

Victorian Audit of Surgical Mortality

REPORT 2015



The Victorian
Surgical Consultative Council





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1. Abbreviations

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
CCU	critical care unit
CPD	Continuing Professional Development
DRG	diagnosis-related group
DHHS	Department of Health and Human Services
DVT	deep vein thrombosis
FLA	first-line assessment
HCGR	hospital clinical governance report
RACS	Royal Australasian College of Surgeons
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SCF	surgical case form
SLA	second-line assessment
VAED	Victorian Admitted Episodes Dataset
VASM	Victorian Audit of Surgical Mortality
VSCC	Victorian Surgical Consultative Council

2. Clinical director's report

Learning from mortality outcomes.

This is the seventh annual report since data collection for the Victorian Audit of Surgical Mortality (VASM) commenced on 1 July 2007. In this report we present the outcomes of the review of 10,607 deaths from 1 July 2007 to 30 June 2015. Since 2007, seven Case Note Review Booklets have been disseminated which, together with the annual reports, have proven to be a popular tool with the surgical readership.

One hundred per cent audit participation at sites with surgical services continues across public and private hospitals in Victoria. A total of 1,163 of the eligible 1,297 Royal Australasian College of Surgeon (RACS) Victorian surgical Fellows are currently participating in the audit. Currently the peer review audit is limited to the following specialities General, Colorectal, Vascular, Urology, Neurosurgery, Orthopaedic, Otolaryngology Head and Neck, Paediatric, Gynaecology, Plastic, Cardiothoracic, Oral/maxillofacial, Ophthalmology, Trauma, Transplant and Oncology surgical services. The scope of the current audit does not review Anaesthetic Cosmetic, Obstetrics, Cardiology, Radiology and Gastroenterology deaths. The audits of surgical mortality have successfully expanded the program to include the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Fellows, and aims to further expand its collaborations with The Victorian Consultative Council on Anaesthetic Mortality and Morbidity.

The current participation rate has increased to 89.6% in 2014 - 2015 is encouraging, and was anticipated due to the educational value and the compulsory status of Australian and New Zealand Audit of Surgical Mortality (ANZASM) for Continuing Professional Development (CPD) compliance. Currently, 66.6% of Gynaecological Fellows and 89.5% of Orthopaedic Fellows participate in the VASM audit, although participation is voluntary under their CPD programme.

The RACS continues to place increased emphasis on participation in the VASM as part of CPD. As a parallel process, the Medical Board of Australia requires the 'provision of evidence of the CPD activities Fellows have undertaken to meet the requirements of the Board's standard'.⁽¹⁾ This ensures that the RACS will properly discharge its CPD duties.

Clinical trends relating to clinical risk management during the audit period show overall improvements in patient surgical care. Deep vein thrombosis (DVT) prophylaxis to reduce the likelihood of pulmonary embolus, use of critical care facilities, fluid balance management and patient operative profile will remain crucial areas to monitor in order to implement educational strategies from the lessons learned in this audit. Our stakeholder education program aims to address deficiencies in clinical management and it is encouraging to note the decrease of these as progressive reports are published.

The VASM has rolled out the second series of hospital clinical governance reports (HCGRs) in February 2016. This report presents de-identified aggregate data to enable benchmarking and monitoring of clinical management trends within a hospital and compare it against other participating peer-grouped hospitals, both within the region and nationally. The HCGRs can be presented and discussed at hospital clinical governance committee meetings, audit of surgical mortality management committee meetings, with the local health network (or similar) representative, as well as with hospital quality managers and Department of Health and Human Services (DHHS) representatives. DHHS received these reports for educational performance monitoring and improvement purposes. Non-participation of Fellows and poorly completed forms will hinder the value of these quality assurance reports sent out to hospitals.

Implementation of the electronic Fellows interface as the primary method for submission of patient data will occur during the course of 2016 and this will help alleviate the current deficiencies associated with illegible and incomplete

data. Variability in the quality and completeness of patient records submitted by hospitals remains an area of criticism received from second-line assessors. This is an area VASM will monitor as it is crucial in obtaining a useful report.

Along with other jurisdictions we have consistently identified the following clinical risk management issues as ongoing areas for improvement:

- delay in diagnosis and treatment, including better detection and management of the deteriorating patient
- poor communication between health professionals, especially for coordination of patient care, and
- decision to operate rather than palliate.

The VASM is very aware of the importance of data accuracy. The clinical data is entered by the audit team using Read Codes, but as this is not performed by clinicians, unintentional errors have occurred in the past. Over the past year all data entry forms have been checked by the clinical director prior to entry into the database. This will result in accurate data capture which allows for meaningful clinical reports.

The VASM also has initiated an extra step in the audit process as a pilot study, whereby the treating surgeon is given a form after receiving the assessor reports. This allows the clinician with the best grasp of the clinical nuances of the case to fill in the gaps identified by the assessors or add information that allows better perspective on the course to death. In 67.4% (145/215) of instances the treating surgeon indicated on the feedback evaluation form that the peer review assessment was a good source of information to improve surgical care at their institution. This new process has proven to be very instructive.

Conclusion

The success of the VASM is dependent upon participating surgeons and hospitals, and a highly efficient, motivated and hard-working team at the RACS.

Despite the existence of this audit, it has been observed that the same type of issues occur repeatedly; driving VASM to refocus on the educational role to disseminate lessons learnt and recommendation messages across to clinicians and using the HCGRs to drive further improvements.

The support of the Victorian State Government, the Victorian Department of Health and Human Services (DHHS), the Victorian Surgical Consultative Council (VSCC), the Australian Health Practitioner Regulation Agency, the Australian Commission on Safety and Quality in Health Care, the Victorian Managed Insurance Authority, RANZCOG and RACS has facilitated VASM's progress.

Yours sincerely,



Mr Barry Beiles MB.BCh, FRACS (Vasc)
Clinical Director, VASM

3. Executive summary

Audit results reported for the period 2007 to 2015

Surgical trends

2014-2015 population: 6 million
Surgeries: 672,957



2007-2008 population: 5.3 million
Surgeries: 548,968

Mortality trends

2007-2008: 0.4%
Mortalities: 2,267



2014-2015: 0.3%
Mortalities: 1,966

Demographics

55% male

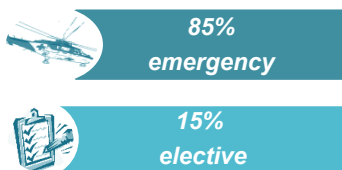
Median age: 77



45% female

Median age: 82

Risk of death prior to surgery



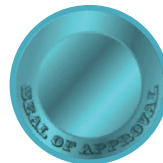
KEY FINDINGS



Improved surgeries
Improved participation
Improved compliance
Improved patient care



Improved critical care utilisation
Improved deep venous thrombosis prophylaxis utilisation
Improved fluid balance management



Decreased mortality
Decreased adverse events
Decreased transfer delays
Decreased second-line assessments



Improve communication
Improve protocol compliance
Improve clinical management
Improve infection control
Improve perioperative management
Improvement in clinical delays

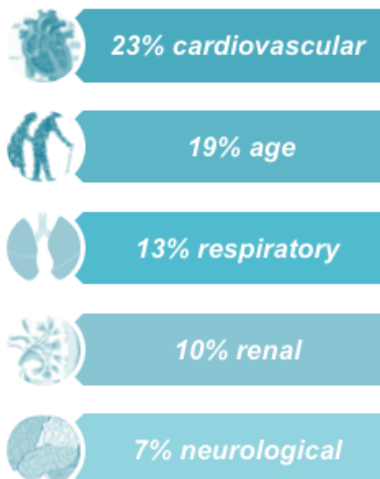
Adverse event trends

2007-2008
7% AE



2014-2015
5% AE

Most common comorbid factors



Cases with no issues

2014-2015
72% No issues

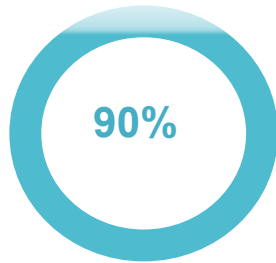


2007-2008
63% No issues

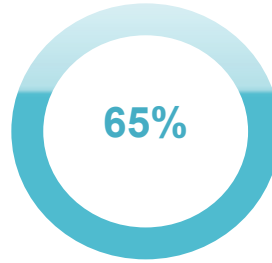
Participation status



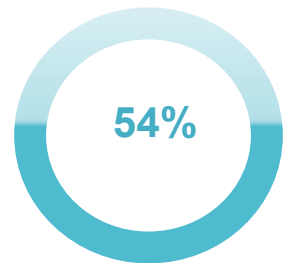
Hospital participation



RACS surgeon participation



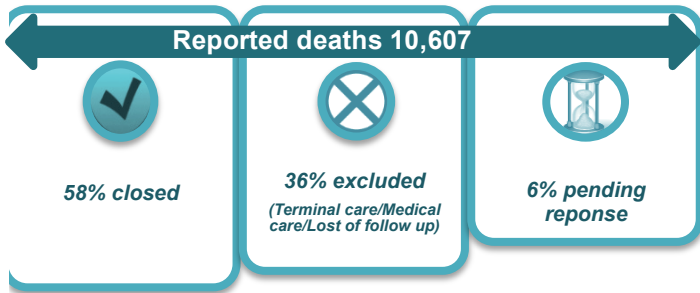
RANZCOG surgeon participation



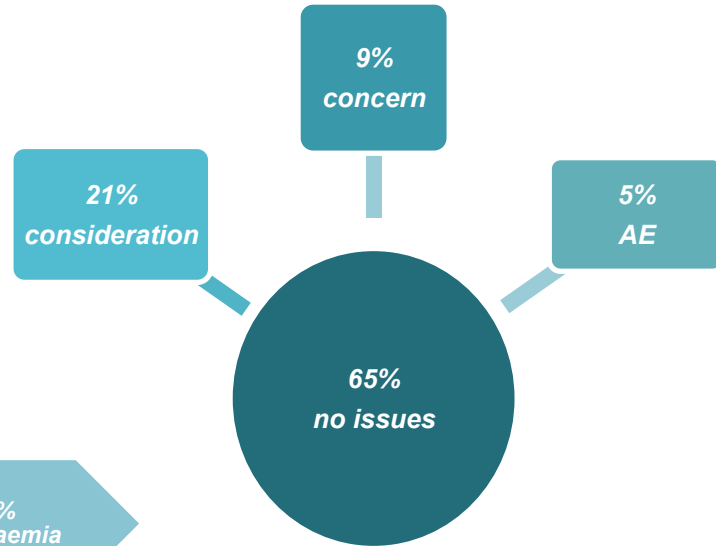
Online interface usage

Compliance status

Reported deaths 10,607



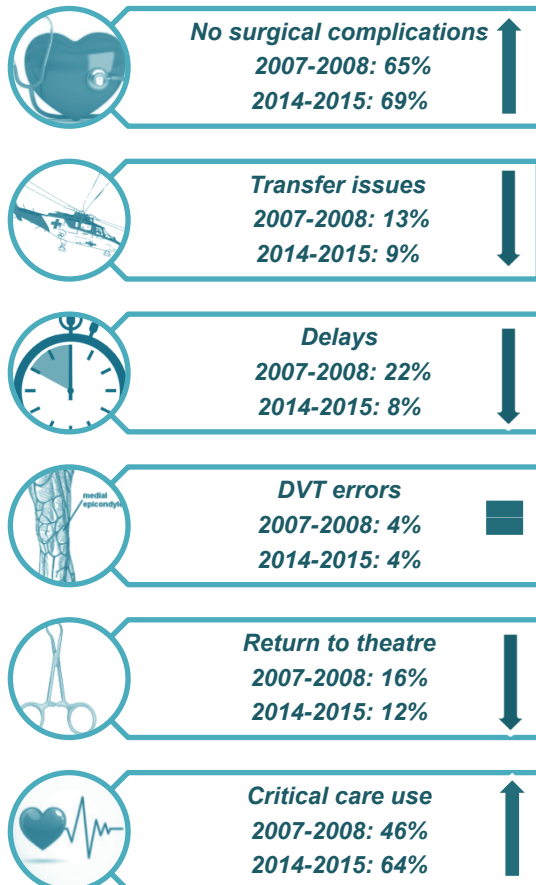
Peer review assessed issues



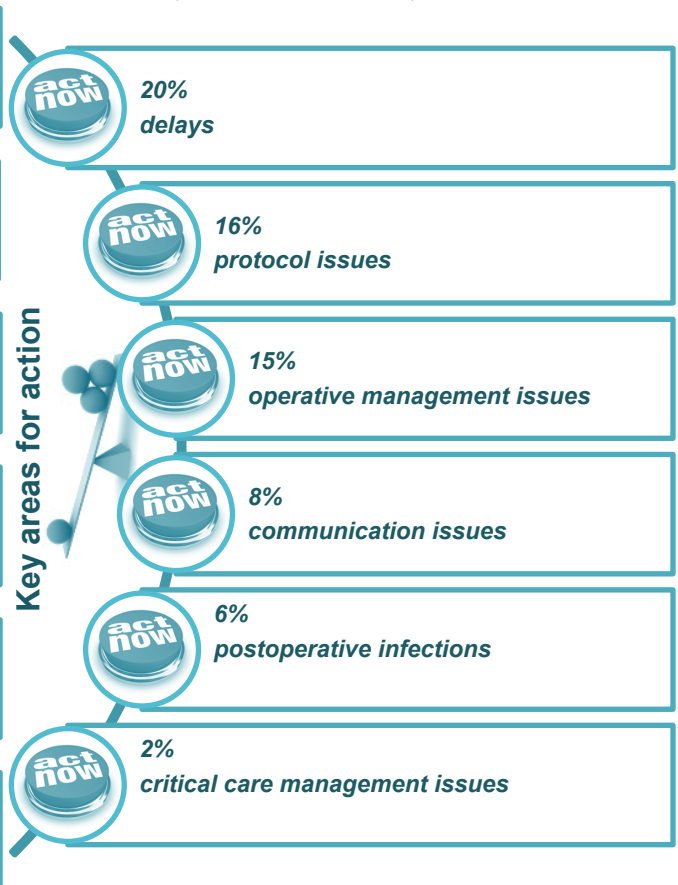
Main causes of death



Clinical risk management n=6,179 audited cases



Main clinical management issues n=2,122 issues in 6,179 audited cases



Continuous improvements in clinical risk management

Key areas for action

4. Recommendations for VASM clinical stakeholders

The recommendations outlined below are lessons learned from the audited surgical mortality cases. The treating surgeons involved in these cases receive detailed reports and recommendations on issues of patient management identified by the peer review assessors.

1. *Improved leadership in patient care*

- In complex cases there must be clear, demonstrable leadership in patient management.
- The treatment plan for each patient should be understood by all involved in their care.
- The lead clinician must be accountable, responsive, prepared for challenges and must focus on optimal patient care.
- During lengthy operations there should be a low threshold for seeking assistance from colleagues to avoid fatigue.
- Senior surgical opinion is essential when dealing with surgical complications and should not be delayed by team hierarchy structure.

2. *Improved perioperative management*

- Appropriate preoperative, intraoperative and postoperative preparation and management aims to decrease operative complications and promote successful recovery. Delay in, or unnecessary preoperative investigations can have fatal consequences.
- Preparation and management should include:
 - evaluation of both physical and psychological preparation
 - complete medical history and physical examination procedures
 - consent for the surgery and discussion of potential outcomes
 - appropriate documentation and communication of results with clinical and surgical teams, and
 - the avoidance of futile surgery through informed discussion with the patient and family.
- The patient should be discharged to the ward with comprehensive orders.
- Preventative measures should be implemented for reducing complications.
- Instructions must be given about further management when the patient is discharged from a clinical or surgical team.
- The potential outcomes from the probable clinical diagnosis must be considered when developing a treatment plan.
- The patient should be transferred to a medical unit if elderly and high-risk. Also if medical issues are assessed as being the prominent clinical factor during the admission episode, providing that the surgical postoperative care can be performed appropriately in that setting.

3. *Improved protocol compliance*

- All hospitals should have a formal protocol for early identification of clinical management issues and immediate management plans. This protocol needs to be updated according to national guidelines and policies.
- Hospitals should follow protocols. Failure to follow hospital protocol or national clinical guidelines during all parts of patient care can contribute to errors.

4. *Action on evidence of clinical deterioration*

- Clinical deterioration should be monitored as it is an issue that is recognised throughout Australia and internationally.
- When clinical deterioration occurs and no clear cause is identified, consideration should be given to causes outside the treating surgeon's specialty or expertise.
- Clinical findings must be considered alongside the results of investigations.
- Clinical deterioration must be acted upon as well as recorded.

5. *Improved awareness of surgical emergencies and sharing of care*

- The audit revealed that patients admitted as surgical emergencies are at greater risk where care is shared. All health professionals should increase their awareness of this risk to improve the quality and safety of patient care.

6. Infection control

- The audit revealed that patients admitted as surgical are at an increased risk of developing infection. The risk is high especially in such a comorbid group of patients therefore stringent infection control care should be considered in this patient pool. The Australian Guidelines for the Prevention and Control of Infection in Healthcare are designed to prevent and manage healthcare associated infection (HAI), these should be utilised at hospitals, therefore VASM endorses the use of current hospital protocols and guidelines to reduce the incidence of infection.⁽²⁾
- Key actions to be taken for control and management are:
 - timely recognition
 - appropriate investigation
 - rapid administration of treatment
 - timely involvement of expert teams.

7. In-hospital fall prevention

- The audit revealed that patients admitted as surgical emergencies have a greater risk of falling while in hospital. All health professionals should increase their awareness of this risk to improve the quality and safety of patient care.
- The Best Practice Guidelines for Australian Hospitals, Residential Aged Care Facilities and Community Care⁽³⁾ are designed to facilitate practices that reduce falls and associated harm. The VASM endorses the use of current hospital protocols and guidelines to reduce the incidence of in-hospital falls.^(4, 5)

8. Improved communication

- All health professionals and institutions should actively collaborate and communicate to effectively support an appropriate interchange of information and coordination of patient care at all stages during the admission episode.

5. Introduction

5.1 About the VASM

The VASM is part of the ANZASM, a national network of regionally-based audits of surgical mortality that aim to ensure the highest standard of safe and comprehensive surgical care. VASM is a collaboration between the Victorian Government's Department of Health and Human Services (DHHS), the Victorian Surgical Consultative Council and the Royal Australasian College of Surgeons (RACS), The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) and The Australian Orthopaedic Association (AOA). The VASM project is funded by the health service programs branch of the Victorian department of health to review all deaths associated with surgical care and ascertain the adverse outcomes that were preventable. See Figure 1 in the accompanying 2015 VASM Technical Report for more information relating to the governance of the VASM.

5.2 Objectives

The objective of the audit is to identify preventable or contributing factors associated with surgical mortality through a peer review process that reviews all deaths associated with surgical care. The audit is a patient safety and quality initiative designed to highlight trends in deficiencies of care and system issues, and has a focus on education and performance improvement.

5.3 Audit process

The VASM reviews notifications of deaths that have occurred within 30 days of a surgical procedure and in the same admission. The VASM audit does not include morbidity cases.

Individual regional audits of surgical mortality are notified of in-hospital deaths associated with surgical care. The mortality notifications in Victoria are submitted by hospitals, coroner e-depositions, or directly from the treating surgeon. All cases in which a surgeon was responsible for, or had significant involvement in, the care of a patient are within the scope of the audit, whether or not the patient underwent a surgical procedure. The audit includes deaths that occur in a Victorian hospital when:

- an operation was performed by a surgeon, regardless of who admitted the patient
- the patient was under the care of a surgeon and no operation was performed.

If a case does not fulfil either of the above-listed criteria it is excluded from the audit by the notifying hospital or by audit staff. Deaths identified by the reporting surgeon as terminal care cases are recorded, but these are excluded from further assessment in the audit. Terminal care is nominated by the surgeon on the surgical case form (SCF) and cannot be identified from the notification of death information received by the audit of surgical mortality office.

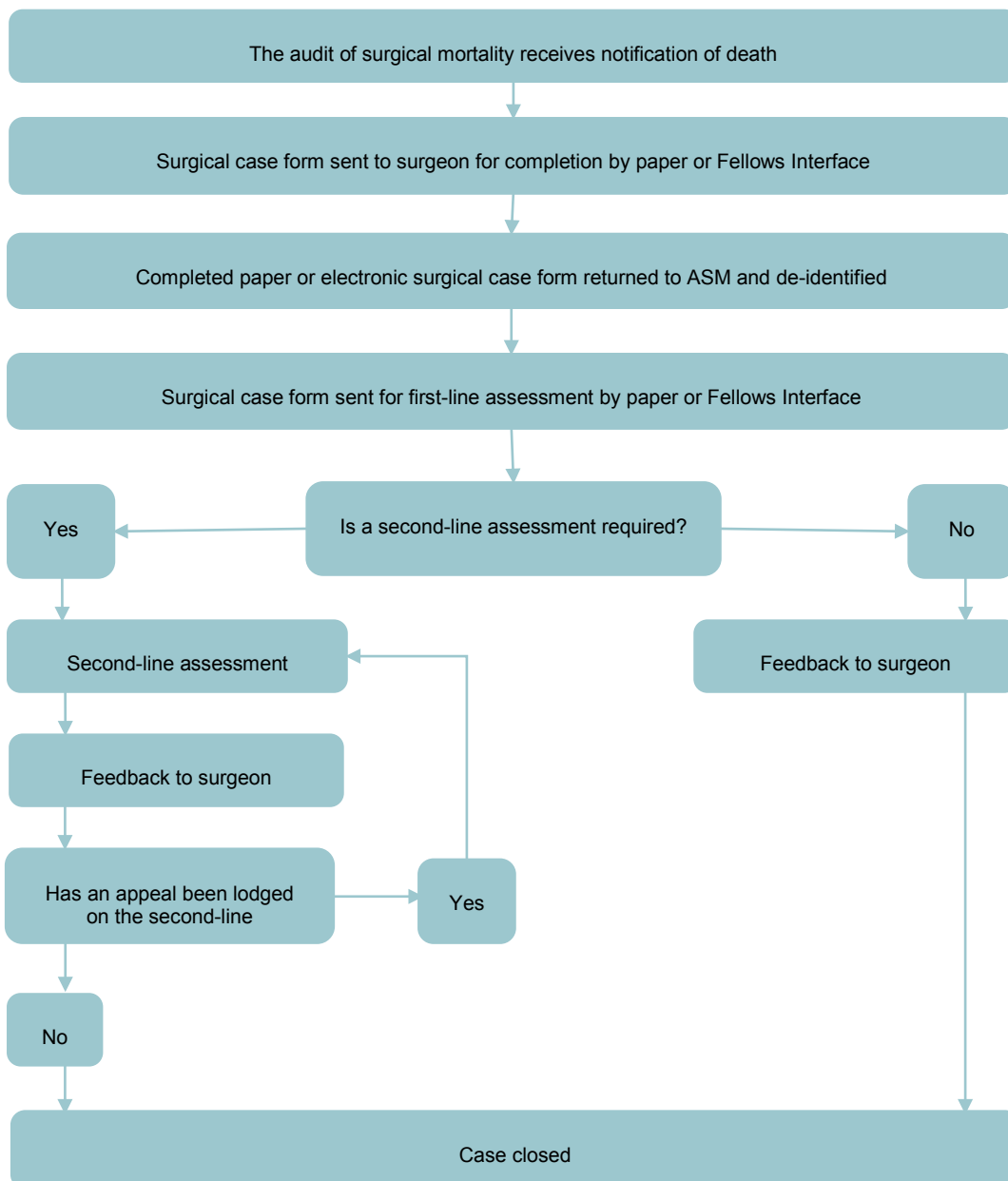
Clinical details pertaining to the management of each case are recorded on a standard, structured SCF completed by the consultant or treating surgeon associated with the case. The completed SCF is submitted to the audit office, and the information de-identified and sent for first-line assessment (FLA) by a surgeon from a different hospital with the same surgical specialty. The first-line assessor is unaware of the name of the deceased, the treating surgeon or the hospital in which the death occurred.

There are two possible outcomes of the FLA.

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

Where an SLA is deemed necessary, assessors are selected using the same criteria as for first-line assessors. The reports provided by the assessors are returned to the treating surgeon, together with a feedback form so that the treating surgeon can "assess the assessors". The feedback form contains a free-text field in which the treating surgeon can expand on points raised in the assessment. This allows the treating surgeon to provide accurate clinical details of the treated patient. Any updates received from the treating surgeon are added to the file held by the VASM.

Figure 1: The audit process.



6. Audit participation and audit processes

6.1. Audit numbers

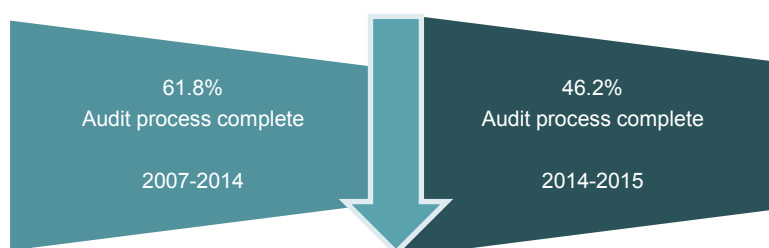
The VASM received 10,607 notifications of deaths that have been associated with surgical care from its commencement on 1 July 2007 to the end of the current audit period 30 June 2015.

It is beneficial to put these deaths into some perspective by reviewing the total number of surgical procedures performed in Victoria over this period. VASM interrogated the Victorian Admitted Episodes Dataset (VAED), and during the audit period a total of 4,920,844 patients underwent surgical procedures in Victoria.

It should be noted that a small percentage of reported deaths emanate from the private sector. The private sector accounted for 991 of the 6,179 total cases audited from July 2007 to June 2015 (16.1%). This is predictable from the known casemix of the two sectors. Differences in risk profiles between the two sectors are because critically ill patients and higher risk patients are being seen in the public hospital system which provides the majority of critical care services.

VAED indicated that in a single year (1 July 2014 to 30 June 2015) 672,957 patients underwent surgical procedures in both the public and private sector. Of the 1,966 surgical mortality cases identified by VAED, 1,681 were reported to VASM (85.5%).

Table 1: Audit numbers over sequential audit periods.



Case status	2007-2012	2012-2013	2013-2014	2014-2015	Audit period
Closed	3,400 (59.1%)	987 (63.4%)	1,016 (63.0%)	776 (46.2%)	6,179 (58.3%)
Non-participant	1,061 (18.4%)	141 (9.1%)	145 (9.0%)	55 (3.3%)	1,402 (13.2%)
Reported in error	239 (4.2%)	42 (2.7%)	63 (3.9%)	67 (4.0%)	411 (3.9%)
Terminal care	486 (8.4%)	185 (11.9%)	220 (13.6%)	240 (14.3%)	1,131 (10.7%)
Lost to follow-up	565 (9.8%)	190 (12.2%)	76 (4.7%)	5 (0.3%)	836 (7.9%)
Pending cases (SCF/FLA/SLA)	4 (0.1%)	13 (0.8%)	93 (5.8%)	538 (32.0%)	648 (6.1%)
All cases	5,755 (100%)	1,558 (100%)	1,613 (100%)	1,681 (100%)	10,607 (100%)

Note: n=10,607.

Audit period 1 July 2007 to 30 June 2015.

SCF: surgical case form; FLA: first-line assessment; SLA: second-line assessment.

Comments:

- The process review backlog is the reason the most recent reporting period (2014-2015) has the highest number of pending cases, at 32% (538/1,681). This pool of cases will be included in the analysis of future reports. The time frame given for each step of the audit process (SCF, FLA and SLA return) is 21 working days. Obtaining medical records and undergoing documentation de-identification processes can take up to 6 months at times for complex cases. The compulsory status of Australian and New Zealand Audit of Surgical Mortality (ANZASM) for Continuing Professional Development (CPD) compliance will further reduce processing backlogs.
- The VASM's goal is to review all mortality cases within three months of notification. The specialties with the highest casemix were General Surgery, Orthopaedic and Neurosurgery, Vascular Surgery and Cardiothoracic Surgery. Clinical information and completed assessment reviews were available on 58.3% (6,179/10,607) of reported cases.

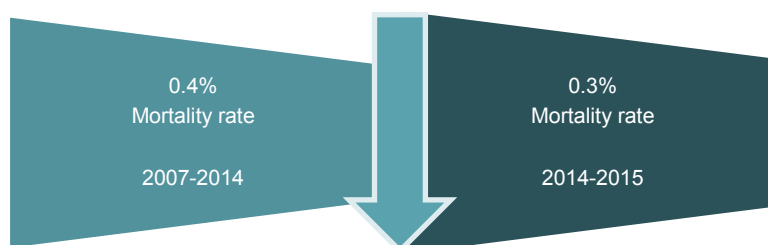
- Terminal care admissions comprised 10.7% (1,131/10,607) of reported cases and were excluded from the review process. An additional 3.9% (411/10,607) of cases were wrongly attributed to a surgical unit.
- 7.9% (836/10,607) of cases were deemed lost to follow-up due to the surgeon moving interstate, abroad, retiring or the unattainability of medical records. These cases were excluded from the analysis.
- 13.2% (1,402/10,607) of cases could not proceed in the audit process as the treating surgeon had elected not to participate. The rate of non-participant cases has declined from 2007–2012, in which it was 18.4%, to 3.3% in the current audit period (2014–2015). VASM envisages that the rate of non-participant cases will decline further as participation in VASM is now a mandatory component of attaining CPD recertification.
- 6,179 deaths had been fully audited by the census date. The outcomes from the peer review process are restricted to those deaths and are the focus of this report. The outcomes of the remaining 6.1% (648/10,607) of cases that are still pending should be available in the next audit report.

6.2. 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 the patient was under the care of a surgeon. In these circumstances the discharging unit would usually be recorded as surgical; however, in some instances a patient who has received surgical care may not be under the care of a surgeon at the time of death.

In parallel with the VASM's audit process hospitals must also submit data to the VAED, which is maintained by the DHHS. This is robust database providing casemix information required for hospital activity based funding. The information allocates individual patient episodes to diagnosis-related groups (DRGs). These DRGs are specialty-specific and provide an alternative source of mortality data. The DHHS has provided the VASM with a list of deaths that occurred in patients with surgical DRGs over the period 1 July 2012 to 30 June 2015. A comparison of the VAED data with the VASM reported mortality data was performed to ascertain gaps in reporting of hospital mortality.

Table 2: Mortalities reported to VAED



Audit period	Total surgeries n	VAED reported mortalities n (%)
2007-2012	2,949,510	10,851 (0.4%)
2012-2013	634,609	1,997 (0.3%)
2013-2014	663,768	1,924 (0.3%)
2014-2015	672,957	1,966 (0.3%)
Total	4,920,844	16,738 (0.3%)

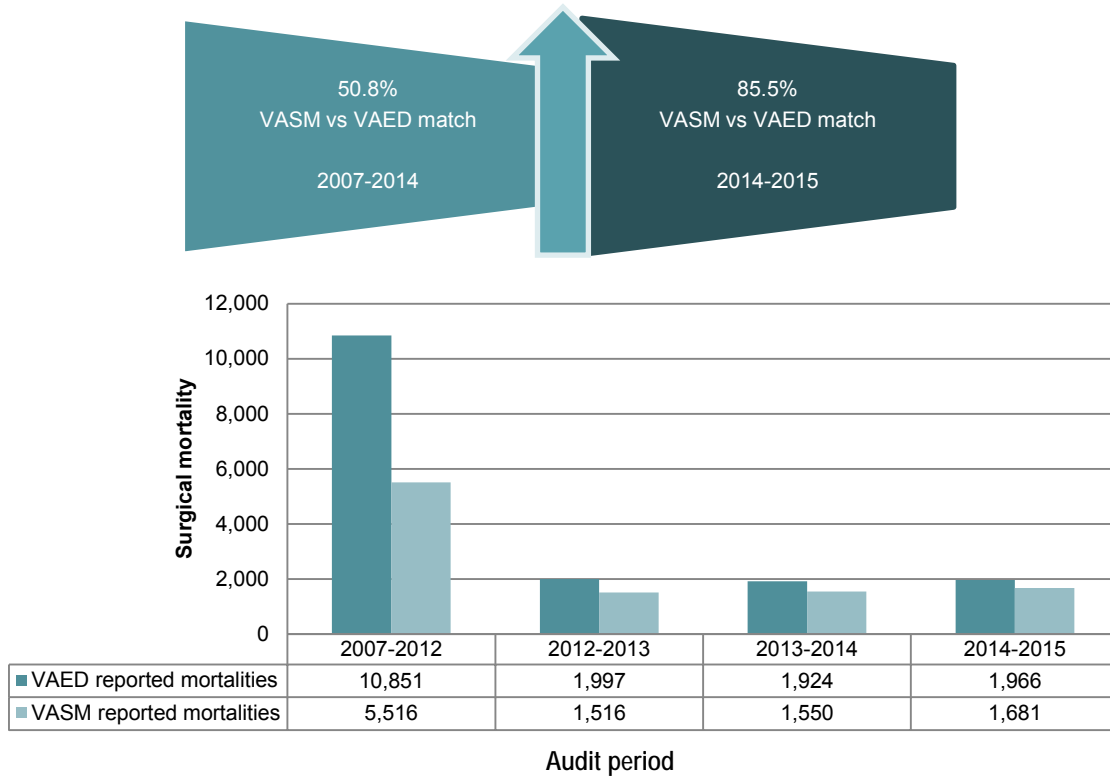
VAED: Victorian Admitted Episodes Dataset
Audit period 1 July 2007 to 30 June 2015.

Comments:

- The VAED indicates that during the audit period 672,957 patients received surgical care in Victorian public and private hospitals, and of these 0.3% (1,966) resulted in auditable mortalities reported to the VASM.
- It should be noted that the VASM and the VAED data are collected for different purposes and should be considered complementary. The VAED is a database established for funding purposes. It contains more patients than the VASM because surgical procedures performed by non-surgeons are included in the VAED.
- Based on VAED data there has been a decrease in surgical mortality over the last seven years, from 0.41% to 0.3%. This is highly statistically significant ($p < 0.0001$). It is postulated that one of the causal factors of this improved outcome is the establishment of the VASM.⁽⁶⁾

Figure 2: Matched mortality: VASM data compared with VAED data

This graph shows a comparison of data collected between 1 July 2014 and 30 June 2015 on 1,681 deaths reported to VASM.



VAED: Victorian Admitted Episodes Dataset; VASM: Victorian Audit of Surgical Mortality.
 Audit period 1 July 2007 to 30 June 2015.

Comments:

- The match for the surgical mortality data reached 85.5%, with 1,681 VASM-reported deaths compared with 1,966 VAED surgical deaths.
- There were 5.6% (347/6,179) VASM cases from private hospitals (data not shown).
- The rapid rise in the percentage of VASM reported deaths is accounted for by the increased participation of private hospitals to 100% in 2012. In 2014 there was a slight decrease in the match of VASM and VAED data, as some hospitals experienced difficulties in reporting mortalities to VASM in a timely manner due to upgrades in their electronic health information systems.

6.3. Audit participation rates

To comply with the audit process surgeons must not only agree to participate, but to also return completed SCFs and assessment forms in a timely, accurate and complete manner. Thus there is a difference between participation and compliance. The hospitals in which they work must provide notifications of death on a regular basis, as this is the main trigger for the audit process to begin.

All Victorian public and private hospitals providing relevant surgical services are participating and providing notifications of death. At the audit’s inception in 2007, public hospital participation stood at 31.0%. Total public hospital participation (100%) was achieved in 2010. Similarly, in 2010 when private hospital participation commenced, private participation was 43.2%. Total private hospital participation (100%) was reached in 2012.

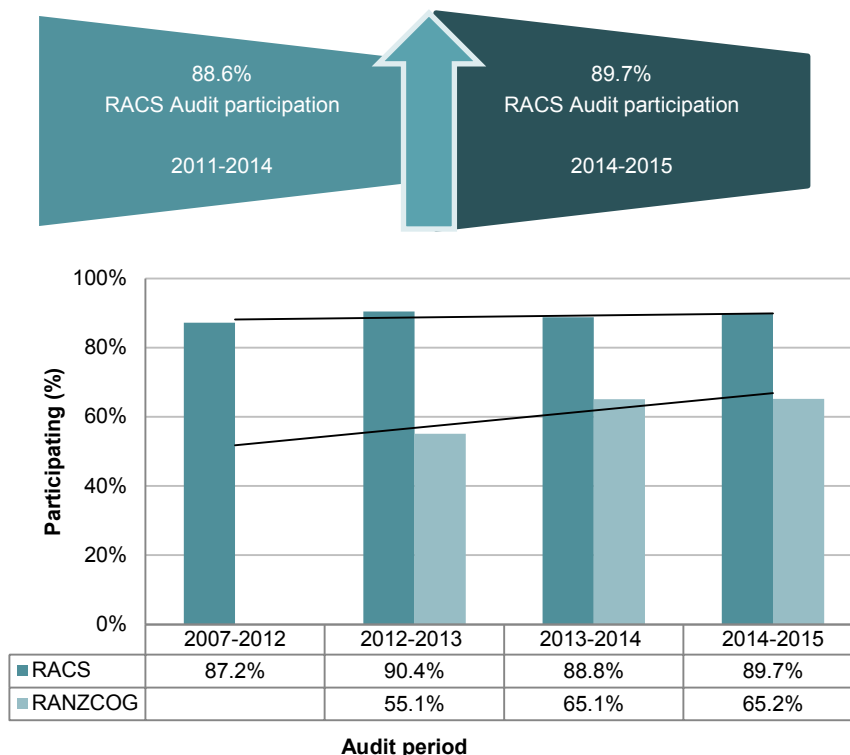
The RACS Council has delivered strong support to ANZASM, with participation by surgeons in their state mortality audit a compulsory component of the CPD program since January 2010. The RACS CPD program currently conducts a verification process on 7% of surgeons for their claimed CPD activities. Verification of a surgeon’s participation in the mortality audit is anticipated to increase to 100% in the near future.

The RANZCOG Board approved formal collaboration with the ANZASM in 2012, which is the reason for lower participation rate of the gynaecological Fellows compared with surgical Fellows, and registration of participants is increasing.

The VASM audit collects data on all deaths occurring after a gynaecological surgical procedure. The Consultative Council on Obstetric and Paediatric Mortality and Morbidity continues to separately review all maternal, perinatal and paediatric deaths in Victoria.

The following four figures (figures 3, 4, 5 and 6) outline in detail the participation rates of Victorian Fellows.

Figure 3: Surgeon agreement to participate.



Audit period 1 July 2007 to 30 June 2015.

RACS: Royal Australasian College of Surgeons; RANZCOG: Royal Australian and New Zealand College of Obstetricians and Gynaecologists

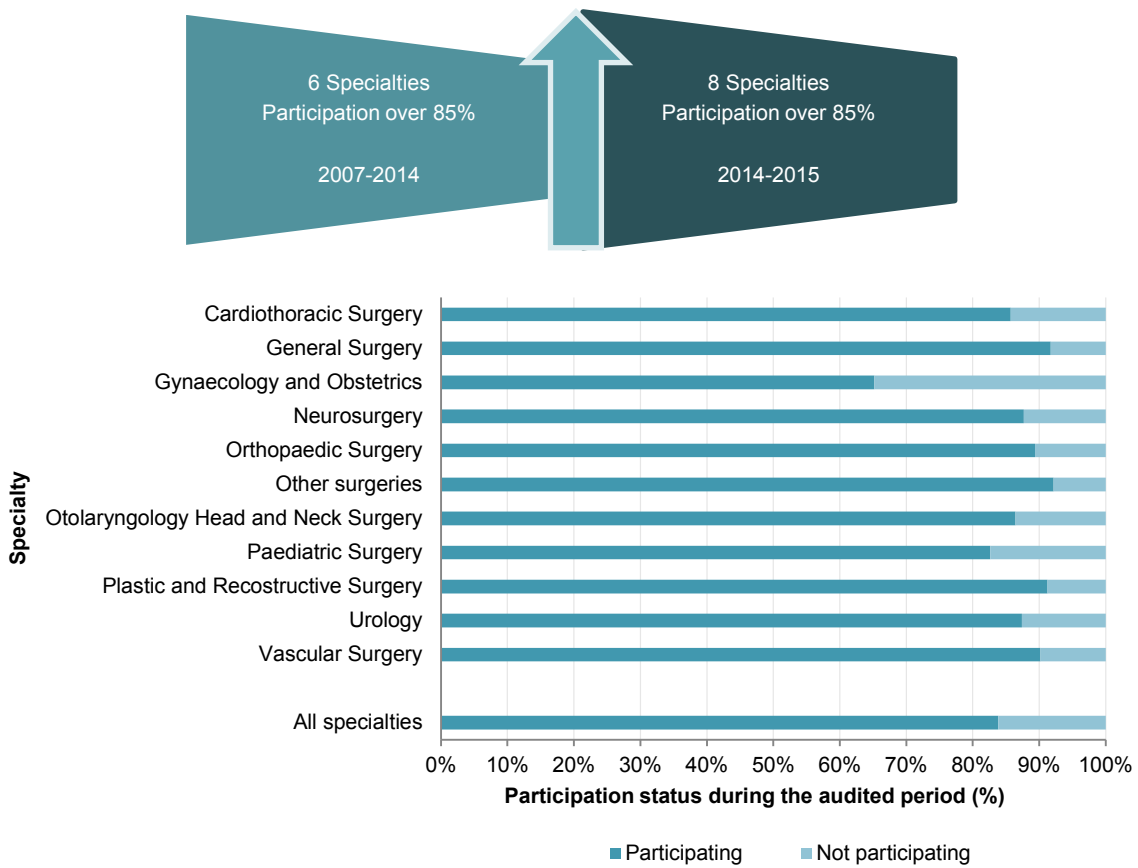
Note: RANZCOG participation rates from 2011-2012 were excluded as only four surgeons were invited to participate in that year.

The trend lines reflect the uptake of audit participation and takes into account RANZCOG from 2011.

Comments:

- 89.7% (1,163/1,297) of Victorian RACS Fellows registered in the RACS database are currently participating. The increase in the participation rate from 87.2% in 2011-2012 to the current level of 89.7% (2014–2015) is encouraging, and is due to the RACS’ CPD requirement.
- True participation is measured by adherence and factual compliance with the audit process after agreement to sign up to the audit activity. Compliance with the audit is an 82.4% return rate of the case record forms. Almost half of RANZCOG and RACS Fellows perform assessments as first- or second-line assessors. Moreover, 53.7% (768/1,429) of the enrolled RANZCOG and RACS Fellows submit data electronically.
- At present, 66.6% (266/399) of the gynaecological specialists invited to participate since August 2012 have enrolled in the VASM audit.

Figure 4: Surgeon agreement to participate by surgical specialty.



Note: total n=1,705.

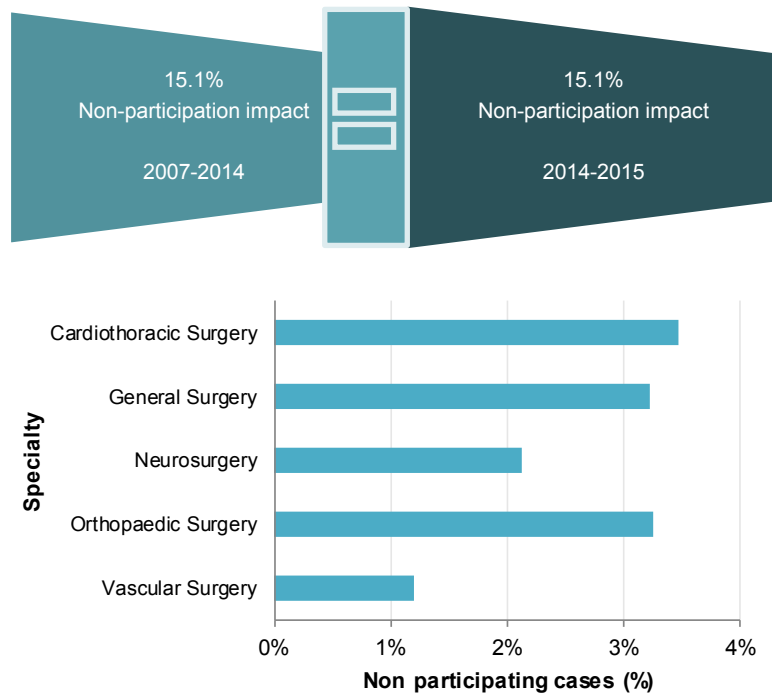
Audit period 1 July 2007 to 30 June 2015.

Other surgeries includes: Oral/maxillofacial, Ophthalmology, Trauma, Transplant and Oncology.

Comments:

- Combined specialty participation in the surgical specialties ranged from 65.2% to 91.2% and remained high in the last triennium.
- The lower participation rate for gynaecology is associated with the relatively recent introduction of RANZCOG Fellows to the audit. Also, the proportion of RANZCOG members who do not practice gynaecology as proceduralists is currently unknown to VASM and further clarification was sought from non-respondents. It is expected that registration of participants will increase further in 2016-2017.

Figure 5: Cases by specialty that could not be reviewed due to non-participation.

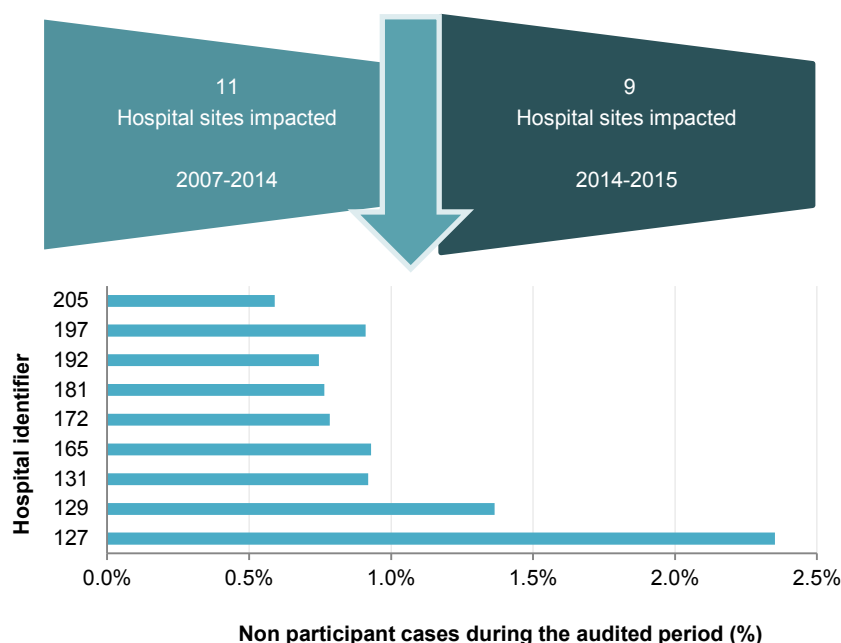


Note: total n=1,402.
 Audit period 1 July 2007 to 30 June 2015.

Comments:

- The specialties with the greatest degree of non-compliance during the audit period were Cardiothoracic Surgery, General Surgery, Orthopaedic Surgery, Neurosurgery and Vascular Surgery. These specialties have a larger volume of operative procedures compared with other specialties. These cases mean that 15.1% of deaths could not be audited due to surgeon non-compliance.
- The return rate by specialty across other states and territories is comparable to the VASM return rates.⁽⁷⁾
- The audit process relies on active and ongoing compliance of surgeons. The introduction of mandatory participation for CPD compliance since January 2010 is hoped to lead to the full participation of treating surgeons.
- High non-compliance aggregate rates are reported to the participating hospitals via the Hospital Clinical Governance reports.
- It should be noted that orthopaedic surgical Fellows may choose to do their CPD through the Australian Orthopaedic Association, and gynaecological Fellows may choose to do their CPD through the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Fellows for which currently ANZASM audits are not mandatory however consideration is given to mandate the audit activities from 2017 for these surgical Fellows as well. The VASM would like to encourage those hospitals that have a high number of non-participating surgeons, as per the hospital governance report outcomes sent early February 2016 to review the approach to the VASM adopted by their surgical staff.

Figure 6: Hospital origin of cases that could not be reviewed due to non-participation by treating surgeon.



Note: total n=1,402.
 Audit period 1 July 2007 to 30 June 2015.
 Only hospitals with cases of a count of $\geq 0.5\%$ have been included in this analysis.

Comments:

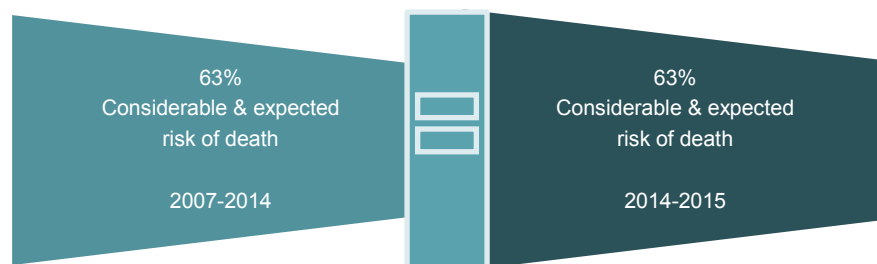
- Surgeons electing not to participate in 2014–2015 were concentrated in only a few hospitals.
- In each instance the hospital had agreed to participate by notifying deaths to the VASM. However, the responsible treating surgeons had not returned the SCFs and thus the audit process could not be completed for those cases.

6.4. Hospital Clinical Governance Reports

- The VASM released the first series of the national individualised Hospital Clinical Governance Reports in November 2014 and the second series has been rolled out in February 2016. The VASM and the ANZASM identify clinical management issues via independent peer review assessments to actively manage and improve patient safety. The audit developed strategies to redress these issues. This HCGR report uses a comprehensive data set that can assist accreditation of hospitals for certain National Safety and Quality Health Service (NSQHS) Standards such as; Standard 1 - Governance for Safety and Quality in Health, Standard 3 - Healthcare Associated Infections, Standard 6 - Clinical Handover, Standard 9 - Recognising and Responding to Clinical Deterioration in Acute Health Care and Standard 10 - Preventing Falls and Harm from Falls.
- The VASM has rolled out the HCGRs in February 2016 with de-identified and aggregated data. These reports enable benchmarking and monitoring of clinical management trends within a hospital as well as comparisons with other participating peer-grouped hospitals, both within the region and nationally. The HCGR can be presented and discussed at hospital clinical governance committee meetings, audit of surgical mortality management committee meetings, with the local health network (or similar) representative, as well as with hospital quality managers and DHHS representatives. Non-participation of Fellows and poor completion of the case record form diminishes the value of these quality assurance reports.
- The VASM currently is in the process of enhancing the Individual Surgeons Report and the Hospital Clinical Governance Reports, and has the objective of producing summarised Clinical Governance Reports that would highlight any problems hospitals may have.
- The RACS Research, Audit and Academic Surgery Division of RACS (through ASERNIP-S) is currently carrying out a review on ‘What makes a good Morbidity & Mortality meeting’ and aims to produce a booklet with educational guidelines and a checklist that will followed by a formal RACS position paper on the topic.
- Hospitals routinely ask for evidence of CPD and Mortality Audit compliance. The RACS will provide the confirmatory documentation of this to the surgeons concerned and the relevant Director of Clinical and/or Medical Services (if requested).

6.5. Demographics and characteristics of audited deaths

Table 3: Characteristics of audited deaths over the audit period.



Number of audited deaths		2007-2015	
		n=6,179	%
Mean age (range)		74 years	(<1 day to 104 years)
Age SD		19 years	
Median age		79 years	
Gender (male: female)		55%:	45%
Admission status (emergency: elective)		85%:	15%
ASA grade	ASA 1-2:	7%	
	ASA 3:	27%	
	ASA 4:	45%	
	ASA 5-6:	15%	
Risk of death prior to surgery	Expected:	13%	
	Considerable:	50%	
	Moderate:	25%	
	Small:	9%	
	Minimal:	3%	
Most common comorbid factors	Cardiovascular:	23%	
	Age:	19%	
	Respiratory:	13%	
	Renal:	10%	
	Neurological/psychiatric:	7%	
	Diabetes:	6%	
	Advanced malignancy:	5%	
	Obesity:	3%	
	Hepatic:	3%	
	Most common surgical diagnoses	Fracture of neck of femur:	19%
Carcinoma:		13%	
Intracranial haemorrhage:		11%	
Coronary artery disease:		7%	
Intestinal obstruction:		6%	
Abdominal aortic aneurysm:		5%	
Number of operative procedures performed	≥3:	9%	
	2:	16%	
	1:	75%	

Note: total n=6,179 and demographic data remained stable during the audit period 1 July 2007 to 30 June 2015.

Data not available: admission status n=18 (0.3%); ASA grade n=355 (6%); risk of death n=40 (1%), comorbid factors n=576 (3%).

Comorbidities describe coexisting medical conditions or disease processes that are additional to the primary diagnosis.

ASA: American Society of Anesthesiologists. The ASA physical status is an international measure of patient risk used by anaesthetists.⁽⁶⁾ SD; Standard deviation

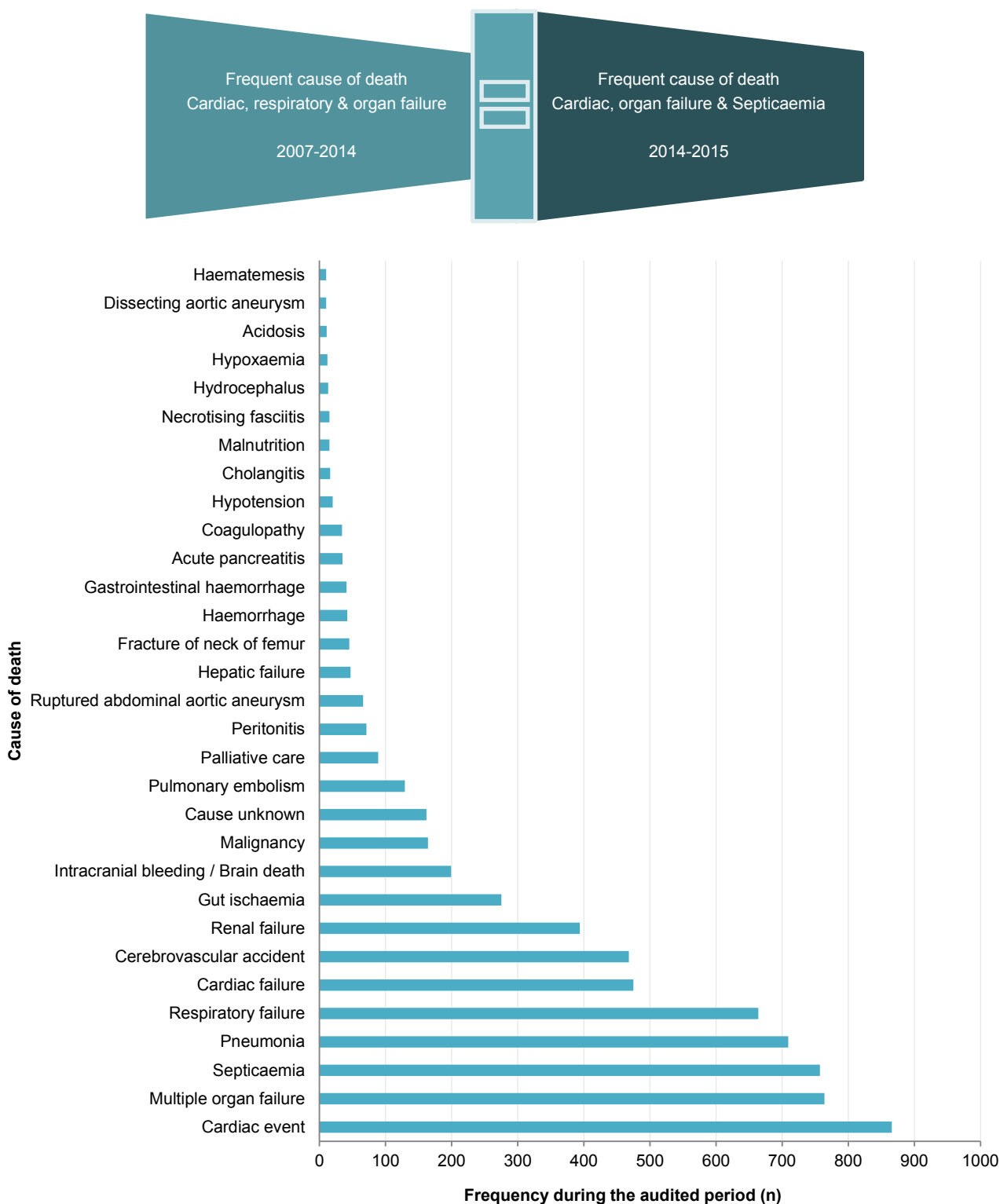
American Society of Anesthesiologists (ASA) grade characteristics:

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.

6.6. Establishing the cause of death

The cause of death recorded by the treating surgeon, as presented in Figure 7, 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. However, requests for postmortems are decreasing.

Figure 7: Frequency of reported causes of death.



Note: n=6,836 conditions were perceived to be responsible for death in 6,179 cases.

Audit period 1 July 2007 to 30 June 2015.

The cause of death is directly coded from the treating surgeon's statement. Once a code has a count of ≥ 10 across the audit period it is included in this figure by being grouped into larger overarching categories. This figure represents all 31 overarching categories of cause of death.

Comments:

- The next most frequently cited causes of death were multiple organ failure, 11.2% (764); septicaemia, 11.1% (757); pneumonia, 10.4% (709); and respiratory failure, 9.7% (664) in 6,836 conditions cited.
- The most frequently cited cause of death was cardiac event, with 12.7% (866/6,836) of cases. In many cases this reflects the terminal event and not the underlying pathology, and this has been identified as an issue in terms of the accurate completion of death certificates.⁽⁹⁻¹²⁾ The cardiac event category includes cardiac arrest, myocardial infarction and cardiogenic shock. The next most frequently cited causes of death were multiple organ failure, 11.2% (764); septicaemia, 11.1% (757); pneumonia, 10.4% (709); and respiratory failure, 9.7% (664).
- At times the cause of death is predictable as the existing comorbidities contribute to these as in a recent Australian study that highlighted, “potentially modifiable comorbidities are associated with poorer postoperative outcomes”⁽¹³⁾
- The number of postmortems performed, including coronial requested postmortems, was 17% (1,052/6,179) of cases. This rate remained constant during the full audit period and the reasons for the low rate of postmortem referrals remain unknown. Postmortems were performed in 21.6% (206/951) of elective cases and 15% (783/5,210) of emergency cases. It is known that postmortems are deemed to provide educational information and valuable insights, and these referral rates are of concern.⁽⁹⁻¹²⁾
- The cause of death identified by the coroner’s office and by the VASM has identified a high degree of concordance when the coronial diagnosis is used as the gold standard. A comparison of the VASM cause of death analysis with coronial data clearly demonstrated that coronial data provides independent verification of VASM data, even when a full internal postmortem examination has not been performed.⁽¹⁴⁾

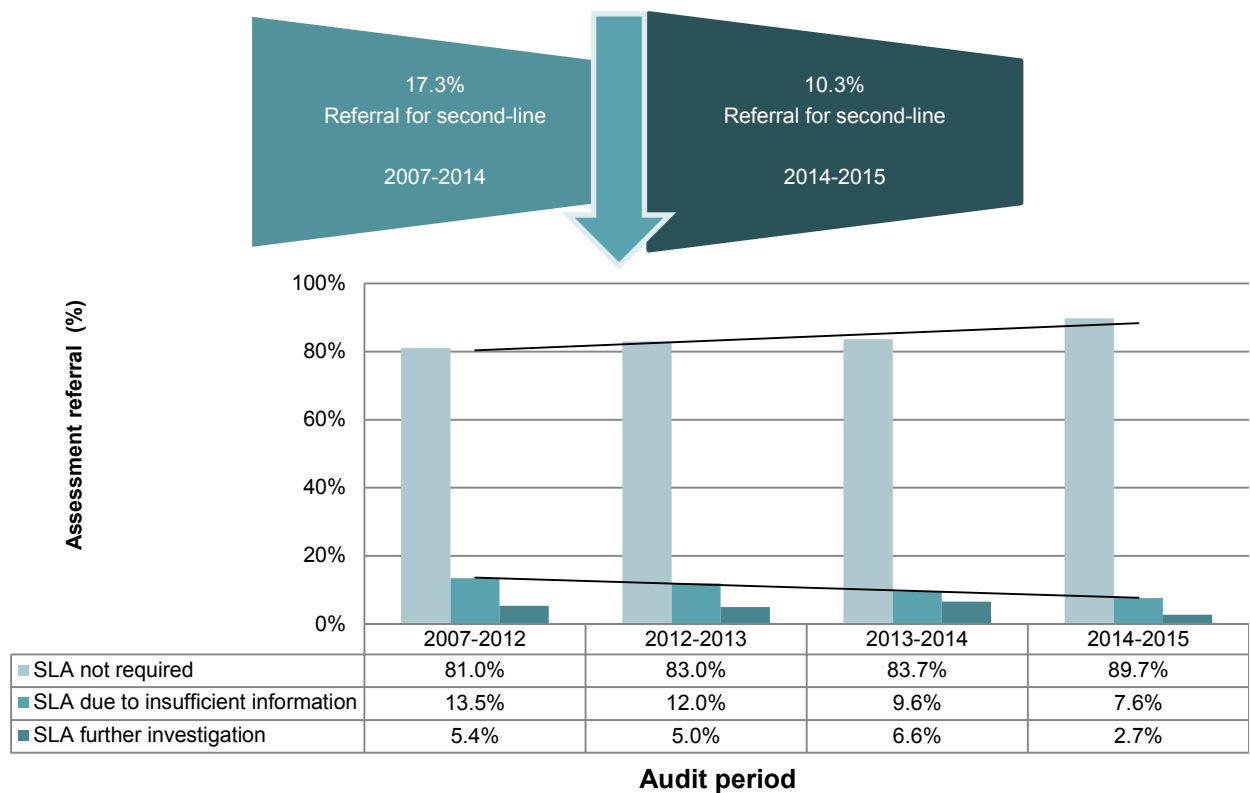
6.7. Peer review process

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 6,179 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 was deemed inadequate then an SLA or case note review was requested. Other triggers for requesting an SLA are:

- a more detailed review of the case is required, which could better clarify events leading up to death
- death is unexpected, for example in a young, fit patient with benign disease or a day surgery case
- insufficient information provided by the treating surgeon.

The number of SLAs required due to a lack of information provided in the SCF is an indirect measure of surgeon compliance in the audit process. SLAs required for the other triggers may represent suspected issues of clinical management. The lack of information provided in the SCFs has decreased since the beginning of the audit, but still requires improvement. The reasons given for referral for SLA are provided in Figure 8.

Figure 8: Reason for referral for second-line assessment (SLA).

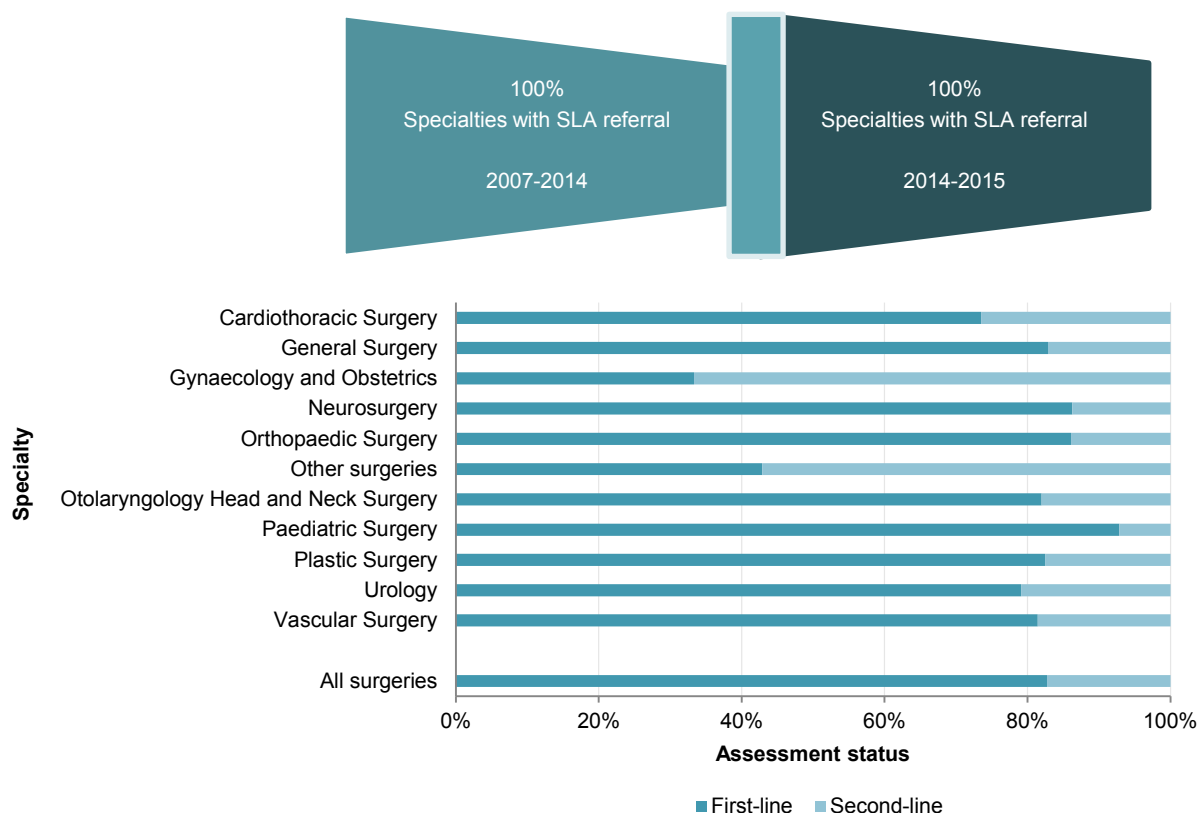


Note: total n=6,179.
 Audit period 1 July 2007 to 30 June 2015.
 Data not available: n=7 (<1%).

Comments:

- The need for SLA has decreased over time, in part because the quality of the information provided in the SCFs returned by treating surgeons has improved. The percentage of cases referred for SLA due to insufficient information has dropped significantly; from 13.5% in 2007–2012 to 7.6% in 2014–2015. Cases with an ASA score greater than or equal to 4 were significantly more likely to be referred for SLA ($p < 0.001$) (data not shown).
- In 82.8% (5,119/6,179) of audited cases the first-line assessor did not refer the case for SLA.
- 30.3% (319/1,052) of second-line assessment requests were made based on the need for a more detailed review of perceived issues of management.
- There have been improvements in the quality of the data provided to the VASM since 2007; however, ongoing issues remain with the quality of the data provided by some treating surgeons. Greater attention to detail in completing the SCF would help reduce the workload of colleagues who have agreed to act as first- and second-line assessors, and the quality assurance and medical records representatives at collaborating hospitals.
- In 24.2% (255/1,052) of SLAs at least one aspect of the patient medical record submitted to the assessor was deemed unsatisfactory from SLA pool that required further investigation. Criticisms included poor medical admission notes and follow-up records and unsatisfactory description of the 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 during a patient’s stay in hospital, is exacerbated by poor and inaccurate clinical notes.

Figure 9: Frequency of need for second-line assessment by specialty



Note: total n = 6,179.
 Audit period 1 July 2007 to 30 June 2015.
 Data not available: n=7 (<1%).
 Smaller specialties such as Oral/maxillofacial, Ophthalmology, Oncology and Trauma were excluded due to small numbers.

Comments:

- The need for SLA referral varied between specialties. Gynaecology had the highest percentage of cases referred for SLA; however no inferences can be made, as Gynaecology was a new specialty recruited in 2013.
- The need for referral for SLA was similar in metropolitan and rural regions (data not shown).

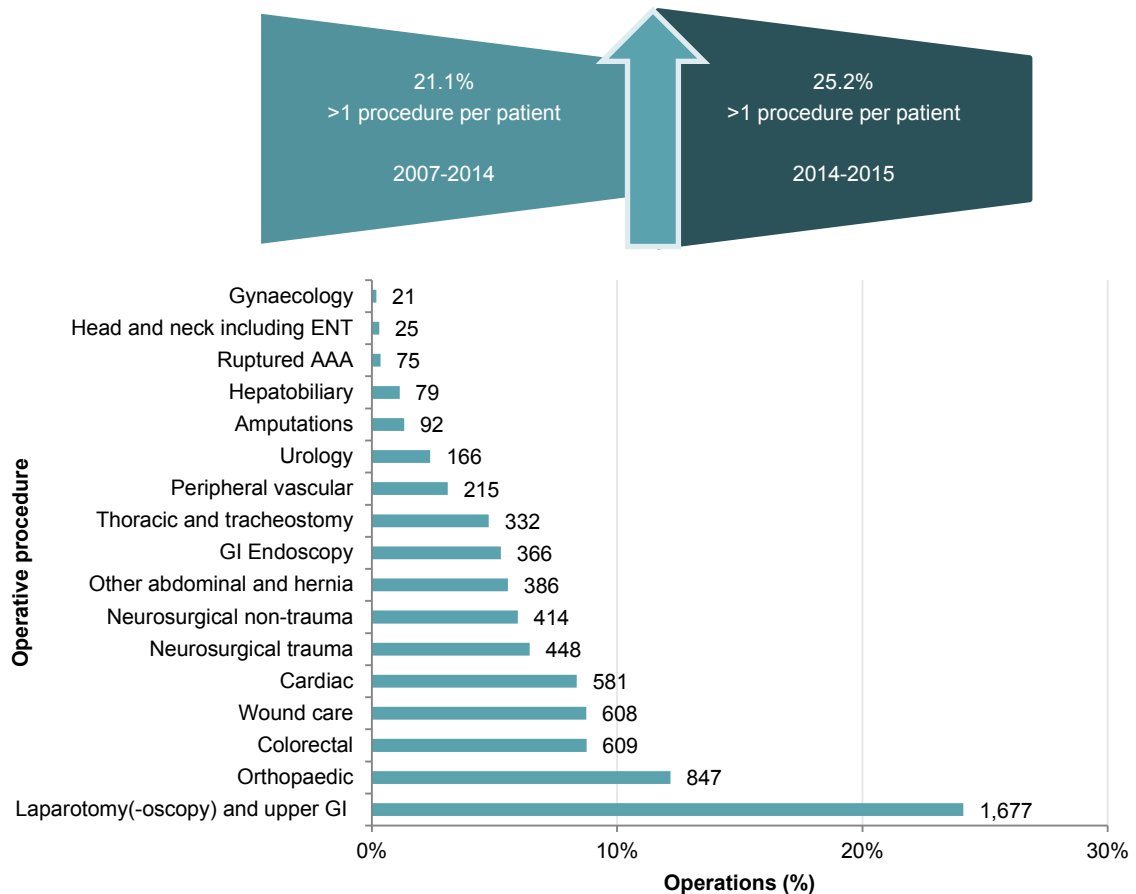
7. Clinical risk management

7.1. 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.

The role of the treating surgeon is to take responsibility for the overall success of the operation; they need to ensure that the operation proceeds smoothly and with the lowest possible risk of complications or an unplanned return to theatre.

Figure 10: Frequency of individual surgical procedures



Note: total n=5,184 patients having operative treatment (with 7,270 episodes).

Audit period 1 July 2007 to 30 June 2015.

Only procedures with a frequency >10 interventions have been recorded.

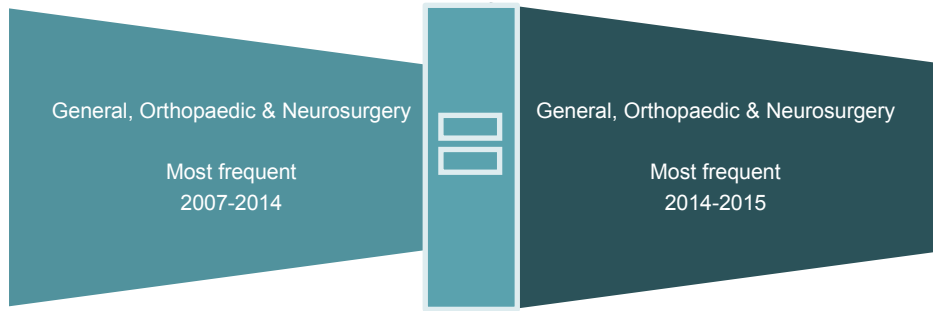
AAA: abdominal aortic aneurysm; GI: gastrointestinal; ENT: Ear, nose and throat.

The operative procedures were categorised in this annual report to group the operations for simpler classification. A breakdown of operative procedures is detailed in the 2015 VASM Technical Report.

Comments:

- There were 5,184 patients who underwent operative treatment (2007-2015). As a patient can undergo multiple procedures during the same admission, and at the same surgical session, 7,270 separate procedures were performed in total.
- During the last sequential year of the audit period 2014-2015 there was a 4.1% increase in the number of patients that had multiple surgical episodes. This increase has not reach statistical significance $p=0.8$. (data now shown)
- The most frequent procedures reported have usually been associated with laparotomy, laparoscopy and upper gastrointestinal (the most usual group of multiple procedures), and orthopaedic pathologies.

Table 4: Operative mortality frequency by specialty.



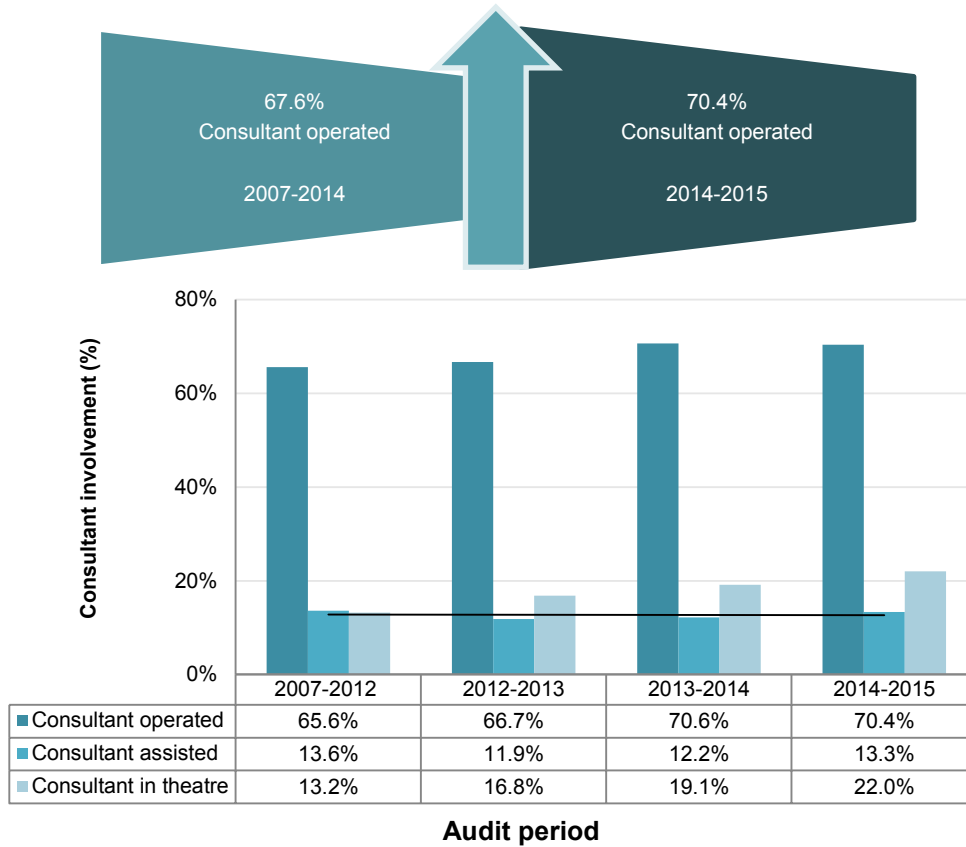
Specialty	Frequency (%)
General Surgery	2,073 (40.0%)
Orthopaedic Surgery	1,044 (20.1%)
Neurosurgery	617 (11.9%)
Cardiothoracic Surgery	560 (10.8%)
Vascular Surgery	449 (8.7%)
Urology	197 (3.8%)
Plastic Surgery	124 (2.4%)
Otolaryngology Head and Neck Surgery	56 (1.1%)
Paediatric Surgery	49 (0.9%)
Obstetrics and gynaecology	9 (0.2%)
Other surgeries	6 (0.1%)
Total	5,184 (100%)

Note: total n=7,270 episodes in 5,184 patients who had operative treatment.
 Audit period 1 July 2007 to 30 June 2015.

Comments:

- There is great variation by specialty in the rate of operative intervention over the audit period, attributable to the casemix and risk group of patients in each specialty. Only nine gynaecology patients were included in this report.
- The 97.9% (931/951) patients admitted electively who subsequently died had a higher rate of operative intervention than the 81.3% (4,238/5,210) patients admitted as emergencies ($p < 0.001$). This was not unexpected as most elective admissions to a surgical unit are for an operative procedure.
- Sometimes it is deemed inappropriate to continue with the procedure as occurred in 4.9% (354/7,270) procedures.

Figure 11: Seniority of surgeons performing surgery.

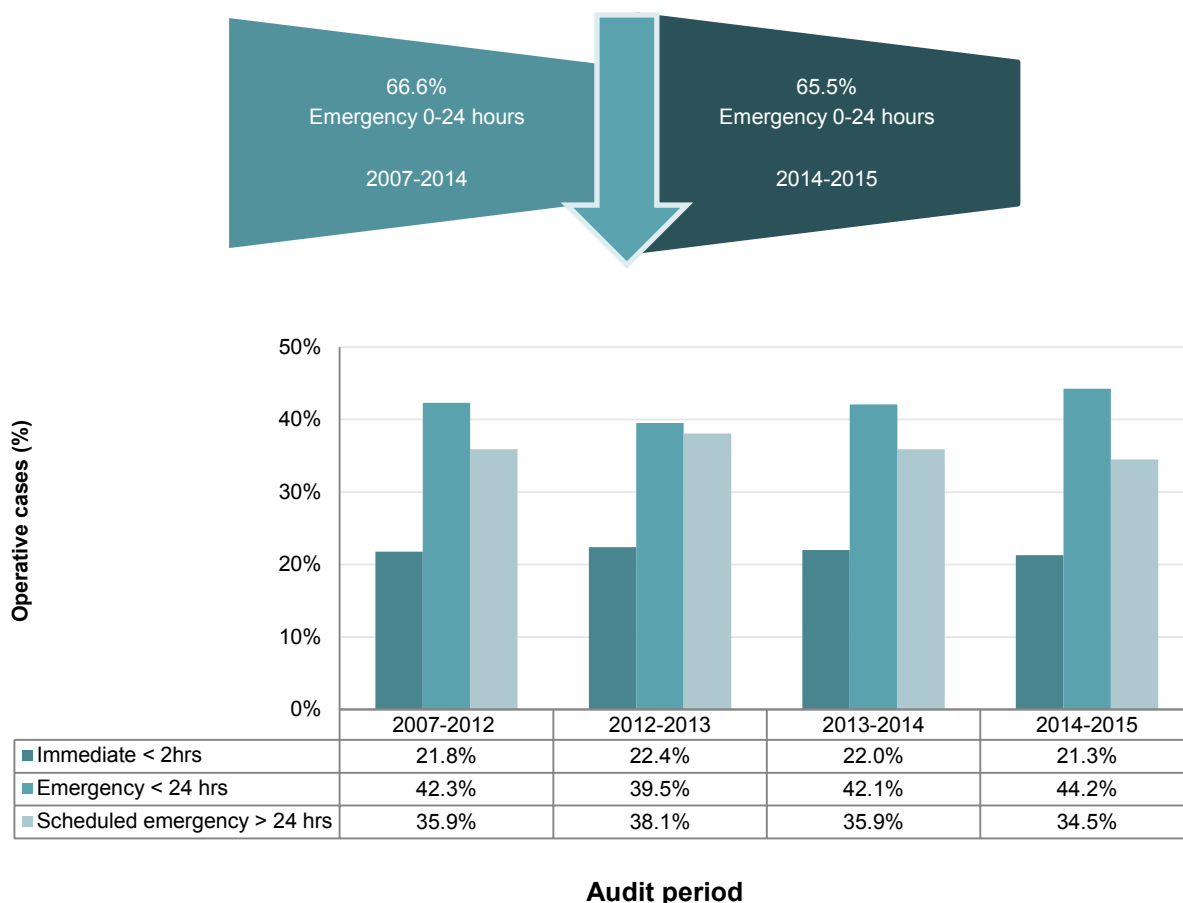


Note: total n=7,270 episodes in 5,184 patients having operative treatment.
 Audit period 1 July 2007 to 30 June 2015.
 The consultant operated exponential trend line is constant.

Comments:

- In 2014-2015 a consultant surgeon performed the surgery in 70.4% (666/859) of cases. The VASM would like to see a further increase in consultant involvement in surgical procedures. There is some bias in these figures as data accuracy has been poor in this section of the SCF. This increase in consultant involvement is appropriate when the risk profile of the audited cases is considered. The increase in active participation by consultants from 65.6% (2,539/3,870) in 2007-2012 to 70.4% (666/859) over the current audit period reached statistical significance ($p < 0.001$). The role of the consultant is to take responsibility for the overall success of the operation, thus their presence in theatre is crucial
- In 2014-2015 an anaesthetist was present in 96.1% (686/714) of cases in which there was an operative procedure (data not shown).

Figure 12: Timing of operative procedures in emergency admissions.



Note: total n=5,359 episodes in 4,238 emergency patients.
 Audit period 1 July 2007 to 30 June 2015.
 Data not available: n=294 (5.4%).
 Hrs: hours.

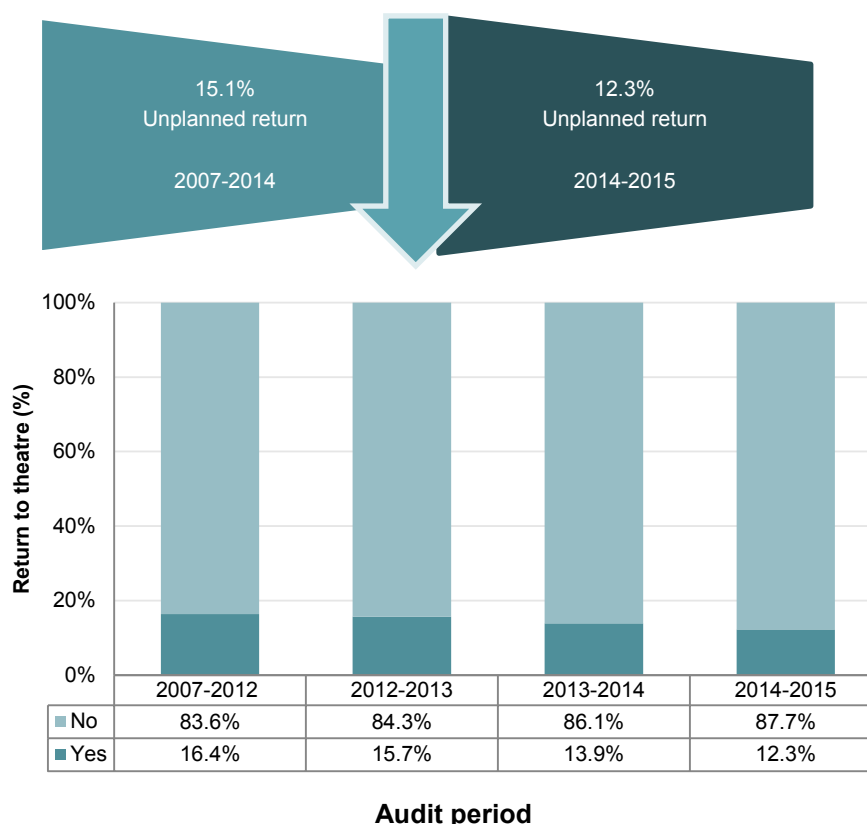
Comments:

- The time criticality of a patient’s condition predicts the timing of emergency surgery. Of the emergency admissions who underwent surgery, 21.8% (1,107/5,065) had surgery within 2 hours of admission, 42.1% (2,131/5,065) had surgery within 24 hours, and 36.1% (1,827/5,065) had surgery more than 24 hours after admission.
- During the audit period 63.9% (3,328/5,065) of 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.⁽¹⁵⁻¹⁷⁾

7.1.1 Unplanned return to the operating room

An unplanned return to the operating room is usually necessitated by the development of a complication requiring further operative intervention. Some complications following complex surgery are to be expected due to the pre-existing comorbidity profile, surgical risk status and the nature of the disease being treated. However, a high rate of return to the operating room can indicate that the care being provided could be improved, and it is an overall VASM, VSCC and DHHS goal to see the trend decreasing over future audit periods.

Figure 13: Unplanned return to the operating room



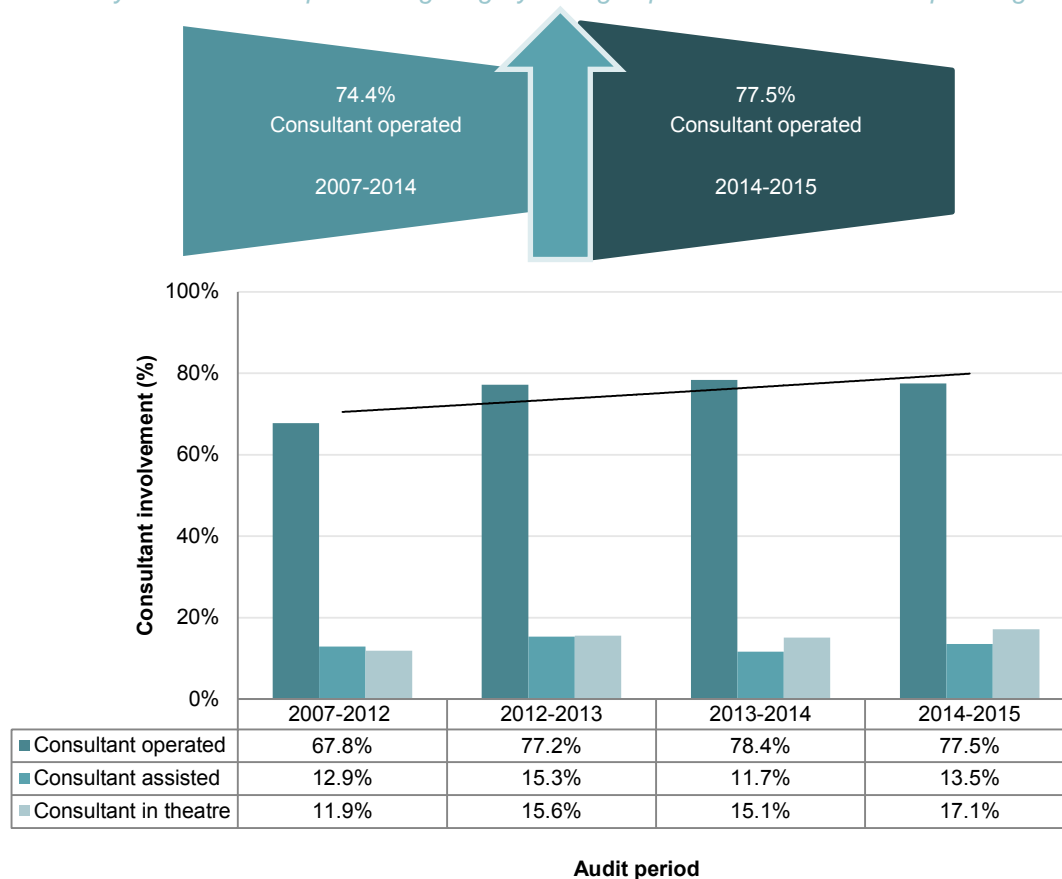
Note: total n=7,270 episodes in 5,184 patients having operative treatment.
 Audit period 1 July 2007 to 30 June 2015.
 Missing data: n=56 (<1%).

Comments:

- An unplanned return to the operating room was reported in 15.1% (785/5,184) of cases in which a surgical procedure was performed. These figures are similar to the national mortality audit findings.⁽¹⁸⁾
- There has been a slight variation of trends in the frequency of unplanned returns during the audit period, which dropped from 16.4% (442) in the 2007-2012 period to 12.3% (87) in the 2014-2015 period, which is not statistically significant, and an overall decrease in this over the audit period would be desirable.

The increased trend over time of senior consultants performing surgery at an unplanned return to the operating room is highly recommended and appropriate when considering the patient's surgical risk profile and operative complications (see Figure 14).

Figure 14: Seniority of consultants performing surgery during unplanned returns to the operating room.



Note: total n=1,991 episodes in 785 unplanned return to theatre patients.

Audit period 1 July 2007 to 30 June 2015.

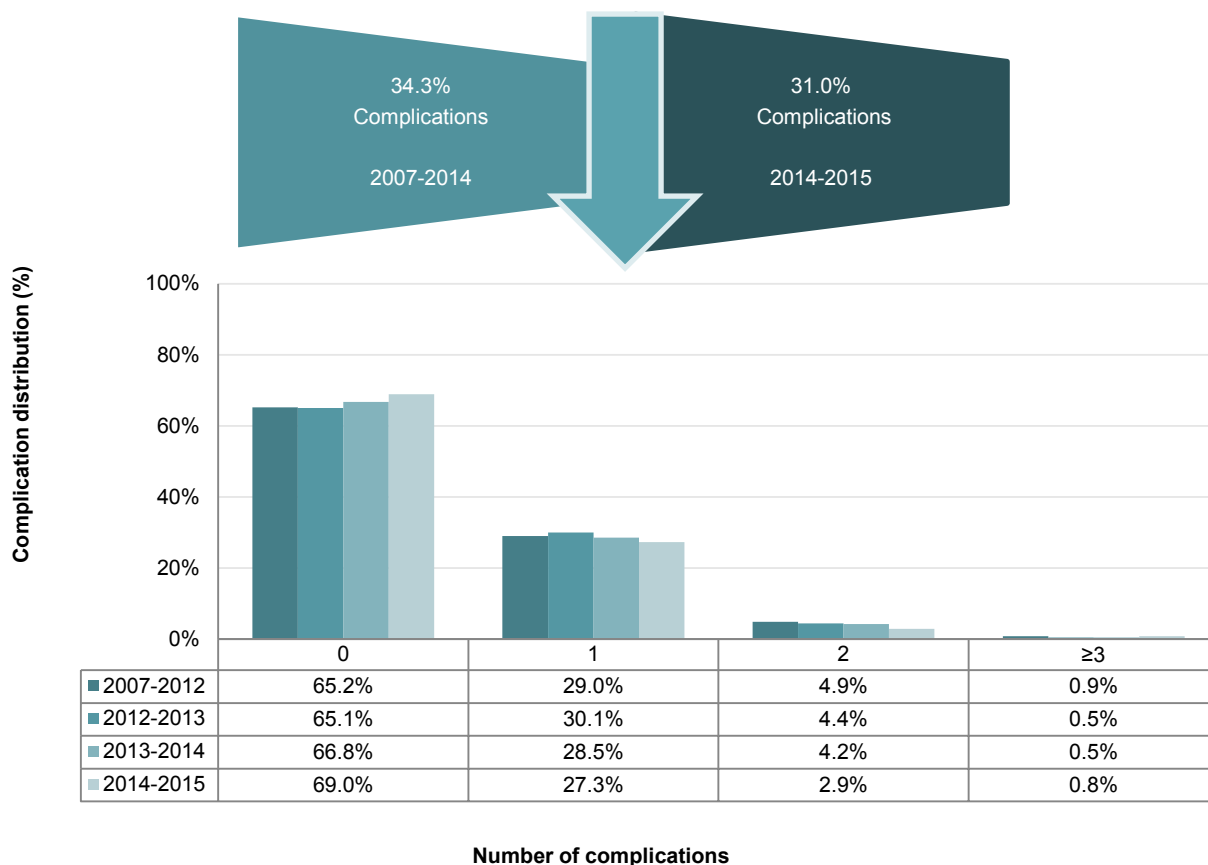
The consultant operated exponential trend line is curved which highlights considerable rise in consultant involvement.

Comments:

- Active consultant participation was exponentially higher in cases requiring an unplanned return to the operating room ($p < 0.001$). This result is appropriate as such cases are more challenging and the risks are greater.
- The frequency of unplanned returns to the operating room by surgical specialty is a reflection of the risk profile inherent in their casemix or surgical inferences (data not shown). Some surgical specialties are associated with higher complication risks than others.
- There were no major differences in unplanned returns to the operating room between metropolitan and rural regions. The seniority of surgeons operating in rural and metropolitan regions was also similar (data not shown).

7.1.2 Postoperative complications

Figure 15: Postoperative complications recorded by treating surgeon.

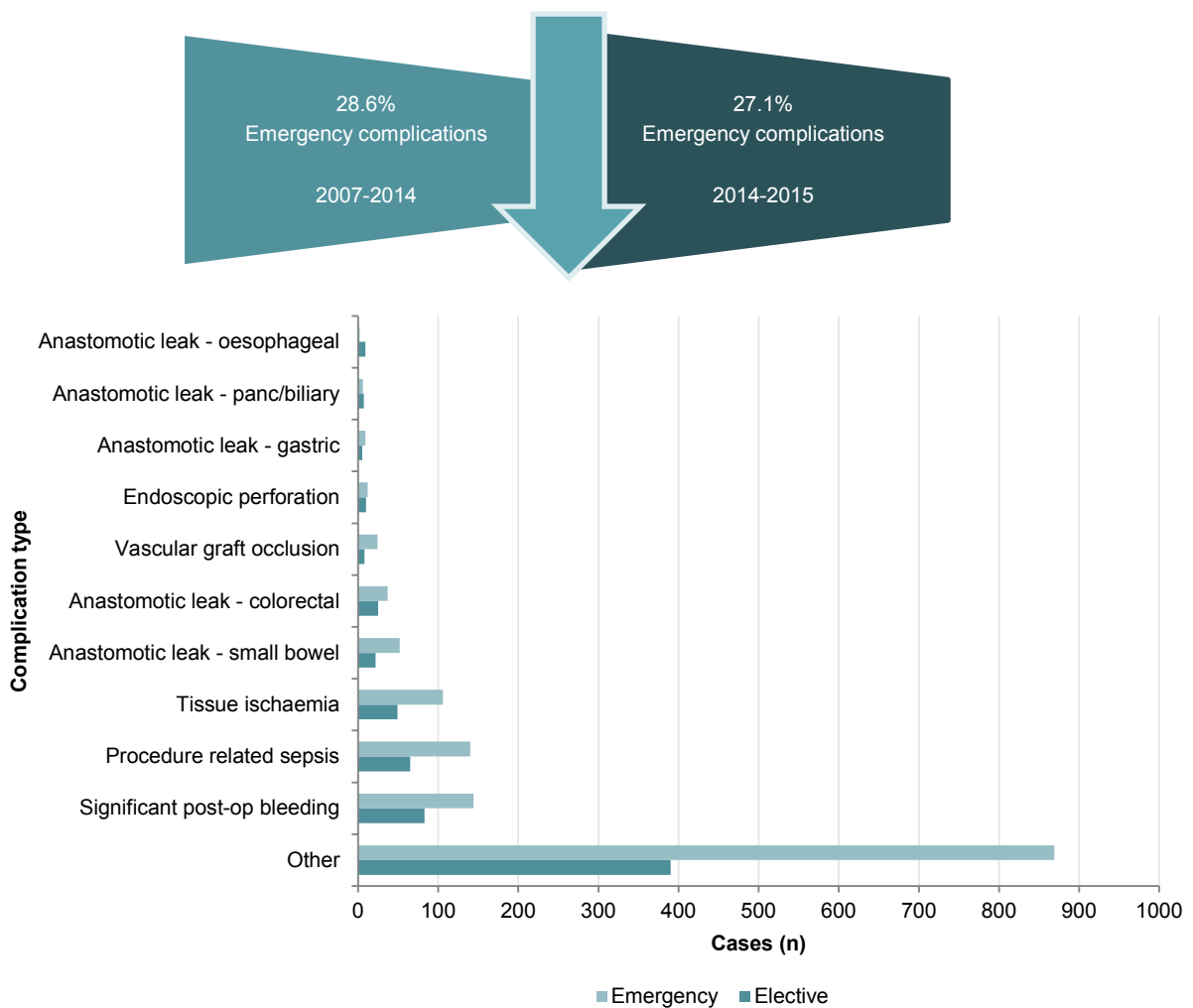


Note: total n=5,184 patients who underwent operative treatment.
Audit period 1 July 2007 to 30 June 2015.

Comments:

- The rate of postoperative complications reported by treating surgeons has remained low throughout the audit period, with a small decrease over time. Of the 65.9% (3,419/5,184) had no complications in the operative cases audited. A single operative complication was recorded in 27.5% (1,427/5,184) of cases.

Figure 16: Frequency of specific postoperative complications by urgency status.

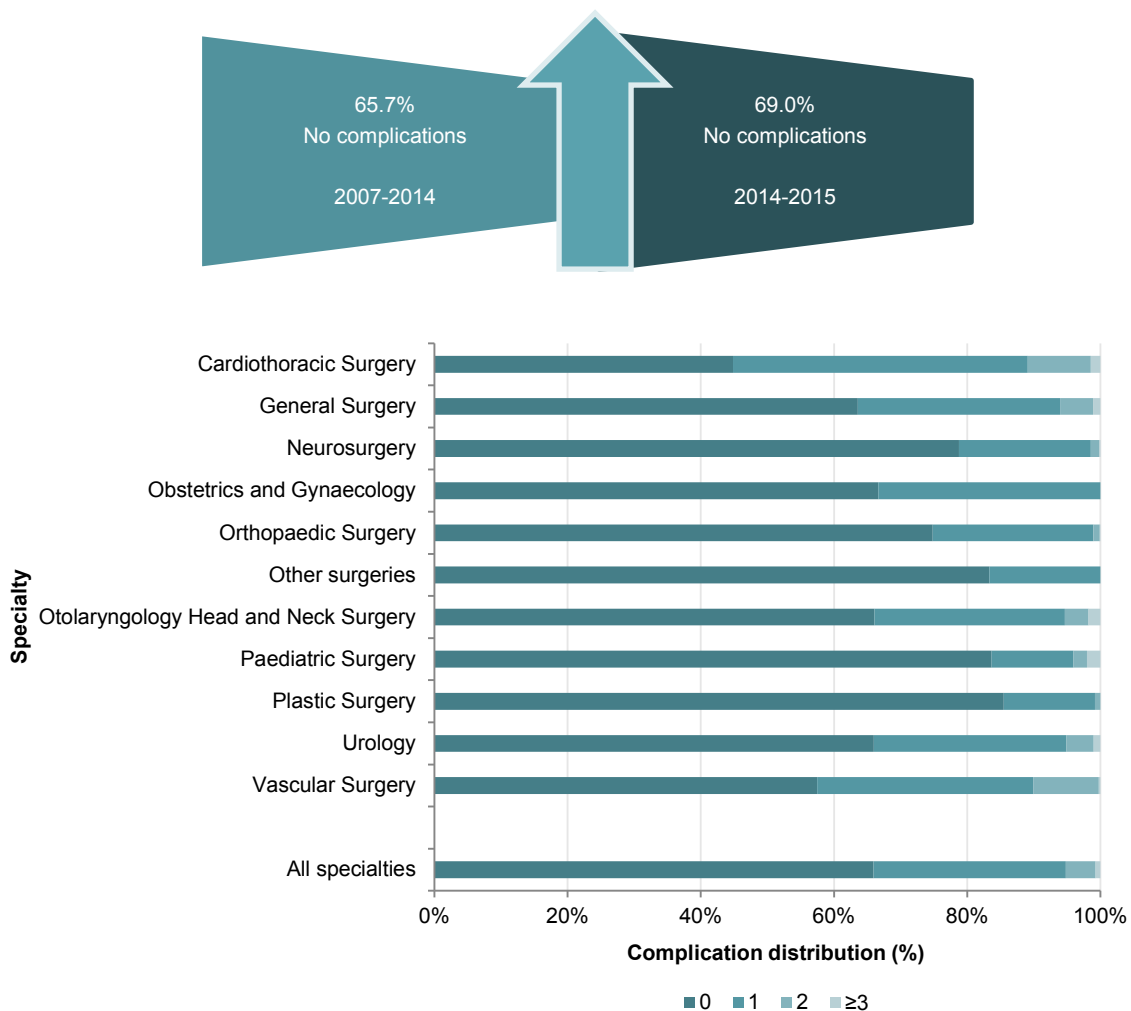


Note: total n=2,074 complications in 7,270 episodes for 5,184 patients who underwent operative treatment
 Audit period 1 July 2007 to 30 June 2015.
 Panc: pancreatic; post-op: postoperative.

Comments:

- Emergency cases are more likely to have postoperative complications.
- The audit pool contains 84.3% (5,210/6,179) cases admitted as emergencies and highlights the greater complication risk during surgical procedures (see Figure 16).
- A total of 1,259 'other' complications were identified, including: cardiac failure, intrapulmonary haemorrhage, intracerebral bleed, postoperative hypoxia, acute or chronic renal failure, paraplegia, liver failure, pneumonia, perforated viscus, pulmonary embolism, pyelonephritis, respiratory failure, seizures, sepsis, stroke and wound haematoma.

Figure 17: Postoperative complications by specialty.



Note: total n=5,184 patients having operative treatment.
 Audit period 1 July 2007 to 30 June 2015.
 Other surgeries include Oral/maxillofacial, Ophthalmology, Trauma, Transplant and Oncology.

Comments:

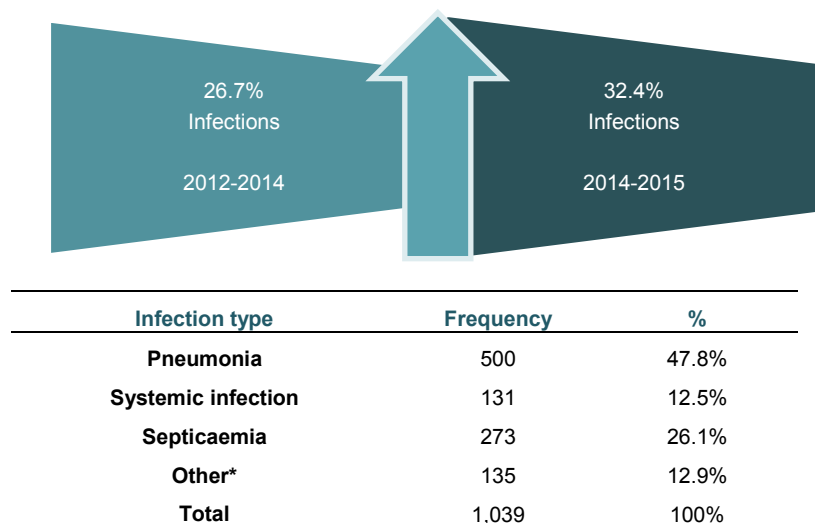
- There were differences in the rate of postoperative complications among the specialties, with cardiothoracic surgery having the highest number of procedures per patient.
- Only 9 gynaecology and 49 paediatric patients were included in this report.

7.2. Clinically significant infections

In 2012 the VASM started collecting data points on clinically significant infections. The VASM monitors trends and if the infections were acquired pre- or post-operatively from the available retrospective mortality data of infections at hospitals.

Table 5 and Table 6 outline the type and timing of infection respectively, while Figure 18 compares infection rates across the various surgical specialties.

Table 5: Clinically significant infections by type.



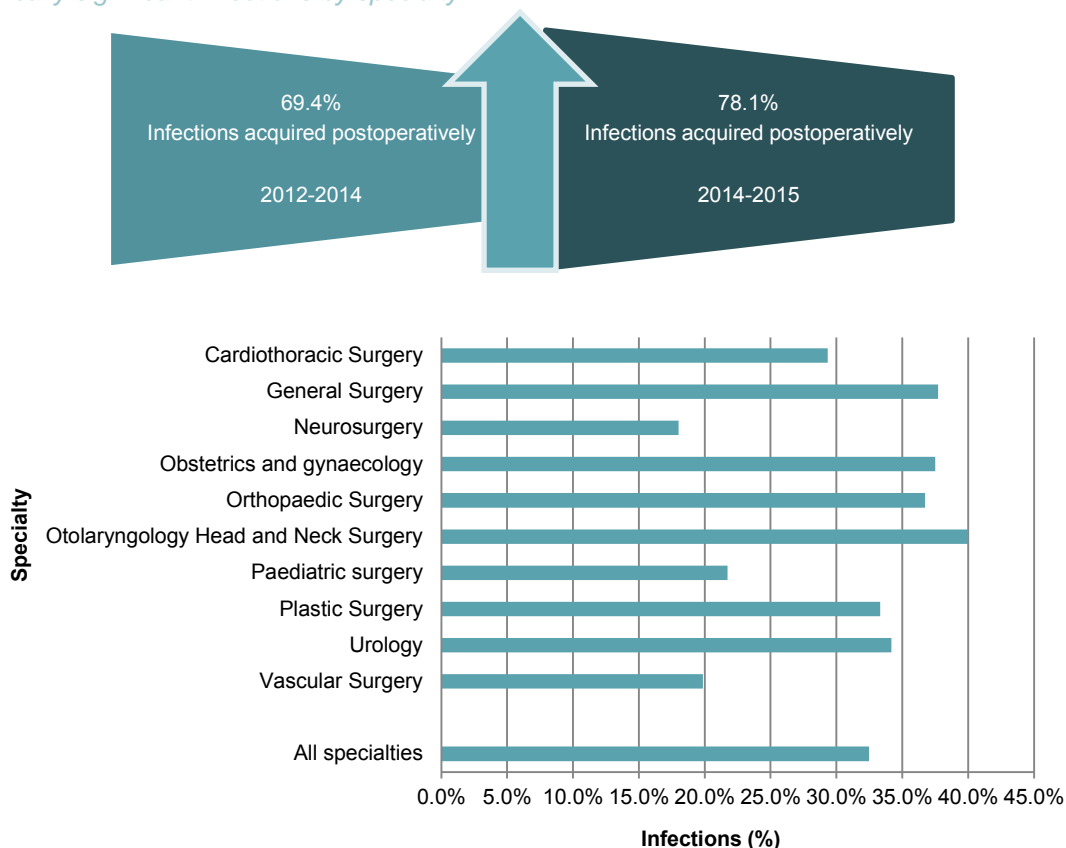
Note: total n=1,046 patients.

Audit period 1 July 2011 to 30 June 2015.

Other infections*: 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 organisms.

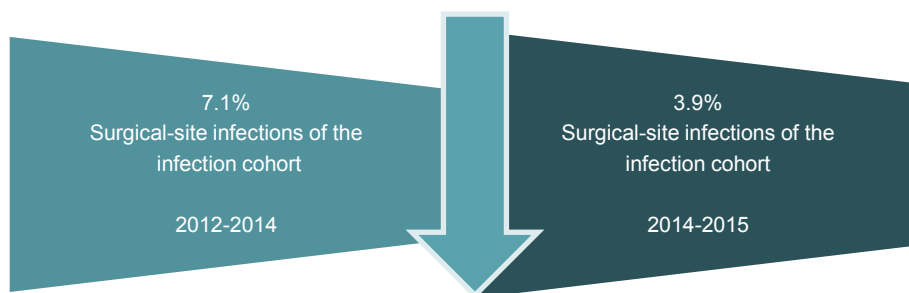
Data not available: n=7 (<1%).

Figure 18: Clinically significant infections by specialty.



Note: total n=1,046 patients.

Table 6: Time frame in which the clinically significant infection was acquired.



Infection time frame	2011-2012	2012-2013	2013-2014	2014-2015	Audit period
	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
Acquired preoperatively	15 (13.2%)	38 (21.2%)	24 (14.2%)	18 (14.1%)	95 (16.1%)
Surgical-site infection	11 (9.6%)	8 (4.5%)	12 (7.1%)	5 (3.9%)	36 (6.1%)
Acquired postoperatively	72 (63.2%)	124 (69.3%)	128 (75.7%)	100 (78.1%)	424 (71.9%)

Note: total n=1,046 patients with 590 incidences of noted infections and 128 of these were reported in 2014-2015.

Audit period 1 July 2011 to 30 June 2015.

Data not available: n=7 (<1%).

Freq: frequency.

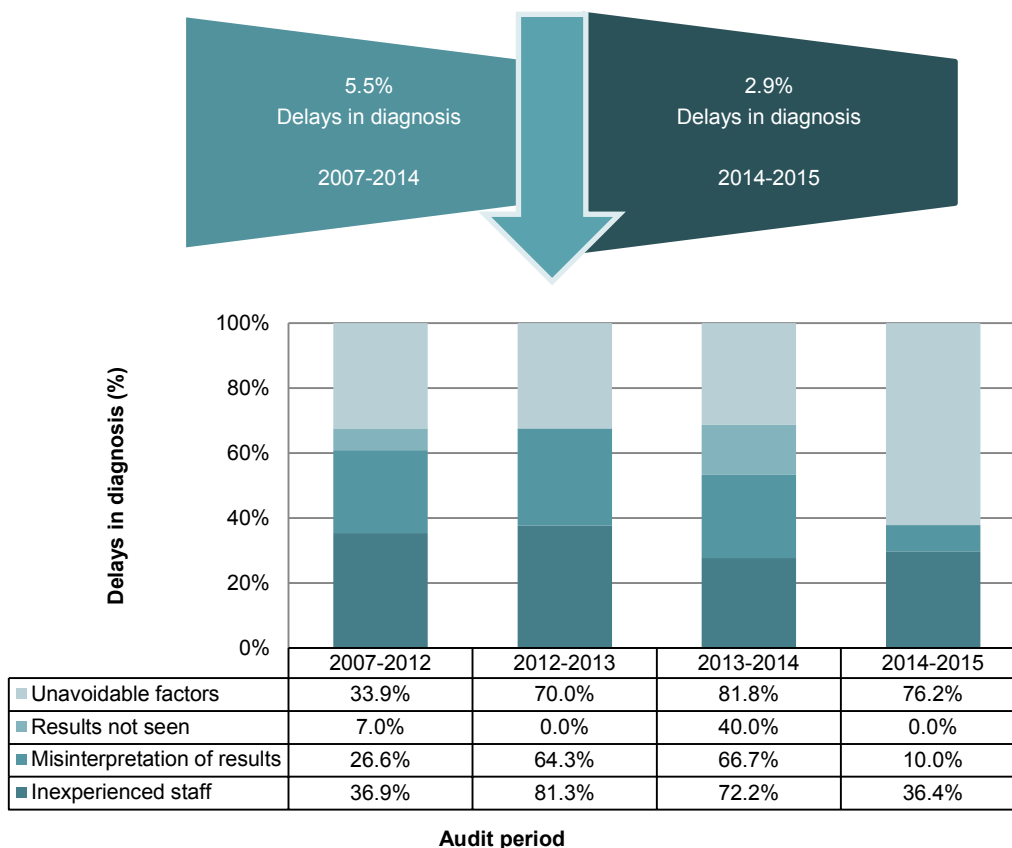
Comments:

- The time frame when the infection was acquired can play a role in the patient’s recovery following the surgical procedure.
- Infection was reported in 28.4% (1,046/3,679) cases audited since the data collection commenced for infections. The infection rate between emergency and elective admissions varies between 18.1% and 40.0% respectively.
- Pneumonia and septicaemia comprised 73.9% (773/1,046) of the cases where infection was identified of these cases 47.1% (364/773) were acquired postoperatively
- The infection rate across specialties varied, reflecting the casemix of individual specialties.
- 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 organisms.
- Strategies for implementing surgical site infections surveillance have been implemented overseas⁽¹⁹⁾ and in Australia.⁽²⁰⁾
- A standardised surgical site infections surveillance method was implemented in Victoria in 2002. Since implementation, a research study found a need to facilitate the refinement of recommended surgical antibiotic prophylaxis regimens and expand surveillance strategies on a national level.⁽²⁰⁾

7.3. Delay in diagnosis

Treating surgeons were asked to record any perceived delays in establishing a diagnosis and proceeding to definitive treatment.

Figure 19: Perceived delays in establishing a diagnosis.



Note: total n=289 issues identified in 266 patients of the 5,184 audited cases. Audit period 1 July 2007 to 30 June 2015.

Comments:

- The treating surgeons identified delays in diagnosis in 289 instances of the 266 cases with delays (individual cases can have multiple delay issues). The diagnostic delays were identified in 5.6% (289/5,184) of the operative audited cases. When cases were submitted to the first- or second-line assessment process, the incidence of perceived delay in patient care was 23.5% (1,217/5,184), higher than the incidence identified by treating surgeons.
- Delay in establishing a diagnosis has dropped from 5.5% in 2007-2012 to 2.9% in 2014-2015; however, this is only one facet of the concerning rate of delay in implementing definitive treatment shown in the clinical management issues section 7.9(data not shown).
- It is important to note that such delays are not always attributable to the surgical team. As published 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”.⁽²¹⁾

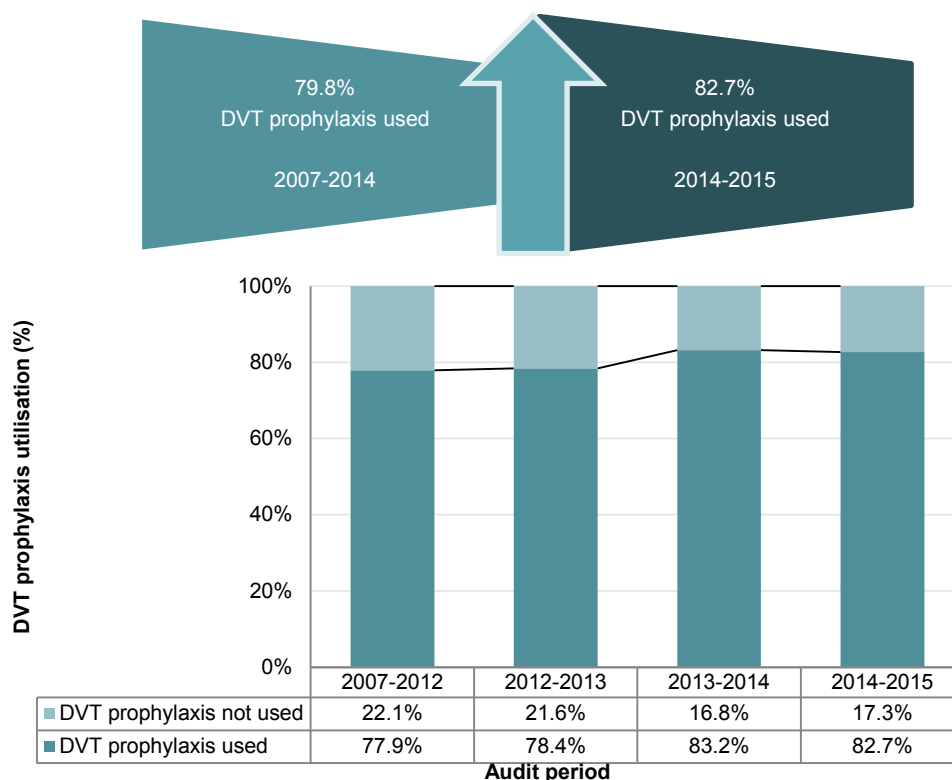
7.4. Deep vein thrombosis prophylaxis

The goal of this section is to identify if strategies are in place for treatment against the formation of deep vein thromboses and subsequent pulmonary embolism in patients at risk. There are effective pharmacological and mechanical preventive options available; however, DVT remains a major cause of mortality in hospital patients across Australia. The clinical practice guidelines for the prevention of venous thromboembolism in patients admitted to Australian hospitals^(4, 22) are reviewed and updated periodically to facilitate the best care available to patients.

The recommendations in the guidelines and the VASM report are intended to encapsulate the available evidence on the prevention of DVT. However, the guidelines should only be followed subject to the judgement of clinicians caring for individual patients and the patients' own preferences.

The treating surgeon has to record if DVT prophylaxis was given and what type of prophylaxis was actually used. The reasons given for not providing DVT prophylaxis are displayed in this section.

Figure 20: DVT prophylaxis use during the audit period.

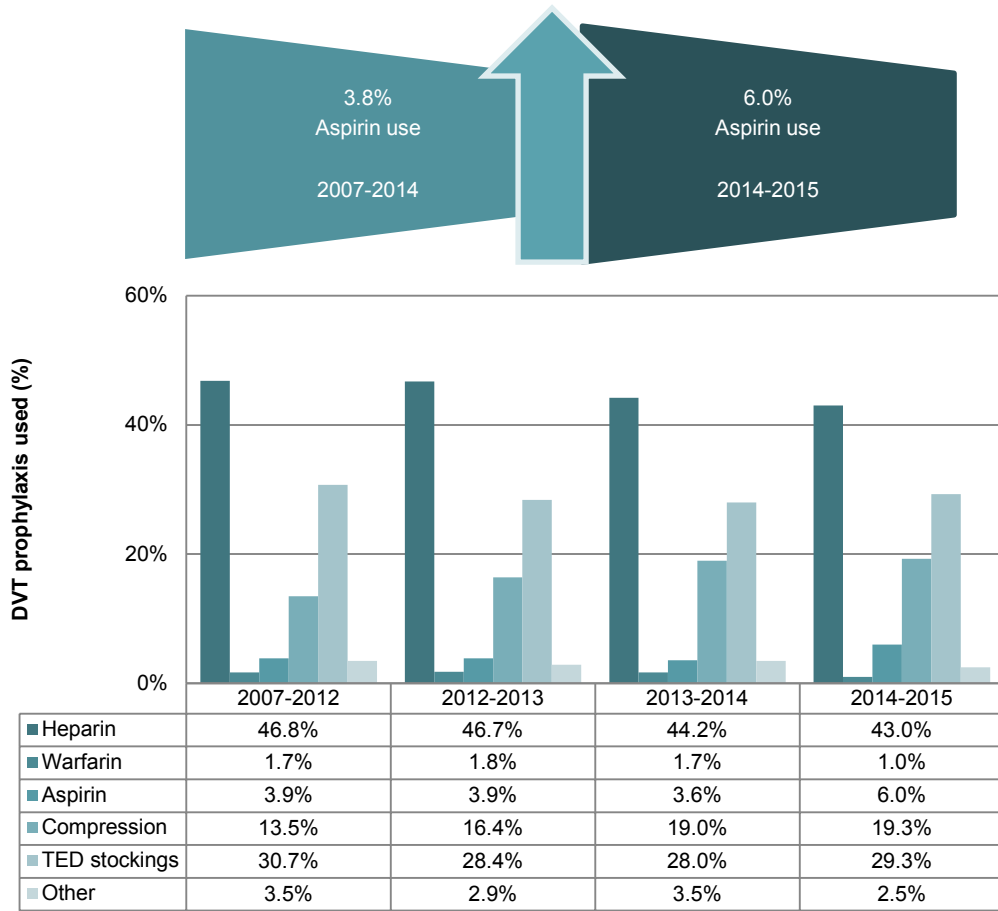


Note: total n=5,184 operative cases.
 Audit period 1 July 2007 to 30 June 2015.
 Data not available: n=86 (2%).
 DVT: deep vein thrombosis.

Comments:

- The use of DVT prophylaxis has risen slightly from 77.9% (2,088/2,679) in 2007–2012 to 82.7% (716/865) in 2014–2015 ($p < 0.05$).
- The VASM data suggests that use of DVT prophylaxis is similar in both elective and emergency cases (data not shown).

Figure 21: Type of DVT prophylaxis used.



Note: total n=6,971 agents used in 5,184 cases. One patient can have multiple prophylaxis used during surgical care.

Data not available: n=86 (2%) in 5,184 operative cases.

Audit period 1 July 2007 to 30 June 2015.

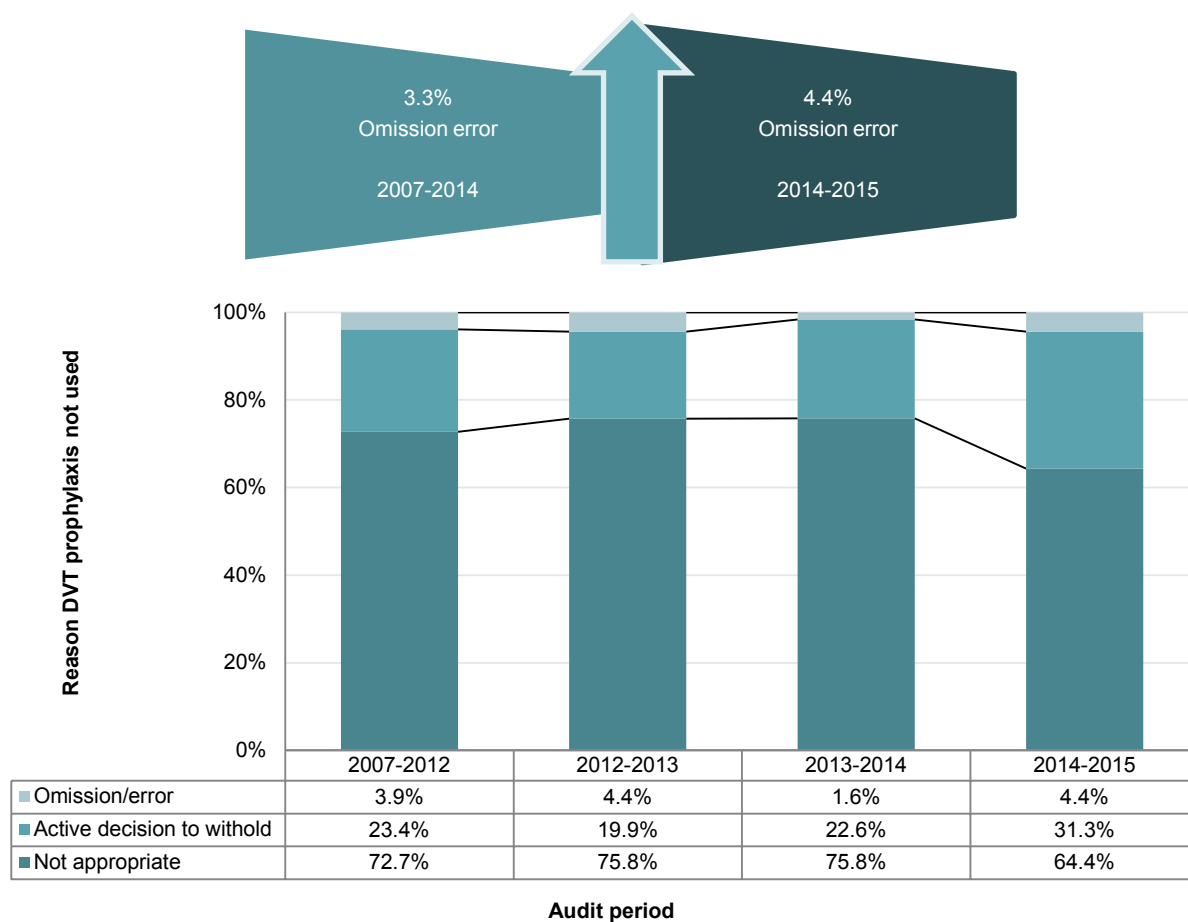
'Other' prophylaxis included: calf stimulators, Clexane, Fragmin, clopidogrel, enoxaparin, epidural, full anticoagulation for non-ST segment elevation myocardial infarction, and inferior vena cava filter and infusion.

TED: thromboembolic deterrent; DVT: deep vein thrombosis.

Comments:

- The increase in the use of Aspirin from 3.8% (137/3,357) to 6.0% (63/1,057) is statistically significant ($p < 0.001$).⁽²³⁾
- The spectrum of DVT prophylaxis used varies slightly over time with the greatest variance noted in Aspirin use.
- The type of prophylaxis used is subject to the judgement of clinicians caring for individual patients.

Figure 22: Reasons given by treating surgeon for not providing DVT prophylaxis.



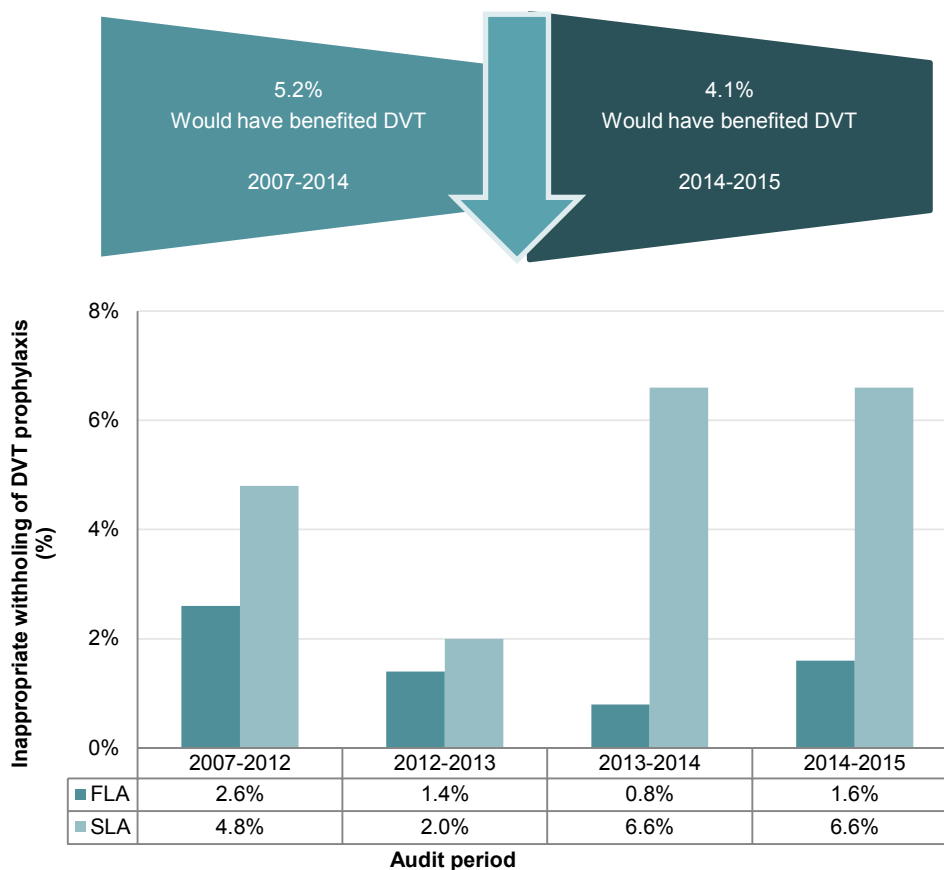
Note: total n=1,042 patients not receiving prophylaxis in 5,184 operative cases.
 Audit period 1 July 2007 to 30 June 2015.
 Data not available: n=86 (2%)
 DVT: deep vein thrombosis.

Comments:

- Overall, 20.1% of patients received no prophylaxis (1,042/5,184). In the majority of these cases in 95.7% (871/1,042) this was a conscious decision by the treating team.
- The omission rate has increased from 3.9% (20/591) in 2007-2012 to 4.4% in 2014-2015 (5/115) although this was not statistically significant ($p=0.07$).

Assessors were asked to comment on the appropriateness of withholding prophylaxis as outlined in Figure 23.

Figure 23: Assessor perception of appropriateness of decision to withhold DVT prophylaxis.



Note: total n=1,042 patients not receiving prophylaxis in 5,184 operative cases.
 Audit period 1 July 2007 to 30 June 2015.
 Data not available: n=86 (2%) in 5,184 operative cases.
 DVT: deep vein thrombosis; FLA: first-line assessment; SLA: second-line assessment.

Comments:

- Assessors (FLA and SLA) felt that the decision to withhold DVT prophylaxis on clinical grounds was appropriate in the majority of cases (74.2%; 774/1,042).
- Assessors (FLA and SLA) felt that in only 3.6% of cases in which a patient did not receive DVT prophylaxis they would have benefited from it (37/1,042). This percentage has decreased over time in successive audit years but this encouraging trend has not reached statistical significance ($p=0.076$).
- The assessors (FLA and SLA) could not accurately assess the appropriateness of the decision to withhold DVT in 17.2% of cases due to insufficient evidence in the audit documentation (180/1,042).
- The tendency of second-line assessors to be more critical than FLA of clinical management events was foreseeable, as second-line assessors have the opportunity to review patient medical records.

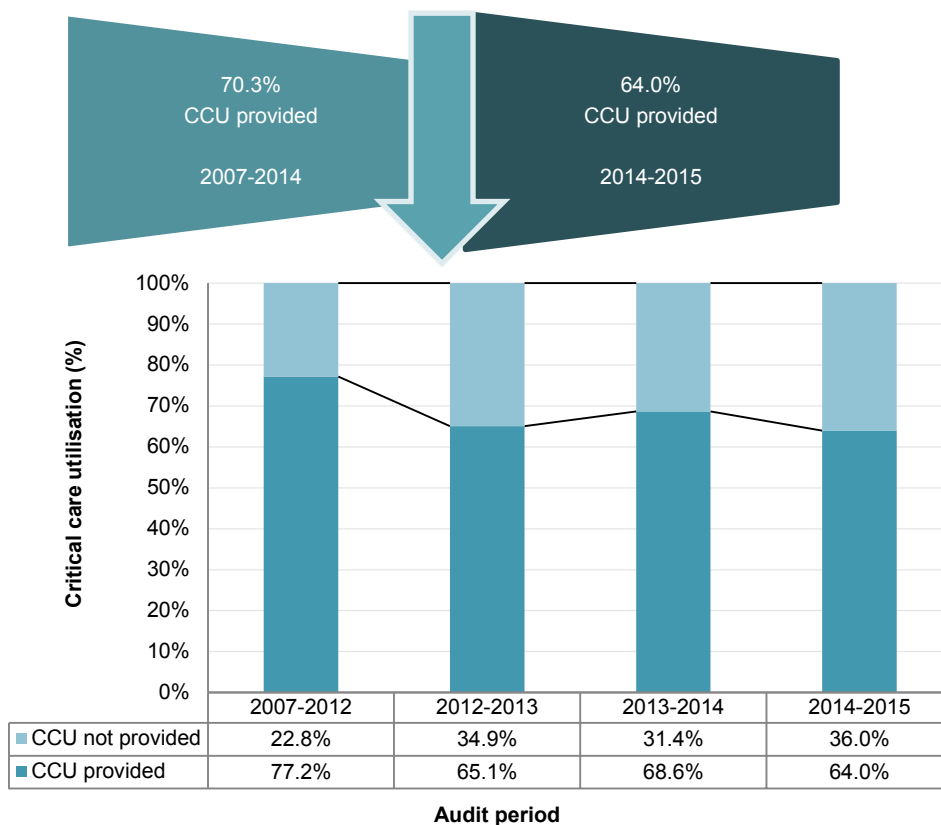
7.5. Adequacy of provision of critical care support to patients

Critical care is essential to support acute medical admissions as they represent the most seriously ill group of patients.

Ideally, critical care facilities should be co-located with the emergency department and surgical departments especially in larger acute hospitals. A close working relationship between the surgical team and the critical care unit (CCU) is essential, although not all surgical patients require critical care support.

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

Figure 24: Provision of critical care support

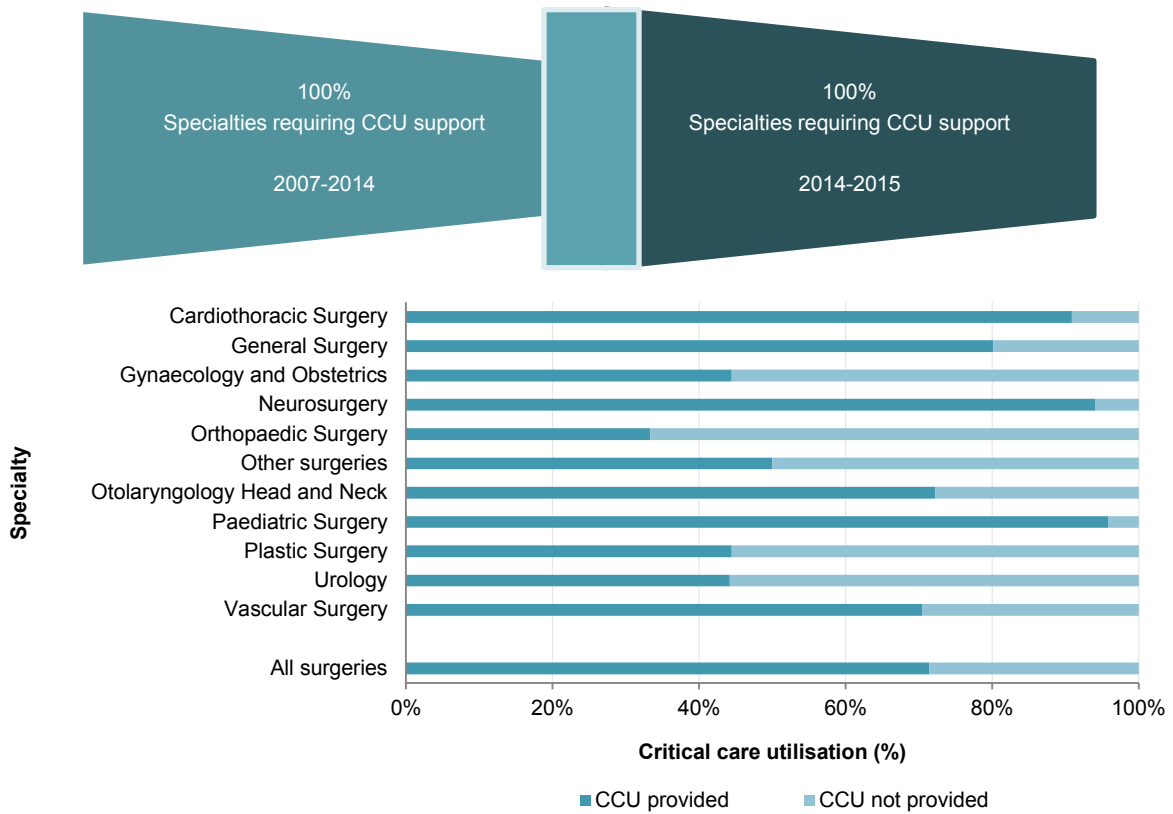


Note: total n=5,184 operative cases,
 Audit period 1 July 2007 to 30 June 2015.
 Data not available: n=422 (8%).
 CCU: critical care unit.

Comments:

- This question was reframed in 2010 to make it more informative and reduce the amount of missing data. The data collected from 2007 to 2010 has been remapped to the current data format.
- During their inpatient hospital stay, 66.6% (3,402/5,184) of patients received critical care support.
- The utilisation of critical care support has steadily increased, from 44.6% (42/94) in 2007-2008 to 64.0% (400/623) in 2014-2015.
- The use and need for critical care is higher in emergency cases.
- It should be acknowledged that not all hospitals have critical care services and should therefore triage patients accordingly. Analysis of 4,514 cases identified a slight, statistically insignificant difference in CCU usage between rural hospitals (63.7% of patients received CCU care) and metropolitan hospitals (67.4% of patients received CCU care).

Figure 25: Provision of critical care support to patients by specialty.



Note: total n=5,184 operative cases.
 Audit period 1 July 2007 to 30 June 2015.
 Data not available: n=422 (8%).
 'Other surgeries' include: Oral/maxillofacial, Ophthalmology, Trauma, Transplant and Oncology.
 CCU: critical care unit.
 Specialties

Comments:

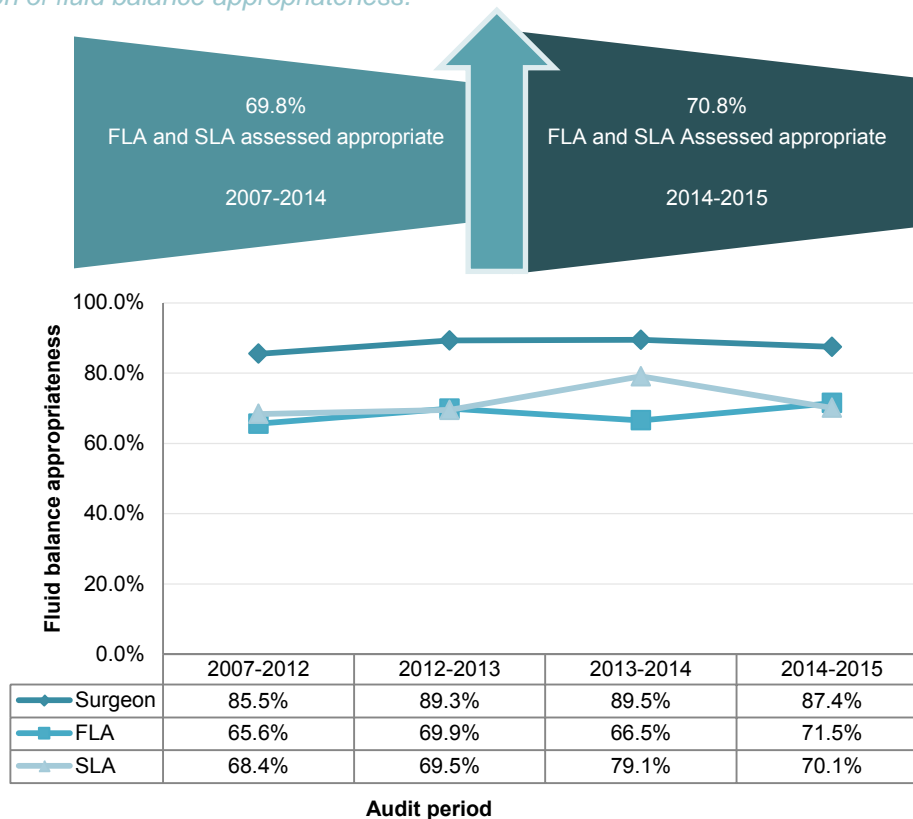
- Similar to previous years, orthopaedic patients have low referral rates for critical care support. This is thought to be due to a high number of elderly patients with fractured neck of femur admitted from high-level care institutions.
- The treating surgeon perceived that a lack of critical care support was potentially an issue in only a very small percentage 23 in 1,809 (<1%) of their cases.
- The peer review process (FLA and SLA) suggested that only 8.2% (169/2,048) of patients who did not receive critical care support were likely to have benefited from it.

7.6. Issues with fluid balance

Deciding on the optimal amount of intravenous fluids to be administered to surgical patients and the best rate at which to give them can be complex. The treatment decisions must be based on careful assessments of the patient's individual needs. The overall goal is to provide enough fluid and electrolytes to meet losses, maintain the normal status of body fluid compartments and enable renal excretion of waste products. Surgical consultants and the clinical teams should be competent in fluid management strategies.

The treating surgeon and all assessors were asked to comment on the appropriateness of fluid balance during the episode of care.

Figure 26: Perception of fluid balance appropriateness.



Note: total SCF n=5,184, FLA n=5,184, SLA n=1,074.

Audit period 1 July 2007 to 30 June 2015.

Data not available: SCF: n=103 (2%); FLA: n=154 (3%); SLA: n=32 (3%).

Comments:

- The treating surgeon felt that fluid balance had been managed appropriately by their clinical team in 87.1% (4,424/5,081) of cases.
- Fluid balance was assessed as inappropriate in the combined groups of first- and second-line assessors in 18.8% (202/1,074) of cases that underwent SLA.
- A recent study on the interaction between fluid balance and disease severity of the critically ill patient found that “early adequate fluid resuscitation together with conservative late fluid management may provide better patient outcomes”.⁽⁵⁾

7.7. Trauma

In the audit period 2011-2012 the 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 Table 7).

The VASM monitors trends, especially in falls, to ensure strategies are implemented to prevent and minimise harm from falls in the future.

Table 7: Causes of trauma



Trauma causes	2011-2012	2012-2013	2013-2014	2014-2015	Audit period
Fall at home	52 (41.6%)	92 (40.5%)	105 (42.0%)	77 (41.0%)	326 (41.3%)
Fall in a care facility	28 (22.4%)	91 (40.1%)	76 (30.4%)	54 (28.7%)	249 (31.5%)
Fall in hospital	11 (8.8%)	8 (3.5%)	12 (4.8%)	16 (8.5%)	47 (5.9%)
Fall type unknown	2 (1.6%)	3 (1.3%)	6 (2.4%)	5 (2.7%)	16 (2.0%)
Fall other*	8 (6.4%)	13 (5.7%)	19 (7.6%)	10 (5.3%)	50 (6.3%)
Road accident	19 (15.2%)	16 (7.0%)	23 (9.2%)	19 (10.1%)	77 (9.7%)
Violence	5 (4.0%)	4 (1.8%)	9 (3.6%)	7 (3.7%)	25 (3.2%)
Total	125 (100%)	227 (100%)	250 (100%)	188 (100%)	790 (100%)

Note: total n=790 patients.

Audit period 1 July 2011 to 30 June 2015.

Data not available: n=27 (3%).

*includes roads and public venues.

Comments:

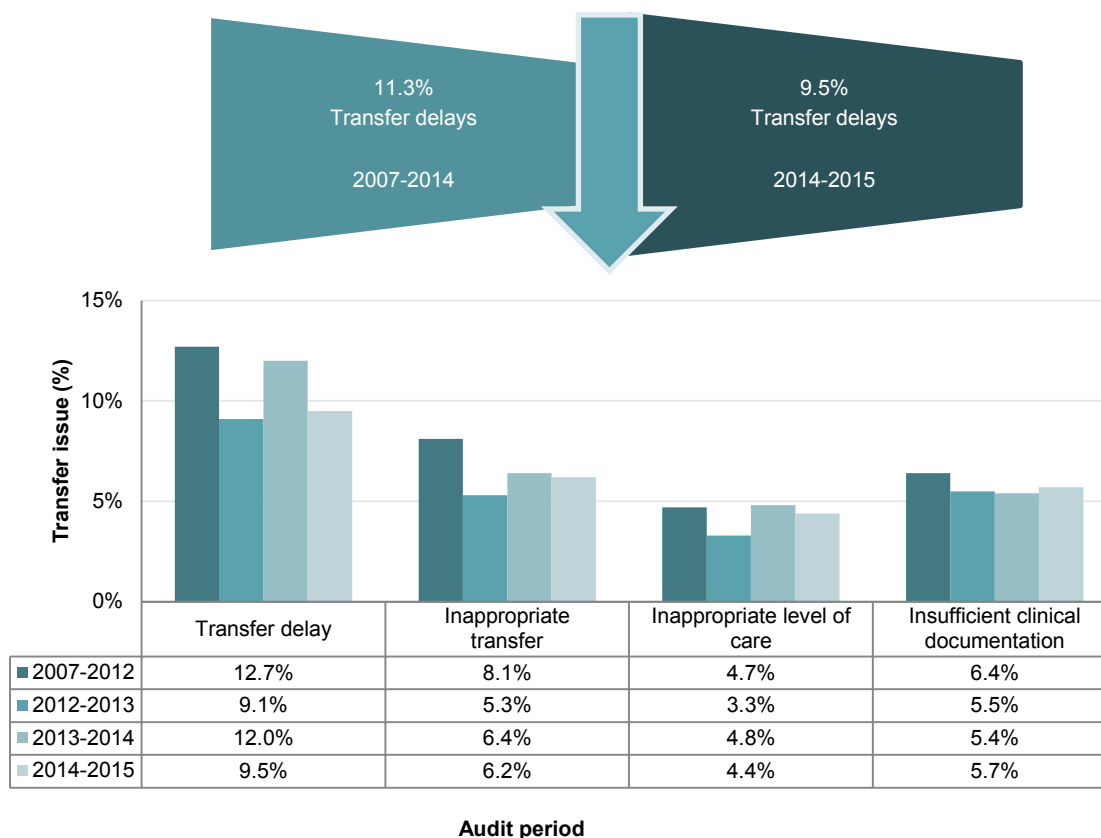
- 21.5% (790/3,679) of mortalities reported since January 2012 were attributed to trauma.
- Of the traumatic events, 87.1% (688/790) were caused by falls, 9.7% (77/790) were caused by traffic accidents and 3.2% (25/790) were victims of violence.
- 43.1% (296/688) of falls occurred in hospitals or care facilities 47.3% (326/688) falls occurred at home, and only 9.5% (66/688) elsewhere.
- 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 or improved at hospitals, and care facilities should be improved where possible.
- A review of patient care received by elderly patients undergoing surgery in the UK had similar findings.⁽²¹⁾ Future analysis should provide greater insight into strategies for improvement in this aspect of patient care, especially when falls occurred in a care facility and in hospital. In an Australian study, hospital falls were attributed to the quality of Victorian coded data on external cause of injury due to a fall.⁽²⁴⁾
- The VASM would like to see a reduction in fall trends in the years to come and will therefore include this in its educational programs. A study found a reduction in postoperative falls in patients who participated in a preoperative education program.⁽²⁵⁾ The value of reviewing falls in trauma and orthopaedic cases can be a powerful tool to unite institutions motivated to assess changing demographics and standards of treatment, and ultimately institute change.⁽²⁶⁾ Therefore, similar educational strategies could be implemented at Victorian health care facilities.

7.8. Patient transfer issues

The treating surgeon was asked to provide information on patients who required interhospital transfer as part of their care, and this included information on the timeliness and appropriateness of the transfer.

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

Figure 27: Interhospital transfer issues.



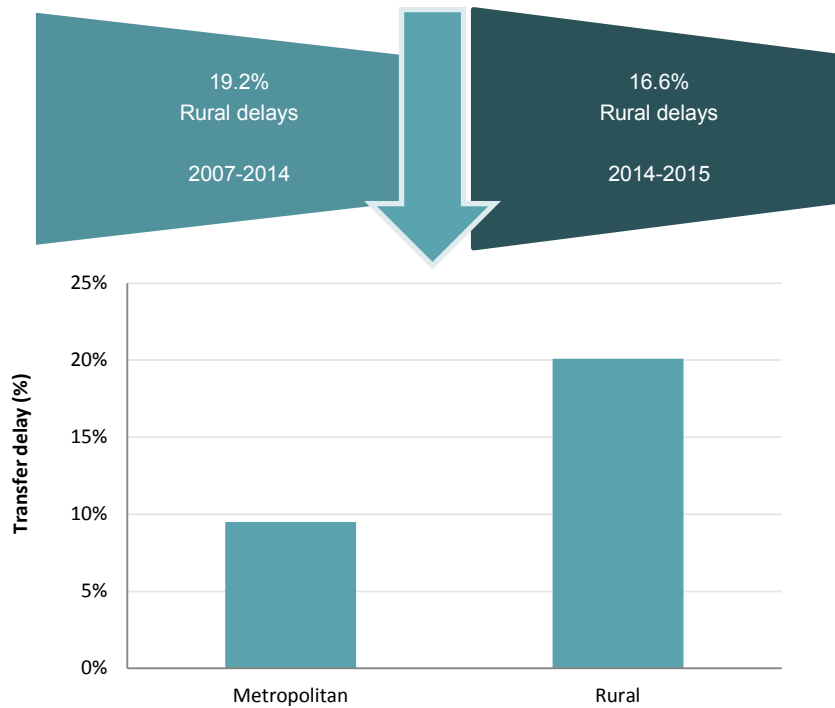
Note: total n=366 transfer issues in 1,181 transfer cases.
Audit period 1 July 2007 to 30 June 2015.

Comments:

- The patient underwent a transfer to another hospital in 22.7% (1,181/5,184) of cases.
- The frequency of patients requiring transfer for definitive care has remained similar throughout the audit period
- Various issues of care related to transfers were identified in 30.9% (366/1,181) of patients requiring transfer. Figure 27 demonstrates the spectrum of all issues identified by surgeons.
- Inappropriate level of care during transfer was identified in 4.2% (50/1,181) of cases.
- It was felt that inadequate clinical information and documentation had been provided to the receiving hospital in 5.6% (67/1,181) of cases.
- In 11.1% (130/1,181) of cases it was felt that the transfer had occurred inappropriately late in the course of the illness.
- Delays and problems in transfer can cause risks and challenges posed by shared care. There is a need to improve the safety of patient care in such settings and implement clear communication channels with relevant patient care teams.

7.8.1 Transfer delays by region

Figure 28: Perceived delays in transfer of patients to another hospital.



Note: total n=1,181 transfers in 5,184 operative cases.
 Audit period 1 July 2007 to 30 June 2015.

Comments:

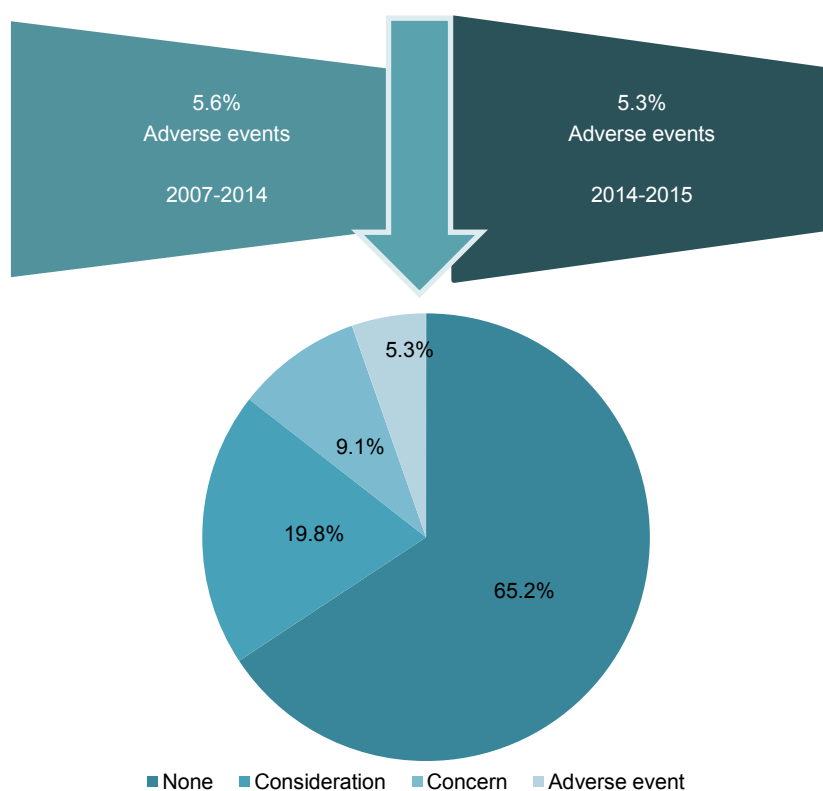
- A major reason for transfer is to attain a higher level of care, such as access to critical care support, and it is expected that rural hospitals will have a greater need to transfer patients. However, RACS supports the Rural Doctors Association of Victoria’s recommendation that there should be greater support and round the clock availability of well-trained rural doctors to ensure that appropriate care is provided to the patient prior to transfer.⁽²⁷⁾
- Transfer problems were more frequently seen in rural regions (20.1%; 43/214) than metropolitan areas (9.5%; 87/915). This result was statistically significant ($p < 0.001$). During the last sequential year 2014-2015 of the audited period VASM noted a reduction of 2.6% in rural delays that is commendable.

7.9. Outcomes of the peer review

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 patient management 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, the VASM has specified a spectrum of criticism from which the assessor can choose, as outlined below.

- 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 separation, or which contributed to or caused death.

Figure 29: Clinical management issues as identified by assessors.



Note: total n= 6,179 cases.
Audit period 1 July 2007 to 30 June 2015.
Data not available: n=21 (<1%).

Comments:

- 65.2% (4,026/6,179) of cases had no identified clinical management issues.
- Minor issues of patient management were perceived to have occurred in 19.8% (1,221/6,179) of cases.
- Areas of concern were identified in 9.1% (561/6,179) of cases.
- In 5.3% (330/6,179) of cases assessors identified a clinical issue serious enough to be categorised as an adverse event.

7.9.1 Areas of clinical incidents

Table 8: 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

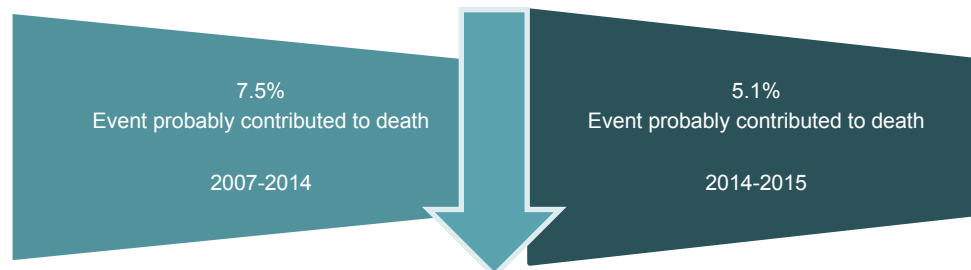


Table 9: Frequency of clinical management issues during the audited period.

Degree of criticism of patient management	Total occurrences (n=8,431 in 6,179 cases)	Patients affected by clinical issues (n=6,179 (%))
No issues identified	4,046	4,046 (65.4%)
Area of consideration	2,636	1,221 (19.8%)
Area of concern	1,202	561 (9.1%)
Area of adverse event	480	330 (5.3%)
Missing data	67	21 (0.4%)
Total	8,431	6,179 (100%)
Perceived impact on patient outcome	Total occurrences (n=8,431 in 6,179 cases)	Patients affected by clinical issues (n=6,179)
No issues of management identified	4,046	4,046 (65.4%)
Did not affect clinical outcome	1,000	489 (7.9%)
May have contributed to death	2,748	1,251 (20.2%)
Probably contributed to death	403	316 (5.1%)
Missing data	234	77 (1.3%)
Total	8,431	6,179 (100%)
Perceived preventability of clinical issues	Total occurrences (n=8,431 in 6,179 cases)	Patients affected by Clinical issues (n=6,179)
No issues identified	4,046	4,046 (65.4%)
Definitely preventable	533	379 (6.1%)
Probably preventable	1,723	795 (12.9%)
Probably not preventable	1,494	732 (11.8%)
Definitely not preventable	163	96 (1.6%)
Missing data	472	131 (2.2%)
Total	8,431	6,179 (100%)
Clinical team* responsible for management issue	Total occurrences (n=8,967 in 6,179 cases)	Patients affected by clinical issues (n=6,179)
No issues identified	4,046	4,046 (65.4%)
Surgical team	2,081	1,152 (18.6%)
Other clinical team	1,033	309 (5.0%)
Hospital issue	279	64 (1.1%)
Other factors*	257	64 (1.1%)
Missing data	1,271	544 (8.8%)
Total	8,967	6,179 (100%)

Audit period 1 July 2007 to 30 June 2015.

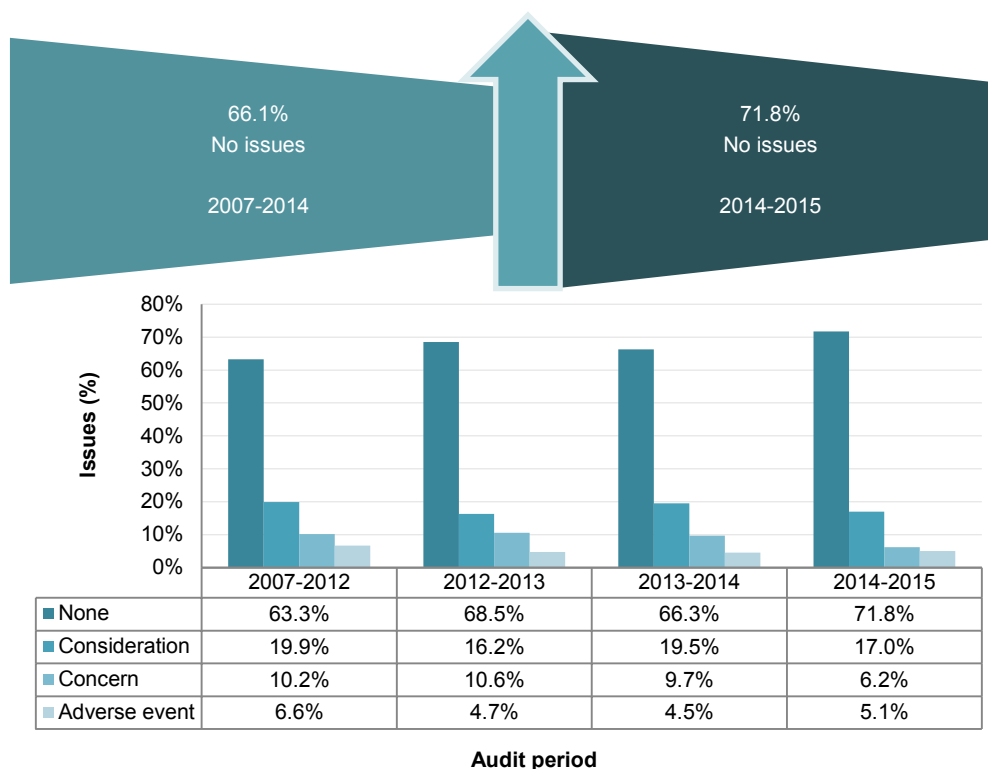
*Other factors can include issues such as staffing levels, patient transfer, patient refusal, ambulance care, anaesthetic care and availability or quality of critical care support.

* More than one clinical team can be responsible for a management issue.

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 may be attributable to any of these teams.
- Assessors perceived that clinical management issues occurred in 34.1% (2,112/6,179) of cases.
- A clinical management issue was identified that was attributed to the surgical team in 18.6% (1,152/6,179) of cases. Clinical management issues were attributed to other clinical teams (e.g. medical and emergency departments) in 5% of cases, to hospital issues in 1.1% of cases, and to other factors in 1.1% of cases. In 8.8% of cases the assessors did not identify the responsible team.
- Assessors felt that clinical management issues probably contributed to death in 5.1% (316) of patients. In the remaining cases in which management issues were perceived, the impact of those issues on the outcome was uncertain. Assessors determined that the clinical management issues were definitely or probably preventable in 19.1% (1,174) of patients with clinical issues.
- These findings are similar to the national mortality audit results.⁽⁷⁾

Figure 30: Trends of clinical management issues as assessed by assessors (FLA and SLA).



Note: total n=6,179.
 Audit period 1 July 2007 to 30 June 2015.
 Data not available: n=19 (<1%).

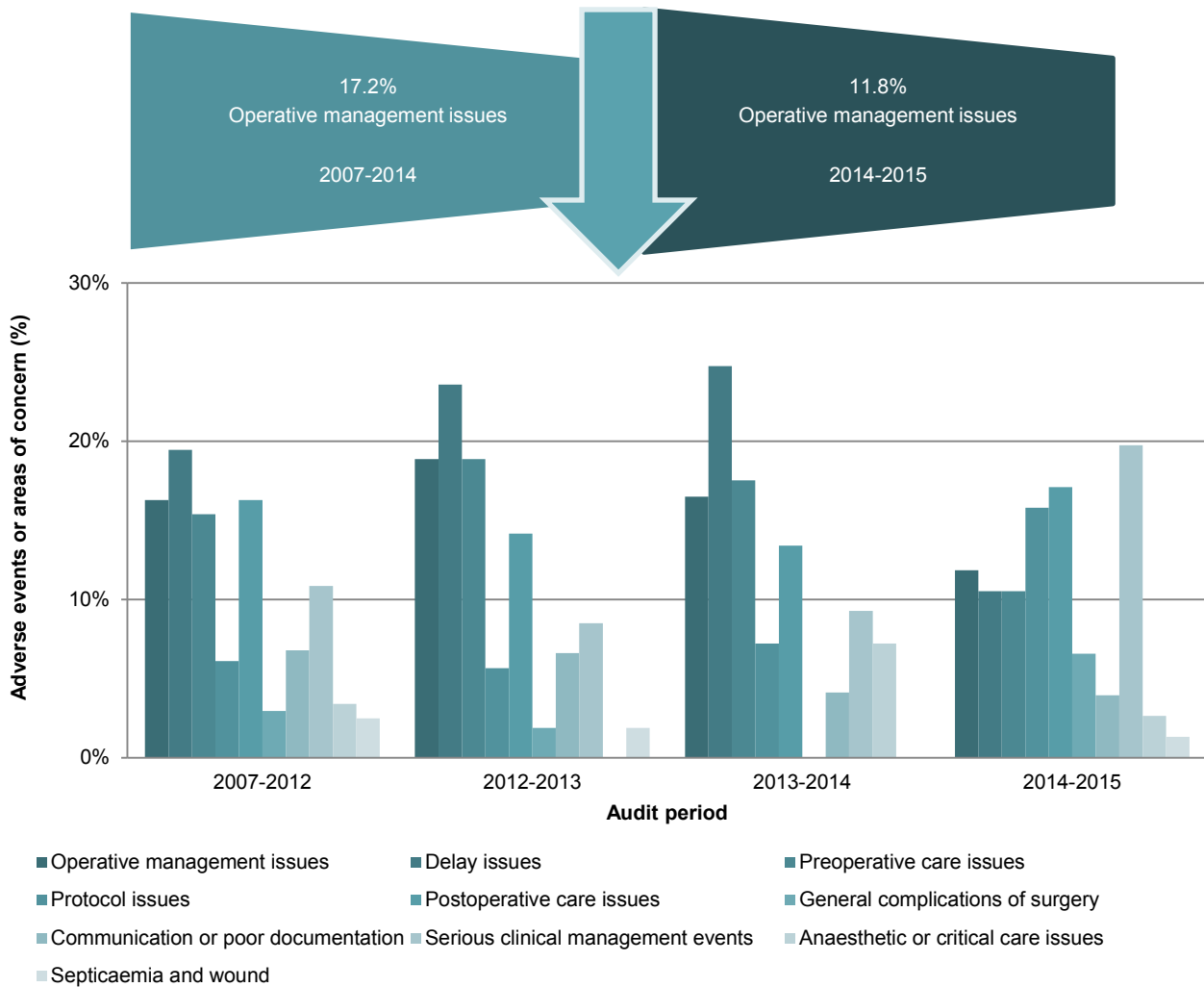
Comments:

- There was a reduction in the rate of clinical issues over the 6-year audited period. In 2007–2012 there were no clinical management issues identified in 63.3% (2,144/3,388) of patients. This figure rose to 71.8% (544/772) in 2014–2015 (p<0.001).
- Assessors perceived more clinical issues than treating surgeons. The issues identified by the treating surgeons compared with the first-line assessor reached a concordance level of 77.3%. The gap widens between the treating surgeon and the second-line assessor, with the level of concordance falling to only 58.2%. These results highlight the importance and value of an independent peer review assessment.
- The prevalence of areas of concern and adverse events identified by assessors was similar among the specialties. Some specialties have had few mortalities reported or recently commenced the audit process, which may skew the data.

7.9.2 Frequency of clinical management issues

The frequency of specific clinical issues of management is shown in Figures 31 and 32. Figure 31 outlines the trending of clinical management issues outlined by second-line assessors across the audit period, focussing on issues identified as areas of concern or adverse events. If an assessor flags an area of concern or adverse event it implies significant criticism. Figure 32 focuses specifically on clinical management issues identified by the assessor as being preventable. The higher the frequency, the greater the requirement for implementing strategies to improve surgical care in that particular clinical area.

Figure 31: Trends in areas of concern and adverse events in second-line assessments.



Note: total n=777 clinical management issues identified as an adverse event or area of concern in 1,052 second-line assessments. Audit period 1 July 2007 to 30 June 2015.

More than one clinical management issue can be attributed to a case.

The clinical issues were re-categorised as detailed in the 2015 VASM Technical report.

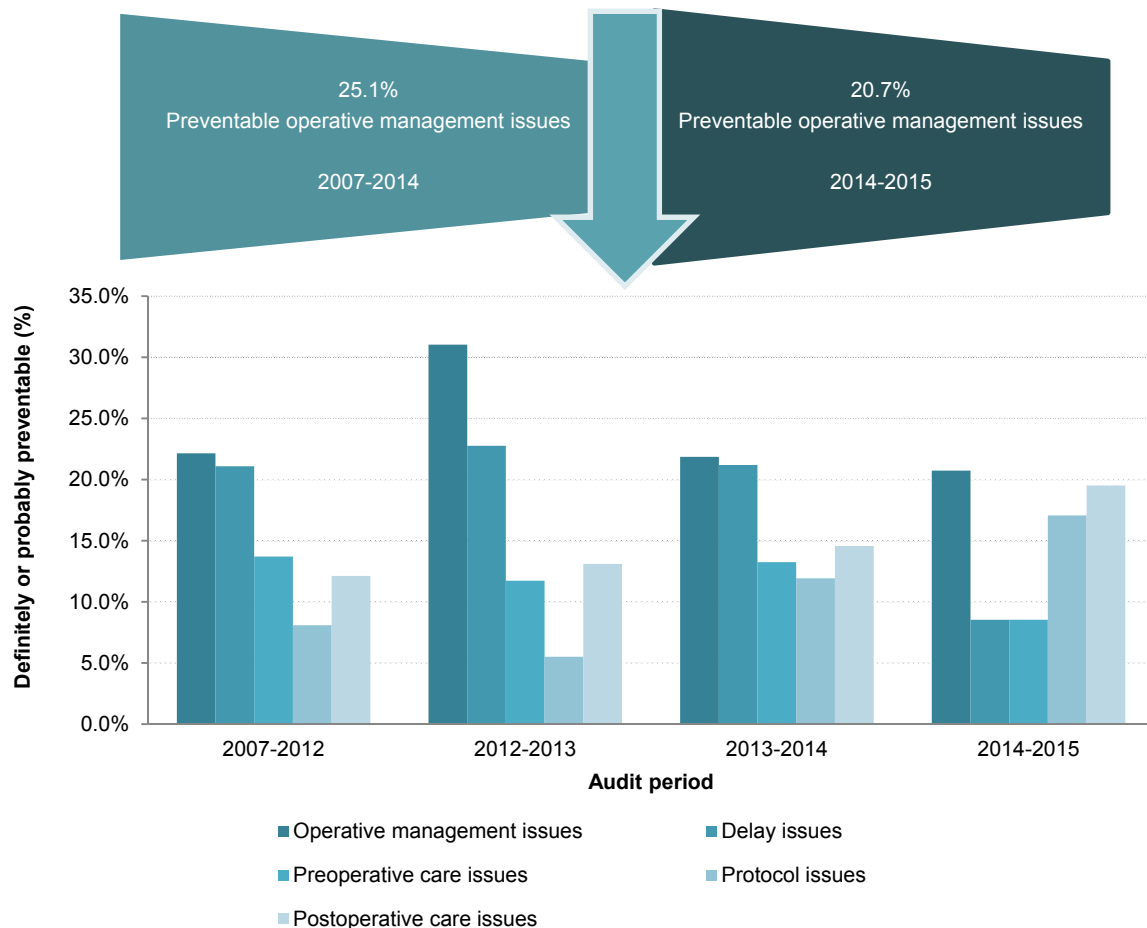
Comments:

- Delay issues 18.7% (145/777), operative management issues 15.2% (118/777), postoperative care issues 15.2% (118/777) and preoperative care issue 14.9% (116/777) were the most common clinical issues identified.
- There was a significant fall in delay issues between 2007-2012 (19.5%) and 2014-2015 (10.5%) ($p < 0.001$). Preoperative care issues also fell, from 15.4% in 2007-2008 to 10.5% in 2014-2015.
- Serious clinical management issues had been identified in 19.7% cases in 2014-2015. These incidences include organ injury, perforation of organs, dislodged clots, perioperative haemorrhage, anastomotic leaks after operations and deep wound dehiscence. There was an increase in serious clinical management issues from 2007-2012 8.1% (38/569) to 11.1% (9/82) in 2014-2015, and the attributable trend and cause will be monitored closely by VASM and reported on in future reports.
- Protocol issues in 2007-2012 rose from 6.8% (46/569) to 15.8% (14/82) in 2014-2015.
- The delay issues 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⁽²⁸⁾, comorbidities⁽²⁹⁾, ASA status, gender, day of surgical admission relating to delay to surgery⁽³⁰⁾, waiting times^(17, 31, 32) and reduction of theatre changeover time.⁽³³⁾

- The attribution of delays were delay in patient care, delay in diagnosis, delay in fully investigating the patient, delay in patient presenting, delay in recognising complications, delay in transfer to surgical unit, delay in transfer to tertiary hospital, delay in starting medical treatment, delay to operation caused by missed diagnosis and delay to surgery where earlier operation was desirable.
- There was also criticism of the choice of operative procedure and decision to consider another operative approach, or performing less extensive procedures on sicker patients with multiple comorbidities. The use of open versus laparoscopic procedures carries a higher incidence of anastomotic leaks and transfusion therefore is crucial in the choice of the operative procedure.⁽³⁴⁾

Figure 32: Trends in top five preventable clinical management issues in second-line assessments



Note: total n=947 clinical management issues identified as definitively or probably preventable in 1,052 second-line assessments. Audit period 1 July 2007 to 30 June 2015.

More than one clinical management issue can be attributed to one case.

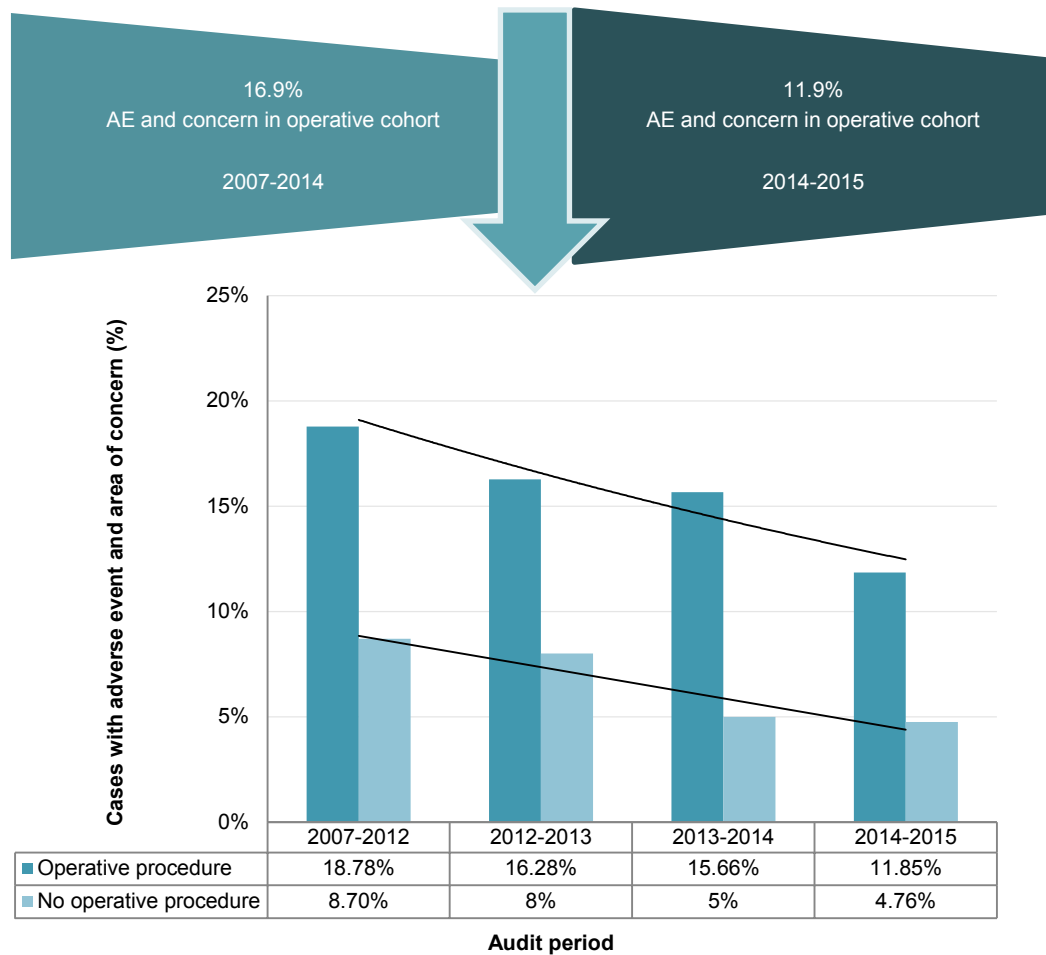
The clinical issues were re-categorised and detailed in the 2015 VASM Technical report.

Comments:

- Operative management issues 23.3% (221) and delay issues 20.3% (192) were the most common preventable clinical issues found in 947 instances.
- Preventable delay issues saw the largest drop, falling from 25.0% (6/24) in 2007-2008 to 8.5% (7/82) in 2014-2015. Preventable preoperative care issues also dropped dramatically between 2007-2008 12.5% (3/24) to 2014-2015 8.5% (7/82).
- Preventable general complications of surgery had the largest rise, from 4.2% (1/24) in 2007-2008 to 6.1% (5/82) in 2014-2015.
- Preventable protocol issues rose to 19.5% (16/82) in 2014-2015.
- Ongoing review and monitoring of patient management is needed for preventable mortality.⁽³⁵⁾

Figure 33 shows the frequency of adverse events and areas of concern by operative status.

Figure 33: Frequency of adverse events and areas of concern by operative status.



Note: total n=6,160.

Audit period 1 July 2007 to 30 June 2015.

Data not available: n=19 (<1%).

The operative and nonoperative power trend line indicates decreased adverse event and area of concern rates in both groups.

Comments:

- Audited cases in which no operative procedure occurred had a significantly lower rate of areas of concern and adverse events (7.6%; 78/992) than cases in which an operative procedure occurred (16.8%; 872/5,184).
- There was a reduction in the frequency of areas of concern and adverse events, from 16.9% during the 2007–2014 period to 11.9% in 2014–2015 ($p<0.001$).

8. VASM evaluation

8.1. Treating surgeon's appraisal of the VASM peer review process

The VASM has uniquely implemented an extra step in the audit process, with the inclusion of a feedback form alongside the assessor reports sent to the treating surgeon. This allows the treating surgeon to record their opinion of the assessments provided. The form also contains a free-text field in which the treating surgeon, the person who is most conversant with the clinical nuances of the patient's course to death, can record their own perspective.

From its commencement of the surgeon's appraisal survey on 1 January 2015 to the end of the current audit period 30 June 2015, VASM received 1,681 notifications of death and of those, 40.1% (674) had completed the full audit process. Of the 674 peer assessments sent to the treating surgeon 31.9% (215) had provided the evaluation on the peer review feedback. Of the 215, 76.3% (164) were for FLAs and 23.7% (51) for SLAs.

Of the 215 treating surgeons that completed the survey, 71.5% agreed with value of the peer review feedback received, 21.2% were neutral about the feedback and 7.6% disagreed with the assessors' opinions from the feedback received. Additional comments were provided alongside the evaluation of the assessment reports on 32.6% of the feedback forms (70).

Overall, 67.4% of treating surgeons agreed that the peer review feedback is a good source of information to improve surgical care at their institution (145/215).

This evaluation survey pilot demonstrates that there is value in the audit process. The VASM audit continues to identify, assess and review factors associated with surgical mortality and will continue to develop action plans, educational programs and recommendations for further patient care improvements in Victoria.

For a detailed analysis of these qualitative surveys, please see the 2015 VASM technical report.

8.2. VASM Evaluation Survey

With the release of each VASM Report an evaluation survey was sent to surgeons and hospitals. The survey sought feedback on the perceived value of the reports, Case Note Review Booklets, 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 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 VASM surveyed 17.6% of Fellows (252/1,429) and 10.1% of hospital contacts (44/436) from the 126 health services with surgical services.

The evaluation survey indicated that the VASM program was valuable and appropriate to the stakeholders. The surgical Fellows provided an average score of 3.9 out of 5, and the Victorian hospital stakeholders provided an average score of 4.3 out of 5.

For a detailed analysis of these surveys please see the 2015 VASM technical report.

8.3. The Perceived Quality of VASM Information

The VASM has completed the first round of a small qualitative project seeking a range of feedback from its stakeholders.

The VASM was externally audited in 2015 by Aspex Consulting. The external audit suggested the update of a new KPI relating to: "The perceived value of information provided by VASM in order to promote ongoing improvements to surgical safety, quality and confidence across the Victorian health system".⁽³⁶⁾ This project conducted by VASM, the Perceived Quality of VASM Information, is in response to the recommendations made by Aspex Consulting.

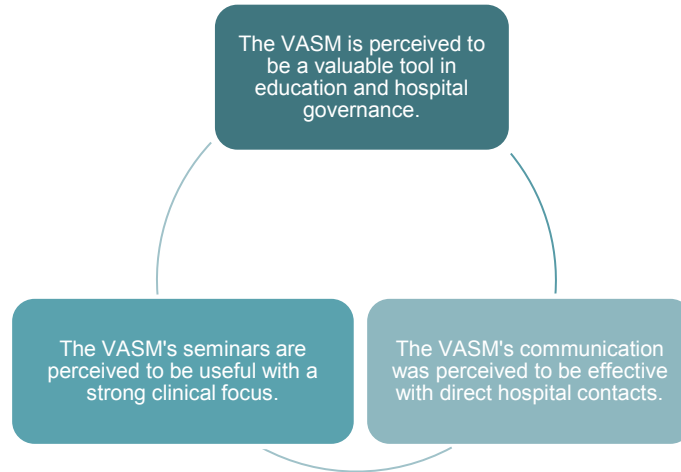
Data was collected in the form of quantitative and qualitative feedback. The mixed method approach was designed to provide open ended explorations into stakeholder's views, while also providing structured tools for annual trending reports.^(37, 38)

Between November and December 2015, 38 hospital stakeholders were contacted and of those, 68.4% (26/38) consented to the interview.

Participants were employed at private and public health services and represented different levels of management and administration.

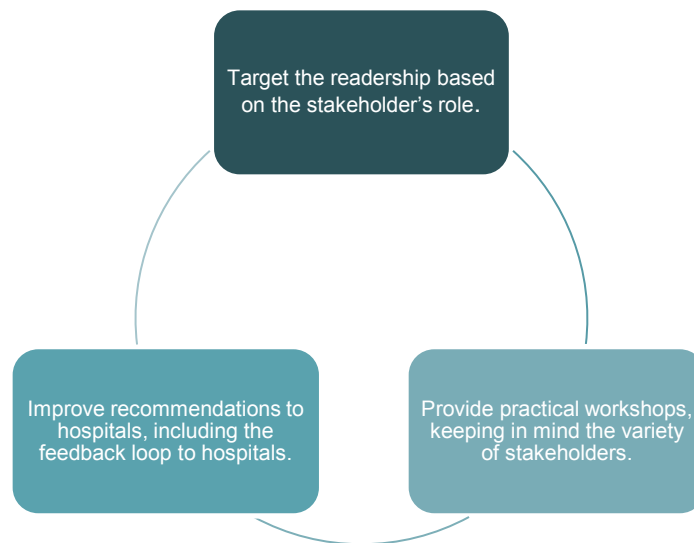
A number of themes emerged from the data, as shown in Figure 34.

Figure 34: Major outcomes regarding the perceived use of the VASM.



Leading on from the above categories, a small number of recommendations for improvement were suggested by hospital contacts. Figure 35 outlines the VASM's goals in these areas.

Figure 35: Stakeholder recommendations for VASM's improvement.



Detailed analysis of the qualitative interviews is provided in the 2015 VASM technical report.

8.4. Concordant validity considerations

Completion of all fields in the SCF 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 events 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.

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

Gwet's AC1 provided a more stable interrater reliability coefficient than Cohen's Kappa and appears less affected by prevalence and marginal probability and is represented in this report for better interpretation of interrater reliability analysis.⁽⁴⁰⁾

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

- Disagreement between first- and second-line assessors was most marked in the fluid balance, timing of the operation, decision to operate, pre, intra and post-operative care and the clinical management section, with second-line assessors perceiving more issues than the first-line assessors.
- The tendency of second-line assessors to be more critical of clinical management events is foreseeable as they have access to an independent description of the episode of care. However, evaluating the quality of the decisions made by the treating surgeons allows preventative measures to be implemented during the peer review process and recommendations for improved surgical care to be delivered to the treating clinical teams.
- The decision to operate is one of the clinical management issues. The question of whether a patient should have surgery is unclear and may have broader implications for surgical decision making.⁽³⁹⁾

For a detailed analysis of these qualitative interviews, please see the 2015 VASM technical report.

9. VASM educational activities

The VASM educational seminars commenced in 2012 and continued into early 2015 as a collaborative effort between the VASM, the DHHS, the VSCC and the Victorian Managed Insurance Authority. The seminars and workshops are intended for interns, surgeons rural and urban, nurse managers and educators, health specialists, administrators, CEOs, and quality and safety officers. Seminar programs can be downloaded from www.surgeons.org/VASM. The following educational programs were offered in the 2015 period;

- **Improving outcomes in the surgical patient (23 February 2016)**

This seminar aimed to raise awareness on contemporary surgical challenges facing surgeons and health professionals. Topics included the management of the deteriorating patient, risks in the frail orthopaedic patient, reducing treatment and diagnosis delays in high-risk patients, operating on the obese patient, insights into trauma and transfer patients, lessons from the coroner, medico-legal issues and a trainee's perspective.

It was attended by over 100 delegates.

- **Would you have changed the management of this patient's course to death? (16 October 2015)**

The VASM and the Tasmania Audit of Surgical Mortality hosted a collaborative workshop at the Victoria Tasmania Annual Surgical Meeting in Hobart.

The workshop raised awareness on the process of identifying and responding early to surgical adverse events in a hospital setting. It emphasised the value of the audit in which peer review was conducted from an empathic, educational standpoint rather than as a punitive exercise.

Plenary sessions were held covering topics such as the value of surgical and anaesthetic peer review assessments, laparoscopic surgery complications, reducing surgical, diagnosis and transfer delays, legal implications of the peer review process and the importance of understanding basic risk management practices.

The invited guests and speakers created an excellent foundation for lively discussions between speakers and delegates.

The seminar was attended by 70 delegates and feedback survey results indicated that the event was valued and well received by the attendees.

10. Audit limitations and data management

As an audit the data is collected to provide feedback to surgeons, rather than for academic research. However, in audit terms the data are of high quality because every case was subject to external peer review.

The data is self-reported and a certain level of bias may be present, but independent assessors make their own assessments on the facts presented.

Data quality is an essential component of all audits. Inaccurate and incomplete clinical information will impair the audit process and prevent identification of trends.⁽¹⁵⁾

The volume of data unavailable continues to be most prevalent. The breakdown of sections with sizeable missing data is the 'fluid balance management' 2.9% (154), 'operative section' 5.7% (294), and 'critical care utilisation' 8.1% (422) in the 6,179 audited cases. These sections will require further improvements as appropriate and detailed responses in these areas are important if the audit is to identify and address adverse trends.

Where data integrity issues are identified, it is important for the audit team to review the format of the questions on the case record forms that will generate the data. The ANZASM felt it appropriate to revise the SCF in 2016.

The current VASM enhanced electronic Fellows' Interface for data submission should ease the process of the data submissions and lead to improved data integrity in the future.

10.1. Conclusion

The VASM audit continues to identify, assess and review factors associated with surgical mortality and will continue to develop action plans, educational programs and recommendations for further patient care improvements in Victoria.⁽³⁵⁾

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