

VICTORIAN AUDIT OF SURGICAL MORTALITY

ANNUAL REPORT 2009





CONTENTS

ABBREVIATIONS	3
CHAIRMAN'S REPORT	4
EXECUTIVE SUMMARY	6
RECOMMENDATIONS	8
1 INTRODUCTION	9
1.1 BACKGROUND	9
1.2 OBJECTIVES	9
1.3 PERFORMANCE REVIEW	9
1.4 STRUCTURE AND GOVERNANCE	9
1.5 DATA MANAGEMENT AND STATISTICAL ANALYSIS	10
2 AUDIT RESULTS	12
2.1 AUDIT NUMBERS	12
2.2 AUDIT PARTICIPATION RATES	13
2.3 DEMOGRAPHIC PROFILE OF AUDITED CASES	20
2.4 RISK PROFILE AND CAUSE OF DEATH IN AUDITED CASES	24
2.5 RISK MANAGEMENT STRATEGIES	32
2.6 CAUSES OF DEATH REPORTED IN AUDITED CASES	38
2.7 POST-MORTEM RATE	39
2.8 PROFILE OF OPERATIVE PROCEDURES	40
2.9 PATIENT TRANSFER ISSUES	48
2.10 PEER-REVIEW OUTCOMES	49
3 VASM PERFORMANCE REVIEW	60
4 REFERENCES	62
5 ACKNOWLEDGMENTS	63



FIGURES

Figure 1: VASM project governance structure	10
Figure 2: Surgeon agreement to participate	13
Figure 3: Surgeon agreement to participate by surgical speciality	13
Figure 4: Case record form return rate	14
Figure 5: Case record form return rate by surgical speciality	14
Figure 6: Seniority of surgeons completing the case record form	15
Figure 7: Case record form return rate by hospital	17
Figure 8: Origin of cases that could not be reviewed due to non-participation	17
Figure 9: Comparison of mortalities reported by VAED compared to hospitals	18
Figure 10: Specialty distribution of audited cases by hospital	19
Figure 11: Gender and age distribution of deceased as notified by hospitals	20
Figure 12: Age distribution of deceased by hospital	20
Figure 13: Age distribution of deceased by region	21
Figure 14: Age and gender of deceased by Local Government Area	21
Figure 15: Urgency status of deceased by hospital	22
Figure 16: Urgency status of deceased by surgical speciality	22
Figure 17: Urgency status of deceased by region	23
Figure 18: ASA grades of deceased by hospital	24
Figure 19: ASA grades of deceased by surgical speciality	25
Figure 20: ASA grades of deceased by region	25
Figure 21: ASA spectrum of deceased by Local Government Area	26
Figure 22: ASA grades of deceased by urgency status	27
Figure 23: Prevalence of comorbidities among regions by surgical speciality	27
Figure 24: Comorbidity incidence by Local Government Area	28
Figure 25: Frequency of multiple comorbidities in individual patients	29
Figure 26: Comorbidities reported by hospitals	29
Figure 27: Surgeon's perception of risk of death	30
Figure 28: Surgeon's perception of risk of death by surgical speciality	30
Figure 29: Surgeon's perception of risk of death by region	31
Figure 30: Venous thromboembolism (VTE) prophylaxis use	32
Figure 31: Reasons given for not using VTE prophylaxis	33
Figure 32: Assessor perception of appropriateness of decision to withhold VTE prophylaxis	33
Figure 33: Provision of critical care support to patients by hospital	34
Figure 34: Assessor perception of appropriateness of critical care support	34
Figure 35: Utilisation of critical care facilities by surgical speciality	35
Figure 36: Provision of critical care support to patient by region	36
Figure 37: Fluid balance appropriateness	36
Figure 38: Frequency of reported causes of death	38
Figure 39: Post-mortem utilisation by urgency status	39
Figure 40: Operative procedures performed	40
Figure 41: Frequency of surgical procedures	41
Figure 42: Frequency of operative intervention by hospital	42
Figure 43: Operative procedures by urgency type	42
Figure 44: Operative procedures by region	43
Figure 45: Frequency of multiple operative procedures	43
Figure 46: Seniority of surgeons performing surgery	44
Figure 47: Seniority of surgeons performing unplanned procedures during same admission	44
Figure 48: Unplanned return to the operating room by urgency status	45
Figure 49: Unplanned return to the operating room by surgical speciality	45
Figure 50: Unplanned return to the operating room by hospital	46
Figure 51: Unplanned return to the operating room by region	46
Figure 52: Timing of operative procedures in emergency admissions	47
Figure 53: Aspects of care relating to patients requiring transfer to another hospital	48
Figure 54: Referral for second-line assessment	49



Figure 55: Frequency of need for second-line assessment in individual hospitals	50
Figure 56: Frequency of need for second-line assessment among surgical specialities	50
Figure 57: Frequency of need for second-line assessment by region	51
Figure 58: Clinical management issues	52
Figure 59: Spectrum of clinical management issues	52
Figure 60: Number of clinical management issues by admission type	53
Figure 61: Adverse events and areas of concern by hospital	53
Figure 62: Adverse events and areas of concern by surgical speciality	54
Figure 63: Attribution of responsibility for clinical management issues	54
Figure 64: Frequency of specific clinical issues of management	55
Figure 65: Clinical incidents outcomes	56
Figure 66: Information provided by case record	56
Figure 67: Clinical incidents by patient by severity	59
Figure 68: VASM audit process	61

TABLES

Table 1: Hospitals participating in the audit	16
Table 2: Clinical incidents	58
Table 3: Assigning severity to clinical incidents	58
Table 4: Project schedule and delivery status	60

ABBREVIATIONS

AAA	Abdominal Aortic Aneurysm
ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anaesthesiologists
AST	Advanced Surgical Trainee
CPD	Continuing Professional Development
CRF	Case Record Proforma
DoH	Victorian Department of Health
DRG	Disease Related Groups
ENT	Ear, Nose and Throat
FLA	First-Line Assessment
GIS	Geographic Information Systems
GP	General Practitioner
ICU	Intensive Care Unit
IQR	Interquartile Range
IVC	Inferior Vena Cava
LGA	Local Government Area
NSTEMI	Non-ST Segment Elevation Myocardial Infarction
QASM	Queensland Audit of Surgical Mortality
RACS	Royal Australasian College of Surgeons
SAAPM	South Australian Audit of Perioperative Mortality
SASM	Scottish Audit of Surgical Mortality
SD	Standard Deviation
SLA	Second-Line Assessment
SQL	Structured Query Language
SSL	Secure Sockets Layer
TASM	Tasmanian Audit of Surgical Mortality
TED	Thrombo Embolic Deterrent
VSCC	Victorian Surgical Consultative Council
VAED	Victorian Admitted Episodes Dataset
VASM	Victorian Audit of Surgical Mortality
VTE	Venous Thromboembolism Prophylaxis
WAASM	Western Australian Audit of Surgical Mortality



CHAIRMAN'S REPORT

The death of a patient can be a learning experience.

The Victorian Audit of Surgical Mortality (VASM) has been conducting mortality reviews for 18 months. During this time we have successfully recruited all but a very few Victorian hospitals providing surgical services. Similarly the number of surgeons actively participating has increased.

Actual participation by surgeons is really measured by compliance in returning the various forms and reports in a timely manner. We have seen major progress in this area with our return rate going from 40% to 73% in the last year. My thanks to my colleagues for their support.

Success in recruitment has meant that the number of deaths available for peer-review has increased exponentially. This has meant that preparation of this annual report has been both more challenging and also more rewarding. The information presented in this report is merely a snapshot of surgical deaths in Victoria. Some issues have been raised for discussion but it will be important to look at any trends unmasked in subsequent reports.

The audit process itself involves some degree of subjectivity. In an attempt to validate the process we drew a random sample of 10% of completed first-line assessments and subjected them to further review by another surgeon. This second reviewer was unaware of the initial findings. The outcome was supportive of the processes. There were differences of opinion but these were often more of degree of criticism rather than missing clinical issues. A full report of the study can be viewed at: www.surgeons.org/VASM

The study did suggest that some of the questions in the forms might benefit from review to clarify the true meaning of the question asked. Using the same methodology we are currently studying the agreement among different independent assessors performing second-line assessments on the same case. Results of the second validation audit are not yet available.

Mortality reviews such as VASM employ the 'accidental death construct' as a window into quality in surgery. We must remember that there are many pitfalls in interpreting the outcome of such audits. Paramount among these is the risk of over interpretation and creating false expectation of potential gains. I would draw your attention to the excellent review on this topic by Brennan et al. (1)

22% of Victorian Fellows have yet to commit to the audit. The College perceives that participation in clinical audit is an essential facet of continuing professional development (CPD). Commencing in 2010 College Council has mandated participation in one of the State audits of surgical mortality as an essential component of recertification. This year surgeons will receive individual records of their participation. These can be presented as evidence of participation in clinical audit.

This year we have revised our 'guidelines for assessors' booklet to ensure Victorian policies are in line with other states. We have specified complications that should automatically be recorded as adverse events.

Our management committee has been very supportive and continues to provide good advice and constructive ideas. VASM continues to work closely with the Victorian Surgical Consultative Council (VSCC) to monitor, analyse and report trends associated with potentially preventable surgical mortality. We would also like to acknowledge the cooperation of the quality and health information management departments in all participating hospitals. It is the VASM staff that make all this possible. Their attention to detail and adherence to protocol is the solid foundation on which the audit is built.

All this would not have been possible without the support of the Victorian Department of Health. They have not only provided the funding that allows us to achieve our objectives but have facilitated progress by encouraging participation by hospitals and facilitating access to state casemix data.



This is all provided without any attempt to influence our editorial integrity.

With this help, and the support we receive from many others, I can only remain confident about the future.

Colin Russell
VASM Chairman



EXECUTIVE SUMMARY

The majority of surgical deaths in this audited series occurred in elderly patients with underlying health problems, admitted as an emergency with an acute life threatening condition often requiring 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, not the treatment provided. Patients in rural regions tended to be older than in the metropolitan sector.

The Victorian Audit of Surgical Mortality (VASM) commenced auditing surgical mortality in Victorian public hospitals in January 2008. This report represents data collected to the end of June 2009. Our initial focus was to gain the support and participation of our surgeons and hospitals. This has been successful with all but a very few hospitals signing up and 679 (71%) of 955 Victorian Fellows agreeing to participate, with more than half wishing to be assessors. Actual participation of surgeons, as measured by timely completion of the necessary audit forms, is approaching that in other states. However, compliance in completing all necessary fields in the various forms can still improve. In the critical care section one field was left blank in 189 case reports. Although this will prompt a review of that question, we would prefer if surgeons completed the form or wrote a direct comment.

Over the 18 months to the end of June hospitals have notified VASM of 1,458 surgical deaths. The many rate-limiting steps in the audit process mean we have only completed the audit process in half of these cases. The clinical information on which we base our review was generally provided by the treating consultant themselves and not junior medical staff. The quality of the data provided has sometimes been disappointing, with assessors commenting on the inadequacy of the information provided in one quarter of the audited cases. This precipitated a second-line assessment in 35 (4.9%) instances, to ensure clarity of events around the death.

The majority of audited deaths 598 (83.2%) occurred in patients admitted as an emergency for an acute condition.

Venous thromboembolism prophylaxis is important in the prevention of pulmonary embolus. This audit would suggest that it is still not provided to all patients who might benefit. Provision of critical care support to patients was not always perceived to be ideal. The information provided does not tell us why this occurred.

A consultant surgeon performed the majority 475 (63.5%) of operative procedures. This bias to senior operators is appropriate for this high risk group of patients. However, consultant presence at subsequent and unplanned returns to the operating room was perhaps lower than desirable.

There were no criticisms of patient management in 518 (71.1%) of audited cases. The peer-review process did find faults in the management of 200 (27.9%) of the audited cases. In the majority of these instances (58%), the comments were mild (areas of consideration). However, we must acknowledge that in 33 (4.6%) patients, the peer-review process concluded significant errors (adverse events) in management had occurred. The individual criticisms have been directed to the treating surgeons for their reflection. In two instances the treating surgeon successfully appealed what was seen to have been an inappropriate interpretation of what actually occurred.

Delays in referral to a surgical unit were frequently commented on. This indicates there is an opportunity to improve the timeliness of referrals to surgical units. It is surely better to consult early, even if in error, than to delay and miss the opportunity for an optimal outcome. Adequacy of preoperative investigations and postoperative care were also frequently cited. Examples of these issues have been featured in a case report booklet. Other cases that exemplified important clinical issues have also been profiled in the 'case note review booklet', which has now been sent to all surgeons. Cases that demonstrated important facets of patient management were selected on the basis of their general education value to College members.



We have applied statistical analysis to assess the incidence of major issues of management (adverse event, areas of concern), in individual hospitals and surgical specialities. The identification of such outliers would be important. The statistical method (funnel plots) requires a threshold volume of data to draw inferences. As study numbers are still relatively low in individual hospitals and specialties, no inferences can yet be drawn.

Our objective is to review surgical deaths and assess if the treatment provided to individual deceased patients might have been improved and changed the outcome. Where treatment was adjudged to be less than optimal, feedback is provided directly to the treating surgeon. This achieves another objective, that of being educative rather than punitive. Another primary objective is identification of systemic issues and adverse trends in surgical care. Identifying issues like VTE prophylaxis is an example where improvement can perhaps improve outcomes. We will however require some 'tincture of time' to achieve meaningful analysis of trends in surgical mortality. Overall it is our perception that we are slowly attaining our goals.



RECOMMENDATIONS

Many of last year's recommendations have been implemented. Collaboration between the Department of Health, Victorian Surgical Consultative Council, Coroner's Office, hospitals and health services continues to facilitate our progress.

Objectives for the coming year are:

- Improve the return rate of case record forms and increase participation by surgeons.
- Continue to collaborate with VSCC and other agencies like the coroner's office.
- Continue to disseminate important messages emanating from the audit.
- Develop an electronic interface to allow Fellows to complete assessments online.
- Facilitate communication and information sharing with other state mortality audits.
- Contribute to the development of a national mortality audit report.
- To facilitate availability of important information in Coroner's reports to assessors through closer liaison with the Coroner's Court of Victoria.
- Develop yearly trend analysis as data becomes available.



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 a *'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 whilst 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 2008 annual report. An important measure of the success of VASM is whether these recommendations have been addressed or achieved. A list of key performance indicators, recommendations and progress against the indicators are listed in Section 3 of this annual report.

1.4 Structure and governance

The audit is managed by the Research, Audit and Academic Surgery (RAAS) Division of the Royal Australasian College of Surgeons (The College) and is supported and funded by state 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 by surgeons is voluntary. There is, however, recognition of participation in VASM as a respondent and assessor in Category 3: 'Clinical Governance and Evaluation of Patient Care' of the Continuing Professional Development (CPD) program.

The VASM audit is funded by the Victorian Department of Health. The College provides infrastructure support and conducts the oversight to the project. VASM works closely with the VSCC and provides regular reports to ANZASM, VSCC, hospitals and the Victorian Department of Health.

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 will inform the VSCC of trends in surgical mortality and assist with the development of processes to enable the surgical community and health care providers to address system issues.



Data is downloaded from the secure database and then analysed using the statistical package STATA version 10.1, Microsoft Office Excel (2003) and ArcGIS version 9. Demographic data and summary statistics are 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. Kappa scores have been used as a measure of agreement. Funnel plots have been used to explore heterogeneity and are presented with upper and lower two and three standard deviation limits.

Numbers in the parentheses in the text (n) represent the number of cases actually 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

In statistical analysis a p-value < 0.05 is considered statistically significant.

1.5.3 Interpretation of funnel plots

Funnel plots are a visual tool for investigating bias in meta-analysis. They are scatter plots of the analysis effects estimated from individual studies (horizontal axis) against a measure of study size (vertical axis). The name funnel plot is based on the precision in the estimation of the underlying treatment effect increasing as the sample size of component studies increases.

1.5.4 Interpretation of geographic mapping

GIS provides a common analytical framework in which data can be geographically displayed.

1.5.5 Interpretation of spider charts

A spider chart is a graphical representation of multiple data points in the form of a two dimensional graph of three or more quantitative variables shown on all axes starting from the same unique point. Therefore, two profiles can be easily recognised and compared with each other as well as with the multivariate values.

1.5.6 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 2009 Victorian Audit of Surgical Mortality (VASM) received 1,458 notifications of death that have been associated with surgical care.

Regarding the audit status of these 1,458 deaths:

- 955 (65.5%) case record forms have been completed and returned to VASM by the treating surgeon.
- 76 (5.2%) cases were recorded as admissions for terminal care and therefore excluded from the review process.
- 83 (5.7%) cases had been wrongly attributed to a surgical unit and were therefore excluded from the review process.
- 73 (5.0%) cases could not proceed in the audit process as the treating surgeon had elected not to participate.
- In 50 (6.9%) cases, the treating surgeon could not access the hospital case notes to complete the case record form [coroner's case 22 (1.5%) and medical records issue 28 (3.6%)].
- 718 (49.2%) of these deaths have been fully audited.

As basic clinical information on each death requires the treating surgeon to complete a case record form, data available for this analysis comes entirely from the 955 deaths where case record forms have been returned. The outcomes from the actual peer-review process are restricted to the 718 deaths for which the full audit process has been completed.

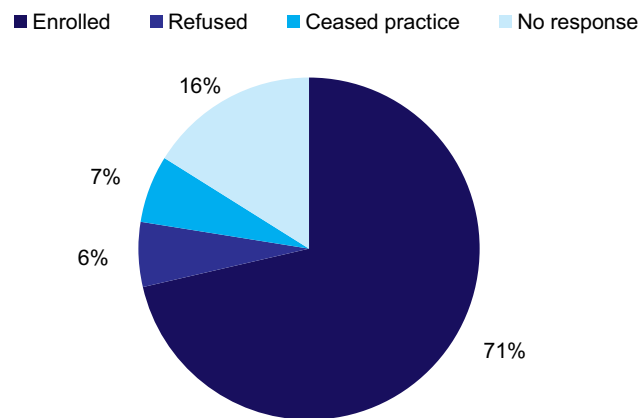


2.2 Audit participation rates

The audit process relies on surgeons not just agreeing verbally to participate, but on returning completed case record forms and assessment forms in a timely manner. The hospitals in which they work must provide notifications of deaths on a regular basis, as these are the triggers for the audit process.

2.2.1 Participation by Fellows

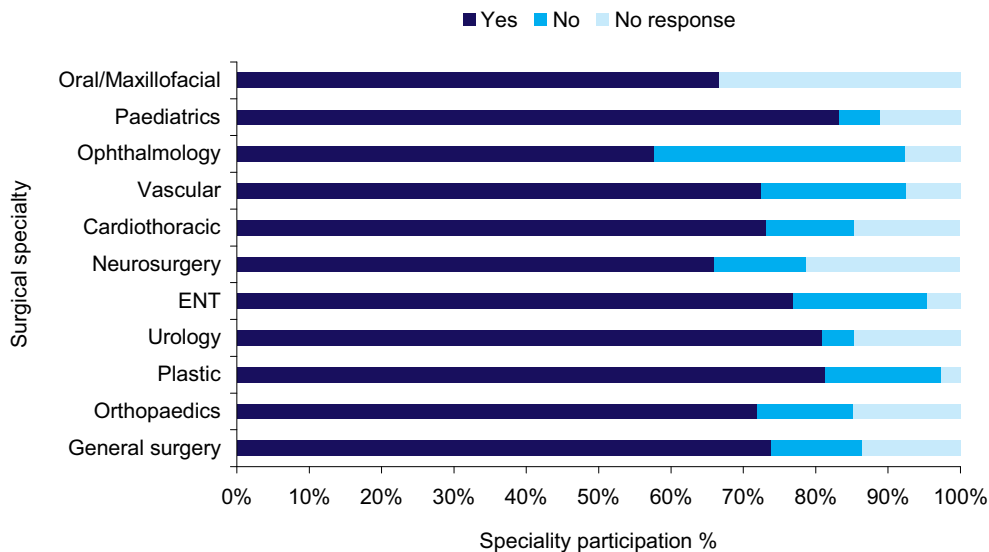
Figure 2: Surgeon agreement to participate as percentage of the 955 College Fellows in Victoria



Comment:

- It is disappointing that 211 (22%) of Victorian Fellows are not participating.
- The College Council has acknowledged the importance of clinical audit by recommending that active participation in ones state mortality audit be a compulsory component of the Continuing Professional Development (CPD) program. This process will come into effect in 2010. Details of RACS CPD programme of requirements are available at: <http://www.surgeons.org/Content/NavigationMenu/FellowshipandStandards/CPDRecertification/default.htm> (2)

Figure 3: Surgeon agreement to participate by surgical specialty (n=955)

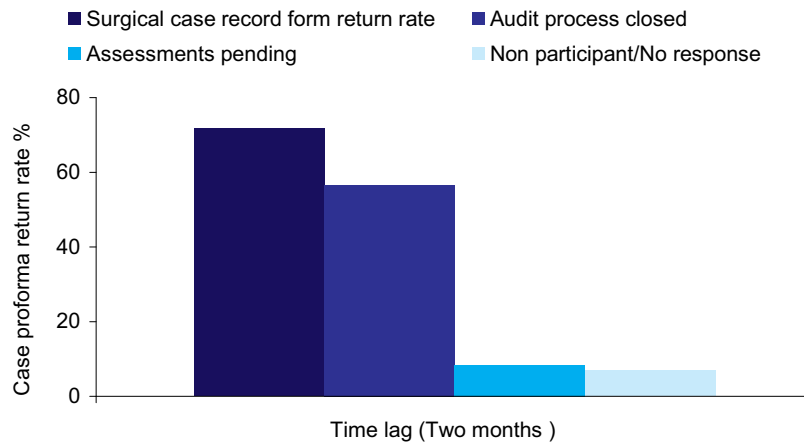


Comment:

- Participation rates were similar among specialties.



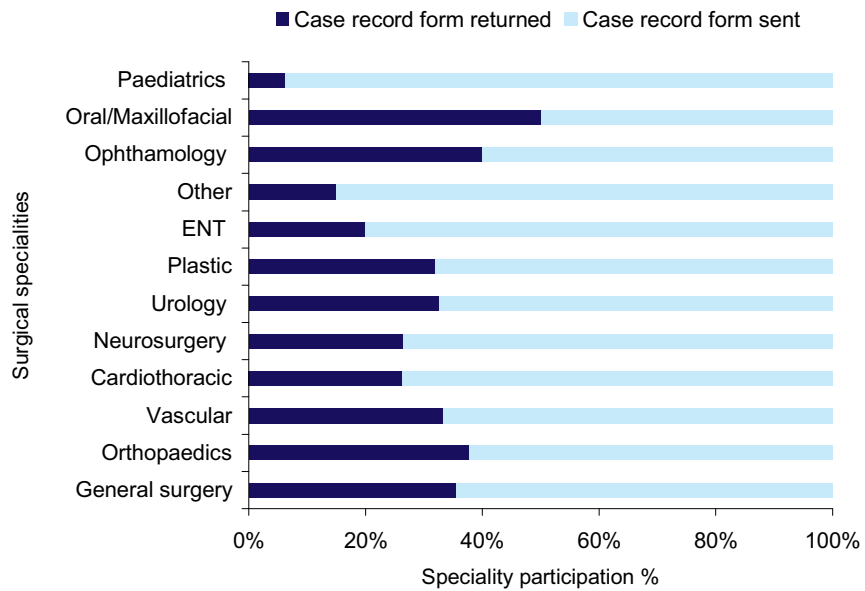
Figure 4: Case record form return rate (n=1,458)



Comment:

- A case record form was sent to each surgeon nominated as the treating surgeon in all 1,458 instances of death reported to VASM.
- The true rate of participation by Fellows is measured by the return rate of case record forms by treating surgeons. If we allow two months from notification of death to receipt of the case record form, the return rate is 73%. The return rate in other states varies between 77% and 95%.

Figure 5: Case record form return rate by surgical specialty (n=1,458)

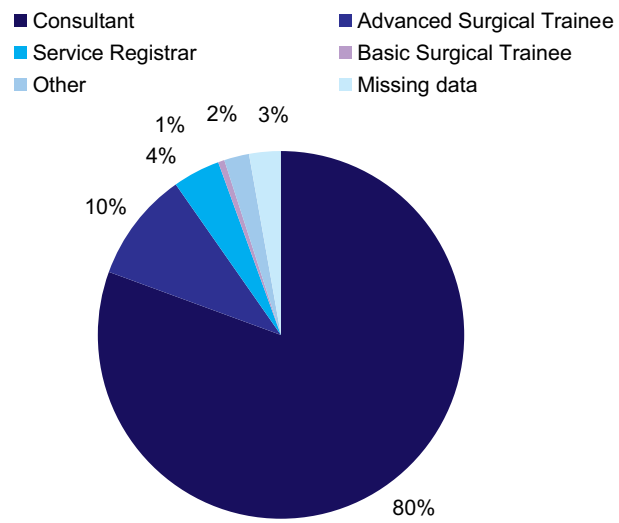


Comment:

- This suggests the case record form return rates were similar among specialties. Low numbers in paediatrics limit comment.



Figure 6: Seniority of surgeons completing the case record form (n=718)



Comment:

- Of the 718 case record forms, 578 (80%) were completed by the consultant.



2.2.2 Participation by hospitals

Table 1: Hospitals participating in the audit

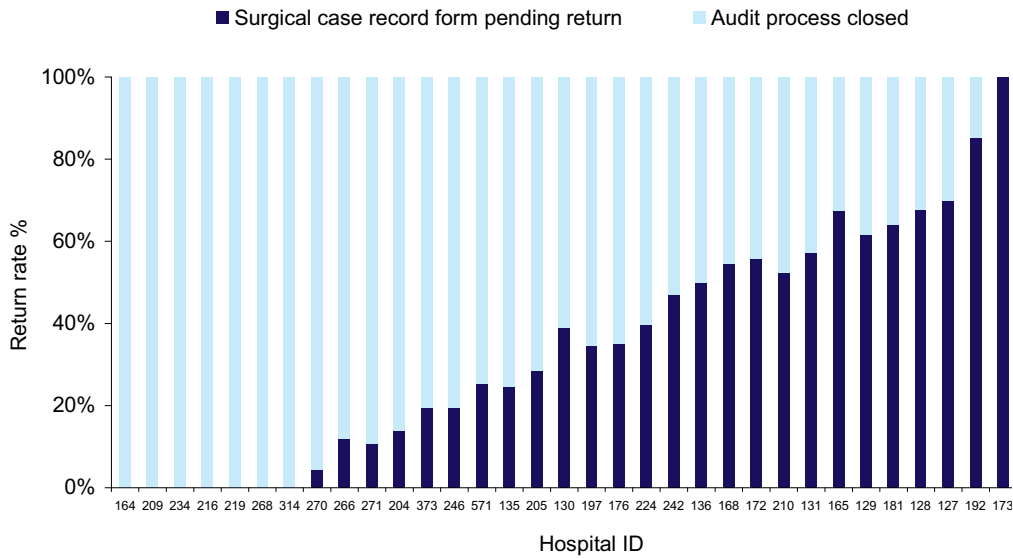
Hospital	Participation	Hospital	Participation
127	Reporting	221	Reporting
128	Reporting	223	Reporting
129	Reporting	224	Reporting
130	Reporting	225	Reporting
131	Reporting	228	Not participating
135	Reporting	229	Reporting
136	Reporting	230	Reporting
153	Reporting	232	Reporting
155	Reporting	233	Reporting
156	Reporting	234	Reporting
164	Reporting	239	Not participating
165	Reporting	240	Reporting
167	Reporting	241	Not participating
168	Reporting	242	Reporting
169	Reporting	244	Reporting
170	Reporting	246	Reporting
172	Reporting	247	Reporting
173	Reporting	249	Reporting
176	Reporting	251	Reporting
180	Reporting	255	Reporting
181	Reporting	256	Reporting
182	Reporting	257	Reporting
183	Reporting	258	Reporting
184	Reporting	259	Not participating
185	Reporting	260	Reporting
186	Reporting	261	Reporting
188	Reporting	263	Reporting
189	Reporting	264	Reporting
190	Reporting	265	Reporting
192	Reporting	266	Reporting
193	Pending enrolment	267	Reporting
194	Not participating	268	Reporting
196	Reporting	270	Reporting
197	Reporting	271	Reporting
198	Reporting	273	Not participating
199	Reporting	274	Not participating
200	Not participating	373	Reporting
202	Not participating	571	Reporting

Comment:

- Hospitals where no mortalities occurred or where deaths have not been reported have been excluded from further analysis.
- Certain hospitals that are part of a health service might have aggregate data shown in the report rather than individual representation; this reporting format is dependent on the health services mortality reporting methods.
- Out of 76 hospitals, 66 (86.8%) are reporting, 9 (11.8%) are not participating, whilst 1 (1.3%) is pending enrolment.



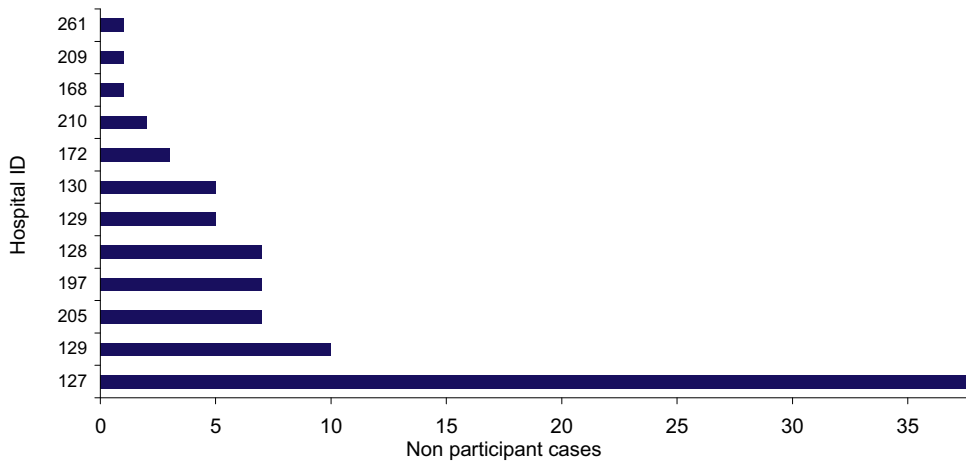
Figure 7: Case record form return rate by hospital (n=1,458)



Comment:

- Compliance with the audit process as assessed by case record form return rates varies among hospitals.

Figure 8: Origin of cases that could not be reviewed due to non-participation by treating surgeon (n=87)



Comment:

- Surgeons electing not to participate seem to be focused in a few hospitals. The audit process cannot proceed without surgeon participation.
- In each instance above, the hospital has agreed to participate and notify deaths to VASM.

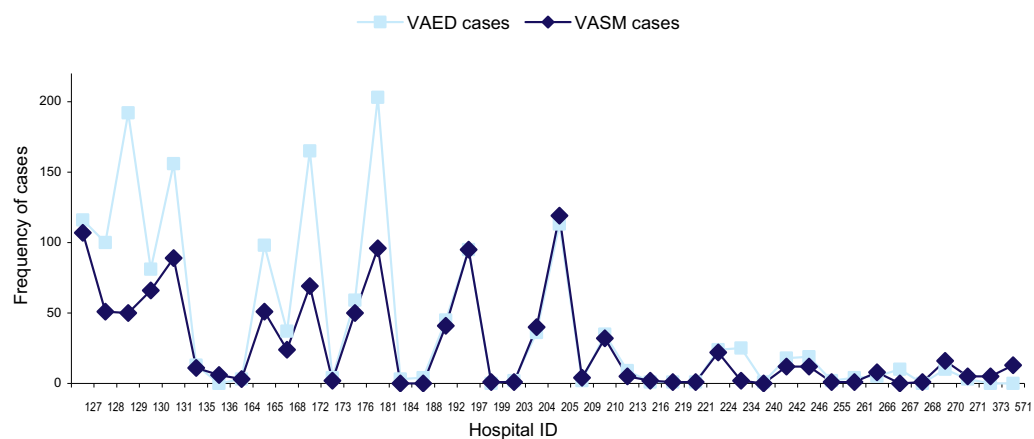


2.2.3 Verification of audit numbers

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 have to submit data to the Victorian Admitted Episode Dataset (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 specialty notification. The Department of Health has provided us with a list of deaths that occurred in patients with surgical DRGs over the period 1 July 2008 to 30 June 2009. It should be noted that these two methods of assessing mortality (hospital and VAED) have different sources and should be considered as complementary rather than parallel.

Figure 9: Comparison of mortalities reported by VAED compared to hospitals

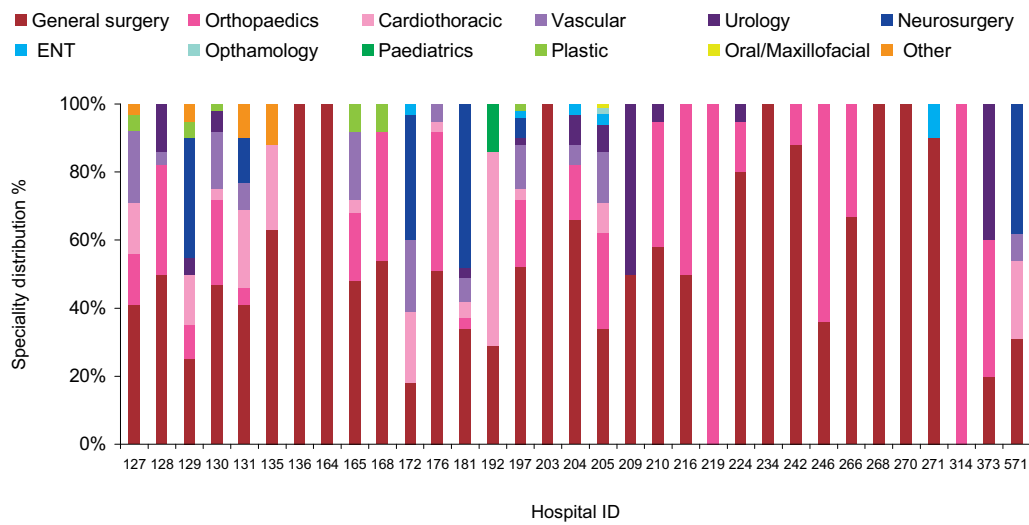


Comment:

- This is a comparison of data collected between the period of 1 July 2008 to 30 June 2009.
- Over this time period, VAED data suggests there were 1,695 deaths that might be attributable to surgery whereas hospital notifications to VASM suggested only 1,115 (65.8%).
- The actual number of deaths notified by each hospital is dependent on the length of time that a hospital has been reporting deaths to VASM. Some hospitals did not report deaths over the full time period, which explains some of the difference.



Figure 10: Specialty distribution of audited cases by hospital (n=718)



Comment:

- The speciality distribution is probably a reflection of the casemix of individual hospitals.

Key points

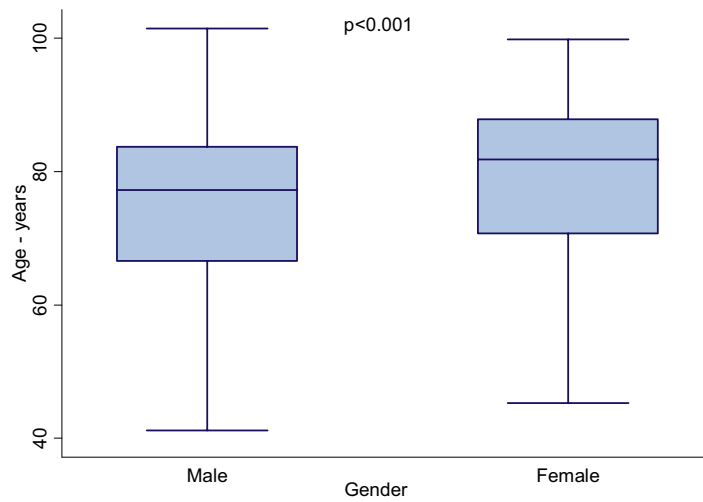
- 679 (71.1%) out of 955 Victorian Fellows have agreed to participate in the audit.
- 347 (51.1%) of these 679 Fellows have also agreed to be first or second-line assessors.
- Case record form return rates have risen from 40% to 73% over the last year.
- 92 (90%) Victorian hospitals providing surgical services are now participating and providing notifications of death.
- During the reporting period from 1 January 2008 to 30 June 2009, death notifications were incomplete as we were still recruiting surgeons and hospitals.
- VAED mortality numbers and hospital notifications of death are complementary.



2.3 Demographic profile of audited cases

There were 718 audited cases with a mean (SD) age of 75.2 (16.6) years and a median (IQR) age of 79.1 (68.0 to 85.8) years. The age range varied from 3 days old to 101.4 years old.

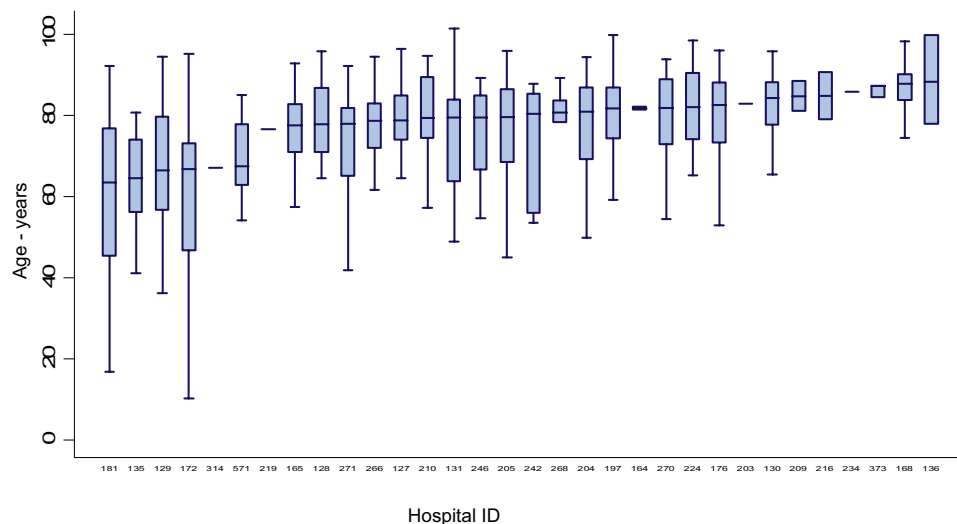
Figure 11: Gender and age distribution of deceased as notified by hospitals (n=718)



Comment:

- The median (IQR) age for 332 (46.2%) females was 81.8 (70.7 to 87.8) years compared to 77.2 (66.5 to 83.7) years for males, $p < 0.001$. Extreme values are not displayed on the graph.
- This age profile is consistent with the ageing general population.

Figure 12: Age distribution of deceased by hospital (n=718)

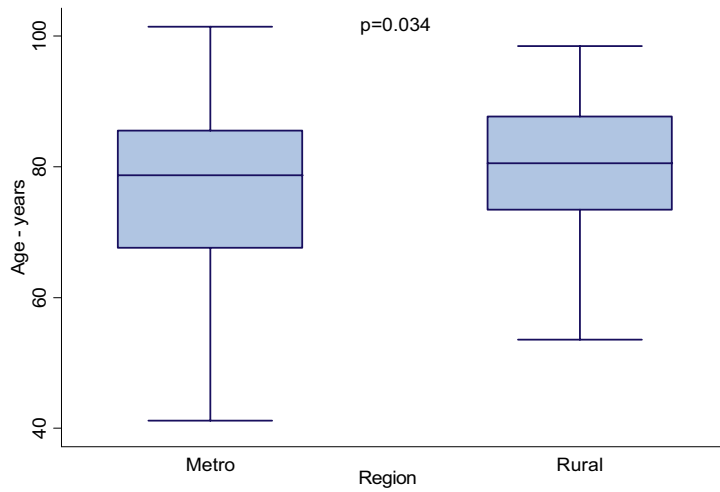


Comment:

- Extreme values have not been displayed on the graph.
- A thin horizontal bar indicates small patient numbers with a narrow age range.
- The mean age of deceased patients in this audited series is 75.



Figure 13: Age distribution of deceased by region (n=718)

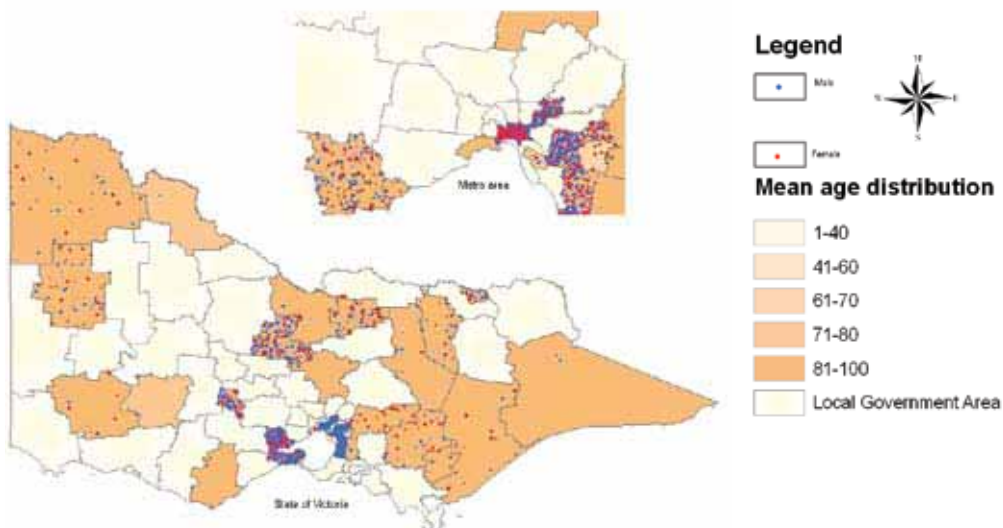


Note: Missing data n=14 (1.9%).

Comment:

- The median (IQR) age of patients who died in the rural sector (n=170) was 80.5 (73.4 to 87.7) compared to 78.7 (67.6 to 85.5) in the metropolitan sector (n=534), p=0.034.
- In an Australian study on cardiovascular disease and patient delay, it was found that many deaths and significant cardiac disability result from delayed response to symptoms of heart attack [and] although delays due to transport and initiation of reperfusion therapy in hospital may contribute to late treatment, the major component of delay is the time patients take in deciding to seek help.(3)

Figure 14: Age and gender of deceased by Local Government Area (n=718)



Comment:

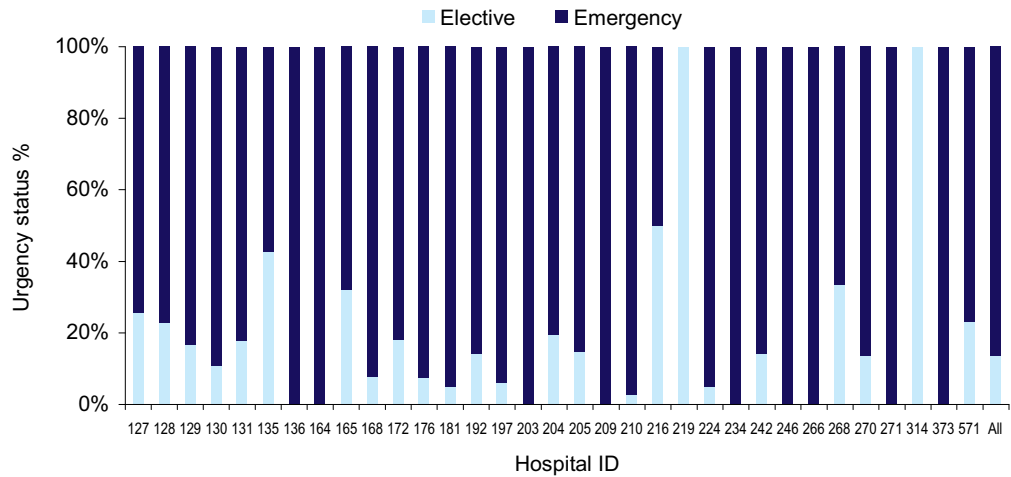
- This is a pictorial view of the gender and mean age distribution of reported deaths by Local Government Area (LGA). The points displayed have been 'scattered' in their relevant LGA. Individual points do not indicate where a death occurred, only the LGA in which death occurred.
- Only LGAs where a surgical death has occurred have data points or shading.



2.3.1 Urgency status of patients

The urgency status of patients records whether audited cases were admitted electively or as emergencies for acute conditions.

Figure 15: Urgency status of deceased by hospital (n=718)

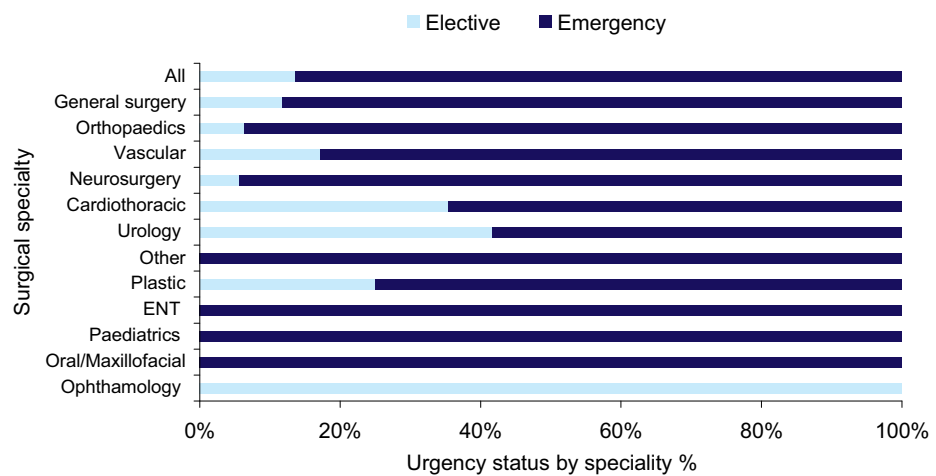


Note: Missing data n=26 (3.6%).

Comment:

- The proportion of audited cases admitted as emergencies varies among hospitals. Some rural hospitals do not have emergency departments.
- The majority of audited deaths 598 (83.2%) occurred in patients admitted as an emergency for an acute condition.
- There was no difference in the mean ages of elective and emergency patients (data not shown in this graph).

Figure 16: Urgency status of deceased by surgical speciality (n=718)



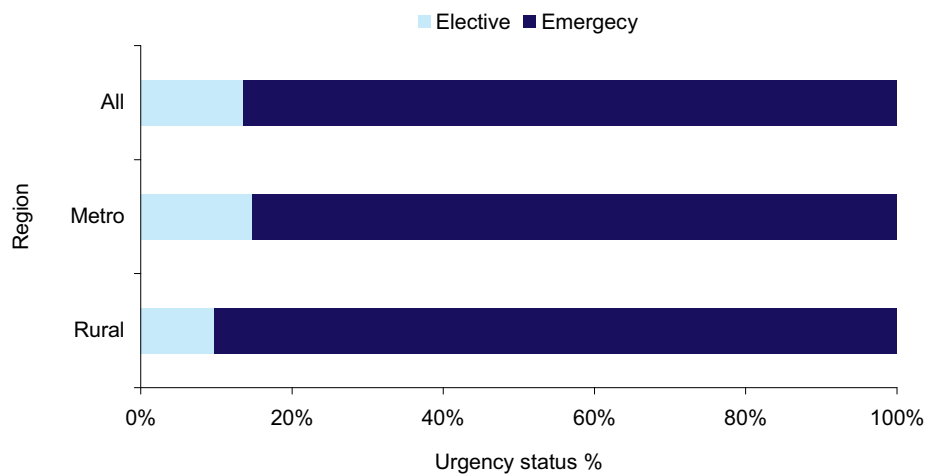
Note: Missing data n=26 (3.6%).

Comment:

- The proportion of audited cases admitted as emergencies varies among specialties. This is a feature of the casemix of individual specialties.



Figure 17: Urgency status of deceased by region (n=718)



Note: Missing data n=40 (5.5%).

Comment:

- The majority of audited deaths occurred in patients admitted as emergencies for acute conditions.
- The urgency profile is similar across rural and metropolitan hospitals.

Key points

- **598 (83.2%) of deaths in this audited series occurred in patients admitted as emergencies with acute conditions. This is similar to other Australian mortality audit statistics.(4,5,6)**
- **The high mean age of these patients (75 years) indicates surgical mortality is predominantly in the elderly. Patients dying in the rural sector tended to be older than in the metropolitan areas.**



2.4 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 Anaesthesiologists (ASA) status, reported comorbidities and a surgeon's perception of risk of death.

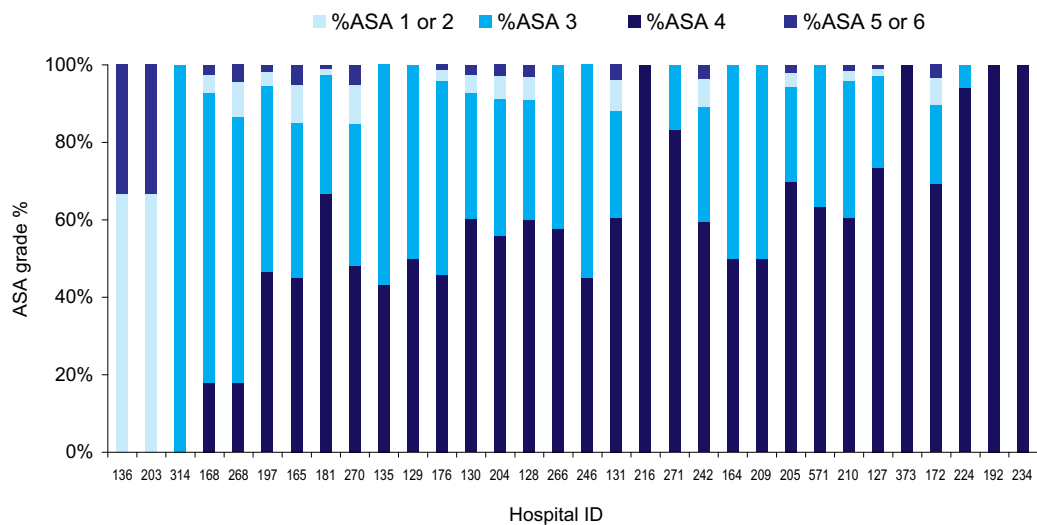
2.4.1 ASA status of patients

The ASA status is an international measure of patient risk used by anaesthetists.

ASA grade characteristics:

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

Figure 18: ASA grades of deceased by hospital (n=718)



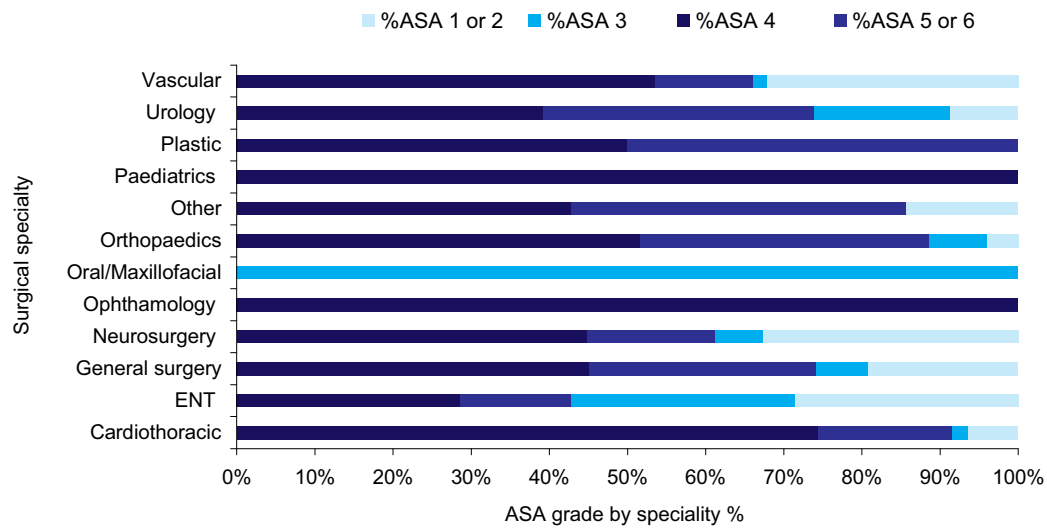
Note: Missing data n=40 (5.5%).

Comment:

- The preponderance of high ASA grades suggests most deaths have occurred in patients assessed as high risk by the anaesthetic team.



Figure 19: ASA grades of deceased by surgical speciality (n=718)

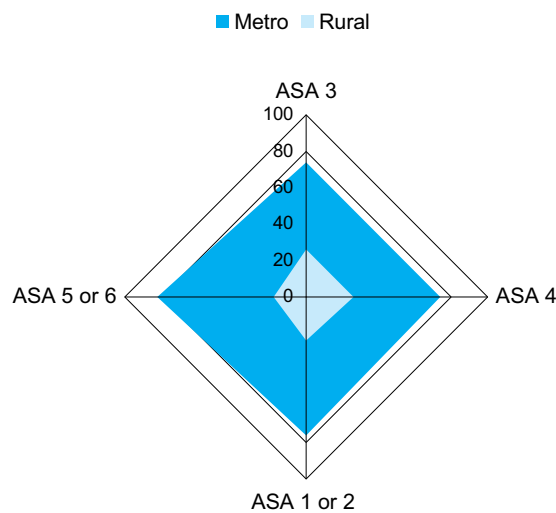


Note: Missing data n=40 (5.5%).

Comment:

- The variation in severity of ASA grades among specialities is a reflection of the risk profile inherent in their casemix.

Figure 20: ASA grades of deceased by region (n=718)



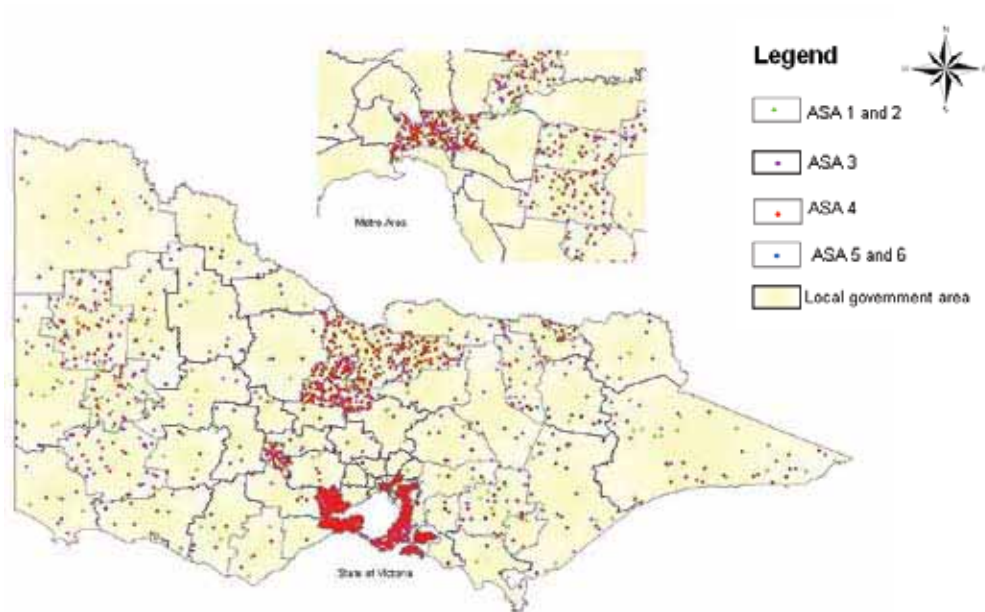
Note: Missing data n=40 (5.5%).

Comment:

- This figure demonstrates a high mean ASA grade in both rural and metropolitan regions. It suggests the majority of deaths occurred in patients with significant comorbidity.
- In metropolitan regions there was a trend to a higher proportion at the ASA 5 and 6 end of the spectrum but this was not significant (p-value 0.810).



Figure 21: ASA spectrum of deceased by Local Government Area (n=718)



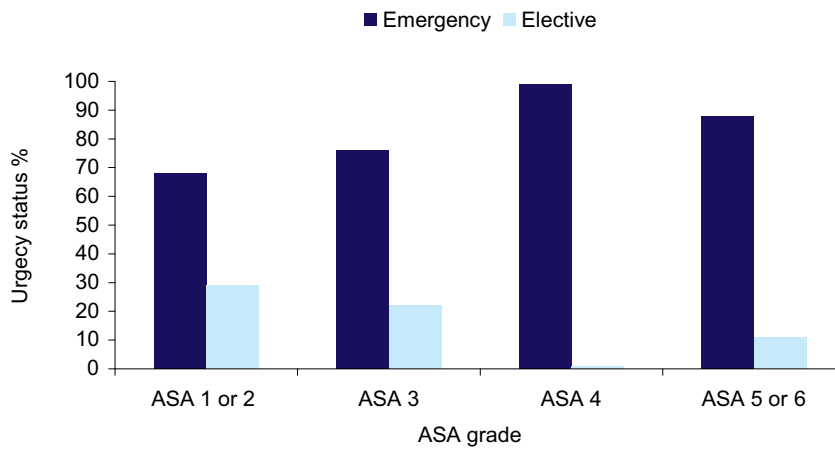
Note: Missing data n=40 (5.5%).

Comment:

- This is a pictorial view of the ASA spectrum among reported deaths by Local Government Area (LGA). The points displayed have been 'scattered' in their relevant LGA. Individual points do not indicate where a death occurred, only the LGA in which death occurred.
- Only LGAs where a surgical death has occurred have data points or shading.
- As might be expected, deaths in high risk cases (ASA>4) are focused in metro hospitals or the more major rural centres.



Figure 22: ASA grades of deceased by urgency status (n=718)



Note: Missing data n=40 (5.5%).

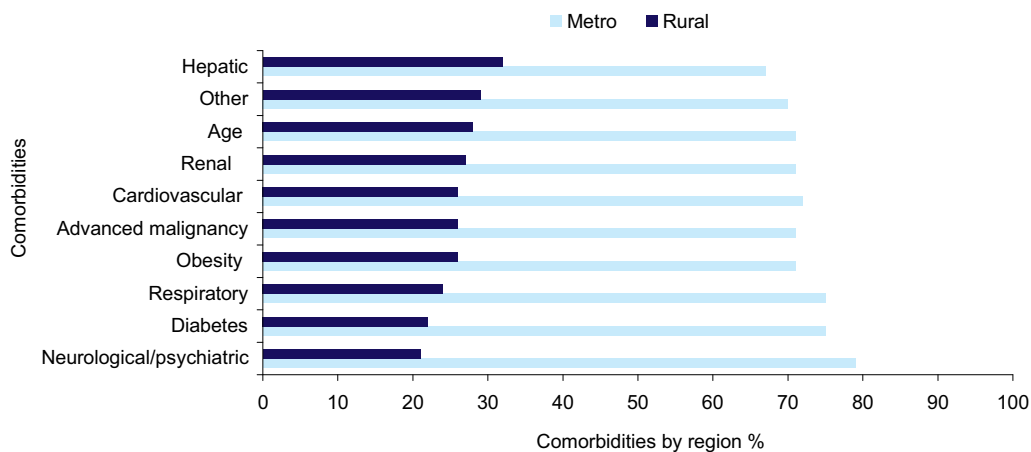
Comment:

- Patients with ASA grades 4 and 5 or 6, had a higher proportion of admissions as emergencies, than those with ASA grades 1 or 2 and 3.
- Cases with an ASA >4 were more likely (p-value 0.001) to be referred for case note review (second-line assessment); data is not shown in this figure.

2.4.2 Comorbidities

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

Figure 23: Prevalence of comorbidities among regions by surgical speciality (n=2,913 in 718 cases)



Note: Missing data n=74 (2.5%).

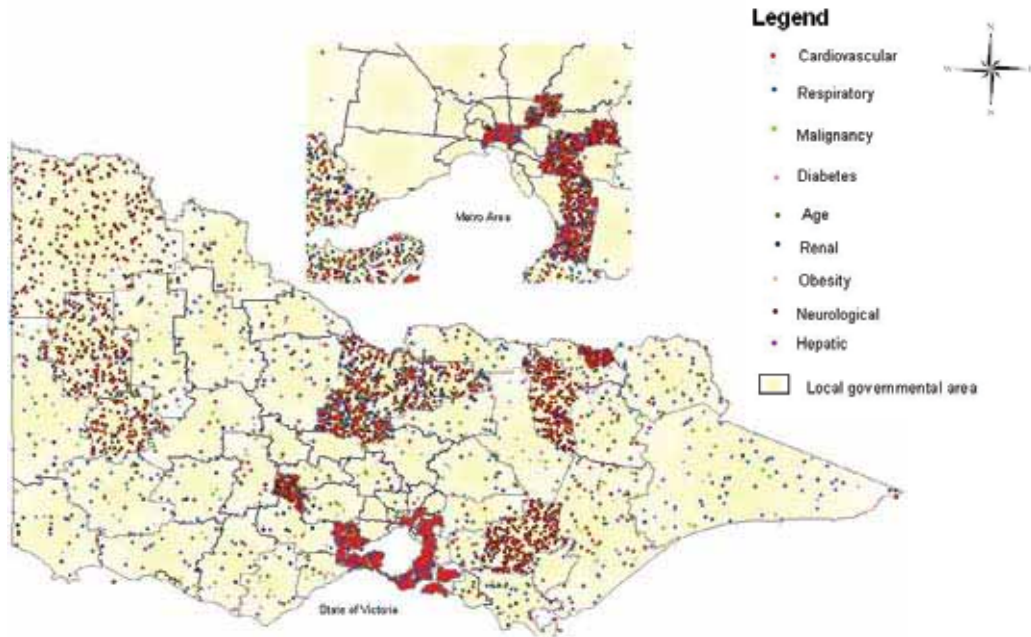
Comment:

- 2,913 comorbidities were reported in the 718 cases that had completed review.
- The comorbidity profile associated with audited deaths appears similar across metropolitan and rural regions.
- Most patients had more than one comorbidity.



- The most common risk factors notified in the 718 series of surgical deaths were cardiovascular 455 (63.3%), age 397 (55.2%), respiratory problems 288 (40.1%) and neuro-psychiatric 138 (19.2%).
- This profile is similar to that reported in the 2009 Western Australia Audit of Surgical Mortality (WAASM) report (4), the 2008 South Australia Audit of Perioperative Mortality (SAAPM) report (5), and the 2008 Queensland Audit of Surgical Mortality (QASM) (6) report.

Figure 24: Comorbidity incidence by Local Government Area (n=2,913 in 718 cases)

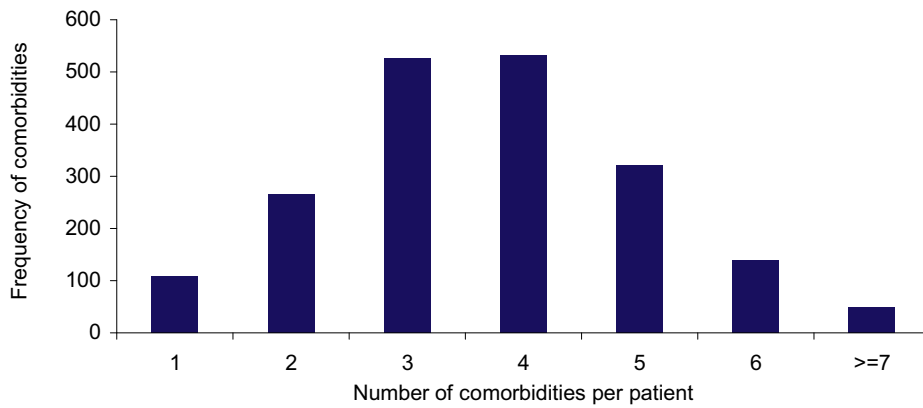


Comment:

- This is a pictorial representation of the distribution and type of comorbidity seen in Local Government Areas (LGA). The points displayed have been 'scattered' in their relevant LGA. Individual points do not indicate where a death occurred, only the LGA in which death occurred.
- Only LGAs where a surgical death has occurred have data points or shading.
- As might be expected, deaths in patients with significant comorbidity tend to be focussed in metropolitan hospitals and major rural centres.



Figure 25: Frequency of multiple comorbidities in individual patients (n=2,913 in 718 cases)

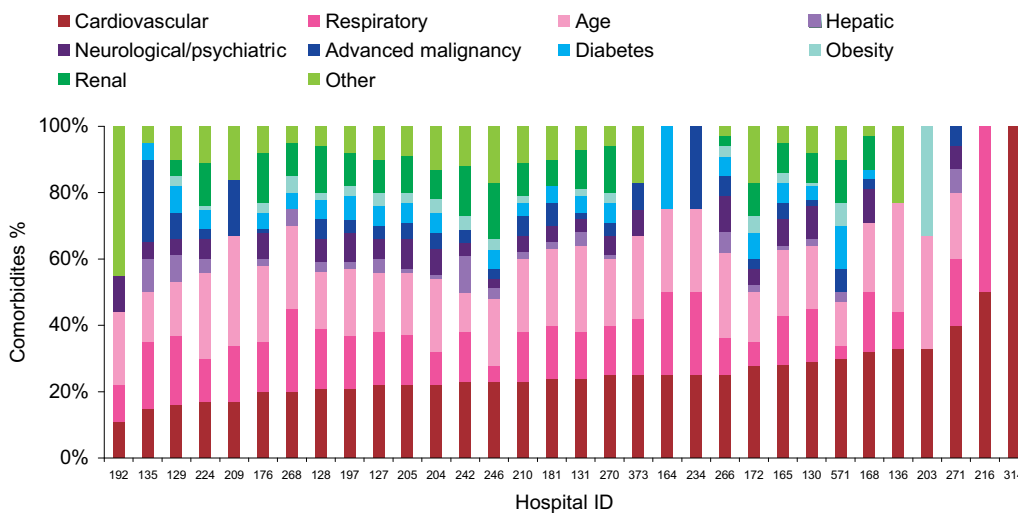


Note: Missing data n=74 (2.5%).

Comment:

- In this audited series, 644 (89.6%) of 718 cases were reported to have more than one comorbidity.

Figure 26: Comorbidities reported by hospitals (n=2,913 of 718 cases)



Note: Missing data n=74 (10.3%) cases.

Comment:

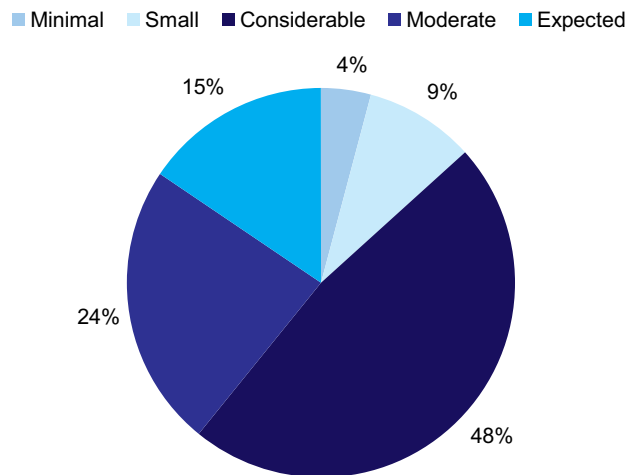
- This figure shows the comorbidity profile of surgical deaths in individual hospitals.
- The profile appears similar across hospitals with cardiovascular, age and respiratory problems as the most frequent comorbidity reported.



2.4.3 Surgeon's perception of risk status

Treating surgeons are asked to record their perception of risk of death of their patient at the time of treatment.

Figure 27: Surgeon's perception of risk of death (n=718)

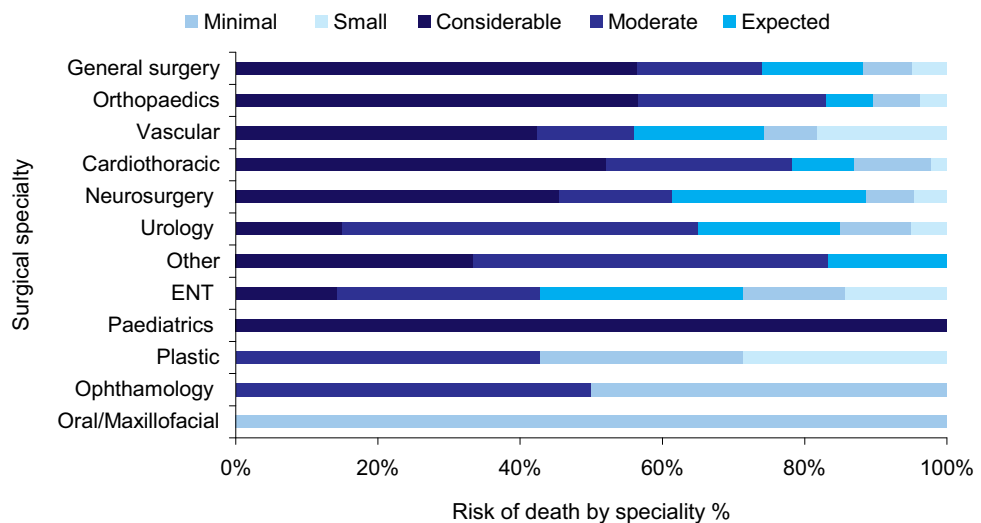


Note: Missing data n=178 (24.7%).

Comment:

- The treating surgeon assessed the risk of death as high (considerable, moderate or expected) in the majority of cases.
- The overall perception of risk of death by hospital as identified by surgeons is similar to the aggregate findings and reflective of the risk profile associated with the casemix of the individual hospital.
- This supports the high risk profile suggested by the mean age, ASA score and associated comorbidity.
- Note the high number of missing data.

Figure 28: Surgeon's perception of risk of death by surgical speciality (n=718)



Note: Missing data n=178 (24.7%).

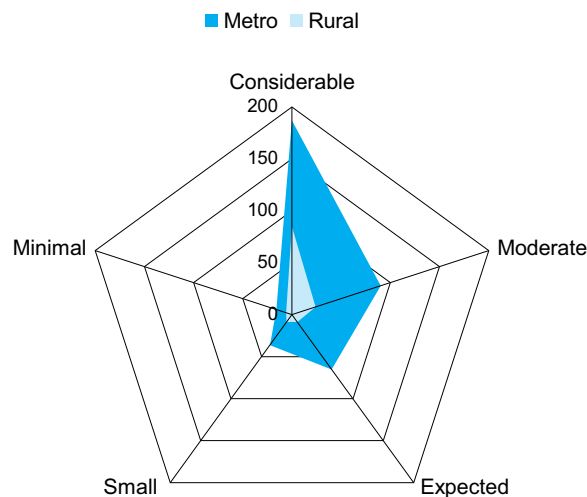
Comment:

- The surgeon's perception of risk of death by hospital is similar to the aggregate findings and reflective of the risk profile associated with the casemix of the individual hospital.



- 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, in cardiothoracic surgery, the perceived risk of death is based on the patient's profile where serious heart condition, and their poor health places them at greater risk of complications than people in good health.(7)

Figure 29: Surgeon's perception of risk of death by region (n=718)



Note: Missing data n=178 (24.7%).

Comment:

- The overall perceived risk of death of patients in this series is high. It was similar in rural and metropolitan regions.

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 risk of surviving their current illness.
- There were 644 (89.6%) patients with more than one pre-existing illness affecting their chance of recovery. The most frequent conditions cited were cardiovascular and respiratory.
- These findings are not surprising when we consider the high mean age of patients in the series.



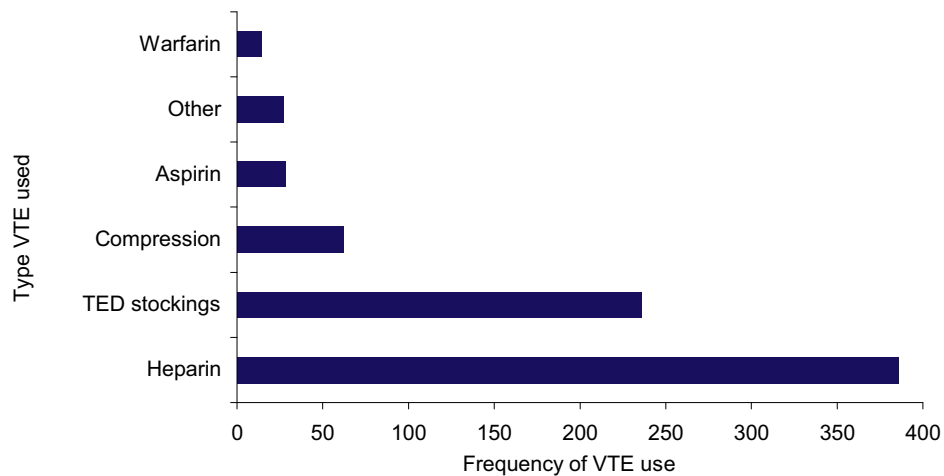
2.5 Risk management strategies

The following sections detail the risk minimisation strategies and appropriateness of provision of critical care support to audited cases.

2.5.1 Venous thromboembolism prophylaxis

The treating surgeon has to record if venous thromboembolism (VTE) prophylaxis was given and what type of prophylaxis was actually used.

Figure 30: Venous thromboembolism (VTE) prophylaxis use (n=478 in 718 cases)



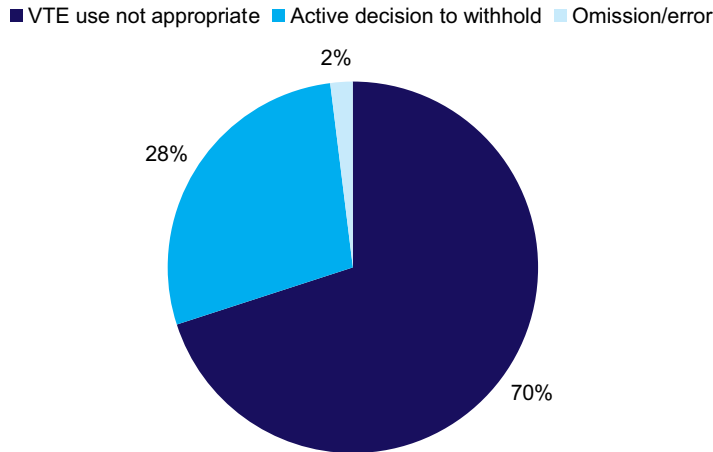
Note: Missing data n= 41 (5.7%). Don't know stated n=2 (0.3%).

Comment:

- Some form of VTE prophylaxis was recorded as being provided in 478 (66.5%) of 718 cases.
- Heparin was given in 386 (80%) of these 718 cases. The case record form does not record the type of heparin product used. Thrombo Embolic Deterrent (TED) stockings were provided in half the audited cases.
- VTE prophylaxis recorded in the Other category included calf stimulators, clexane, clopidogrel, enoxaparin, epidural, fragmin, full anticoagulation for Non-ST Segment Elevation Myocardial Infarction (NSTEMI), Inferior Vena Cava (IVC) filter, plavix on admission and infusion.
- Assessors felt that the prophylaxis actually provided to patients was inappropriate in only 11 (2.3%) of these 478 cases.



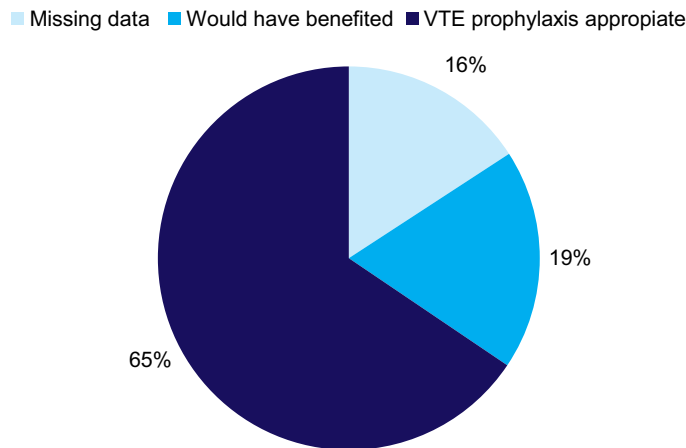
Figure 31: Reasons given (by treating surgeon) for not using VTE prophylaxis (n=197 in 718 cases)



Comment:

- 197 (28%) patients of the 718 received no prophylaxis. In the majority of these cases it was a conscious decision by the treating team. The inadvertent omission rate was low, n=3 (2%).

Figure 32: Assessor perception of appropriateness of decision to withhold VTE prophylaxis (n=135 in 718 cases)



Note: Missing data n= 41 (30.3%).

Comment:

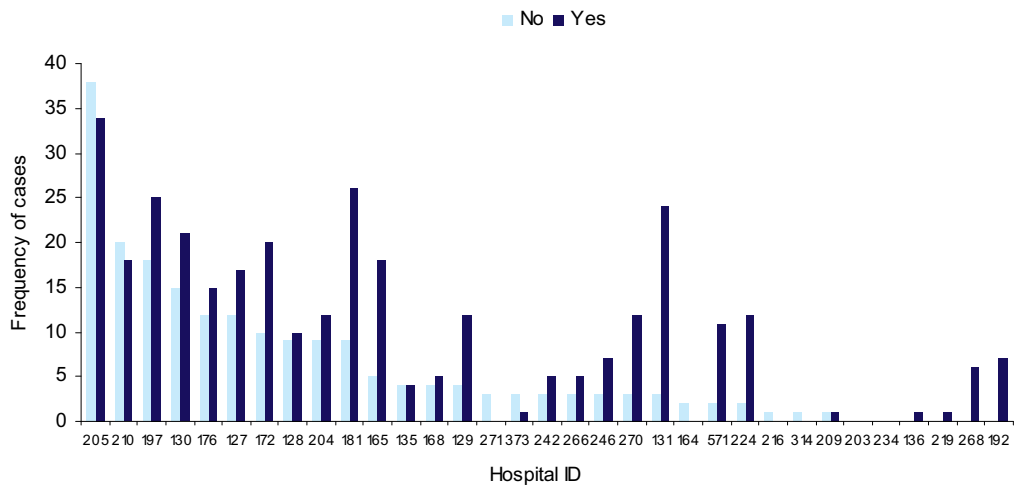
- Assessors are asked to comment on the appropriateness of VTE prophylaxis.
- The decision not to provide VTE prophylaxis was assessed as inappropriate in 135 (18.8%) of the 718 cases.
- In the 83 cases that underwent both First-Line Assessment (FLA) and Second-Line Assessment (SLA), the agreement between first and second-line assessors on appropriateness of VTE prophylaxis was only 'fair' (kappa score 0.25).



2.5.2 Provision of critical care support to patients

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

Figure 33: Provision of critical care support to patients by hospital (n=330 in 718 cases)

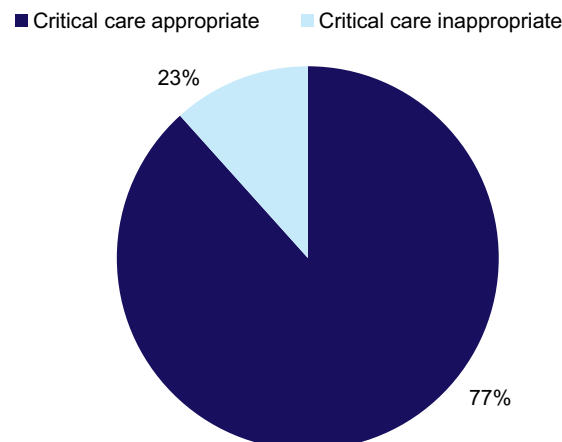


Note: Missing data n=189 (26.3%).

Comment:

- It should be acknowledged that not all hospitals have critical care facilities.
- Of the 718 audited cases, 330 (45.9%) received critical care support during their admission.
- Of the 718 audited cases, 199 (27.7%) did not receive treatment in a critical care facility.
- Note the high rate of missing data outlined above.

Figure 34: Assessor perception of appropriateness where critical care support was not provided (n=199 in 718 cases)



Comment:

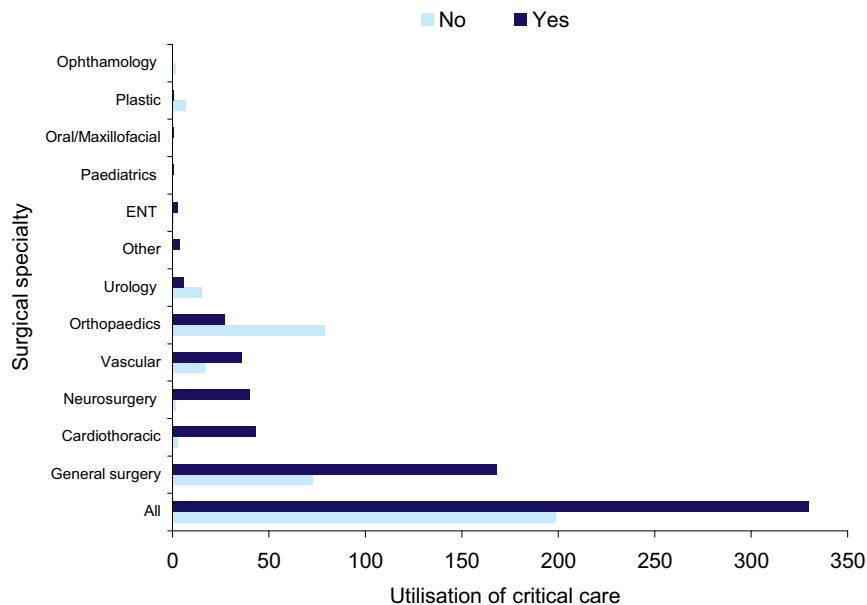
- The peer-review process concluded that in 46 (23.1%) of these 199 cases the patient might have benefited from critical care support. The distribution was similar across rural and



metropolitan areas.

- We do not have information on the reasons why patients did not receive critical care support.
- There are differences between the two assessment types as the second-line assessors had full access to the patient medical records while first-line assessors were relying on the surgical case record proforma completed by the surgeon in care of the patient.
- From a Melbourne-based Australian study, the use of critical care is prevalent in older patients having surgery [that] had high rates of comorbidities and postoperative complications, placing considerable demands on critical care services. Patient factors were often stronger predictors of mortality than the type of surgery.(8)
- Critical issues were also highlighted from the National Health and Hospitals Reform Commission’s 2009 report, which indicated that almost 20 per cent of older patients in public hospitals would be more appropriately cared for outside an acute hospital [due to] lack of appropriate post-acute care services, delays in the discharge process, delays in diagnostic tests, and delays in medical and other specialised consultations.(9)

Figure 35: Utilisation of critical care facilities by surgical speciality (reported n=330 in 718 cases)



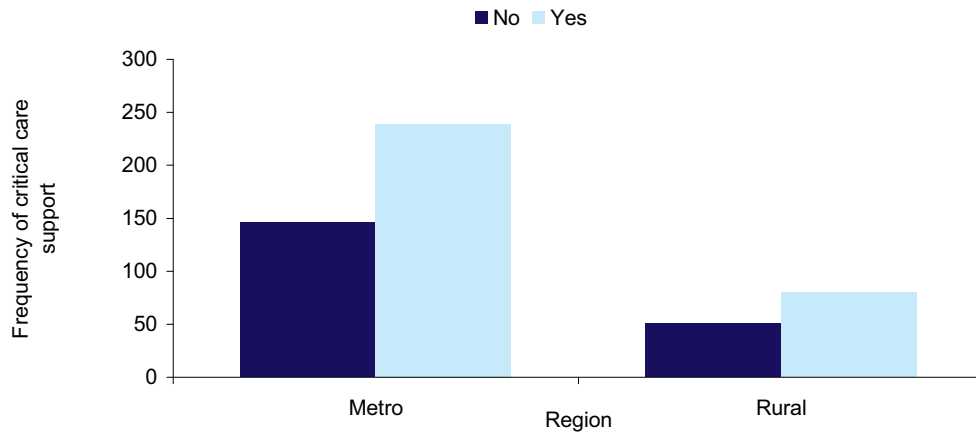
Note: Missing data n=189 (26.3%).

Comment:

- Orthopaedic cases have low referral rates to critical care facilities. This may be because of the high number of elderly patients with a fractured neck of the femur from high level care institutions being seen as inappropriate for critical care support.



Figure 36: Provision of critical care support to patient by region (n=330 in 718 cases)

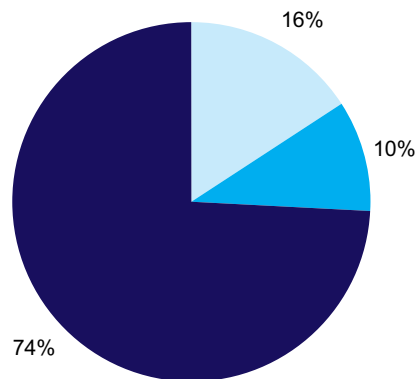


Comment:

- The above graph shows no significant difference in the provision of critical care support between metropolitan and rural regions.
- The provision of critical care support between metropolitan and rural regions was 62.2% versus 61.1% respectively, $p=0.812$.

Figure 37: Fluid balance appropriateness (n=533 in 718 cases)

Missing Fluid balance inappropriate Fluid balance appropriate



Comment:

- Of the 718 cases that have available data and completed the peer-review process, 533 (74.2%) reported no issues of fluid balance management.
- Fluid balance was assessed as inappropriate in 72 (10.0%) of the 718 cases.
- The fluid balance appropriateness comparison agreement between First-Line Assessor (FLA) and Second-Line Assessor (SLA) was poor (45.9%, with a kappa score of 0.13).



Key points

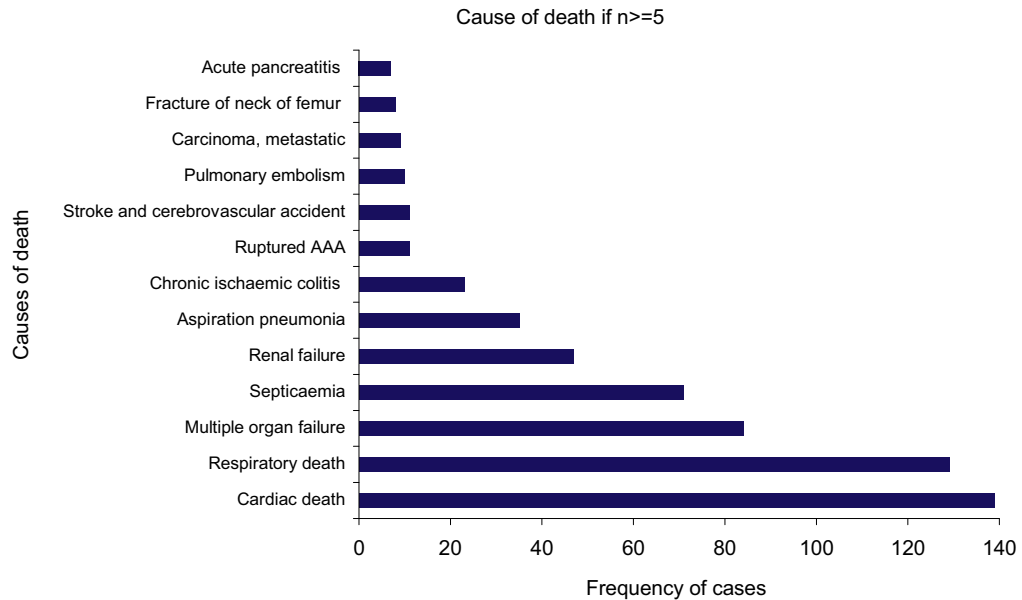
- **It is important that surgical patients receive VTE prophylaxis where appropriate. 478 (66.5%) of 718 patients did receive prophylaxis. In 3 (2%) of these cases, the assessor felt that what was provided was inadequate.**
- **In the 197 (27.4%) instances where prophylaxis was intentionally withheld by the clinical team, the assessors disagreed with the decision in two thirds of cases.**
- **It seems that VTE prophylaxis is still not routinely provided to all appropriate patients.**
- **In the majority of instances, those patients perceived to benefit from critical care support received it. The review process felt that 46 (23%) of those who did not receive support in a critical care unit might have benefited from it. The information available does not allow us to comment on the availability of critical care facilities in Victoria.**



2.6 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.

Figure 38: Frequency of reported causes of death (n=918 in 718 cases)



Note: Missing data n=57 (7.9%).

Comment:

- There were 918 conditions perceived to be responsible for death recorded in 718 cases.
- Cardiac failure 139 (19.4%), respiratory failure 129 (18.0%), multiple organ failure 84 (11.6%), and septicaemia 71 (9.8%) were most frequently cited. These conditions accounted for 423 (58.9%) of deaths in this series.
- A further 398 other conditions, felt to be responsible for death, were reported. As the individual frequencies of each was less than five they have not been listed.
- In 2008, a study carried out by the Australian Commission on Safety and Quality in Health Care reported that acute sepsis-related factors were most important in contributing to the probability of early death.(10)

2.6.1 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 post-mortem examination may be requested. This latter method of confirming cause of death is requested with decreasing frequency.

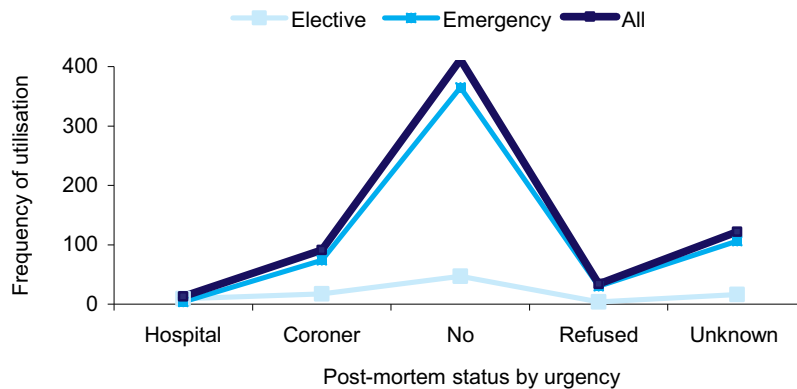
Key points

- **There were 918 conditions perceived to be responsible for death recorded in 718 cases.**
- **Cardiac failure 139 (19.4%), respiratory failure 129 (18.0%), multiple organ failure 84 (11.6%), and septicaemia 71 (9.8%) were most frequently cited. These conditions accounted for 423 (58.9%) of deaths in this series.**



2.7 Post-mortem rate

Figure 39: Post-mortem utilisation by urgency status (n=105 in 718 cases)



Comment:

- The number of post-mortems performed, including coronial ones, is very low at 105 (14.6%) instances in 718 cases. This figure is concerning, as post-mortems can provide educational information and valuable insights.
- The provision of critical care support between metropolitan and rural regions was similar, 62.2% and 61.1% respectively, $p=0.812$
- The pattern of referral to the coroner or request for post-mortem is similar for elective and emergency admissions.
- The post-mortem rates in Victoria are similar to other states and Scottish findings.(11)
- There is no difference by hospital or region in referral pattern by admission type.
- The majority of post-mortems were coronial and occurred in deaths associated with emergency admissions.

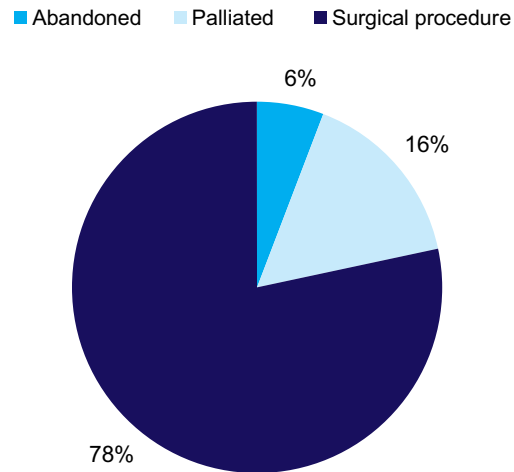
Key points

- **Cardiac failure and respiratory failure are cited as the most frequent causes of death. This is congruent with the risk profile described for this series of patients.**
- **These reasons for death are based on the clinical course to death.**
- **The low rate of post-mortems does not allow confirmation of these diagnoses.**



2.8 Profile of operative procedures

Figure 40: Operative procedures performed (n=748 procedures in 718 patients)



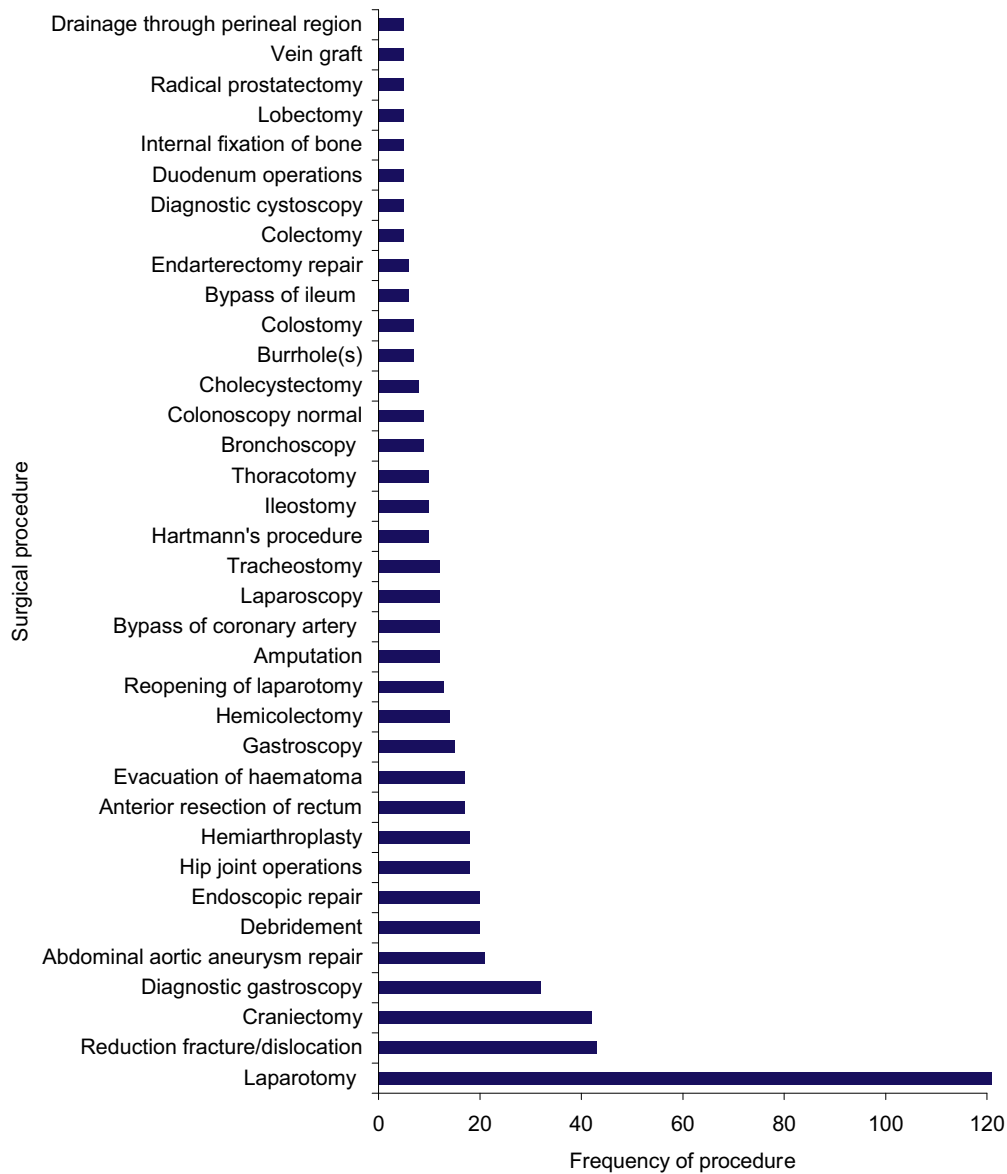
Note: Missing data n=20 (2.7%).

Comment:

- No surgical procedure was performed in 41 (5.7%) of 718 audited deaths.
- Deaths where no procedure occurred were mainly patients admitted as an emergency and were associated with an 'active' decision not to operate.
- From a Queensland-based Australian study, it was identified that many patients are still being subjected to unnecessary investigations and interventions in the last days of life and the reluctance on the part of many doctors and patients to accept palliative care reflects a natural desire to avoid death.(12)
- In the 2009 report by Palliative Care Australia, it was identified that evidence suggesting that advance care planning is best initiated before the person becomes acutely unwell (13) when it comes to providing quality care at the end of the patient's life.



Figure 41: Frequency of surgical procedures (if n>=5) reported in 718 audited cases

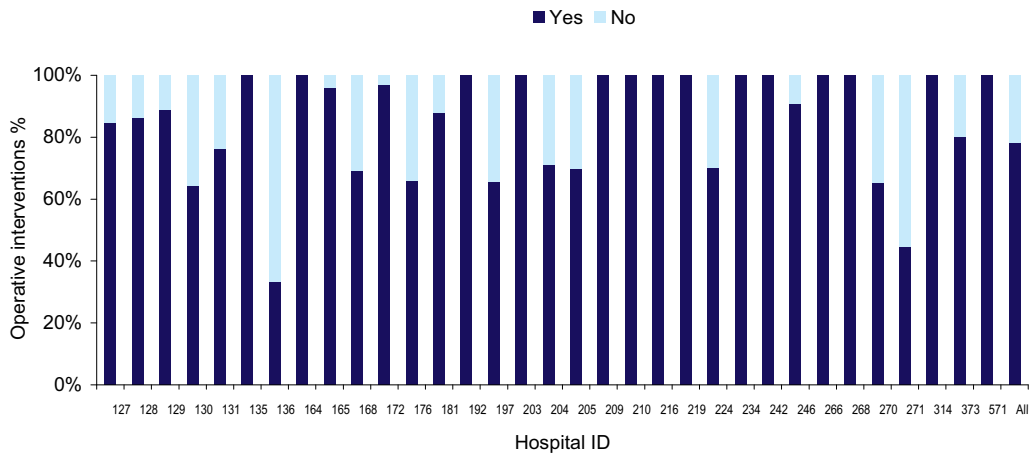


Comment:

- A patient can undergo multiple procedures during the same admission and at the same surgical session.
- Only procedures with a frequency > 5 are recorded here. There were also 299 'Other' procedures recorded.
- The most frequent procedures reported are usually associated with emergency admission for trauma or acute abdominal pathology.



Figure 42: Frequency of operative intervention by hospital (n=748 in 718 cases)

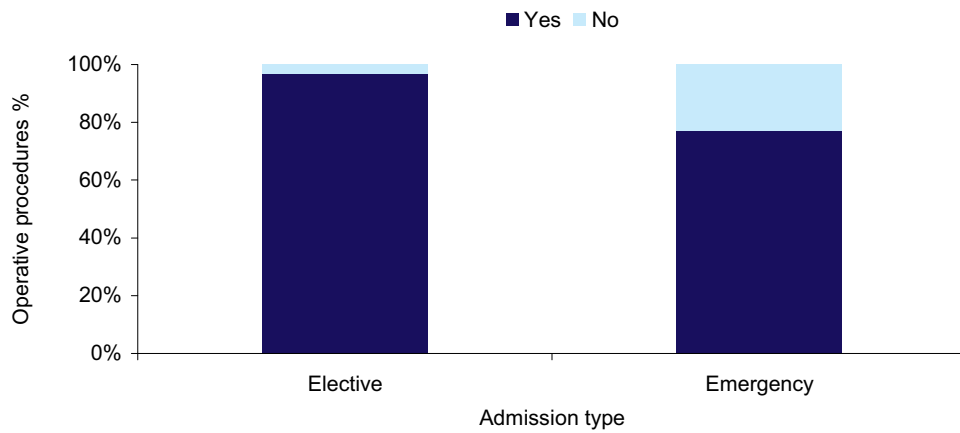


Note: Missing data n=49 (6.5%). 'Don't know' stated by surgeon n=4 (0.5%).

Comment:

- This figure reflects the general distribution of operative interventions by hospital in the aggregate data.

Figure 43: Operative procedures by urgency type (n=748 in 718 cases)



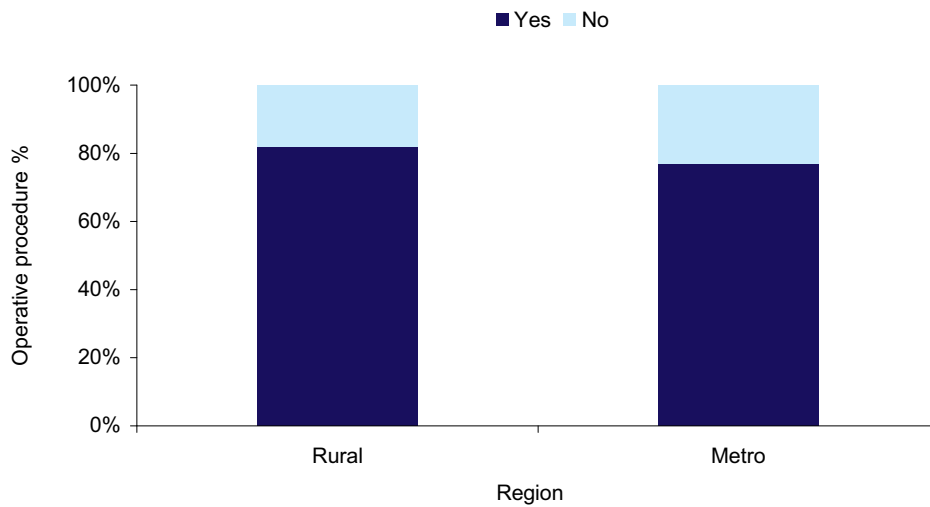
Note: Missing data n=49 (6.5%). 'Don't know' stated by surgeon n=4 (0.5%).

Comment:

- Not all elective admissions in the series underwent surgery.
- The use of conservative (non-operative) approaches to management has been greater in emergency admissions.



Figure 44: Operative procedures by region (n=748 in 718 cases)

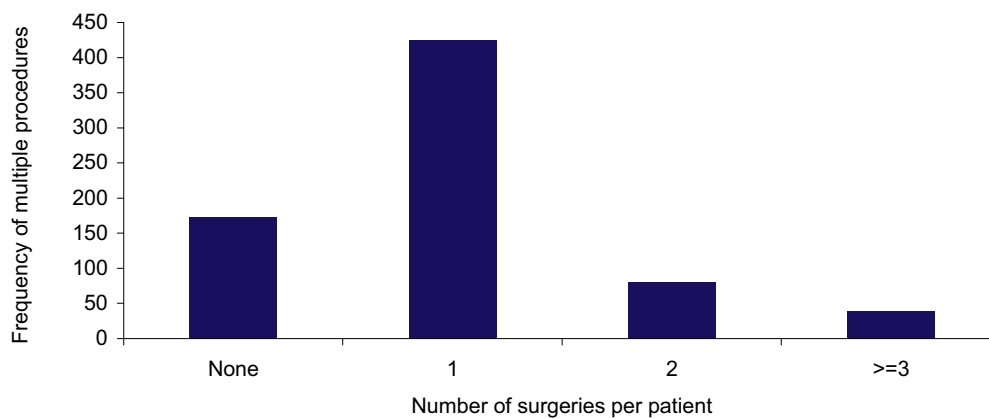


Note: Missing data n=49 (6.5%). 'Don't know' stated by surgeon n=4 (0.5%).

Comment:

- The frequency of surgical intervention was 546 (76%) overall, with no significant differences between metropolitan and rural regions, 410 (57.1%) and 136 (18.9%) respectively.

Figure 45: Frequency of multiple operative procedures (n=748 in 718 cases)

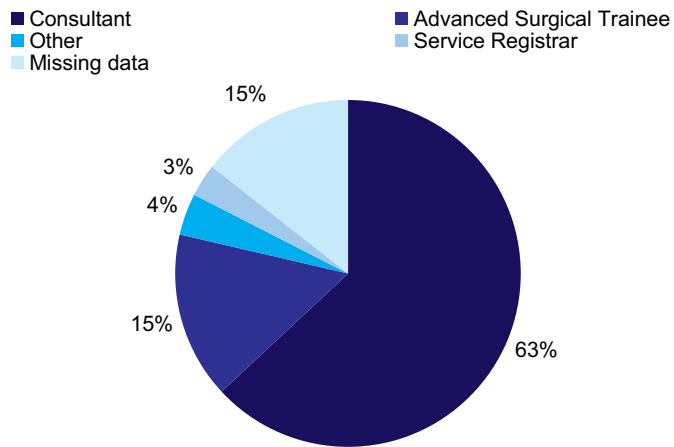


Comment:

- Only one surgical procedure was performed in 425 (59.1%) of the 718 audited cases. Multiple procedures were reported in 120 (16.7%) patients.



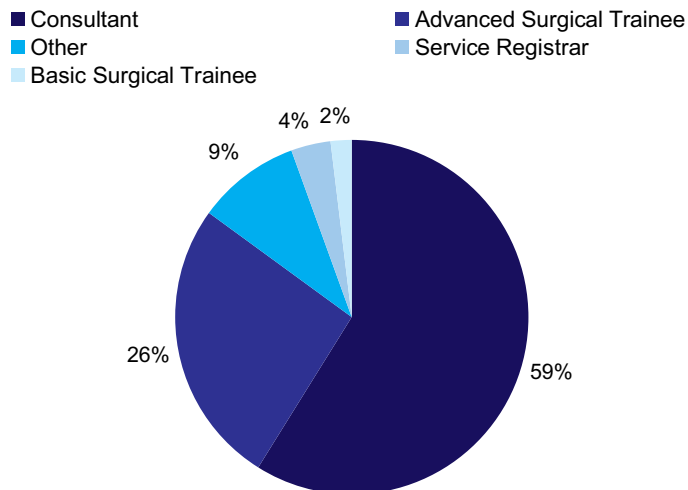
Figure 46: Seniority of surgeons performing surgery (n=748 in 718 cases)



Comment:

- The majority of operative procedures were performed by a consultant surgeon 475 (63.5%). This bias towards consultants is appropriate when the risk profile of the audited cases is considered.
- A consultant anaesthetist was present in 603 (83.9%) of the 718 cases (data not shown).

Figure 47: Seniority of surgeons performing unplanned procedures during same admission (n=95 in 718 cases)



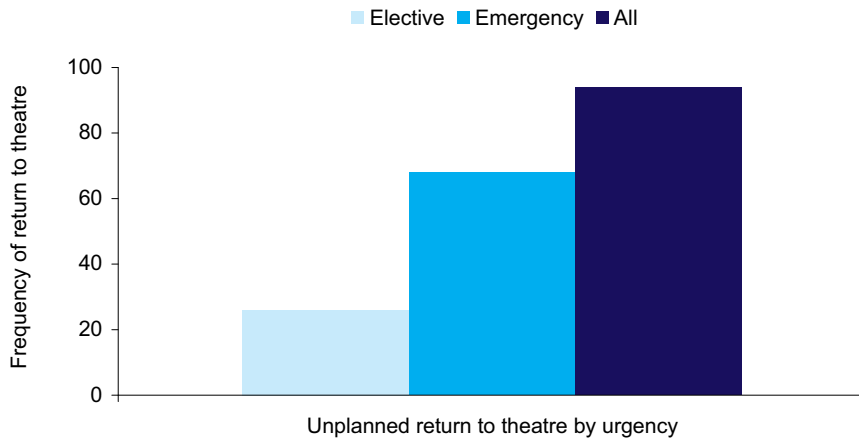
Comment:

- There was an unplanned return to the operating room in 95 (13.2%) of the 718 audited cases. The consultant performed 56 (58.9%) of these 95 operations and 25 (26.3%) were done by an Advanced Surgical Trainee (AST).
- Perhaps in this high risk group of patients, consultant presence should have been higher in especially unplanned returns to the operating theatre.
- In 120 of the cases where additional surgery was required, the seniority of surgeons performing the surgery was similar 75 (62.5%) with 13 (10.8%) being performed by advanced surgical trainees. Subsequent surgery data not shown in this graph.



2.8.1 Unplanned return to operating room

Figure 48: Unplanned return to the operating room by urgency status (n=95 in 748 operations)

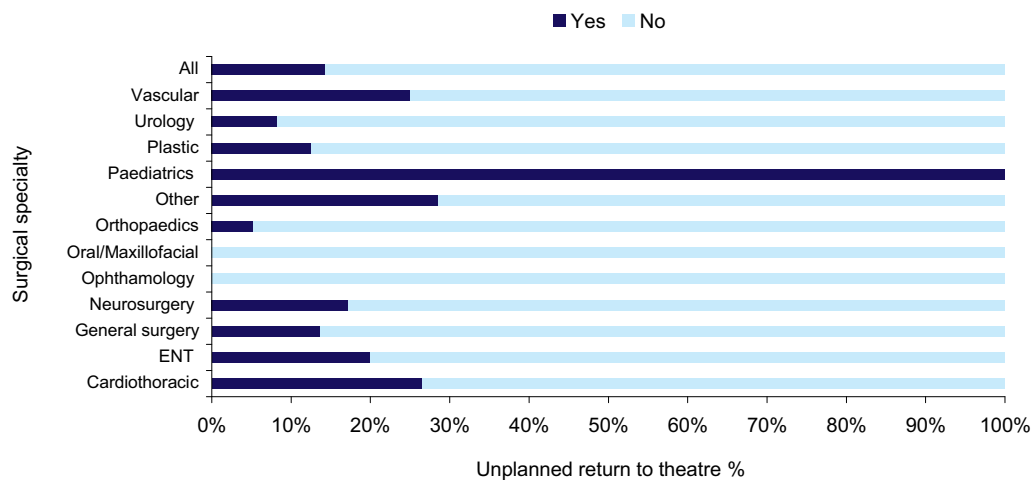


Note: Missing data n=49 (6.5%). 'Don't know' stated by surgeon n=4 (0.5%).

Comment:

- An unplanned return to the operating room was reported in 95 (13.2%) of 718 audited cases.
- The frequency of unplanned return to the operating room was similar for emergency and elective admissions. Data points are not shown in this graph.
- As shown in figure 49, consultant presence was lower at these procedures. We do not know the magnitude of these procedures but perhaps consultant presence should have been higher. Similar consultant involvement for unplanned returns was noted in early audits of the Scottish Audit of Surgical Mortality (SASM). Subsequent audits showed a reversal of the trend.(11)

Figure 49: Unplanned return to the operating room by surgical speciality (n=95 of 748 operations)



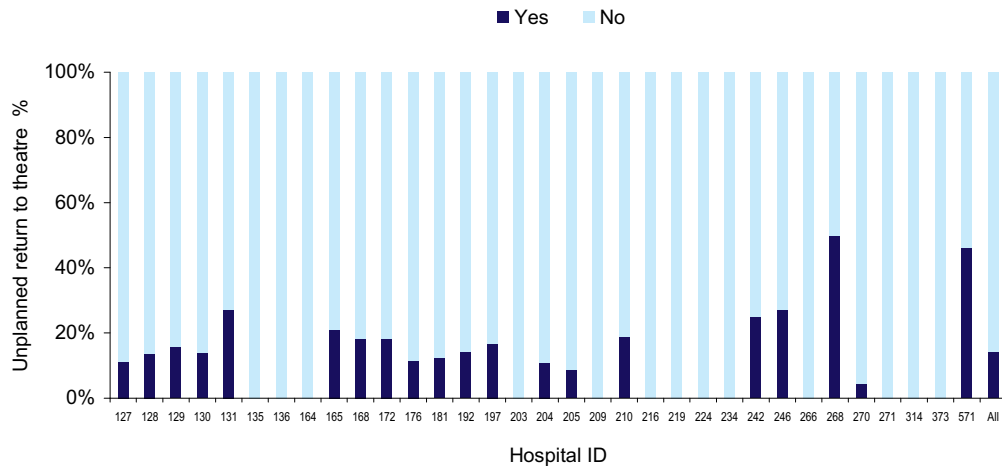
Note: Missing data n=49 (6.5%). 'Don't know' stated by surgeon n=4 (0.5%).

Comment:

- The proportion of unplanned returns to the operating room varied among specialities. The numbers are small, especially in paediatric surgery, and no inference is made.



Figure 50: Unplanned return to the operating room by hospital (n=95 of 748 operations)

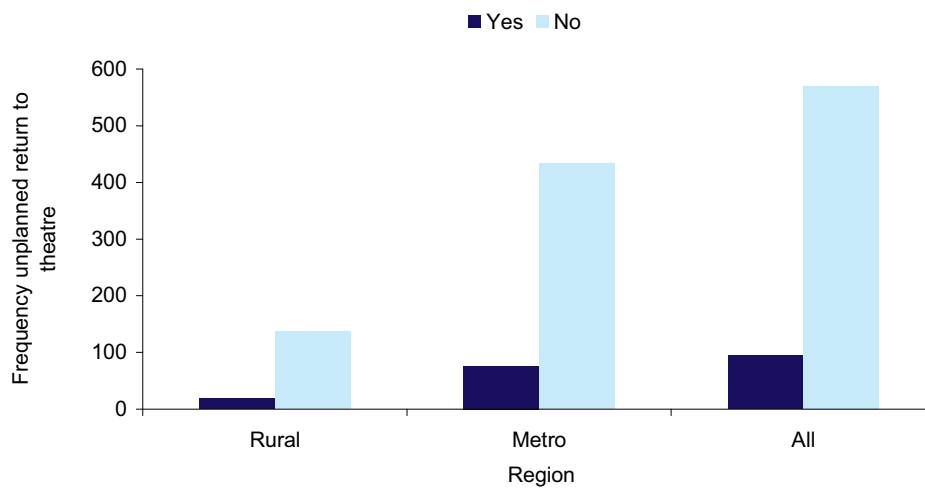


Note: Missing data n=49 (6.5%).

Comment:

- The numbers are small and no inference is made.

Figure 51: Unplanned return to the operating room by region (n=95 in 748 operations)



Note: Missing data n=49 (6.5%). 'Don't know' stated by surgeon n=4 (0.5%).

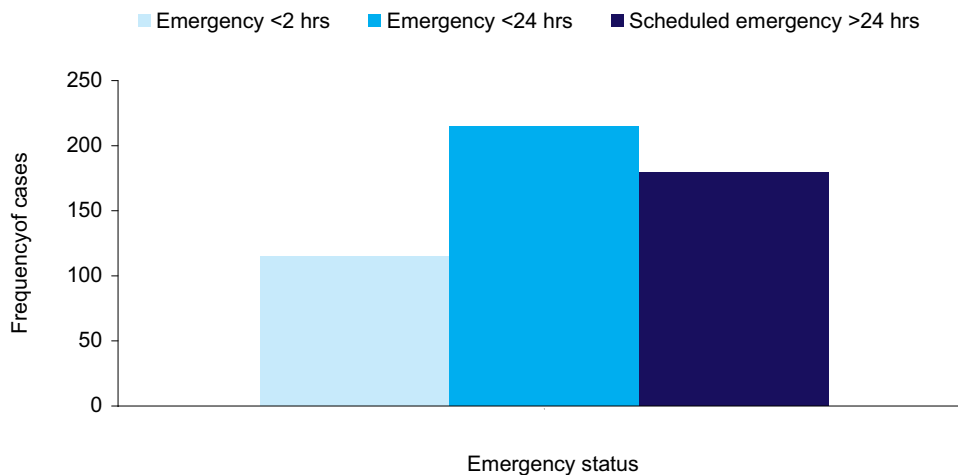
Comment:

- There were no major differences for unplanned return to the operating room in rural and metropolitan regions. In the metropolitan area, 592 operations were reported with 76 (12.8%) of these being an unplanned return to the operating room. In the rural area, 156 operations were reported with 19 (12.1%) of these being an unplanned return to the operating room.



2.8.2 Timing of emergency procedures

Figure 52: Timing of operative procedures in emergency admissions (n=509 in 718 cases)



Comment:

- The time criticality of a patient's condition predicts the timing of emergency surgery. Of 509 emergency admissions, 115 (22.5%) had surgery within 2 hours of admission, 215 (42.2%) had surgery within 24 hours and 179 (35.1%) after 24 hours.
- This means 330 (64.8%) of the 509 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 is an increasing issue for hospitals.
- According to a 2009 report findings on the status of Australian public hospitals, the majority of emergency surgery is carried out in public hospitals (87%) with nearly 223,000 procedures provided on an emergency basis in 2007 to 2008.(14)

Key points

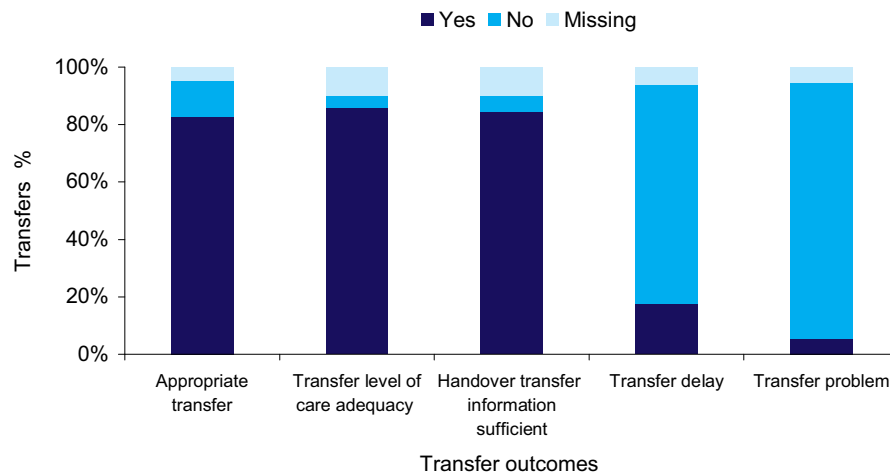
- **Of the 748 episodes of surgery in 718 patients there were 887 procedures.**
- **There was an unplanned return to theatre in 95 (13.2%) patients. Consultant presence at these and the other planned returns to the operating room was lower than the initial episode. Perhaps in this group of patients, consultant attendance should have been higher.**



2.9 Patient transfer issues

The treating surgeon is asked to provide information on patients who required inter-hospital transfer as part of their care. This includes timeliness and appropriateness of transfer.

Figure 53: Aspects of care relating to patients requiring transfer to another hospital (n=149 in 718 cases)



Comment:

- There were 149 instances where patients required transfer to another hospital. The reasons for transfer are not recorded.
- In 123 (82.5%) of the 149 cases, transfer procedures were deemed to be appropriate.
- In 128 (85.9%) of the 149 cases, appropriate levels of care during the transfer were confirmed.
- In 126 (84.5%) cases, it was felt that adequate clinical hand over had been provided to the receiving hospital.
- In 86 cases (57.7%), it was felt that transfer had occurred inappropriately late in the patient's management.
- Transfer problems included multiple comments and this category was not structured to identify specific issues.
- Delay in transfer to a surgical unit was also highlighted in a British study where the travel time between the nearest hospital and the survival rate of a patient with ruptured abdominal aortic aneurysm was detrimental with only those who were relatively stable and thus survived transit. (15)

Key points

- **The major criticism associated with the patient transfer was delay in appreciating the need to transfer to a major centre.**



2.10 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. First-line assessment (FLA) have been completed in 718 cases. Each first-line assessor had to decide if the treating surgeon had provided enough information in the case record form to allow them to reach a conclusion. If inadequate information was provided then the first-line assessor requests a second-line assessment (SLA) or case note review. Other triggers for requesting second-line assessment are:

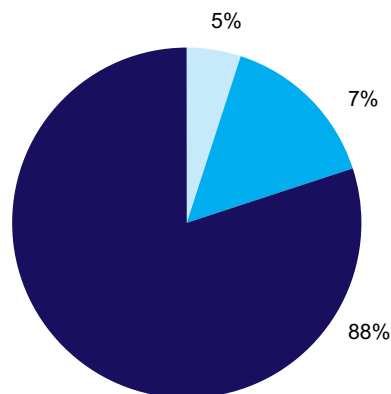
- More detailed review of the case, which could better clarify events leading up to death and any lessons emanating from the case under review.
- Unexpected death, for example in a young, fit patient with benign disease or a day surgery case.

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

2.10.1 Second-line assessments

Figure 54: Referral for second-line assessment (n=83 in 718 cases)

- Second-line review required due to insufficient information
- Second-line review required for further investigations
- Second-line review not required

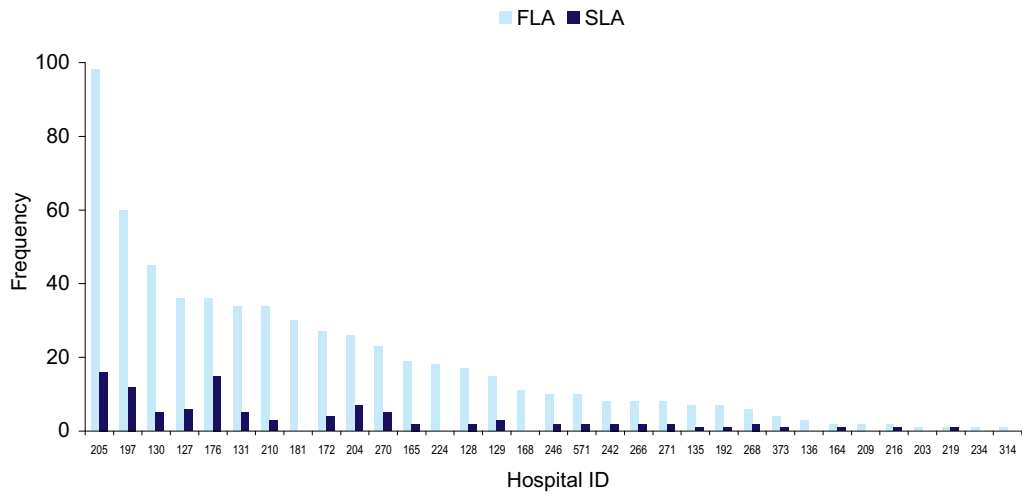


Comment:

- Second-line assessment was only requested in 83 (11.5%) of the 718 audited cases. This rate is similar to other states.
- Lack of information was the trigger for second-line assessments in 35 (4.9%) of these 718 cases.
- In a further 48 (6.7%) cases, the first-line assessor felt the information provided was disappointing but did not impede their decision making. Data not shown in this graph.
- Cases with an ASA >4 were more likely (p-value 0.001) to be referred for case note review (second-line assessment). Data not shown in this graph.



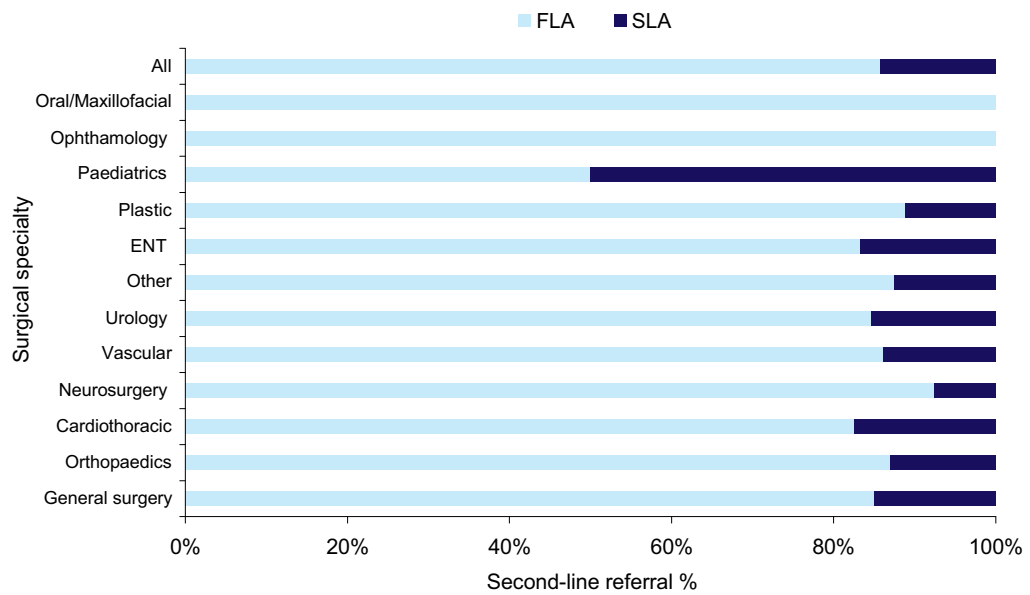
Figure 55: Frequency of need for second-line assessment in individual hospitals (n=83 in 718 cases)



Comment:

- The frequency of case referral for second-line assessment was similar among hospitals.

Figure 56: Frequency of need for second-line assessment among surgical specialities (n=83 in 718 cases)

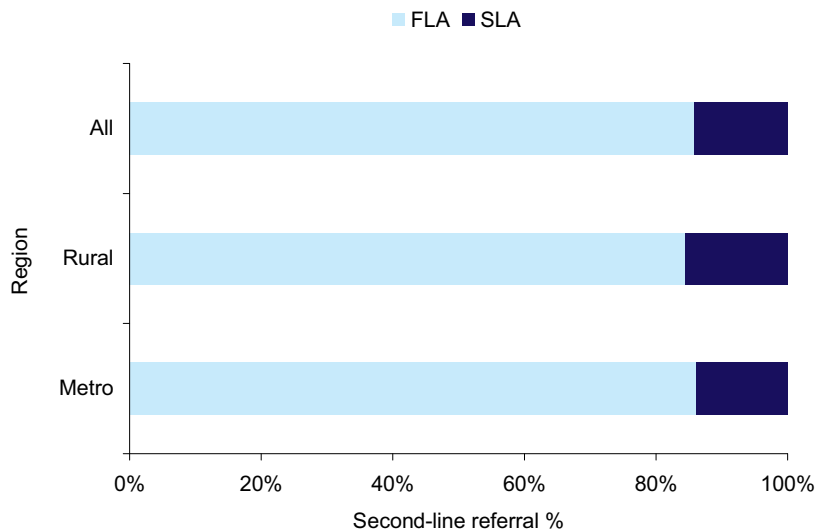


Comment:

- The need for second-line assessment was similar among the specialities. The very small number of audited paediatric deaths does not allow us to draw any inferences.



Figure 57: Frequency of need for second-line assessment by region (n=83 in 718 cases)



Comment:

- The need for referral for second-line assessment is similar in metropolitan and rural regions.

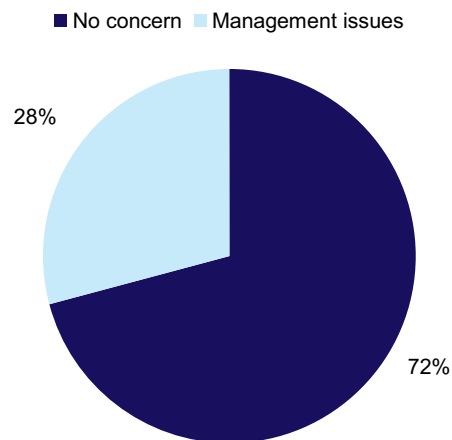
2.10.2 Clinical management issues

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. Where 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: This is where 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 58: Clinical management issues (n=200 in 718 cases)

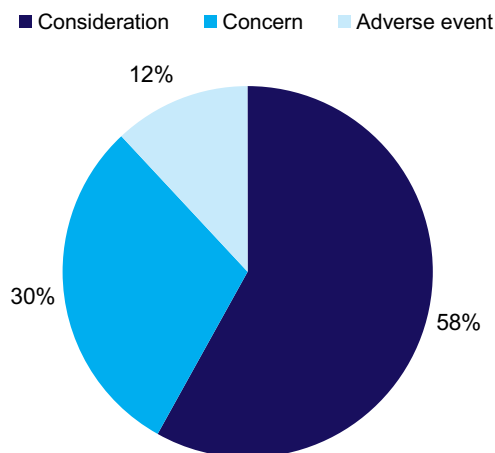


Note: Missing data n=43 (5.9%).

Comment:

- In 518 (72.1%) of the 718 cases that completed the audit process, no issues of patient management were perceived.
- 424 clinical management issues were perceived in 200 cases.

Figure 59: Spectrum of clinical management issues (n=424 in 200 cases)

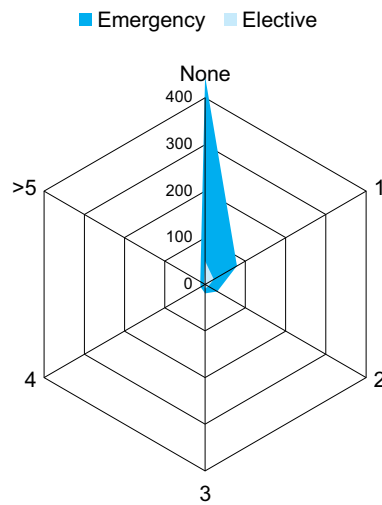


Comment:

- The majority of the issues raised were areas of consideration 245 (58%).
- In 50 (11.8%) of the 424 clinical issues, assessors felt these were serious enough to be called adverse events.
- 50 (11.8%) adverse events of the 424 management issues were perceived to have occurred in 33 (4.5%) patients of the 718 audited cases.
- 128 (30.1%) areas of concern of the 424 management issues were suggested in 50 (6.9%) patients of the 718 audited cases.
- The agreement between first and second-line assessor on degree of criticism was poor (kappa score of 0.11). This is perhaps not surprising as the second-line assessor had the opportunity to review the hospital case record whereas the first-line assessor had more limited information on which to judge.
- Prevalence of issues raised by assessors in rural and metropolitan regions was similar (data not shown).



Figure 60: Number of clinical management issues by admission type (n=424 in 200 cases)

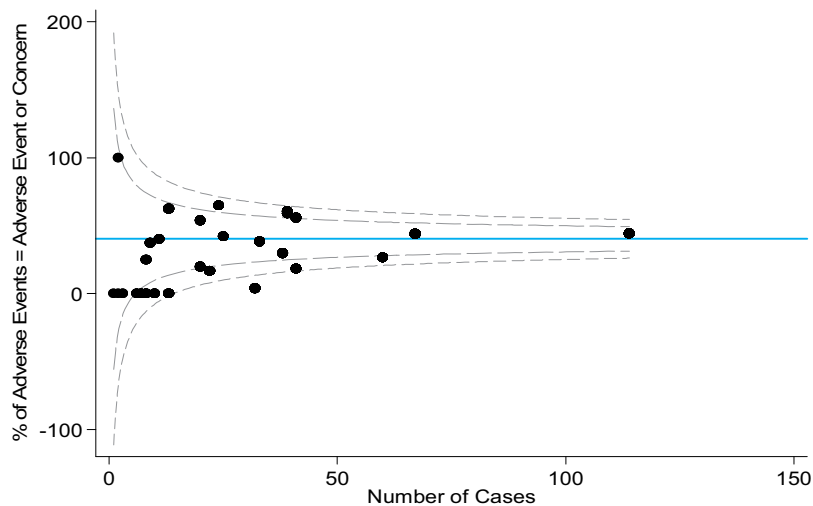


Note: Missing data n=1 (0.2%).

Comment:

- In 518 (72.1%) of the 718 audited cases, no issues of clinical management were identified.
- In patients who had at least one clinical management issue identified, 22.5% were elective admissions and 77.6% were emergency admissions, $p < 0.001$.
- The frequency of detection of clinical issues was similar in rural and metropolitan regions, 30.6% versus 27.3% respectively ($p = 0.412$).

Figure 61: Adverse events and areas of concern by hospital (n=424 in 200 cases)

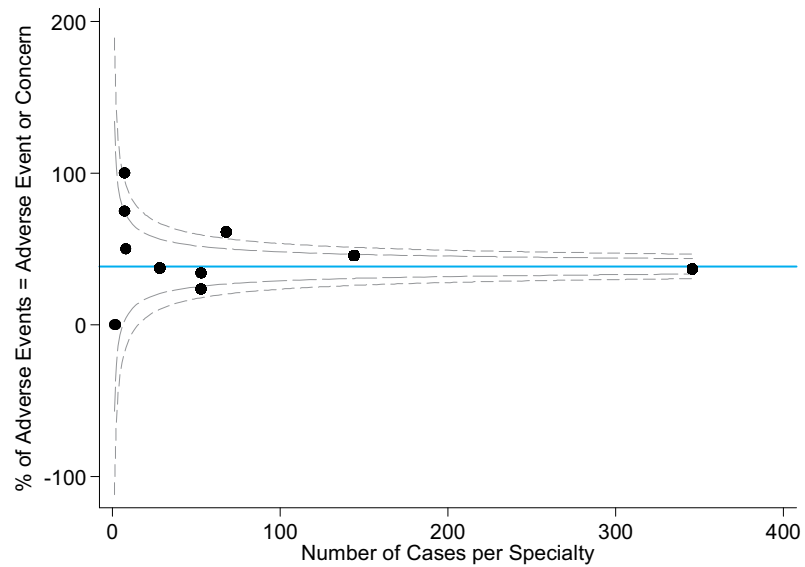


Comment:

- Nine hospitals are below the lower 2 Standard Deviation (SD) limit, while one hospital is below the lower 3 SD limit indicating good performance.
- Four hospitals are above the upper 2 SD limit, while none are above the upper 3 SD limit.
- If an assessor flags an area of concern or adverse event this implies significant criticism. In this funnel plot we have combined these to look at the prevalence of this degree of criticism among hospitals. However, as numbers are small no inference is made.



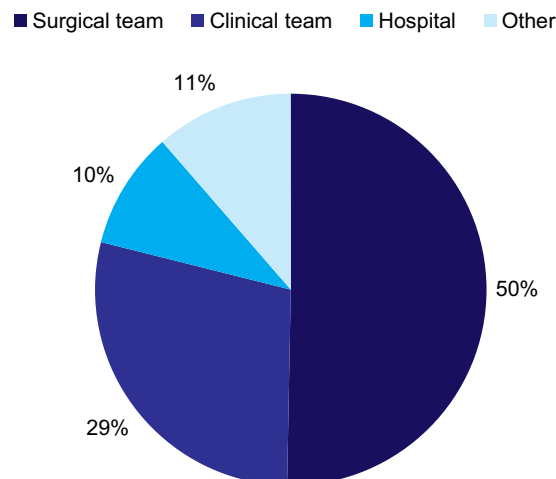
Figure 62: Adverse events and areas of concern by surgical speciality (n=424 in 200 cases)



Comment:

- If an assessor flags an area of concern or adverse event this implies significant criticism. In this funnel plot we have combined these to look at the prevalence of this degree of criticism among surgical specialties.
- One specialty is below the lower 2 SD limit.
- One specialty is on and one clearly above the upper 3 SD limit, suggesting a higher proportion of adverse events or concern than other specialties. However, both of these specialties currently have small numbers available for analysis.

Figure 63: Attribution of responsibility for clinical management issues (n=424 in 200 cases)

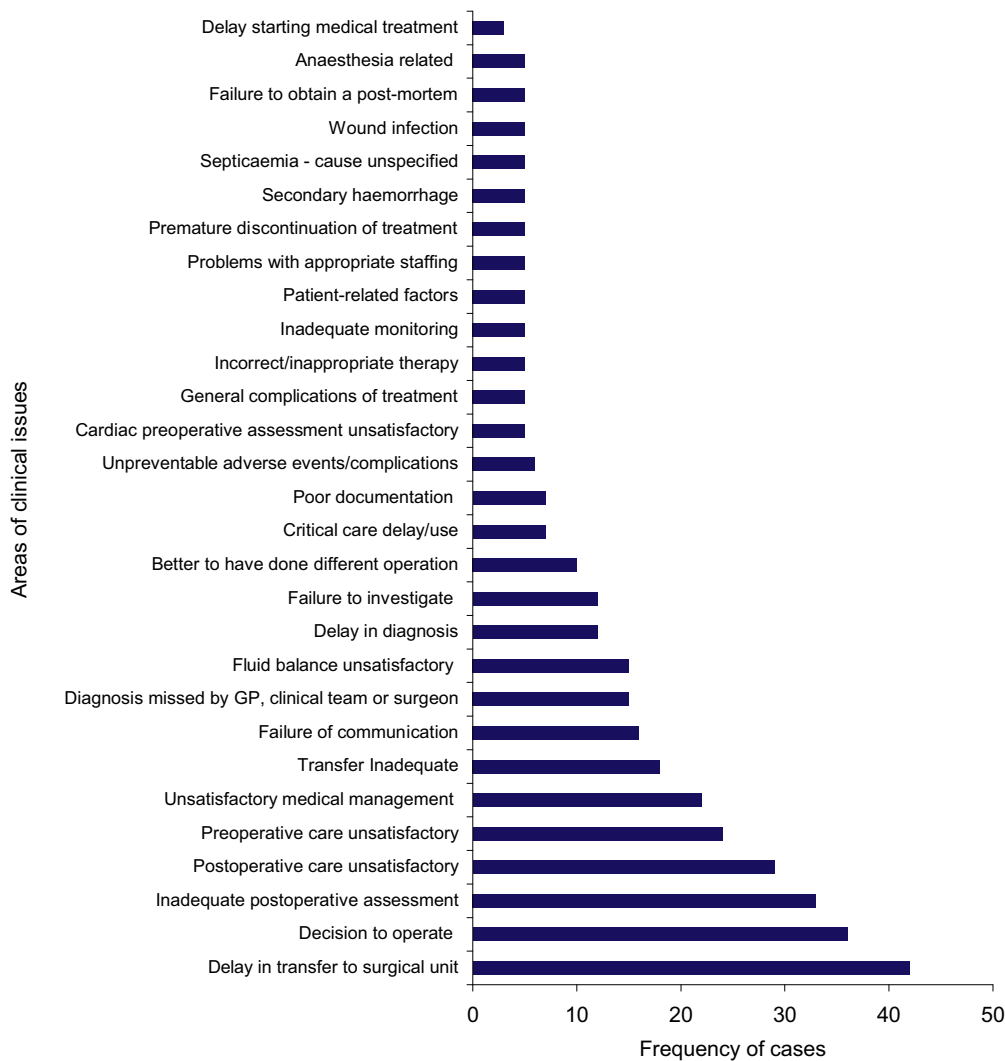


Comment:

- Patients may require input from clinical teams other than surgery during their course of treatment. Management issues raised may therefore be attributable to any of these teams.
- Half of the issues identified were attributed to the surgical team. Another 121 (29%) were attributed to other clinical teams for example, medical and emergency department.
- The Hospital and Other categories are not well defined and overlap. They include issues such as staffing levels, patient transfer issues, the availability and quality of critical care support and anaesthetic care.



Figure 64: Frequency of specific clinical issues of management (n=424 in 200 cases)

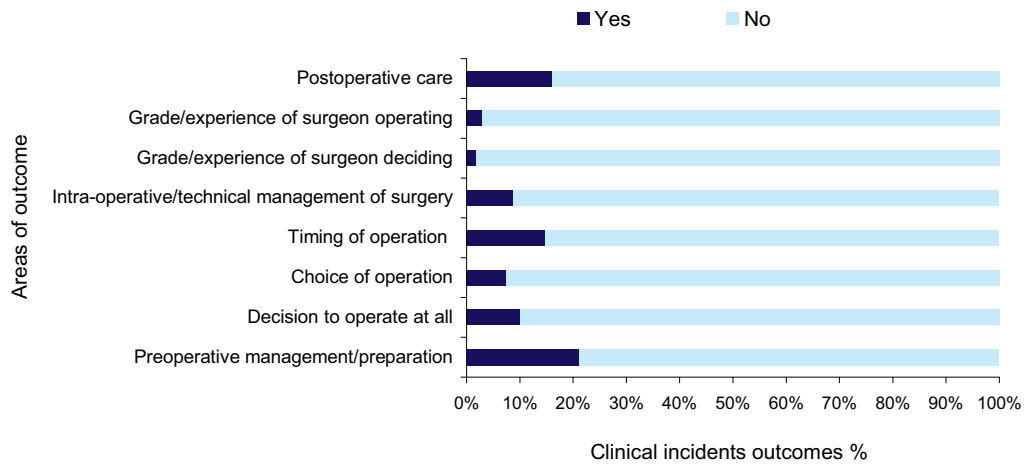


Comment:

- In addition to simply identifying if a management issue occurred, assessors have to indicate at what phase of patient management these occurred.
- The most common issues reported were delay in transfer to a surgical unit 42 (9.9%), inappropriateness of the decision to operate 36 (8.5%) and unsatisfactory pre or postoperative assessment of patients 86 (20.4%). It should be acknowledged that a number of these were 'areas of consideration' and therefore relatively minor criticisms.
- In the 2009 WAASM report, patient delay was due to a number of issues such as incorrect initial diagnosis and difficulty in accessing an operating room or Intensive Care Unit (ICU).(4) Similarly, in the 2008 SAAPM report, delays in treatment included factors such as delays in diagnosis, access to radiology and timing of surgery.(5)



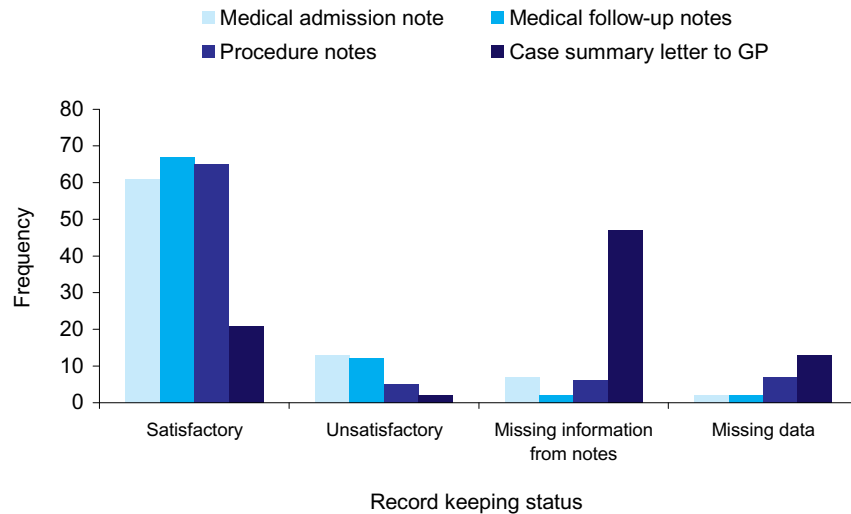
Figure 65: Clinical incidents outcomes (n=718 cases)



Comment:

- This section was difficult to interpret due to missing data; on average 119 (16.5%) data points were missing for each question.
- Of the 718 audited cases where the audit process was completed and data had been provided, assessors identified that the most frequent management issues were preoperative management/preparation 110 (15.3%) cases, postoperative care 78 (10.8%) cases and the timing of operation 74 (10.3%) cases.

Figure 66: Information provided by case record (n=83 of 718 cases)



Comment:

- Second-line assessors are asked to comment on the adequacy of the hospital case record.
- In 32 (38.5%) of 83 second-line assessments, at least one aspect of the medical notes was deemed unsatisfactory. These included poor follow-up records and unsatisfactory description of surgical procedure.
- 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 over the hours and days of a patient's stay in hospital is exacerbated by poor and inaccurate clinical notes.



Key points

- A case note review (SLA) was deemed necessary to clarify events leading to the clinical outcome in 83 (11.6%) of 718 audited cases. In 35 (4.8%) of the audited cases, the inadequacy of information provided by the treating surgeon was the trigger for further review.
- The need for second-line assessment was similar across hospitals, surgical specialties and metro and rural regions.
- In 518 (71.2%) of the 718 audited cases, no issues pertaining to the clinical management of patients were identified.
- The review process perceived that faults in the clinical management, serious enough to be called adverse events, had occurred in 33 (4.5%) of the audited cases. These were felt to be preventable in 5 (0.7%) of the 718 cases and have contributed to the likelihood of death in 4 (0.6%). The five adverse events were attributed to the individual treating surgical units. In a further two instances hospital-wide issues were attributed to the outcome. In all cases detailed feedback has been provided directly to the relevant treating surgeons.
- Adverse event and area of concern are at the higher end of the spectrum of criticism applied by the peer-review process. We have combined these in funnel plots to look for outlier performance among individual hospitals and surgical specialties. As study numbers are still relatively low for this analysis, no inferences are possible. This may be possible in future years.

The Victorian Audit of Surgical Mortality (VASM) is established as a quality management initiative for the healthcare community. This initiative is modelled from an 'outcomes research, evidence-based medicine or comparative effectiveness research,' which began to reshape the field of both medicine and surgery.(16)



Table 2: Clinical incidents (n=424 in 718 cases)

Clinical incidents	Total occurrences (n)	Patients affected by clinical management (n)
No clinical management issues perceived	518	0
Degree of criticism expressed	Clinical management issues (n)	Patients affected by clinical management (n)
Area of consideration	245	117
Area of concern	128	50
Area of adverse event	50	33
Missing data	1	0
Perceived impact on outcome	Clinical management issues (n)	Patients affected by clinical management (n)
Did not affect clinical outcome	88	37
May have contributed to death	299	140
Probably contributes to death	35	22
Missing data	2	1
Preventability of incidents	Clinical management issues (n)	Patients affected by clinical management (n)
Definitely preventable	47	31
Probably preventable	190	76
Probably not preventable	157	85
Definitely not preventable	15	6
Missing data	15	2
Attribution to clinical speciality	Clinical management issues (n)	Patients affected by clinical management (n)
Surgical team	213	123
Clinical team	121	47
Hospital issue	42	13
Other	48	17
Missing data	0	0

Comment:

- Audited cases can have multiple clinical incidents identified for each patient. These can vary from area of consideration, concern to adverse event.

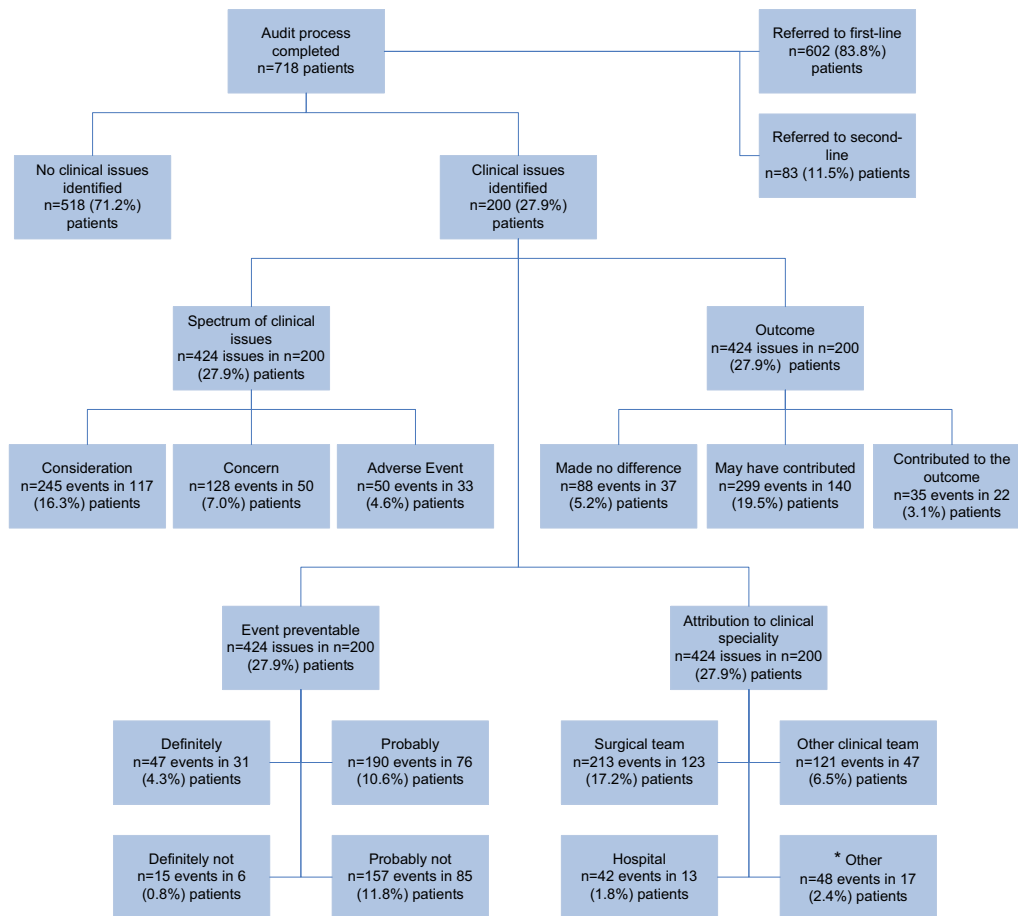
Table 3: Assigning severity to clinical incidents

	Less severe ←————→ Very severe			
Areas of clinical incidents	N/A	Consideration	Concern	Adverse event
Outcome of incidents	N/A	Did not affect clinical outcome	May have contributed to death	Probably contributes to death
Preventable incidents	Definitely not	Probably not	Probably	Definitely
Association of incidents	Other	Hospital	Clinical team	Surgical team

Note: N/A = not applicable.



Figure 67: Clinical incidents by patient by severity (n=718 cases)



* Note: Other category includes: GP, patient presenting late to hospital, hospice, etc.



3 VASM PERFORMANCE REVIEW

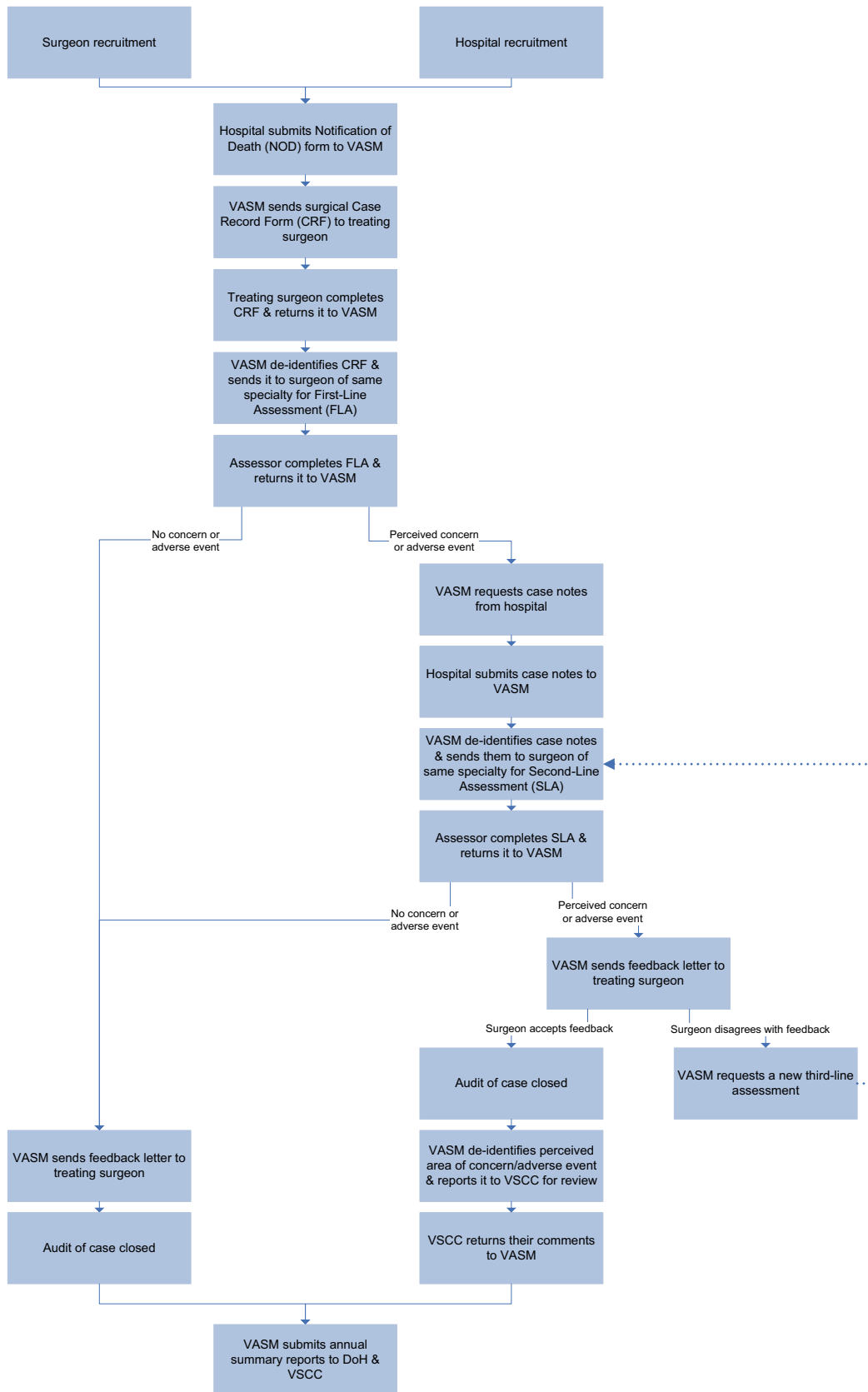
Many of last year's recommendations have been fully implemented. Collaboration between the Department of Health, Victorian Surgical Consultative Council, Coroner's Office, hospitals and health services over the last two years has resulted in valuable lessons learned.

Table 4: Project schedule and delivery status

Schedule of key deliverables	Status
<ul style="list-style-type: none"> Establishment of governance model 	✓ Completed 27 November 2007
<ul style="list-style-type: none"> Establishment of mortality audit at four pilot sites 	✓ Completed 27 November 2007
<ul style="list-style-type: none"> Establishment of mortality audit at a further four sites 	✓ Completed 23 May 2008
<ul style="list-style-type: none"> Establishment of mortality audit at all Victorian public hospitals 	✓ Completed 23 November 2008 (10 hospitals pending response)
<ul style="list-style-type: none"> Provision of confidential, specific reports to the department, the Minister for Health and VSCC, and: <ol style="list-style-type: none"> A report on the four pilot hospitals after their commencement, including data analysis and qualitative issues and lessons. Reports to involved surgeons after their commencement in the audit. Reports to involved hospitals. 	✓ Completed 30 June 2009
<ul style="list-style-type: none"> Individual case forms provided to the VSCC, in instances where areas of consideration, concern or adverse event was identified by the second-line assessor 	✓ Completed 30 June 2009
<ul style="list-style-type: none"> Provision of annual public report based in lay format 	✓ Completed 30 October 2009
<ul style="list-style-type: none"> Agreement reached regarding the process to address individual surgeons, surgical outcomes that have been identified as outside of acceptable parameters, in line with the following principles: <ul style="list-style-type: none"> The definition of normal parameters to be agreed by RACS, VSCC and DHS. Recommendations are to be made by VSCC to address deficiencies in surgical outcomes. Identified surgeons to be informed of audit findings and VSCC recommendations by the chair of the VSCC. Continued monitoring of surgeon performance to be ongoing following implementation of VSCC recommendations. Surgeons identified as having surgical outcomes outside of normal parameters following the implementation of VSCC recommendations to undergo further remediation. 	✓ Completed 30 October 2009
<ul style="list-style-type: none"> 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.



Figure 68: VASM audit process





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- Participating Victorian hospitals
- Participating Victorian Fellows and International Medical Graduates
- Assessors, in particular the dedicated and specialty-specific first-line assessors
- Surgeons who have acted as assessors, for the time and effort providing detailed and valuable case-note reviews
- Hospital medical records departments
- Victorian Surgical Consultative Council
- Western Australian Audit of Surgical Mortality
- Tasmanian Audit of Surgical Mortality
- South Australian Audit of Perioperative Mortality
- Queensland Audit of Surgical Mortality
- The Collaborating Hospitals' Audit of Surgical Mortality
- Royal Australasian College of Medical Administrators
- Victorian Department of Health, for funding the project
- Royal Australasian College of Surgeons for their infrastructure and oversight of this project



VASM Management Committee

Colin Russell	Chair, Victorian Audit of Surgical Mortality
Jonathan Rush	Chair, Victorian Surgical Consultative Council
Andrew Clarke	Senior Project Officer, Victorian Quality Council Secretariat and Knowledge Management Unit, Statewide Quality Branch, Department of Health
Michael Dobson	Chair, Victorian State Committee
Andrew Cochrane	Australasian Society of Cardiac and Thoracic Surgeons
Peter Thomson	Australian Society of Otolaryngology, Head and Neck Surgery
Bruce Waxman	Colorectal Surgical Society of Australia and New Zealand
Keith Stokes	Australasian Association of Paediatric Surgery
Lee Gruner	Censor in Chief, Royal Australasian College of Medical Administrators
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Heather Cleland	The Australian Society of Plastic Surgeons
Gary Fell	Australia and New Zealand Society for Vascular Surgery
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