TASMANIAN AUDIT OF SURGICAL MORTALITY

ANNUAL REPORT 2015

Royal Australasian College of Surgeons

ROYAL AUSTRALASIAN COLLEGE OF SURGEONS

TASM Tasmanian Audit of Surgical Mortality

Tasmanian Government

ANZASM Australian and New Zealand Audit of Surgical Mortality

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(i) Clinical Director's Report

I am pleased to present this 12th Report of the Tasmanian Audit of Surgical Mortality (TASM). This year has seen further improvements in the audit system. Firstly, the introduction of electronic case submission and assessments has proved to be very successful, and all 140 Fellows now submit their data by this means, which has much reduced the problems of incomplete and illegible data. Secondly, there is now linkage with mortality data held by the Department of Health and Human Services (DHHS). This provides a check on the completeness with which TASM captures deaths in surgical care, or following surgical treatment, and should improve case recognition.

Table 2 of this report shows that the DHHS and TASM datasets do identify different numbers of surgical deaths, and it will be important for TASM to identify where these discrepancies lie, to ensure that we are not 'missing' relevant patients. However, one encouraging aspect of this information should not be overlooked- the rate of mortality within the surgical sphere is falling. Total surgical admissions have risen, but deaths have fallen. Over the 5 year period, the mortality rate has fallen by 15% based upon the DHHS figures, and 26% based on the TASM data. I made reference to this trend in national data a few years ago in my chairman's introduction, but it is most encouraging that this positive direction appears to be continuing here in Tasmania.

Nevertheless, this year's report indicates that we cannot cease in our efforts to improve outcomes. Areas of concern or adverse events are still being identified in the assessment of about 10% of cases. This proportion has been roughly stable over the years, and given the falling overall number of deaths, the absolute numbers of concerns and adverse events is falling, but these still represent patients in whom the fatal outcome might have been avoided. The areas in which the problems arise are ones which have been repeatedly identified over the years- intensive care unit (ICU) access, patient transfer, continuity of care/handover, prompt response to evidence of clinical deterioration, documentation, and consultant leadership. Over the last year, TASM has held workshops based upon presentation and discussion of assessed cases, precisely to create a forum for consideration of these issues. Feedback from these sessions has been highly positive as a means of 'closing the audit loop'- making sure that the lessons learned from case review are considered by the surgical community.

My colleague, and motive force behind the original introduction of systematic mortality audit in this country, Western Australian chairman James Aitken, draws attention to the changing environment in the community with regard to transparency of audit processes such as ours. To quote James:

"The protection the ANZASM is afforded under the Commonwealth Qualified Privilege Scheme is essential to both surgeons and assessors who need to be confident that they can make honest and frank comments without fear that these will later be used against them. Without the Qualified Privilege granted in 2002, it is unlikely the Western Australian Audit of Surgical Mortality (WAASM), or any of the other state audits, would have commenced. However, 15 years on, expectations have changed and health departments, our funders on behalf of our patients and the public, are of a view that the ANZASM needs to be able to address suboptimal care if it becomes aware of it."

I wholly concur with James' view that it is vital that we maintain the confidence of the public and the health departments in each state and federally. Unless they feel assured that we are rigorously examining our own outcomes, and acting to improve care where it is seen to be deficient, we will surely face calls for greater access to ANZASM deliberations.

Finally, can I thank the Tasmanian DHHS and RACS for their support of TASM, which would not be possible without this assistance. I would also like to extend my gratitude to all of my colleagues who have assisted TASM by promptly submitting case forms for their cases, by assessing cases, by serving on the managing committee, and by contributing to our workshops. It can only thrive if we continue to enjoy this high level of support from all of you.

Mr Rob Bohmer

Clinical Director, TASM

(ii) Shortened Forms

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
CPD	continuing professional development
DHHS	Department of Health and Human Services
DVT	deep vein thrombosis
FLA	first-line assessment
OR	operating room
RACS	Royal Australasian College of Surgeons
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SCF	surgical case form
SLA	second-line assessment
TASM	Tasmanian Audit of Surgical Mortality

(iii) Acknowledgements

The Tasmanian Audit of Surgical Mortality (TASM) would like to acknowledge the support and assistance of the many individuals and institutions that have helped in the development of this project, including:

- participating Tasmanian hospitals
- participating Tasmanian Fellows and International Medical Graduates
- first-and second-line assessors
- hospital health information departments
- Western Australian Audit of Surgical Mortality
- Australian Capital Territory Audit of Surgical Mortality
- Northern Territory Audit of Surgical Mortality
- Victorian Audit of Surgical Mortality
- South Australian Audit of Perioperative Mortality
- Queensland Audit of Surgical Mortality
- Collaborating Hospitals' Audit of Surgical Mortality
- National Coronial Information System
- Royal Australasian College of Medical Administrators
- Tasmanian Department of Health and Human Services (DHHS) for funding the project
- The Royal Australasian College of Surgeons (RACS) for infrastructure and oversight of this project.

(iv) TASM Management Committee

Mr Rob Bohmer	Chairman, MBChB, FRACS – General Surgeon
Prof Peter Stanton	Vice Chairman, BMedSci(Hons), MBBS(Hons), PhD(Glas) RCPSG, FRACS – General Surgeon
Dr Amanda Young	FRCS(Edin) FRACS – General Surgeon
Mr Stephen Brough	MBChB, MSc, FRCS(Urol.), FRACS – Consultant Urologist
Dr Margaret Walker	MBBS(Hons), FANZCA – Anaesthetist
Dr Helen McArdle	BMedSci, MBBS, MPH, FOEM, FRACMA, FAICD – Medical Adviser – Safety & Quality DHHS
Prof Richard Turner	MBBS(Hons), BMedSc, FRACS, PhD
Mr James Roberts -Thomson	BMedSci, MBBS, FRCS, FRACS – General Surgeon
Dr Brett Daniels	BSc(Hons), PhD, MBBS(Hons), FRANZCOG
Ms Lisa Lynch	Project Manager – TASM – Registered Nurse

(v) Executive Summary

Audit participation and processes

100%
Public (4) and private (9) hospitals participation

100%
RACS (96) and RANZCOG (44) Fellows participation

62.1%
(121 / 195)
Underwent SLA because of lack of information

12.4%
(188 / 1,509)
Closed as terminal care cases

Demographic and operative profile

34.9%
(528 / 1,509)
No operative intervention

1,272
Separate episodes of surgery

981
Patients

74.6%
(945 / 1,266)
Consultant performed the surgery

95.3%
(1,207 / 1,266)
Consultant made decision to proceed to surgery

Clinical risk management

(783 / 981)
Deep Vein Thrombosis (DVT) prophylaxis was provided

(605 / 773)
Received support from the critical care facilities

(79 / 1,509)
Issue of fluid balance management during treatment

Clinical care and system management factors

The most common avoidable factors

Decision to operate	2.6%	(39 / 1,509)
Adverse event factors in management	20.4%	(309 / 1,509)
Choice of operation or procedure	1.1%	(16 / 1,509)
Delay to surgery	0.9%	(15 / 1,509)

30.2%
(379 / 1,253)
Unplanned return to operating room

Managing demand for emergency surgery

No complication	57.2%	(561 / 981)
Single complication	27.6%	(271 / 981)
Multiple complications	15.2%	(149 / 981)

Delay in interhospital transfers

Transfer required	17.3%	(261 / 1,509)
Care deemed to be inappropriate	6.1%	(16 / 261)
Delay in transfer	8.8%	(23 / 261)

Audit participation and processes

From its commencement on 1 July 2004 to the end of the current audit period (30 June 2015), the TASM received 1,736 notifications of death that had been associated with surgical care. By the census date, 86.9% (1,509/1,736) of the deaths had been fully audited and 12.4% (188/1,509) were closed as terminal care cases. The outcomes from the peer-review process are restricted to the deaths that are fully peer-reviewed which are the focus of this report.

All public and private hospitals with relevant surgical activity continue to provide notifications of patient deaths associated with surgery. Full uptake of the audit in the private sector is commendable.

The TASM reached 100% participation of all Tasmanian Fellows and hospitals in 2012. The submission and return of surgical case forms (SCFs), a pivotal step in the audit process, has reached 100%. Inaccurate or incomplete clinical information impairs the quality of the audit and prevents the accurate identification of trends. Compliance in completing the mandatory data fields (and therefore the overall data quality) has improved. The treating consultant, rather than a junior member of the team, usually provides the information on the reported cases to the TASM. This indicates a high level of ongoing personal involvement by participating surgeons. The majority of hospital deaths occur in the public sector. This is not a reflection on the quality of care provided in the public sector. Patients cared for in the private hospital sector tend to be elective admissions, which also tend to be of lower complexity than that of the public hospital sector.

The TASM peer-review process is a retrospective examination of the clinical management of patients who died while under the care of a surgeon. All cases that meet TASM inclusion criteria undergo first-line assessment (FLA) and some cases are referred for second-line assessment (SLA), also known as a case note review. Both first- and second-line assessors must consider whether the patient's death was a direct result of the disease process, or whether aspects of the management of the patient may have contributed to the outcome.

The main trigger for an SLA was a lack of clinical information, and 62.1% (121/195) of cases that underwent an SLA were referred for this reason. The need for an SLA was similar among surgical specialties, and between metropolitan and rural hospitals. The percentage of SLAs in 2015 was consistent with the average percentage (12.9%) since the commencement of the audit (195/1,509).[1]

Demographic and operative profile

The demographic and surgical risk profiles of the audited cases reveal similar trends to those identified in previous reports. The majority of surgical deaths have occurred in elderly patients with underlying health problems, who have been admitted via emergency with an acute life-threatening condition. Causes of death were often linked to their pre-existing health status. In these cases death was almost always assessed by the review process as being not preventable, or to be a direct result of the disease processes involved rather than the treatment provided. The most common causes of death reported were multiorgan failure, septicaemia and respiratory failure. This is congruent with the most common comorbidities in this series of patients and is similar to the national audit findings.[2]

There was no operative intervention performed in 34.9% (528/1,509) of audited cases. This was most commonly an active decision not to proceed. A total of 1,272 separate episodes of surgery occurred in 981 patients. The most frequent operative procedures described were for trauma or acute abdominal pathology. This reflects the high percentage of patients admitted as emergencies for irretrievable clinical problems. A consultant performed the surgery in 74.6% (945/1,266) of instances, and made the decision to proceed to surgery in 95.3 (1,207/1,266) of cases.

CLINICAL RISK MANAGEMENT

Three areas of clinical priority were considered and a number of other issues were identified relating to clinical care or management. These are provided to inform clinical risk management strategies to surgeons and health services as part of the TASM's continuing performance improvement quality audit cycle. The audit considered three important areas of clinical priority:

- deep vein thrombosis (DVT) prophylaxis to reduce the likelihood of pulmonary embolus
- use of critical care facilities
- fluid balance management.

Ongoing analysis, monitoring and reporting against these three areas should be an important role of TASM in driving improvement of clinical outcomes.

These areas are crucial to analyse and monitor over time in order to continue educational dissemination of findings and recommendations from the audit until the TASM findings reflect perpetual improvement in these areas.

DVT

The appropriate use of DVT prophylaxis is an important step in preventing the formation of deep vein thromboses and subsequent pulmonary emboli in patients at risk. DVT prophylaxis was provided in 79.8% (783/981) of audited operative deaths. A conscious decision to withhold prophylaxis was the reason given for non-provision in most of the remaining cases. The withholding of prophylaxis was generally necessitated by a clinical contraindication. Inadvertent omission of prophylaxis was rare, occurring in only three cases. When the appropriateness of withholding prophylaxis was reviewed, the assessors generally agreed that the decision was correct. In 76.7% (132/172) of cases the first-line assessors felt that the decision was appropriate, and in 56.5% (13/23) of cases the second-line assessors felt that the decision was appropriate. Close working relationships between the surgical and critical care teams is essential to further reduce omission rates.

Use of critical care facilities

Critical care facilities are essential to support acute medical admissions. During the audited period 2004–2015, 78.3% (605/773) of cases received critical care support during the course of the hospital stay. The utilisation of critical care support has remained constant from 2004 to 2015. The non-use of critical care was viewed as inappropriate by first-line assessors in 0.9% (13/1,495) of cases and by second-line assessors in 1.5% (3/194) of cases. Hospitals should monitor their critical care support for acute admissions in order to ensure that appropriate referrals are made.

Fluid balance during treatment

There was a perception that fluid balance may have been an issue of management in only 5.2% (79/1,509) of cases. Decisions regarding the volume of intravenous fluids to administer, and the rate at which they should be administered, can be complex. It is critical that fluid management is optimised.

CLINICAL CARE AND SYSTEM MANAGEMENT FACTORS

Assessors use a standard spectrum of criticism to assess the appropriateness of the clinical care provided. In 79.5% (1,201/1,509) of audited cases assessors perceived either no, or only minor, issues of patient management. Areas of concern were identified in 5.1% (77/1,509) of patients. In 3.7% (56/1,509) of patients assessors felt that the clinical issues were serious enough to be categorised as adverse events. The incidence of more serious criticism of clinical care was similar among the surgical specialties. The 2015 results are consistent with the national audit findings. [1]

Criticisms of clinical care are not always attributable to the surgical team, with many identified issues attributed to other specialty areas.

The TASM monitors trends of commonly avoidable factors. The most common avoidable factors among the issues identified were:

- decision to operate: 2.6%(39/1,509)
- adverse event factors in management: 20.4%(309/1,509)
- choice of operation or procedure: 1.1% (16/1,509)
- delay to surgery: 0.9% (15/1,509).

Return to operating room (OR)

Some complications following complex surgery are to be expected due to a patient's pre-existing comorbidity profile, surgical risk status and the nature of the disease being treated. However, a high rate of return to the OR indicates that the care provided could be improved.

There was an unplanned return to the OR in 30.2% (379/1,253) of patients who underwent a surgical procedure. However, direct consultant involvement in such cases has risen consistently during the audited period. The TASM would like to see a continuation of this trend, which is to be commended.

Managing demand for emergency surgery

A significant challenge for the hospital system is managing the demand for emergency surgery. The demand for time in the OR relating to emergency cases remains a significant problem. Despite this, a low rate of postoperative complications reported by treating surgeons has remained constant throughout the audit period. There were no complications in 57.2% (561/981) of operative cases, while a single complication was recorded in 27.6 (271/981) of patients.

Delay in inter-hospital transfers

Inter-hospital transfers are a critical part of the high risk surgical care treatment plan. Treatment plans should give consideration to the timeliness and appropriateness of patient transfer. An inter-hospital transfer was required in 17.3% (261/1,509) of cases, and transfers were usually necessitated by the need for higher levels of care. The level of care provided during transfer was deemed inappropriate in 6.1% (16/261) of cases. Delay in transfer was identified in 8.8% (23/261) of cases. Delays in inter-hospital transfers can carry risks and challenges for the patient and clinical teams. There is a need to improve the safety of patient care during inter-hospital transfers, including improved communication and coordination of patient care.

(vi) Recommendations for TASM Clinical Stakeholders

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 the patient's 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.

2 Better documentation of care plans and clinical events

- The case record is an essential tool for identifying clinical sequence and an appropriate clinical management plan. As such, the case record must contain clear and accurate documentation of events and plans.
- An issue repeatedly identified by reviewers is the lack of adequate information submitted on the SCF. Improvement in the completion of data collected will reduce the number of SLAs.

3 Action on evidence of clinical deterioration

- Clinical deterioration 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 deterioration must be acted on as well as recorded.

4 Improved preoperative management

- Appropriate preoperative preparation and management decreases operative complications and promotes 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.

5 Improved postoperative management

- The patient should be transferred to the ward with comprehensive orders.
- Preventative measures should be implemented for reducing complications.
- Comprehensive information must be documented for further management when a patient is discharged from a clinical or surgical team.

6 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 have increased awareness of this risk to ensure the safety of patients while they are in hospital. Risk assessments must be completed on admission and appropriate strategies implemented.

7 Improved awareness of surgical emergencies and sharing of care

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

8 Improved communication

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

(vii) TASM Objectives for 2016-2017

The TASM objectives for the coming year are:

- continue to maintain the return rate of SCFs
- continue to collaborate with agencies such as the coroner's office to ensure that there are no gaps in mortality reporting or the peer-review process
- work closely with the Tasmanian Government Department of Health and Human Services in closing the gap in mortality reporting
- continue to disseminate important messages emanating from the audit via workshops and seminars
- continue to improve the data collection forms and processes through the electronic interface
- contribute to the development of the national mortality audit report
- improve the structure of the database and the quality of data submissions
- facilitate communication and information sharing with other state mortality audits
- enhance analysis techniques
- enhance reporting methods for hospital accreditation processes.

1. Introduction

1.1 Background

TASM is part of the Australian and New Zealand Audit of Surgical Mortality (ANZASM), a national network of regionally-based audits of surgical mortality that aim to ensure the highest standard of safe and comprehensive surgical care. TASM is a collaboration between the Tasmanian Government DHHS and RACS. The TASM project is funded by the Tasmanian DHHS to review all deaths associated with surgical care and identify preventable adverse outcomes (see Figure 1 for TASM governance structure).

1.2 Objectives

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

The ASM audits all deaths that occur in a hospital when:

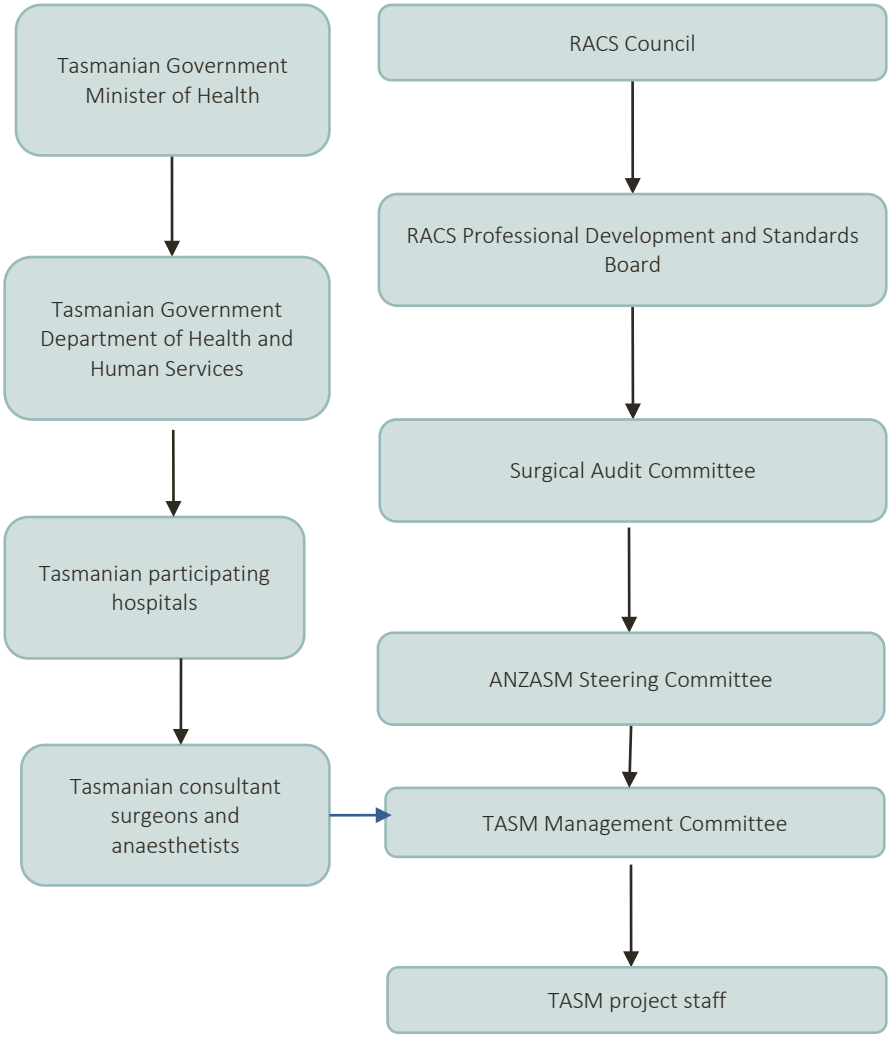
1) the patient was under the care of a surgeon (surgical admission), whether or not an operation was performed

2) the patient was under the care of a physician (medical and non-surgical admissions) and underwent a surgical procedure.

If a case does not fulfill either of the above-listed criteria it is excluded from the audit by the notifying hospital or by audit staff. Deaths that are 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 TASM office.

The TASM reviews notifications of patient deaths that have occurred in hospital following a procedure or during an inpatient stay under a surgical unit. The TASM does not include morbidity cases, although emerging issues identified through the review of mortality cases are also applicable to the morbidity patient pool.

Figure 1: Governance structure of the Australian and New Zealand Audit of Surgical Mortality (ANZASM) and the Tasmanian Audit of Surgical Morality (TASM)



RACS: Royal Australasian College of Surgeons.

1.3 Audit process

Individual regional audits of surgical mortality are notified of in-hospital deaths associated with surgical care. The mortality notifications in Tasmania are submitted by hospitals and 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.

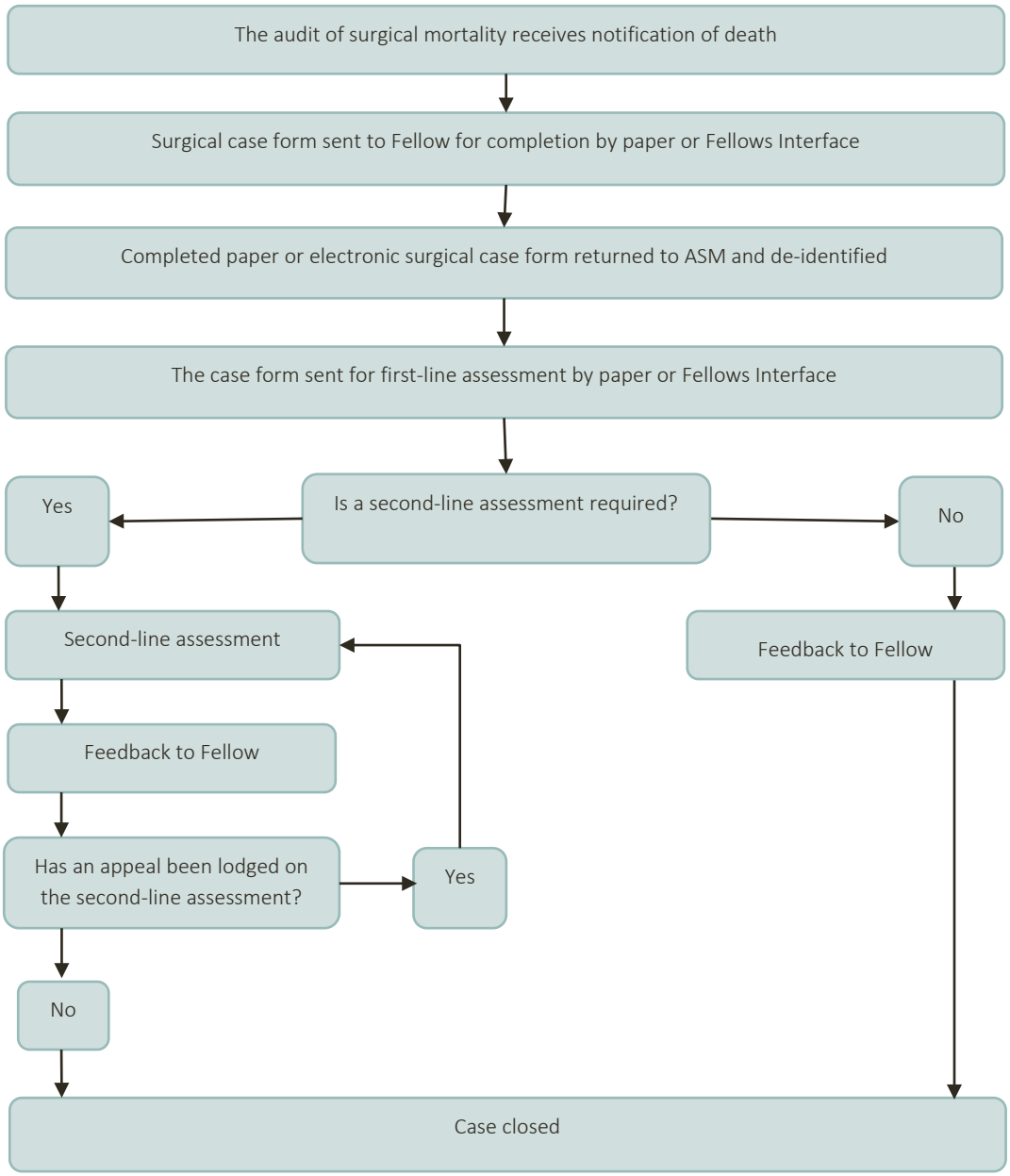
Clinical details pertaining to the management of each case are recorded on a standard, structured SCF completed by the consultant or treating surgeon associated with the case. The completed SCF is submitted to the audit office, and the information is de-identified and sent for FLA by a surgeon from a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

There are two possible outcomes of the FLA:

- The information provided by the treating surgeon enables the assessor to reach a conclusion about the case and identify any issues of clinical management, or
- The case is referred for a second, in-depth assessment in the form of an SLA (case note review). An SLA may be requested as a result of:
    - a need to clarify issues of patient management identified or suspected by the first-line assessor
    - the treating surgeon providing insufficient information on the SCF, preventing the first-line assessor from reaching a conclusion about the case.

In cases for which an SLA is deemed necessary, the assessor is selected using the same criteria as that used for the first-line assessor (see Figure 2).

Figure 2: The audit process



2. Audit participation and audit processes

2.1 Audit numbers

From its commencement on 1 July 2004 to the end of the current audit period (30 June 2015), TASM received 1,736 notifications of deaths that were associated with surgical care (see Table 1).

Table 1: Audit numbers over sequential audit periods (n=1,736)

Case status	2004-2012	2012-2013	2013-2014	2014-2015	Audit period
Closed	1,138 (86.5 %)	121 (89.6%)	118 (84.9%)	132 (90.4%)	**1,509 (86.9%)**
Non-participant	7 (0.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**7 (0.4%)**
Terminal care	139 (10.6%)	14 (10.4%)	21 (15.1%)	14 (9.6%)	**188 (10.8%)**
Lost to follow-up	32 (2.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**32 (1.8%)**
All cases	**1,316 (100%)**	**135 (100%)**	**139 (100%)**	**146 (100%)**	**1,736 (100%)**

Comments:

- The TASM aims to have all mortality cases reviewed within 3 months of notification. The specialties with the highest casemix within the reporting period were General Surgery, Orthopaedic Surgery, Neurosurgery and Vascular Surgery.
- Clinical information and completed assessment reviews were available for 86.9% (1,509/1,736) of the reported cases. The outcomes from the peer review process are restricted to these deaths and are the focus of this report.
- 10.8% (188/1,736) of cases were recorded as admissions for terminal care and were therefore excluded from the review process.
- 1.8% (32/1,736) 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.
- 0.4% (7/1,736) 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 2.4% in the 2004–2012 period to 0% in 2014–2015. Participation in the TASM is a mandatory component of attaining RACS continuing professional development (CPD) approval. There were 132 deaths in the 2014-2015 audit period that had completed the full audit process by the census date.

2.2 Verification of audit numbers

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

In parallel with the TASM's audit process, the DHHS also collects diagnosis-related group information. This is an alternative source of mortality data that can be used to cross-check the completeness of TASM mortality reporting. It provides casemix information required for hospital activity based funding. The information allocates individual patient episodes to diagnosis-related groups. These diagnosis-related groups are specialty specific and can therefore provide an alternative source of mortality data. The DHHS has provided the TASM with a list of deaths that occurred in patients with surgical diagnosis-related groups over the period 1 July 2009 to 30 June 2013 (see Table 2).

Table 2: Comparison of mortalities obtained by the DHHS with TASM

Audit period	Total surgeries	DHHS reported mortalities (%)	TASM reported mortalities (%)
2009–2010	54,335	167 (0.3%)	167 (0.3%)
2010–2011	56,006	170 (0.3%)	158 (0.3%)
2011–2012	58,757	154 (0.3%)	122 (0.2%)
2012–2013	59,440	156 (0.3%)	135 (0.2%)
Total	**228,538**	**647 (0.3%)**	**582 (0.25%)**

DHHS: Department of Health and Human Services; TASM: Tasmanian Audit of Surgical Morality.

Comments:

The comparison of Tasmanian admitted patient episode data against the TASM reported mortalities reflects differences in hospital mortality reporting. This could warrant closer collaboration with the DHHS to investigate this issue further. Data for 2013-14 was unavailable at time of reporting.

2.3 Audit participation rates

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

2.4 Hospital participation

Table 3: Hospital participation in the audit

Hospital participation	2004-2012	2012-2013	2013-2014	2014-2015
Public	4 (100.0%)	4 (100.0%)	4 (100.0%)	4 (100.0%)
Private	9 (100.0%)	9 (100.0%)	9 (100.0%)	9 (100.0%)
Total	**13 (100.0%)**	**13 (100.0%)**	**13 (100.0%)**	**13 (100.0%)**

Comments:

- All Tasmanian public and private hospitals providing relevant surgical services are participating in the audit and providing notifications of death.

2.5 Participation by Fellows

Participation (see Table 4) has been a mandatory component of attaining CPD approval since January 2010 and compliance is verified each year by RACS.

In August 2012 the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Board approved formal collaboration with the ANZASM. The TASM audit collects data on all deaths occurring after a gynaecological surgical procedure. The Council on Obstetric and Paediatric Mortality and Morbidity continues to separately review all maternal, perinatal and paediatric deaths in Tasmania.

Table 4: Surgeon agreement to participate

Fellow participation	2004-2012	2012-2013	2013-2014	2014-2015
RACS	93 (100.0%)	93 (100.0%)	93 (100.0%)	96 (100.0%)
RANZCOG	44 (100.0%)	44 (100.0%)	44 (100.0%)	44 (100.0%)
Total	**137 (100.0%)**	**137 (100.0%)**	**137 (100.0%)**	**140 (100.0%)**

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

Comments:

- 100% of the 96 eligible Tasmanian RACS Fellows are currently participating in the audit.
- Currently, 100% (44/44) of the gynaecological specialists invited to participate have enrolled in the TASM audit. Invitations to gynaecological specialists to participate in the audit commenced in August 2012.
- Almost half of RANZCOG and RACS Fellows perform assessments as either first- or second-line assessors.
- 100% (140) of enrolled RANZCOG and RACS Fellows submit data online via the Fellows Interface.

Compliance by surgical specialty is shown in Table 5.

Table 5: Compliance by surgical specialty from 2004-2015 audit period

Specialty	Compliant	Non-compliant
Cardiothoracic Surgery	100.0%	0.0%
General Surgery	100.0%	0.0%
Gynaecology Surgery	100.0%	0.0%
Neurosurgery	100.0%	0.0%
Orthopaedic Surgery	100.0%	0.0%
Other *	100.0%	0.0%
Otolaryngology Head and Neck Surgery	99.0%	1.0%
Paediatric Surgery	100.0%	0.0%
Plastic Surgery	98.0%	2.0%
Urology Surgery	100.0%	0.0%
Vascular Surgery	100.0%	0.0%

*Includes: Colorectal Surgery, Ophthalmology, and Oral and Maxillofacial Surgery.

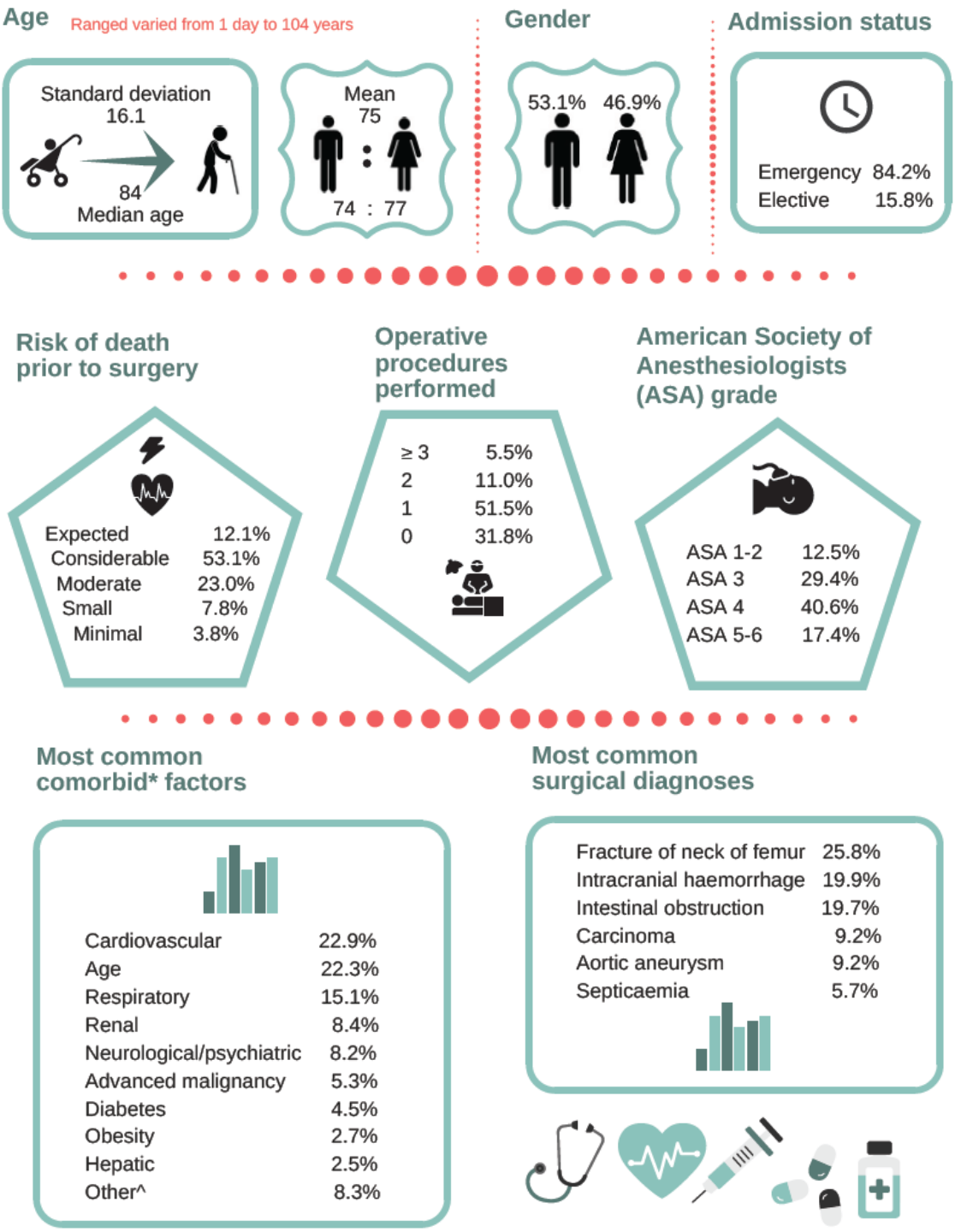
Comments:

- The return rate of specialties in other states and territories varies between 75% and 100%.[2]
- The audit process relies on active and ongoing participation of surgeons. Orthopaedic surgical Fellows may choose to do their CPD through the Australian Orthopaedic Association. It is worth noting that from January 2017 participation for Orthopaedic Fellows in the ANZASM is mandatory.
- In 2015 there was 100% participation across all specialties in Tasmania.
- The TASM began producing hospital reports in November 2014. These reports contain de-identified and aggregated data, enabling benchmarking and monitoring of clinical management trends both within a specific hospital and with other participating peer-grouped hospitals. Peer-grouped hospitals can be located within the region or throughout Australia.

2.6 Demographics and characteristics of audited deaths

Demographics and characteristics of audited deaths are shown in Figure 3.

Figure 3: Characteristics of audited deaths from 1 July 2004 to 31 June 2015 (n=1,509)

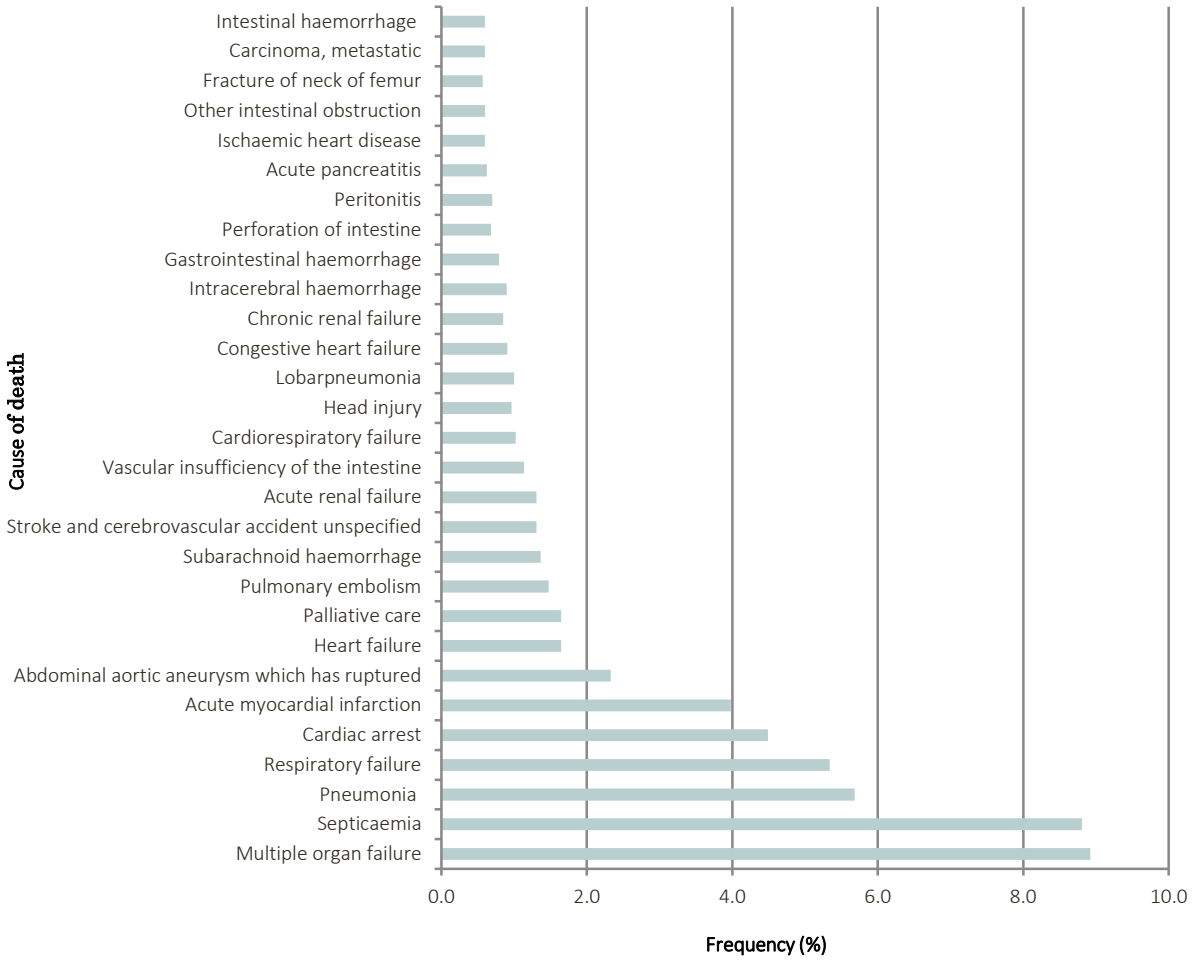


*Comorbidities describe coexisting medical conditions or disease processes that are additional to the primary diagnosis.
^Includes dementia, alcohol abuse, substance abuse, anaemia, anorexia, anticoagulation, ascites, pneumonia, nutritional deficiency, bowel obstruction, frailty, immunocompromised, osteoarthritis and coagulopathy.

2.7 Establishing the cause of death

The cause of death recorded by the treating surgeon is based on the clinical course of the patient and any relevant supporting evidence from investigations (see Figure 4). Where doubt exists around the circumstances leading to death the case will be referred to the coroner. In other instances, where the cause of death is not clear, a postmortem examination may be requested. However, requests for postmortems are decreasing

Figure 4: Frequency of reported causes of death (n=1,760 causes of death reported for 1,509 patients)



Note: a cause of death has been included in this figure if the total count was ≥10.

Comments:

- Across 1,509 patients there were 408 conditions that were perceived to be responsible for death.
- The most frequently cited causes of death included multiple organ failure 10.4% (157/ 1,509), septicaemia 10.3% (155), pneumonia 6.6% (100), respiratory failure 6.2% (94), cardiac arrest 5.2% (79) and acute myocardial infarction 4.7% (71). Death was attributed to these conditions in 60.8% of causes of death reported (656/1,079).
- Postmortems, including coronial requested postmortems, were conducted in 11.5% (174/1,509) of cases. This rate remained constant during the reporting period, and the reasons for the low rate of postmortem referral are unknown. Postmortems are deemed to provide educational information and valuable insights, and these referral rates are worth further investigation.[5-8]

2.8 Peer review process

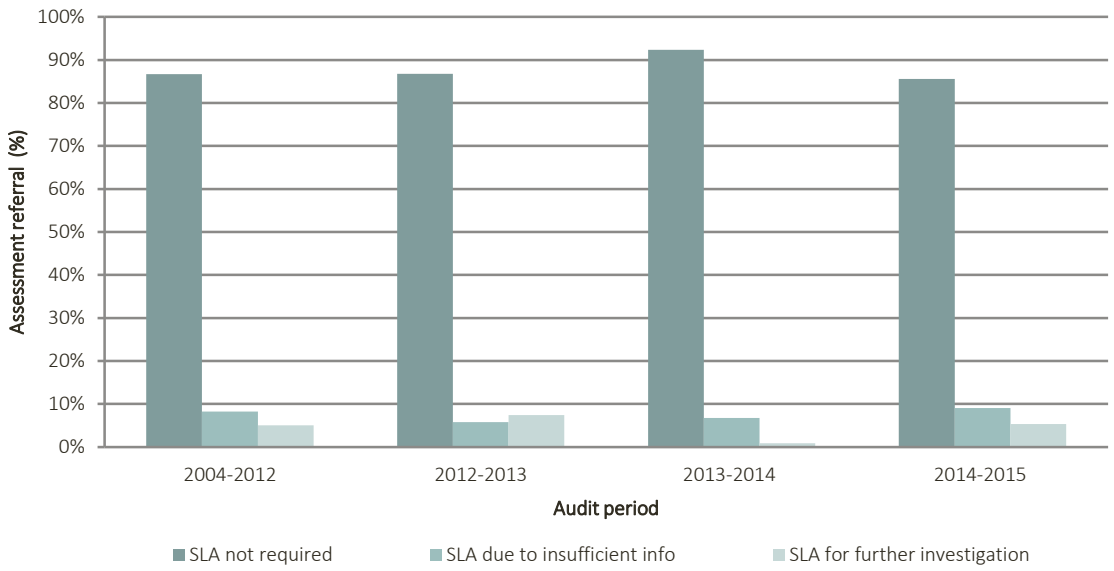
FLAs were completed for 1,509 cases. Each first-line assessor had to decide whether the treating surgeon had provided adequate information to allow a conclusion to be reached. If the information was deemed inadequate then an SLA was requested. Other triggers for requesting an SLA are:

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

The requirement for SLAs would reduce with an increase in detail of information being provided in the SCF. SLAs required for the other triggers are more likely to represent suspected issues of clinical management.

The requirement for SLAs has decreased since the beginning of the audit, but could still improve. The reasons given for referral for SLA are provided in Figure 5.

Figure 5: Reason for referral for second-line assessment (SLA) (n=1,509)



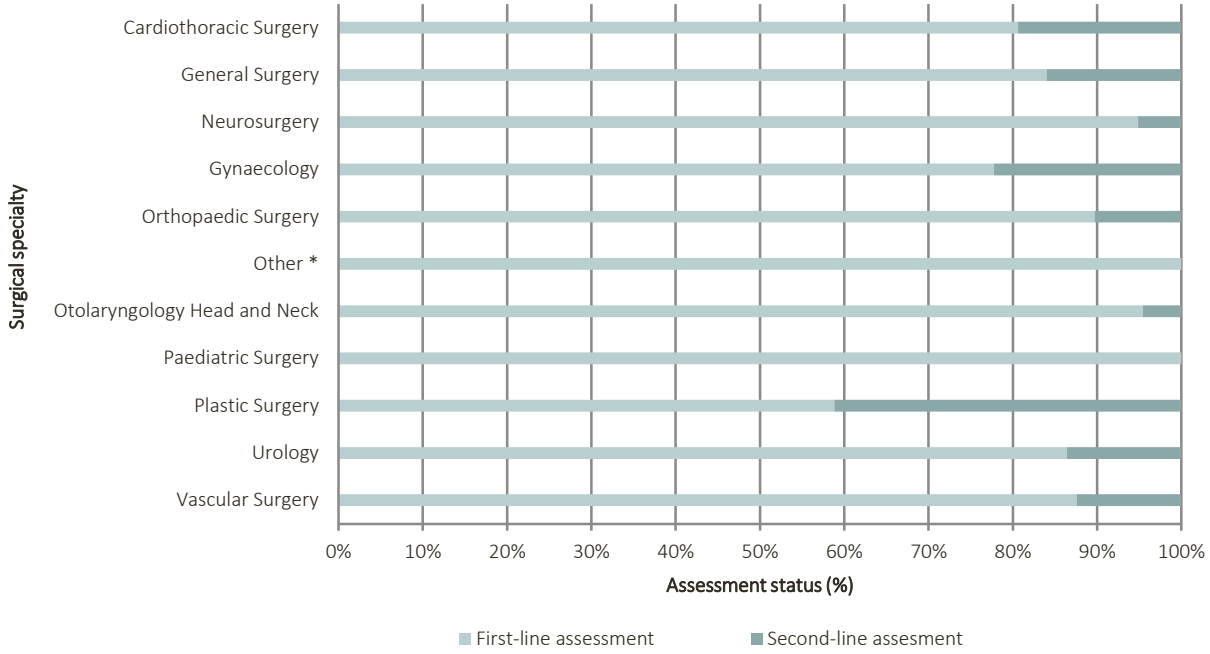
Comments:

- Across the entire audit period 87.1% (1,314/1,509) of cases were closed following FLA.
- The need for SLA has decreased over time, in part because the quality of the information provided in SCFs has improved. Despite some improvement, the provision of insufficient clinical information by the treating surgeon remains the most common trigger for SLA, accounting for 62.1% (121/195) of referrals. The remaining 37.9% (74/195) of cases were referred for SLA due to perceived issues of management and/or the need for a more detailed review.
- There have been improvements in the quality of the data provided to the TASM since 2004; however, there are ongoing issues with the quality of data provided by some treating surgeons. Greater attention to detail in completing the SCF would help the review process by colleagues who have agreed to act as first and second-line assessors, as well as that of the quality assurance and medical records representatives at collaborating hospitals.
- Criticisms included poor medical admission notes, insufficient follow-up records and unsatisfactory descriptions of the surgical procedure.

- Hospital case notes are a vital record of the treatment received by patients. Poor or inaccurate clinical notes add to the difficulties associated with managing patients in a complex hospital environment, particularly when there is an increasing lack of continuity of care provided to patients.

Figure 6 shows the referral for SLA by surgical specialty.

Figure 6: Referral for second-line assessment by surgical specialty (n=1,509)



*includes Oral and Maxillofacial Surgery and Ophthalmology .

Comments:

- The need for SLA referral varied between specialties, ranging from 0% to 41.2% (7/17).
- The need for SLA referral was similar in metropolitan and rural regions.
- High referral percentage for Plastic Surgery is based on the small number of deaths.

3. Clinical risk management

3.1 Profile of operative procedures

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

The role of the treating surgeon is to take responsibility for the overall success of the operation. Table 6 shows the frequency of surgical procedures.

Table 6: Frequency of individual surgical procedures (n=1,550 in 1,272 patients)

Note: Only those procedures with number ≥10 included in the Table

Surgical procedure	Number	Per cent
Exploratory laparotomy	212	16.7%
Burrhole(s) for ventricular external drainage	30	2.4%
Laparotomy approach	28	2.2%
Other prosthetic hemiarthroplasty of hip	28	2.2%
Right hemicolectomy and anastomosis	22	1.7%
Exploratory open craniotomy	21	1.7%
Debridement of skin	19	1.5%
Reopening of laparotomy site	16	1.3%
End colostomy	16	1.3%
Amputation below knee	15	1.2%
Creation of ileostomy	14	1.1%
Extended right hemicolectomy and end-to-end anastomosis	13	1.0%
Loop colostomy	13	1.0%
Diagnostic gastroscopy	12	0.9%
Operation on aneurysm of aorta	11	0.9%
Total cholecystectomy	11	0.9%
Lavage of peritoneum	11	0.9%
Jejunostomy	10	0.8%
Replacement of aortic valve	10	0.8%
Craniotomy for clipping of aneurysm	10	0.8%
Anterior resection of rectum and anastomosis	10	0.8%
Primary closed reduction of fracture and internal fixation with screw(s)	10	0.8%
Primary open reduction of fracture and internal fixation with screw(s)	10	0.8%
Prosthetic cemented hemiarthroplasty of hip	10	0.8%
Diagnostic cystoscopy	10	0.8%
Abdominal aortic aneurysm which has ruptured	10	0.8%
Intestinal adhesions with obstruction	10	0.8%
Fracture of neck of femur	10	0.8%

Missing data: n=90 (7.1%).

Comments:

- 65% (981/1,509) of audit patients underwent operative treatment. There were 1,272 separate procedures performed, with some patients undergoing multiple procedures during their admission or during the same surgical session.

Table 7 shows the total number of operative patients who died, by specialty.

Table 7: Total number of operative patients who died, by specialty *(n=981 patients who underwent 1,272 separate surgical procedures)*

Specialty	Frequency	Per cent
General Surgery	557	43.8%
Orthopaedic Surgery	191	15.0%
Neurosurgery	185	14.5%
Vascular Surgery	136	10.7%
Urology	66	5.2%
Cardiothoracic Surgery	60	4.7%
Other*	19	1.5%
Plastic Surgery	21	1.7%
Otolaryngology, Head and Neck Surgery	14	1.1%
Paediatric Surgery	10	0.8%
Gynaecology	7	0.6%
Ophthalmology	3	0.2%
Oral and Maxillofacial Surgery	3	0.2%
All specialties	**1,272**	**100.0%**

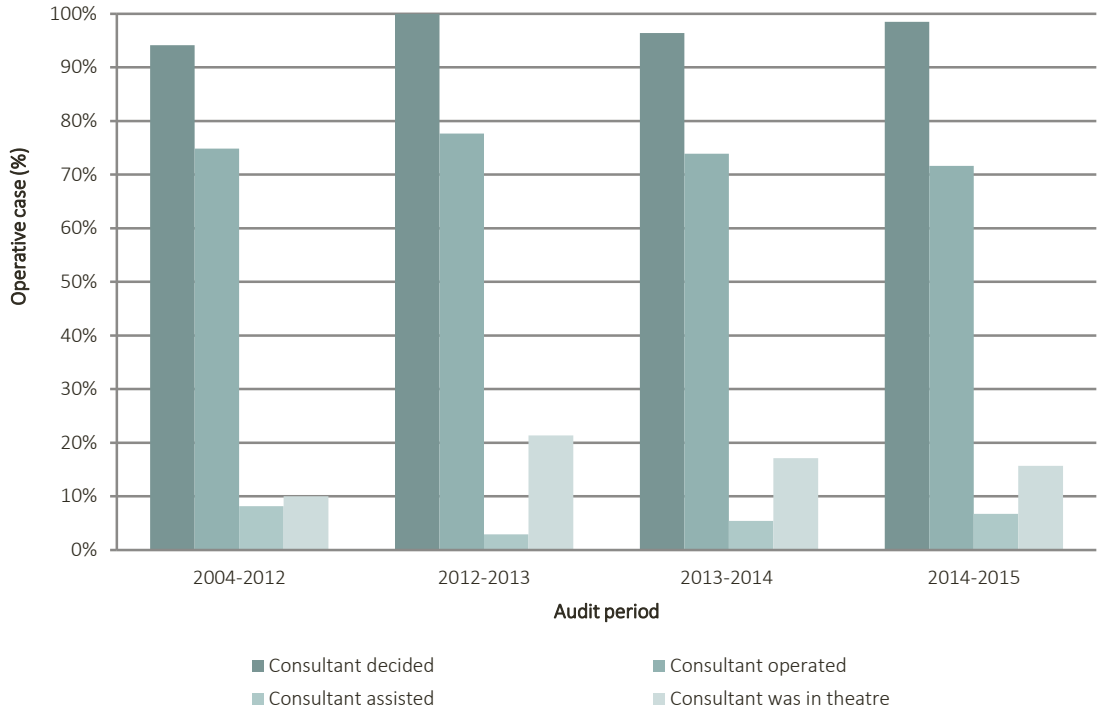
Note: Missing data: n=132 (10.3%).
*Includes Gynaecology and Colorectal Surgery.

Comments:

- General Surgery, Orthopaedic Surgery and Neurosurgery pathologies, were associated with the highest number of reported procedures.
- There is great variation by specialty in the rate of operative intervention over the audit period. Only seven gynaecology patients were included in this year's report.
- The surgical procedure was abandoned in 5.2% (79/1,509) of cases due to the extent of the disease process precluding even short-term survival.

Figure 7 shows the level of consultant involvement in deciding and performing surgery.

Figure 7: Level of consultant involvement in deciding and performing surgery (n= 1,550 separate surgical procedures in 1,272 patients. Missing data: n=6 (<1%))

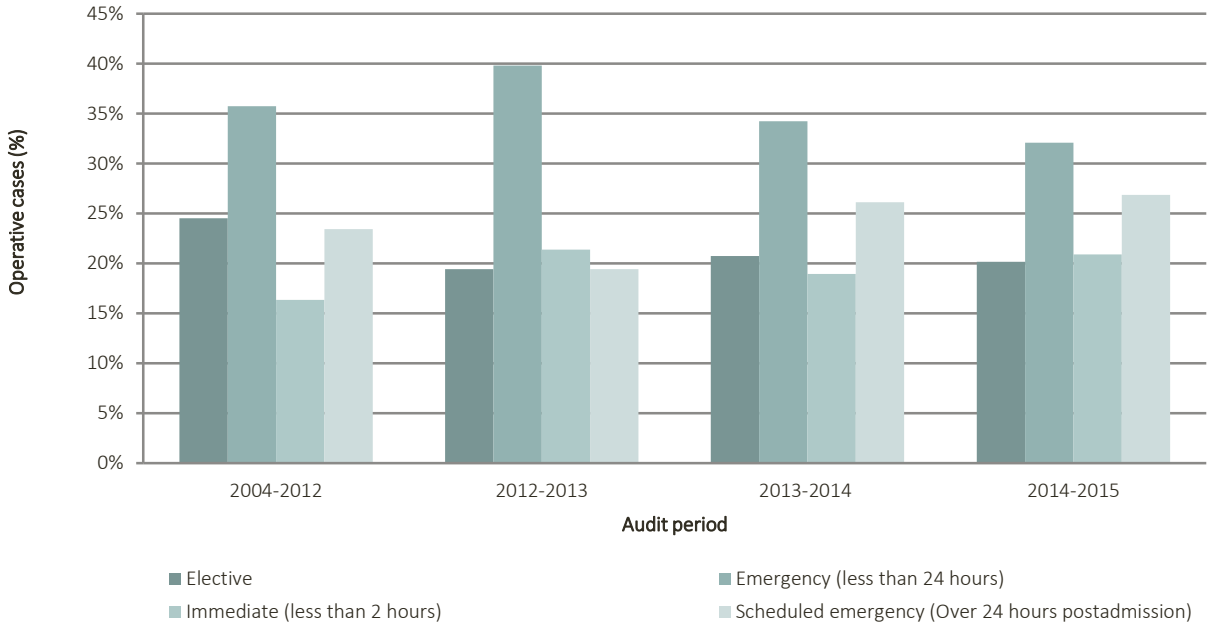


Comments:

- A consultant surgeon performed the surgery in 74.3% (945/1,272) of surgical episodes. This rate remained similar over the audit period. The TASM would like to see a further increase in this. There is some bias in these figures as data accuracy has been poor in this section of the SCF. The increase in consultant involvement is appropriate when the risk profile of the procedure is considered. The role of the consultant is to take responsibility for the overall success of the operation, and their presence in theatre is crucial.
- An anaesthetist was present in 83.9% of procedures (1,067/1,272).

Figure 8 shows the timing of operative procedures in emergency and elective admissions.

Figure 8: Timing of operative procedures in emergency and elective admissions (n=894 patients who underwent 1,272 separate surgical procedures)



Missing data: n=6 (<1%).

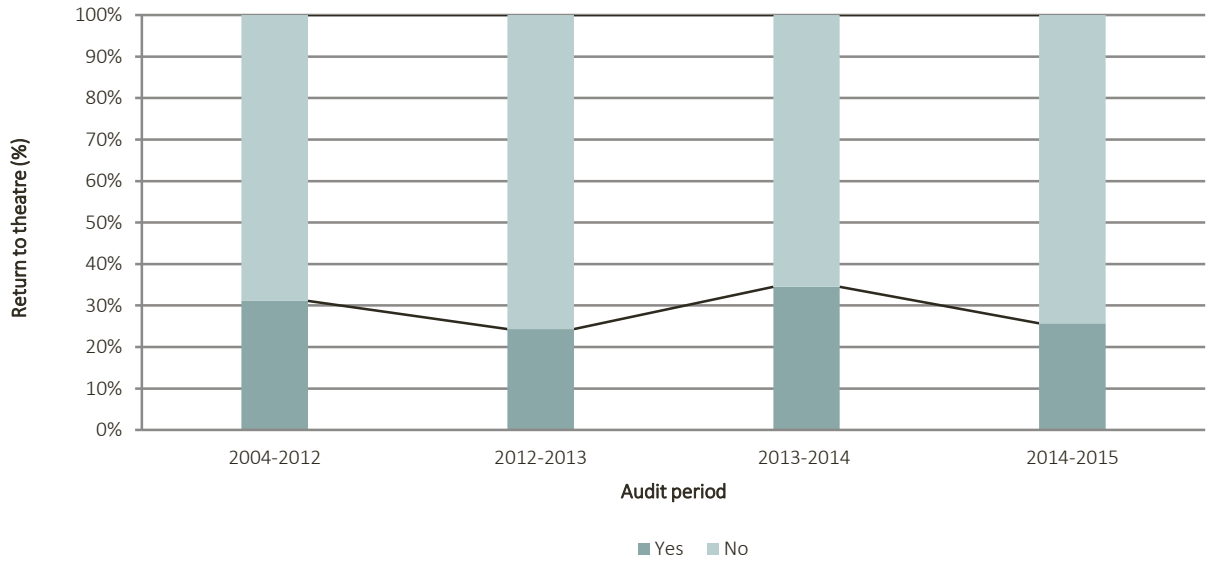
Comments:

- The time criticality of a patient's condition predicts the timing of emergency surgery. Of the 971 emergency admissions that underwent surgery, 17.4% (221/1,266) had surgery within 2 hours of admission, 35.5% (450/1,266) had surgery within 24 hours, and 23.7% (300/1,266) had surgery after 24 hours.
- Overall, 58.8% (745/1,266) of emergency admissions to a surgical unit had surgery within 24 hours of admission. Strategies to address the associated scheduling problems are being implemented by government, surgeons and hospitals.[9-11]

3.2 Unplanned return to the OR

An unplanned return to the OR 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 patient's pre-existing comorbidity profile, surgical risk status and the nature of the disease being treated. However, a high rate of returns to the OR can indicate that improvements to care are needed. TASM would like to see in unplanned returns to the OR a decrease over future audit periods (see Figure 9).

Figure 9: Unplanned return to the operating room (n= 1,272 surgical episodes, including 379 returns to theatre in 894 patients)



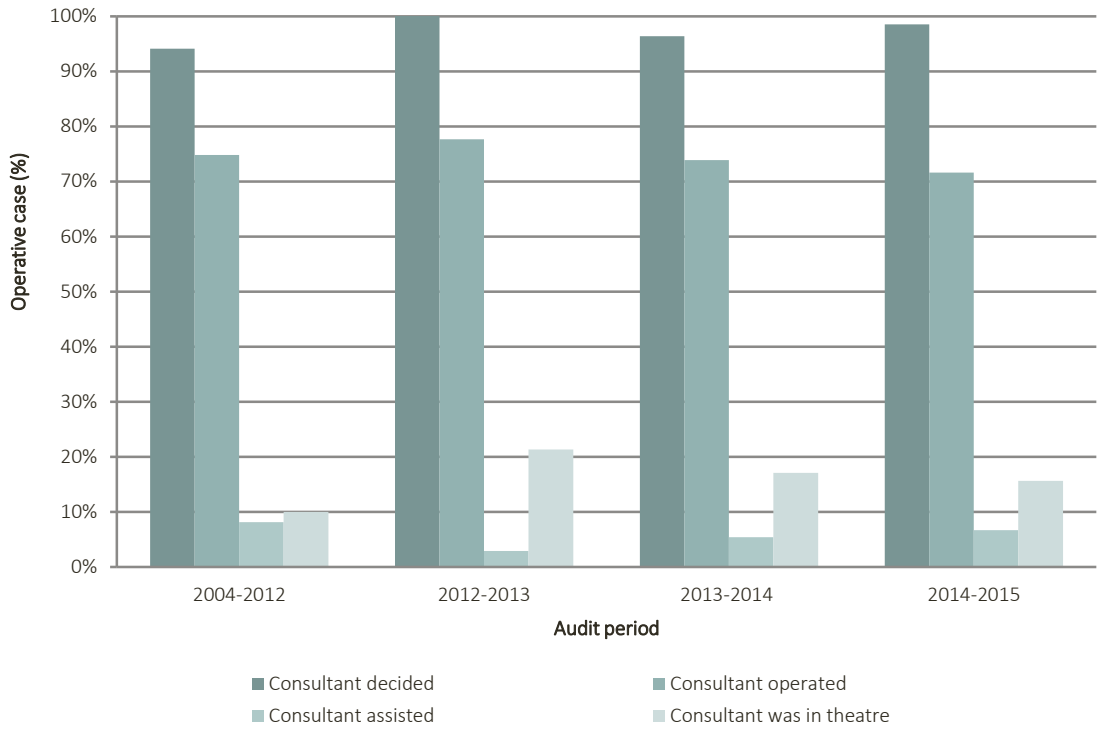
Missing data: n=19 (1.5%).

Comments:

- An unplanned return to the OR was reported in 30.2% (379/1,253) of surgical episodes.
- There has been a slight variation in the trend for unplanned returns to the OR during the audit period. Despite the spike in 2013/14 (34.5%; 39/113), the frequency has dropped from 31.1% (279/897) in 2004-2012 to 25.7% (35/136) in 2014-2015. An overall decrease in the frequency of unplanned returns to the OR over the audit period would be beneficial to these patients.

  There has been a trend towards senior consultants performing surgery at unplanned returns to the OR. This trend is deemed appropriate when patient surgical risk profiles and operative complications are considered. This trend is to be highly commended (see Figure 10).

Figure 10: Seniority of surgeons performing surgery at unplanned returns to the operating room (n=379 episodes in 1,272 surgical episodes having operative treatment)



Missing data: n=19 (1.5%).

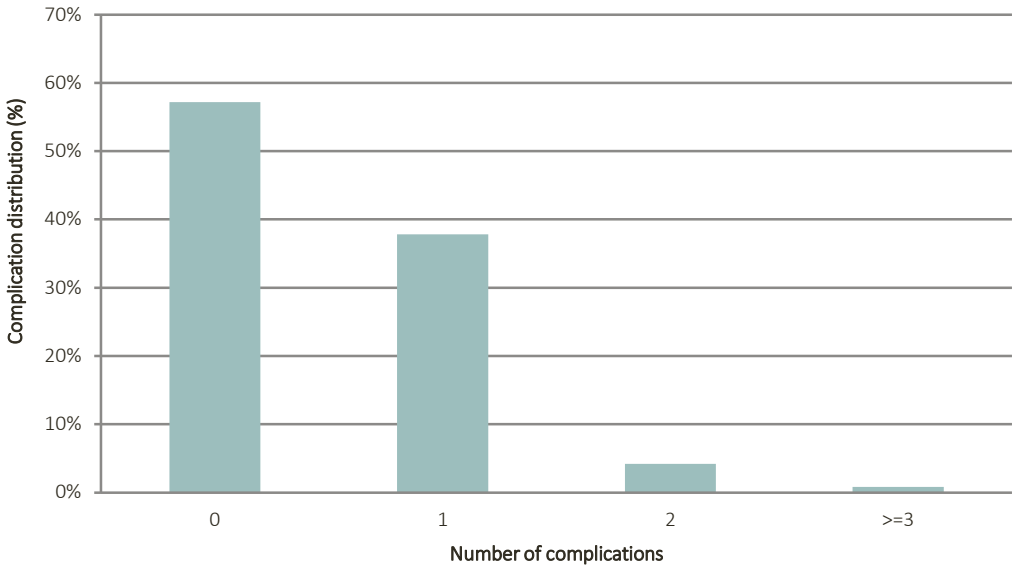
Comments:

- Active consultant participation was higher (83.9%; 318/379) in procedures performed during an unplanned return to the OR compared with the initial operative group (74.6; 945/1,266). This result is appropriate as such cases are more challenging and the risks are greater.

3.2.1 Postoperative complications

Figure 11 shows the postoperative complications recorded by the treating surgeon.

Figure 11: Postoperative complications recorded by the treating surgeon 2004-2015 (Note: n=428 complications in 981 operative cases)

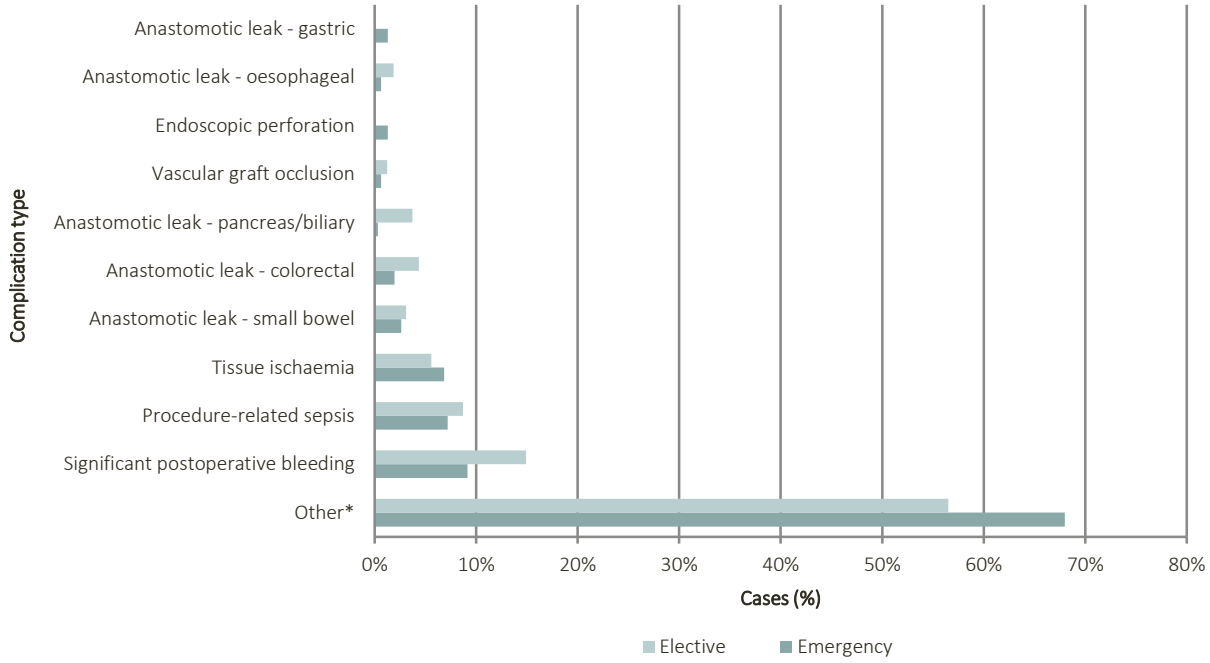


Comments:

- The low rate of postoperative complications reported by treating surgeons has remained constant throughout the audit period (data not shown). Of the 981 patients, 57.2% (561) had no complications and only a single complication was recorded in 37.8% (371) of patients. The remaining 5.0%% (49/981) of patients had two or more complications.

Figure 12 shows the frequency of specific postoperative complications by urgency status.

Figure 12: Frequency of specific postoperative complications by urgency status (n=428 complications in 981 operative cases)



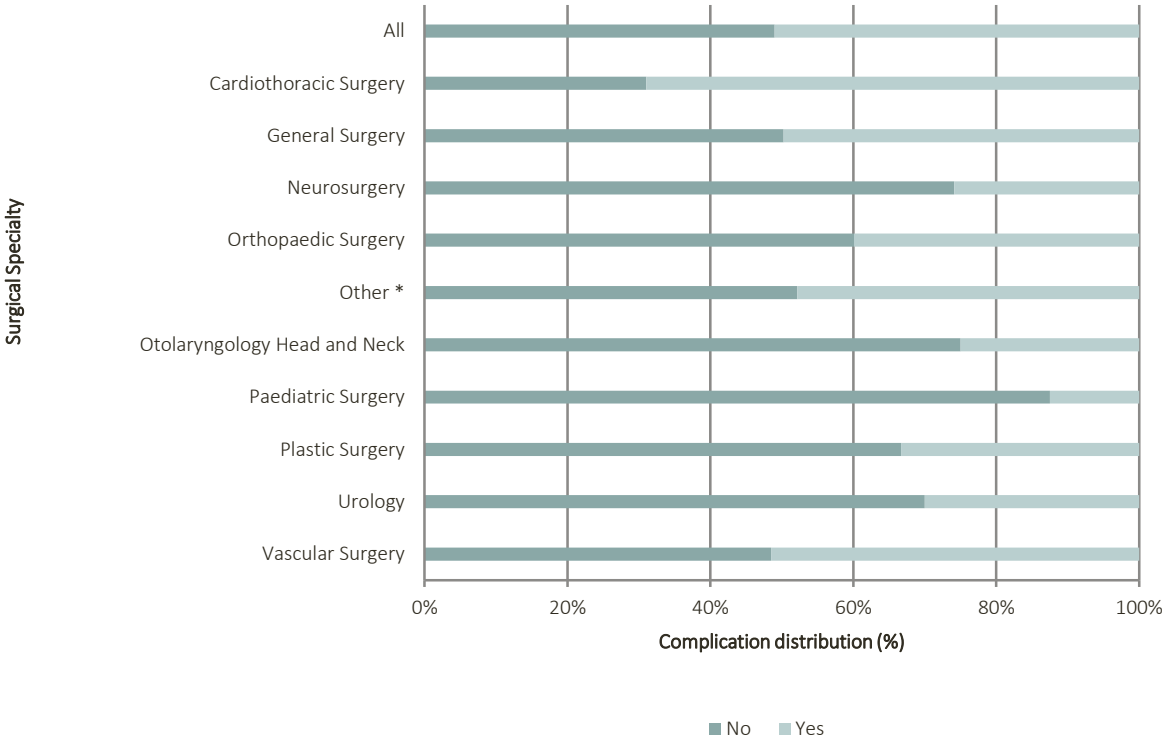
*Other complications include aspiration pneumonia, cardiac arrest, pulmonary embolus, myocardial infarction, pulmonary embolism, respiratory failure and wound dehiscence.

Comments:

- Significant postoperative bleeding is the highest complication type (11.1%; 52/467) for both emergency and elective surgery.
- 71.4% (306/428) of reported complications occurred in patients admitted as emergencies (data not shown).

Figure 13 shows the postoperative complications by specialty.

Figure 13: Postoperative complications by specialty (n=428 complications in 981 operative cases)



*Includes Oral and Maxillofacial Surgery, Paediatric Surgery, Ophthalmology and Gynaecology.

Comments:

- There were differences in the rate of postoperative complications among specialties. Please note that low case numbers associated with some specialties may skew the data.

3.3 Clinically significant infections

In 2012 the TASM started collecting data on clinically significant infections. The TASM is keen to monitor trends from the available retrospective mortality data of infections at hospitals. It is envisaged that future TASM trending will show a reduction of clinically significant infections in this group of high-risk patients as appropriate measures and management strategies continue to be implemented and monitored by health institutions (see Table 8).

Table 8: Clinically significant infections by type (n=127 infections in 371 patients)

Type	Number	Per cent
Pneumonia	47	37.0%
Septicaemia	47	37.0%
Intra-abdominal sepsis	19	15.0%
Other*	14	11.0%
All	127	100.0%

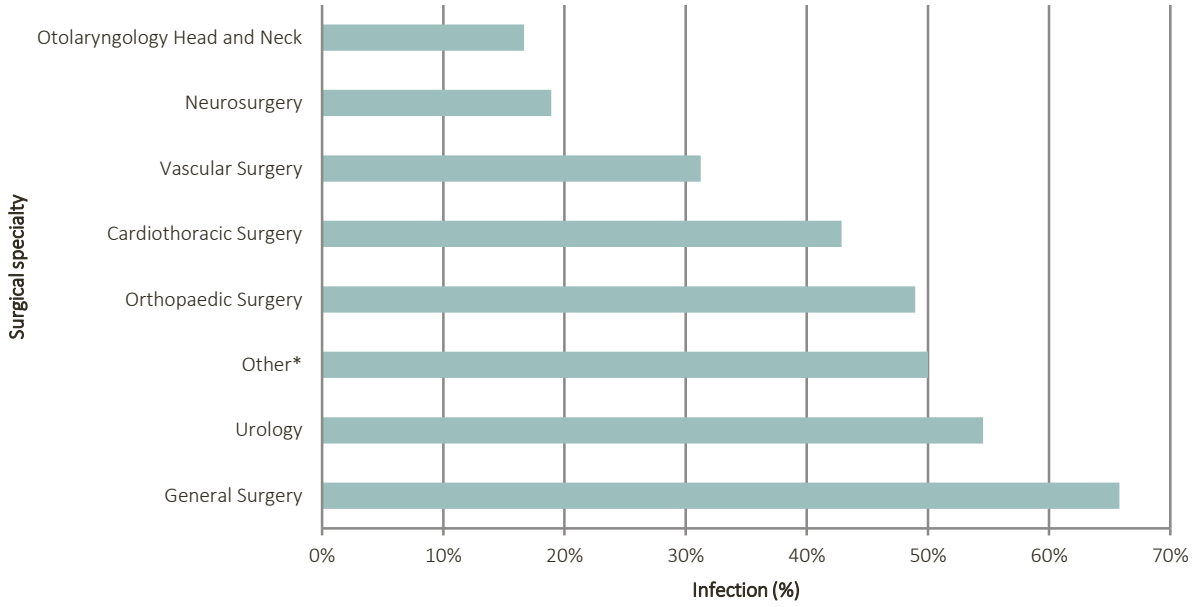
*Other includes *Klebsiella*, *Clostridium difficile*, *Escherichia coli* and methicillin-resistant *Staphylococcus aureus*.

Comment:

- An infection was reported in 34.2% (127/371) of cases audited in 2012–2015.
- Pneumonia and septicaemia were each responsible for 37.0% (47/127) of the cases of infection.
- The infective organisms identified were: *Clostridium difficile*, *Candida albicans*, *Escherichia coli*, *Enterococcus*, *Klebsiella*, methicillin-sensitive *Staphylococcus aureus*, *Streptococcus mitis*, yeast and mixed organisms.

Figure 14 shows the clinically significant infections by specialty.

Figure 14: Clinically significant infections by specialty



Note: n=127 infections in 371 patients.
*Includes Gynaecology, Plastic Surgery, Paediatric Surgery and Colorectal Surgery.

Table 9 shows the time frame when the clinically significant infection was acquired.

Table 9: Time frame when the clinically significant infection was acquired between 2012-2015 (n=127 infections in 371 patients)

Infection	Number	Frequency (%)
Other *	60	47.2%
Acquired postoperatively	54	42.5%
Acquired preoperatively	8	6.3%
Surgical site infection	4	3.1%
Other invasive site infection	1	0.8%
Total	**127**	**100.0%**

Missing data: n=10 (12.9%)
*Other: *Klebsiella*, *Clostridium difficile*, *Escherichia coli* and methicillin-resistant *Staphylococcus aureus*.

Comments:

- Of the cases of infection acquired during admission, 42.5% (54/127) were acquired postoperatively, 0.8% (1/127) were as a result of other invasive site infections, 47.2% (60/127) were attributed to other infections, 6.3% (8/127) were acquired preoperatively and 3.1% (4/127) were surgical site infections. These figures will be monitored for trends in years to come.

3.4 Delay in diagnosis

Treating surgeons were asked to record any perceived delays in establishing a diagnosis and proceeding to definitive treatment (see Tables 10 and 11).

Table 10: Delays associated with establishing a diagnosis (n=111 issues from 1,509 cases)

Delay	2004-2012	2012-2013	2013-2014	2014-2015	Audit period
GP associated	7 (11.5%)	0 (0.0%)	0 (0.0%)	1 (12.5%)	**8 (9.0%)**
Medical unit	11 (18.0%)	4 (36.4%)	2 (22.2%)	1 (12.5%)	**18 (20.2%)**
Surgical unit	17 (27.9%)	1 (9.1%)	2 (22.2%)	3 (37.5%)	**23 (25.8%)**
Other*	26 (42.6%)	6 (54.5%)	5 (55.6%)	3 (37.5%)	**40 (44.9%)**

GP: general practitioner.
*Other includes delay from hospital in the home, nursing home and emergency department.

Table 11: Perceived delays in proceeding to definitive treatment (n=63 issues identified in 1,509 cases)

Reason for delay	Number	Per cent
Other*	32	50.8%
Inexperienced staff	10	15.9%
Incorrect test	7	11.1%
Unavoidable factors	7	11.1%
Misinterpretation of results	6	9.5%
Results not seen	1	1.6%
Total	**63**	**100.0%**

*Other includes delay to imaging, delay in emergency department and incorrect consultation.

Comments:

- Treating surgeons identified delays in establishing the diagnosis in 7.4% (111) of the 1,509 audited cases (data not shown). This rate has remained relatively constant over time.
- It is important to note that delays are not always attributable to the surgical team.
- A review of care received by elderly patients undergoing surgery in the United Kingdom found that delays between admission and operation were related to risk assessment, and that the risk assessment "should include input from senior surgeons [or] anaesthetists" [12]

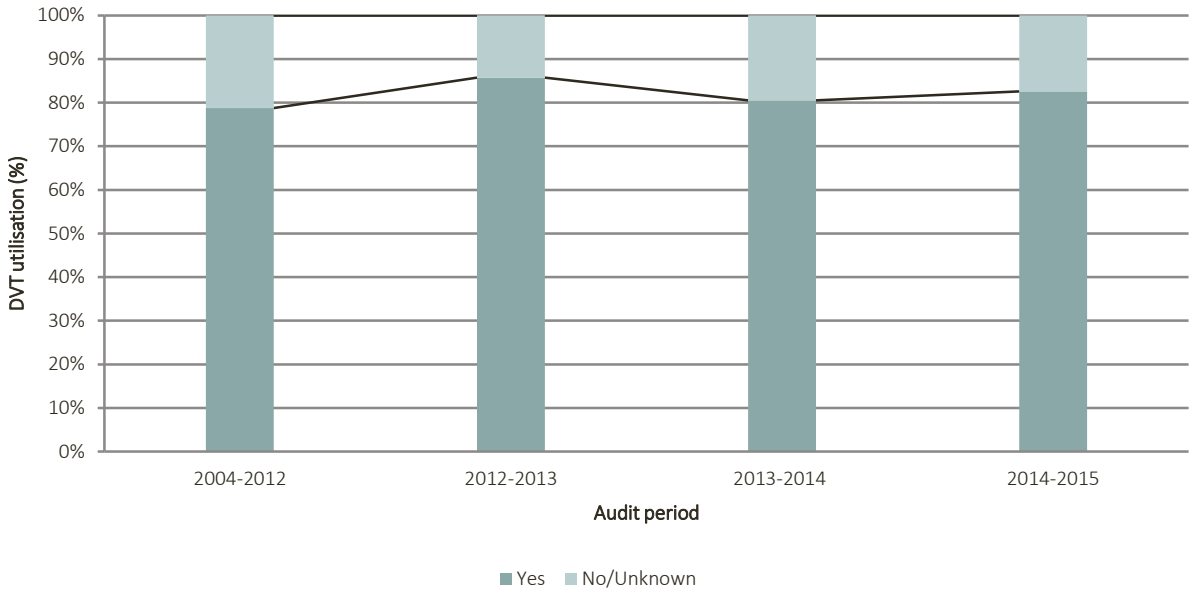
3.5 DVT prophylaxis

The overall aim is to identify whether appropriate strategies are being used to prevent Deep Vein Thrombosis (DVT) and subsequent pulmonary embolism in patients at risk. Despite the availability of effective pharmacological and mechanical preventive options, DVT remains a major cause of mortality in hospital patients across Australia. The clinical practice guidelines for the prevention of venous thromboembolism in patients admitted to Australian hospitals are reviewed and updated periodically to facilitate the best care available to patients. These are found in the National Health and Medical Research Council. Prevention of Venous Thromboembolism (VTE) in Patients Admitted to Australian Hospitals and Australian and New Zealand Audit of Surgical Mortality Working Party on Prevention of Venous Thromboembolism. Prevention of Venous Thromboembolism: best practice guidelines for Australia and New Zealand [13,14].

The recommendations in the guidelines 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 patient's own preferences.

The treating surgeon was asked to record whether DVT prophylaxis was given (see Figures 15 and 16), and if it was, the type of prophylaxis that was used (see Figure 17). The reasons given by surgeons for not providing DVT prophylaxis are also discussed in this section (see Tables 12 and 13). DVT usage by specialty in shown in Figure 18.

Figure 15: DVT prophylaxis use during the audit period (n=981 operative cases)*

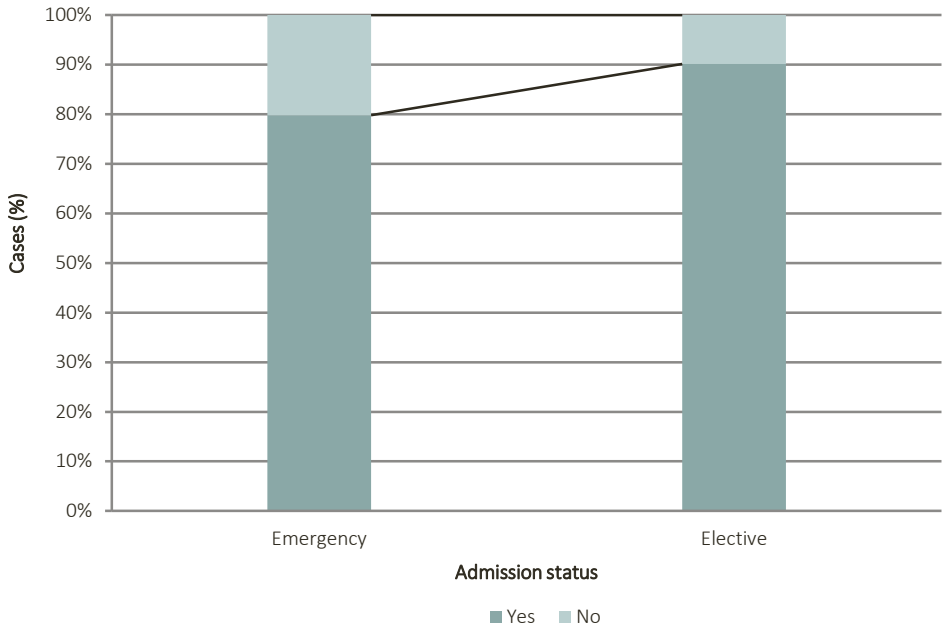


*DVT: deep vein thrombosis.

Comments:

- The use of DVT prophylaxis varies from 78.7% (574/729) in 2004–2012 to 82.6% (71/86) in 2014-2015.
- Overall, DVT prophylaxis was used in 79.8% (783/981) of operative cases.

Figure 16: DVT prophylaxis use by admission type (n=894 operative cases)*

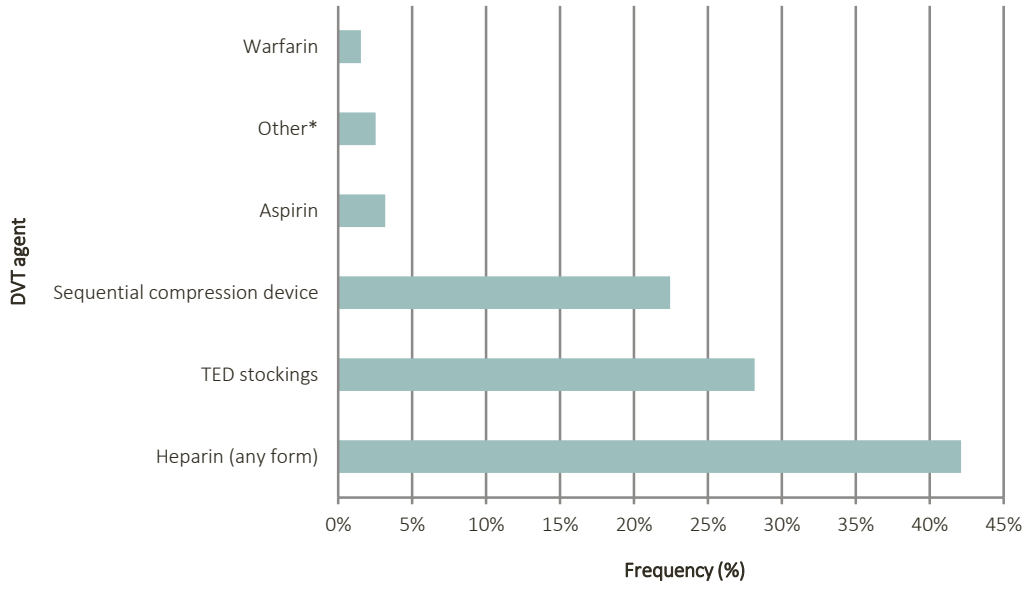


*DVT: deep vein thrombosis.

Comments

- The use of DVT prophylaxis was higher in elective admissions (87.9%; 182/207) compared with emergency admissions (77.6%; 601/774).

*Figure 17: Type of DVT** prophylaxis used (n=1,506)*



*Includes calf stimulators, clopidogrel, epidural, full anticoagulation for non-ST segment elevation myocardial infarction, and inferior vena cava filter and infusion.
**DVT: deep vein thrombosis; TED: thromboembolic deterrent stockings.

Comments:

- The spectrum of DVT prophylaxis used has been consistent over the reporting period (data not shown).
- The type of prophylaxis used is subject to the judgement of clinicians caring for individual patients.

Table 12: Reasons given by treating surgeon for non-provision of DVT prophylaxis (n=153)*

Reason for no use	Frequency	Per cent
Active decision to withhold	50	32.7%
Not appropriate	100	65.4%
Not considered	3	2.0%
Total	**153**	**100.0%**

Missing data: n=45
*DVT: deep vein thrombosis.

Comments:

- Overall, 13.1% (198/1,509) of patients from the audit pool received no prophylaxis (data not shown).
- The non-provision of prophylaxis was a conscious decision made by the treating team in the majority of cases 98% (150/153).

Table 13: Assessor perception of the appropriateness of the decision to withhold DVT prophylaxis*

Reason for no use	First-line assessor	Second-line assessor
Appropriate	132 (76.7%)	13 (56.5%)
Not appropriate/Unknown	40 (23.3%)	10 (43.5%)
Total assessments with no use of DVT	**172 (100.0%)**	**23 (100.0%)**

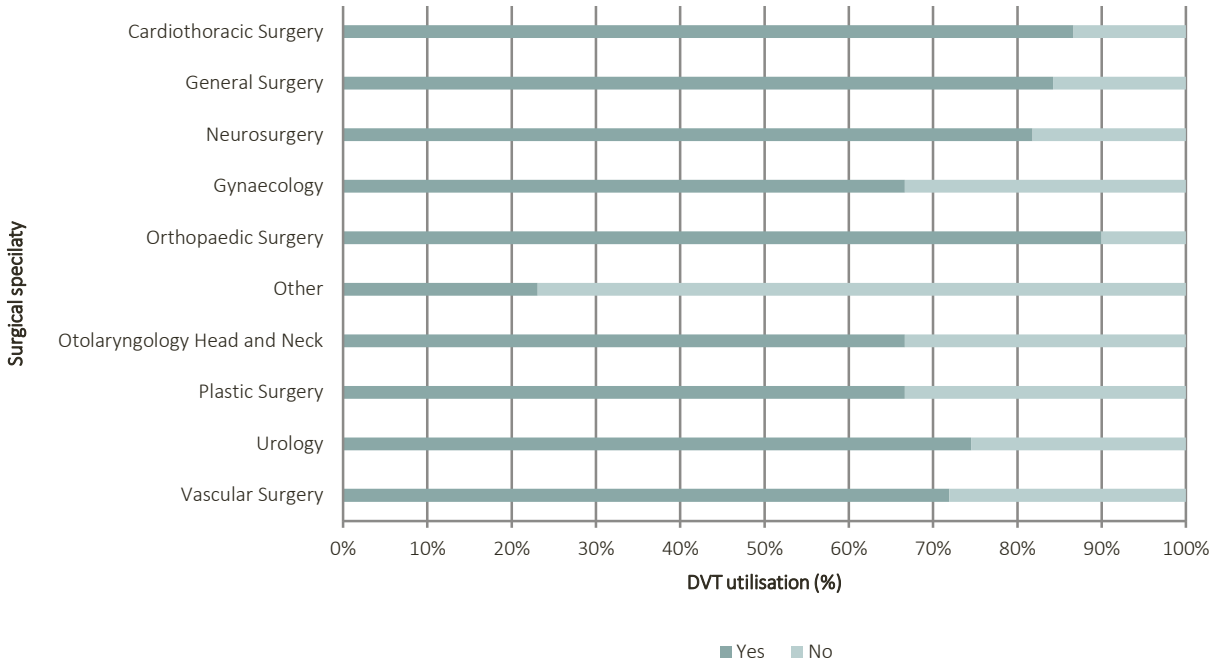
*DVT: deep vein thrombosis.

Comments:

Assessors were asked to comment on the appropriateness of withholding prophylaxis:

- First-line assessors felt that the decision to withhold DVT prophylaxis on clinical grounds was appropriate in 76.7% (132/172) of cases.
- Second-line assessors felt that the decision to withhold DVT prophylaxis on clinical grounds was appropriate in 56.5% (13/23) of cases.
- The tendency of second-line assessors to be more critical of clinical management events is to be expected as they have access to and review the patient medical records.

Figure 18: DVT prophylaxis use by specialty*



*DVT: deep vein thrombosis.

Comments:

- Prophylaxis use by specialty varied from 23.1% Other (3/13) to 89.9% Orthopaedic surgery (161/179).

3.6 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 and surgical departments, especially in larger acute hospitals. A close working relationship between the surgical team and critical care team is essential; however, not all surgical patients require critical care support.

The treating surgeon was asked to record whether the patient received critical care support before or after surgery (see Table 14). The first- and second-line assessors were asked to review the use of critical care facilities for patients (see Figure 19).

Table 14: Provision of critical care support during the audit period

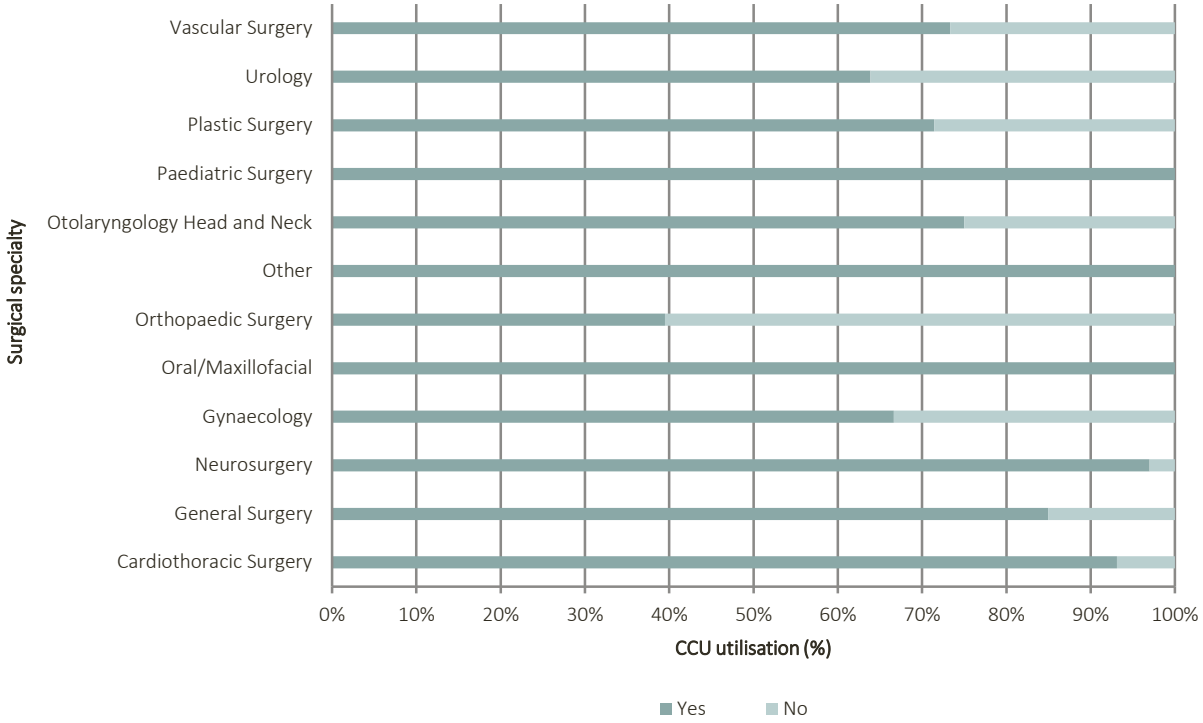
CCU	2004-2012	2012-2013	2013-2014	2014-2015	Audit period
Yes	426 (81.8%)	59 (70.2%)	58 (70.7%)	62 (72.1%)	**605 (78.3%)**
No	95 (18.2%)	25 (29.8%)	24 (29.3%)	24 (27.9%)	**168 (21.7%)**
Total	**521 (100.0%)**	**84 (100.0%)**	**82 (100.0%)**	**86 (100.0%)**	**773 (100.0%)**

Note: n=981 operative cases. Missing data: n=208 (23%).
CCU: critical care unit.

Comments:

- In 78.3% (605/773) of operative cases the patient received critical care support during their inpatient stay.
- Emergency cases had a greater need for, and higher use of, critical care facilities (data not shown).
- It should be acknowledged that not all hospitals have critical care services.

Figure 19: Provision of critical care support to patients by specialty



Note: Missing data: n=208 (23%).
CCU: Critical Care Unit

Comments:

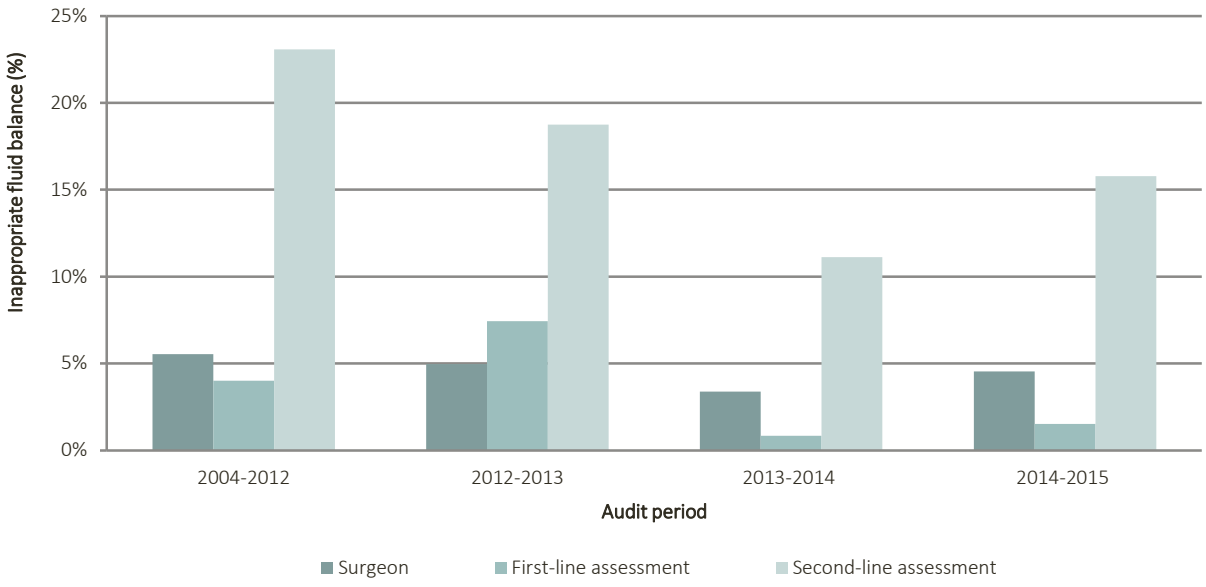
- Similar to previous years, orthopaedic patients had a low referral rate for critical care support (39.5%; 47/119). This is thought to be due to a high number of elderly patients with a fractured neck of femur who have been admitted from high level care institutions.
- First-line assessors found that 0.9% (13/1,495) of patients who did not receive care in a critical care unit would likely have benefitted from it. Second-line assessors perceived that 1.5% (3/194) of patients who did not receive critical care support would likely have benefitted from it.

3.7 Issues with fluid balance

Decisions regarding the optimal amount of intravenous fluids, and the best rate at which to administer them, can be complex. Treatment decisions must be based on a careful assessment of patient 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 inappropriateness of a patient's fluid balance during the episode of care (see Figure 20).

Figure 20: Perception of inappropriateness of fluid balance (n=1,509)



Missing data: n=109 (7.2%).

Comments:

- Treating surgeons felt that in 94.7% (1,430/1,509) of cases the patient's fluid balance had been appropriately managed by the clinical team.
- Surgeons perceived that the fluid balance was inappropriate in 5.2% (79/1,509) of cases. Whereas first-line assessors perceived that the fluid balance was inappropriate in 3.8% (54/1,420) of cases and second-line assessors perceived it as inappropriate in 21.3% (37/174) of cases.
- A 2011 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".[15]

3.8 Patient transfer issues

The treating surgeon was asked to provide information on patients who required an inter-hospital transfer as part of their care. This included information on the timeliness and appropriateness of the transfer, as well as on any perceived clinical issues associated with the transfer (see Table 15 and Figure 21).

Table 15: Types of issues associated with patient transfer (n= 85 out of 261 transfers = 32.6% patients)

Patient Transferred	2004-2012	2012-2013	2013-2014	2014-2015	Audit period
Transfer problems*	6 (3.0%)	2 (10.0%)	1 (5.9%)	1 (4.8%)	**10 (3.8%)**
Inappropriate transfer	13 (6.4%)	0 (0.0%)	0 (0.0%)	3 (14.3%)	**16 (6.1%)**
Insufficient documentations	17 (8.4%)	1 (5.0%)	0 (0.0%)	2 (9.5%)	**20 (7.7%)**
Inappropriate level of care	12 (5.9%)	0 (0.0%)	1 (5.9%)	3 (14.3%)	**16 (6.1%)**
Transfer delay	16 (7.9%)	2 (10.0%)	2 (11.8%)	3 (14.3%)	**23 (8.8%)**
Total transfer issues	**64 (31.5%)**	**5 (25.0%)**	**4 (23.5%)**	**12 (57.1%)**	85 (32.6%)

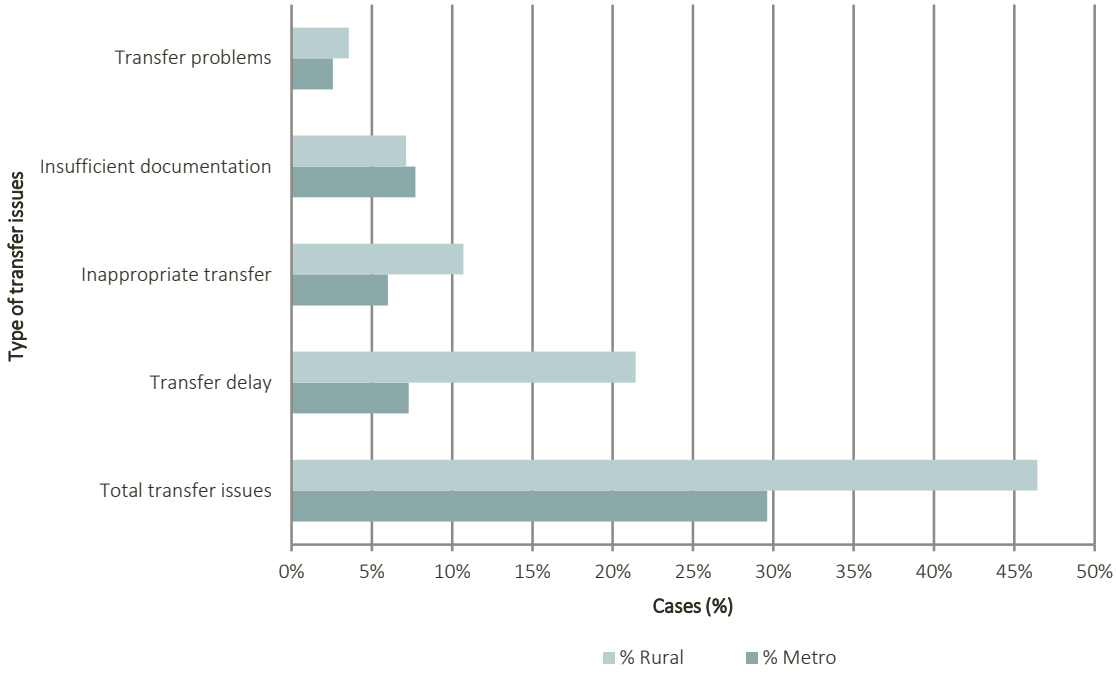
*Transfer problems not specified
Missing data: n=36 (3%).

Comments:

- 17.3% (261/1,509) of patients required a transfer during the audit period (data not shown).
- Of the 261 patients who underwent a transfer, 74.7% (195/261) had an operation. A transfer was required for 26.6% (64/240) of nonoperative patients (data not shown).
- The frequency of patients requiring a transfer for definitive care has remained similar throughout the years of the audit (data not shown).
- Issues of care related to transfers were identified in 32.6% (85/261) of cases involving a patient transfer. This rate has been constant over time:
    - In 6.1% (16/261) of cases it was felt that there was an inappropriate level of care provided during transfer.
    - In 7.7% (20/261) of cases it was felt that inadequate clinical information and documentation had been provided to the receiving hospital.
    - In 6.1% (16/261) of cases it was felt that the transfer had occurred inappropriately late in the course of the illness.
    - In 8.8% (23/261) of cases it was felt that there was a transfer delay.
- Transfer delays and problems increase the risks to patients and are one of the challenges associated with shared care. The transfer of patients remains an area in which further improvements are required, particularly around communication between patient care teams, to ensure patient safety.
- The TASM has identified a need to better define the transfer issue types in the SCF. These data collection points will be revised nationally.

3.8.1 Inter-hospital transfer issues by rural and metro

Figure 21: Types of issues associated with patient transfers (n=85 issues in 261 transfers)



Metro: metropolitan.

Comments:

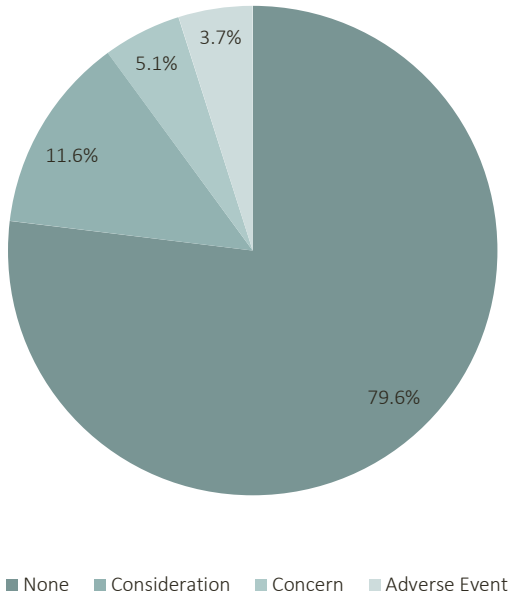
- A major reason for transfer is to attain a higher level of care, such as access to critical care. It is expected that rural hospitals will have a higher need to transfer patients.
- The RACS supports the Rural Doctors Association of Victoria's recommendations to provide greater support and round the clock availability of well-trained rural doctors to ensure that appropriate patient care is provided to the patient prior to transfer.[16]
- Transfer delays were more frequently seen in rural regions than metropolitan areas.

3.9 Outcomes of the peer review

A primary objective of the TASM peer-review process is ascertaining whether 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 (see Figure 22). In cases in which there is a perception that the clinical management may have contributed to death, TASM has specified a spectrum of criticism from which the assessor can choose, as outlined below.

- An area for **consideration**: 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**: the assessor believes that an area of care **should** have been better.
- An **adverse event**: 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 22: Clinical management issues as identified by assessors (n=1,509 patients)



Comments:

- In 91.2% (1,376/1,509) of audit cases there were no, or only minor (area of consideration) perceived issues of patient management.
- Areas of concern were identified in 5.1% (77/1,509) of patients.
- Adverse events, the most serious form of criticism, were identified by assessors in 3.7% (56/1,509) of patients.

3.9.1 Areas of clinical incidents

Table 16 is a reference table and shows the severity of criticism of perceived clinical management issues. Table 17 shows the frequency of clinical management issues.

Table 16: Severity of criticism of perceived clinical management issues

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

N/A = Not Applicable

Comments:

- More than one clinical management issue may be identified for each patient. The percentage of patients affected is the important measure.
- Patients often require input from other clinical teams during the course of their treatment. Management issues raised may, therefore, be attributable to any of these teams.

Table 17: Frequency of clinical management issues

Degree of criticism of patient management	Total occurrences	Per cent
No issues identified	1,201	79.6%
Area of consideration	175	11.6%
Area of concern	77	5.1%
Area of adverse event	56	3.7%
Total	**1,509**	**100.0%**

Perceived impact on patient outcome	Total occurrences	Per cent
No issues of management identified	1,201	86.4%
Did not affect clinical outcome	14	1.0%
May have contributed to death	108	7.8%
Probably contributed to death	67	4.8%
Total	**1,390**	**100.0%**

Perceived preventability of clinical issues	Total occurrences	Per cent
No issues identified	1,201	79.6%
Definitely preventable	49	3.2%
Probably preventable	115	7.6%
Probably not preventable	131	8.7%
Definitely not preventable	13	0.9%
Total	**1,509**	**100.0%**

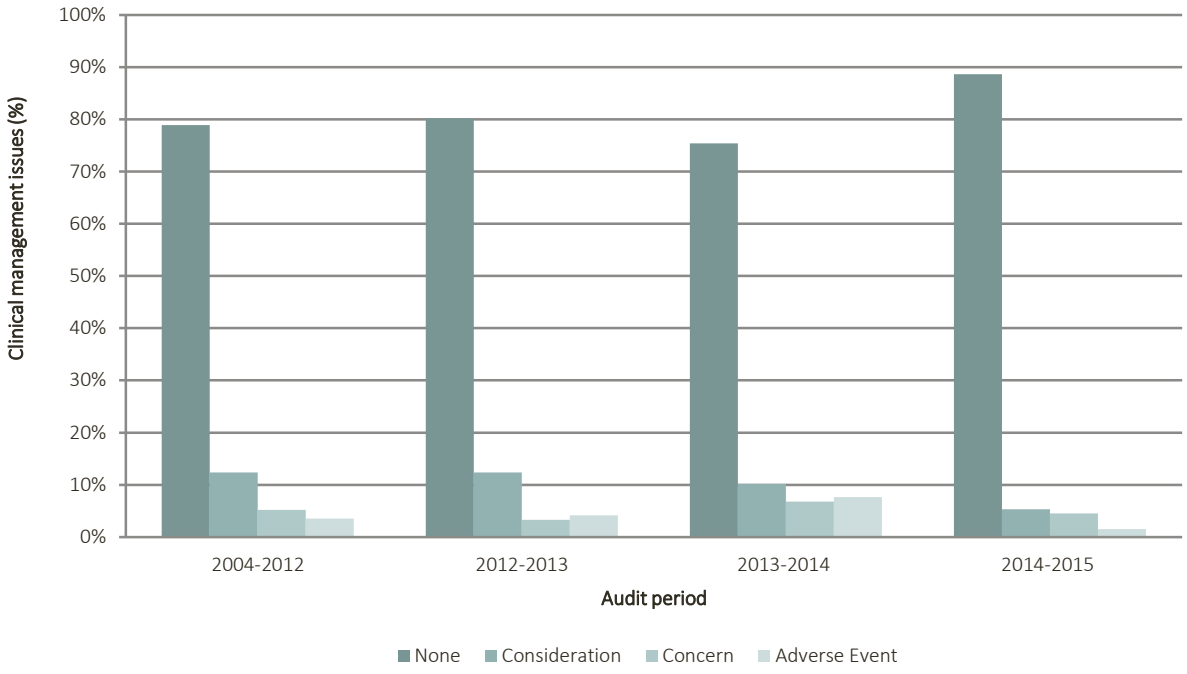
Clinical team responsible for management issue	Total occurrences	Per cent
No issues identified	1,201	71.3%
Surgical team	257	15.3%
Other clinical team	138	8.2%
Hospital issue	67	4.0%
Other factors*	21	1.2%
Total**	**1,684**	**100.0%**

*Includes issues such as staffing levels, patient transfer, patient refusal, ambulance care, anaesthetic care and availability or quality of critical care support.
**Note: Management issues can be attributed to more than one clinical team.

Comments:

- Both sets of assessors perceived that clinical management issues occurred in 20.4% (308/1,509) of cases.
- 15.3% (257/1,684) of issues were attributable to the surgical team. Another 8.2% (138/1,684) of issues were attributable to other clinical teams (for example, medical and emergency departments). Hospital issues were responsible for 4.0% (67/1,684) of clinical management issues and 1.2% (21/1,684) of issues were attributed to other factors.
- These finding are similar to the national audit results.[2]

Figure 23: Frequency and classification of clinical management issues by audit period (n=1,509)



Note: Missing data: n=13 (<1%).

Comments:

- The rate of clinical issues has remained constant over the audit period.
- In the 2004–2012 audit period, 78.8% (897/1,138) of patients had no identified clinical management issues. This figure reached 88.6% (117/132) in 2014–2015.
- The assessors perceived more clinical issues over the total audit period than the treating surgeon. Treating surgeons identified clinical management issues in 21.0% (317/1,509) of patients while first-line assessors identified management issues in 25.7% (388/1,509) of patients. This gap widens when looking at the number of patients identified as having clinical management issues by the treating surgeon (50.9%; 108/212) compared with the second-line assessor (62.7%; 133/212). These results support the importance and the value of an independent peer-review assessment.

3.9.2 Frequency of clinical management issues

The frequency of specific clinical issues of management, and adverse events by operative status, are shown respectively in Table 18 and Figure 24. The higher the frequency of clinical management issues the greater the requirement for improved surgical care in that particular area.

Table 18: Frequency of clinical management issues

Clinical management issue	Number	Per cent
Decision to operate	39	10.8%
Adverse factors in management	23	6.4%
Better to have done different operation or procedure	16	4.4%
Delay to surgery (i.e. earlier operation desirable)	15	4.1%
Delay in diagnosis	14	3.9%
General complications of treatment	11	3.0%
Diagnosis-related complications	10	2.8%
Delay to operation caused by missed diagnosis	10	2.8%
Delay in recognising complications	6	1.7%
Aspiration pneumonia after anaesthetic	6	1.7%
Anastomotic leak after open surgery	6	1.7%
Postoperative bleeding after open surgery	5	1.4%
Heart complication	5	1.4%
Delay to reoperation	5	1.4%
Delay in investigating the patient	5	1.4%
Failure to investigate or assess patient fully	5	1.4%
Postoperative care unsatisfactory	5	1.4%
Secondary haemorrhage	4	1.1%
Aspiration pneumonia	4	1.1%
Delays	4	1.1%
Unsatisfactory medical management	4	1.1%
Delay in recognising anastomotic leak	3	0.8%
Diagnosis missed - unspecified	3	0.8%
Communication failures	3	0.8%
Intraoperative bleeding during open surgery	3	0.8%
Delay in x-ray department	3	0.8%
Anaesthesia related	3	0.8%
Pulmonary embolus	3	0.8%
Total	**362**	**100%**

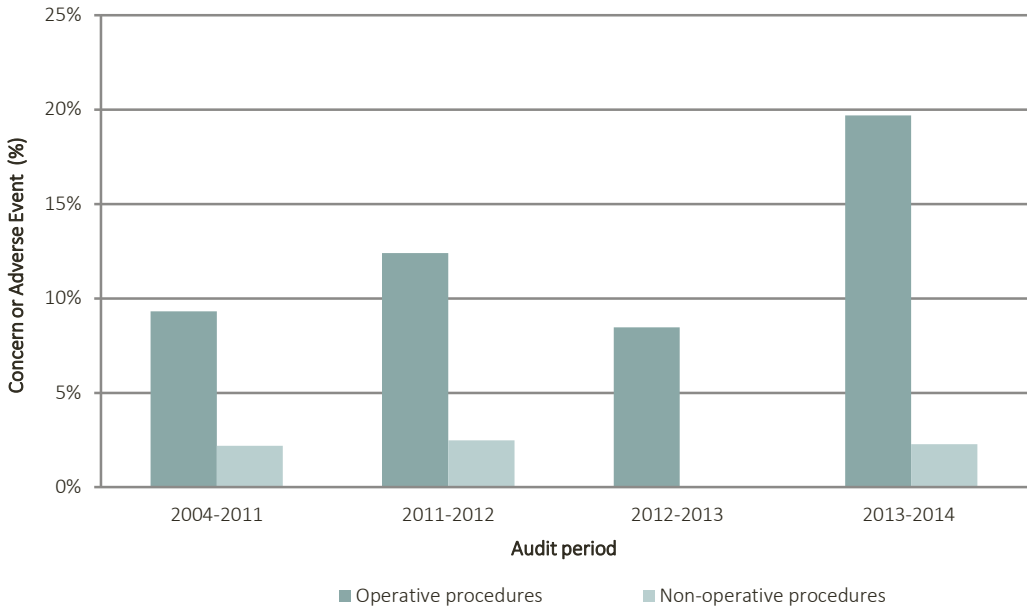
Note: n=362 clinical management issues identified in 1,509 cases. Categories with less than three instances not listed (38.3%; 139). More than one clinical management issue can be attributed to a case.

Comments:

- The most common clinical issues were decision to operate, 10.8% (39/362), and adverse event factors in management, 6.4% (23/362). These are significant findings, highlighting that clinical deterioration must be acted on and not just recorded.
- The delay in definitive treatment category includes delays in transfer, establishing diagnosis and starting treatment. TASM's findings are similar to a number of studies on hip fracture patients. These studies have found that delay to

surgery was attributable to patient factors such as: age[17],comorbidities[18], American Society of Anesthesiologists (ASA) status, gender, day of surgical admission relating to delay to surgery[19], waiting times[11, 20, 21] and reduction of theatre changeover time.[22]

Figure 24: Frequency of adverse events and areas of concern by procedure type and audit period

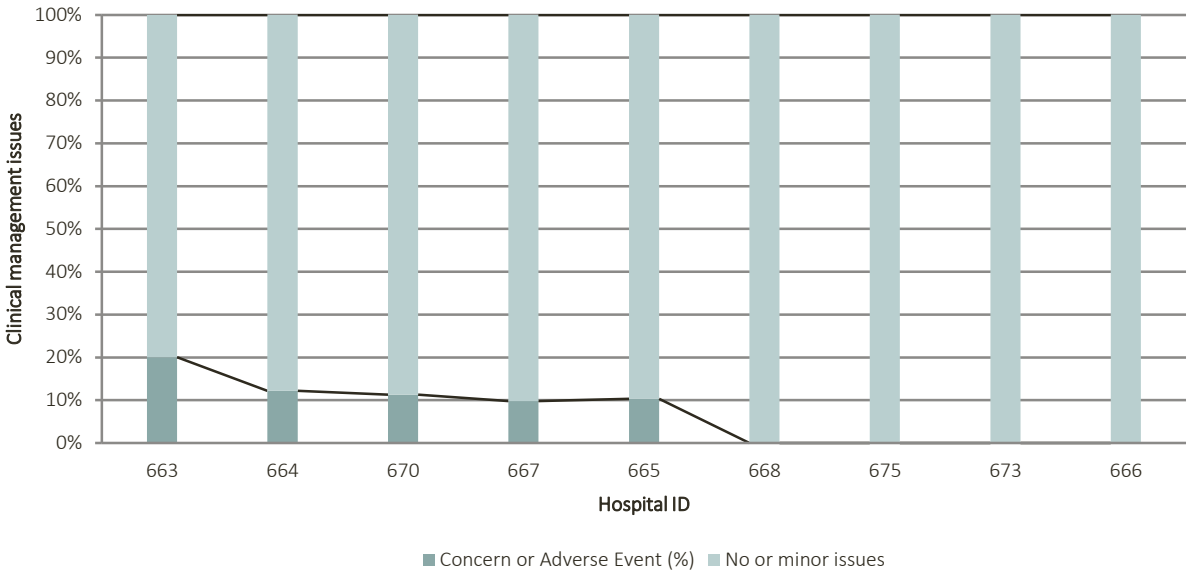


Note: n=188 areas of concern and adverse events in n=1,509 cases.
AE: adverse event.

Comments:

- The overall area of concern and adverse events during the audit period was 12.5% (188/1,509).
- Overall, cases which had non-operative procedures had a significantly lower rate of areas of concern and adverse events (2.1%; 31/1,509) compared with cases in which an operative procedure was performed (10.4%; 157/1,509).

Figure 25: Adverse events and areas of concern by hospital during the audit period

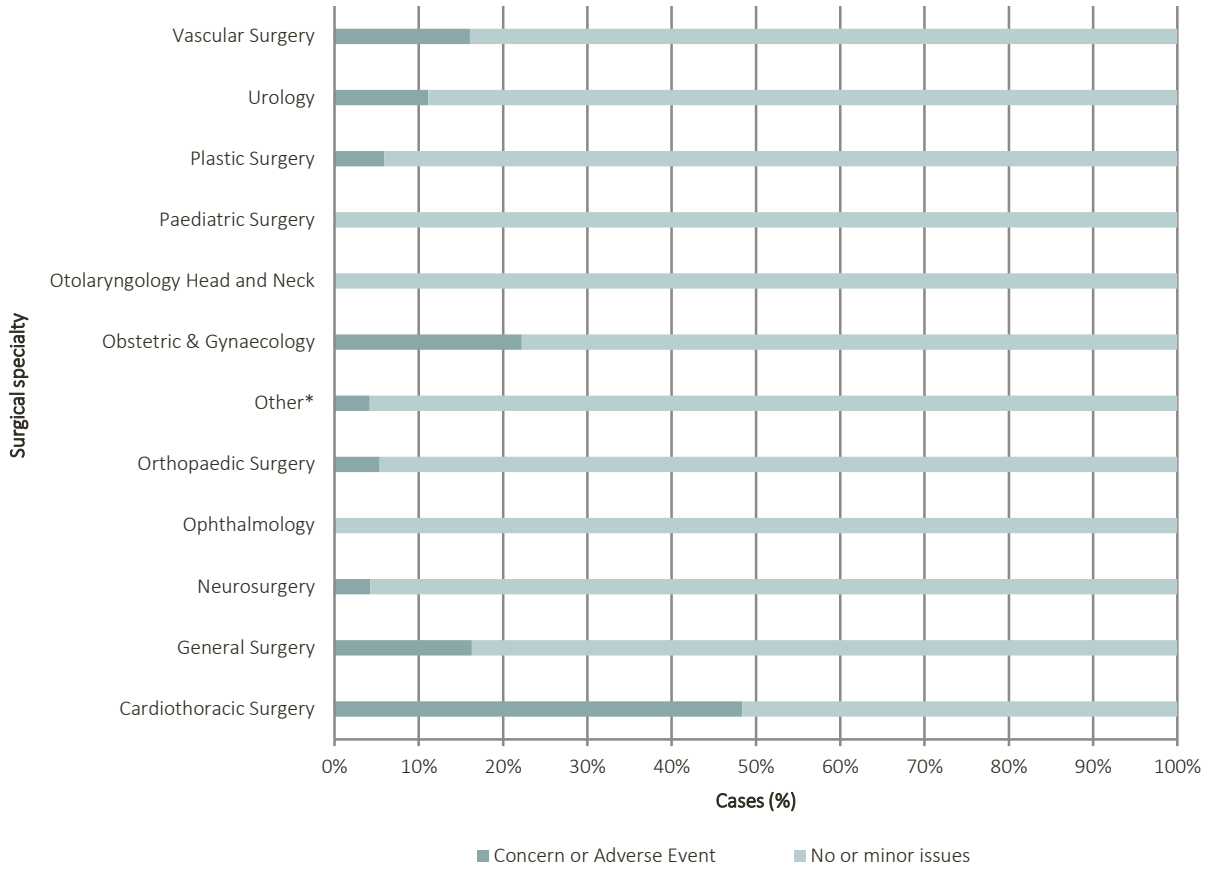


Note: n=113 areas of concern and adverse event in n=1,509 cases. Grey lines represent percentage grids.
AE: adverse event; ID: identifier.

Comments:

- The TASM program has rolled out the hospital reports in February 2016. These reports present de-identified and aggregated data to enable benchmarking and monitoring of clinical management trends within a hospital and compare it against other participating peer-grouped hospitals, both within the region and nationally. 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) representatives, as well as with hospital quality managers and DHHS representatives.
- The individual hospital clinical governance reports will outline specific areas of concern and adverse events identified for the reporting sites.

Figure 26: Adverse events and areas of concern by surgical specialty



Note: n=113 areas of concern and adverse event in n=1,509 cases.
Other: Maxillofacial and Colorectal Surgery.
AE: adverse event.

Comments:

- As in previous reports, the adverse events and areas of concern differ by specialty due to casemix and low numbers.

3.9.3 Conclusions

The TASM would like to encourage participating stakeholders to improve their leadership approaches in patient care with a focus on better documentation of clinical events, leadership, action on evidence of clinical deterioration, improved communication and awareness for shared care requirements. Also clinicians should focus on improved preoperative, intraoperative and postoperative management.

4. Audit limitations and data management

Audit data is collected to provide peer review feedback to surgeons and is available for academic research. The data is of high quality as every case underwent external peer review.

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

Data quality is an essential component of all audits. Inaccurate and incomplete clinical information will impair the audit process and prevent identification of trends.[10]

The volume of missing data continues to be greatest in two sections: fluid balance management (21.8%; 330/1,509), and critical care utilisation (13.7%; 208/1,509). Appropriate responses to these questions are important, as incomplete or missing data hinders the ability of the audit to identify and address adverse trends. Where data integrity issues are identified it is important to review the format of the questions that will generate the data. ANZASM revises the SCF as part of continuous improvement in the quality of the audit data.

The TASM will upgrade the electronic Fellows Interface by the end of 2016 for enhanced data submission and this should lead to improved data quality and integrity in the future.

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6. Appendix

6.1 Data management and statistical analysis

All deaths occurring in Tasmanian hospitals while the patient is under the care of a surgeon that are notified to TASM are audited. Cases admitted for terminal care and deaths incorrectly attributed to surgery are excluded from the full audit process. The 2013–2014 report includes deaths reported to TASM since data collection commenced on 1 July 2004 up to 30 June 2015. As the multiple rate-limiting steps in the audit process result in a mean time to completion of three months, information on some deaths that occurred during the reporting period may be still under review and are not included.

Data is encrypted in the web database. This data is sent to, and stored in, a central Structured Query Language server database that includes a reporting engine. All transactions are time-stamped. All changes to audit data are written to an archive table, enabling a complete audit trail to be created for each case.

An integrated workflow rules engine supports the creation of letters, reminders and management reports. This system is designed and supported by the RACS IT department. All communications are encrypted with Secure Sockets Layer certificates.

Data is downloaded from the secure database and then analysed using Microsoft Office Excel (2010). Demographic data and summary statistics have been presented. Variables have also been tested for yearly trends. Numbers in the parentheses in the text (n) represent the number of cases analysed. These numbers vary as not all data fields were completed by surgeons.

6.2 Exclusion of identifiable data

Data that might identify surgical groups, patients or hospitals have been excluded from this report, as have extreme values.

6.3 Classification of operative procedures

- Cardiac: includes angiograms, bypass of coronary artery, exploratory median sternotomy, median sternotomy approach, replacement of aortic and mitral valve.
- Colorectal: includes anterior resection of rectum and anastomosis, colostomy, partial colectomy, hemicolectomy, ileostomy and reversal of Hartmann's procedure.
- Gastrointestinal endoscopy: includes colonoscopy, gastroscopy, endoscopic retrograde cholangiopancreatography and sigmoidoscopy.
- Laparotomy and upper gastrointestinal: includes cholecystectomy, endoscopic division of adhesions of peritoneum, gastrectomy, ileostomy, jejunostomy, oversewing of small bowel and repair of inguinal hernia.
- Neurosurgical trauma: includes burrhole(s) for ventricular external drainage, craniectomy, craniotomy, evacuation of haematoma, insertion of cranial monitor, insertion of drainage system into bone and intracranial pressure monitoring evacuation.
- Orthopaedic: includes hip joint operations, hemiarthroplasty, fracture and internal fixation.
- Peripheral vascular: includes embolectomy of femoral artery and vein graft thrombectomy.
- Thoracic and tracheostomy: includes bronchoscopy, insertion of tube drain into pleural cavity, thoracotomy and tracheostomy.
- Urology: includes diagnostic cystoscopy and transurethral resection of male bladder.
- Wound care: includes debridement of bone, muscle and skin, drainage of septal abscess, dressing of wound and lavage of peritoneum.

6.4 Classification of clinical management issues

- Adverse event: includes anastomotic leak after open surgery, injury caused by fall in hospital, pulmonary embolus, secondary haemorrhage and transfer should not have occurred.
- Communication or poor documentation: includes communication failures due to poor case notes and poor communication between physician and surgeon.
- General complications after operation: includes aspiration pneumonia, general complications of treatment, postoperative bleeding after open surgery and septicaemia.
- Management or protocol issues: includes adverse events related to treatment guidelines or protocols, diagnosis-related complication, failure to use DVT prophylaxis, high dependency unit not used postoperatively, patient-related factors and patient refusing treatment, surgeon too junior, treatment did not conform to guidelines and unsatisfactory medical management.
- Operation inappropriate: includes decision to operate and consider different operation or operation should not have been done.
- Preoperative care issues: includes computed tomography scan should have been done, cardiac monitoring inadequate, failure to investigate or assess patient, failure to recognise severity of illness and inappropriate treatment prior to surgical referral.
- Postoperative care issues: includes drug-related complication, failure to use high dependency unit postoperatively, fluid balance unsatisfactory, fluid overload and inadequate postoperative assessment.

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Royal Australasian College of Surgeons

TASM Tasmanian Audit of Surgical Mortality

Tasmanian Government

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists

ANZASM Australian and New Zealand Audit of Surgical Mortality