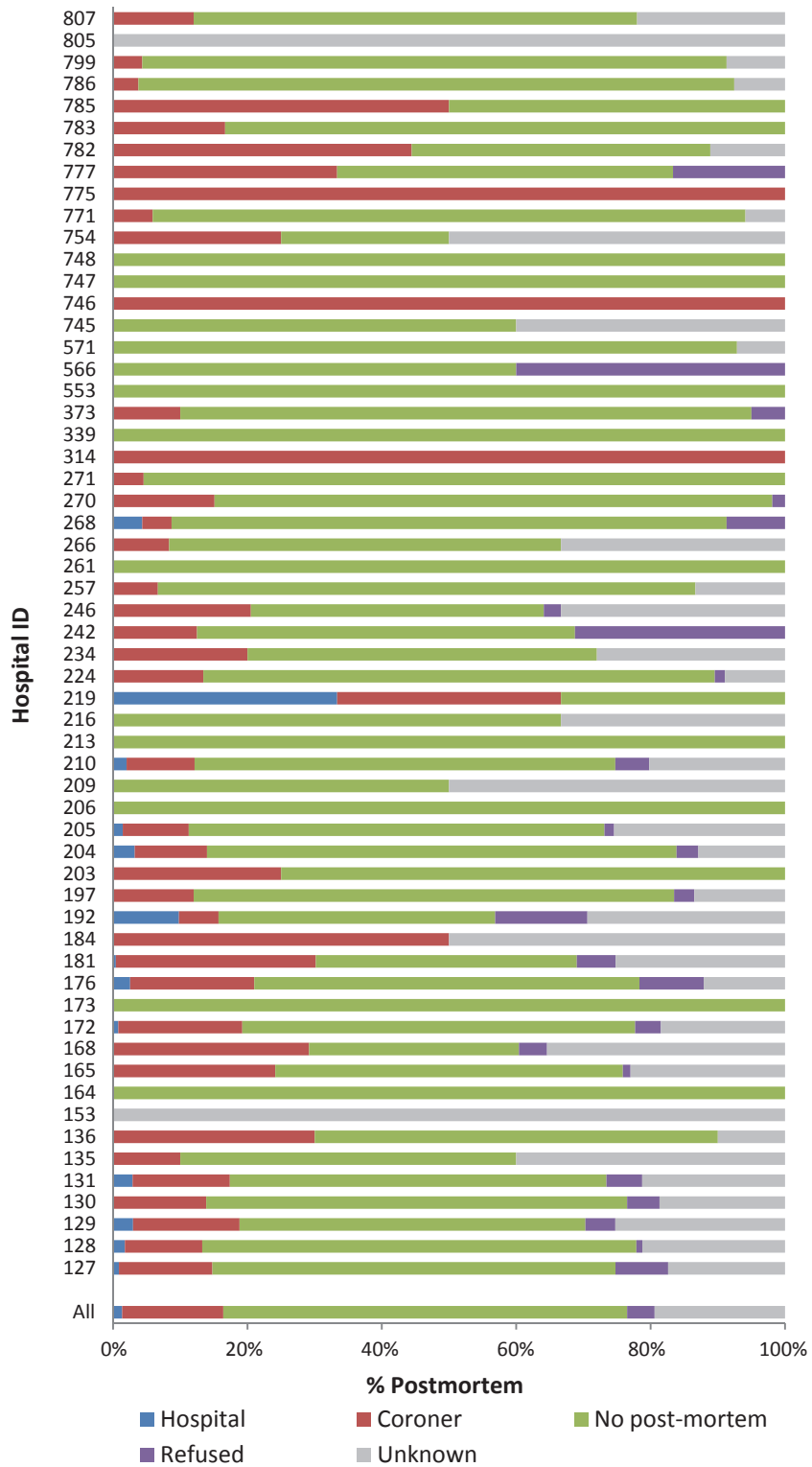
- The number of postmortems performed, including coronial ones, was very low at 462 (16%) instances in 2,862 cases (see Figure 48). This may be of concern to some as postmortems are deemed to provide educational information and valuable insights.
- The pattern of referral to the Coroner or request for postmortem was 376 (14%) in elective and 2,446 (86%) in emergency cases (data not shown in Figure 48).
- There was no difference in referral pattern by hospital, region or admission type (data not shown in this graph).
- The majority of postmortems were coronial and occurred in deaths associated with emergency admissions.

#### Key points

- Respiratory failure and cardiac failure have been cited as the most frequent causes of death. This is congruent with the risk profile described for this series of patients.
- The low rate of postmortems does not allow confirmation of these diagnoses.
- CT scans which are replacing formal autopsies in some institutions cannot always answer relevant questions and could be misleading in determining the final cause of death.



Figure 49: Postmortem utilisation by hospital



Note: Total n = 2,862.  
 Missing data: n = 43 (2%).

**Comments:**

- The number of postmortems performed by hospital has variances as expected with differing casemix (see Figure 49).



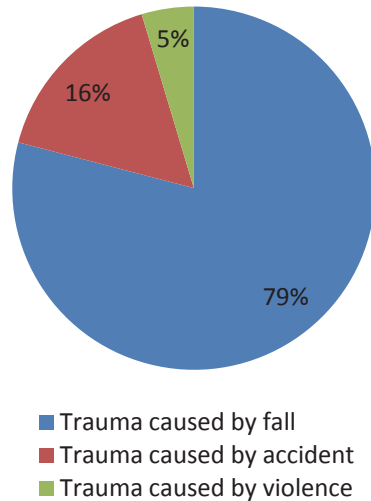


### 2.9.2 Trauma

In 2012 VASM started collecting data points on trauma cases where severe bodily injury or shock, for example from a fall, accident or violence, occurred in patients that required surgery (see Figure 50).

VASM is keen to monitor trends, especially in falls, to ensure strategies are implemented to prevent and minimise harm from falls in the future.

Figure 50: Trauma causes



Note: Total n = 141.  
Missing data: n = 1 (<1%).

#### Comments:

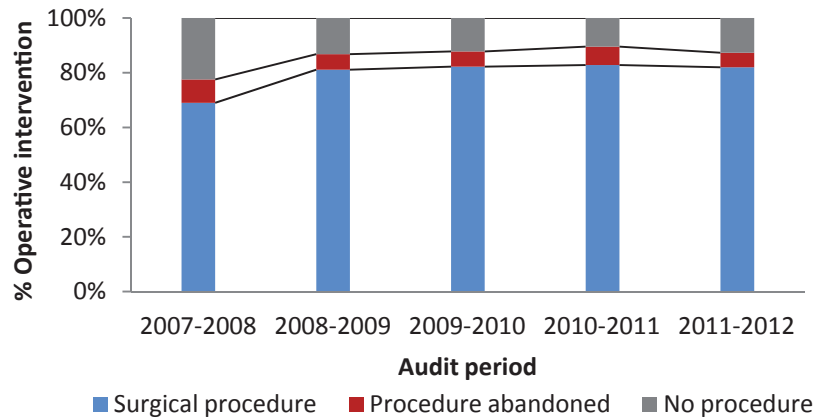
- Of the 141 cases reported since January 2012, only 43 (30%) were attributed to traumatic events.
- Of the 43 traumatic events, 79 percent were caused by falls, 16 percent were caused by traffic accidents and 5 percent were victims of violence.
- Of the 34 falls, 16 (47%) occurred in hospitals or in a care facility, 16 (47%) at home and only two (6%) at other settings (data not shown in this graph).
- The VASM surgical population is at an increased risk of falls due to the acuity of the life threatening pre-existing conditions, comorbidities and frailty due to advanced age; therefore, prevention of falls should be addressed at hospitals and care facilities should be improved where possible. Future analysis should provide greater insight into strategies for improvement in this aspect of patient care.
- A recent study found a reduction in postoperative falls in patients who participated in a preoperative education program.<sup>(21)</sup>



## 2.10. Profile of operative procedures

The following section examines the frequency and timing of surgical procedures, the seniority of the surgeon performing them and the need for reoperation.

Figure 51: Operative procedures performed and abandoned



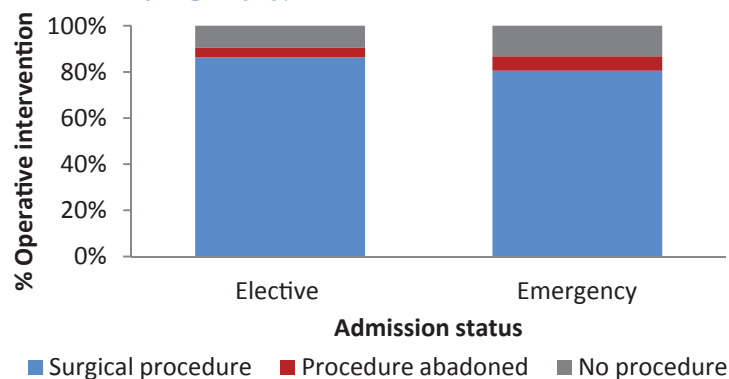
Note: Total n = 2,273 operations with 3,198 episodes.

Missing data: n = 385 (12%).

### Comments:

- A total of 2,273 (71%) audited cases underwent a surgical procedure with 3,198 episodes (see Figure 51).
- There was no significant change since 2008 in the rate of operative intervention over the audit period.

Figure 52: Operative intervention by urgency type



Note: Total n = 2,273 operations with 3,198 episodes.

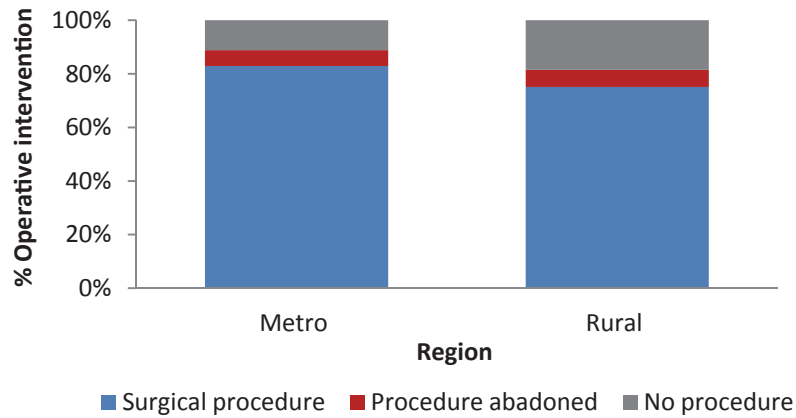
Missing data: n = 385 (12%).

### Comments:

- The 416 patients admitted as elective admissions and who subsequently died had a higher rate of operative intervention (74%) than the 1,846 patients admitted as emergencies (71%) ( $p < 0.001$ ). This is not unexpected as most elective admissions to a surgical unit are for an operative procedure.
- Sometimes during surgery it is deemed inappropriate to continue with the procedure as there is no prospect of even short-term survival of the patient due to the extent of the disease process. This was necessary in a very low percentage of the audited cases (163, 5%).
- Deaths where no operative intervention occurred were more frequently associated with emergency admissions (303, 13%). In such cases there was usually an active decision not to operate.



Figure 53: Operative intervention by region



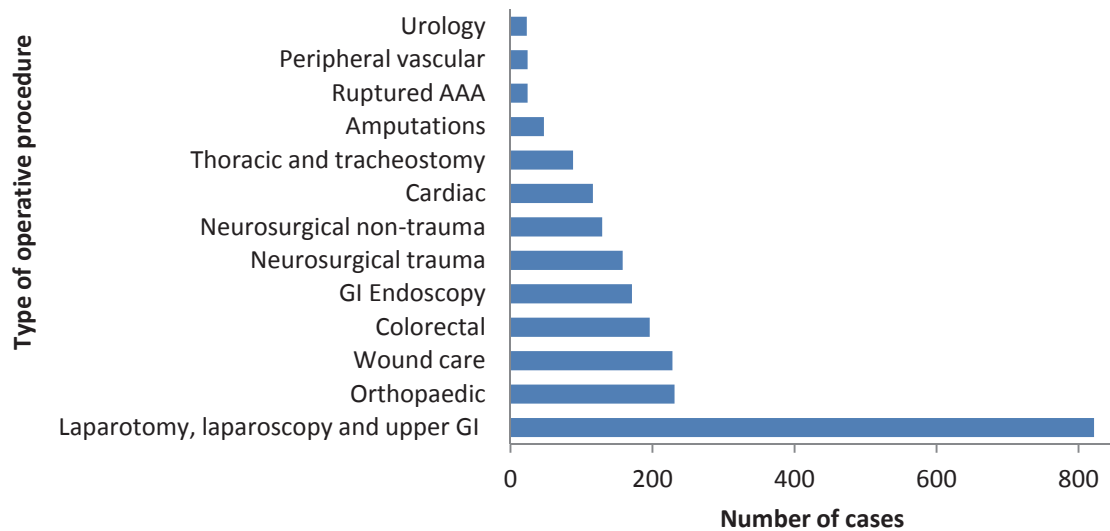
Note: Total n = 2,273 operations with 3,198 episodes.  
Missing data: n = 385 (12%).  
Metro: metropolitan.

Comments:

- Death was more often associated with operative intervention in metropolitan areas compared to rural ( $p < 0.001$ ).
- The reason for this is not obvious, but it could be due to frail patients who require complex surgery being referred to and managed in metropolitan hospitals.



Figure 54: Frequency of individual surgical procedures reported



Note: Total n = 2,273 operations with 3,198 episodes.

Missing data: n = 385 (12%).

Only procedures with a frequency  $\geq 10$  interventions have been recorded.

During 3,198 separate episodes of surgery in 2,862 patients, there were 2,273 operative procedures described, as a patient can undergo multiple procedures during the same admission and at the same surgical session/episodes (see Figure 54).

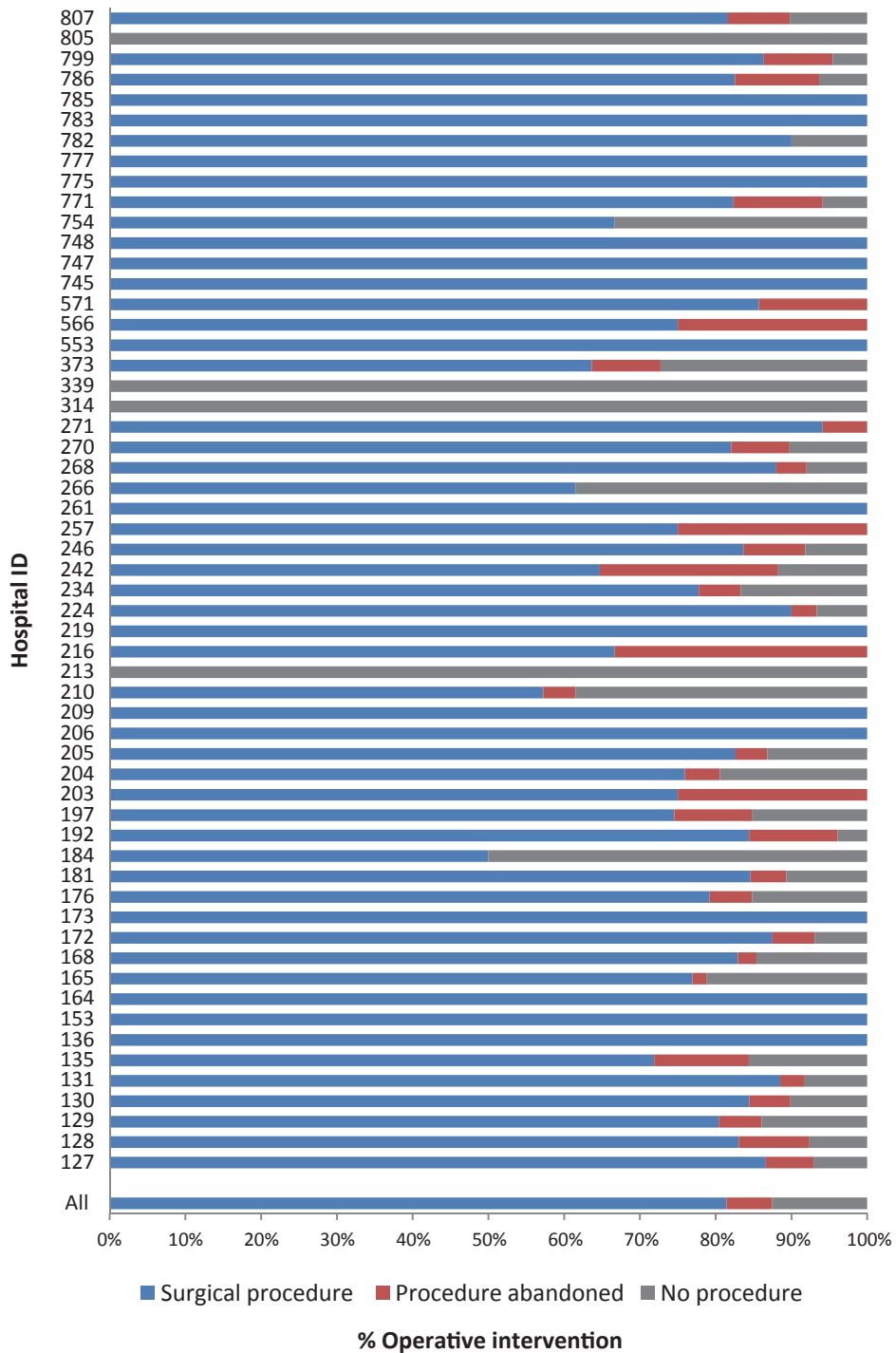
#### Comments:

- The most frequent procedures reported have usually been associated with laparotomy, laparoscopy and upper GI (the most usual group of multiple procedures), and orthopaedic pathologies.
- The operative procedures were recategorised in this year's report to group the operations for simpler classification. A breakdown of operative procedures are as follows:
  - Cardiac: includes angiograms, bypass of coronary artery, exploratory median sternotomy, median sternotomy approach, replacement of aortic and mitral valve.
  - Colorectal: includes anterior resection of rectum and anastomosis, colostomy, partial colectomy, hemicolectomy, ileostomy and reversal of Hartmann's procedure.
  - GI Endoscopy: includes colonoscopy, gastroscopy, endoscopic retrograde cholangiopancreatography and sigmoidoscopy.
  - Laparotomy, laparostomy and upper GI: includes cholecystectomy, endoscopic division of adhesions of peritoneum, gastrectomy, ileostomy, jejunostomy, oversewing of small bowel and repair of inguinal hernia.
  - Neurosurgical trauma: includes burrhole(s) for ventricular external drainage, craniectomy, craniotomy, evacuation of haematoma, insertion of cranial monitor, insertion of drainage system into bone and intracranial pressure monitoring evacuation.
  - Orthopaedic: includes hip joint operations, hemiarthroplasty, fracture and internal fixation.
  - Peripheral vascular: includes embolectomy of femoral artery and vein graft thrombectomy.
  - Thoracic and tracheostomy: includes bronchoscopy, insertion of tube drain into pleural cavity, thoracotomy and tracheostomy.
  - Urology: includes diagnostic cystoscopy and transurethral resection of male bladder.
  - Wound care: includes debridement of bone, muscle and skin, drainage of septal abscess, dressing of wound and lavage of peritoneum.





Figure 55: Frequency of operative intervention by hospital



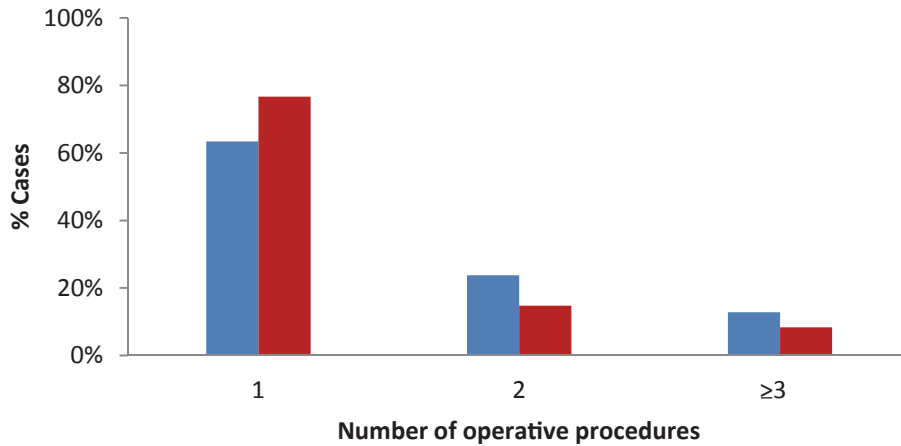
Note: Total n = 2,273 operations with 3,198 episodes of 2,862 cases.  
 Missing data: n = 385 (12%).  
 ID: identifier.

**Comments:**

- The data in Figure 55 above reflect the general distribution of operative interventions by hospital in the aggregate data. A number of the hospitals represented here do not perform emergency surgery.
- Not all patients underwent surgery.



Figure 56: Operative procedures by urgency type



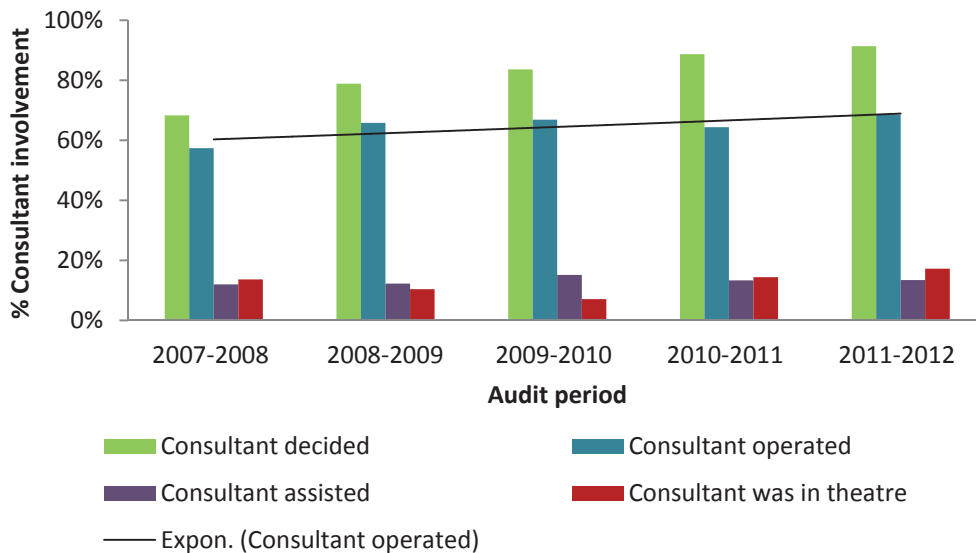
Note: Total n = 2,239.  
Missing data: n = 34 (2%).

■ Elective ■ Emergency

Comments:

- The apparent higher frequency of multiple interventions in patients admitted electively (see Figure 56) is probably due to the higher percentage of emergency cases (82%) versus elective (18%) cases skewing the data.
- The frequency of multiple interventions was similar in metropolitan and rural regions (data not shown in Figure 56).<sup>(3)</sup>

Figure 57: Seniority of surgeons deciding on and performing surgery



Note: Total n = 2,273 operations with 3,198 episodes.  
Missing data: n = 1 (<1%).

The consultant operated exponential trend line is marginally curved which highlights considerable rise in consultant involvement.

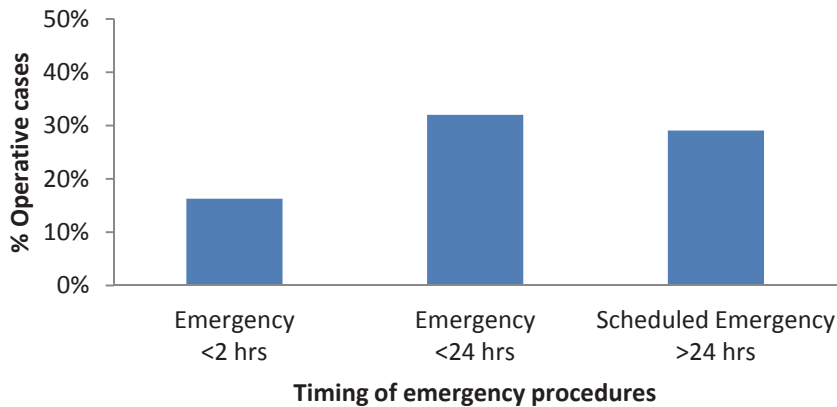
Figure 57 shows the seniority of surgeons deciding on and performing surgery.



**Comments:**

- A consultant surgeon performed the surgery in 66 percent of cases and took the decision to proceed to surgery in more than 84 percent of instances. This bias towards consultants is appropriate when the risk profile of the audited cases is considered. The increase in active participation by consultants over time reached statistical significance ( $p < 0.001$ ).
- An anaesthetist was present in 2,173 (96%) of the 2,273 operative procedures in the 2,862 audited series (data not shown in Figure 57).

Figure 58: Timing of operative procedures in emergency admissions



Note: Total n = 2,267.  
 Missing data: n = 513 (23%).  
 hrs: hours.

**Comments:**

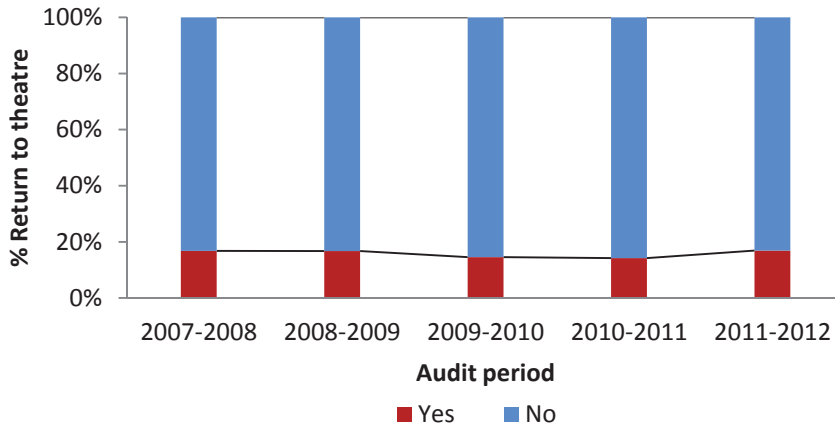
- The time criticality of a patient's condition predicts the timing of emergency surgery. Of 2,267 emergency admissions who underwent surgery, 369 (16%) had surgery within two hours of admission, 726 (32%) within 24 hours and 659 (29%) after 24 hours.
- Therefore, 1,095 (48%) of 2,267 emergency admissions to a surgical unit required surgery within 24 hours of admission. Strategies to address the associated scheduling problems are being implemented by government, surgeons and hospitals.<sup>(10-12)</sup> For example, The Society of Cardiothoracic Surgery initiated measurement and monitoring of safety and quality in cardiac interventional procedures by establishing the Australian Cardiac Procedures Registry.<sup>(13)</sup> Similarly, the Royal Australasian College of Surgeons established the National Breast Cancer Audit.<sup>(14)</sup>



2.10.1 *Unplanned return to the operating room*

An unplanned return to the operating room (OR) is usually necessitated by the development of a complication requiring further operative intervention (see Figure 59).

Figure 59: *Unplanned return to the operating room*

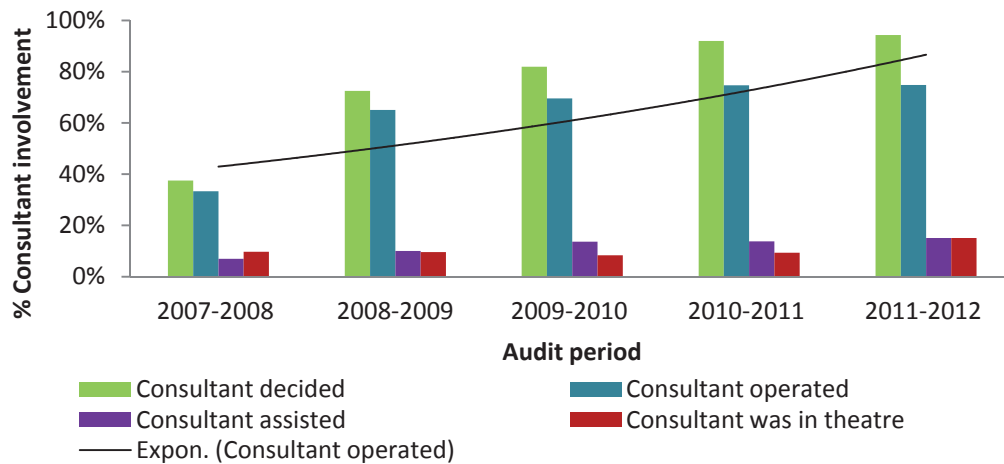


Note: Total n = 2,273 operations with 3,198 episodes.  
Missing data: n = 30 (1%).

Comments:

- An unplanned return to the OR was reported in 348 (15%) of 2,273 cases where a surgical procedure was performed.
- There has been a slight variation of trend in frequency of unplanned returns during the audit period which is not statistically significant.

Figure 60: *Seniority of surgeons performing surgery at unplanned return to the operating room*



Note: Total n = 912.  
Missing data: n = 1 (0.1%).  
The consultant operated exponential trend line is curved which highlights considerable rise in consultant involvement.

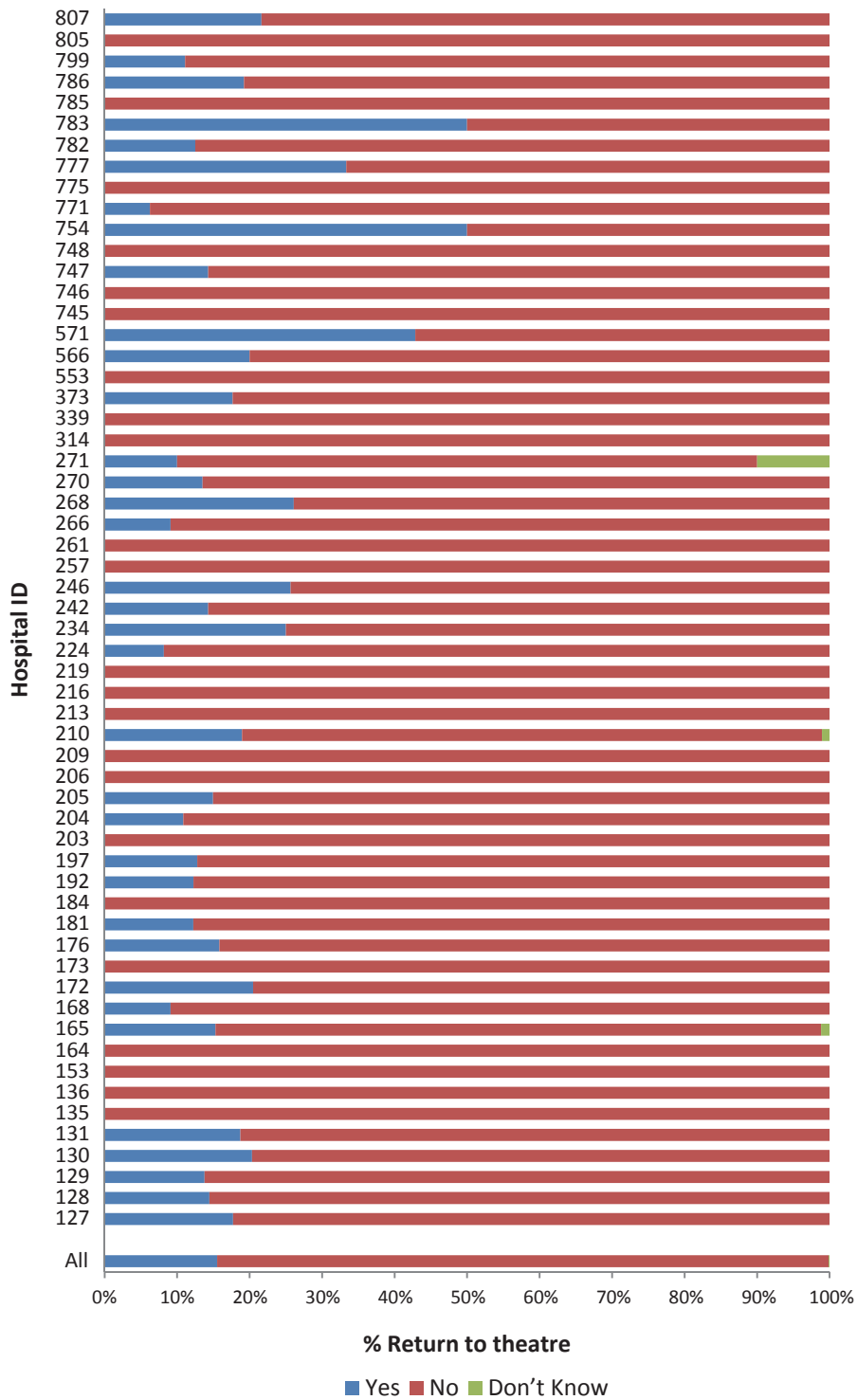
Comments:

- Active consultant participation was exponentially higher in cases requiring unplanned return to the OR ( $p < 0.001$ ) (see Figure 60).
- This is appropriate as such cases are more challenging and the risks are greater.





Figure 61: Unplanned return to the operating room by hospital



Note: Total n = 2,273 operations with 3,198 episodes.

Missing data: n = 30 (1%).

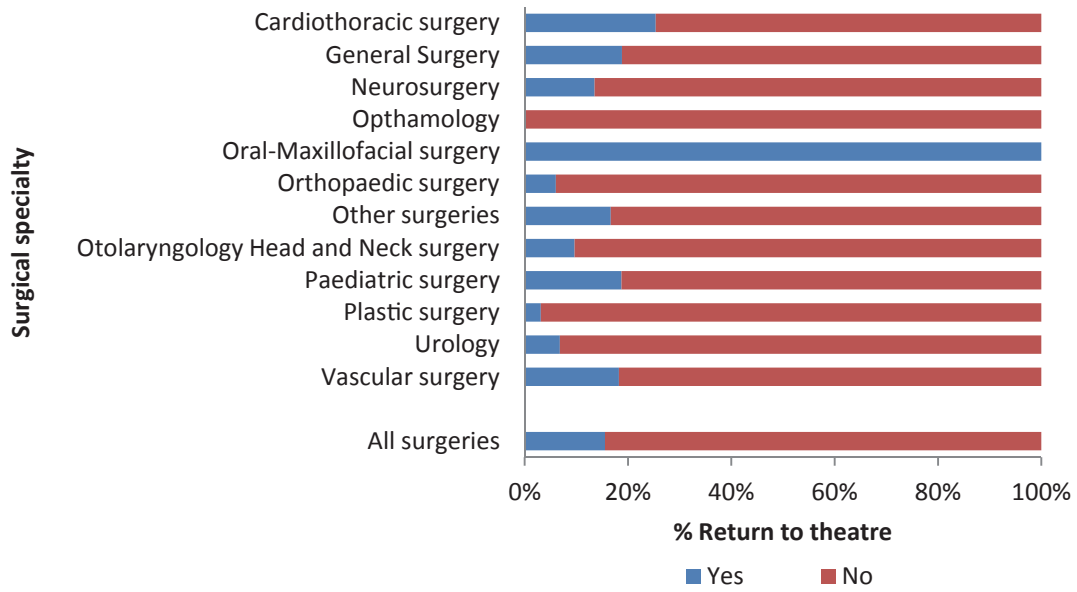
ID: identifier.

**Comments:**

- As mentioned above, an unplanned return to the OR was reported in 348 (15%) of the audited cases undergoing a procedure. Figure 61 shows that the incidence varied among hospitals. The variance may be explained by the casemix of individual hospitals.



Figure 62: Unplanned return to the operating room by surgical specialty



Note: Total n = 2,273 operations with 3,198 episodes.

Missing data: n = 30 (1%).

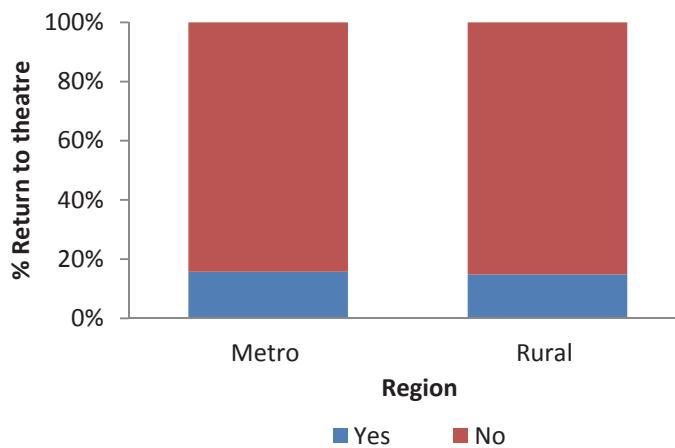
'Other surgeries' includes trauma, transplant, oncology, obstetrics and gynaecology.

Figures 62 and 63 show the unplanned return to the operating room by surgical specialty and region.

**Comments:**

- The frequency of unplanned return to the OR is a reflection of the risk profile inherent in their casemix.

Figure 63: Unplanned return to the operating room by region



Note: Total n = 2,273 operations with 3,198 episodes.

Missing data: n = 30 (1%).

Metro: metropolitan.



Comments:

- There were no major differences in unplanned return to the OR between metropolitan and rural regions.
- The seniority of surgeons operating in rural and metropolitan regions was similar (data not shown in Figure 63).

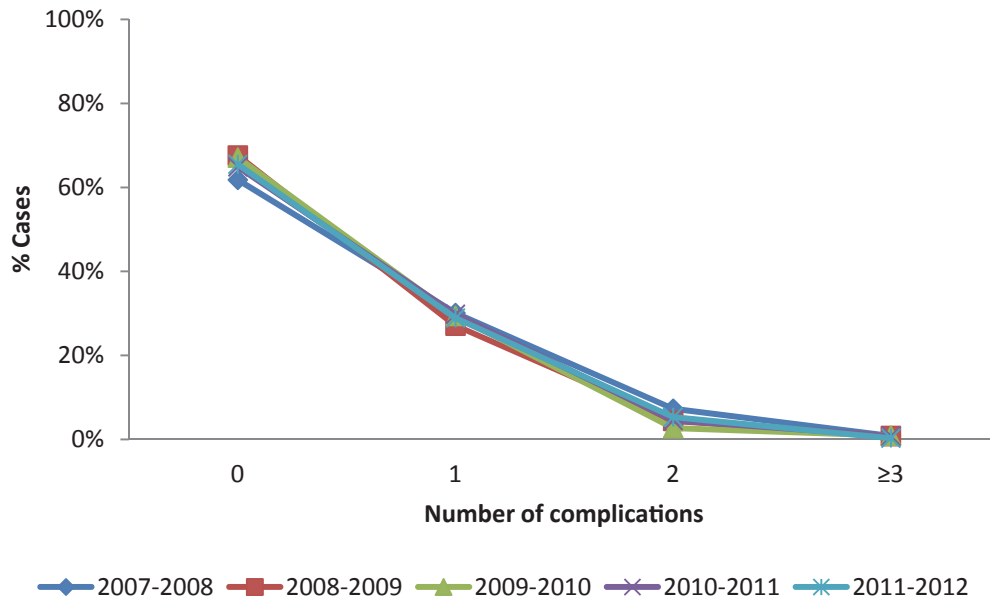
Key points

- During separate 3,198 episodes of surgery in 2,862 patients, there were 2,273 operative procedures described, as a patient can undergo multiple procedures during the same admission and at the same surgical session.
- The most frequently-reported procedures were associated with emergency admission for trauma or acute abdominal pathology.
- A consultant surgeon performed the initial surgery in 66 percent of cases and took the decision to proceed to surgery in more than 84 percent of instances.
- Similar to previous reports, 1,095 (48%) of the 2,267 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 workload remains an issue for hospitals.
- An unplanned return to the OR, usually necessitated by the development of a complication, was reported in 348 (15%) of 2,273 patients in the audited series. This percentage has decreased slightly over time yet has not reached clinical significance ( $p=0.3$ ).
- Active consultant participation was higher in cases that involved an unplanned return to the OR and has increased significantly over the audit period ( $p<0.001$ ).



## 2.11. Postoperative complications

Figure 64: Postoperative complications recorded by treating surgeon



Note: Total n = 2,273.

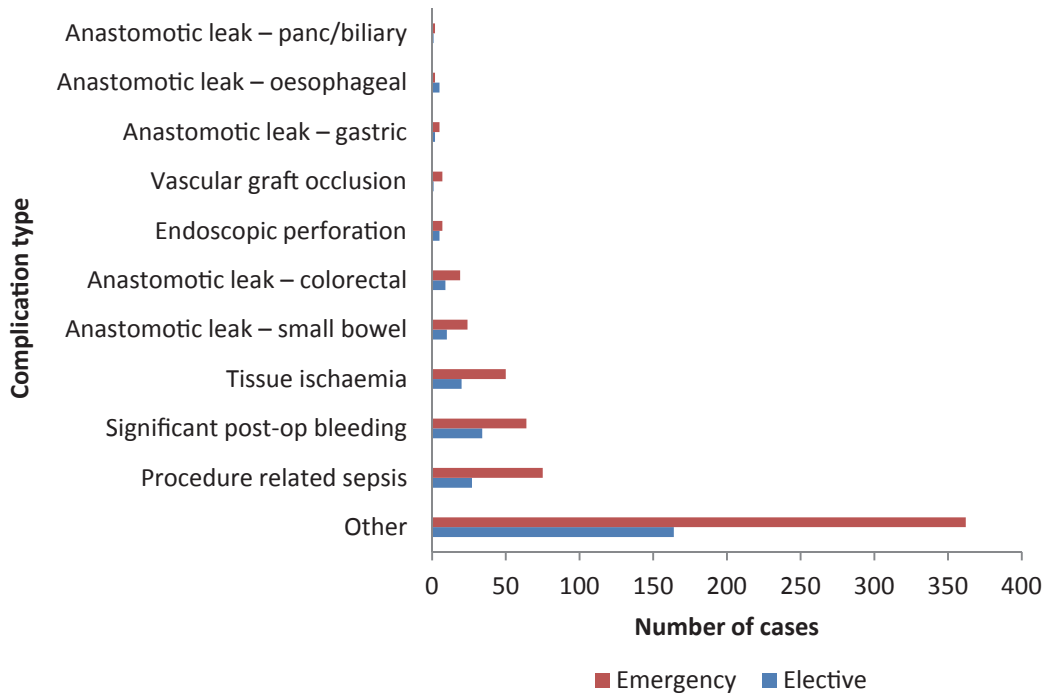
Missing data: n = 34 (1%).

### Comments:

- The treating surgeon is asked to record any postoperative complications and the trend remains similar across during the audit period (see Figure 64).
- The low rate of postoperative complications reported by treating surgeons has remained constant throughout the audit period. Of the 2,273 cases audited, 1,502 (66%) had no complications, and only a single complication was recorded in 656 (29%) patients.



Figure 65: Frequency of specific postoperative complications by urgency status



Note: Total n = 907.  
Missing data: n = 12 (1%).  
Panc: pancreatic; postop: postoperative.

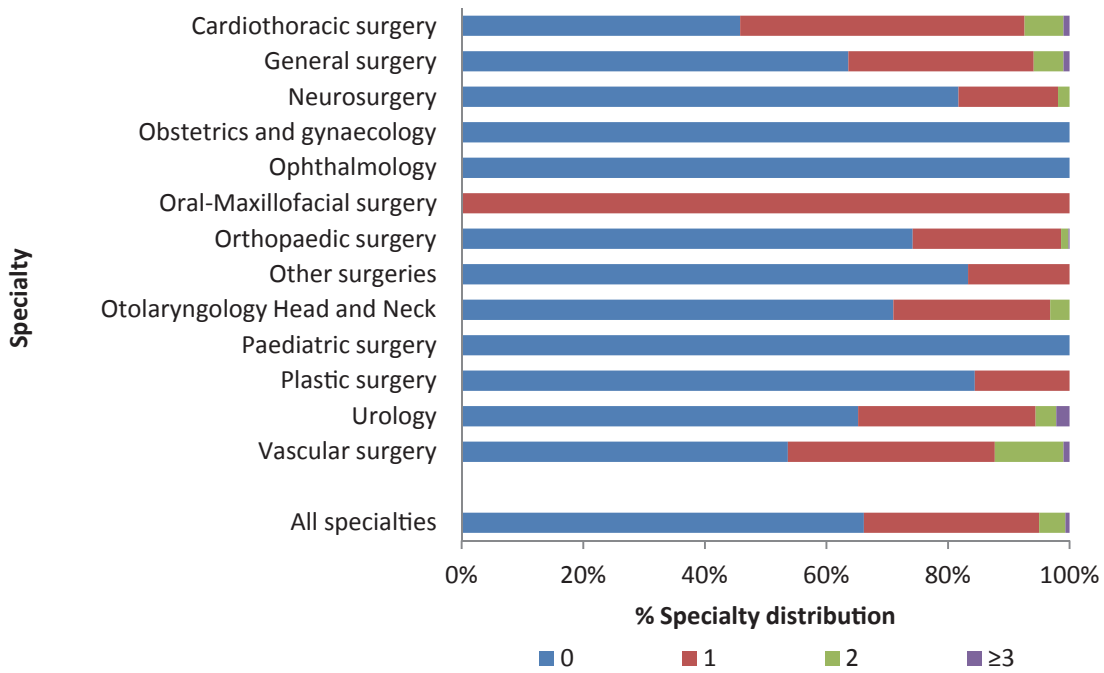
**Comments:**

- Emergency cases will most likely have more complications as the audit pool contains 86 percent of cases admitted as emergencies, this group being at greater risk during surgical procedures (see Figure 65).
- A total of 535 'other' complications were identified, including cardiac failure, intrapulmonary haemorrhage, intra-cerebral bleed, postoperative hypoxia, acute or chronic renal failure, paraplegia, liver failure, pneumonia, perforated viscus, pulmonary embolism, pyelonephritis, renal failure, respiratory failure, seizures, sepsis, stroke and wound haematoma.





Figure 66: Postoperative complications by specialty



Note: Total n = 2,273.

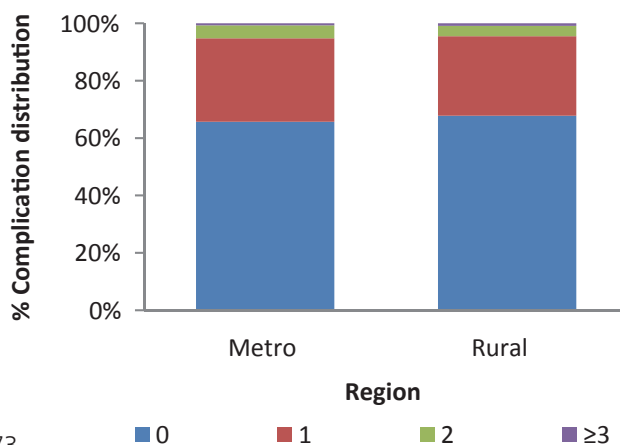
Missing data: n = 34 (1%).

'Other surgeries' include trauma, transplant, oncology, obstetrics and gynaecology.

Comments:

- There were differences in the rate of postoperative complications among specialties (see Figure 66).

Figure 67: Postoperative complications by region



Note: Total n = 2,273.

Missing data: n = 34 (1%).

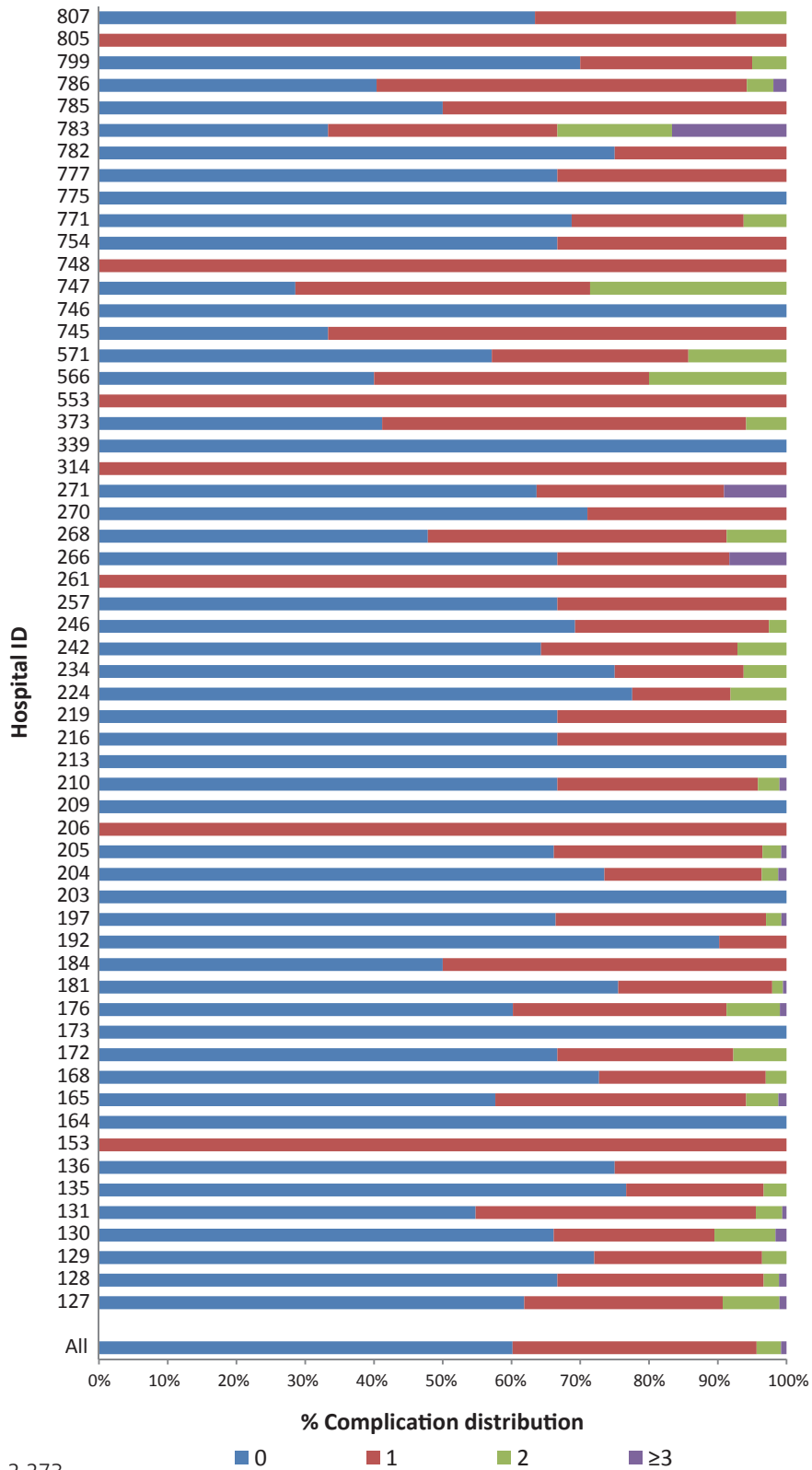
Metro: metropolitan.

Comments:

- There were no major differences between the rate of postoperative complications in metropolitan and rural regions (see Figure 67).



Figure 68: Postoperative complications by hospital



Note: Total n = 2,273.  
 Missing data: n = 34 (1%).  
 ID: identifier.

Comments:

- The reported rate of postoperative complications varied between hospitals and regions.

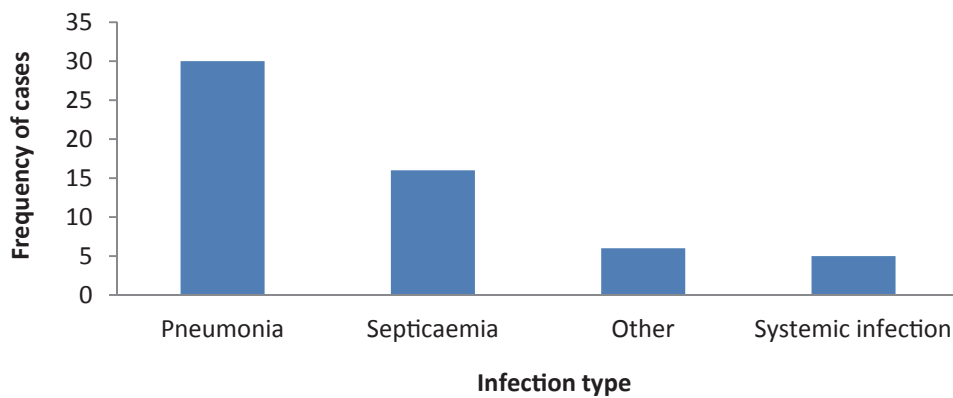


## 2.12. Clinically significant infections

In 2012 VASM started collecting data points on clinically significant infections (see Figure 69).

VASM is keen to monitor trends for infection rate in this high risk population at hospitals to prevent and maximise control of antimicrobial usage.

Figure 69: Clinically significant infections



Note: Total n = 141.  
Missing data: n = 1 (<1%).

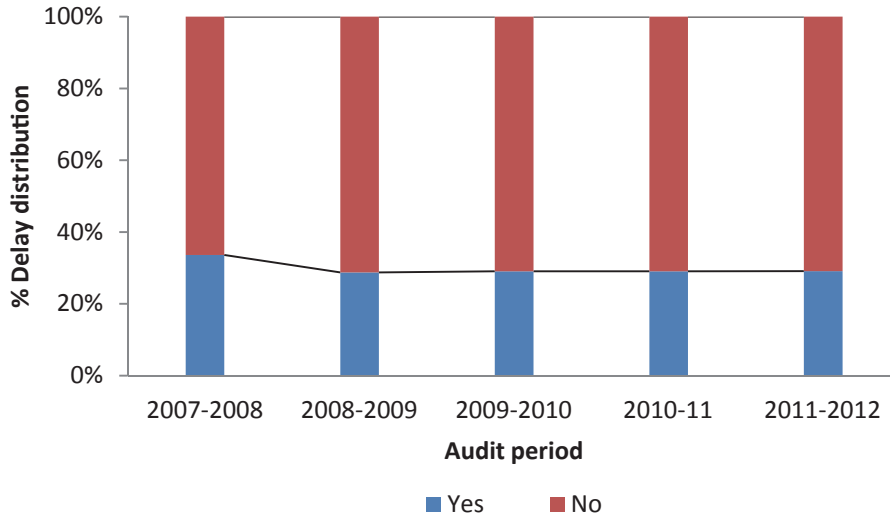
### Comments:

- There was infection reported in 58 (41%) cases of the small data pool of 141 cases audited and recorded in 2012.
- Pneumonia and septicaemia attributed to 46 (79%) cases of the infection pool (n=58).
- Of the 58 cases, the infection was acquired during hospital in 34 (59%) cases and pre-admission in 19 (33%) cases; in 4 (<1%) cases, it was unknown when the infection was acquired (data not shown in this graph).
- The infective organisms identified were: clostridium difficile, candida albicans, escherichia coli, enterobacter aerogenes, enterococcus, klebsiella, lactobacillus, methicillin-resistant staphylococcus aureus, methicillin-sensitive staphylococcus aureus, staphylococcus haemolyticus, staphylococcus pyogenes, staphylococcus aureus, varicella, yeast and mixed organism.



### 2.13. Anaesthetic problems

Figure 70: Anaesthetic delays



Note: Total n = 2,273.  
Missing data: n = 94 (4%).

#### Comments:

- As reflected in Figure 70, the frequency of delays related to anaesthesia was 28 percent (632 of the 2,273 operative cases audited). The reasons for these delays were not stated.

#### Key points

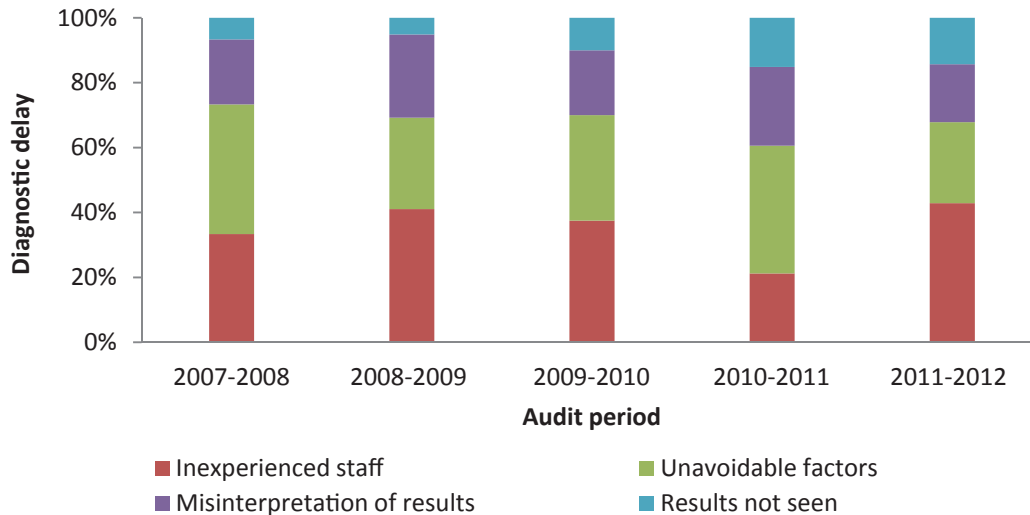
- The low rate of postoperative complications reported by treating surgeons has remained constant throughout the audit period.
- Of the 2,273 operative cases audited, no complications were recorded in 1,530 (67%) and only one complication was recorded in 632 (28%) patients.



### 2.14. Delay in diagnosis

Treating surgeons were asked to record any perceived delays in establishing a diagnosis and proceeding to definitive treatment (see Figure 71).

Figure 71: Perceived delays in establishing a diagnosis



Note: Total n = 178 issues identified in 2,862 audited cases.

**Comments:**

- The treating surgeons identified delays in establishing the diagnosis in 178 (6%) of the 2,862 audited cases. This rate has remained relatively constant over time.
- When cases were submitted to first or second-line peer-review, the incidence of perceived delay in patient care was higher at 28 percent.
- Delay in establishing a diagnosis is one facet of the concerning rate of delay in implementing definitive treatment shown in the clinical management issues section Figure 86.
- It is important to note that such delays are not always attributable to the surgical team. For example, in a recent review in the United Kingdom on care received by elderly patients undergoing surgery, delay between admission and operation was related to risk assessment which should include input from senior surgeons [or] anaesthetists' [and was also related to] 'extremely poor documentation, nutritional assessment and evidence of appropriate management'.<sup>(15)</sup>

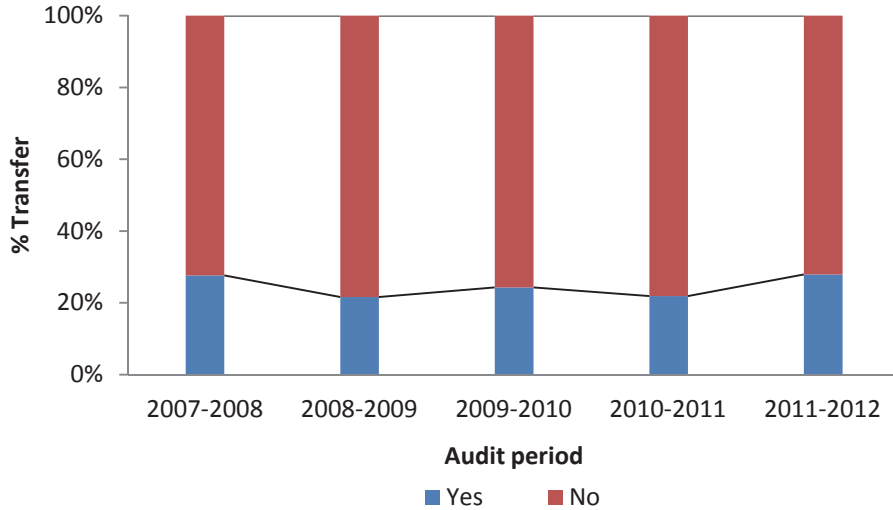




### 2.15. Patient transfer issues

The treating surgeon was asked to provide information on patients who required inter-hospital transfer as part of their care (Figure 72). This included timeliness and appropriateness of transfer.

Figure 72: Patients requiring transfer to another hospital



Note: Total n = 2,273.

Missing data: n = 25 (1%).

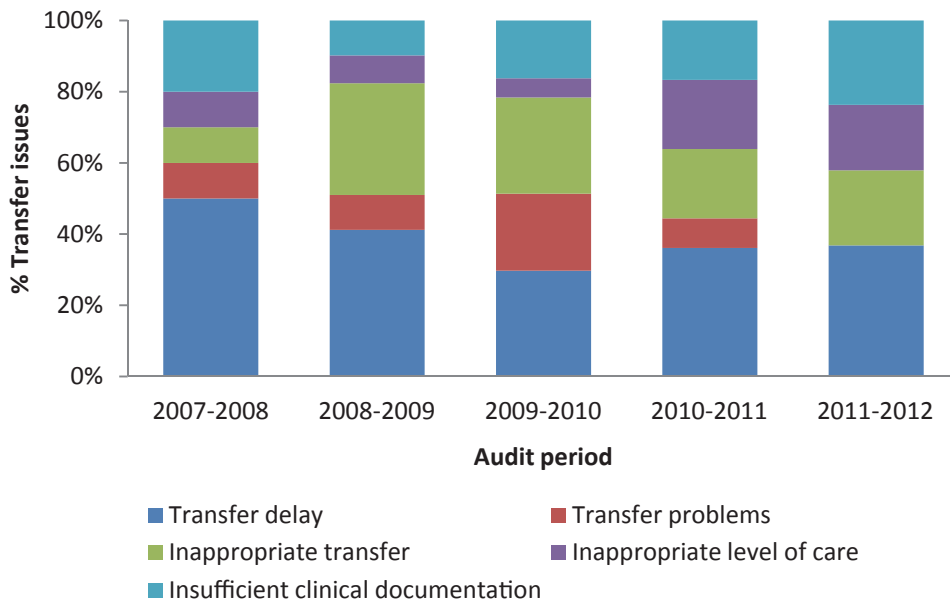
#### Comments:

- There were 533 (23%) instances in the audited series of 2,273 operative cases where patients underwent transfer to another hospital.
- The frequency of patients requiring transfer for definitive care has remained similar throughout the audit period.



Treating surgeons were asked to record any perceived clinical issues associated with individual patient transfers.

Figure 73: Care of patient during transfer to another hospital



Note: Total n = 533 in 2,273 audited cases.  
Missing data: n = 25 (5%).

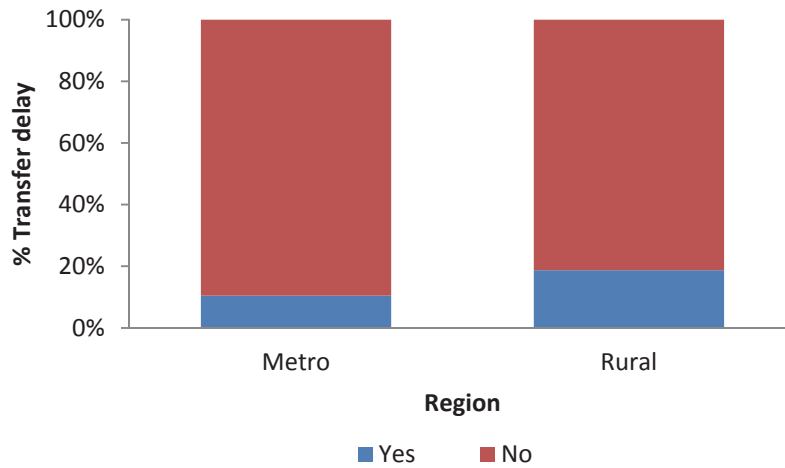
**Comments:**

- Various issues of care related to patient transfers were identified in 172 (32%) of the 533 patients requiring transfer. This rate has been constant over time. Figure 73 demonstrates the spectrum of all issues identified by surgeons.
- The level of care provided during transfer was deemed appropriate in 478 (90%) of the 533 cases and inappropriate transfer was identified in 55 (10%) cases.
- During the audit period it was felt that adequate clinical information and documentation had been provided to the receiving hospital in 472 (89%) of the 533 cases.
- In a further 62 (12%) it was felt that the transfer had occurred inappropriately late in the course of the illness and 17 (9%) cases had transfer problems.



## 2.16. Transfer delays by region

Figure 74: Perceived delays in transfer of patients to another hospital by region



Note: Total n = 533.  
Missing data: n = 24 (5%).  
Metro: metropolitan.

### Comments:

- Transfer delays were more frequently seen in rural regions than metropolitan areas. This result was statistically significant ( $p < 0.001$ ). A major reason for transfer is to attain a higher level of care and access to critical care. As such it is to be expected that rural hospitals with their lower levels of care would predominate.
- The Rural Doctors Association of Victoria stated: 'ensuring that appropriate medical care is provided before transfer means a commitment on the part of the state to maintain the rural medical workforce and to ensure that rural hospitals take appropriate steps to guarantee round the clock availability of well trained and experienced rural doctors'.<sup>(16)</sup>

### Key points

- The peer-review process suggests the incidence of delay in establishing a diagnosis necessary for confirming definitive treatment is 563/2009 (28%). Such delays are a concern. It is important to note these delays are not always attributable to the surgical team.



### 3. Peer-review outcomes

The VASM peer-review process is a retrospective examination of the clinical management of patients who died while 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. FLAs were completed in 2,306 cases. Each first-line assessor had to decide if the treating surgeon had provided adequate information to allow a conclusion to be reached. If the information is deemed inadequate then a SLA or case note review is requested. Other triggers for requesting SLA are:

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

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

#### 3.1 Second-line assessments

Figure 75: Referral for second-line assessment



Note: Total n = 2,862.

Missing data: n = 1 (<1%).

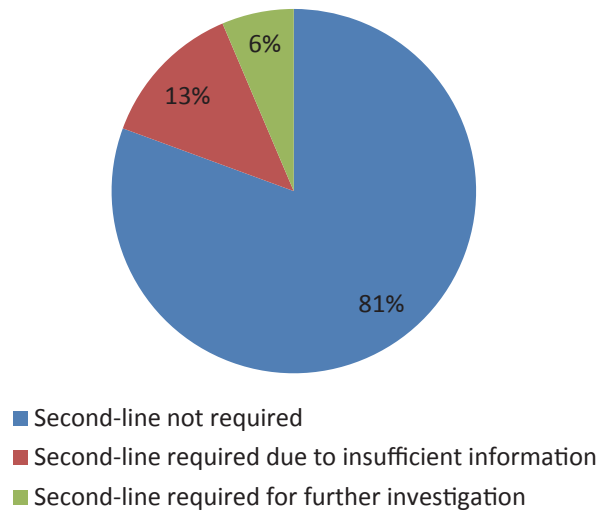
■ First-line ■ Second-line

#### Comments:

- The perception of need for SLA has decreased over time, in part because the quality of the information provided in CRFs returned by treating surgeons has improved. The percentage of cases referred for SLA has dropped significantly from 25 percent in 2007-2008 to 9 percent in 2011-2012 (see Figure 75).
- Cases with an ASA>4 were significantly more likely to be referred for SLA (p<0.001) (data not shown in this graph).



Figure 76: Reason for referral for second-line assessment



Note: Total n = 2,862.

Missing data: n = 1 (<1%).

The reasons given for referral to second-line assessment are provided in Figure 76.

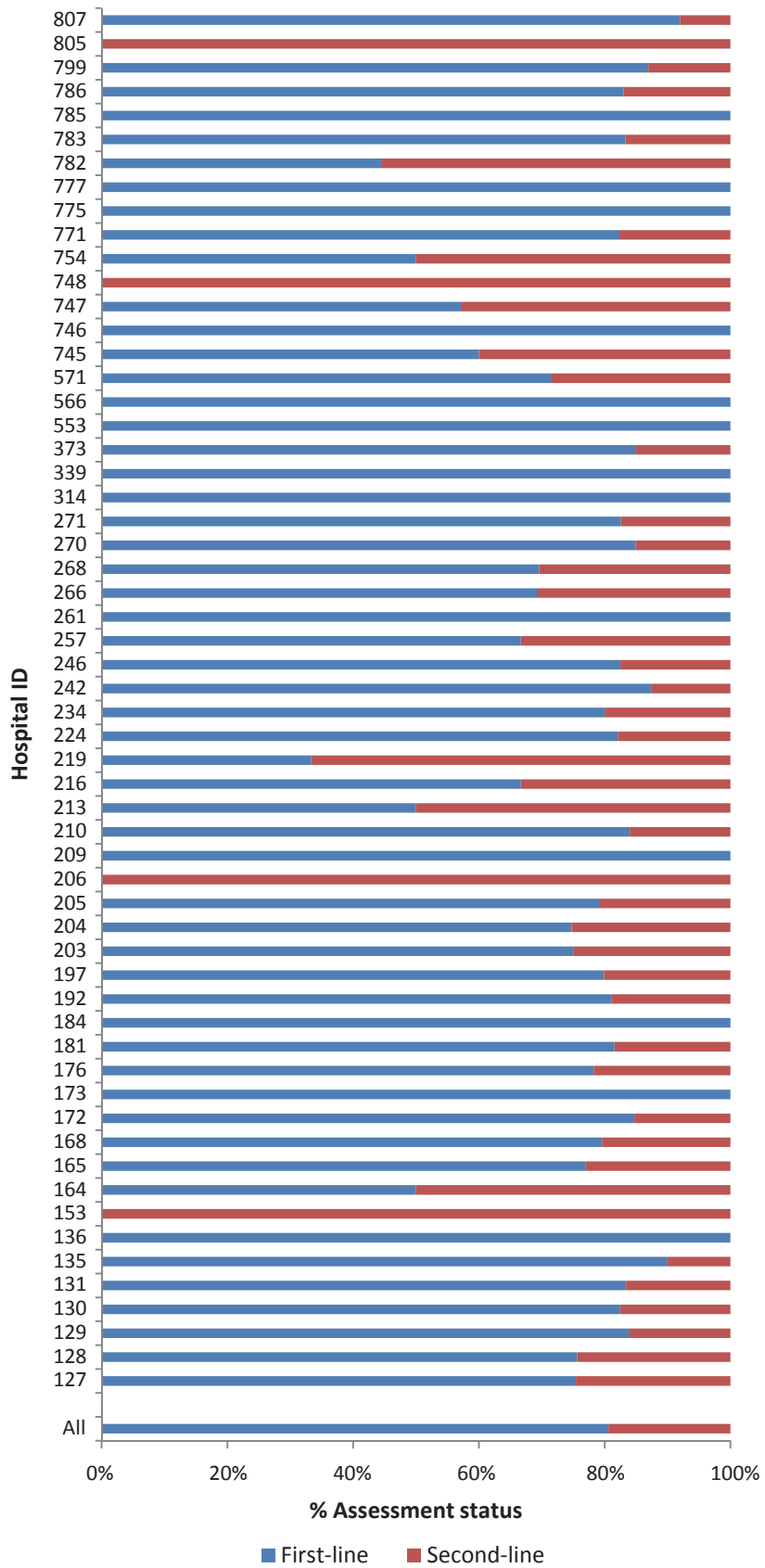
#### Comments:

- In 2,306 (81%) of the 2,862 audited cases there was no second-line referral was made by the first-line assessor.
- Despite some improvement, insufficient clinical information provided by the treating surgeon remains the most common trigger for SLA, occurring in 372 (67%) of the 555 cases that had a second-line assessment.
- The remaining 183 cases (33%) required more detailed review for perceived issues of management.
- This issue with the quality of the data provided by some treating surgeons is unfortunately ongoing. Greater attention to detail in completing the case record form (CRF), can help reduce the workload of colleagues who have agreed to act as first and second-line assessors.





Figure 77: Frequency of need for second-line assessment in individual hospitals



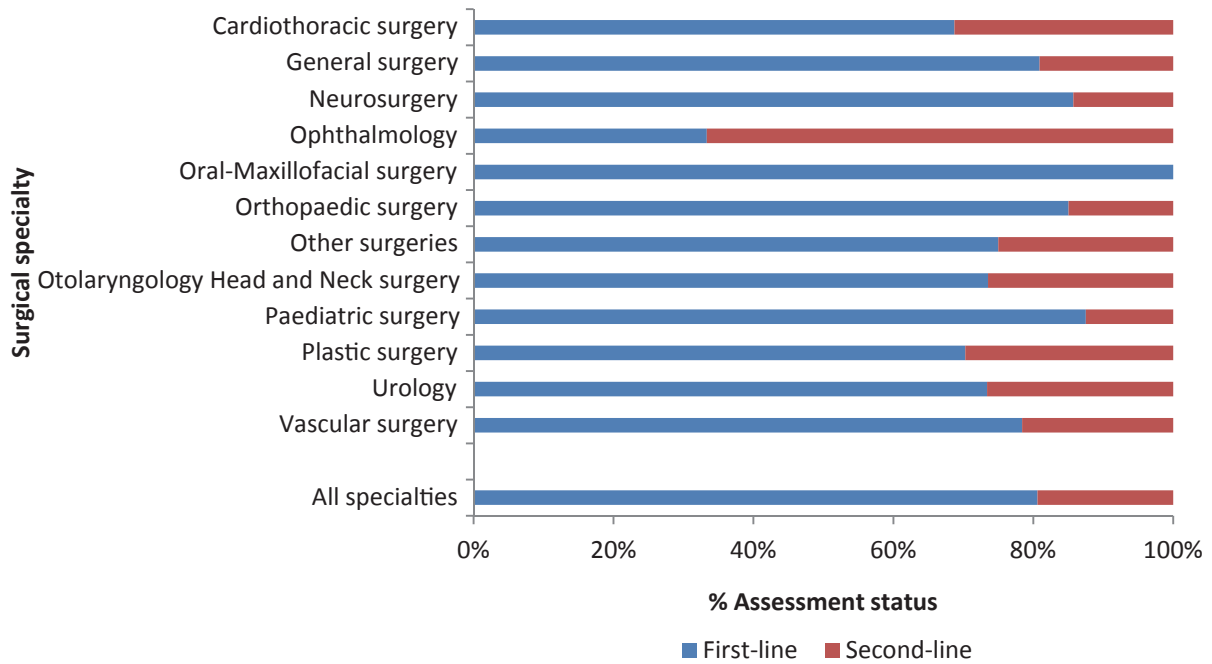
Note: Total n = 2,862.  
 Missing data: n = 1 (<1%).  
 ID: identifier.



Comments:

- The frequency of referral for SLA varied among hospitals (see Figure 77).
- No inferences can be drawn, as risk stratification is not possible.
- Some hospitals have had few mortalities reported, which may skew the data.

Figure 78: Frequency of need for second-line assessment in surgical specialties



Note: Total n = 2,862.

Missing data: n = 1 (<1%).

'Other surgeries' include trauma, transplant, oncology, obstetrics and gynaecology.

Comments:

- The need for SLA referral varied between specialties (see Figure 78). No inferences have been made.
- The need for referral for SLA was similar in metropolitan and rural regions (data not shown in this graph).

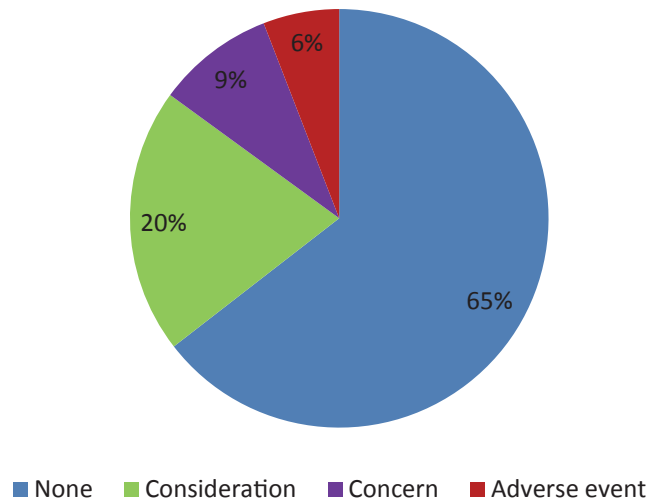


### 3.2 Clinical management issues

A primary objective of the VASM 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. There are two possible outcomes: either 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. In cases in which there is a perception that the clinical management may have contributed to death, VASM has specified a spectrum of criticism from which the assessor can choose:

- An area for consideration exists: the assessor believes an area of care could have been improved or different, but recognises 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 hospitalisation, or to temporary or permanent impairment or disability of the patient at the time of discharge, or which contributed to or caused death.

Figure 79: Clinical management issues as perceived by assessors



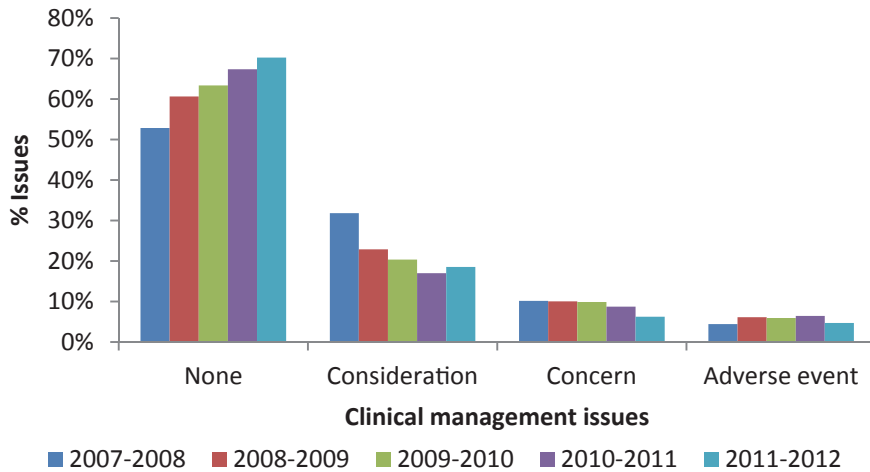
Notes: Total n = 2,862.  
Missing data: n = 10 (0.4%).

**Comments:**

- In 2,425 (85%) of the 2,862 cases that completed the audit process, no or only minor issues of patient management were perceived to have occurred (see Figure 79).
- In 259 (9%) of cases, areas of concern were identified.
- In 168 (6%) of 2,862 patients, assessors felt the clinical issues were serious enough to be called adverse events.



Figure 80: Spectrum of clinical management issues across the audit period



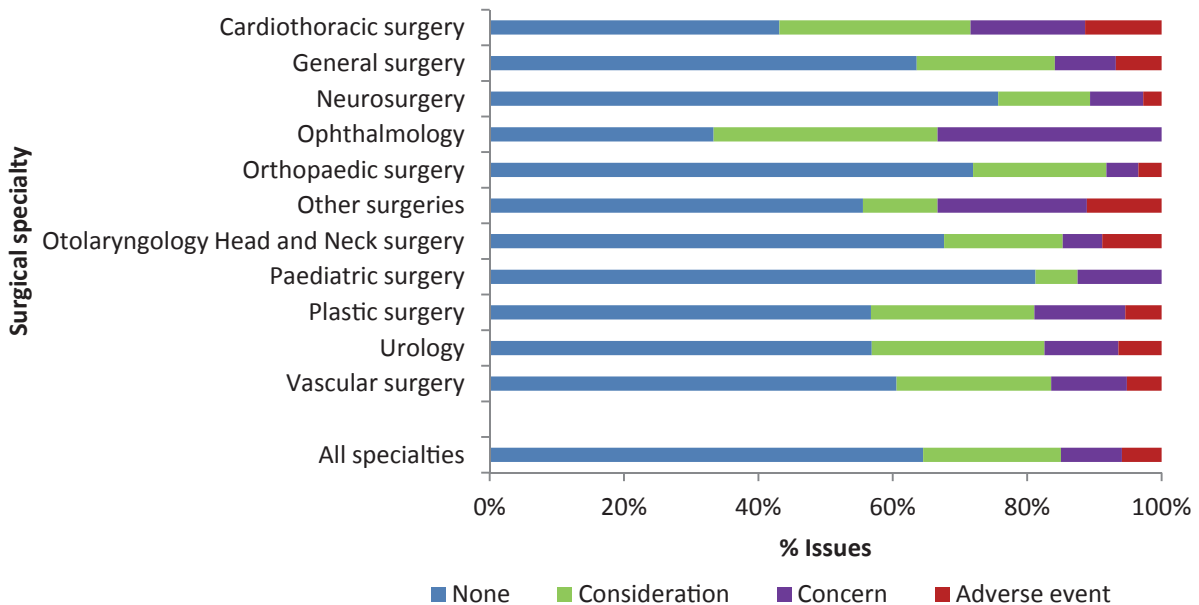
Notes: Total n = 2,862.

Missing data: n = 10 (<1%).

Comments:

- Overall, there has been a reduction in the rate of perceived clinical issues over the 5-year audit period (see Figure 80).
- In 2007-2008, no clinical management issues were identified in 53 percent of patients. This figure rose to 61 percent in 2008-2009, 63 percent in 2009-2010, 67 percent in 2010-2011 and 70 percent in 2011-2012 (p<0.001).

Figure 81: Spectrum of clinical management issues by specialty



Notes: Total n = 2,862.

Missing data: n = 10 (<1%).

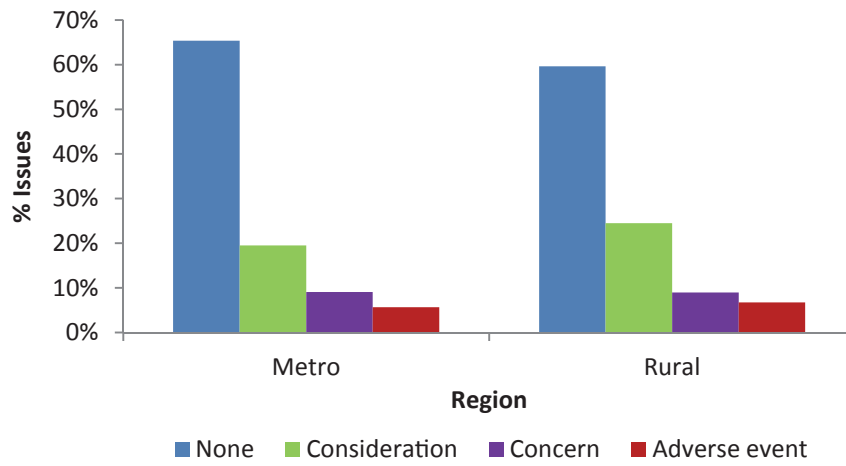
'Other surgeries' include trauma, transplant and oncology, oral-maxillofacial surgery, obstetrics and gynaecology.

Comments:

- The prevalence of areas of concern and adverse events identified by assessors was similar among the specialties (see Figure 81).
- Some specialties have had few mortalities reported, which may skew the data.



Figure 82: Spectrum of clinical management issues by region



Note: Total n = 2,862.  
 Missing data: n = 10 (<1%).  
 Metro: metropolitan.

**Comments:**

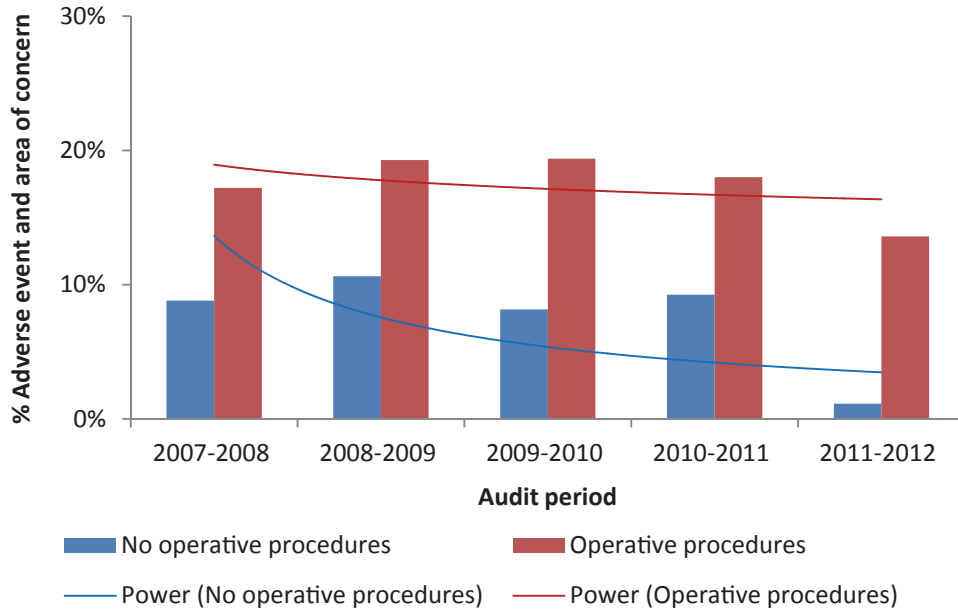
- The prevalence of areas of concern and adverse events perceived by assessors was similar between metropolitan and rural regions (see Figure 82).







Figure 83: Frequency of adverse events and areas of concern by operative status



Note: Total n = 427.

The operative and non-operative power trend line indicates the decreased adverse event and areas of concern rates in both groups.

Figure 83 shows the frequency of adverse events and areas of concern by operative status.

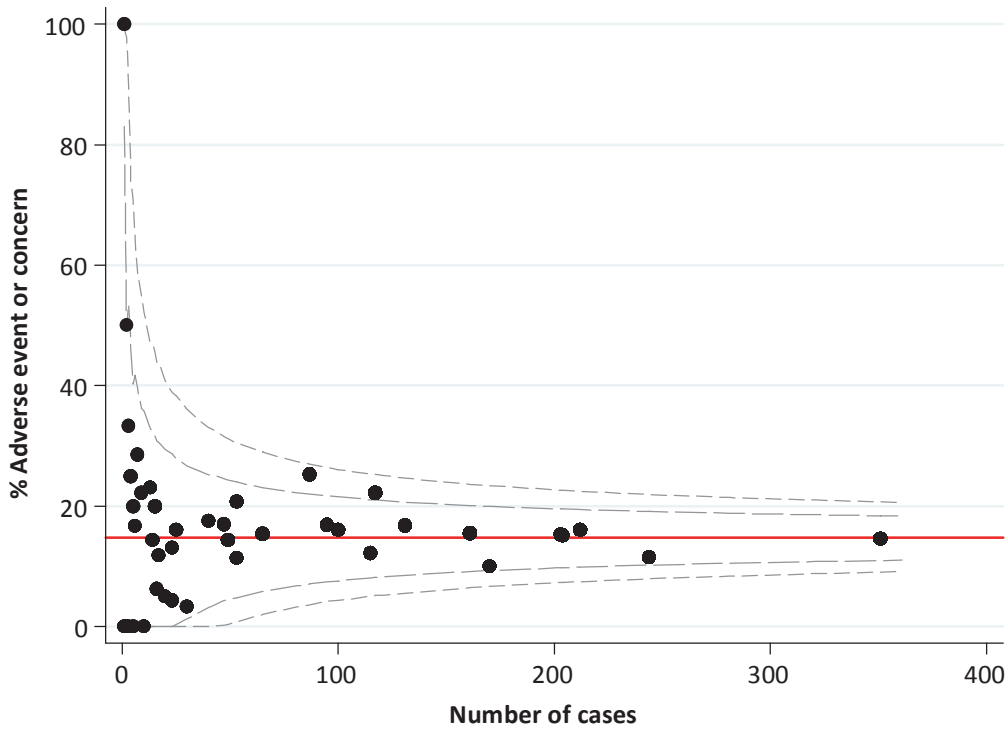
**Comments:**

- Overall, cases where no operative procedure occurred had a significantly lower rate of areas of concern and adverse events identified (8%) than cases where an operative procedure occurred (18%).
- There was a reduction in the frequency of areas of concern and adverse events from 15 percent in 2007-2008 to 11 percent in 2011-2012 (data not shown).
- Cases where the consultant surgeon had no involvement in the surgery, for example, not operating, deciding, assisting or being present in theatre, had similar rates of areas of concern and adverse events (17%) as those where a consultant was involved in the operative procedure (19%). This suggests that in these cases the physical absence of the consultant had no impact on the outcome. The slightly higher percentage of areas of concern and adverse event when a consultant was involved in the surgery may reflect the more complex cases consultant surgeons manage.



Where cases have undergone both FLA and SLA, only the SLA was included in the analyses provided in Figures 84 and 85. If an assessor flags an area of concern or adverse event, this implies significant criticism. In the funnel plots detailed below, we have combined these to look at the prevalence of this degree of criticism among hospitals and surgical specialties.

Figure 84: Adverse events and areas of concern by hospital during the audit period



Note: Total n = 427.  
 Missing data: n = 0.  
 Gray lines represent percentage grids.

Comments:

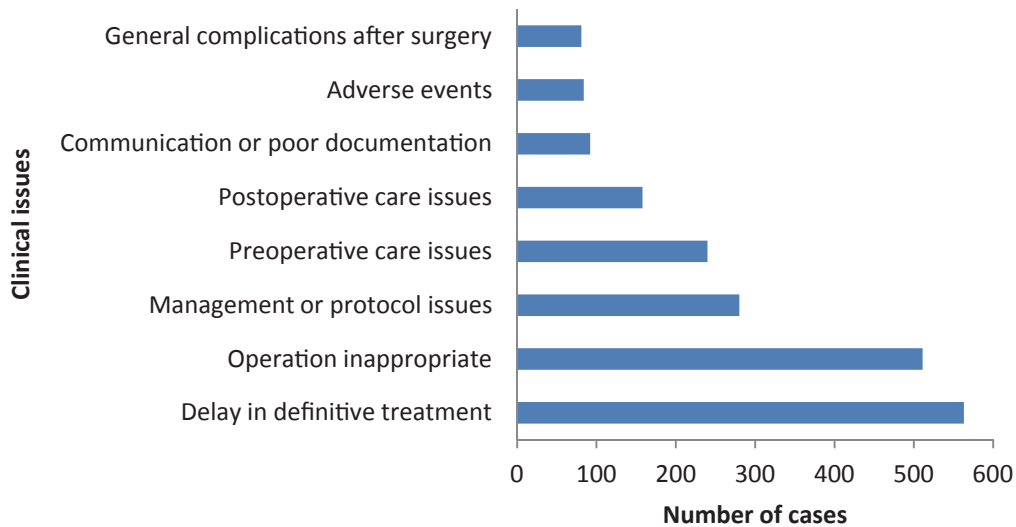
- No hospital was outside the upper 3 SD limit during the audit period.







Figure 86: Frequency of specific clinical issues of management



Note: Total n = 2,009.

The frequency of specific clinical issues of management is shown in Figure 86.

**Comments:**

- The clinical issues were re-categorised in this year’s report. A breakdown of clinical issues per category are as follows:
  - Adverse events: includes anastomotic leak after open surgery, injury caused by fall in hospital, pulmonary embolus, secondary haemorrhage and transfer should not have occurred.
  - Communication or poor documentation: includes communication failures due to poor case notes and poor communication between physician and surgeon.
  - General complications after operation: includes aspiration pneumonia, general complications of treatment, postoperative bleeding after open surgery and septicæmia.
  - Management or protocol issues: includes adverse events related to treatment guidelines or protocols, diagnosis-related complication, failure to use DVT prophylaxis, HDU not used postoperatively, patient-related factors and patient refusing treatment, surgeon too junior, treatment did not conform to guidelines and unsatisfactory medical management.
  - Operation inappropriate: includes decision to operate and consider different operation or operation should not have been done.
  - Preoperative care issues: includes CT scan should have been done, cardiac monitoring inadequate, failure to investigate or assess patient, failure to recognise severity of illness and inappropriate treatment prior to surgical referral.
  - Postoperative care issues: includes drug-related complication, failure to use HDU postoperatively, fluid balance unsatisfactory, fluid overload and inadequate postoperative assessment.
  - Delay in implementing definitive treatment was the most common clinical issue, listed in 563



(28%) of the 2,009 specific issues described. This category includes delays in transfer, establishing diagnosis and starting treatment. A number of studies on hip fracture patients found that delay to surgery was attributable to patient factors such as age<sup>(8)</sup> and comorbidities,<sup>(6)</sup> in addition to waiting times.<sup>(10, 17, 18)</sup>

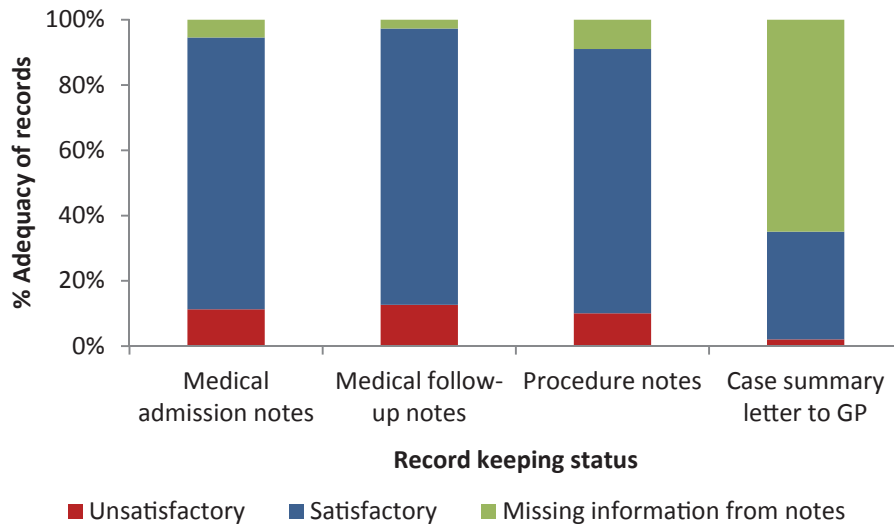
- The attribution of delays in the 563 cases were delays in patient care 16 (1%), delay in diagnosis 153 (8%), delay in fully investigating the patient 11 (1%), delay in patient presenting 11 (1%), delay in recognising complications 23 (1%), delay in transfer to surgical unit 148 (7%), delay in transfer to tertiary hospital 27 (1%), delay in starting medical treatment 34 (2%), delay to operation caused by missed diagnosis 11 (1%) and delay to surgery where earlier operation was desirable 129 (6%).
- There was also criticism of choice of operative procedure and decision to consider another operative approach. For example, 'patients with significant comorbidities may be better suited to a less complex and invasive procedures'.<sup>(6)</sup>
- Another example was related to the type of operation where 'open surgery had greater risk of anastomotic leak than laparoscopic operations. Surgical site infection and intraoperative blood transfusions were also associated with significantly higher rates of anastomotic leak.'<sup>(19)</sup>





Second-line assessors were asked to comment on the adequacy of the information contained in the hospital case record (see Figure 87).

Figure 87: Adequacy of information provided by hospital case record



Note: Total n = 559.  
GP: general practitioner.

**Comments:**

- In 172 (31%) of 559 SLAs, at least one aspect of the medical record was deemed unsatisfactory. Criticism included poor medical admission notes (10%) and follow-up records (11%) and unsatisfactory description of the surgical procedure (8%).
- The hospital case notes are an important record of what occurred during a patient’s treatment. The difficulty in managing patients in a complex environment where there is an increasing lack of continuity in the care provided during a patient’s stay in hospital is exacerbated by poor and inaccurate clinical notes. This is a similar finding to a review of care received by the elderly patients undergoing surgery in the UK.<sup>(15)</sup>

**Key points**

- A case note review (SLA) was deemed necessary to clarify events leading to the clinical outcome in 559 (19%) of the 2,862 audited cases. In 372 (13%) of the audited cases, the inadequacy of information provided by the treating surgeon was the trigger for further review.
- The need for SLA was similar across hospitals, surgical specialties and metropolitan and rural regions.
- In 1,850 (65%) of audited cases, no issues pertaining to the clinical management of patients were identified.
- The review process perceived that faults in the clinical management that were serious enough to be deemed adverse events had occurred in 168 (6%) of the audited cases.



#### 4. Concordant validity considerations

Completion of all fields in the CRF by the treating surgeon requires some self-reflection. An example is where the treating surgeon is asked to nominate any areas of consideration, concern or adverse event emanating from their care of the patient. Such responses by the treating surgeon were compared to assessors’ responses to the same question and the degree of concordance was estimated. These results are shown in Tables 1, 2 and 3.

Full concordance between the treating surgeon and assessor is not anticipated. There are various factors behind this. Among these, the information available to the first-line assessor relies heavily on the treating surgeon’s account of the clinical events. However, the second-line assessor has a de-identified copy of the patient’s medical records and thus a relatively unbiased chronology of care as it happened. The highest level of concordance expected would therefore be between the treating surgeon and first-line assessor, as the first-line assessor only has access to the clinical information recorded by the treating surgeon. The lowest expected concordance is between the treating surgeon and second-line assessor, who has access to an independent description of the episode of care. For this reason, agreement between first and second-line assessors is also predicted to be weak.

Analysis of concordance is a method of studying inter-relater reliability in reporting clinical management issues. Performing a full case note review on all reported deaths is not feasible for logistic reasons.

The outcomes of concordance analysis shown below are reassuring as they mirror the predicted outcomes.

Table 1: Concordant validity between the treating surgeon and the first-line assessor

Concord areas	Surgeon and first-line assessor			
	n (%)	% Concord	Kappa score	(95% CI)
Risk of death	2,209 (77%)	62%	0.41	(0.39-0.42)
ICU care benefit if not received	421 (15%)	97%	0.49	(0.22-0.76)
HDU care benefit if not received	405 (14%)	92%	0.35	(0.17-0.53)
Fluid balance	2,650 (93%)	68%	0.21	(0.18-0.23)
Preoperative management/preparation	2,096 (73%)	87%	0.38	(0.33-0.44)
Intraoperative/technical management	2,068 (72%)	93%	0.32	(0.23-0.40)
Decision to operate at all	2,109 (74%)	88%	0.27	(0.21-0.34)
Choice of operation	2,097 (73%)	93%	0.23	(0.15-0.31)
Grade/experience of surgeon deciding	2,074 (72%)	98%	0.25	(0.09-0.42)
Grade/experience of surgeon operating	2,076 (73%)	97%	0.24	(0.11-0.37)
Timing of operation	2,095 (73%)	91%	0.43	(0.36-0.49)
Postoperative care	2,022 (71%)	91%	0.33	(0.26-0.41)
Clinical management issues	2,853 (100%)	77%	0.45	(0.42-0.49)

Note: A total of 2,862 surgical case record forms and first-line assessments were available for analysis.

CI: confidence interval; HDU: high dependency unit; ICU: intensive care unit.

‘Critical care not received’ data was available in 2,140 audited cases (75%).

There were 2,273 surgical procedures with 3,198 operative episodes.

Kappa score interpretation outlined on page 6 of the report in section 1.5.1.



**Comments:**

- High concord levels were achieved between the surgeon and first-line assessor.
- As expected and indicated by the kappa scores, there was fair to moderate agreement between the treating surgeon and the first-line assessor on all concordance areas.
- The areas with the lowest agreement between the surgeon and first-line assessor were fluid balance, choice of operation and grade/experience of surgeon operating, as indicated by the lower kappa scores. For these, 62 percent were concordant that there was no fluid balance issue, 92 percent were concordant there was no issue with the choice of operation and 98 percent were concordant there was no issue with the grade/experience of surgeon operating.

*Table 2: Concordant validity between the treating surgeon and the second-line assessor*

Concord areas	Surgeon and second-line assessor			
	n (%)	% Concord	Kappa score	(95% CI)
Risk of death	421 (76%)	49%	0.26	-
ICU care benefit if not received	48 (9%)	83%	0.4	-
HDU care benefit if not received	45 (8%)	79%	0.13	(-0.19-0.45)
Fluid balance	465 (84%)	69%	0.26	(0.24-0.31)
Preoperative management/preparation	406 (73%)	70%	0.24	(0.15-0.33)
Intraoperative/technical management	398 (72%)	81%	0.3	(0.18-0.42)
Decision to operate at all	410 (74%)	82%	0.21	(0.09-0.33)
Choice of operation	409 (74%)	80%	0.13	(0.02-0.23)
Grade/experience of surgeon deciding	399 (72%)	94%	0.06	(-0.09-0.21)
Grade/experience of surgeon operating	399 (72%)	93%	0.21	(0.02-0.40)
Timing of operation	405 (73%)	76%	0.21	(0.10-0.32)
Postoperative care	396 (71%)	75%	0.16	(0.06-0.27)
Clinical management issues	497 (90%)	58%	0.19	(0.12-0.26)

Note: A total of 555 surgical case record forms and second-line assessments were available for analysis.

CI: confidence interval; HDU: high dependency unit; ICU: intensive care unit.

Kappa score interpretation outlined on page 6 of the report in section 1.5.1.

**Comments:**

- As indicated by the kappa scores, only poor to moderate agreement was noted between the treating surgeon and the second-line assessor.
- Disagreement between the treating surgeon and second-line assessor was most marked in critical care (HDU), choice of operation and grade/experience of surgeon deciding. Perhaps the treating surgeon is less objective in their assessment of the clinical management of patients. This is not an unexpected finding and supports the value of independent peer review.



Table 3: Concordant validity between the first-line assessor and the second-line assessor

Concord areas	First-line assessor and second-line assessor			
	n (%)	% Concord	Kappa score	(95% CI)
Risk of death	452 (81%)	48%	0.25	(0.23-0.28)
ICU care benefit if not received	99 (18%)	56%	0.27	-
HDU care benefit if not received	149 (27%)	58%	0.35	(0.29-0.41)
Fluid balance	450 (81%)	43%	0.12	(0.08-0.14)
Preoperative management/preparation	371 (67%)	60%	0.3	-
Intraoperative/technical management	366 (66%)	72%	0.42	(0.33-0.45)
Decision to operate at all	392 (71%)	71%	0.33	(0.26-0.39)
Choice of operation	380 (68%)	69%	0.31	(0.27-0.44)
Grade/experience of surgeon deciding	371 (67%)	81%	0.29	(0.27-0.35)
Grade/experience of surgeon operating	375 (68%)	83%	0.42	(0.38-0.49)
Timing of operation	373 (67%)	67%	0.35	(0.27-0.38)
Postoperative care	367 (66%)	59%	0.27	(0.23-0.31)
Clinical management issues	496 (89%)	72%	0.08	(-0.01-0.17)

Note: A total of 555 first and second-line assessments were available for analysis.

CI: confidence interval; HDU: high dependency unit; ICU: intensive care unit.

Kappa score interpretation outlined on page 6 of the report in section 1.5.1

**Comments:**

- As indicated by the kappa scores, agreement was poor to moderate between first and second-line assessors.
- Disagreement between first and second-line assessors was most marked in the fluid balance and the clinical management section, with second-line assessors perceiving more issues than the first-line assessors.

**Key points**

- In general, high to very high levels of concordance were observed.
- As expected and potentially due to objectivity (surgeons' assessment) and availability of extra information (SLA), kappa scores generally tend to be low.





Table 4 shows the severity of criticism of perceived clinical management issues and table 5 shows the frequency of clinical management issues.

Table 4: Severity of criticism of perceived clinical management issues

	Less severe ←—————→ Most severe			
Areas of clinical incidents	None detected	Consideration	Concern	Adverse event
Outcome of incidents	N/A	Did not affect clinical outcome	May have contributed to death	Probably contributed to death
Preventable incidents	N/A	Probably not	Probably	Definitely
Association of incidents	N/A	Hospital	Clinical team	Surgical team

Note: Other factors as listed in table 5 can include issues such as staffing levels, patient transfer, patient refusal, ambulance care, anaesthetic care and availability or quality of critical care support.

N/A: not applicable.

Table 5: Frequency of clinical management issues

Degree of criticism of patient management	Total occurrences	Patients affected by clinical issues (n = 2,862)
No issues identified	1,840	1,840 (64%)
Area of consideration	1,286	560 (20%)
Area of concern	562	271 (9%)
Area of adverse event	230	182 (6%)
Missing data	36	9 (<1%)
<b>Total</b>	<b>3,954</b>	<b>2,862 (100%)</b>

Perceived impact on patient outcome	Total occurrences	Patients affected by clinical issues (n = 2,862)
No issues of management identified	1,840	1,840 (64%)
Did not affect clinical outcome	489	243 (9%)
May have contributed to death	1,345	598 (21%)
Probably contributed to death	182	146 (5%)
Missing data	96	35 (1%)
<b>Total</b>	<b>3,952</b>	<b>2,862 (100%)</b>

Perceived preventability of clinical issues	Total occurrences	Patients affected by clinical issues (n = 2,862)
No issues identified	1,840	1,840 (64%)
Definitely preventable	238	179 (6%)
Probably preventable	836	378 (13%)
Probably not preventable	739	360 (13%)
Definitely not preventable	82	49 (2%)
Missing data	217	56 (2%)
<b>Total</b>	<b>3,952</b>	<b>2,862 (100%)</b>

Clinical team responsible for management issue	Total occurrences	Patients affected by clinical issues (n = 2,862)
No issues identified	1,840	1,840 (64%)
Surgical team	1,176	638 (22%)
Other clinical team	566	176 (6%)
Hospital issue	161	42 (2%)
Other factors*	184	53 (2%)
Missing data	288	113 (4%)
<b>Total</b>	<b>4,215</b>	<b>2,862 (100%)</b>





Comments:

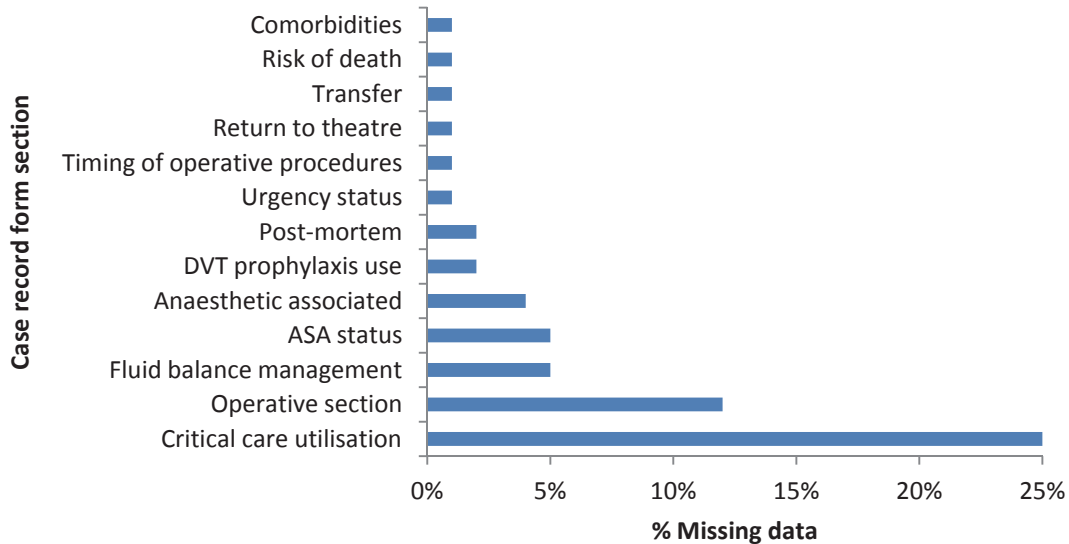
- Audited cases can have more than one clinical management issue identified for each patient. The percentage of patients affected is the important measure.
- Patients often require input from other clinical teams during their course of treatment. Management issues raised may, therefore, be attributable to any of these teams.
- Assessors perceived that clinical management issues occurred in 1,013 (35%) of the 2,862 cases in this audited series.
- In 638 (22%) of the 2,862 cases, an issue was identified that was attributed to the surgical team. Another 6 percent of cases had an issue attributed to other clinical teams (for example; medical and emergency departments), 1 percent attributed to hospital issues, 2 percent to other factors and in 4 percent of cases the responsible team was not identified by the assessors.
- Assessors felt that in 146 (5%) of the 2,862 patients clinical management issues probably contributed to death. In the remaining cases where management issues were perceived, the impact of these issues on the outcome was uncertain.



## 5. Data management and data quality

Data quality is an essential component of all audits. Inaccurate and incomplete clinical information will impair the audit process and prevent identification of trends.<sup>(11,12)</sup>

Figure 88: Limitations of the audit due to missing data



Note: Total n = 2,862.

ASA: American Society of Anesthesiologists; DVT: deep vein thrombosis.

### Comments:

- Figure 88 demonstrates the frequency (in decreasing order) of missing data for individual questions in the CRF.
- The volume of missing data is most prevalent in the 'critical care utilisation', 'operative section', 'fluid balance management', and 'anaesthetic associated' sections. These questions are important if we are to identify and address adverse trends.
- Where data integrity issues are identified, it is important to review the format of the questions that will generate the data. ANZASM felt it appropriate to revise the critical care and VTE questions in 2010 and 2012 as well as the trauma, infection and outcome sections in 2011 and 2012. Also, increasing uptake of the electronic Fellow's interface for data submission should lead to improved data integrity in the future.
- It is important to note that there has been a significant improvement in completion of some of these sections since 2010.
- VASM wishes to emphasise the importance of accuracy and completeness of data.



## 6. First and second-line assessment validation studies

First and second-line assessment validation studies have been conducted among a random sample of cases that have completed the audit process. The findings are consistent with a process that has some degree of subjectivity and lacks a 'gold standard'. The primary objective of the audit program (education of surgeons) is still being achieved by the current process.

The reports can be downloaded from <http://www.surgeons.org/vasm>.

## 7. Establishment of external evaluation

In 2011, VASM contracted Aspex Consulting to conduct an external evaluation of the entire audit process. This process aimed to ascertain the extent to which VASM is achieving its objectives.

**The scope of the evaluation included:**

- Effectiveness of processes used to collect, analyse, maintain and report the VASM data.
- A qualitative analysis of the effectiveness of communication between VASM and health services/clinicians, with recommendations arising from the audit process.
- A qualitative analysis of the effectiveness of the relationship and governance arrangements.

The major outcomes of the evaluation focused on: identifying strengths and areas for improvement in relation to the scope of activities undertaken by VASM; the efficiency and effectiveness of current program operations; and future development to improve the impact of VASM activities.

Overall, findings from the evaluation indicated that VASM has operated effectively and efficiently within its contracted terms of reference to deliver a peer-review audit process that is acceptable to surgical Fellows. High rates of hospital participation and surgeon commitment to the audit process have been achieved. Audit coverage across the private hospital sector is now increasing. Methods of case reporting, case assessment and feedback to a range of stakeholders have been subject to continuous quality improvement to maximise relevance and minimise burden (within the operational constraints imposed upon audit operations). The audit has now achieved a level of maturity in data capture and processing.

**VASM is now in a position to build upon current achievements by:**

- Maintaining surgical trust and commitment.
- Streamlining a range of processes.
- Extending analysis of data.
- Promoting integration of information across the health system and targeting messages identified through the audit to a range of different audiences.

By focusing on these activities, VASM will demonstrate its relevance and strengthen its capacity to make a positive impact on the quality and safety of patient management. The full report of the independent Aspex Consulting Evaluation can be found on: <http://www.surgeons.org/vasm>.



## 8. VASM evaluation surveys on the audit activities

With the release of the 2011 VASM Annual Report, an evaluation survey was sent to surgeons and hospitals. The survey sought feedback on the perceived value of the annual report, the 2012 case note review booklet previously published, the value of the personal feedback sent to treating surgeons as part of the peer-review process and the value of the new electronic interface. In addition there were also free text sections soliciting suggestions for improvement and requesting topics that might be addressed with future educational seminars. Surgeons were also asked if the outcomes from any part of the audit process had led to any change in their practice.

The questions directed to hospitals were similarly structured, but limited to the perceived value of the case note review booklet and annual report, and general educational value of process.

In total, 16 percent of surgeons canvassed returned the survey, as did 18 percent of participating hospitals. These survey return rates can be classified as good according to the Direct Marketing Association's 2010 Response Rate Trend Report.<sup>(20)</sup>

The evaluation surveys presented positive results on the entire VASM audit.

There was a significant amount of interest from the surgeons and hospitals on seminars presented by the VSCC and VASM.

From all the surveys received, the majority of respondents agreed with the appropriateness of the VASM program.

A summary of the findings was published in Surgical News, the newsletter of the Royal Australasian College of Surgeons. The full report of the evaluation survey can be found on: <http://www.surgeons.org/vasm>.



## 9. VASM educational seminars

### *Seminar 1: Managing the deteriorating patient*

A seminar was held in collaboration with VSCC and Victorian Managed Insurance Authority (VMIA) on 23 February 2012. The seminar was focused on recognising and managing the deteriorating patient as a key component of safe clinical care. This component forms one of the top national priority areas of the Australian Commission on Safety and Quality in Health Care.

Evidence from incidents, clinical review of surgical care in Victorian hospitals and patient feedback has demonstrated the need to improve recognition and appropriate management of patients where their condition either progressively or suddenly deteriorates. Inadequate recognition and/or management of deteriorating patients are contributing factors in many adverse events in hospitals and healthcare organisations across the world.

Significant reductions in preventable deaths in healthcare can be achieved by introducing systems which facilitate early identification of the deteriorating patient. This involves clearly defined triggers, timely escalation of the matter and a pre-emptive approach to the management of the deteriorating patient to prevent further deterioration leading to adverse events.

Based on the collective experience of the VSCC, Victorian Department of Health, VASM and VMIA, the topics covered in the seminar included:

- the challenges to responding to the deteriorating patient.
- auditing clinical deterioration - a sequence of events.
- recognising surgical emergencies in ED or ward.
- near-misses as viewed from the ICU perspective.
- escalation and calling for help - before the MET call.
- observation charts, triggers and communication.
- patients and situations at risk in our public hospitals - Clinical Risk Management perspective on medical indemnity claims.
- practical case solutions - panel discussion of typical challenges.

The seminar was attended by over 200 collaborators, including surgeons, interns, emergency department physicians, senior nursing staff, and hospital quality and safety officers.

### *Seminar 2: Profiling the accreditation advantages of the Victorian Audit of Surgical Mortality*

Profiling the accreditation advantages of the Victorian Audit of Surgical Mortality seminar was held in collaboration with VSCC and VMIA on 30 October 2012.

The National Safety and Quality Health Service Standards address critical areas that require improvements.

The seminar highlighted that the VASM audit process is designed to obtain information on factors involved in the death of patients undergoing surgical treatment. This process makes it possible to detect emerging trends in the outcomes of surgical care and develop strategies to redress any system or process errors identified. VASM is a tool that can help with some of the accreditation standards:

- governance, review and reporting.
- preventing and controlling healthcare associated infections.
- clinical handover.
- recognising and responding to clinical deterioration in acute healthcare.
- preventing falls and harm from falls.

The seminar was attended by over 100 collaborators, including surgeons, hospital executives, epidemiologists, nursing staff, and hospital quality and safety officers.





## 10. VASM performance review

Table 6: Project schedule and delivery status

Schedule of key deliverables	Status
Establishment of governance model	✓ Completed 27 November 2007
Establishment of mortality audit at four pilot sites	✓ Completed 27 November 2007
Establishment of mortality audit at a further four sites	✓ Completed 23 May 2008
Establishment of mortality audit at all Victorian public hospitals	✓ Completed 23 November 2008
Provision of confidential, specific reports to the department, the Minister for Health and VSCC, and: <ul style="list-style-type: none"> <li>• a report on the four pilot hospitals after their commencement, including data analysis and qualitative issues and lessons</li> <li>• reports to involved surgeons after their commencement in the audit</li> <li>• reports to involved hospitals.</li> </ul>	✓ Completed 30 June 2009
Individual case report forms provided to the VSCC in instances where areas of consideration, concern or adverse event were identified by the second-line assessor	✓ Completed 30 June 2009
Provision of annual public report in lay format	✓ Completed 30 October 2009
Agreement reached regarding the process to address individual surgeons and surgical outcomes that have been identified as outside of acceptable parameters, in line with the following principles: <ul style="list-style-type: none"> <li>• the definition of normal parameters to be agreed by RACS, VSCC and DHS</li> <li>• recommendations to be made by VSCC to address deficiencies in surgical outcomes</li> <li>• identified surgeons to be informed of audit findings and VSCC recommendations by the chair of the VSCC</li> <li>• continued monitoring of surgeon performance to be ongoing following implementation of VSCC recommendations</li> <li>• surgeons identified as having surgical outcomes outside of normal parameters following the implementation of VSCC recommendations to undergo further remediation.</li> </ul>	✓ Completed 30 October 2009
Provision of an outlier report to the DHS and the VSCC	The audit provides limited opportunities for identifying Fellows who might be considered to be 'outliers'. The aim of the program has been improving clinical standards through education. However, if outlier criteria can be developed through consensus, these might be applied to identify surgeons who would benefit from support from colleagues.
VASM contract renewal	✓ Completed 30 July 2010
Establishment of the Fellows electronic interface	✓ Completed 1 August 2010
Establishment of mortality audit at all Victorian private hospitals	Commenced 1 August 2010 85% Private sector recruited
Establishment of external evaluation of the VASM audit processes	✓ Completed 30 July 2011
Provision of first seminar to Fellows and hospital administrators, and other healthcare professionals on: <ul style="list-style-type: none"> <li>• 'Managing the Deteriorating Patient' in collaboration with VSCC and VMIA.</li> <li>• hospital accreditation tools.</li> </ul>	✓ Completed 23 February 2012 ✓ Completed 30 October 2012
Provision of hospital reports	✓ Completed 30 May 2012
Concordance analysis	✓ Completed 30 May 2012
DHS: Department of Human Services; RACS: Royal Australasian College of Surgeons; VASM: Victorian Audit of Surgical Mortality; VSCC: Victorian Surgical Consultative Council.	



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- Australian Central Territory Audit of Surgical Mortality
- Northern Territory Audit of Surgical Mortality
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- South Australian Audit of Perioperative Mortality
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