

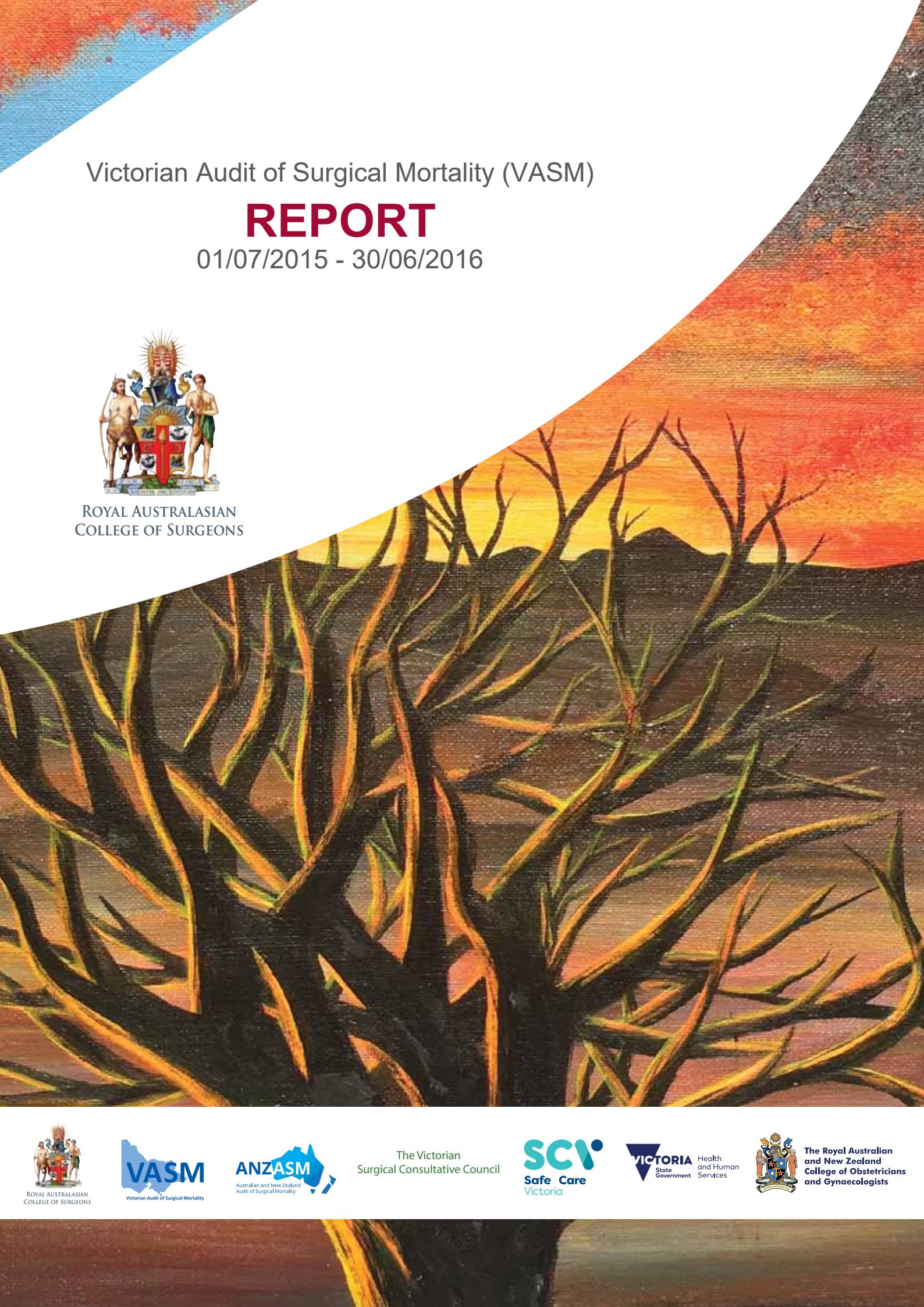
Victorian Audit of Surgical Mortality (VASM)

# REPORT

01/07/2015 - 30/06/2016



ROYAL AUSTRALASIAN  
COLLEGE OF SURGEONS



The Victorian  
Surgical Consultative Council







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## ***Abbreviations***

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ANZCA	Australian and New Zealand College of Anaesthetists
AOA	Australian Orthopaedic Association
ASA	American Society of Anaesthesiologists
CPD	continuing professional development
DHHS	Department of Health and Human Services
DRG	diagnosis-related group
DVT	deep vein thrombosis
FLA	first-line assessment
RACS	Royal Australasian College of Surgeons
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SCF	surgical case form
SCV	Safer Care Victoria
SLA	second-line assessment
VAED	Victorian Admitted Episodes Dataset
VASM	Victorian Audit of Surgical Mortality
VCCAMM	Victorian Consultative Council on Anaesthetic Mortality and Morbidity
VSCC	Victorian Surgical Consultative Council

# **Clinical director's report**

## *Learning from mortality outcomes.*

This is the ninth report since data collection began for the Victorian Audit of Surgical Mortality (VASM), which commenced on 1 July 2007. In this report we present the outcomes of the review of 3,984 deaths from 1 July 2012 to 30 June 2016, when 100% audit participation was achieved by public and private hospitals in Victoria. This also coincided with the Royal Australasian College of Surgeons (RACS) mandating the audit for surgical Fellows. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) joined the audit program in 2012. Since 2007, eight Case Note Review Booklets have been disseminated which, together with the reports, have proven to be a good informative tool with the surgical readership.

The VASM commenced collaboration with the Victorian Consultative Council on Anaesthetic Mortality and Morbidity (VCCAMM) in July 2016 to facilitate the reporting of surgical deaths with a possible anaesthetic component.

The RACS continues to place increased emphasis on participation in the VASM as part of continuing professional development (CPD)<sup>(1)</sup>. In 2017, our Orthopaedic colleagues will adopt VASM as the only pathway for mandatory mortality audit in their CPD program, as determined by the Australian Orthopaedic Association (AOA). This date also coincides with electronic submission of data as the only method of data submission by all surgeons to the VASM, which is anticipated to greatly improve the quality and completeness of our data.

Clinical trends relating to clinical risk management show overall improvements in some key areas of patient surgical care. Deep vein thrombosis (DVT) prophylaxis to reduce the likelihood of pulmonary embolus, appropriate use of critical care facilities, and fluid balance management are risk management issues scrutinised by assessors, but they have not found great numbers of errors in these three areas. In the operatively managed surgical deaths (83%), there was a higher incidence of significant clinical management issues than in the non-operative cohort (18% vs 11%). As these patients form the majority of the cases, attention is focussed on this category in this report, which is of most interest to the surgeon.

The Targeting zero report was released on 14 October 2016, which assessed the department's systems for all in-hospital care in both the public and private sectors<sup>(2)</sup>. Implementation of the recommendations will produce improvements in identified areas and VASM will play an important role in the revised structure. Along with other jurisdictions we have consistently identified the following clinical 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
- decision to operate rather than palliate.

The VASM's extra step in the audit process, whereby the treating surgeon is given a form after receiving the assessor reports, allows VASM to close the audit loop. It also enables the clinician with the best grasp of the clinical nuances of the case to fill in the gaps identified by the assessors and provide a better perspective on the course to death. In 81.9% (77/94) 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. In 9.6% (9/94) of instances, the treating surgeon disagreed with the assessor's comments and provided additional information to the audit office to elucidate on the case. This process continues to be very instructive, allowing a full cycle of reviews. The ability to allow feedback to originating hospitals where there has been a transfer, or to the head of the unit of a specialty outside of the treating surgical unit, such as the emergency department or the intensive care unit, will add to the educational value of VASM. In doing so, this might help to reduce the repetitive pattern of identified clinical management issues encountered in successive reports.

Data quality remains a critical aspect of the audit process. Careful checking of clinical data input has reduced errors and repeated concordance studies have reassured us that our data is of a high standard. Concordance analysis has consistently shown disagreement between the treating surgeon and second-line assessor that was most marked in identified clinical management issues, which emphasises on the importance of the VASM process of peer review.



**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 types of issues occur repeatedly, driving VASM to refocus on its educational role in disseminating lessons learned to clinicians and using the hospital governance reports to drive further improvements.

The support of the Victorian State Government, the Victorian Department of Health and Human Services (DHHS), Safer Care Victoria (SCV), the Victorian Surgical Consultative Council (VSCC), VCCAMM, The Australian and New Zealand College of Anaesthetists (ANZCA), the Australian Commission on Safety and Quality in Health Care, the Victorian Managed Insurance Authority, the AOA, RANZCOG and RACS has facilitated VASM's progress.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'B. Beiles', written in a cursive style.

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

# 2015-2016 Executive summary

## Compliance



100% hospitals



93.2% Fellows

## Trauma



- 87.1% (799/917) fall
- 10.3% (92/917) road accident
- 2.8% (26/917) violence

## Demographic



20.8%  
(832/3,948)  
patient transfers



84.2%  
(3,325/3,948)  
emergency admission



43.7% F 56.3%M  
Mean age: 73  
(1 day - 102 years)

## Infections



- 31.8% (1,256/3,948)  
clinical significant infections

Infection type

- 14.9% (592/3,948) pneumonia
- 8.1% (319/3,948) septicaemia
- 4.6% (184/3,948) intra-abdominal sepsis

## Operations



- 90.4% (3,568/3,948) operative sessions
- 14.5% (520/3,568) unplanned return to theatre
- 9.1% (325/3,568) with >1 operative procedure performed

## Outcomes



- 31.6% (1,251/3,948)  
clinical management issues
- 68.1% (2,688/3,948)  
no clinical management issues

Areas of outcome

- 17.4% (687/3,948) consideration
- 9.2% (365/3,948) concern
- 5.0% (199/3,948) adverse events

## Risk factors



- 90.9 (3,588/3,948) with  $\geq 1$  comorbidities
- 86.3% (3,078/3,567) moderate to high risk of death prior surgery
- Top 3 comorbidities of 10,575 identified;
  - 23.3% (2,462/10,575) cardiovascular
  - 19.8% (2,091/10,575) age
  - 12.1% (1,288/10,575) respiratory

## Most common areas of concern & adverse event



- 21.3% (89/418) delay issues



- 17.9% (75/418) operative management issues
- 16.7% (70/418) postoperative care issues
- 12.7% (53/418) preoperative care issues

## i. 2015 - 2016 Current period audit indicators

The current audit indicators presented in this section include comparison of the current year audit 1/07/2015 - 30/06/2016 and national data from the Australian and New Zealand Audit of Surgical Mortality (ANZASM). The Collaborating Hospitals' Audit of Surgical Mortality (CHASM) in New South Wales runs a comparable audit methodology and collects similar data as ANZASM. CHASM data was not accessible to VASM as it is independently managed by the Clinical Excellence Commission of New South Wales, and has different data lock, and has different time frame requirements for analysis, therefore the ANZASM national data aggregate comparisons excluded audit outcomes for New South Wales.

Table 1: Characteristics of the current audit period

Characteristics	VASM	ANZASM
	2015-2016	2015-2016
	n=713	n=2,224
<b>Cases</b>		
Age ≥ 85	27.9% (199/713)	28.4% (632/2,224)
Gender ratio (male: female)	56.7%:43.2%	55.7%:44.2%
Admission status (emergency: elective)	86.5%:13.5%	87.4%:12.6%
Comorbidities ≥ 3	60.3% (391/648)	60.7% (1,211/1,994)
ASA* >4	68.7% * (457/665)	60.5% (1,220/2,018)
Diagnosis delay	7.3% (52/711)	5.9% (131/2,212)
DVT prophylaxis used	82.7% (549/664)	83.2% (1,463/1,759)
Transfer delay	10.9% (16/147)	11.2% (58/519)
Fluid balance unsatisfactory	6.1% (43/709)	6.6% (141/2,133)
CCU used	68.7% (459/668)	67.3% (1,194/1,775)
CCU should have been provided	5.9% (11/188)	6.8% (36/527)
Unplanned return to theatre	14.1% (94/668)	14.3% (253/1,770)
Unplanned admission to CCU	17.0% (113/664)	18.0% (316/1,756)
Postoperative complication	32.0% (212/662)	31.5% (556/1,765)
Infection	34.5% (228/661)	36.0% (633/1,758)
Surgical-site infection	11.1% (12/108)	8.8% (30/342)
No issues identified	74.5%* (529/710)	80.0% (1,773/2,216)
Area of consideration	15.2% (108/710)	12.5% (276/2,216)
Area of concern	6.9%* (49/710)	4.6% (103/2,216)
Area of adverse event	3.2% (23/710)	2.7% (60/2,216)
Preventable issues	11.4% (81/710)	9.4% (208/2,216)
Adverse event that was preventable	2.4% (17/710)	1.7% (38/2,216)
Adverse event that was preventable and caused the death of the patient	1.0% (7/710)	0.6% (14/2,216)

Note: Audit period 1 July 2015 to 30 June 2016.

n=713, in some sections data was omitted or not applicable for analysis of the study cohort (is the reason for the denominator number fluctuations).

ASA\*: American Society of Anesthesiologists.

The ASA physical status classification system is an international measure of patient risk used by anaesthetists.<sup>(1)</sup>

DVT: Deep vein thrombosis.

CCU: Critical care unit

VASM: Victorian Audit of Surgical Mortality

ANZASM: Australian and New Zealand Audit of Surgical Mortality

\*p<0.05 fisher exact test was considered statistically significant.



## Comments:

Implementations of risk management strategies for a generally elderly, sicker group of patients are especially important. The audit looks at parameters such as American Society of Anaesthesiologists (ASA) grade, admission status, DVT prophylaxis to reduce the likelihood of pulmonary embolus, use of critical care facilities and fluid balance management. The Victorian ASA grade was four or higher in 68.7% (457/665) of cases in this current audit period and 60.5% (1,220/2,018) nationally. The difference is statistically significant ( $p < 0.01$ ). The majority of surgical deaths have occurred in elderly patients with underlying health problems, who were admitted as an emergency with an acute life-threatening condition that often required surgery. The actual cause of death was often linked to their pre-existing health status, in that the cause of death frequently mirrored the pre-existing illness.

It has been observed during the audit years that approximately 10% of patients do not have an operation during their episode of care. This is usually the result of an active decision not to proceed and often occurred in patients admitted as an emergency for an irretrievable clinical problem. The most frequent operative procedures described were for trauma or acute abdominal pathology. This reflects the high percentage of patients admitted as emergencies in this series.

Assessors involved in the audit process review and appraise the appropriateness of the clinical care provided to each case. A case can have multiple issues associated with the patient care; for this analysis the more comprehensive assessment, the second-line assessment (SLA), was considered when one was available. An adverse event and an area of concern are at the higher end of the spectrum of criticism applied by the peer-review process. In over 74.5% (529/710) of audited deaths in Victoria there were no perceived issues of patient care. Nationally, this figure is 80.0% (1,773/2,216). When assessing areas of concern it was observed that Victoria had a statistically significant higher rate than the national figures (6.9% [49/710] compared with 4.9% [103/2,116],  $p < 0.02$ ). The Victorian and national rates for preventable adverse events are slightly lower than the national figures 47.1% (81/172) versus the national figures 49.5% (208/420) but does not reach statistical significance ( $p = 0.2$ )

It is important to remember that criticism of clinical care is not always attributable to the surgical team. A third of the issues identified were attributed to other specialty areas or the institution in which the patient was receiving care.

# 1. Recommendations for clinical stakeholders

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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.

## 1.1. 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.

## 1.2. 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
  - 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.
- Early engagement of medical expertise should be prioritised for elderly and high risk patient.

## 1.3. 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 protocols or national clinical guidelines during all parts of patient care can contribute to errors.

## 1.4. 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.

## 1.5. Futile surgery and end of life care

Some of the surgical procedures identified as futile by VASM included:

- decisions about whether to continue with active treatments
- consider if surgery is too complex in a frail patient
- consider when the treatment has a high risk of death or the end of life is near.

RACS has explored the topic of futile surgery and end of life matters and has prepared a policy statement.<sup>(2)</sup>

## 1.6. Improved awareness of surgical emergencies, transfers and sharing of care

- The audit revealed that patients admitted as surgical emergencies are at greater risk. All health professionals should increase their awareness of this risk to improve the quality and safety of patient care and early communication with medical expert should be prioritised for surgical emergencies
- Time delays are to be minimised for elderly frail patients transferred between hospitals due to their limited physiological reserves. Time delays for these patients can significantly affect surgical outcomes.

## 1.7. Infection control

- The audit revealed that patients admitted for surgical care are at an increased risk of developing infection. The risk is high, especially in such a comorbid group of patients, and stringent infection control care should be considered for this patient pool. The Australian Guidelines for the Prevention and Control of Infection in Healthcare are designed to prevent and manage healthcare associated infection. These should be utilised at hospitals, and VASM endorses the use of current hospital protocols and guidelines to reduce the incidence of infection.<sup>(3)</sup>
- Key actions to be taken for control and management are:
  - timely recognition
  - appropriate investigation
  - rapid administration of treatment
  - timely involvement of expert teams.

## 1.8. 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<sup>(4)</sup> 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.<sup>(5, 6)</sup>

## 1.9. 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.
- RACS is committed to building respect in surgery in Australia and New Zealand and dealing with bullying, discrimination, harassment and sexual harassment. The RACS Action Plan: Building Respect, Improving Patient Safety outlines the work RACS is committed to.<sup>(7)</sup>



## 2. Introduction

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### 2.1. 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. The VASM is collaboration between the Victorian Government's DHHS, SCV, VSCC, RACS, RANZCOG, AOA and the VCCAMM. The VASM project is funded by the health service programs branch of the Victorian DHHS to review all deaths associated with surgical care and ascertain the adverse outcomes that were preventable. See Figure 1 in the 2015-2016 VASM Technical Report for more information relating to the governance of the VASM.

### 2.2. 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.

### 2.3. Audit process

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 or gynaecologist, regardless of who admitted the patient
- the patient was under the care of a surgeon or gynaecologist 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 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 Fellow 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 Fellow or the hospital in which the death occurred.

There are two possible outcomes of the FLA.

- The information provided by the treating Fellow is adequate to reach a conclusion about the case and to identify issues of clinical management, if present.
- A further in-depth 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 Fellow was inadequate to reach a conclusion.

In response to the Targeting Zero report recommendations an additional process is being considered in 2017 in collaboration with the VSCC and SCV for a multidisciplinary panel to review de-identified selected SLAs where the outcome was potentially preventable.

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 Fellow, together with a feedback form so that the treating Fellow can “assess the assessors”. The feedback form contains a free-text field in which the treating Fellow can expand on points raised in the assessment. This allows the treating Fellow 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.

## **2.4. Anaesthetic mortality review collaboration**

The VASM commenced collaboration with the VCCAMM in July 2016. The state-wide monitoring and reporting of potential anaesthesia-related mortality and morbidity by the VCCAMM is based on the voluntary submission of direct reports from treating anaesthetists, or indirect reports from VASM and other medical practitioners or hospital anaesthetic departments. The VASM also identifies patients who may have a potential anaesthetic component to their death based on the information in the surgical case record from (Question 17) by the treating surgeon. (see Figure 2) The VASM refers these cases to VCCAMM for a further anaesthetic assessment, in an attempt to achieve more complete capture of anaesthetic-related deaths. The VCCAMM provides VASM with a copy of the final anaesthetic assessment.<sup>(8)</sup>

Figure 1: The VASM audit process

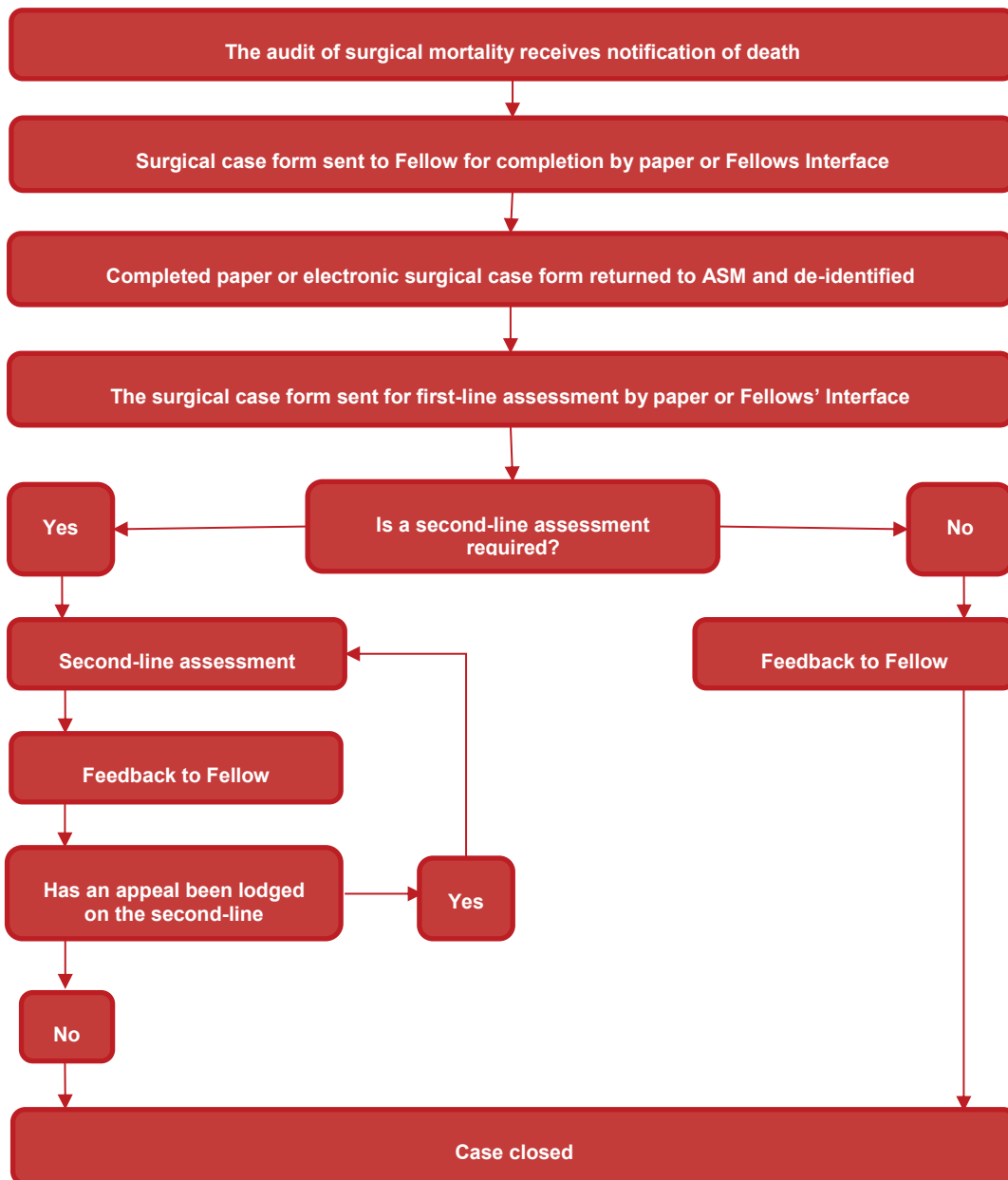
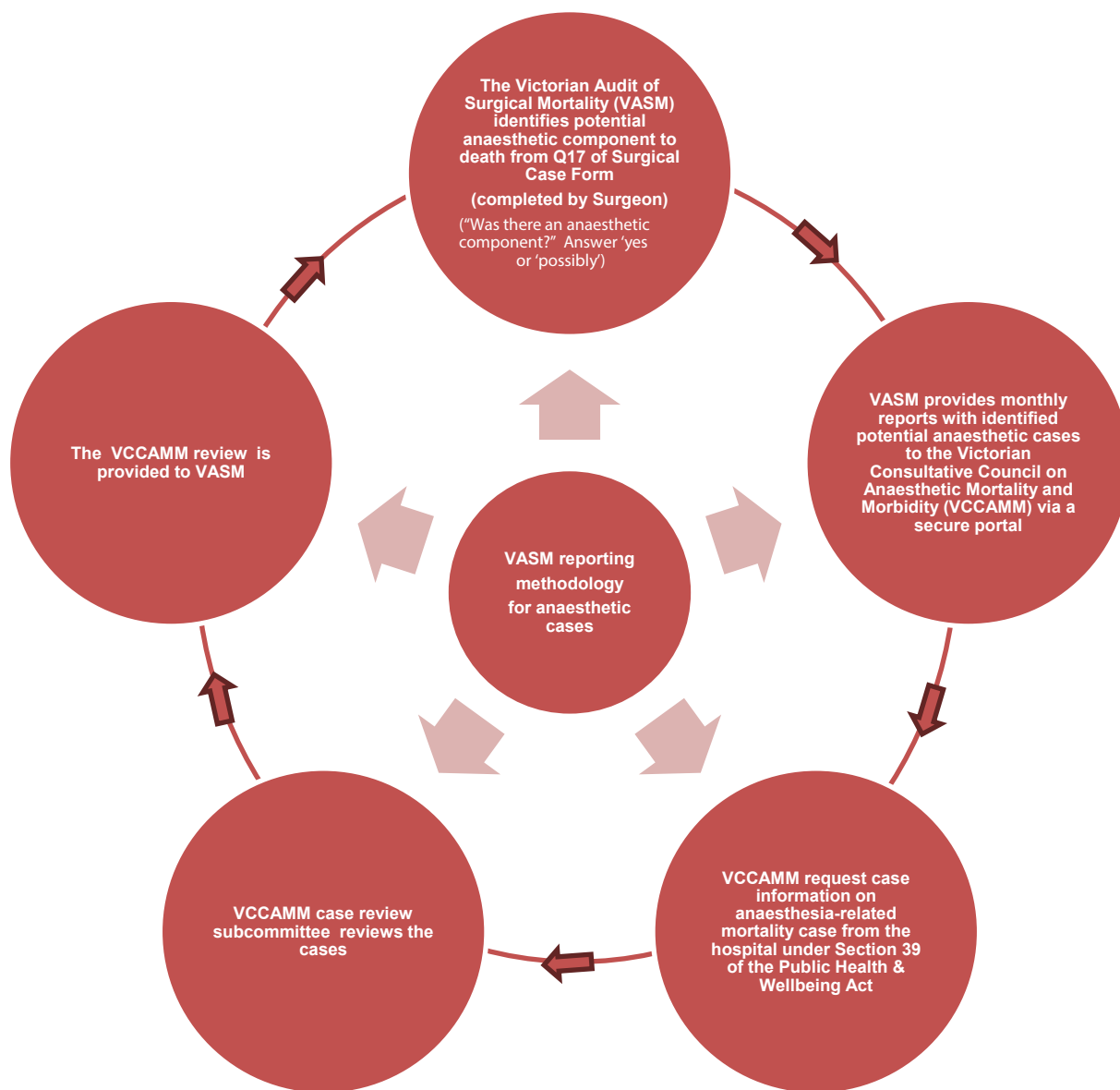




Figure 2: Flowchart of VASM reporting methodology for potential anaesthetic cases to VCCAMM



## ii. 2012 - 2016 Audit trend indicators

### 3. Audit compliance and audit processes

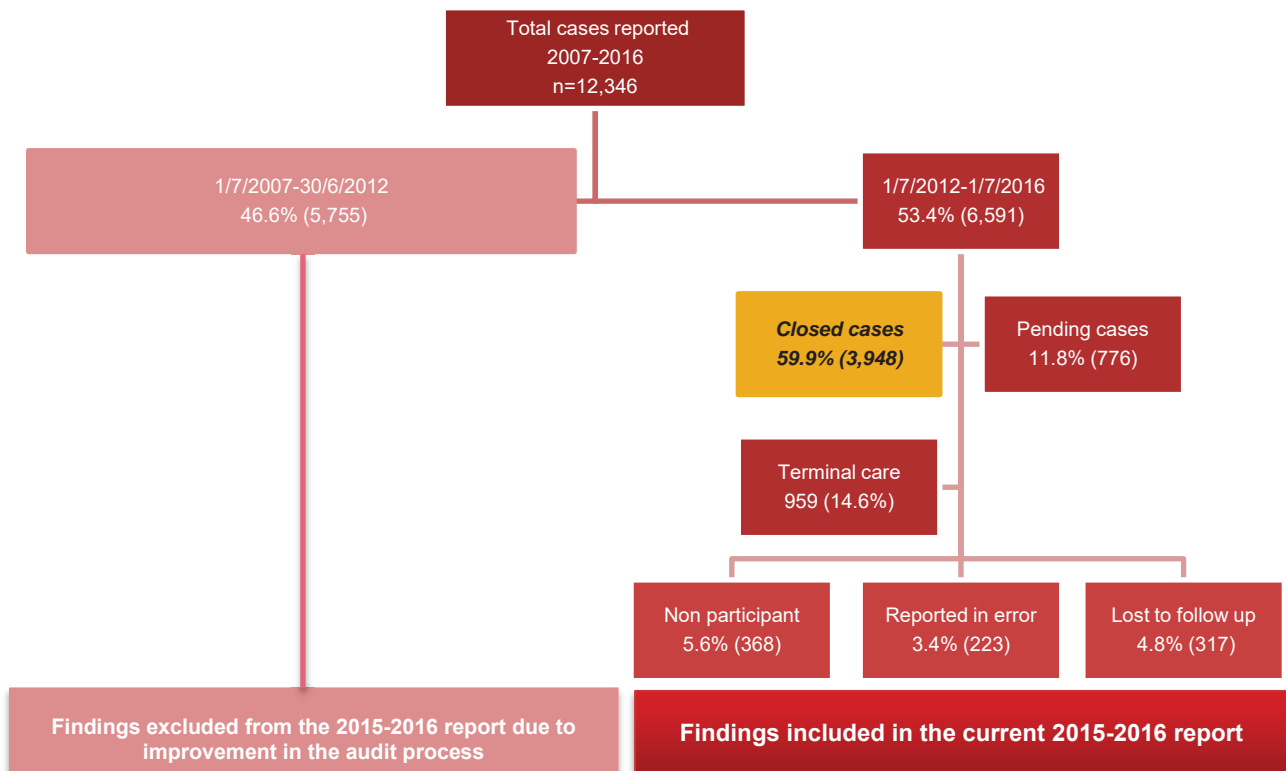
#### 3.1. Audit numbers

From the audit's commencement on 1 July 2007 to the end of the current 2015-2016 audit period, 30 June 2016, the VASM has received 12,346 notifications of deaths that have been associated with surgical care. In 2012 the audit was mandated, and the 1/7/2007-30/6/2012 data was cumulatively reported; therefore 46.6% (5,755) cases were excluded from this report.

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 since 1 July 2012 a total of 2,651,010 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 21.5% (1,492/6,951) of total cases audited from 1 July 2012 to 30 June 2016. This is predictable from the known casemix of the two sectors. Differences in risk profiles between the two sectors are associated with the fact that critically ill and higher risk patients are generally seen in the public hospital system, which provides the majority of critical care services.

Figure 3: Audit numbers over sequential audit periods



Note: n=12,346 cases reported.  
Audit period 1 July 2007 to 30 June 2016.

## Comments:

- Audit data from 2012 has been included for this report analysis for a number of reasons, as in 2012:
  - 100% audit participation was reached at sites with surgical services across public and private hospitals in Victoria
  - RACS mandated the audit for surgical Fellows
  - RANZCOG joined the audit program in 2012
  - the surgical case forms (SCFs) had been revised for several risk management sections to capture improved quality data.
- The findings on 46.6% (5,755/12,346) of the reported mortalities (those reported from 2007 to 2012) are excluded from further analysis in this report as they have been cumulatively reported in previous VASM publications. Moreover, since 2012 all Victorian public and private hospitals have been fully enrolled and compliant with the audit requirements and the RACS has mandated participation in VASM audit.
- The process review backlog of 11.8% (776/6,591) of cases for the 2015 to 2016 audit 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 documentation de-identification processes can take up to 6 months for complex cases.
- The VASM's goal is to review all mortality cases within 3 months of notification. The specialties with the highest casemix were General Surgery, Orthopaedic Surgery, Neurosurgery, Vascular Surgery and Cardiothoracic Surgery and work is being undertaken in 2017 to improve the achievement of this target.
- Clinical information and completed assessment reviews were available for 59.9% (3,948/6,591) of reported cases since 1 July 2012 due to the retrospective multistep nature of the audit program
- Terminal care admissions from 1 July 2012 comprised 14.6% (959/6,591) of reported cases and were excluded from the review process. An additional 3.4% (223/6,591) of cases were wrongly attributed to a surgical unit.
- 4.8% (317/6,591) 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.
- 5.6% (368/6,591) 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 to 2012, from 18.4% to 1.6% (27/1,720) in the current audited period. The VASM envisages that the rate of non-participant cases will decline to zero as participation in VASM is now a mandatory component of attaining CPD recertification. Participation and compliance requirements are outlined in Section 3.4.

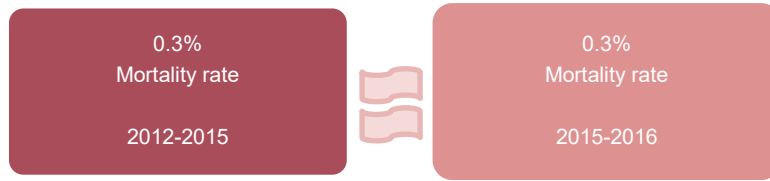
## 3.2. Verification of audit numbers

The audit process is dependent upon 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 audit process, hospitals must also submit data to the VAED, which is maintained by the DHHS. This is a robust database providing the casemix information required for hospital activity based funding.<sup>(9)</sup> The information identifies 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 procedural 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 potential gaps in reporting of hospital mortality. These gaps are verified by VASM by requesting sites to review unreported deaths. The gap in reporting has identified some procedures that do not fulfil the VASM inclusion criteria e.g. cardiology, radiology, gastroenterology procedures. Internal verification was conducted on five pilot sites and found a 94.2% (259/275) match for reportable deaths.



Table 2: Mortalities reported to VAED



Audit period	Total surgeries n	VAED reported mortalities n (mortality rate %)	VASM reported mortalities n (match rate %)
2012-2013	634,609	1,997 (0.3%)	1,558 (78.1%)
2013-2014	663,768	1,924 (0.3%)	1,613 (83.8%)
2014-2015	672,957	1,966 (0.3%)	1,700 (84.6%)
2015-2016	679,676	2,009 (0.3%)	1,720 (85.6%)
<b>Total</b>	<b>2,651,010</b>	<b>7,796 (0.3%)</b>	<b>6,591 (84.5%)</b>

Audit period 1 July 2012 to 30 June 2016.  
VAED: Victorian Admitted Episodes Dataset.

**Comments:**

- The VAED indicates that from 1/7/2012 to 30/6/2016, 2,651,010 patients received surgical care in Victorian public and private hospitals. Of these, 7,796 (0.3%) 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 procedures performed by non-surgeons are included in the VAED. Also, the VASM dataset includes all patients under the care of a surgeon, whereas the VAED dataset used for this comparison includes only patients undergoing a procedure.
- Based on VAED data there has been a decrease in surgical mortality over the last ten years, from 0.4% to 0.3%, which is highly statistically significant ( $p < 0.0001$ , data not shown). From 1/7/2012 to 30/6/2016, the mortality rate remained constant at 0.3%. It is postulated that one of the factors associated with the reduction in surgical mortality has been the establishment of the VASM.<sup>(10)</sup>
- The Australian Commission on Safety and Quality in Health Care engaged Monash University and Health Outcomes Australia to evaluate the economic impact of five clinical quality registries. The report stated that *“The Australian Audit of Surgical Mortality ... is understood to be highly effective.”* The study showed that Australian clinical quality registries have delivered significant value for money when correctly implemented and sufficiently mature, producing a substantial benefit to cost ratio ranging from 2:1 to 7:1.<sup>(11)</sup>

**3.3. Hospital Clinical Governance and Hospital Performance Reports**

- The VASM released the first series of the national individualised Hospital Clinical Governance Reports in 2014, and the current series was disseminated in 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 address these issues. The Hospital Clinical Governance Reports use a comprehensive data set that can assist accreditation of hospitals for certain National Safety and Quality Health Service (NSQHS) Standards. These include: 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.<sup>(12)</sup>

- 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. Hospital Clinical Governance Reports 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.
- The upcoming Hospital Performance Summary Report will enable a comparison of hospitals in terms of potentially preventable mortalities and preventable clinical management issues that contributed to death.
- Both reports will assist the audit team, the SCV, the Victorian DHHS and hospitals to develop strategies to address preventable errors and clinical management issues. These reports are to be used in combination with other comprehensive clinical performance data sets and supplementary performance reports to monitor and improve patient safety in Victoria.
- The RACS Research, Audit and Academic Surgery Division conducted a review on the topic: *what makes a good morbidity & mortality meeting*. The aim of the review was to produce a booklet with educational guidelines and a checklist. This was followed by a formal RACS position paper on the topic, released in 2017.<sup>(2)</sup>
- Hospitals routinely ask for evidence of CPD and mortality audit compliance. The RACS will provide the confirmatory documentation of this to Fellows.

### 3.4. Participation and compliance

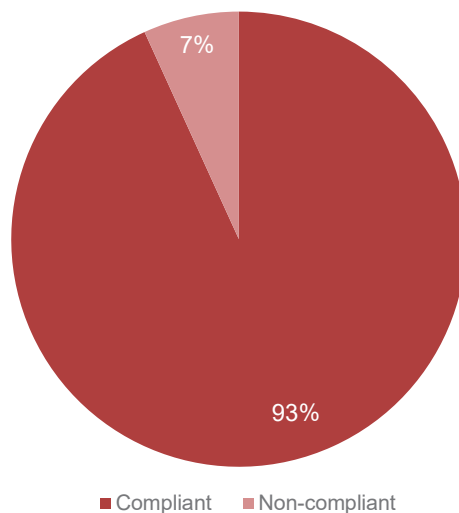
All hospitals that provide surgical services participate and comply with the audit requirements. To comply with the audit process, Fellows of RACS must not only agree to participate, but to also return completed SCFs and assessment forms in a timely, accurate and complete manner. Thus, there is a difference between surgeon participation and compliance. Participation is the receipt of confirmation that the surgeon will participate, and this has been largely irrelevant since 2012 when RACS mandated this activity for all Fellows. Compliance is the return rate of SCFs by the nominated surgeon for deaths notified to VASM by the hospitals. Hospitals provide notifications of death on a regular basis, as this is the main trigger for the audit process to begin.

The RACS Council has delivered strong support to the ANZASM, with participation and compliance by surgeons in their state mortality audit a compulsory component of the CPD program since January 2010.

The RANZCOG, AOA and ANZCA boards have approved formal collaboration with the ANZASM in the audit process.

The VASM audit collects data on all deaths occurring after a gynaecological surgical procedure. The Consultative Council on Obstetric and Paediatric Mortality and Morbidity and VCCAMM continue to separately review obstetric, neonatal and anaesthetic deaths in Victoria. Figure 4 outlines the compliance rates of Victorian Fellows.

Figure 4: Current Fellows compliance status



Current audit period 1 July 2015 to 30 June 2016.

**Comments:**

- Combined Fellows' compliance with the audit was 93.2% for the period 1 July 2015 to 30 June 2016. RACS Fellows had a compliance rate of 86.2% (1,483/1,720 cases), based on the SCF return rate while gynaecological Fellows had a compliance rate of 100% (8/8 cases). The process review backlog of the surgical pending cases should diminish by the next CPD verification period, as the time frame given for each step of the audit process (SCF, FLA and SLA return) is 21 working days. Obtaining medical records and documentation de-identification processes can take up to 6 months for complex cases.
- Almost half of RANZCOG and RACS Fellows perform assessments as first- or second-line assessors.
- For Fellows who appear non-compliant, a reminder letter is disseminated by VASM monthly for a year and Fellows who are not compliant with their annual CPD requirements after the due date of 28 February, receive an escalating series of reminders from the Chair, Professional Standards, Chair, Professional Development and Standards Board, the President and the Executive Director for Surgical Affairs. Failure to comply with CPD is considered a breach of the RACS Code of Conduct and may be referred to the Professional Conduct Committee.

### 3.5. Demographics and characteristics of audited deaths

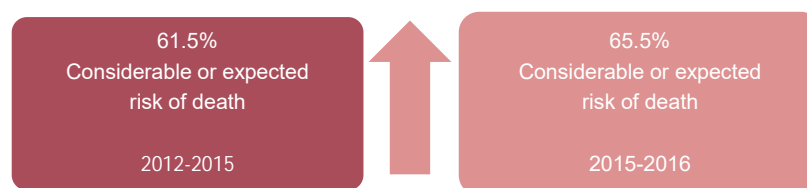


Table 3: Characteristics of audited deaths over the audit period

Audit period	2012-2015		2015-2016	
Number of audited deaths	n=3,235	%	n=713	%
Mean age (range)	73 years	(1 day to 104 years)	72 years	(1 day to 104 years)
Median age in years (IQR)	78 years	(62 to 84 years)	77 years	(62 to 84 years)
Gender (Male:Female)	56.3%	: 43.7%	56.7%	: 43.3%
Admission status (Emergency: Elective)	82.6%	: 17.4%	86.5%	: 13.5%
ASA grades	ASA 1-2	7.1%	ASA 1-2	5.1%
	ASA 3	27.9%	ASA 3	26.2%
	ASA 4	49.8%	ASA 4	54.0%
	ASA 5-6	15.2%	ASA 5-6	14.7%
Risk of death prior to surgery	Expected	13.2%	Expected	14.0%
	Considerable	48.3%	Considerable	51.5%
	Moderate	25.5%	Moderate	23.1%
	Small	10.1%	Small	9.5%
	Minimal	2.9%	Minimal	1.9%
Most common comorbid factors	Cardiovascular	23.3%	Cardiovascular	21.6%
	Age	19.8%	Age	19.3%
	Respiratory	12.2%	Respiratory	11.7%
	Renal	10.2%	Renal	10.0%
	Other	8.6%	Other	8.7%
	Advanced malignancy	6.7%	Advanced malignancy	8.2%
	Diabetes	6.7%	Diabetes	7.8%
	Neurological/psychiatric	6.6%	Neurological/psychiatric	6.1%
	Obesity	3.6%	Obesity	3.8%
	Hepatic	2.6%	Hepatic	2.8%
Most common surgical diagnoses	Fracture of neck of femur	32.8%	Fracture of neck of femur	55.3%
	Malignancy	21.6%	Intestinal obstruction	19.1%
	Cardiac disease	12.7%	Subarachnoid haemorrhage	9.9%
	Cerebrovascular accident	11.6%	Abdominal aortic aneurysm	8.6%
	Intestinal obstruction	9.8%	Neurotrauma	7.2%
	Aortic aneurysm	7.1%		
	Neurotrauma	4.4%		
Number of operative procedures performed	>=3	8.2%	>=3	10.0%
	2	14.5%	2	15.6%
	1	67.6%	1	74.4%
	0	9.6%	0	5.8%

Note: Current audit period 1 July 2015 to 30 June 2016.

ASA: American Society of Anesthesiologists. The ASA physical status classification system is an international measure of patient risk used by anaesthetists.<sup>(1)</sup>

Total n=3,948. Data not available: admission status n=33 (0.8%); ASA grade n=164 (6.7%); risk of death n=31 (0.9%), comorbid factors n=364 (3.3%). Missing data was excluded from table 3.

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

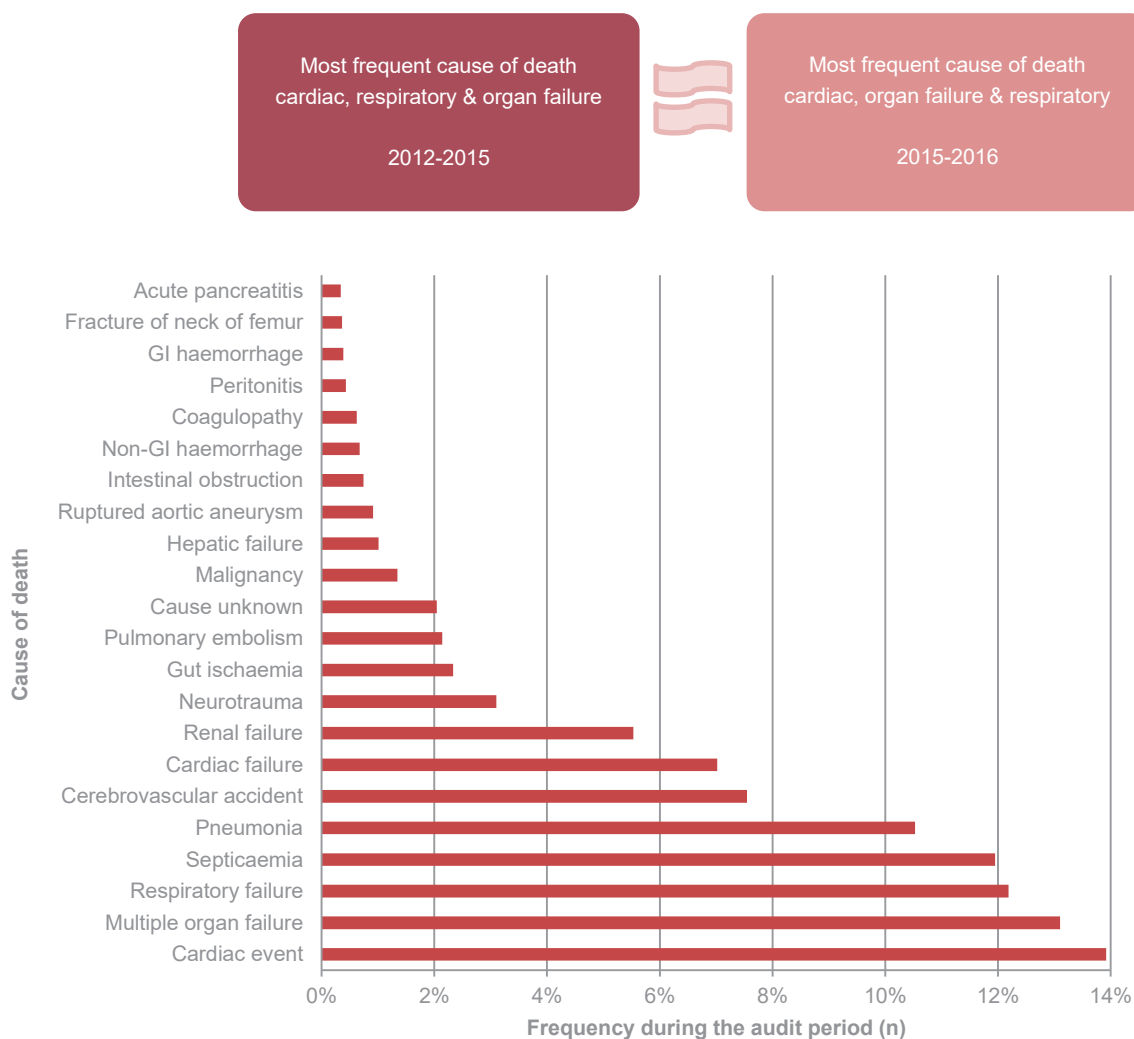
## Comments

- The demographic data remained stable during the audit period 1 July 2012 to 30 June 2016.
- An increase was noted for surgical diagnosis in fracture neck of femur and intestinal obstruction as indicated in table 3.

### 3.6. Establishing the cause of death

The cause of death recorded by the treating surgeon, as presented in Figure 5, 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.

Figure 5: Frequency of reported causes of death



Note: n=4,099 conditions were perceived to be responsible for death in 3,948 cases.

Audit period 1 July 2012 to 30 June 2016.

GI: gastrointestinal.

Exclusion: palliative care (n=60) and hypotension (n=11) as contributory factors rather than cause of death.

The diagnoses codes were re-categorised and detailed in the 2015-2016 VASM Technical Report.

The cause of death is directly coded from the treating surgeon's statement. Once a code has a count of  $\geq 10$  across the audit period it is included in this figure by being grouped into larger overarching categories. This figure represents all 22 overarching categories of causes of death.



### Comments:

- There were 4,099 conditions perceived to have caused death. The most frequently cited were cardiac events, 14.1% (579); multiple organ failure, 13.3% (545); respiratory failure 12.3% (507); septicaemia, 12.1% (497) and pneumonia, 10.7% (438). In many cases this reflects the terminal event and not the underlying pathology, which has been identified as an issue in terms of the accurate completion of death certificates.<sup>(13-16)</sup>
- At times the cause of death is related to existing comorbidities. A recent Australian study concluded that “potentially modifiable comorbidities are associated with poorer postoperative outcomes.”<sup>(17)</sup>
- In 18.7% (737/3,948) of cases a coronial postmortem was performed, which is considered extremely low. 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 29.3% (197/673) of elective cases and 16.9% (540/3,194) of emergency cases. Postmortems are known to provide educational information and valuable insights, and these referral rates are of concern.<sup>(13-16)</sup>
- The cause of death identified by the coroner’s office and by the VASM had 82% agreement when the coronial diagnosis is used as the gold standard.<sup>(18)</sup>

### 3.7. Peer-review process

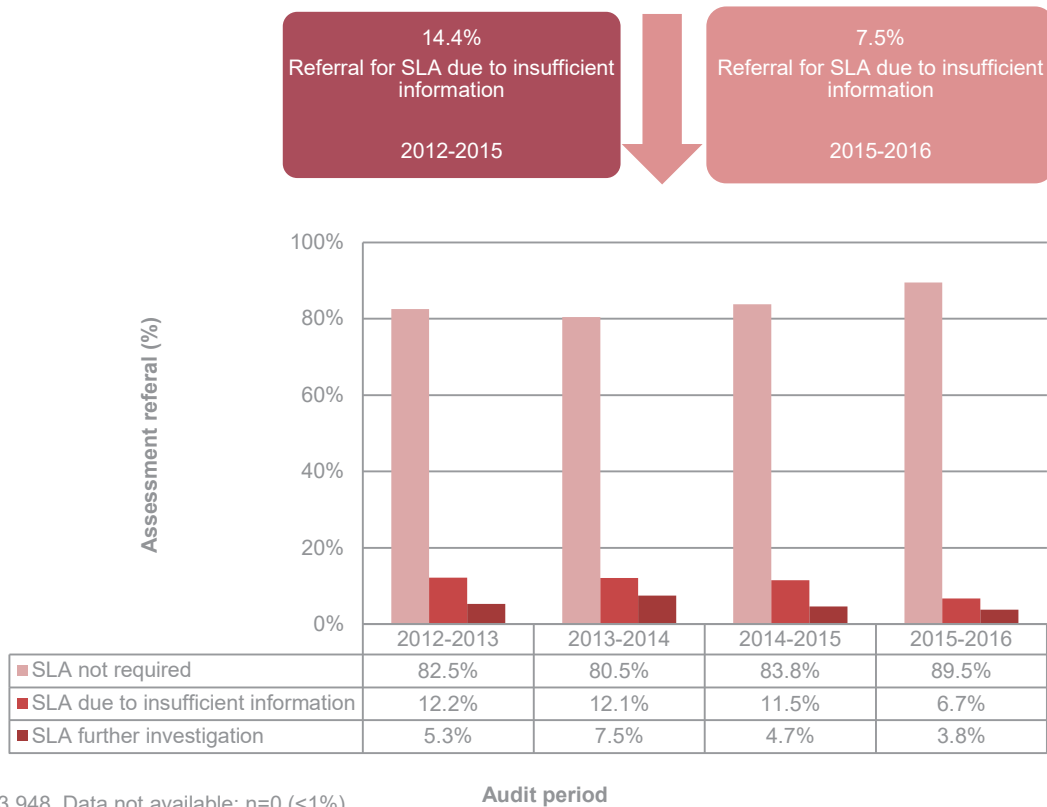
The VASM peer-review process is a retrospective examination of the clinical management of patients who died while under the care of a surgeon. All assessors (first- and second-line) must decide if the death was a direct result of the disease process alone, or if aspects of the management of the patient may have contributed to the outcome.

FLAs were completed in 3,948 cases and 15.9% (629) of those cases required an in-depth SLA. The SLA referral rate for the current period (2015 to 2016) dropped to 10.5% (75/713) from 14.4% in the previous audit activity period. 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 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.

The lack of information provided in the SCFs has decreased since the beginning of the audit, but still requires improvement. SLAs required for other triggers may represent suspected issues of clinical management. The reasons given for referral for SLA are provided in Figure 6.

Figure 6: Reason for referral for second-line assessment (SLA)

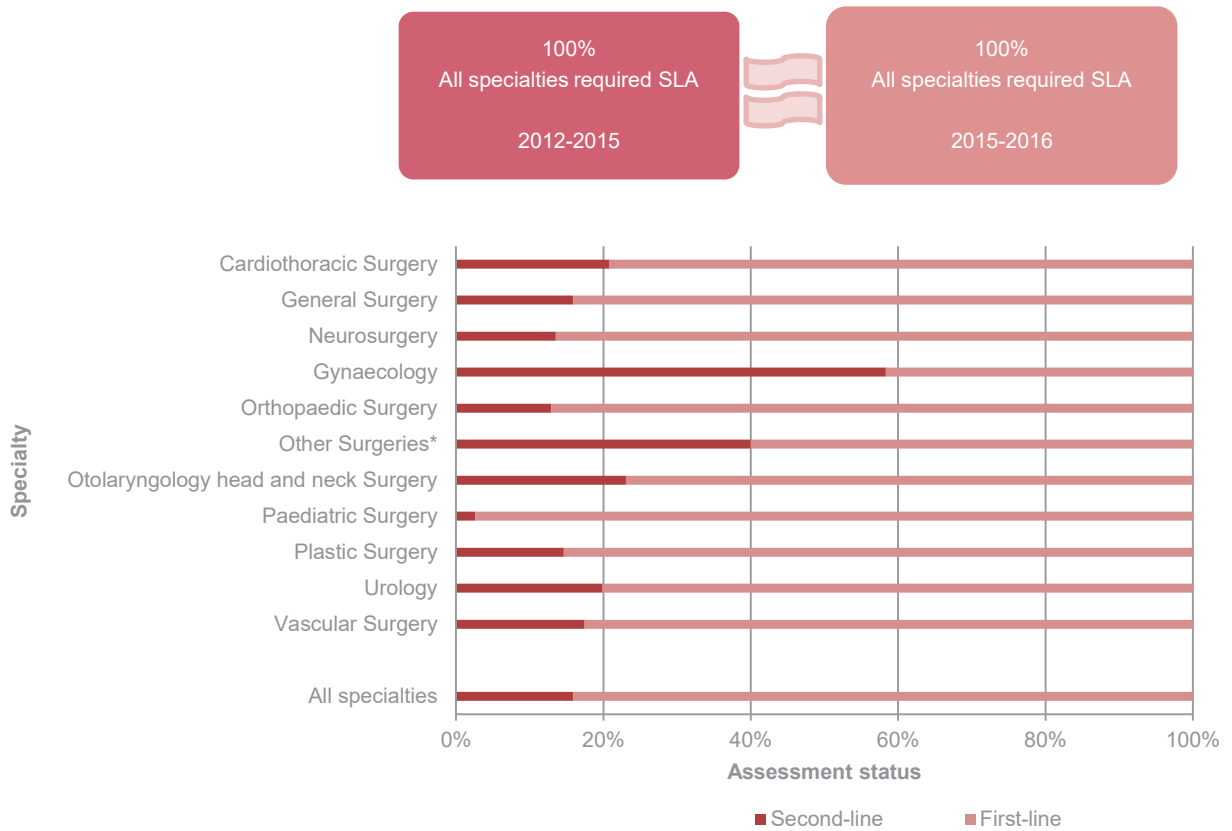


Note: total n=3,948. Data not available: n=0 (<1%).  
 Audit period 1 July 2012 to 30 June 2016.

**Comments:**

- An SLA can be requested for insufficient information and/or further investigation. 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 from 12.2% (121/994) in 2012 to 2013, to 6.7% (48/713) in 2015 to 2016. 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).
- 83.6% (3,300/3,948) of cases were not referred for SLA by the first-line assessor.
- 34.2% (215/629) of SLA 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 VASM; 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. The newly established compulsory move to the electronic interface in 2017 will facilitate the improvements of the data quality received.
- In 23.2% (146/629) of SLAs at least one aspect of the patient medical record submitted to the assessor was deemed unsatisfactory and required further investigation. Criticisms included poor medical admission notes, missing imaging, missing reports, missing transfer notes and follow-up records, and unsatisfactory description of the surgical procedure. Comprehensive and legible hospital case notes are an important record of what occurred during a patient's treatment.

Figure 7: Frequency of need for second-line assessment (SLA) by specialty



Note: n=3,948. Data not available: n=0 (0%).

Audit period 1 July 2012 to 30 June 2016.

Other surgeries include smaller specialties with low case numbers such as Oral/maxillofacial, Ophthalmology, Oncology and Trauma.

**Comments:**

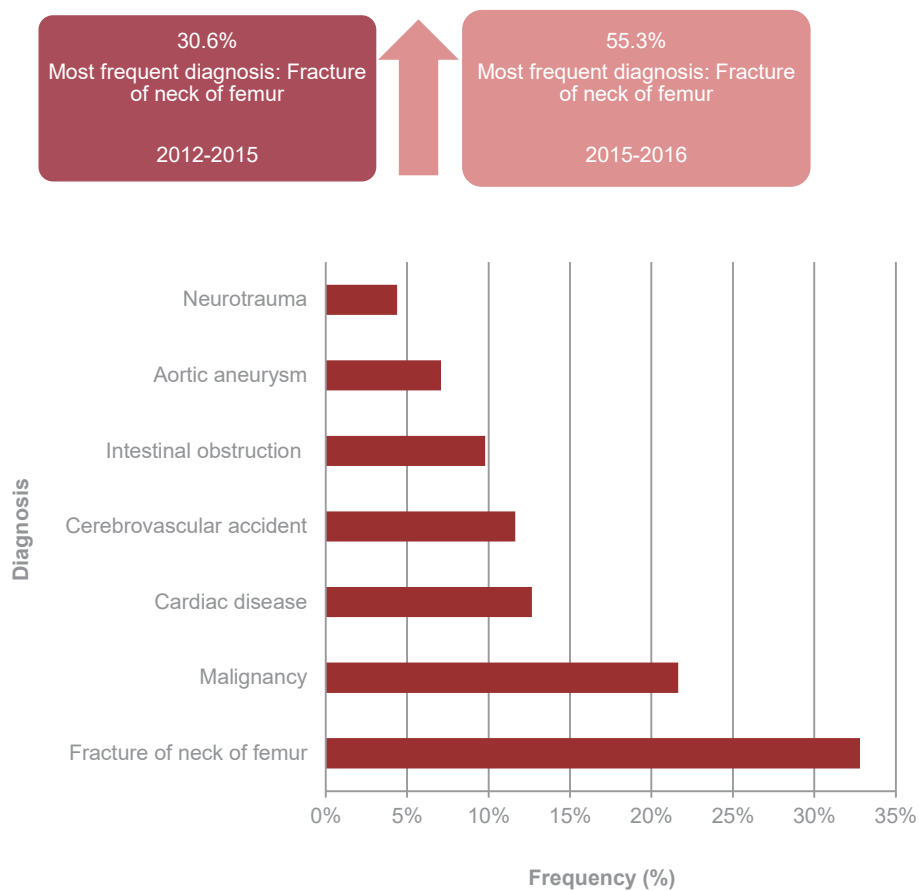
- The need for SLA referral varied between specialties. Gynaecology had the highest percentage of cases referred for SLA; however, no inferences can be made as the number of mortalities in this specialty was low for the audited period.
- The need for referral for SLA was similar in metropolitan and rural regions, and assessments were required for all specialties with reported mortalities, emphasising the educational value of the external peer-review assessments and the educational value of the audit.

## 4. Clinical risk management

### 4.1. Establishing the surgical diagnosis

The top seven diagnoses are outlined below.

Figure 8: Most frequent diagnoses



Note: n=2,766 diagnoses (identified in 3,948 patients).

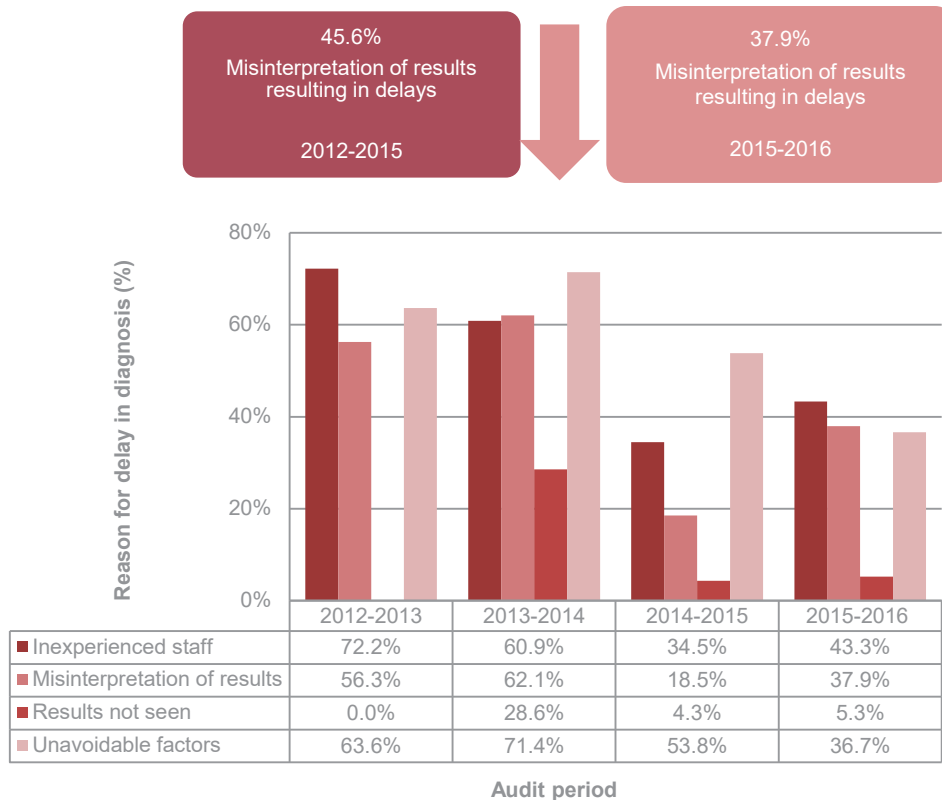
Audit period 1 July 2012 to 30 June 2016.

Information on diagnoses codes are detailed in the 2015-2016 VASM Technical Report.

## 4.2. Delay in diagnosis

Early diagnosis is critical in preventing surgical complications or deterioration, particularly in a frail population. Treating surgeons were asked to record any perceived delays in establishing a diagnosis and proceeding to definitive treatment (see Figure 9).

Figure 9: Perceived delays in establishing a diagnosis



Audit period 1 July 2012 to 30 June 2016.  
 Note: n=265 issues (identified in 3,948 patients).  
 A case can have multiple delay issue associations.  
 Data not available: n=17 (<1%) excluded.

### Comments:

- Diagnostic delays were identified by the treating surgeon in 6.7% (265/3,948) of all cases, and in 7.0% (251/3,568) of cases in which the patient underwent an operation. When cases were submitted to the first- or second-line assessment process, the incidence of perceived delays in patient care was 21.3% (89/418); higher than the incidence identified by treating surgeons.
- Delay in establishing a diagnosis remained constant at around 7% during the audited period.
- 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”.<sup>(19)</sup>

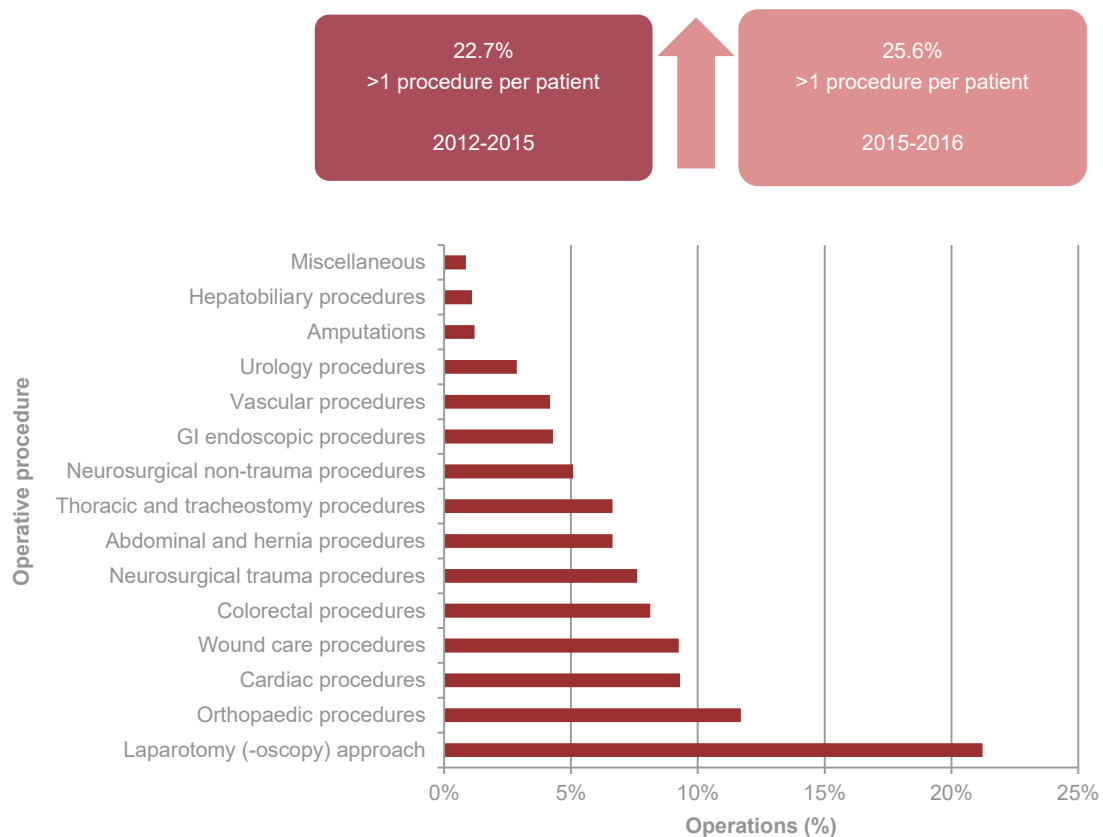


### 4.3. Profile of operative procedures

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

The role of the treating surgeon is to take responsibility for the overall success of the operation. The treating surgeon needs to ensure that the operation proceeds smoothly and with the lowest possible risk of complications or an unplanned return to theatre, especially in a training environment.

Figure 10: Frequency of individual surgical procedures



Note: n=3,568 patients having operative treatment (with 5,036 episodes).

Audit period 1 July 2012 to 30 June 2016. Only procedures with a frequency >10 interventions have been recorded.

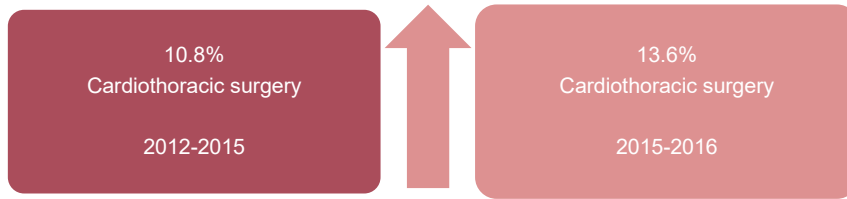
GI: gastrointestinal.

The operative procedures were categorised in this report to group the operations for simpler classification. A breakdown of operative procedures is provided in the 2015-2016 VASM Technical Report.

#### Comments:

- There were 3,568 patients who underwent operative treatment (2012 to 2016). As a patient can undergo multiple procedures during the same admission, and at the same surgical session, a total of 5,036 separate procedures were performed.
- During the last year of the audit period (2015 to 2016) there was a 2.9% increase in the number of patients who had multiple surgical episodes. This increase reached statistical significance  $p < 0.001$  (data not shown).
- The frequencies of procedures reported are outlined in Figure 10. Laparotomy and laparoscopic approaches are recorded separately by VASM staff in addition to the definitive intra-abdominal procedure, which accounts for this data point being the most frequently recorded.

Table 4: Operative mortality frequency by specialty



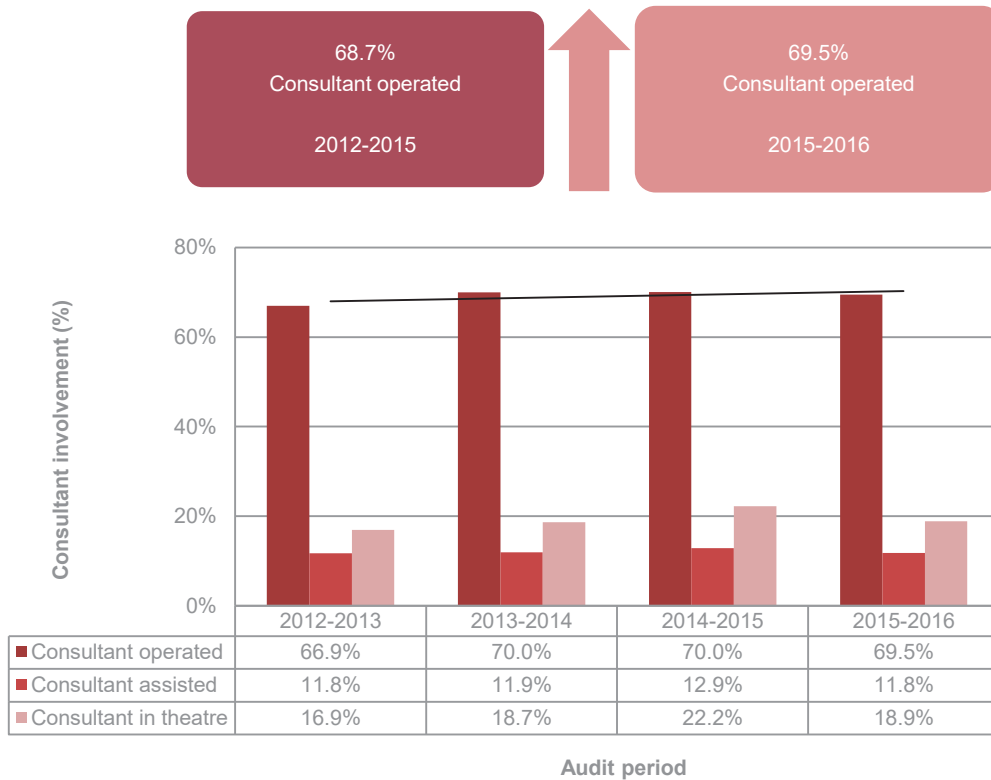
Specialty	Frequency (%)
General Surgery	1,246 (34.9)
Orthopaedic Surgery	738 (20.7)
Cardiothoracic Surgery	485 (13.6)
Neurosurgery	436 (12.2)
Vascular Surgery	315 (8.8)
Urology	147 (4.1)
Plastic Surgery	120 (3.4)
Otolaryngology Head and Neck Surgery	35 (1.0)
Paediatric Surgery	35 (1.0)
Gynaecology	8 (0.2)
Total	3,565 (100)

Note: n=3,568 patients who had operative treatment (5,036 operative episodes).  
Data not available: n=33 (0.8%) excluded.  
Audit period 1 July 2012 to 30 June 2016.

**Comments:**

- There was great variation by specialty in the rate of operative intervention over the audit period, attributable to the casemix and risk profile of patients in each specialty. Only eight gynaecology patients were included in this report. One patient can have multiple surgical episodes.
- A higher rate of operative intervention was seen in elective patients (98.7%; 671/680) compared with patients admitted as emergencies (88.6%, 2,867/3,235;  $p < 0.001$ ). This was not unexpected as most elective admissions to a surgical unit were for an operative procedure.
- Sometimes it is deemed inappropriate to continue with the procedure, as occurred in 9.6% (380/3,948) of procedures.

Figure 11: Seniority of surgeon performing surgery

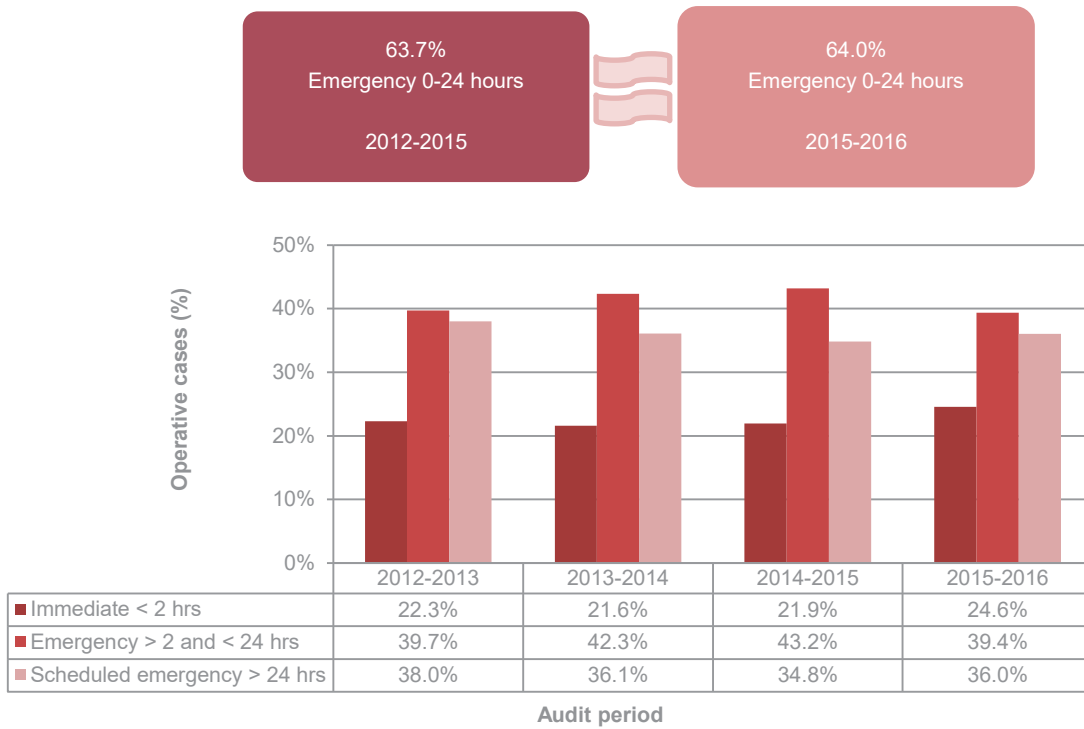


Note: n=5,049 episodes in 3,568 patients having operative treatment.  
 Audit period 1 July 2012 to 30 June 2016.  
 The consultant operated exponential trend line has increased slightly over time.

**Comments:**

- In 2012-2016 a consultant surgeon performed the surgery in 68.7% (3,471/5,049) of operative episodes. The VASM would like to see a further increase in consultant operative involvement in surgical procedures. There is some bias in these figures as data accuracy has been poor in this section of the surgical case record form (SCF). This increase in consultant involvement is appropriate when the risk profile of the audited cases is considered. There was a stable active participation by consultants in 69.5% (674/970) cases for the audited period 2015 to 2016. The role of the consultant is to take responsibility for the overall success of the operation, so their presence in theatre is crucial.
- In 2015 to 2016 an anaesthetist was present in 86.8% (619/713) of cases in which there was an operative procedure. In 8.5% (61/713) of cases the surgeon did not indicate if an anaesthetist was present and in 4.6% (33/713) of cases local anaesthetic was used. Of these cases, 9.7% (60/619) were identified as possibly having an anaesthetic component to the course of death. (data not shown)
- VASM reported 36 cases with an anaesthetic component in the death to VCCAMM since collaboration between the two organisations was initiated. The outcome of these cases will be incorporated in future VCCAMM, ANZCA and VASM publications.

Figure 12: Timing of operative procedures in emergency admissions



Note: n=3,454 episodes in 3,235 emergency patients. Data not available: n=201 (4.1%) excluded.  
 Audit period 1 July 2012 to 30 June 2016.  
 Hrs: hours.

**Comments:**

- Of the emergency admissions who underwent surgery, 22.5% (777/3,454) had surgery within 2 hours of admission, 41.3% (1,428/3,454) had surgery within 24 hours, and 36.2% (1,249/3,454) had surgery more than 24 hours after admission.
- During the audited period 63.8% (2,205/3,454) 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.<sup>(20-22)</sup>

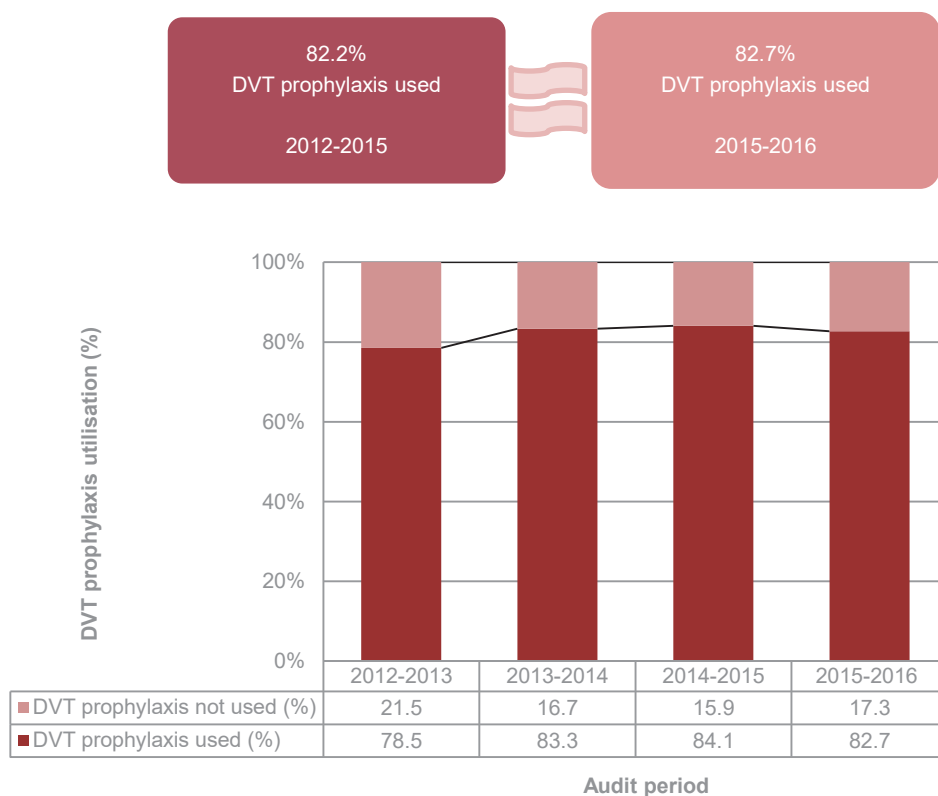
## 4.4. Deep vein thrombosis prophylaxis

The goal of this section is to identify if strategies are in place for treatment against the formation of deep vein thromboses (DVT) and subsequent pulmonary embolism in patients at risk. There are effective pharmacological and mechanical prophylaxis options available; however, pulmonary emboli (PE) 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<sup>(5, 23)</sup> 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 the type of prophylaxis used. Reasons for not providing DVT prophylaxis are also included in this section.

Figure 13: DVT prophylaxis use during the audit period

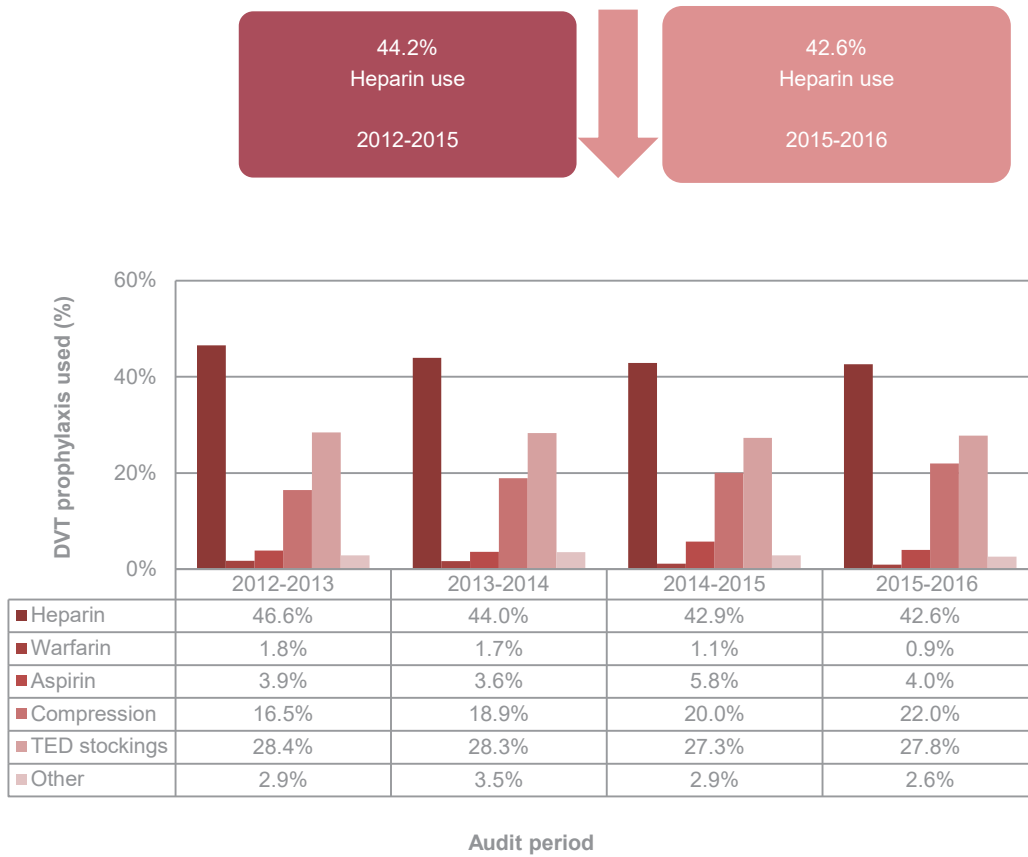


Note: total n=3,568 operative cases. Data not available: n=46 (1.3%) excluded.  
 Audit period 1 July 2012 to 30 June 2016.  
 DVT: deep vein thrombosis.

### Comments:

- The use of DVT prophylaxis has remained high: 82.2% (2,349/2,858) in 2012 to 2015 and 82.7% (549/664) in 2015 to 2016.
- The VASM data suggests that use of DVT prophylaxis is similar in both elective and emergency cases (data not shown).

Figure 14: Type of DVT prophylaxis used



Note: n=5,043 agents used in 3,568 cases (one patient can receive multiple prophylactic agents during surgical care). Data not available: n=46 (1.3%) excluded in 3,568 operative cases.

Audit period 1 July 2012 to 30 June 2016.

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

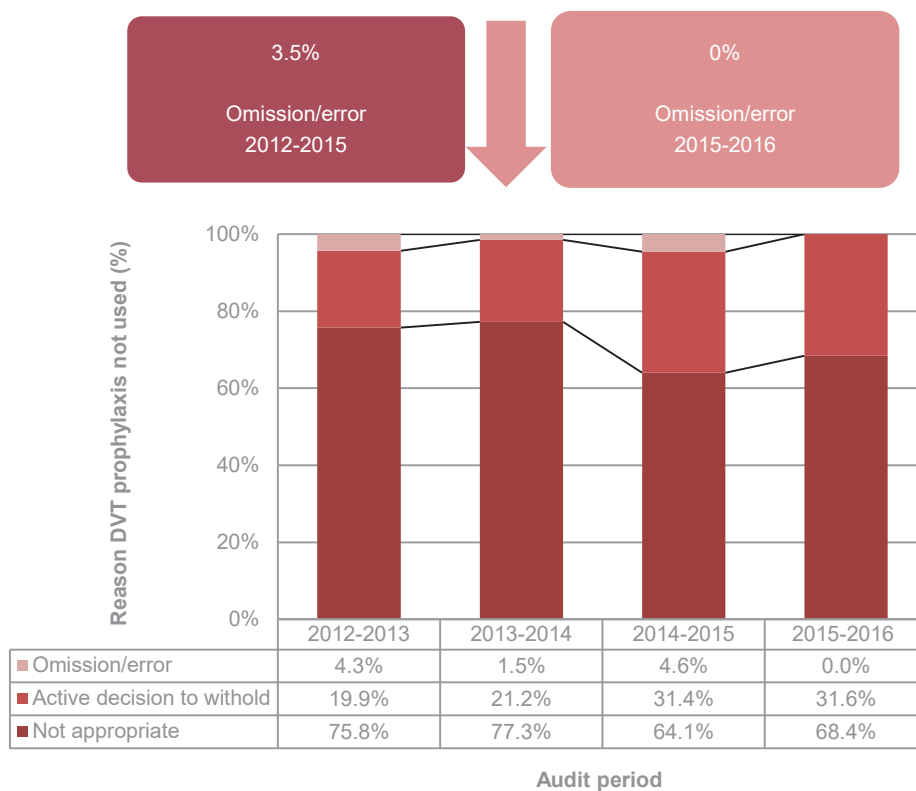
DVT: deep vein thrombosis; TED: thromboembolic deterrent.

**Comments:**

- There was a decrease in the use of Heparin from 44.3% (1,812/4,093) during the previous audit period 2012 to 2015 to 42.6% (405/950) in 2015 to 2016.
- Aspirin has now also been shown to be a valid therapeutic agent in thromboprophylaxis.<sup>(24)</sup>
- The spectrum of DVT prophylaxis used varied slightly over time; no major variance was noted.
- The type of prophylaxis used is subject to the judgement of clinicians caring for individual patients.



Figure 15: Reasons given by treating surgeon for not providing DVT prophylaxis

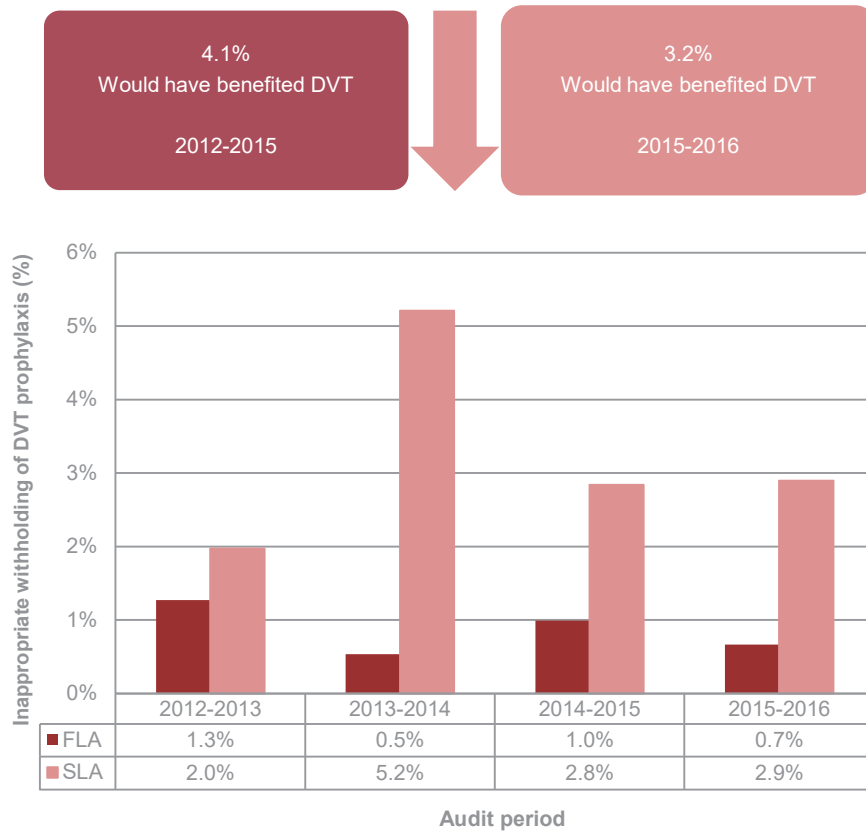


Note: n=624 patients not receiving prophylaxis in 3,568 operative cases. Data not available: n=46 (1.3%) excluded.  
 Audit period 1 July 2012 to 30 June 2016.  
 DVT: deep vein thrombosis.

**Comments:**

- Overall, 17.5% (624/3,568) of patients received no prophylaxis. In the majority of these cases this was a conscious decision by the treating team.
- The omission/error rate has decreased from 3.6% (16/446) in 2012 to 2015 to 0% in 2015 to 2016 (0/95).

Figure 16: Assessor perception of the appropriateness of decision to withhold DVT prophylaxis



Note: n=624 patients not receiving prophylaxis in 3,568 operative cases.  
 Data not available: n=35 (1%) excluded in 3,568 operative cases.  
 Audit period 1 July 2012 to 30 June 2016.  
 DVT: deep vein thrombosis; FLA: first-line assessment; SLA: second-line assessment.

**Comments:**

- Assessors were asked to comment on the appropriateness of withholding prophylaxis, as outlined in Figure 16.
- Assessors (first- and second-line) felt that in only 3.2% of the (20/624) cases in which a patient did not receive DVT prophylaxis, the patient would have benefited from it.
- Assessors could not accurately assess the appropriateness of the decision to withhold DVT in 3.4% (20/589) of cases due to insufficient evidence in the audit documentation. The tendency of second-line assessors to be more critical than first-line assessors of clinical management events was foreseeable, as second-line assessors have the opportunity to review patient medical records.

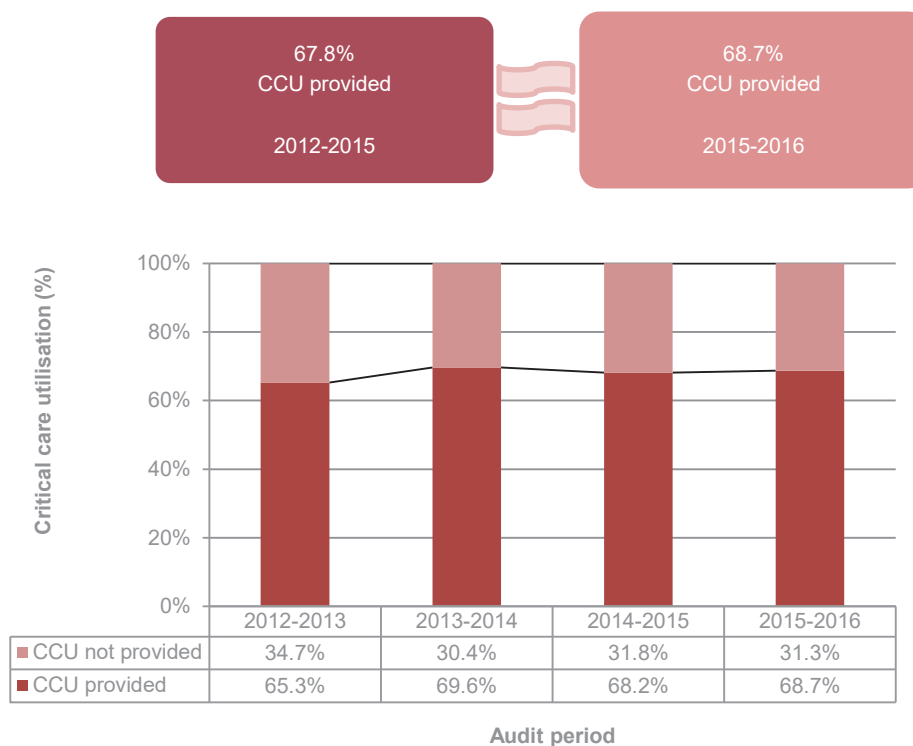
## 4.5. Adequacy of provision of critical care support to patients

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 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 17: Provision of critical care support

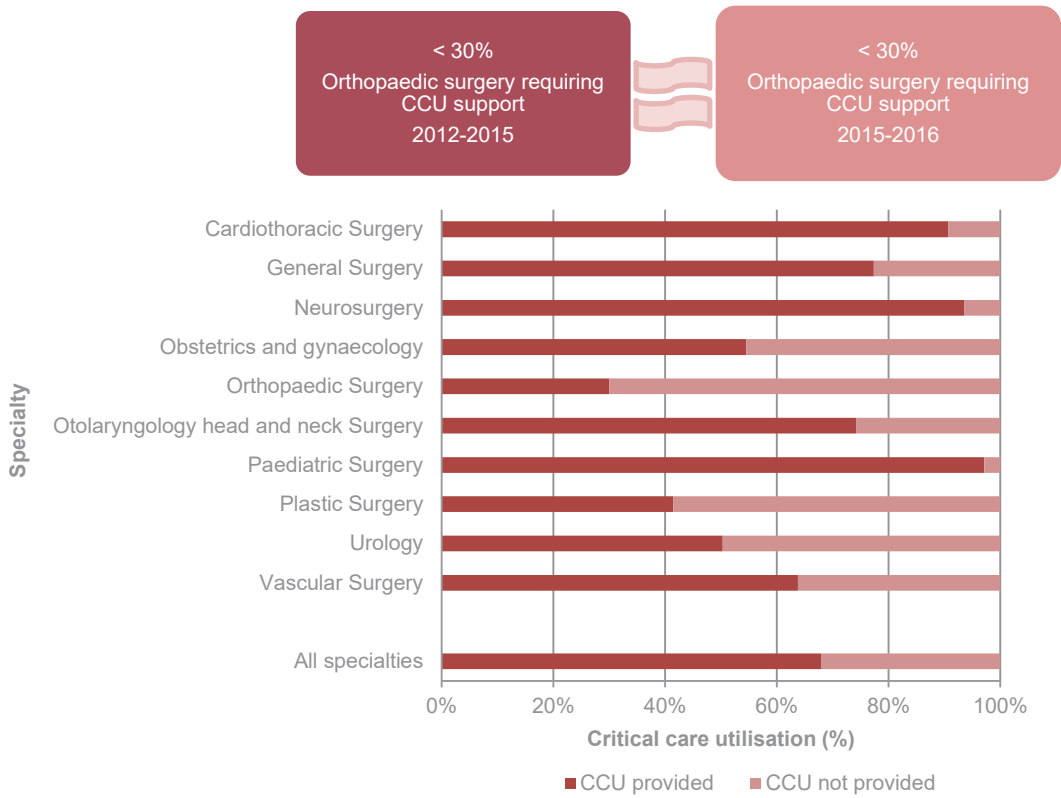


Note: n=3,568 operative cases. Data not available: n=11 (<1%) excluded.  
 Audit period 1 July 2012 to 30 June 2016.  
 CCU: critical care unit.

### Comments:

- During their inpatient hospital stay, 68.0% (2,417/3,557) of patients received critical care support (2012 to 2016).
- In 2015 to 2016 critical care support was used in 68.7% (459/668) of operative cases. The utilisation of critical care support has increased when compared to the very early years of VASM (data not shown).
- The use and need for critical care is higher in emergency cases (data not shown).
- It should be acknowledged that not all hospitals have critical care services and should therefore triage patients accordingly. There was no difference in critical care unit usage between rural hospitals for patients (data not shown).

Figure 18: Provision of critical care support to patients by specialty



Note: n=3,568 operative cases. Data not available: n=11 (<1%) excluded.  
 Audit period 1 July 2012 to 30 June 2016.  
 CCU: critical care unit.

**Comments:**

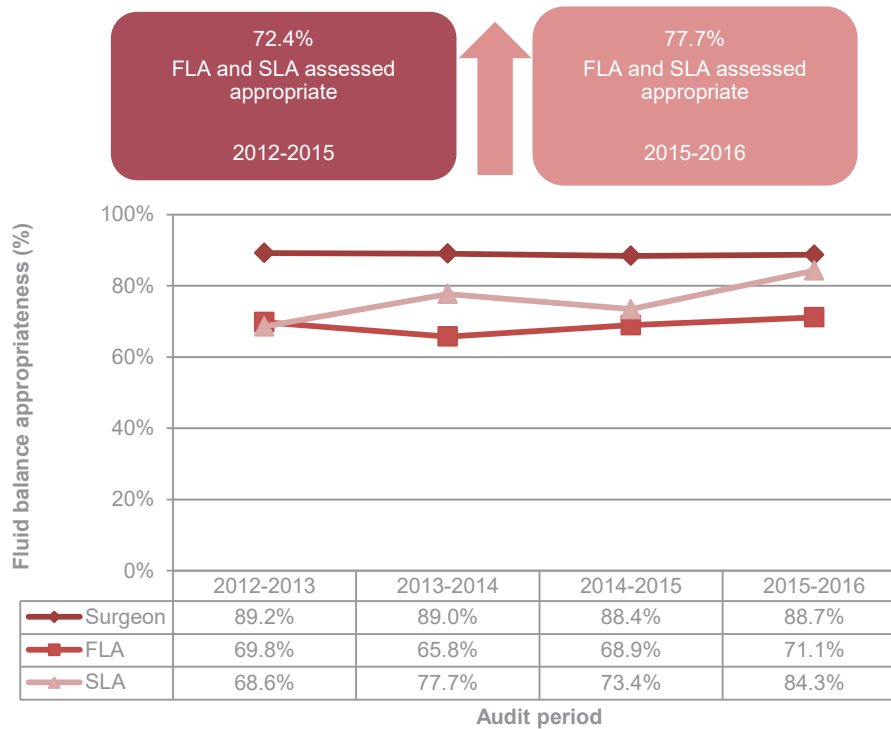
- Similar to previous years, orthopaedic patients have low referral rates for critical care support. This is thought to be due to the high number of elderly patients with a fractured neck of femur admitted from nursing homes.
- The treating surgeon perceived that a lack of critical care support was potentially an issue in 2.8% (32/1,140) of cases.
- Assessors (both first- and second-line) reported that 7.0% (80/1,140) of patients who did not receive critical care support were likely to have benefited from it, which, although small, is more than double than that identified by the treating surgeon.

## 4.6. 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 assessment 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 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 19: Perception of fluid balance appropriateness



Note:

SCF: Surgical Case Record.

FLA: First Line Assessment.

SLA: Second Line Assessment.

SCF n=3,568; FLA n=3,568; SLA n=606. Data not available excluded: SCF: n=46 (1.3%); FLA: n=85 (2.4%); SLA: n=10 (1.7%).

Audit period 1 July 2012 to 30 June 2016.

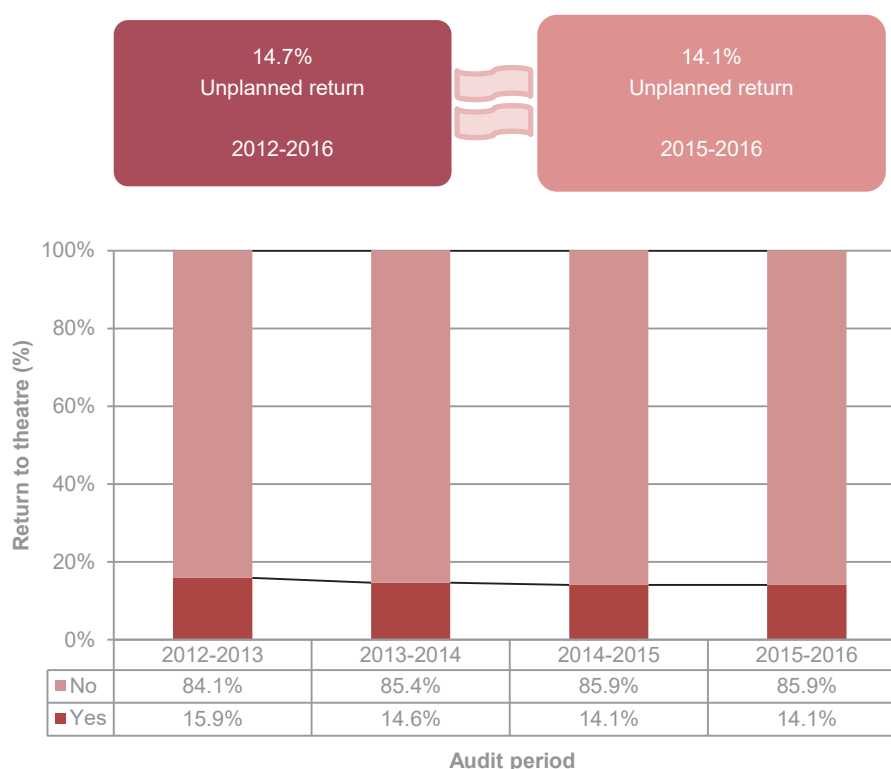
### Comments:

- The treating surgeon felt that fluid balance had been managed appropriately by their clinical team in 88.8% (3,128/3,522) of cases during 2012-2016.
- Assessors (first- and second-line) identified inappropriate fluid balance in 7.6% (295/3,877) of cases during 2012-2016.
- 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".<sup>(6)</sup>

## 4.7. 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 decrease over future audit periods.

Figure 20: Unplanned return to the operating room



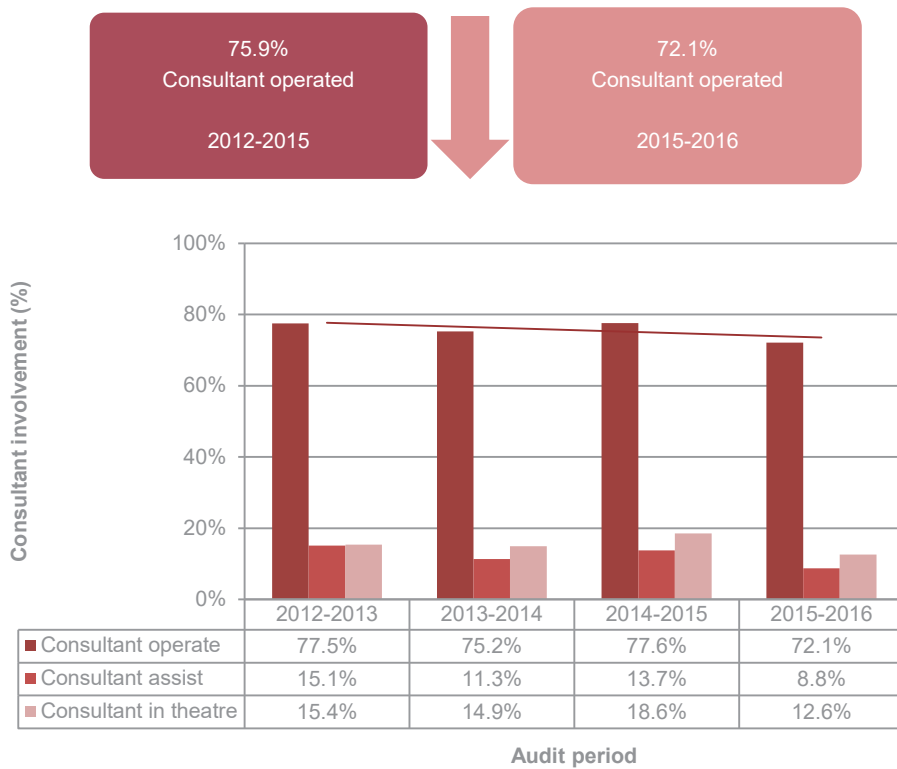
Note: n=5,544 episodes in 3,568 patients having operative treatment. Data not available: n=24 (<1%) excluded. Audit period 1 July 2012 to 30 June 2016.

### Comments:

- An unplanned return to the operating room was reported in 14.7% (520/3,544) of cases during 2012 to 2016 in which a surgical procedure was performed. These figures are slightly lower than the national mortality audit findings.<sup>(25)</sup>
- The frequency of unplanned returns has dropped from 15.9% (137/863) in the 2012 to 2013 period to 14.1% (94/667) in the 2015 to 2016 period, which is not statistically significant. An overall decrease over the audit period in unplanned returns to the operating room is desirable and appropriate.



Figure 21: Seniority of consultants performing surgery during unplanned returns to the operating room



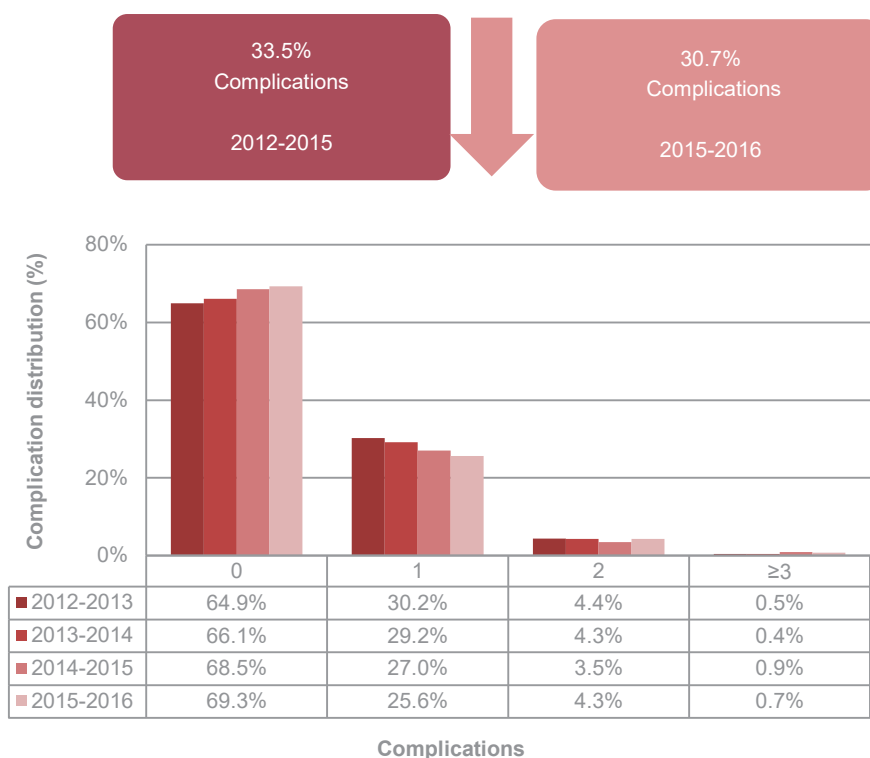
Note: n=1,328 episodes in 512 unplanned return to theatre patients.  
 Audit period 1 July 2012 to 30 June 2016.

**Comments:**

- Active consultant participation in cases requiring an unplanned return to the operating room is appropriate as such cases are more challenging and the risks are greater.
- There seems to be a decrease in consultant involvement in 2015 to 2016 compared with previous years. VASM will be examining this new trend, as consideration should be given to the risk profile of this frail group of patients.
- 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).

## 4.8. Postoperative complications

Figure 22: Postoperative complications recorded by treating surgeon

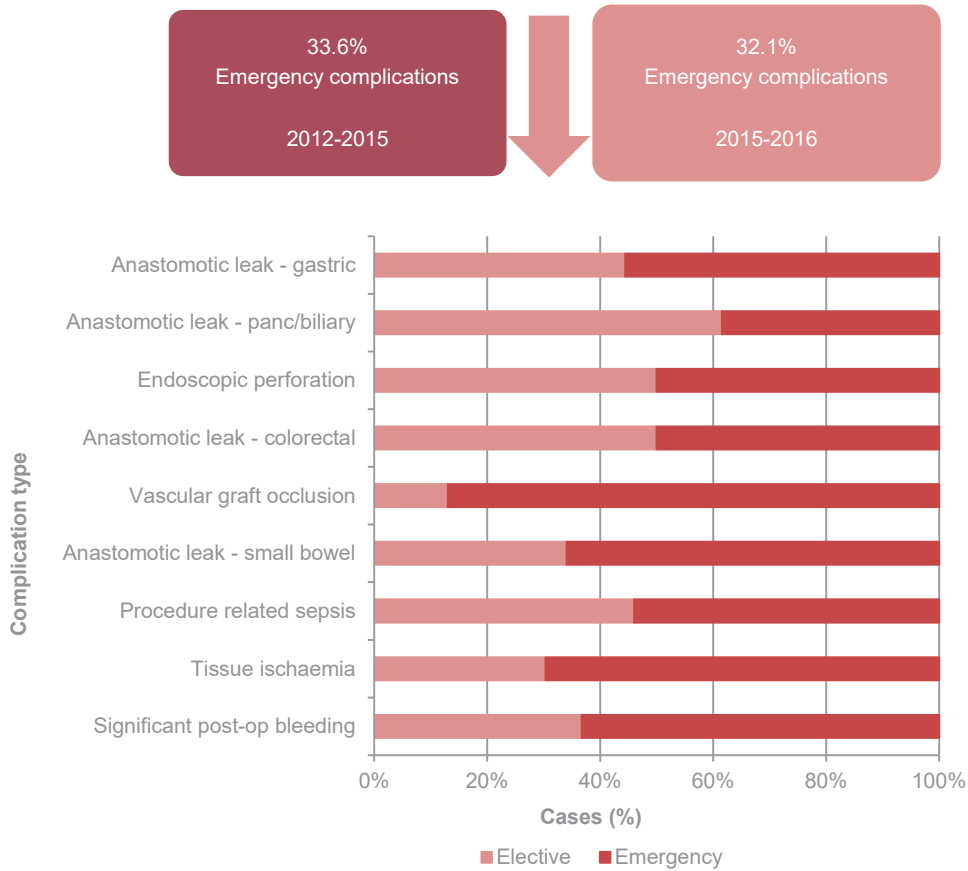


Note: n=3,568 patients who underwent operative treatment.  
Audit period 1 July 2012 to 30 June 2016.

### Comments:

- 67.2% (2,396/3,568) of patients who underwent operative treatment had no complications.
- The rate of postoperative complications reported by treating surgeons has remained low throughout the audit period. There has been a small decrease over the audited period which has reached statistical significance ( $p < 0.001$ ).
- A single operative complication was recorded in 28.1% (1,003/3,568) of cases, and only a small number of patients had more than one complication.

Figure 23: Frequency of specific postoperative complications by urgency status

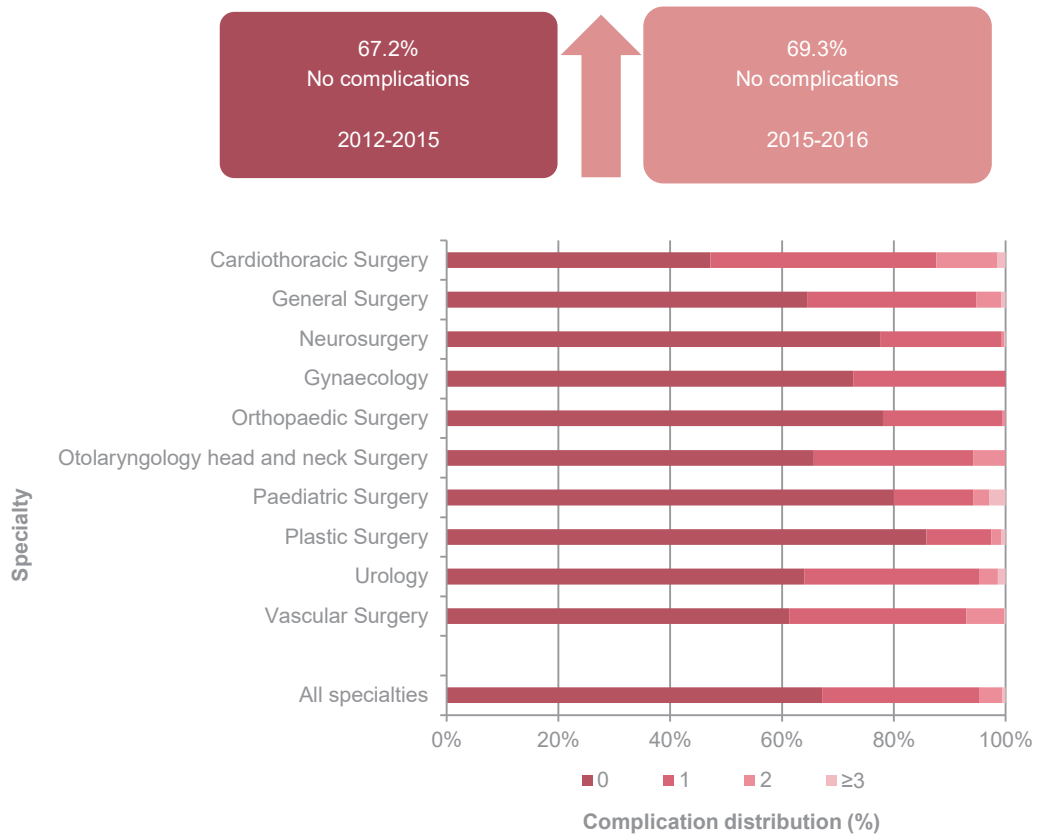


Note: n=1,359 complications in 5,036 episodes for 3,568 patients who underwent operative treatment.  
 Audit period 1 July 2012 to 30 June 2016.  
 Panc: pancreatic; post-op: postoperative.

**Comments:**

- Emergency cases were more likely to have postoperative complications.
- The audit pool contains 81.9% (3,235/3,948) cases admitted as emergencies. Emergency cases are at a greater complication risk during surgical procedures.
- A total of 858 ‘other’ complications were identified and excluded from the graph, 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.
- The SCF complication section will be revised to ensure clearer categorisation of complications for different specialities rather than capturing these under the ‘other’ categories.

Figure 24: Postoperative complications by specialty



Note: n=3,568 patients having operative treatment.  
 Audit period 1 July 2012 to 30 June 2016.

**Comments:**

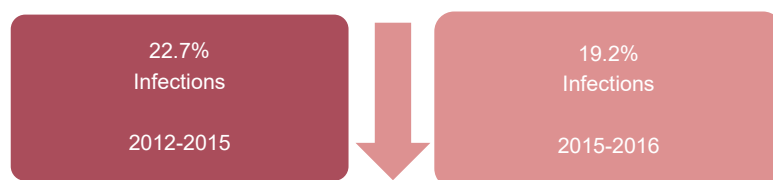
- There were differences in the rate of postoperative complications among the specialties. Cardiothoracic Surgery had the highest number of complications per patient due to the frailty and high risk of profile of patients.
- Only eight gynaecology and 39 paediatric patients were included in this report.

## 4.9. Clinically significant infections

In 2012 the VASM started collecting data points on clinically significant infections. The VASM monitors trends, including whether the infection was acquired preoperatively or postoperatively, 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 25 compares infection rates across the various surgical specialties.

Table 5: Clinically significant infections by type

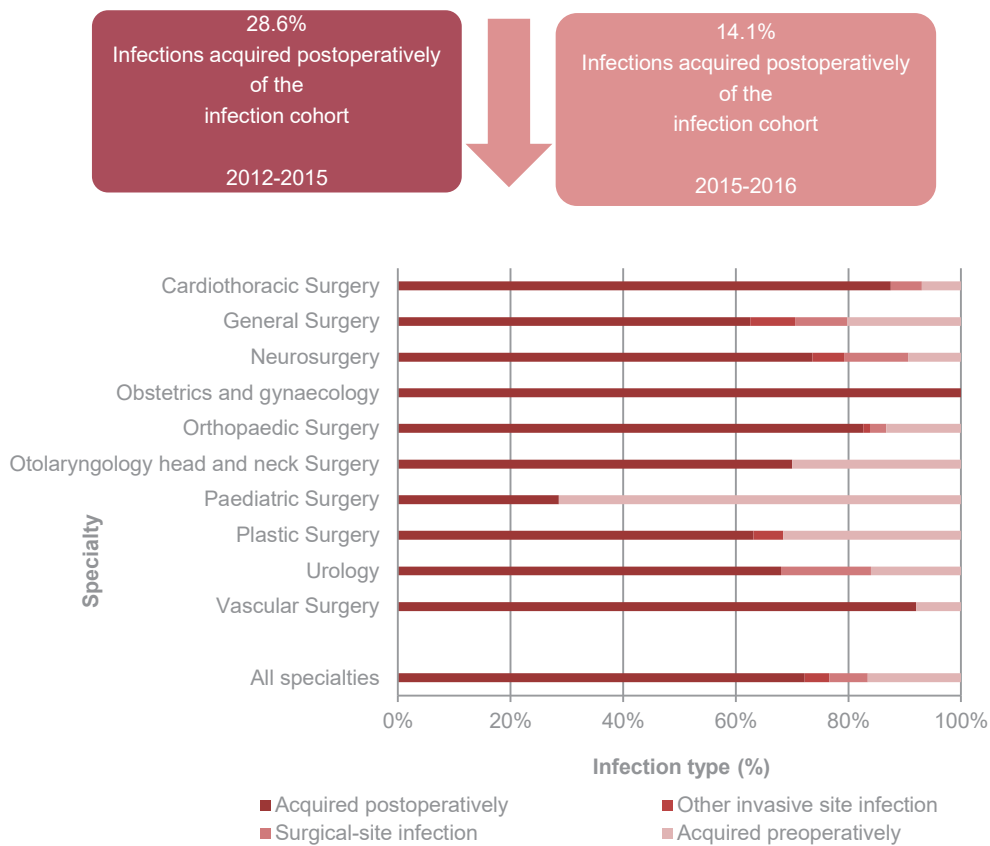


Infection type	2012-2013 % (n)	2013-2014 % (n)	2014-2015 % (n)	2015-2016 % (n)	Total % (n)
Pneumonia	47.5 (135)	50.1 (170)	44.8 (174)	43.8 (103)	46.7 (582)
Intra-abdominal sepsis	11.6 (33)	13.3 (45)	16.0 (62)	18.7 (44)	14.8 (184)
Septicaemia	30.3 (86)	25.1 (85)	24.2 (94)	23.0 (54)	25.6 (319)
Other*	10.6 (30)	11.5 (39)	14.9 (58)	14.5 (34)	12.9 (161)
<b>Total</b>	100 (284)	100 (339)	100 (388)	100 (235)	100 (1,246)

Note: n=1,256 infections in 3,948 patients. Data not available: n=15 (1.2%) excluded. Audit period 1 July 2012 to 30 June 2016.

\*Includes other sites of infection with the following causative organisms: *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.

Figure 25: Timeframe in which the clinically significant infection was acquired by specialty



Note: n=688 infections acquired in 3,948 patients. Data not available: n=35 (3.1%) excluded.  
 Audit period 1 July 2012 to 30 June 2016.



Table 6: Timeframe in which the clinically significant infection was acquired



Infection timeframe	2012-2013 % (n)	2013-2014 % (n)	2014-2015 % (n)	2015-2016 % (n)	Total % (n)
Acquired preoperatively	12.1 (38)	13.4 (25)	13.0 (27)	21.1 (24)	16.6 (114)
Surgical-site infection	4.4 (8)	7.5 (14)	6.3 (13)	10.5 (12)	6.8 (47)
Acquired postoperatively	69.4 (125)	75.9 (142)	77.3 (160)	61.4 (70)	72.2 (497)
Other invasive site infection*	5.0 (9)	3.2 (6)	3.4 (7)	7.0 (8)	4.4 (30)

Note: n=688 infections acquired during last admission in 3,948 patients. Data not available: n=35 (3.1%) excluded. Audit period 1 July 2012 to 30 June 2016.

The infective organisms identified in the 'other group' 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.

#### Comments:

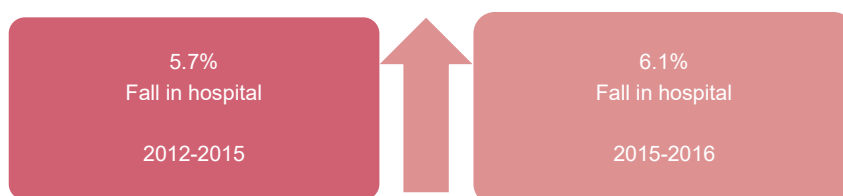
- The timeframe in which the infection was acquired can play a role in the patient's recovery following the surgical procedure.
- The infection rate varied across specialties, reflecting the casemix of individual specialties.
- Infection was reported in 33.4% (1,152/3,447) of cases since data collection commenced for infections.
- Combined, pneumonia and septicaemia comprised 72.3% (901/1,246) of the cases where infection was identified.
- Overall, 72.2% (497/688) of infection cases were acquired postoperatively.
- Surgical-site infections occurred in 6.2% (41/660) of cases involving infection. Surgical-site infections have increased from 6.1% (35/574) in the 2012 to 2015 period to 10.5% (12/114) in 2015 to 2016. There were similar finding in the national data pool.<sup>(26-28)</sup>
- The infective organism was identified in 37% (461/1,246) of the infection cohort.
- Antibiotic prophylaxis is a good infection control measure in surgery and should be considered.<sup>(29)</sup>
- Strategies for reducing surgical-site infections have been implemented overseas and in Australia.<sup>(30,31)</sup>

## 4.10. Trauma

VASM started collecting data on trauma cases in 2012. Trauma cases are those in which a patient received severe bodily injury or shock from a fall, accident or violence (see Table 7).

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

Table 7: Causes of trauma



Trauma causes	2012-2013 % (n)	2013-2014 % (n)	2014-2015 % (n)	2015-2016 % (n)	Audit period % (n)
Fall at home	40.2 (92)	42.4 (112)	40.1 (111)	34.0 (50)	39.8 (365)
Fall in a care facility	39.7 (91)	29.9 (79)	28.9 (80)	32.7 (48)	32.5 (298)
Fall in hospital	3.9 (9)	4.9 (13)	8.3 (23)	6.1 (9)	5.9 (54)
Fall type unknown	1.3 (3)	2.7 (7)	2.2 (6)	2.7 (4)	2.2 (20)
Fall other*	5.7 (13)	7.2 (19)	6.5 (18)	8.2 (12)	6.8 (62)
Road accident	7.4 (17)	9.5 (25)	11.2 (31)	12.9 (19)	10.0 (92)
Violence	1.8 (4)	3.4 (9)	2.9 (8)	3.4 (5)	2.8 (26)
<b>Total</b>	<b>100 (229)</b>	<b>100 (264)</b>	<b>100 (277)</b>	<b>100 (147)</b>	<b>100 (917)</b>

Note: n=917 trauma cases in 3,948 patients. Data not available: n=36 (<1%) excluded.

Audit period 1 July 2012 to 30 June 2016.

\*Includes roads and public venues.

### Comments:

- 23.2% (917/3,948) of mortalities reported since July 2012 were attributed to trauma.
- Of the traumatic events, 87.1% (799/917) were caused by falls, 10.0% (92/917) were caused by traffic accidents and 2.8% (26/917) were associated with violence.
- 38.4% (352/917) of falls occurred in hospitals or care facilities, while 39.8% (365/917) of falls occurred at home and only 7.9% (72/917) occurred 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 associated with advanced age. The 38.4% (352/917) of falls that occurred in hospitals or care facilities should be addressed, with strategies implemented to reduce the number of falls in those locations.

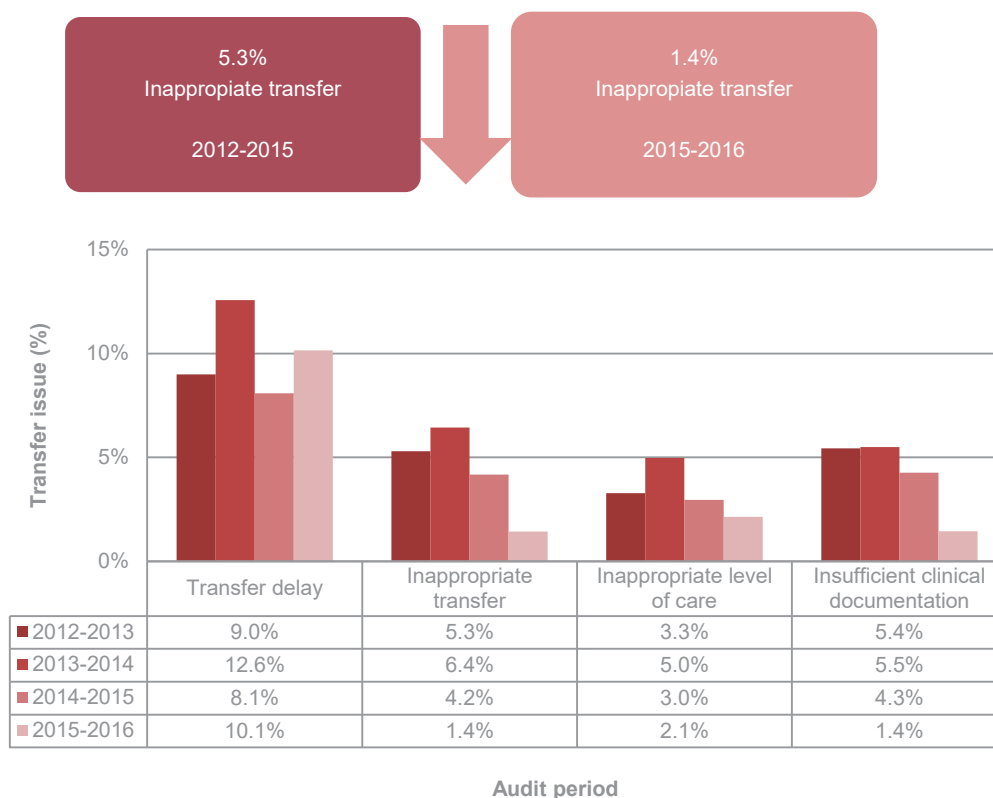
- A review of patient care received by elderly patients undergoing surgery in the United Kingdom had similar findings.<sup>(19)</sup> Future trending analysis of falls should provide greater insight into strategies for improvement in this aspect of patient care, especially when falls occurred in a care facility and in hospital.<sup>(32)</sup>
- 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.<sup>(33)</sup> 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.<sup>(34)</sup> Therefore, similar educational strategies could be implemented at Victorian health care facilities.

## 4.11. Patient transfer issues

The treating surgeon was asked to provide information on patients who required interhospital transfer as part of their care. 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 26: Interhospital transfer issues

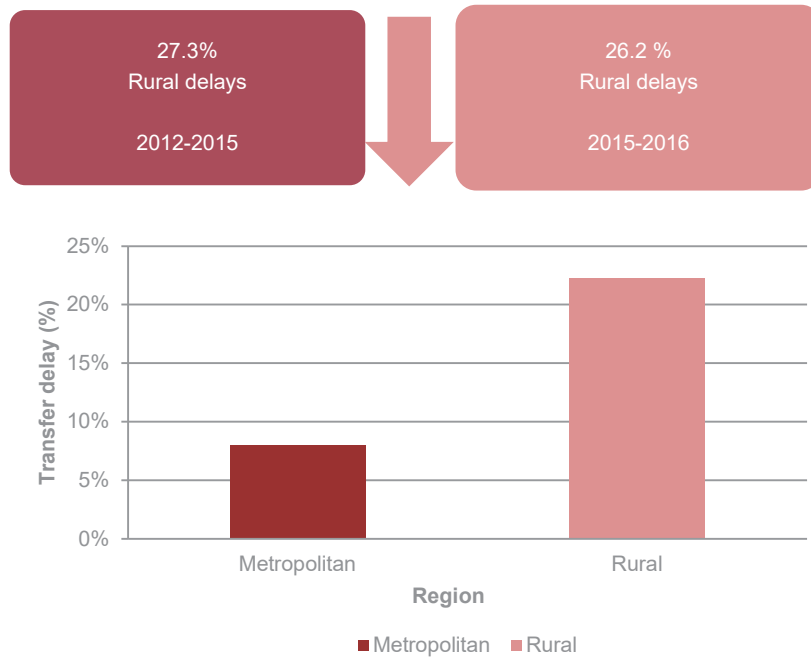


Note: n=823 (23.1%) transfers in 3,568 operative cases.  
Audit period 1 July 2012 to 30 June 2016.

### Comments:

- Patients underwent a transfer to another hospital in 20.8% (823/3,948) of cases and this has been constant throughout the audit.
- Transfer delays were recorded in 9.8% (81/823) of transfer cases. Various issues of care related to transfers were identified in 20.5% (169/823) of transfer cases. Figure 26 shows the spectrum of all issues identified by surgeons.
- An inappropriate level of care during transfer was identified for 3.2% of 823 transfer cases, while inadequate clinical information and documentation was provided to the receiving hospital in 4.1% of 823 transfer cases.
- In 9.4% of 823 transfer 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 for shared surgical care. There is a need to improve the safety of patient care in such settings and implement clear communication channels between relevant patient care teams.
- It is encouraging to note a significant drop in the rate of inappropriate transfers to only 1.4% (2/140) and insufficient documentation 1.5% (2/137) in the latest 2015-2016 audit period.

Figure 27: Perceived delays in transfer of patients to another hospital



Note: n=823 (23.1%) transfers in 3,568 operative cases.  
 Audit period 1 July 2012 to 30 June 2016.

**Comments:**

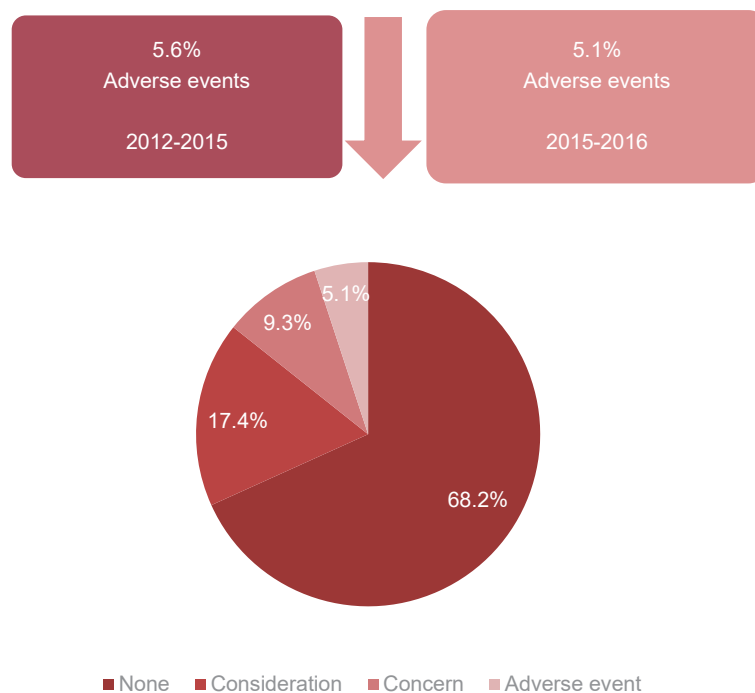
- A major reason for transfer is to provide a higher level of care, such as access to critical care support, and it is expected that rural hospitals will have a greater need to transfer patients. RACS supports the Rural Doctors Association of Victoria’s recommendation that there should be greater support and round the clock availability of well-trained rural doctors to ensure that appropriate care is provided to the patient prior to transfer.<sup>(35)</sup>
- Transfer problems were more frequently seen in rural regions (22.2%; 22/99) than metropolitan areas (8.0%; 53/662) and this result was statistically significant ( $p < 0.001$ ). During 2015 to 2016 of the audited period, VASM noted a small reduction in rural delays from 27.3% (137/501) to 26.2% (33/126).

## 5. 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 28: Clinical management issues as assessed by first- and second-line assessors



Note: n=1,260 clinical management issues in 3,948 cases.  
 Data not available: n=9 (<1%) excluded.  
 Audit period 1 July 2012 to 30 June 2016.

### Comments:

- 68.2% (2,688/3,939) of cases had no identified clinical management issues.
- Minor issues of patient management were perceived to have occurred in 17.4% (687/3,939) of cases.
- Areas of concern were identified in 9.3% (365/3,939) of cases.
- In 5.1% (199/3,939) of cases assessors identified a clinical issue serious enough to be categorised as an adverse event.

- Assessors perceived more clinical issues than treating surgeons, which highlights the importance and value of an independent peer-review assessment. The issues identified by the treating surgeons, compared with the first-line assessor, reached a concordance level of 78.3%. The gap widens between the treating surgeon and the second-line assessor, with the level of concordance falling to only 57.1%. These results are detailed in the 2015-2016 VASM Technical Report.
- The prevalence of areas of concern and adverse events identified by assessors was similar among the specialties. Some specialties that have had few mortalities reported, or that recently commenced participating in the audit process, may skew the data.

## 5.1. Areas of clinical incidents

Table 8: Severity of criticism of perceived clinical management issues

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

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

Degree of criticism of patient management	Total occurrences	Patients affected by clinical issues	
	(n=5,286 in 3,948 cases)	(n=3,948 cases)	%
No issues identified	2,688	2,688	68.1%
Area of consideration	1,535	687	17.4%
Area of concern	733	365	9.2%
Area of adverse event	276	199	5.0%
Data not available	54	9	0.2%
<b>Total</b>	<b>5,286</b>	<b>3,948</b>	<b>100.0%</b>

Perceived impact on patient outcome	Total occurrences	Patients affected by clinical issues	
	(n=5,286 in 3,948 cases)	(n=3,948 cases)	%
No issues of management identified	2,688	2,688	68.1%
Did not affect clinical outcome	584	278	7.0%
May have contributed to death	1,592	747	18.9%
Probably contributed to death	245	188	4.8%
Data not available	177	47	1.2%
<b>Total</b>	<b>5,286</b>	<b>3,948</b>	<b>100.0%</b>

Perceived preventability of clinical issues	Total occurrences	Patients affected by clinical issues	
	(n=5,286 in 3,948 cases)	(n=3,948 cases)	%
No issues identified	2,688	2,688	68.1%
Definitely preventable	329	229	5.8%
Probably preventable	1,018	476	12.1%
Probably not preventable	860	424	10.7%
Definitely not preventable	108	57	1.4%
Data not available	283	74	1.9%
<b>Total</b>	<b>5,286</b>	<b>3,948</b>	<b>100.0%</b>

Clinical team responsible for management issue	Total occurrences	Patients affected by clinical issues	
	(n=5,713 in 3,948 cases)	(n=3,948 cases)	%
No issues identified	2,688	2,688	68.1%
Surgical team	1,543	358	9.1%
Other clinical team	777	90	2.3%
Hospital issue	179	15	0.4%
Other factors*	148	9	0.2%
Data not available	378	788	20.0%
<b>Total</b>	<b>5,713</b>	<b>3,948</b>	<b>100.0%</b>

Audit period 1 July 2012 to 30 June 2016.

Note: n=1,260 clinical management issues in 3,948 cases of the audit patient pool. More than one clinical team can be responsible for a management issue.

\*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.



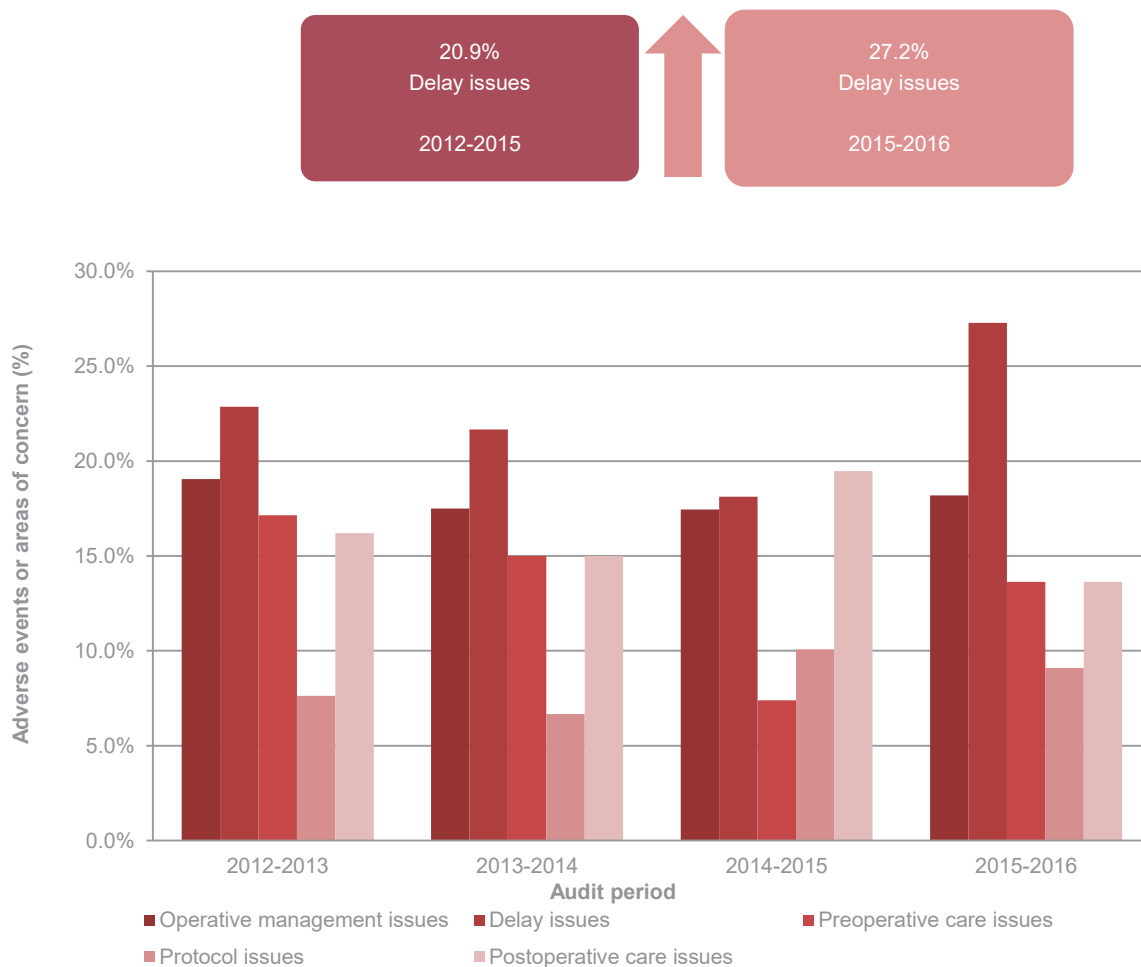
**Comments:**

- 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 31.9% (1,260/3,948) of cases of the audit patient pool.
- A clinical management issue attributable to the surgical team was identified in 9.1% (358/3,948) of cases. Clinical management issues were attributed to other clinical teams (e.g. medical and emergency departments) in 2.3% of cases, to hospital issues in 0.4% of cases, and to other factors in 0.2% of cases. In 20.1% of cases the assessors did not identify the responsible team.
- Assessors felt that clinical management issues probably contributed to death in 4.8% (188/3,948) 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 17.9% (705/3,948) of patients with clinical issues.
- These findings are similar to the national mortality audit results.<sup>(36)</sup>

## 5.2. Frequency of clinical management issues

The frequency of specific clinical management issues is shown in Figures 29 and 30. Figure 29 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 30 focuses specifically on clinical management issues identified by the assessor as being preventable. The higher the frequency, the greater the need for strategies to improve surgical care in that particular clinical area.

Figure 29: Trends in top five areas of concern and adverse events in second-line assessments



Note: n=1,009 clinical management issues as an adverse event or area of concern of these the top ten clinical management issues identified were 41.4% (n=418) in 629 second-line assessments.

Audit period 1 July 2012 to 30 June 2016.

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

The clinical issues were re-categorised as detailed in the 2015-2016 VASM Technical Report.

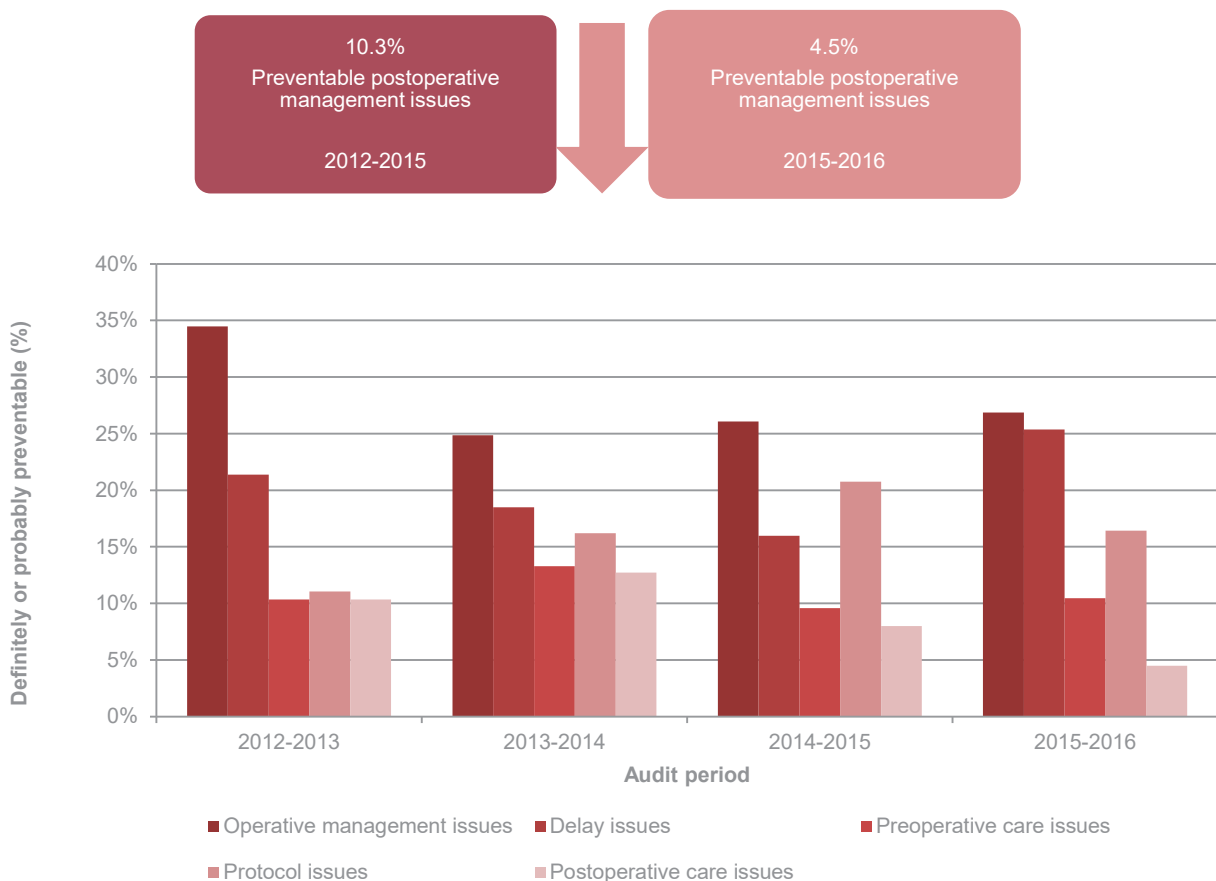
### Comments:

- Trends in and causes of clinical management issues are monitored closely by VASM and remain the focus of reports and educational events. The most common clinical management issues were delay issues (21.3%; 89/418), operative management issues (17.9%; 75/418), postoperative care issues (16.7%; 70/418) and preoperative care issues (12.7%; 53/418). Protocol issues remained similar to the previous audited period and postoperative care issues have improved by 3.3%.
- There was an increase in delay issues 20.6% from 2012 to 2015 (77/374) cases to 27.2% in 2015 to 2016 (12/44) cases ( $p < 0.001$ ). Despite the existence of this audit and recommendations made by

VASM, it has been observed that the same types of issues occur repeatedly, driving VASM to refocus on its educational role in disseminating lessons learned to clinicians and using the hospital governance reports to drive further improvements.

- The delay category includes delays in: patient care, diagnosis, fully investigating the patient, patient presenting, recognising complications, transfer to surgical unit, transfer to tertiary hospital and starting medical treatment. The category also includes delay to operation caused by missed diagnosis and delay to surgery where earlier operation was desirable.
- A number of studies on hip fracture patients found that delay to surgery was attributable to patient factors such as age<sup>(28)</sup>, comorbidities<sup>(37)</sup>, ASA status, gender, day of surgical admission relating to delay to surgery<sup>(38)</sup>, waiting times<sup>(22, 39, 40)</sup> and reduction of theatre changeover time.<sup>(41)</sup>
- There was also criticism of the choice of operative procedure, decision to consider another operative approach and 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 the choice of the operative procedure can be crucial to reduce postoperative complications.<sup>(42)</sup>

Figure 30: Trends in top five preventable clinical management issues in second-line assessments



Note: n=1,009 clinical management issues identified as an adverse event or area of concern in 629 second-line assessments and 573 were recorded as probably or definitely preventable.

Audit period 1 July 2012 to 30 June 2016.

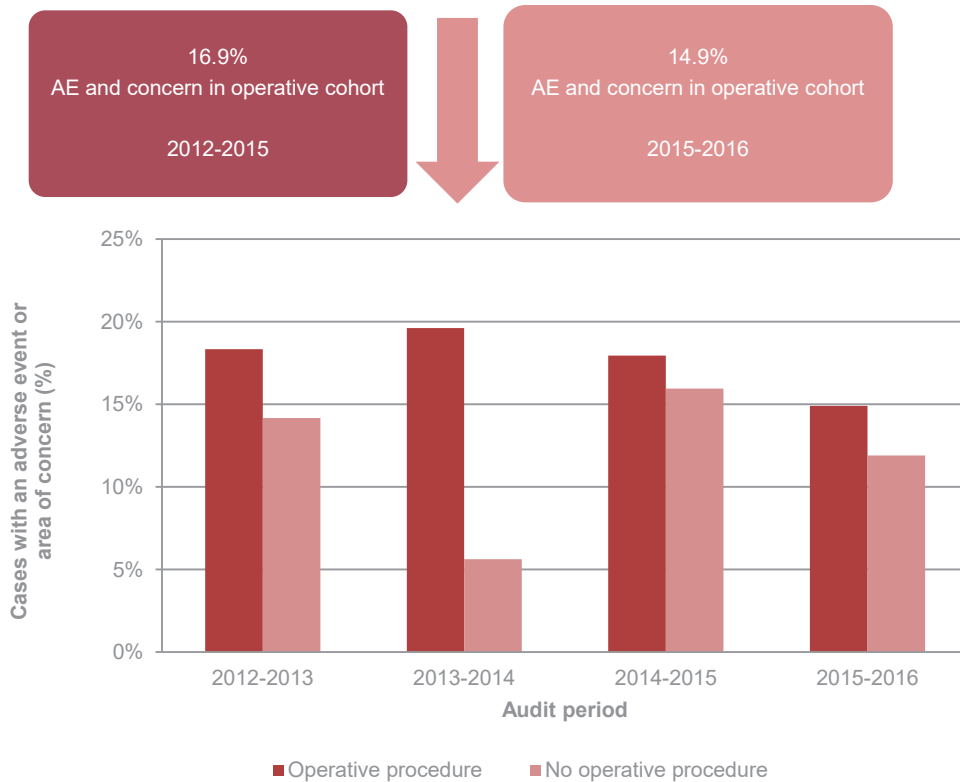
More than one clinical management issue can be attributed to one case.

The clinical issues were re-categorised and detailed in the 2015-2016 VASM Technical Report.

**Comments:**

- The most common preventable clinical management issues were operative management issues (27.9%; 160/573) and delay issues (19.2%; 110/573).
- Preventable postoperative care issues saw the largest drop, falling from 10.3% (52/506) in 2012 to 2015 to 4.5% (3/67) in 2015 to 2016.
- Preventable delay issues rose from 18.4% (93/506) in 2012 to 2015, to 25.4% (17/67) in 2015 to 2016. Ongoing review and monitoring of patient management is needed for reducing cases with preventable mortality.<sup>(43)</sup>

Figure 31: Frequency of adverse events and areas of concern by operative status



Note: n=485 clinical management issues identified as an adverse event or area of concern in 629 second-line assessments with n=3,568 operative cases and n=380 nonoperative cases.  
 AE: Adverse event  
 Data not available: n=9 (<1%) excluded.  
 Audit period 1 July 2012 to 30 June 2016.

**Comments:**

- Audited cases in which no operative procedure occurred had a lower rate of areas of concern and adverse events (11.1%; 42/380) compared with cases in which an operative procedure occurred (17.9%; 639/3,568). Overall, 9.6% of patients did not undergo an operation (380/3,948).

## 6. VASM evaluation

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### 6.1. 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 (since 1 January 2015) 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, who is most conversant with the clinical nuances of the patient's course to death, can record their own perspective.

Since the commencement of the surgeon's appraisal survey on 1 January 2015 to 30 June 2016, the audit process has been completed in 41.4% (712/1,718) of cases. In 13.2% (94/712) of cases the peer-review process feedback form was returned by the treating surgeon. Of those forms, 83 related to FLAs (88.3%) and 11 were associated with SLAs (11.7%).

Overall, 81.9% of treating surgeons agreed with the value of the peer-review feedback, 8.5% remained neutral and 9.6% disagreed with the assessors' opinions from the feedback reports. In total, 29 surgeons of the 92 provided additional comments along with their evaluation of the feedback reports (31.5%). Of the 94 responses received in some sections data was omitted reason for the denominator number fluctuations.

The treating surgeon agreed that the peer-review feedback was a good source of information to improve surgical care at their institution in 68.1% (64/94) of evaluations.

This evaluation survey pilot demonstrates that there is value in this additional audit step.

For a detailed analysis of these qualitative surveys, please see the 2015-2016 VASM Technical Report.

### 6.2. 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 logistical reasons.

Gwet's AC1 provides a more stable inter-rater reliability coefficient than Cohen's Kappa and appears less affected by prevalence and marginal probability. It is represented in this report for better interpretation of inter-rater reliability analysis.<sup>(40)</sup>

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 areas of fluid balance; timing of the operation; decision to operate; preoperative, intraoperative and postoperative care; and clinical management, with second-line assessors perceiving more issues than first-line assessors. The question of whether a particular patient should have surgery is complex and may have broader implications for surgical decision making.<sup>(44)</sup>
- The tendency of second-line assessors to be more critical of clinical management events was foreseeable, as they have access to an independent description of the episode of care.
- For a detailed analysis of these qualitative interviews, please see the 2015-2016 VASM Technical Report.

### 6.3. The perceived quality of VASM information

The VASM completed two series of this qualitative project in response to the recommendations made by external auditors, Aspex Consulting.

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”.

Data was collected in the form of quantitative and qualitative feedback. The mixed methods approach was designed to provide open ended explorations into stakeholders’ views, while also providing structured tools for annual trending reports.<sup>(45, 46)</sup>

As outlined in Table 10, the results showed that the audit is viewed as a valuable educational tool. Communication with stakeholders was considered effective and efficient. Some respondents highlighted the need for publications to appeal to a broader (i.e. non-clinical) audience, increased collaboration with other health professional organisations, and increased feedback loop for VASM recommendation implementations, Detailed analysis of the qualitative interviews is provided in the 2015-2016 VASM Technical report.

Table 10: Quantitative results relating to perceptions of VASM



Questions	2014-2015			2015-2016		
	Ave	n	%	Ave	n	%
How well do you understand the VASM audit process?	3.7	26	100.0%	3.1	27	100.0%
How comprehensively have you read information published by VASM over the past 12 months?	3.0	25	96.2%	3.0	27	100.0%
How would you rate the quality of the information reported by VASM?	4.3	24	92.3%	3.8	25	92.6%
How would you rate the quality of these educational workshops and seminars conducted by VASM?	4.5	8	30.8%	3.8	4	14.8%
How useful has the information from VASM been to you in your role?	3.3	24	92.3%	2.8	27	100.0%
How would you rate the effectiveness of communications with VASM?	3.9	24	92.3%	4.3	27	100.0%

#### **6.4. VASM educational activities**

The VASM annual educational seminars commenced in 2012 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. All VASM educational programs can be downloaded from [www.surgeons.org/VASM](http://www.surgeons.org/VASM).

#### **6.5. Audit limitations and data management**

As an audit the data is collected to provide feedback to surgeons, rather than for academic research.

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. The QASM audit colleagues had investigated the validity of routine reporting of surgical information for SCFs submitted for peer review by the treating surgeon and these were compared against patient medical records. The analysis found 98.2% concordance between the data reported by the treating surgeon and the hospital medical records information held and the majority of the discordances were mainly omissions.<sup>(20)</sup>

Use of the electronic Fellows' Interface for data submission should ease the data submission process, and will lead to improved data integrity in the future. It will be mandatory to use the Fellows' Interface for data submission from 1 January 2017.

#### **6.6. 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 improving patient care in Victoria.<sup>(43, 47)</sup>

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