TASMANIAN AUDIT OF SURGICAL MORTALITY

Royal Australasian College of Surgeons

ANNUAL REPORT

2017

Royal Australasian College of Surgeons

Tasmanian Government

ANZASM
Australian and New Zealand Audit of Surgical Mortality

TASM
Tasmanian Audit of Surgical Mortality

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(I) SHORTENED FORMS

AE	Adverse event
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
CCU	critical care unit / critical care utilisation
CMI	clinical management issue
CNRB	Case Note Review Booklet
CPD	continuing professional development
DoH	Department of Health
DVT	deep vein thrombosis
FLA	first-line assessment
GI	gastrointestinal
Hrs	hours
NOD	notification of death
NSQHS	National Safety and Quality Health Service
OR	operating room
PE	pulmonary embolism
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
TED	thromboembolic deterrent stockings.
TASM	Tasmanian Audit of Surgical Mortality

(II) 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 Surgical 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 (DoH) for funding the project
- The Royal Australasian College of Surgeons (RACS) for infrastructure and oversight of this project.

(III) 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 Jodi Glading	BSc, MPsych, BMedSci, MBBS(Hons), MHM, FRACMA – Deputy Chief Medical Officer DoH
Prof Richard Turner	MBBS(Hons), BMedSc, FRACS, PhD
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(IV) EXECUTIVE SUMMARY

AUDIT PARTICIPATION AND PROCESSES

From its commencement on 1 July 2004 to the end of the current audit period 30 June 2017, the TASM received 2,012 notifications of death that had been associated with surgical care. By the census date, 82.2% (1,654/2,012) of the deaths had been fully audited and 11.5% (231/2,012) were excluded as terminal care cases. Terminal care cases therefore do not require the full peer review process. The outcomes from the peer review process are restricted to these deaths that are fully peer-reviewed and 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 and this has been maintained. The submission and return of surgical case forms (SCFs), a pivotal step in the audit process, has constantly been 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 61.8% (136/220) 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 reviewed in 2017 was 7.4% (7/94) compared to 13.3% (220/1,654) over the entire reporting period.[1,2] This trend is similar to the National and Victorian Audit of Surgical Mortality (VASM) findings.

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 multi-organ failure, acute myocardial infarction and respiratory failure. This is congruent with the most common comorbidities in Tasmanian patients and is similar to the national audit findings.[2]

A total of 1,788 separate episodes of surgery occurred in 1,654 patients. The most frequent operative procedures described were for General, Orthopedic and Neurosurgical pathologies. This reflects the high percentage of patients admitted as emergencies for irretrievable clinical problems. A consultant performed the surgery in 73.9% (1,123/1,519) of instances and made the decision to proceed to surgery in 94.8% (1,440/1,519) of cases.

Clinical risk management

Three areas of clinical priority 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 clinical priority areas are:

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

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 79.3% (972/1,226) 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 76.2% (154/202) of cases the first-line assessors felt that the decision was appropriate, and in 44.4% (12/27) of cases the second-line assessors felt that the decision was appropriate. The tendency of second-line assessors to be more critical of clinical management events is foreseeable, as they have more supporting documents such as the patient's medical notes when assessing the cases. 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 2004-2017, 77.4% (737/952) 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 2017. When patients were not cared in critical care units the first-line assessors viewed it as inappropriate in 0.9% (13/1,437) of cases and the second-line assessors in 1.4% (3/220) of cases. The TASM would like to encourage hospitals to 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 5.6% (92/1,654) 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 86.5% (1,431/1,654) of audited cases assessors perceived either no, or only minor, issues of patient management. Areas of concern were identified in 5.0% (83/1654) of patients. In 3.7% (62/1,654) 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 2017 results are consistent with the previous year's findings and 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 coded avoidable factors among the 423 clinical management issues identified were:

- decision to operate: 10.4% (44/423)
- adverse events in the management of patient: 6.1% (26/423)
- delay to surgery: 4.5% (19/423).
- better to have done different operation or procedure: 4.3% (18/423)

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. The TASM's goal is to see strategies implemented by health services in order to see a decrease in trends relating to unplanned return to the OR.

There was an unplanned return to the OR in 28.8% (428/1,485) of patients who underwent a surgical procedure. However, direct consultant involvement in such cases has risen consistently during the audited period.

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 57.6% (665/1,154) of operative cases, while a single complication was recorded in 37.3% (430/1,154) of patients. The remaining 5.1% (59/1,154) of patients had two or more complications.

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 17.5% (290/1,654) 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 5.4% (16/294) of cases. Delay in transfer was identified in 8.5% (25/294) of cases. Delays in inter-hospital transfers carry greater 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.

TASM ACTIVITY KEY POINTS

Audit management

Through the RACS TAS State Office, increase the profile of the audit to the TAS surgical trainees. This will familiarise trainees with the audit's purposes and processes and be of assistance should surgeons delegate cases to them.

Collaborate closely with the TAS State Office to improve in identifying newly graduated surgical trainees, thereby ensuring early recruitment of new Fellows/surgeons into the audit.

Education

Produce at least one case note review booklet per year, combined with the Western Australia Audit of Surgical Mortality, to educate, facilitate change and improve practice.

The increase in the proportion of patients treated with a palliative approach could reflect an increasing awareness of end of life issues and patient preferences.

Provide educational activities focused on issues such as the decision to operate (including decision making tools and reducing futile care) and end of life issues including Advance Care Directives.

(V) RECOMMENDATIONS AND KEY POINTS FOR TASM CLINICAL STAKEHOLDERS

IMPROVED LEADERSHIP IN COMMUNICATION

Consultation with senior surgeons is essential when dealing with important decisions and unexpected compilations.

Surgeons are encouraged to discuss valuable assessor feedback, audit findings and recommendations with surgical colleagues and at relevant meetings.

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.

LEARNING THROUGH THE AUDIT

It is recognised that the audit provides surgeons with an alternative form of learning. The audit should:

- encourage surgeons to be assessors to enhance their own learnings from the audit
- encourage surgeons to make use of the audit data in research publications
- identify emerging trends and address them in educational processes such as seminars and themed case note review booklets
- include "alcohol abuse" as a comorbidity in the SCF.

PRACTICE AND POLICY

The audit is routine, systematic and clinically relevant. It can inform hospital and clinical practice. The audit data should be used to:

- review existing clinical activities and hospital processes
- influence public policy
- identify areas where clinical improvement can be made.

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 DoH and RACS. The TASM project is funded by the Tasmanian DoH to review all deaths associated with surgical care and identify preventable adverse outcomes. The Governance structure for the Tasmanian Audit of Surgical Mortality is outlined in Figure 1.

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.

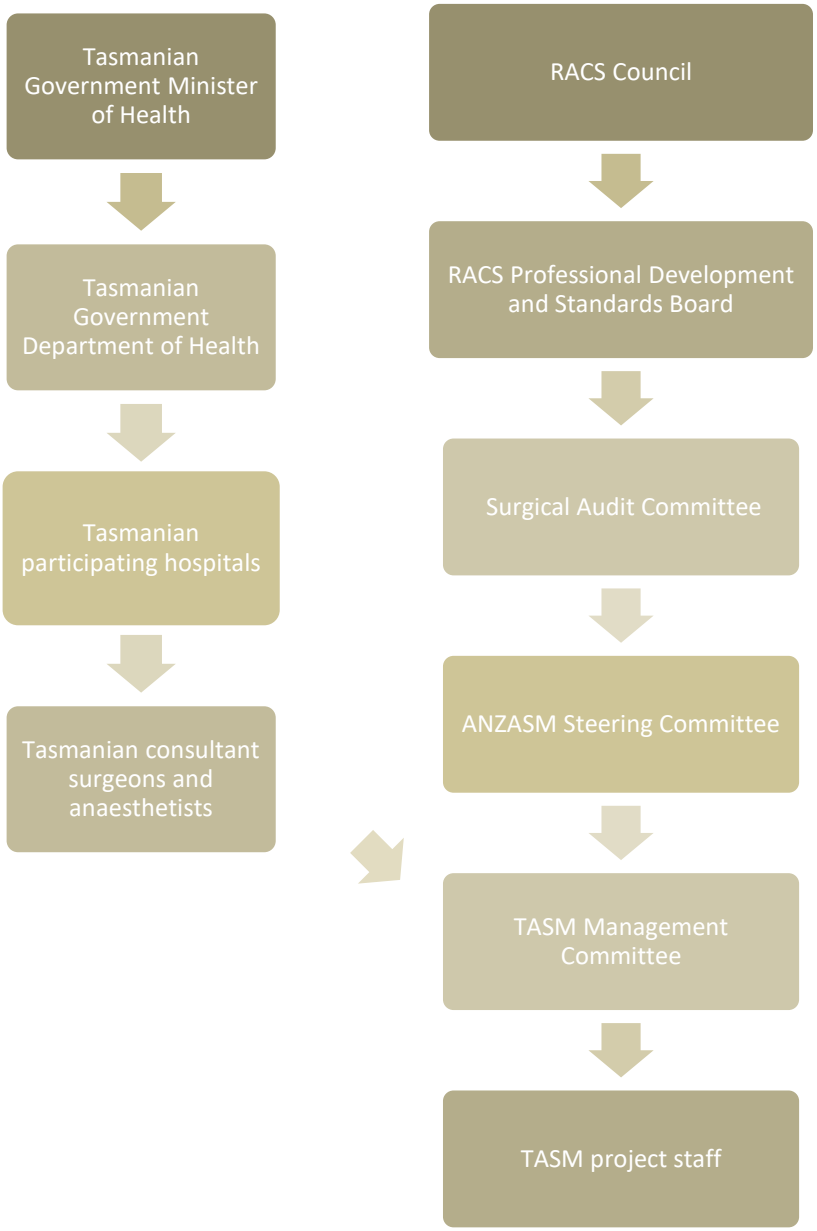
The ASM audits all deaths that occur in a hospital when:

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 fulfil 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.

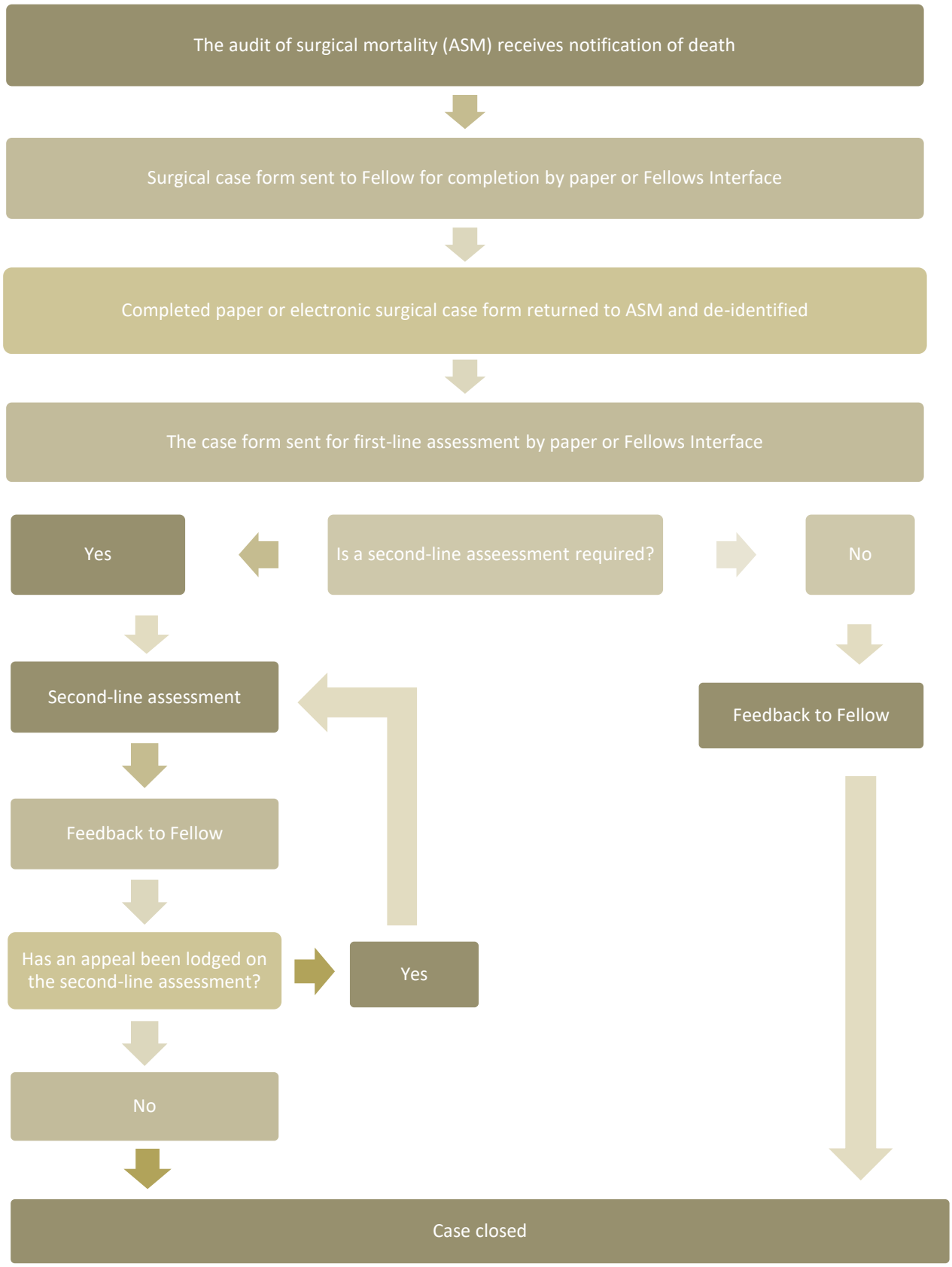
Clinical details pertaining to the management of each case are recorded on a standard, structured SCF completed by the consultant or treating surgeon associated with the case. The completed SCF is submitted to the audit office, and the information is de-identified and sent for FLA by a surgeon from a 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 2017), TASM received 2,012 notifications of deaths that were associated with surgical care (see Table 1).

Table 1: Audit numbers over sequential audit periods (n=2,012)

Case status	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Total Audit period
Closed	1,048 (79.6 %)	121 (89.6%)	118 (84.9%)	132 (90.4%)	141 (86.5%)	94 (83.2%)	1,654 (82.2%)
Non-participant	8 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	8 (0.4%)
Terminal care	141 (10.7%)	14 (10.4%)	21 (15.1%)	14 (9.6%)	22 (13.5%)	19 (16.8%)	231 (11.5%)
Lost to follow-up	119 (9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	119 (5.9%)
Pending cases* (SCF / FLA / SLA)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
All cases	**1,316 (100%)**	**135 (100%)**	**139 (100%)**	**146 (100%)**	**163 (100%)**	**113 (100%)**	**2,012 (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, Vascular Surgery and Cardiothoracic Surgery.
- Clinical information and completed assessment reviews were available for 82.2% (1,654/2,012) of the reported cases. The outcomes from the peer review process are restricted to these deaths and are the focus of this report.
- 11.5% (231/2,012) of cases were recorded as admissions for terminal care and were therefore excluded from the review process.
- 5.9% (119/2,012) 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 % (8/2,012) 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 0.6% in the 2004-2012 period to 0% in 2014-2017. Participation in the TASM is a mandatory component of attaining RACS Continuing Professional Development (CPD) approval.
- There were 94 deaths in the 2016-2017 audit period that had completed the full audit process by the census date.

2.2 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.

2.3 Hospital participation

Table 2: Hospital participation in the audit

Hospital participation	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
Public	4 (100%)	4 (100%)	4 (100%)	4 (100%)	4 (100%)	4 (100%)
Private	9 (100%)	9 (100%)	9 (100%)	9 (100%)	9 (100%)	9 (100%)
Total	**13 (100%)**	**13 (100%)**	**13 (100%)**	**13 (100%)**	**13 (100%)**	**13 (100%)**

Comments:

- All Tasmanian public and private hospitals providing relevant surgical services are participating in the audit and providing notifications of death. High compliance was noted since 2012.

2.4 Participation by Fellows

Participation is a mandatory component of attaining CPD approval. This requirement for participation commenced in January 2010. The RACS CPD program currently conducts an annual verification process of surgeons for their claimed CPD activities.

In August 2012 the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Board approved formal collaboration with the ANZASM (see Table 3). 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 3: Surgeon agreement to participate

Fellow participation	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
RACS	93 (100%)	93 (100%)	93 (100%)	96 (100%)	137 (100%)	**148 (100%)**
RANZCOG	44 (100%)	44 (100%)	44 (100%)	44 (100%)	44 (100%)	**43 (100%)**
Total	**137 (100%)**	**137 (100%)**	**137 (100%)**	**140 (100%)**	**181 (100%)**	**191 (100%)**

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

Comments:

- In 2016-2017, 100% of the 103 eligible Tasmanian RACS Fellows are currently participating in the audit. The other 45 RACS Fellows are made up of locums and interstate assessors.
- Currently, 100% (43/43) 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% (191/191) of enrolled RANZCOG and RACS Fellows submit data online via the Fellows Interface.

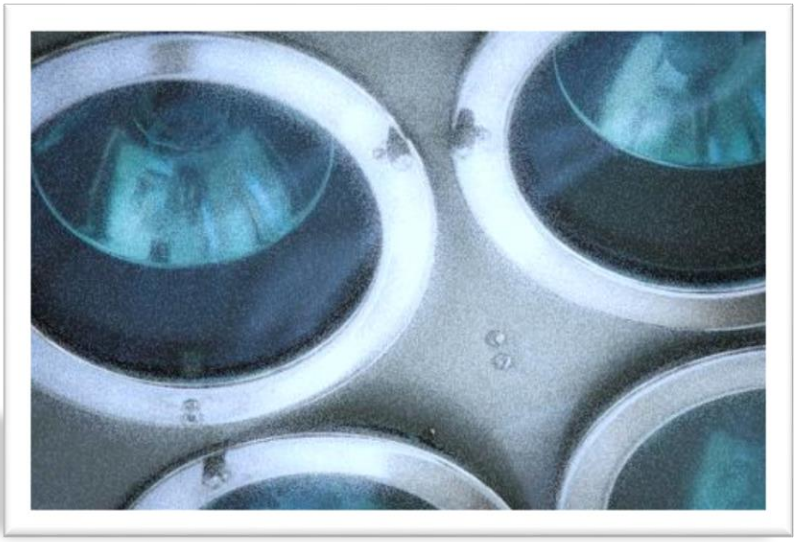
Table 4: Compliance by surgical specialty in 2016-2017 audit period

Specialty	Compliant
Cardiothoracic Surgery	100.%
General Surgery	100%
Gynaecology Surgery	100%
Neurosurgery	100%
Orthopaedic Surgery	100%
Other *	100%
Otolaryngology Head and Neck Surgery	100%
Paediatric Surgery	100%
Plastic and Reconstructive Surgery	100%
Urology Surgery	100%
Vascular Surgery	100%

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

Comments:

- In 2017 there was 100% (191/191) participation across all specialties in Tasmania (data not shown).
- The TASM began producing hospital clinical governance reports in November 2014 and released the latest reports in March 2018. These reports contain de-identified and aggregated data, enabling benchmarking and monitoring of clinical management trends both within a specific hospital and compared with other participating peer-grouped hospitals. Peer-grouped hospitals can be located within the region or throughout Australia.



2.5 Demographics and characteristics of audited deaths

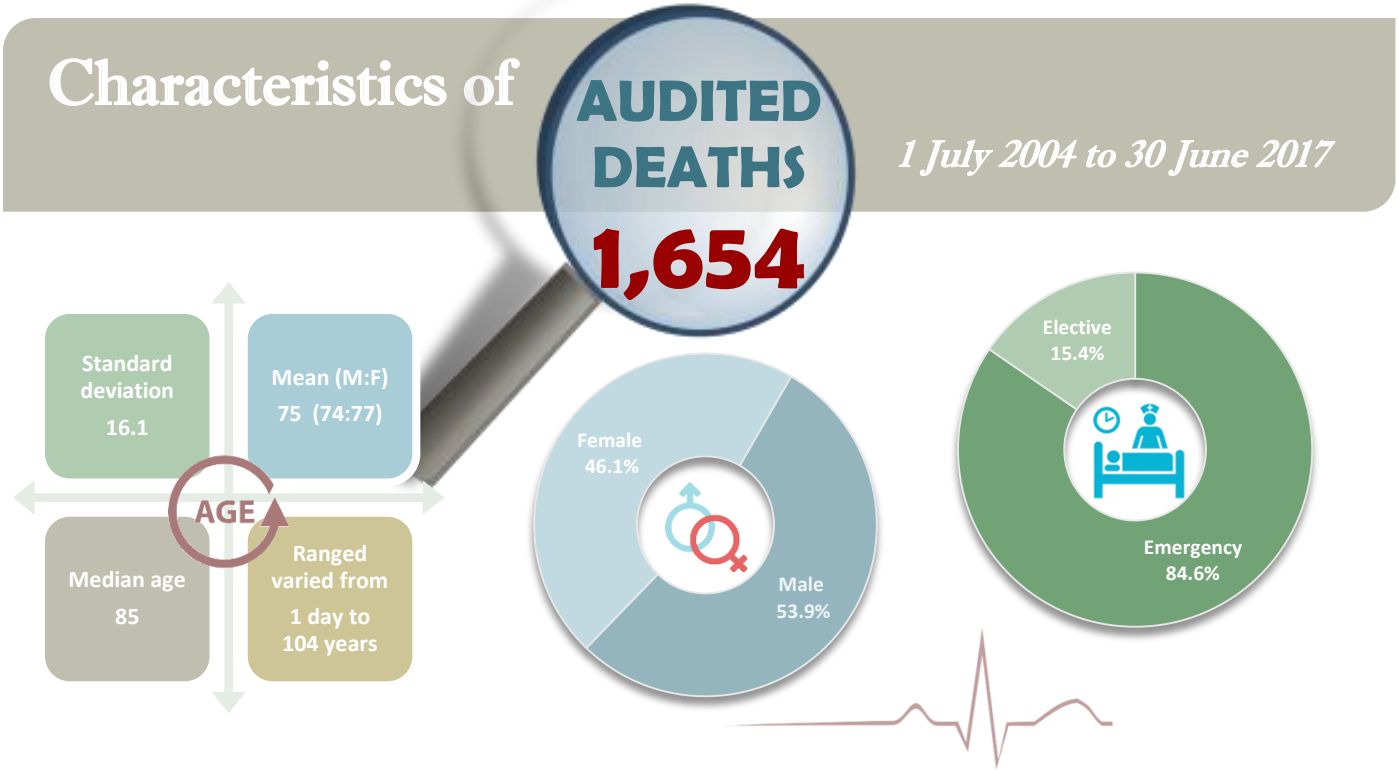
Demographics and characteristics of audited deaths are shown in Table 5 and Figure 3.

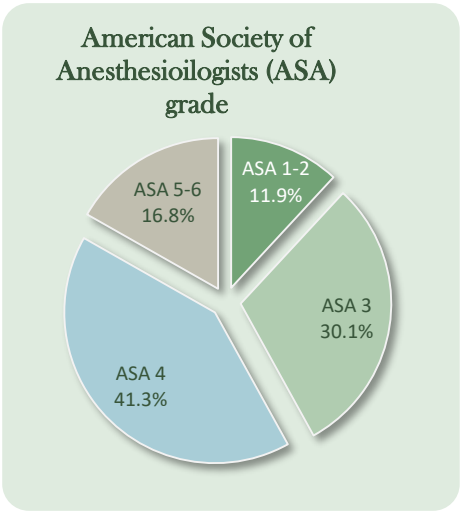
Table 5: Characteristics of audited deaths from 1 July 2004 to 30 June 2017 (1,654 patients)

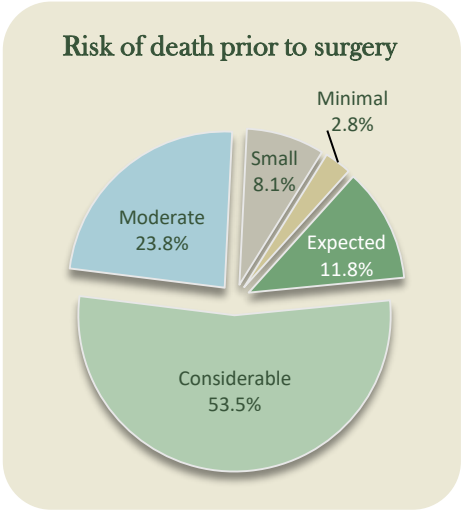
Number of audited deaths			1,654
Age	Mean (Male: Female)	Years:	75 (74:77)
	Median		85
	Standard deviation		16.1
		Range:	1 day to 104 years
Gender		Male:	53.9%
		Female:	46.1%
Admission status		Emergency:	84.6%
		Elective:	15.4%
American Society of Anesthesiologists (ASA) grade		ASA 1-2:	11.9%
		ASA 3:	30.1%
		ASA 4:	41.3%
		ASA 5-6:	16.8%
Risk of death prior to surgery		Expected:	11.8%
		Considerable:	53.5%
		Moderate:	23.8%
		Small:	8.1%
		Minimal:	2.8%
Most common comorbid* factors		Cardiovascular:	22.5%
		Age:	22.3%
		Respiratory:	14.4%
		Other†:	9.0%
		Renal:	8.2%
		Neurological/psychiatric:	7.7%
		Advanced malignancy:	5.1%
		Diabetes:	5.2%
		Obesity:	3.2%
		Hepatic:	2.4%
Most common surgical diagnoses		Fracture of neck of femur:	23.4%
		Other intestinal obstruction:	20.0%
		Intracranial haemorrhage:	16.6%
		Carcinoma:	13.6%
		Aortic aneurysm:	7.7%
		Septicaemia:	5.2%
Operative procedures performed		≥3:	8.0%
		2:	16.8%
		1:	74.4%
		0:	0.9%

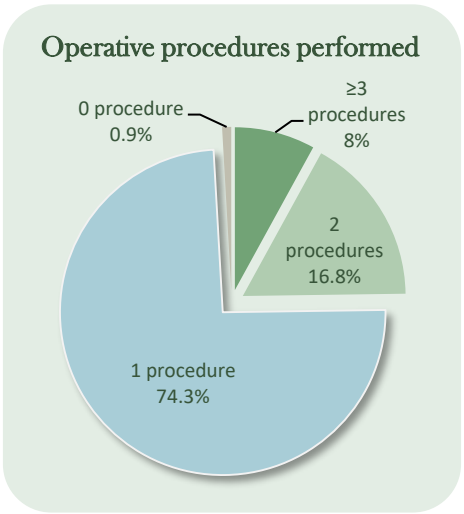
*Comorbidities describe coexisting medical conditions or disease processes that are additional to the primary diagnosis.
†Includes dementia, alcohol abuse, substance abuse, anaemia, anorexia, anticoagulation, ascites, pneumonia, nutritional deficiency, bowel obstruction, frailty, immunocompromised, osteoarthritis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

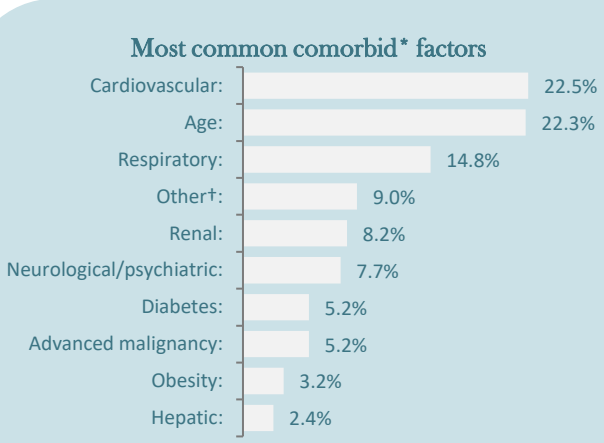
Figure 3: Characteristics of audited deaths from 1 July 2004 to 30 June 2017 (n=1,654)

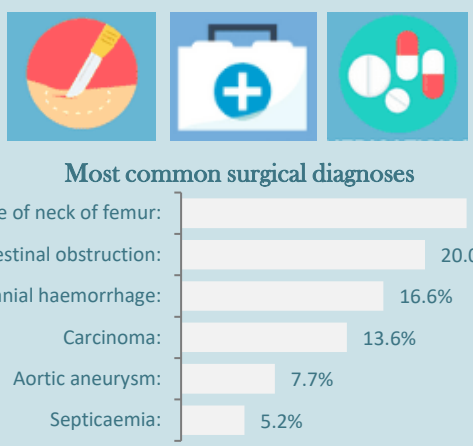










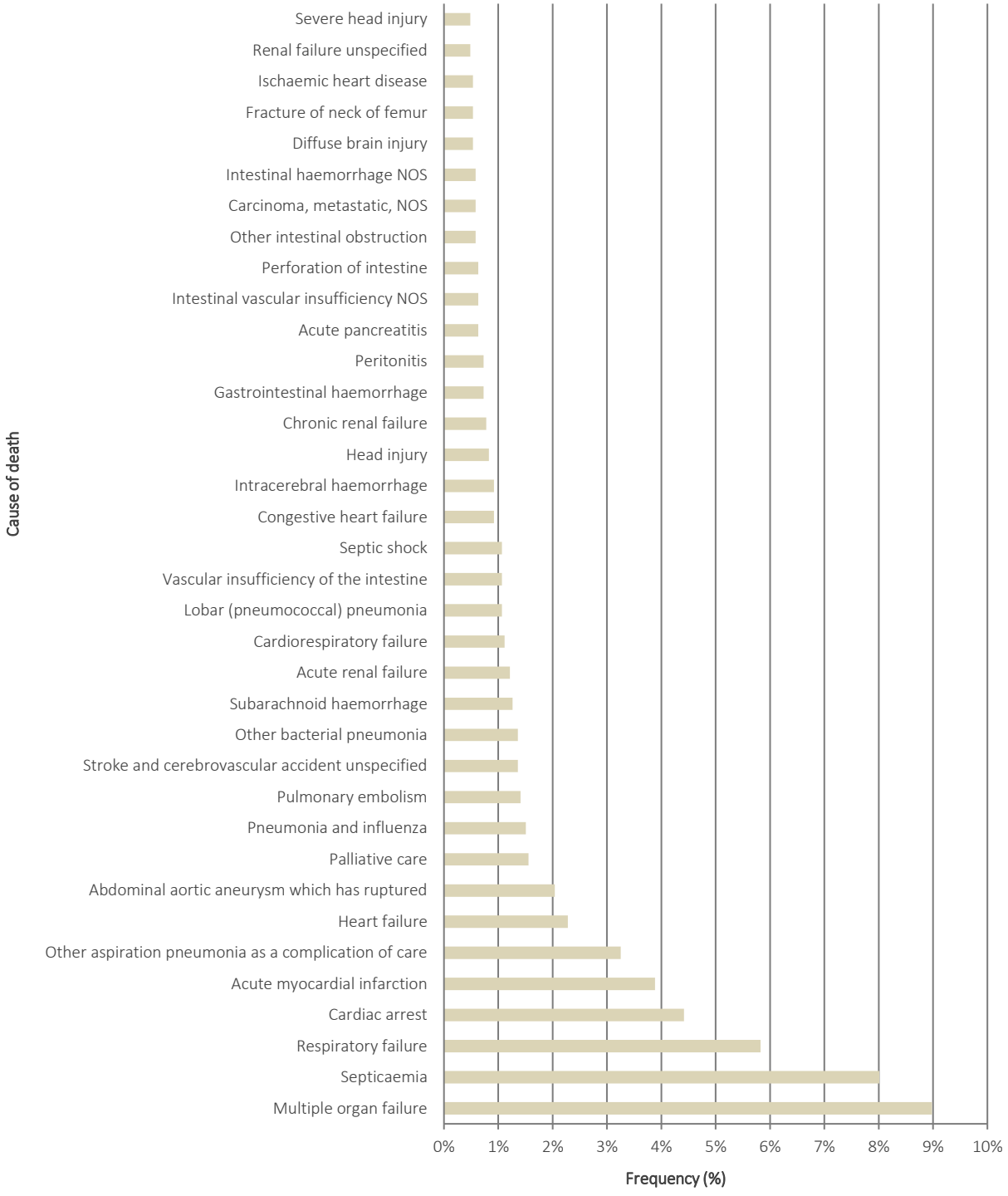


*Comorbidities describe coexisting medical conditions or disease processes that are additional to the primary diagnosis.
†Includes dementia, alcohol abuse, substance abuse, anaemia, anorexia, anticoagulation, ascites, pneumonia, nutritional deficiency, bowel obstruction, frailty, immunocompromised, osteoarthritis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

2.6 Establishing the cause of death

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

Figure 4: Frequency of reported causes of death (n= 2,060 conditions which were the causes of death reported for 1,654 patients)



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

NOS: Not otherwise specified

Comments:

- Across 1,654 patients there were 2,060 conditions that were perceived to be responsible for death.
- The most frequently cited causes of death included multiple organ failure 9.0% (185/2,060), septicaemia 8.0% (165/2,060), respiratory failure 5.8% (120/2,060), cardiac arrest 4.4% (91/2,060) and acute myocardial infarction 3.9% (80/2,060). Death was attributed to these conditions in 31.1% of causes of death reported (641/2,060). A recent Australian study found that "potentially modifiable comorbidities are associated with poorer postoperative outcomes".[6]

2.7 Postmortem

The cause of death recorded by the treating surgeon is based on the clinical course of the patient and any relevant supporting evidence from investigations. Where doubt exists around the circumstances leading to death, the case will be referred to the coroner. In other instances, where the cause of death is not clear, a postmortem examination may be requested. This latter method of confirming cause of death is requested with decreasing frequency.

Figure 5: Postmortem performed (n=207 postmortems in 1,654 patients)

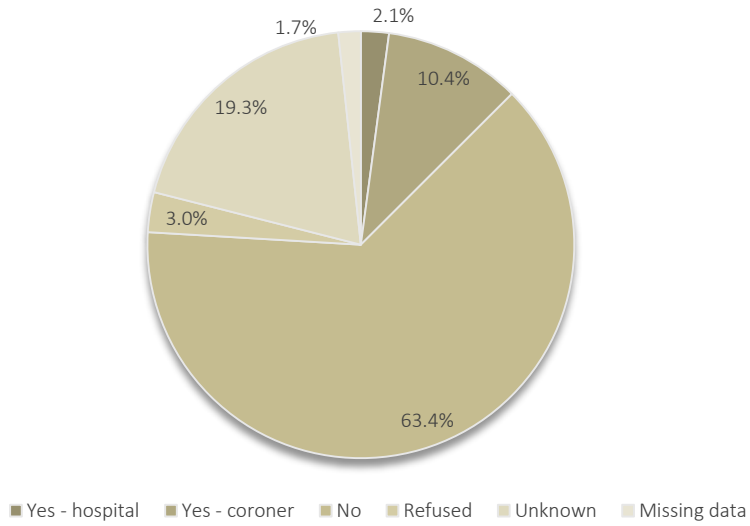


Table 6: Postmortem performed

Postmortem performed	Number	Per cent (%)
Yes - hospital	35	2.1
Yes - coroner	172	10.4
No	1,049	63.4
Refused	50	3.0
Unknown	320	19.3
Missing data	28	1.7

Comments:

- Postmortems, including coronial requested postmortems, were conducted in 12.5% (207/1,654) of cases. This rate remained constant since audit inception, 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.[7-10] This may be of concern to some as postmortems are deemed to provide educational information and valuable insights.

- The majority of postmortems were coronial and occurred in deaths associated with emergency admissions.

Table 7: Elective and emergency admissions

	Elective	Emergency
Yes - hospital	9	26
Yes - coroner	42	130

2.8 Peer review process

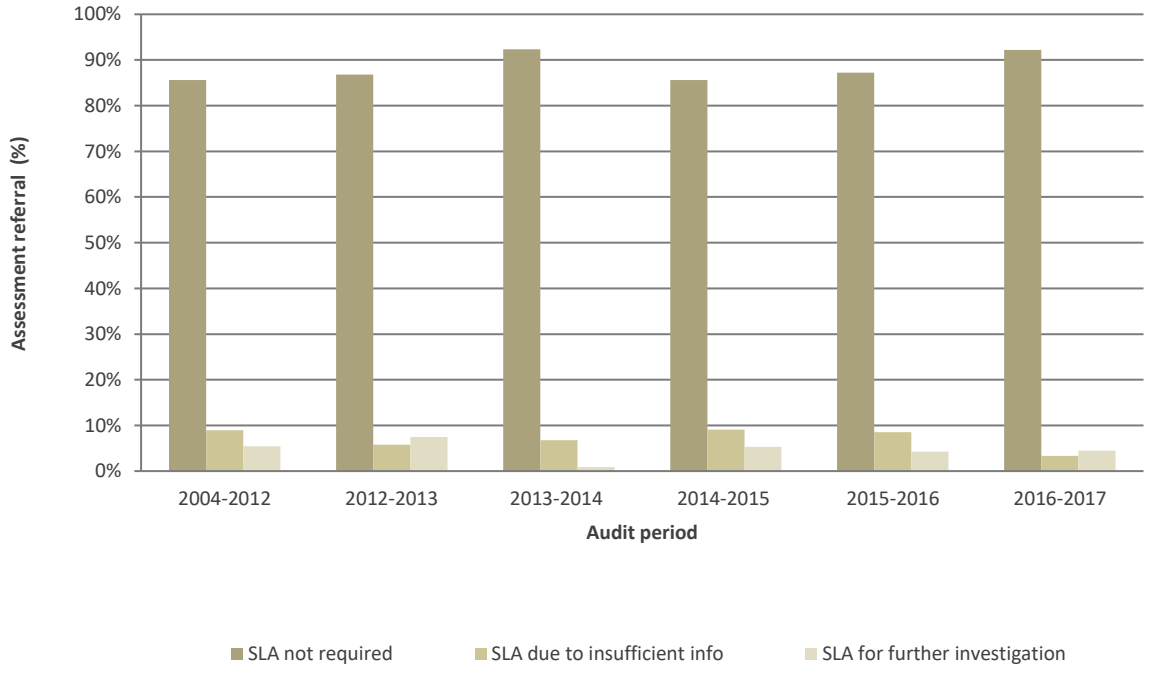
The TASM peer review process is a retrospective examination of the clinical management of patients who died while under the care of a surgeon. All assessors (first- and second-line) must decide whether the death was a direct result of the disease process alone, or if aspects of the management of the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

FLAs were completed for 1,654 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 number of SLAs required due to a lack of information in the SCF is an indirect measure of surgeon compliance in the audit process. SLAs required for the other triggers are more likely to represent suspected issues of clinical management. This has decreased since the beginning of the audit but could still improve. The reasons given for referral for SLA are provided in Figure 6.

Figure 6: Reason for referral for second-line assessment (SLA) (n=1,654)



Comments:

- Across the entire audit period 86.7% (1,434/1,654) of cases were closed following FLA.
- The need for SLA has slightly decreased over time, from 5.4% (2004-2012) to 4.4% (2016-2017) 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 61.8% (136/220) of referrals. The remaining 38.2% (84/220) 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.
- 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.

Table 8 shows the referral for SLA by surgical specialty.

All cases require FLA and only cases requested by the FLA undergo this process. SLA is outlined in Section 1.3.

Table 8: Referral for second-line assessment by surgical specialty (n=1,654)

Specialty	FLA	SLA	Total Case
Vascular Surgery	124 (86.7%)	19 (13.3%)	143 (100%)
Urology	73 (84.9%)	13 (15.1%)	86 (100%)
Plastic and Reconstructive Surgery	14 (66.7%)	7 (33.3%)	21 (100%)
Paediatric Surgery	10 (100%)	0 (0%)	10 (100%)
Otolaryngology Head and Neck	18 (90%)	2 (10%)	20 (100%)
Other *	31 (91.2%)	3 (8.9%)	34 (100%)
Orthopaedic Surgery	257 (90.5%)	27 (9.5%)	284 (100%)
Neurosurgery	214 (93.9%)	14 (6.1%)	228 (100%)
General Surgery	658 (83.8%)	127 (16.2%)	785 (100%)
Cardiothoracic Surgery	35 (81.4%)	8 (18.6%)	43 (100%)
Total	1,434 (86.7%)	220 (13.3%)	1,654 (100%)

*Includes Gynaecology, Oral and Maxillofacial Surgery and Ophthalmology.

Comments:

- The need for SLA referral varied between specialties, ranging from 0% to 33.3%.
- The need for SLA referral was similar in metropolitan and rural regions (data now shown).
- High referral for an in-depth second line inquest for plastic surgery is based on a 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. They need to ensure that the operation proceeds smoothly and with the lowest possible risk of complications or an unplanned return to theatre. A patient can undergo multiple procedures during the same admission and operative session.

Table 9: Frequency of the top surgical procedures (n=1,788 in 1,654 patients)

Surgical procedure	Number	Per cent
Exploratory laparotomy	263	17.3%
Burrhole(s) for ventricular external drainage	42	6.8%
Other prosthetic hemiarthroplasty of hip	33	5.3%
Laparotomy approach	33	5.3%
Right hemicolectomy and anastomosis	28	4.5%
Exploratory open craniotomy	23	3.7%
Debridement of skin	21	3.4%
End colostomy	19	3.1%
Extended right hemicolectomy and end to end anastomosis	17	2.8%
Amputation below knee	17	2.8%
Reopening of laparotomy site	17	2.8%
Prosthetic cemented hemiarthroplasty of hip	17	2.8%
Creation of ileostomy	17	2.8%
Diagnostic cystoscopy	16	2.6%
Fracture of neck of femur	16	2.6%
Diagnostic gastroscopy	13	2.1%
Jejunostomy	13	2.1%
Loop colostomy	13	2.1%
Intestinal adhesions with obstruction	13	2.1%
Total cholecystectomy	12	1.9%
Abdominal aortic aneurysm which has ruptured	12	1.9%
Endoscopic insertion of ureteric stent	12	1.9%
Anterior resection of rectum and anastomosis	11	1.8%
Change of dressing	11	1.8%
Craniotomy for clipping of aneurysm	11	1.8%
Craniotomy for evacuation of non-traumatic haematoma	11	1.8%
Extended right hemicolectomy and ileostomy HFQ	11	1.8%
Other bypass of coronary artery	11	1.8%
Operation on aneurysm of aorta NEC	11	1.8%
Evacuation of subdural haematoma	11	1.8%
Lavage of peritoneum	11	1.8%
Primary closed reduction #+internal fixation with screw(s)	10	1.6%
Primary open reduction of #+internal fixation with screw(s)	10	1.6%
Replacement of aortic valve NEC	10	1.6%
Other operations on bowel	10	1.6%

Note: Frequency shown if count greater than 10.

Missing data: n=2 (<1%).

Comments:

- 91.8% (1,518/1,654) of audit patients underwent operative treatment. There were 1,788 separate procedures performed, with some patients undergoing multiple procedures during their admission or during the same surgical session.

Table 10 shows the frequency of operative mortality by specialty

Table 10: Frequency of operative mortality by specialty (n=1,518 patients who underwent 1,788 separate surgical procedures)

Specialty	Frequency	Per cent
Cardiothoracic Surgery	77	5.1%
General Surgery	670	44.1%
Neurosurgery	217	14.3%
Gynaecology	8	0.5%
Ophthalmology	3	0.2%
Oral/Maxillofacial	3	0.2%
Orthopaedic Surgery	234	15.4%
Other*	23	1.5%
Otolaryngology Head and Neck	16	1.1%
Paediatric Surgery	13	0.9%
Plastic and Reconstructive Surgery	26	1.7%
Urology	80	5.3%
Vascular Surgery	148	9.7%
Total	**1,518**	**100%**

Note: n=1,518 patient had an operative procedure.

Missing data n=112

*Includes Colorectal Surgery.

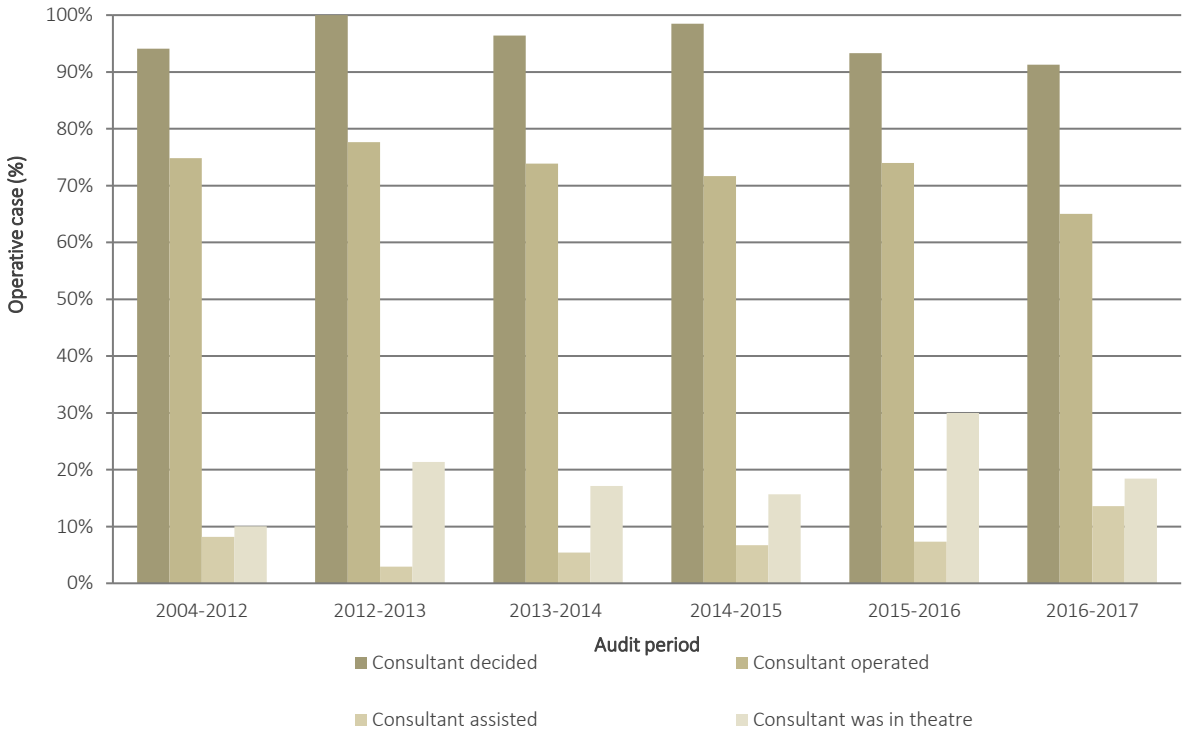
Comments:

- The most frequently reported procedures were most commonly associated with General Surgery and Orthopaedic Surgery pathologies, these cases are high risk of a complex case mix of patients.

  There is great variation by specialty in the rate of operative intervention over the audit period. This variation is attributable to the casemix and high-risk patients in each specialty.

- The procedure was abandoned only in 5.5% (83/1,518) of operative procedures due to the extent of the disease process precluding even short-term survival.

Figure 7: Level of consultant involvement in deciding and performing surgery



Note: n=1,788 separate surgical procedures in 1,518 patients.

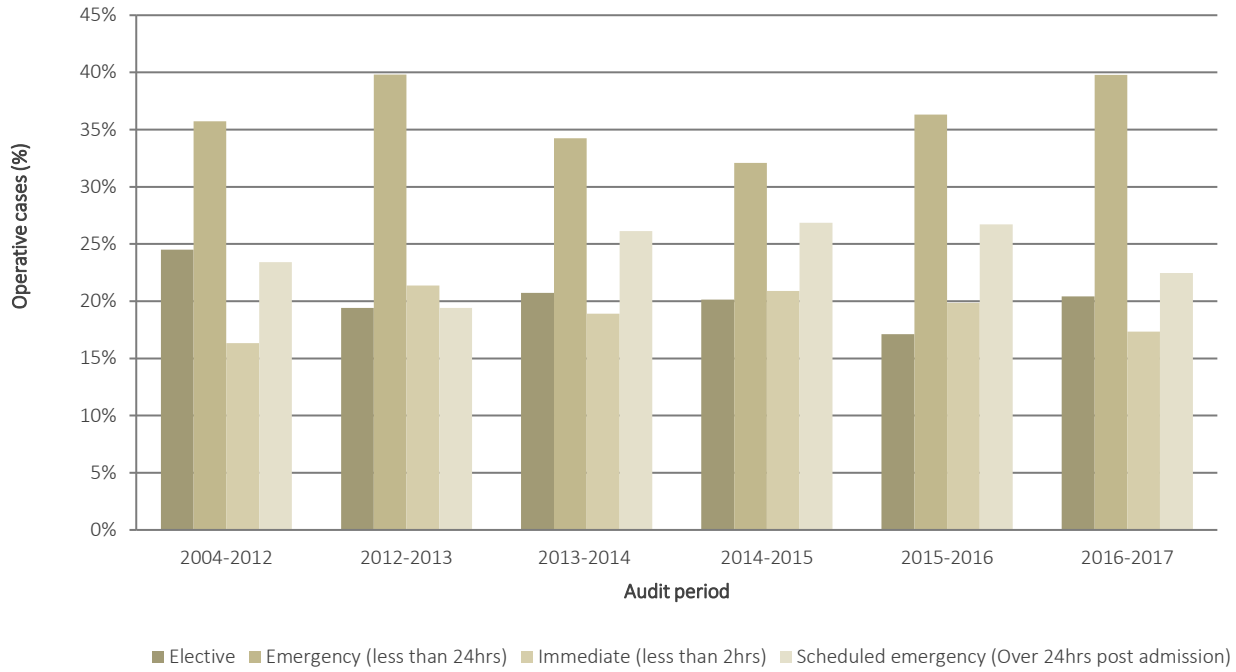
Note: Missing data: n=26 (1.7%).

Comments:

- During the audit period a consultant surgeon decided or performed the surgery in 94.9% (1,440/1,518) of surgical episodes. The role of the consultant is to take responsibility for the overall success of the operation, and their presence in theatre is crucial.

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=1,788 separate surgical procedures in 1,518 patients)



Note: Missing data: n=8 (<1%).

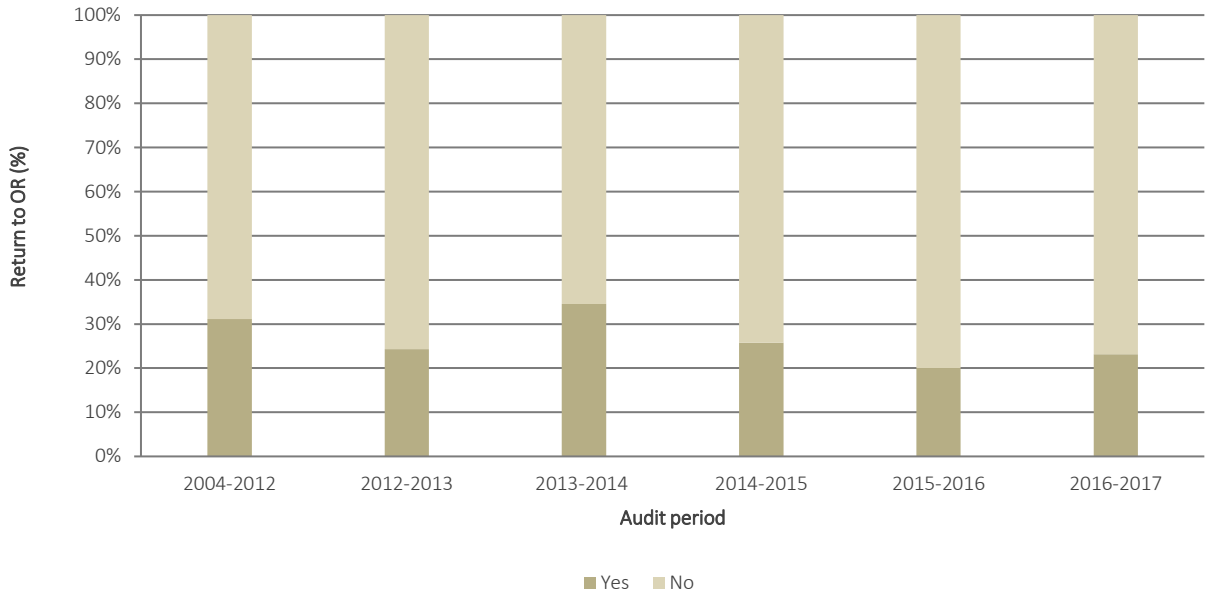
Comments:

- The time criticality of a patient's condition predicts the timing of emergency surgery. Of the emergency admissions that underwent surgery, 35.9% (542/1,510) had surgery within 2 hours of admission, 17.7% (267/1,510) had surgery within 24 hours, and 23.9% (361/1,510) had surgery after 24 hours.
- Overall, 69.1% (809/1,170) 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.[11-13]

3.2 Unplanned return to the Operating Room (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, any returns to the OR can indicate that improvements in patient care should be considered. TASM would like to see a continuing decrease in unplanned returns to the OR. Figure 9 outlines unplanned return to theatre over the audit period.

Figure 9: Unplanned return to the operating room



Note: 1,518 operative procedures with 451 returns to theatre.

Note: Missing data: n=12(<1%).

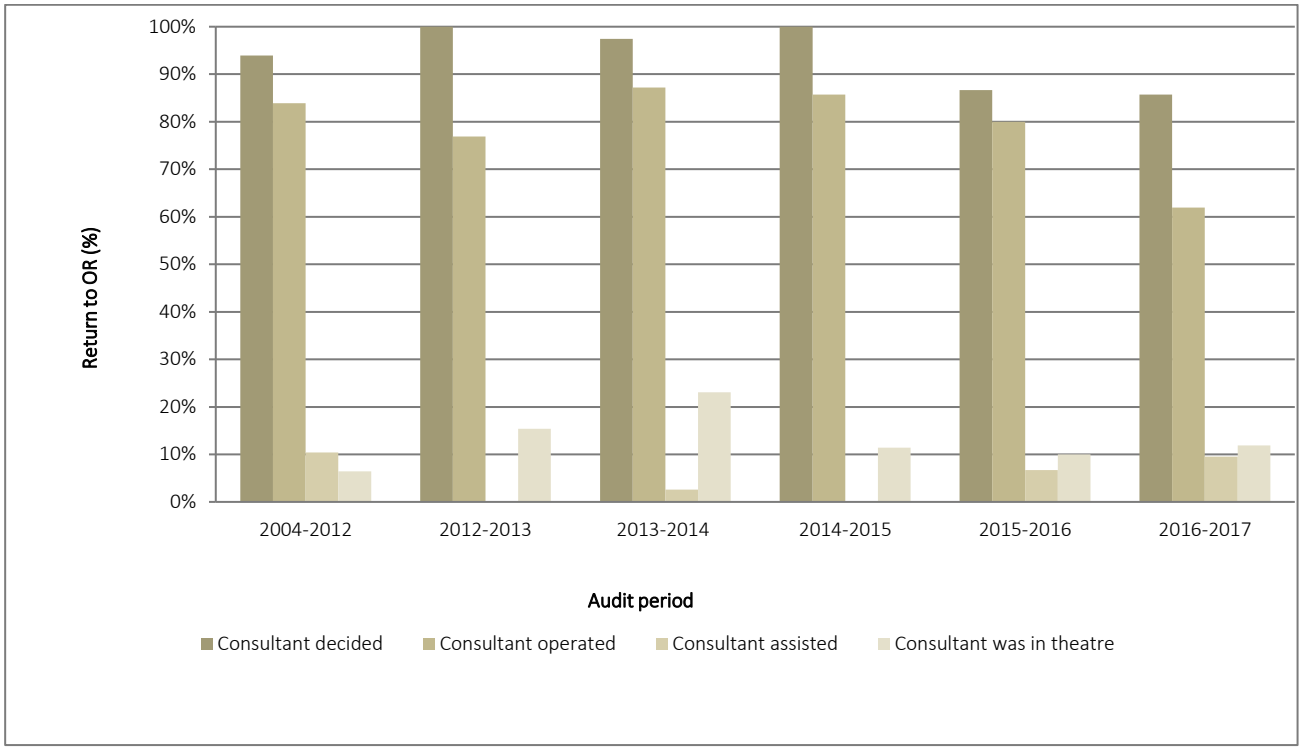
Table 11: Unplanned return to the operating room

Unplanned return to the operating room	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Audit period
Yes	279 (31.1%)	26 (24.3%)	39 (34.5%)	35 (25.7%)	30 (20.0%)	19 (23.2%)	**428 (28.8%)**
No	618 (68.9%)	81 (75.7%)	74 (65.5%)	101 (74.3%)	120 (80.0%)	63 (76.8%)	**1,057 (71.2%)**
All procedures	**897 (100%)**	**107 (100%)**	**113 (100%)**	**136 (100%)**	**150 (100%)**	**82 (100%)**	**1,485 (100%)**

Comments:

- In the 2016-2017 periods, unplanned return to the OR was reported in 23.2% (19/82) of cases where a surgical procedure was performed.
- There has been a slight variation in the trend for unplanned returns to the OR during the audit commenced in 2004.
- With the exception of 2015-16, cases where senior consultants assisting in surgery at unplanned returns to the OR have increased. This trend is deemed appropriate when patient surgical risk profiles and operative complications are considered (see Figure 10).

Figure 10: Seniority of surgeons performing surgery at unplanned returns to the operating room



Note: n=1,400 emergency admissions in 1,654 admissions

Note: 1,518 operative procedures with 451 returns to theatre.

Note: Missing data: n=12 (<1%).

Table 12: Consultant involvement

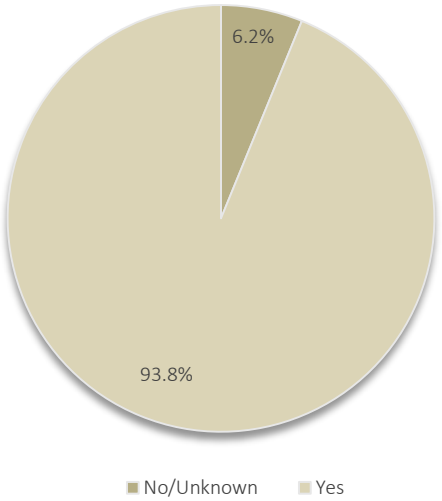
Consultant involvement	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Audit period
Consultant decided	864 (94.1%)	103 (100%)	107 (96.4%)	132 (98.5%)	140 (93.3%)	94 (91.3%)	**1,440 (94.8%)**
Consultant operated	687 (74.8%)	80 (77.7%)	82 (73.9%)	96 (71.6%)	111 (74.0%)	67 (65.0%)	**1,123 (73.9%)**
Consultant assisted	75 (8.2%)	3 (2.9%)	6 (5.4%)	9 (6.7%)	11 (7.3%)	14 (13.6%)	**118 (7.8%)**
Consultant was in theatre	92 (10.0%)	22 (21.4%)	19 (17.1%)	21 (15.7%)	45 (30.0%)	19 (18.4%)	**218 (14.4%)**

Comments:

- Active consultant operative participation was higher 81.6% (368/451) (data not shown) in procedures performed during an unplanned return to the OR compared with the primary operative group 74.0% (1,123/1,518). This result is appropriate as such cases are more challenging and the risks are greater.

3.3 Anaesthetic association

Figure 11: Anaesthetist present during surgery



Note Missing data n=38 (2.5%)

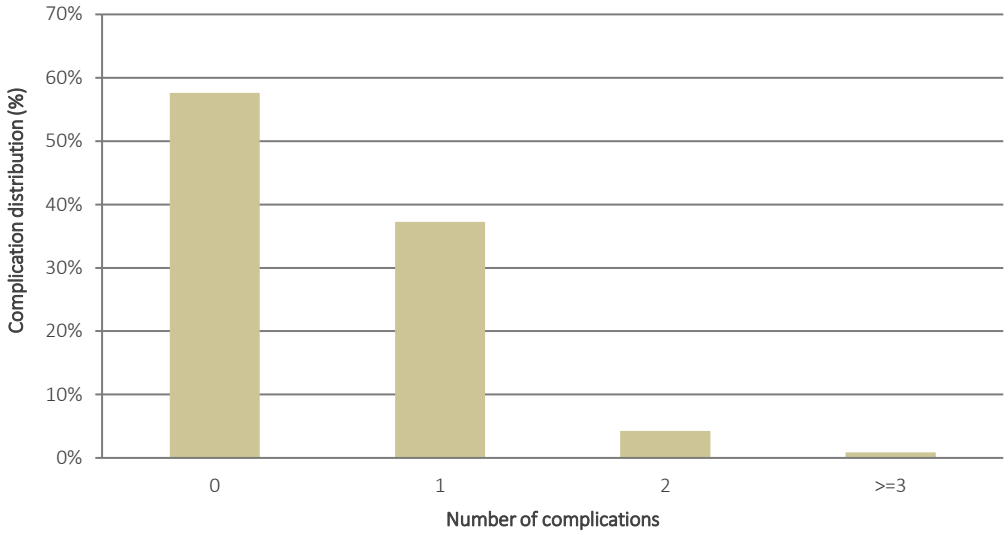
Comments:

- An anaesthetist was present in 93.8% of procedures (1,424/1,518). In 6.2% (94/1,518) instances the anaesthetist was not present or data not provided.
- The surgeon stated that 1.7% (24/1,424) of the deaths were related to the anaesthetic and that 5.8% (82/1,424) were possibly related to the anaesthetic (data not shown).

3.4 Postoperative complications

Figure 12 shows the postoperative complications recorded by the treating surgeon.

Figure 12: Postoperative complications recorded by the treating surgeon



Note: n=555 complications in 1,788 surgical procedures of 1,154 patients.

Note: Missing data n=66 (11.9%)

Comments:

- The low rate of postoperative complications reported by treating surgeons has remained constant throughout the audit period (data not shown). Of the 1,154 patients that had an operative procedure 57.6% (665) had no complications and only a single complication was recorded in 37.3% (430) of patients. The remaining 5.1% (59/1,154) of patients had two or more complications.

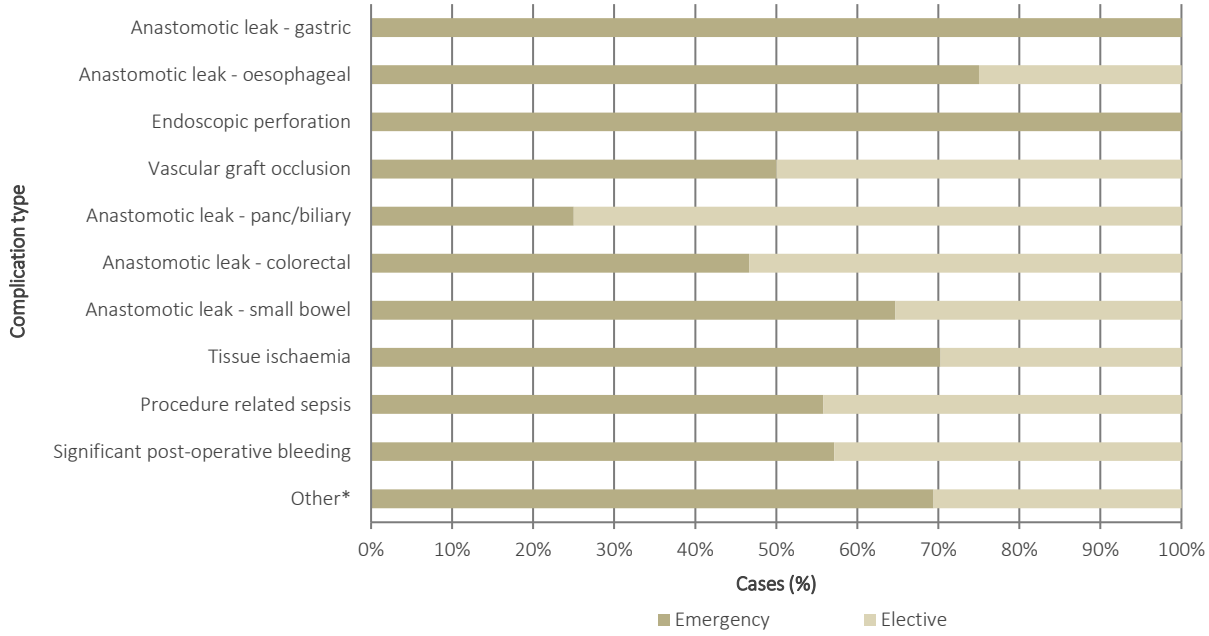
Table 13: Postoperative complications recorded by the treating surgeon

Number of complications	Frequency	Per cent
0	665	57.6%
1	430	37.3%
2	49	4.2%
>=3	10	0.9%

Note: n=555 complications in 1,788 surgical procedures of 1,154 patients.

Note: Missing data n=66 (11.9%)

Figure 13: Frequency of specific postoperative complications by urgency status



Note: n=555 complications in 1,788 surgical procedures of 1,154 patients.

Note: Missing data n=66 (11.9%)

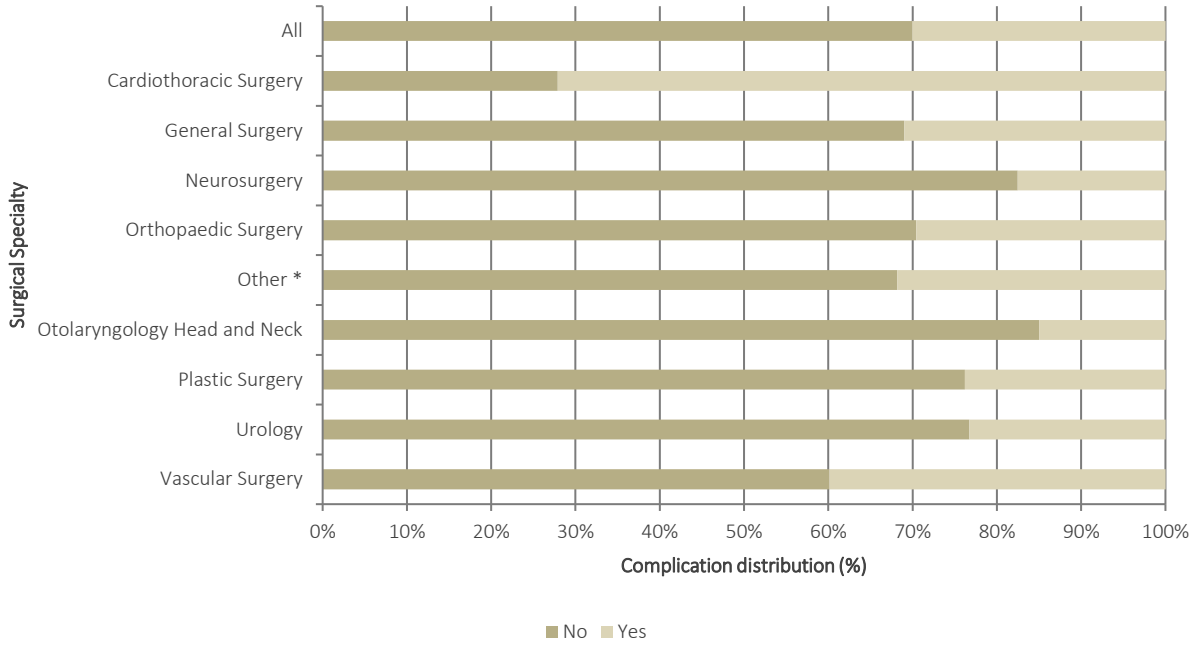
*Other complications include aspiration pneumonia, cardiac arrest, pulmonary embolus, myocardial infarction, pulmonary embolism, respiratory failure, liver failure, wound dehiscence and stroke.

Panc: pancreatic

Comments:

- Patients admitted as an emergency had a higher rate 66.1% (367/555) of reported complications versus elective patients 33.9% (188/555).

Figure 14: Postoperative complications by specialty



Note: n=489 complications in 1,154 operative cases.

*Other includes Oral and Maxillofacial Surgery, Colorectal Surgery Paediatric Ophthalmology and Gynaecology.

Table 14: Complication by specialty

Specialty	No	Yes	Total
Vascular Surgery	86 (60.1%)	57 (39.9%)	143 (100%)
Urology	66 (76.7%)	20 (23.3%)	86 (100%)
Plastic Surgery	16 (76.2%)	5 (23.8%)	21 (100%)
Otolaryngology Head and Neck	17 (85%)	3 (15%)	20 (100%)
Other *	30 (68.2%)	14 (31.8%)	44 (100%)
Orthopaedic Surgery	200 (70.4%)	84 (29.6%)	284 (100%)
Neurosurgery	188 (82.5%)	40 (17.5%)	228 (100%)
General Surgery	542 (69.0%)	243 (31.0%)	785 (100%)
Cardiothoracic Surgery	12 (27.9%)	31 (72.1%)	43 (100%)
All	**1,157 (70.0%)**	**497 (30.0%)**	**1,654 (100%)**

* Other includes Oral and Maxillofacial Surgery, Paediatric 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.

3.5 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. TASM has reported these trends to hospitals and It is envisaged that future trending will show a reduction of clinically significant infections in this group of high-risk patient's measures as management strategies are implemented and monitored by health institutions (see Table 15).

Table 15: Clinically significant infections by type

Type	Number	Per cent
Pneumonia	88	41.1%
Septicaemia	35	16.4%
Intra-abdominal sepsis	65	30.4%
Other* source	26	12.1%
All	**214**	**100%**

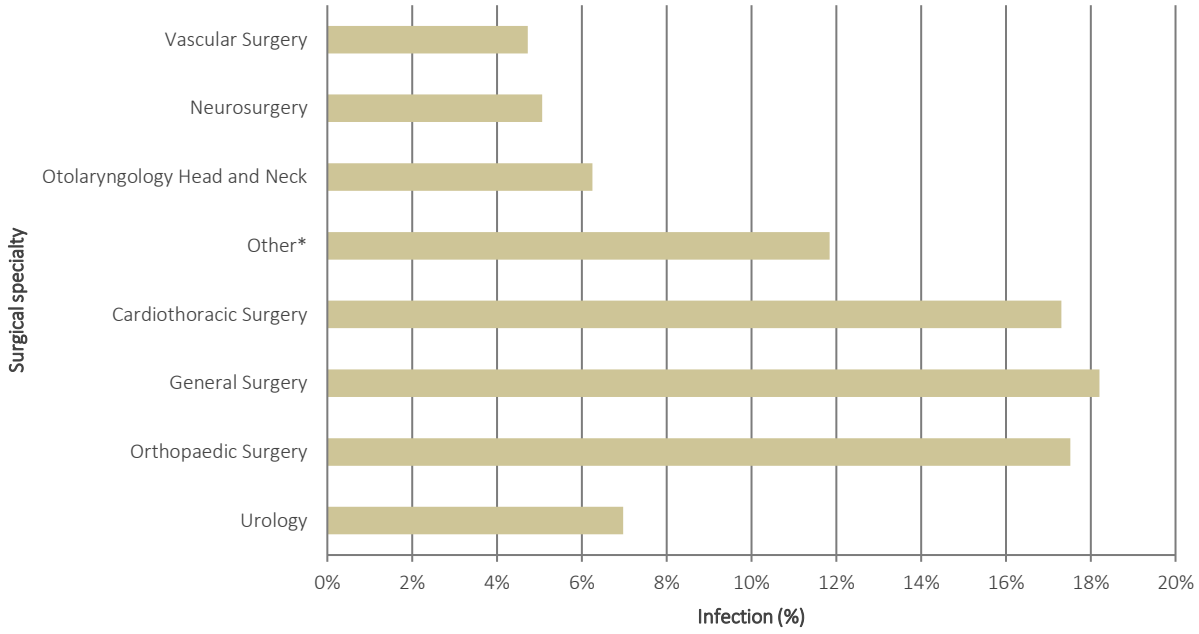
*Other includes Klebsiella, Clostridium difficile, Escherichia coli and methicillin-resistant Staphylococcus aureus.

Note: n= 214 infections in 606 patients.

Comments:

- An infection was reported in 35.3% (214/606) of cases audited in 2012-2017.
- Pneumonia and septicaemia were responsible for 57.5% (123/214) of the cases of infection.

Figure 15: Clinically significant infections by specialty



Note: n= 214 infections in 606 patients.

*Includes Gynaecology, Plastic and Reconstructive Surgery, Paediatric Surgery and Colorectal Surgery.

Table 16 shows the time frame when the clinically significant infection was acquired.

Table 16: Time frame when the clinically significant infection was acquired

Infection	Frequency	Per cent
Acquired postoperatively	87	74.4%
Acquired preoperatively	19	16.2%
Surgical site infection	8	6.8%
Other invasive-site infection	3	2.6%
Total	**117**	**100%**

Comments:

- Of the cases of infection acquired during admission, 74.4% (87/117) were acquired postoperatively, 16.2% (19/117) were acquired preoperatively, 6.8% (8/117) were surgical site infections and 2.6% (3/117) were attributed to other infections. These figures will be monitored for trends in years to come.

3.6 Delay in diagnosis

Treating surgeons were asked to record any perceived delays in establishing a diagnosis and proceeding to definitive treatment (see Tables 17 and 18).

Table 17: Delays associated with establishing a diagnosis

Delay	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Audit period
GP associated	7 (11.5%)	0 (0.0%)	0 (0.0%)	1 (12.5%)	5 (29.4%)	1 (20.0%)	14 (12.6%)
Medical unit	11 (18.0%)	4 (36.4%)	2 (22.2%)	1 (12.5%)	5 (29.4%)	2 (40.0%)	25 (22.5%)
Surgical unit	17 (27.9%)	1 (9.1%)	2 (22.2%)	3 (37.5%)	2 (11.8%)	1 (20.0%)	26 (23.4%)
Other*	26 (42.6%)	6 (54.5%)	5 (55.6%)	3 (37.5%)	5 (29.4%)	1 (20.0%)	46 (41.4%)
Total delays	61 (100%)	11 (100%)	9 (100%)	8 (100%)	17 (100%)	5 (100%)	111 (100%)
Closed	1,316	135	139	146	141	94	**2,012**

Note: n=111 issues from 1,654 cases. Once case can have multiple delay associations.

GP: general practitioner.

*Other includes delay from hospital in the home, nursing home and emergency department.

Table 18: Perceived delays in proceeding to definitive treatment (n=123 issues identified in 1,560 cases)

Reason for delay	Number	Per cent (%)
Other*	37	30.1
Unavoidable factors	27	22
Inexperienced staff	23	18.7
Misinterpretation of results	19	15.4
Incorrect test	16	13.0
Results not seen	1	0.8
Total	**123**	**100**

Note: n=123 issues from 1,654 cases. One case can have multiple delay associations.

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

Comments:

- Treating surgeons identified delays in establishing the diagnosis in 7.3% (120/1,654) of the audited cases (data not shown). This rate has remained relatively constant over time.

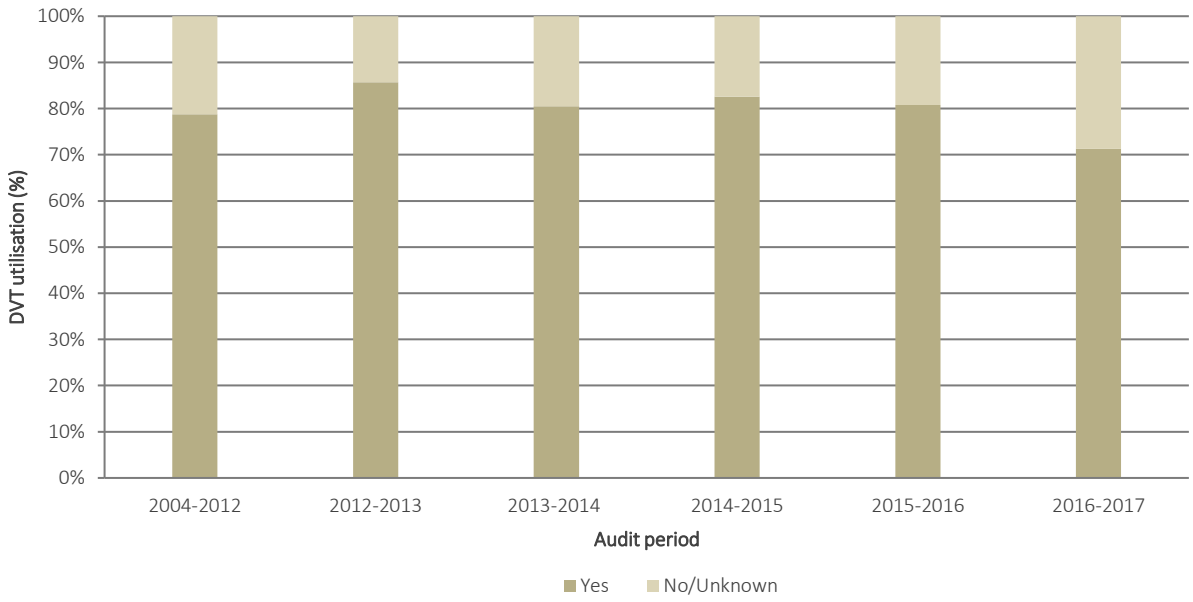
3.7 DVT prophylaxis

The overall aim is to identify whether appropriate strategies are being used to prevent 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[14] are reviewed and updated periodically to facilitate the best care available to patients.

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 16 and 17), and if it was, the type of prophylaxis that was used (see Figure 18). The reasons given by surgeons for not providing DVT prophylaxis are also discussed in this section (see Tables 20 and 21). DVT usage by specialty in shown in Figure 19.

Figure 16: DVT prophylaxis use during the audit period



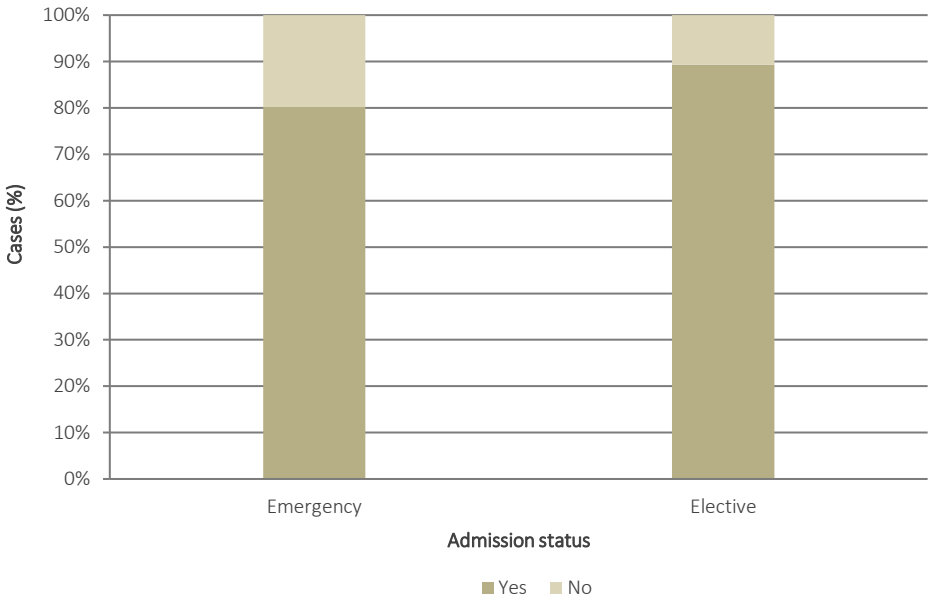
Note: n=1,788 surgical procedures of 1,154 patients.

DVT: deep vein thrombosis.

Comments:

- 972 patients received DVT agents. The use of DVT prophylaxis has reduced slightly, from 78.7% (574/729) in 2004-2012 to 80.6% (122/151) in 2015-2016 and 71.3% (67/94) in 2016-2017.

Figure 17: DVT prophylaxis use by admission type



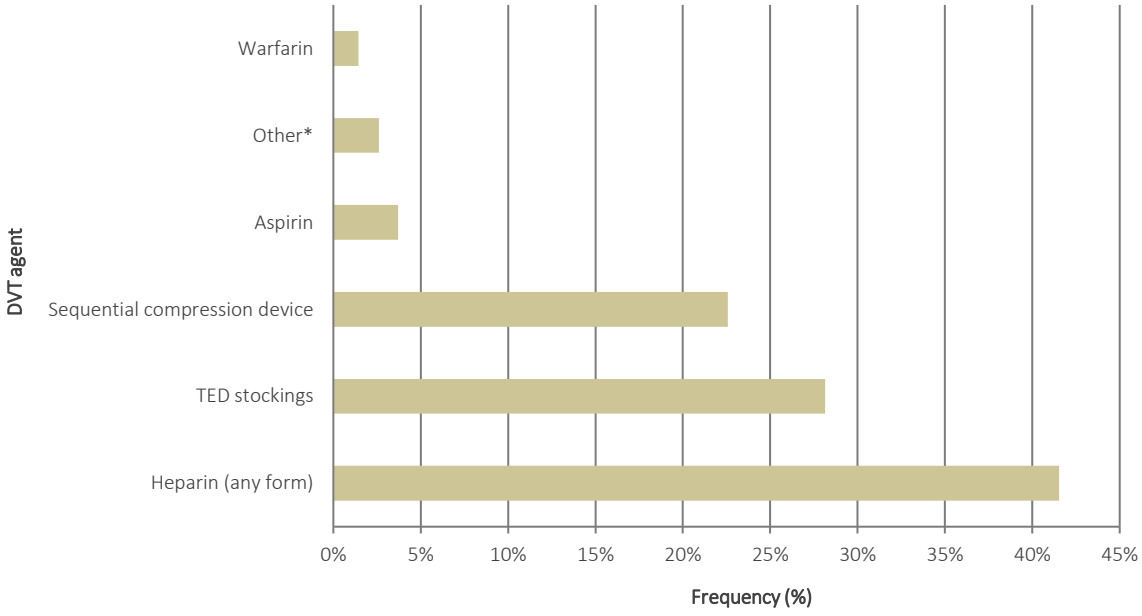
Note: n=1,788 surgical procedures of 1,154 patients.

DVT: deep vein thrombosis.

Comments:

- The use of DVT prophylaxis was higher in elective admissions 87.8% (209/238) compared with emergency admissions 78.4% (718/916).

Figure 18: Type of DVT prophylaxis used



DVT: deep vein thrombosis; TED: thromboembolic deterrent stockings.

Note: n=972 patients received DVT agents.

*Includes calf stimulators, clopidogrel, epidural, full anticoagulation for non-ST segment elevation myocardial infarction, and inferior vena cava filter and infusion.

Comments:

- The spectrum of DVT prophylaxis used has been consistent since 2004.
- The type of prophylaxis used is subject to the judgement of clinicians caring for individual patients.

Table 19: Reasons given by treating surgeon for non-provision of DVT prophylaxis

Reason for no use	Frequency	Per cent (%)
Active decision to withhold	58	31.4
Not appropriate	124	67.0
Not considered	3	1.6
Total	**185**	**100**

Note: n=972 patients received DVT agents.

Note: Missing data n=69 (2.7%)

DVT: deep vein thrombosis.

Comments:

- Overall, 22.0% (254/1,154) 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 71.7% (182/254).

Table 20: Assessor perception of the appropriateness of the decision to withhold DVT prophylaxis

Reason for no use	First-line assessor	Second-line assessor
Appropriate	154 (76.2%)	15 (55.6%)
Not appropriate/Unknown	48 (23.8%)	12 (44.4%
Total assessments with no use of DVT	**202 (100%)**	**27 (100%)**

Note: n=254 patients did not receive DVT agents.

Missing data: n=52 (2.1%)

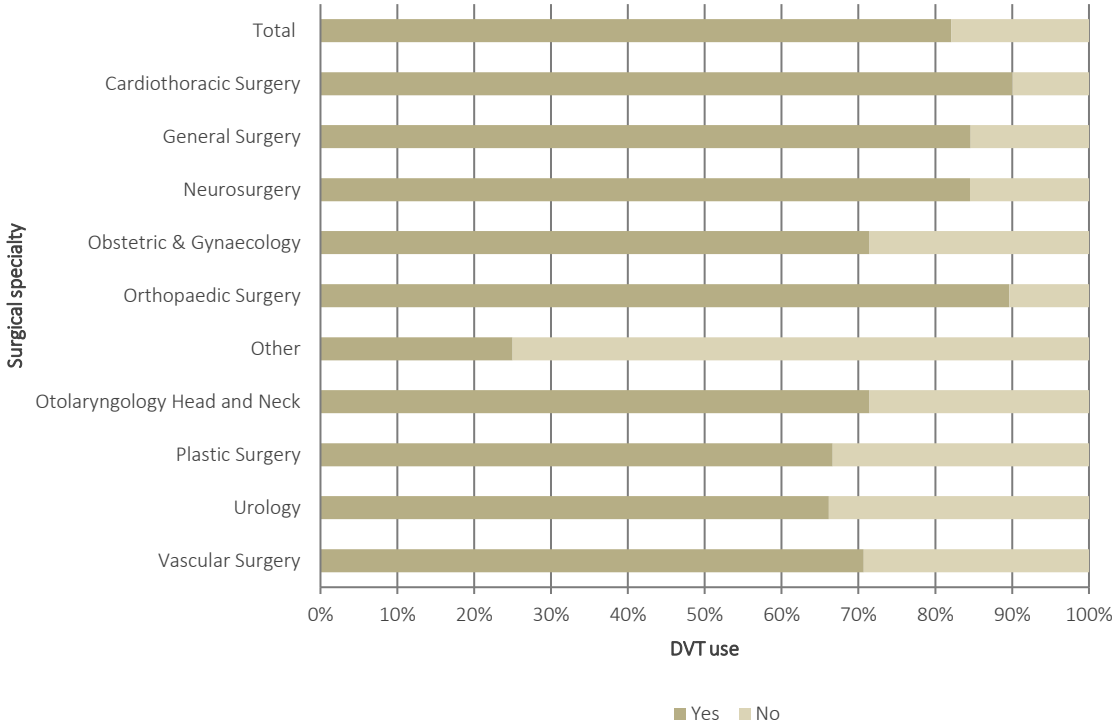
DVT: deep vein thrombosis.

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 76.2% (154/202) of cases.
- Second-line assessors felt that the decision to withhold DVT prophylaxis on clinical grounds was appropriate in 55.6% (15/27) of cases.
- The tendency of second-line assessors to be more critical of clinical management events is to be expected after the review of the patient medical records.

Figure 19: DVT prophylaxis use by specialty



Note: n=972 patients received DVT agents.

DVT: deep vein thrombosis.

Other*includes Colorectal, Oral and Maxillofacial Surgery.

3.8 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 surgeons were asked to record whether the patient received critical care support before or after surgery (see Table 21).

Table 21: Provision of critical care support during the audit period

CCU	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Audit period
Yes	426 (81.8%)	59 (70.2%)	58 (70.7%)	62 (72.1%)	75 (70.1%)	56 (77.8%)	**736 (77.3%)**
No	95 (18.2%)	25 (29.8%)	24 (29.3%)	24 (27.9%)	32 (29.9%)	16 (22.2%)	**216 (22.7%)**
Total	**521 (100%)**	**84 (100%)**	**82 (100%)**	**86 (100%)**	**107 (100%)**	**72 (100%)**	**952 (100%)**

Note: Missing data: n=203 (14%).

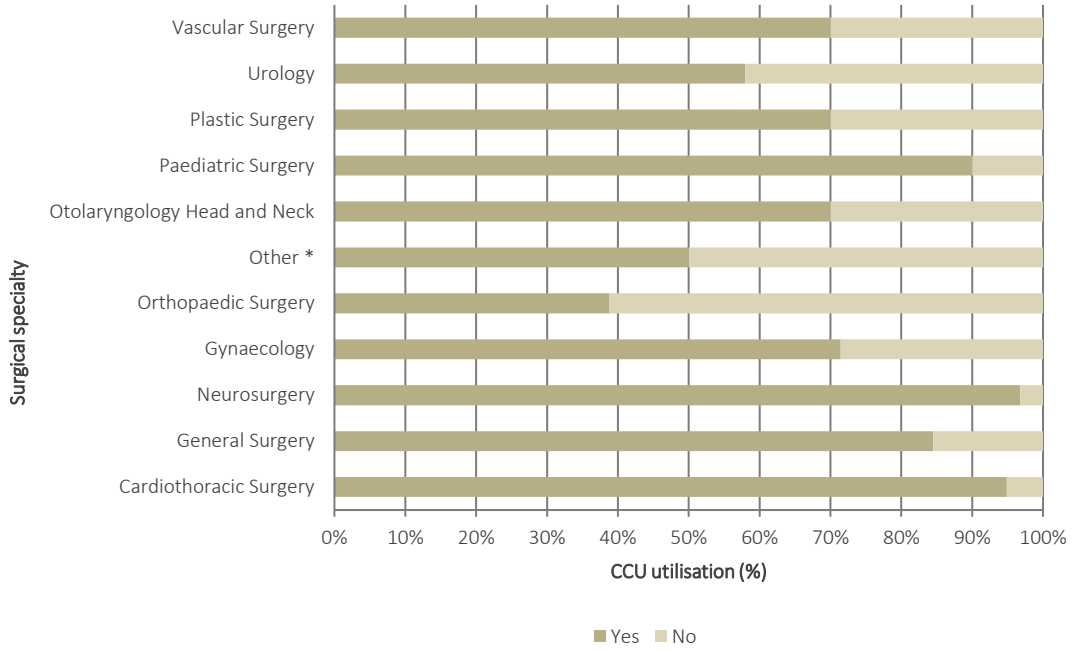
CCU: Critical Care Unit.

Comments:

- In 77.3% (736/952) of operative cases the patient received critical care support during their inpatient stay and this rate has increased 8.7% since 2015-2016.
- 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.

A breakdown of the critical care support utilisation by specialty is outlined in Figure 20.

Figure 20: Provision of critical care support to patients by specialty



Note: Missing data: n=203 (14%).

CCU: Critical Care Unit.

* Includes Colorectal Surgery

Comments:

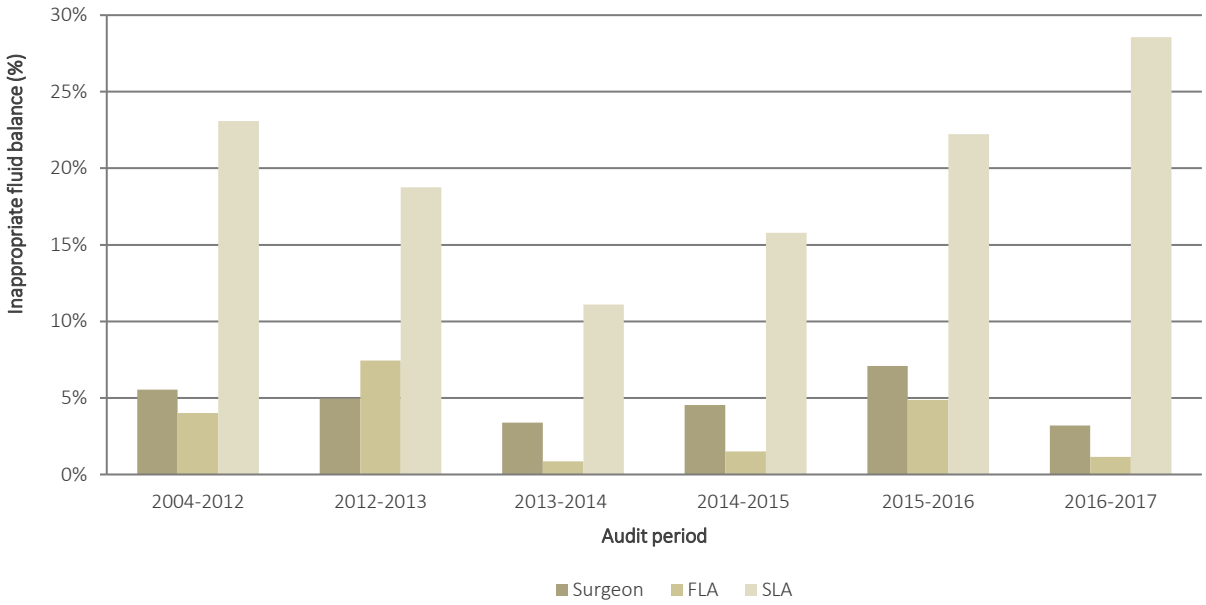
- Referral rates for critical care support vary from 38.8% (59/152) for the orthopedic patients to 96.8% (151/156) in neurosurgery. This is thought to be due to a high number of elderly patients with a fractured neck of femur who have been admitted from high level care institutions.
- The first- and second-line assessors were asked to review the appropriateness of the use of critical care facilities for patients by specialty and found that 1% (16/1,654) of patients who did not receive care in a critical care unit would likely have benefitted from it. (data not shown)

3.9 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 21).

Figure 21: Perception of inappropriateness of fluid balance



Missing data: n=17 (1.1%).

Note: n=1,560.

FLA: First-line assessors; SLA: Second-line assessor.

Table 22: Perception of inappropriateness of fluid balance

	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Audit period
Surgeon	63 (5.5%)	6 (5.0%)	4 (3.4%)	6 (4.5%)	10 (7.1%)	3 (3.2%)	92 (5.3%)
Total SCF cases	1,138	121	118	132	141	94	1,744
FLA	42 (4.0%)	9 (7.4%)	1 (0.8%)	2 (1.5%)	6 (4.9%)	1 (1.1%)	61 (3.7%)
Total FLA	1,049	121	118	132	123	87	1,630
SLA	30 (23.1%)	3 (18.8%)	1 (11.1%)	3 (15.8%)	4 (22.2%)	2 (28.6%)	43 (21.6%)
Total SLA	**130**	**16**	**9**	**19**	**18**	**7**	**199**

SCF: Surgical Case Form; FLA: First-line assessors; SLA: Second-line assessor.

Comments:

- Treating surgeons felt that in 5.3% (92/1,744) of cases the patient's fluid balance had been inappropriately managed by the clinical team.
- First-line assessors and the treating surgeons perceived that the fluid balance was inappropriate in 3.7% (61/1,630) of cases, while second-line assessors perceived it as inappropriate in 21.6% (43/199) of cases. The tendency of second-line assessors to be more critical of clinical management events is foreseeable as they have access to an independent description of the episode of care. However, evaluating the quality of the decisions made by the treating surgeons allows preventative measures to be implemented during the peer review process and recommendations for improved surgical care to be delivered to the treating clinical teams

- 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]

3.10 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 23 and Figure 22).

Table 23: Types of issues associated with patient transfer

Patient Transferred	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Audit period
Transfer problems	6 (3.0%)	2 (10.0%)	1 (5.9%)	1 (4.8%)	0 (0.0%)	0 (0.0%)	**10 (3.4%)**
Inappropriate transfer	13 (6.4%)	0 (0.0%)	0 (0.0%)	3 (14.3%)	0 (0.0%)	0 (0.0%)	**16 (5.4%)**
Insufficient documentations	17 (8.4%)	1 (5.0%)	0 (0.0%)	2 (9.5%)	1 (4.3%)	0 (0.0%)	**21 (7.1%)**
Inappropriate level of care	12 (5.9%)	0 (0.0%)	1 (5.9%)	3 (14.3%)	0 (0.0%)	0 (0.0%)	**16 (5.4%)**
Transfer delay	16 (7.9%)	2 (10.0%)	2 (11.8%)	3 (14.3%)	1 (4.3%)	1 (10.0%)	**25 (8.5%)**
Total transfer issues	**64 (31.5%)**	**5 (25.0%)**	**4 (23.5%)**	**12 (57.1%)**	**2 (8.7%)**	**1 (10.0%)**	88 (29.9%)

Note: n=88 issues with 294 patients required transfer.

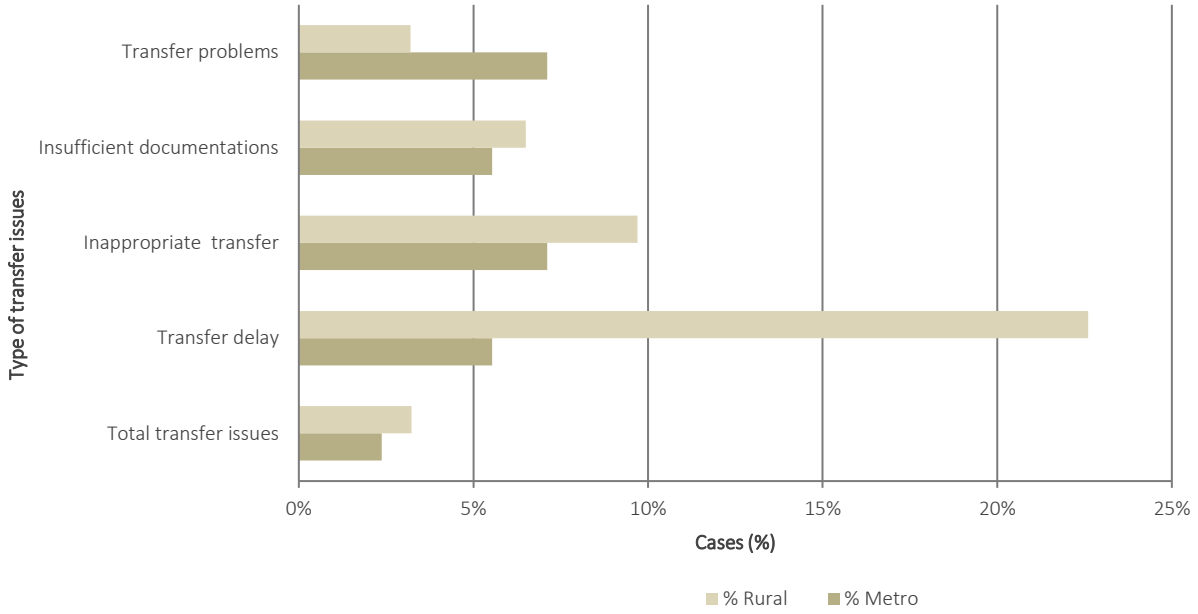
Missing data: n=4 (1.4%).

Comments:

- 17.8% (294/1,654) of patients required a transfer during the audit period.
- Of the 294 patients who underwent a transfer, 74.5% (219/294) had an operation. A transfer was required for 25.5% (75/294) of non-operative patients.
- The frequency of patients requiring a transfer for definitive interventional surgical care has remained similar throughout the years of the audit.
- Issues of care related to transfers were identified in 29.9% (88/294) of cases involving a patient transfer.
    - In 5.4% (16/294) of cases it was felt that there was an inappropriate level of care provided during transfer.
    - In 7.1% (21/294) of cases it was felt that inadequate clinical information and documentation had been provided to the receiving hospital.
    - In 8.5% (25/294) 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.

3.10.1 Inter-hospital transfer issues by region

Figure 22: Types of issues associated with patient transfers from rural or metropolitan area



Metro: metropolitan transfer issues.

Table 24: Types of issues associated with patient transfers

Patient Transferred	Metro	Rural
Transfer problems	6 (2.4%)	1 (3.2%)
Inappropriate transfer	14 (5.5%)	3 (9.7%)
Insufficient documentations	18 (7.1%)	2 (6.5%)
Inappropriate level of care	14 (5.5%)	1 (3.2%)
Transfer delay	18 (7.1%)	7 (22.6%)
Total transfer issues	70 (27.7%)	14 (45.2%)
Total patients transferred	**253 (100%)**	**31 (100%)**

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.
- Timely transfers, rapid assessments and prompt management on arrival is essential.

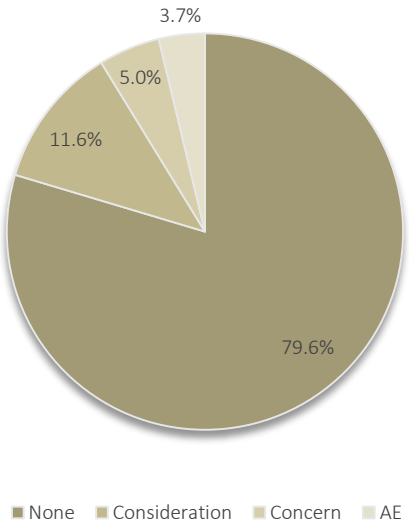
3.11 Outcomes of the peer review

The audit process is outlined in the first section of the report and highlights the quality assurance loop in the audit review process, prior feedback and recommendations being provided to the treating Fellow, the surgical team, the clinical community and hospitals.

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 23). 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 23: Clinical management issues as identified by the highest level of assessors



Note: n=1,654

Comments:

- In 79.6 % (1,317/1,654) of audit cases there were no issues perceived issues of patient management
- In 11.6 % (192/1,654) only minor (area of consideration) perceived issues of patient management.
- Areas of concern were identified in 5.0% (83/1,654) of patients.
- Adverse events, the most serious form of criticism, were identified by assessors in 3.7% (62/1,654) of patients.

3.11.1 Areas of clinical incidents

Table 25 is a reference table and shows the severity of criticism of perceived clinical management issues. Table 27 shows the frequency of clinical management issues.

Because TASM is a surgical audit more weight is placed on the surgical team. The severity of clinical incidents is focusing on the accountability of the surgical team as this is the primary focus of the audit.

Table 25: 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 26: Frequency of clinical management issues

Degree of criticism of patient management	Total occurrences of CMI	Per cent (%)
No issues identified	1,317	79.6%
Area of consideration	192	11.6%
Area of concern	83	5.0%
Area of adverse event	62	3.7%
Total	**1,654**	**100%**

Perceived impact on patient outcome	Total occurrences of CMI	Per cent
No issues of management identified	1,317	77.6%
Did not affect clinical outcome	70	4.1%
May have contributed to death	226	13.3%
Probably contributed to death	85	5.0%
Total	**1,698**	**100%**

Perceived preventability of clinical issues	Total occurrences of CMI	Per cent
No issues identified	1,317	77.8%
Definitely preventable	55	3.2%
Probably preventable	153	9.0%
Probably not preventable	154	9.1%
Definitely not preventable	14	0.8%
Total	**1,693**	**100%**

Clinical team responsible for management issue	Total occurrences of CMI	Per cent
No issues identified	1,317	70.4%
Surgical team	306	16.3%
Other clinical team	154	8.2%
Hospital issue	71	3.8%
Other factors*	24	1.3%
Total	**1,872**	**100%**

Note: A case can have more than 1 clinical management issue associated with it.

Management issues can be attributed to more than one clinical team.

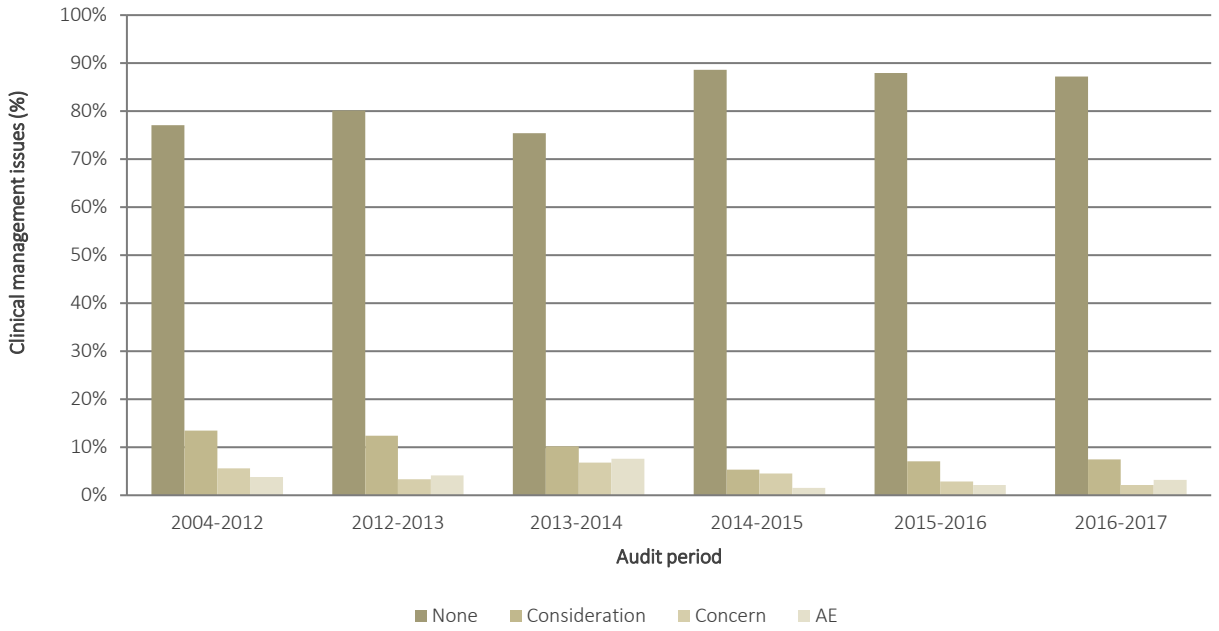
*Includes issues such as staffing levels, patient transfer, patient refusal, ambulance care, anaesthetic care and availability or quality of critical care support.

CMI: Clinical Management Issue

Comments:

- The highest-level assessors perceived that clinical management issues occurred in 20.4% (337/1,654) of cases. These results support the importance and the value of an independent peer review assessment.
- 16.3% (306/1,872) of issues were attributable to the surgical team. Another 8.2% (154/1,872) of issues were attributable to other clinical teams (for example, medical and emergency departments). Hospital issues were responsible for 3.8% (71/1,872) and 1.3% (24/1,872) of issues were attributed to other factors.
- These findings are similar to the national audit results.[2]

Figure 24: Frequency and classification of clinical management issues by audit period (n=1,1654)



Comments:

- The rate of clinical issues has remained constant over the audit period.
- In the 2004-2012 audit periods, 77.1% (808/1,048) of patients had no identified clinical management issues. This figure is 87.2% (82/94) in 2016-2017.

Table 27: Clinical management issues

Clinical management issues	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2015-2016	Audit period
None	808 (77.0%)	97 (80.2%)	89 (75.4%)	117 (88.6%)	124 (87.9%)	82 (87.2%)	1,317 (79.6%)
Consideration	141 (13.5)	15 (12.4%)	12 (10.2%)	7 (5.3%)	10 (7.1%)	7 (7.4%)	192 (11.6%)
Concern	59 (568%)	4 (3.3%)	8 (6.8%)	6 (4.5%)	4 (2.8%)	2 (2.1%)	83 (5.0%)
Adverse Event	40 (3.8%)	5 (4.1%)	9 (7.6%)	2 (1.5%)	3 (2.1%)	3 (3.2%)	62 (3.7%)
Closed	**1,048 (100%)**	**121 (100%)**	**118 (100%)**	**132 (100%)**	**141 (100%)**	**94 (100%)**	**1,654 (100%)**

AE: adverse event.

Frequency of clinical management issues

The frequency of specific clinical issues of management, and adverse events by operative status, are shown respectively in Table 28 and Figure 25. The higher the frequency of clinical management issues the greater the requirement for improved surgical care in that particular area. Table 28 outlines the frequency of clinical management issues if the count of frequency is > 3.

Table 28: Frequency of clinical management issues (n=423 clinical management issues identified)

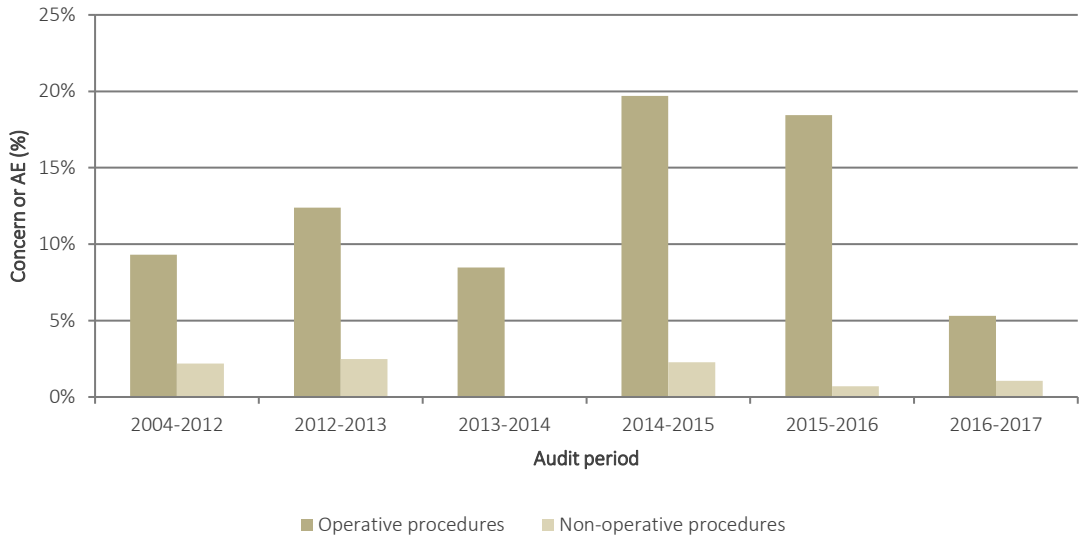
Area of clinical management issue	Number	Per cent
Decision to operate	49	11.6%
Adverse factors in management	26	6.1%
Delay to surgery (ie earlier operation desirable)	19	4.5%
Better to have done different operation or procedure	18	4.3%
Delay in diagnosis	16	3.8%
General complications of treatment	15	3.5%
Delay to operation caused by missed diagnosis	11	2.6%
Diagnosis related complications	11	2.6%
Post-operative bleeding after open surgery	7	1.7%
Anastomotic leak after open surgery	7	1.7%
Aspiration pneumonia	7	1.7%
Failure to investigate or assess patient fully	6	1.4%
Aspiration pneumonia after anaesthetic	6	1.4%
Delay in recognising complications	6	1.4%
Heart complication	6	1.4%
Communication failures	6	1.4%
Post-operative care unsatisfactory	6	1.4%
Delay in investigating the patient	5	1.2%
Delay to re-operation	5	1.2%
Delays	5	1.2%
Intra-operative bleeding during open surgery	5	1.2%
Unsatisfactory medical management	4	0.9%
Secondary haemorrhage	3	0.7%
Better to have had more extensive surgery	3	0.7%
Anaesthesia related	3	0.7%
Respiratory tract complication of open surgery	3	0.7%
Pulmonary embolus	3	0.7%
Delay in transfer to tertiary hospital	3	0.7%
Delay in X-ray department	3	0.7%
Diagnosis missed - unspecified	3	0.7%
Diagnosis missed by radiologist	3	0.7%
Perforation of colon during endoscopic operation	3	0.7%
Equipment related complication	3	0.7%
Delay in recognising anastomotic leak	3	0.7%
Total	**282**	**66.6%**
Categories with less than three instances not listed	141	33.3%

Categories with less than three instances not listed 33.3% (141/423). More than one clinical management issue can be attributed to a case.

Comments:

- The most common clinical issues were decision to operate, 11.6% (49/423), and adverse event factors in management, 6.1% (26/423). These are significant findings, highlighting that clinical deterioration must be acted on and not just recorded. Delays remain a common issue across the audited period and these results are similar to the national figures. [2]
- The delay in definitive treatment category includes delays in transfer, establishing diagnosis and starting treatment. The TASM's findings are similar to a number of studies on hip fracture patients found that delay to surgery was attributable to patient factors such as age[16], comorbidities[17], ASA status, gender, day of surgical admission relating to delay to surgery[18], waiting times[13, 19, 20] and reduction of theatre changeover time.[21]
- Criticisms of the choice of operation included the failure to adequately consider or perform less extensive procedures on sicker patients with multiple comorbidities.

Figure 25: Frequency of adverse events and areas of concern by operative cases and audit period



AE: adverse event.

Note: A case can have more than 1 clinical management issue associated with it.

Table 29: Frequency of adverse events and areas of concern by operative cases and audit period

Case status	2004-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Audit period
Procedure	106 (9.3%)	15 (12.4%)	10 (8.5%)	26 (19.7%)	26 (18.4%)	5 (5.3%)	188 (10.8%)
No procedure	25 (2.2%)	3 (2.5%)	0 (0.0%)	3 (2.3%)	1 (0.7%)	1 (1.1%)	33 (1.9%)
All AE and concern	131 (11.5%)	18 (14.9%)	10 (8.5%)	29 (22.0%)	27 (19.1%)	6 (6.4%)	221 (12.7%)
Audited cases	**1,138 (100%)**	**121 (100%)**	**118 (100%)**	**132 (100%)**	**141 (100%)**	**94 (100%)**	**1,744 (100%)**

AE: adverse event.

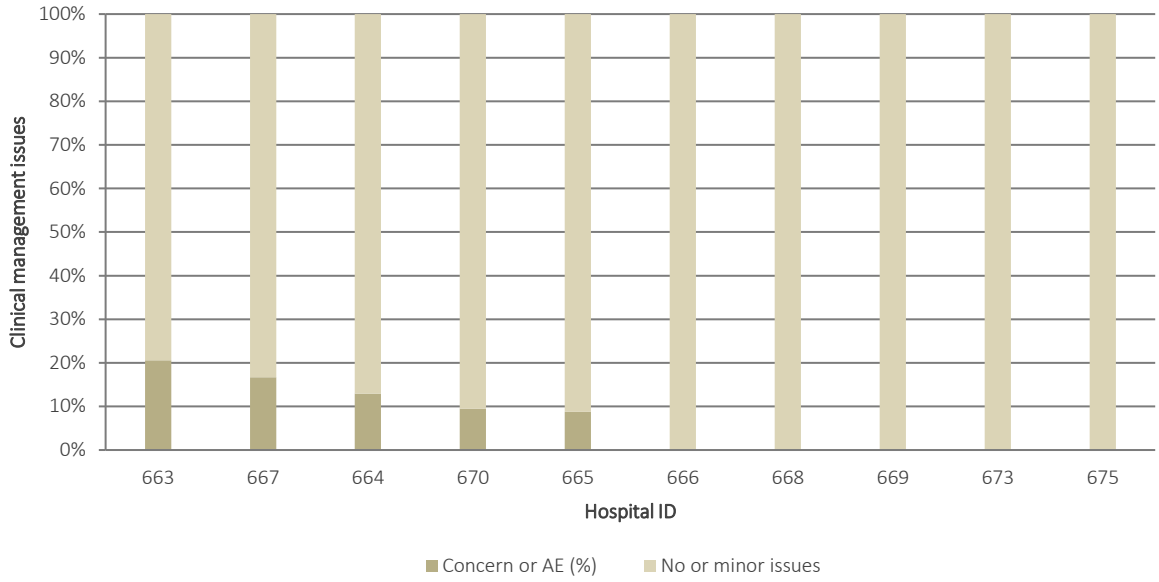
Note: n=1,788 separate surgical procedures in 1,518 patients.

Note: A case can have more than 1 clinical management issue associated with it.

Comments:

- Non-operative procedures had a significantly lower rate of areas of concern and adverse events 1.9% (33/1,744) compared with cases in which an operative procedure was performed 10.8% (188/1,744).
- The overall area of concern and adverse events during the audit period was 12.2% (212/1,744).

Figure 26: Adverse events and areas of concern by hospital during the audit period



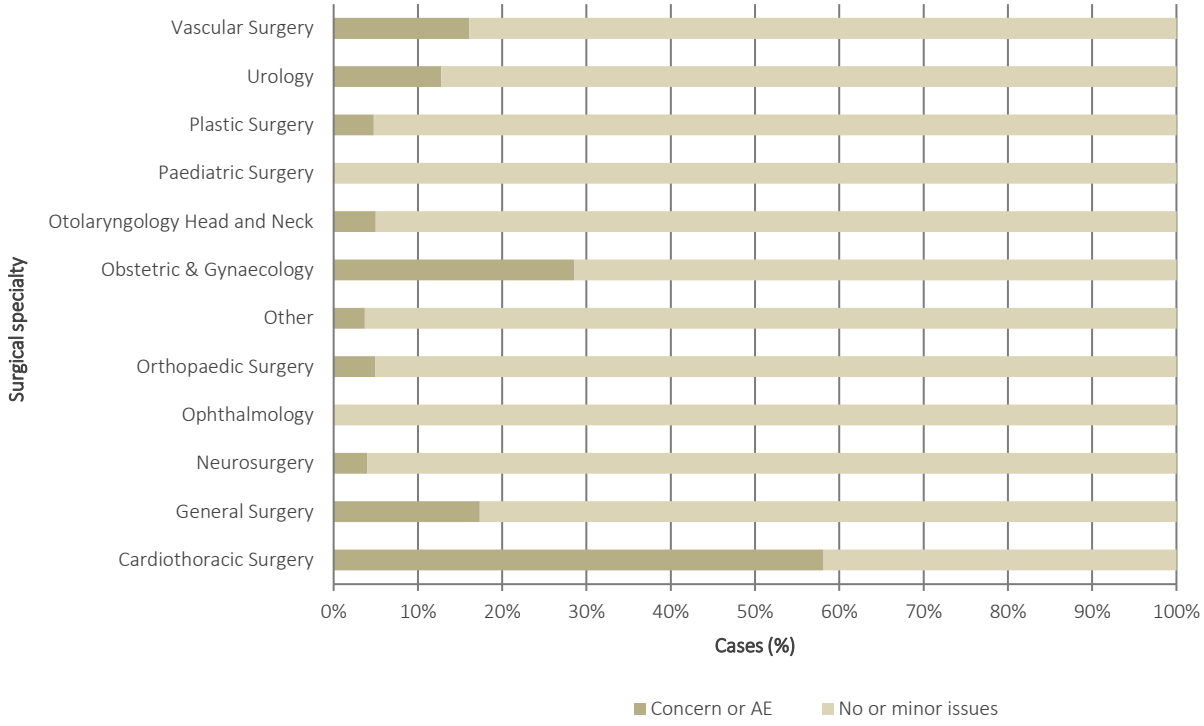
Grey lines represent percentage grids.

AE: adverse event; ID: identifier.

Comments:

- Areas of concern were identified in 5.0% (83/1,654) of patients. Adverse events, the most serious form of criticism, were identified by assessors in 3.7% (62/1,654) of patients.
- The individual hospital clinical governance reports outline specific areas of concern and adverse events identified for the reporting sites.
- The TASM program released the current hospital reports in March 2017. 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 DoH representatives.

Figure 27: Adverse events and areas of concern by surgical specialty



Grey lines represent percentage grids.

* Other: Colorectal Surgery.

AE: adverse event.

Table 30: Adverse events and areas of concern by surgical specialty

Surgical specialty	Concern or AE	No or Minor Issues
Cardiothoracic Surgery	25 (58.1%)	18 (41.9%)
General Surgery	136 (17.3%)	649 (82.7%)
Neurosurgery	9 (3.9%)	219 (96.1%)
Ophthalmology	0 (0%)	4 (100%)
Orthopaedic Surgery	14 (4.9%)	270 (95.1%)
Other*	1 (3.7%)	26 (96.3%)
Obstetrics & Gynaecology	2 (28.6%)	5 (71.4%)
Otolaryngology Head and Neck	1 (5%)	19 (95.0%)
Paediatric Surgery	0 (0%)	10 (100%)
Plastic Surgery	1 (4.8%)	20 (95.2%)
Urology	11 (12.8%)	75 (87.2%)
Vascular Surgery	23 (16.1%)	120 (83.9%)
All cases audited	**221 (13.3%)**	**1,437 (86.7%)**

AE: adverse event; ID: identifier.

*Includes Colorectal Surgery, Oral and Maxillofacial Surgery.

Comments:

- The TASM program has rolled out the surgeon's individual aggregate report to enable benchmarking and monitoring of clinical management trends. The TASM audit continues to identify, assess and review factors associated with surgical mortality and will continue to develop action plans for Fellows, educational programs and recommendations for further patient care improvements in Tasmania.

3.11.2 Conclusions

Surgery in Tasmania is safe and well regulated. Only a small proportion of surgical patients die. However, when a death does occur, it is reviewed by peer surgeon assessors. This is the responsibility of the RACS through the TASM. The de-identified and aggregated results of those deaths are presented in this document.

As our population ages, there will be more work and more challenges presented to the surgical community. The surgeons who form this vital part of our healthcare system will rise to these challenges.

They will learn from the issues in these pages, learn from scientific achievements from around the world and learn from the opportunities for self-reflection that the TASM offers them.

4. AUDIT LIMITATIONS AND DATA MANAGEMENT

Audit data is primarily collected, managed, peer-reviewed and analysed to provide feedback to surgeons. 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.[12]

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. The ANZASM revised the SCF to improve the quality of the audit data.

The TASM upgraded the electronic Fellows Interface in 2016 for enhanced data submission, which should lead to continuous improved data quality and integrity.

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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 2016–2017 report includes deaths reported to TASM since data collection commenced on 1 July 2004 up to 30 June 2017. 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

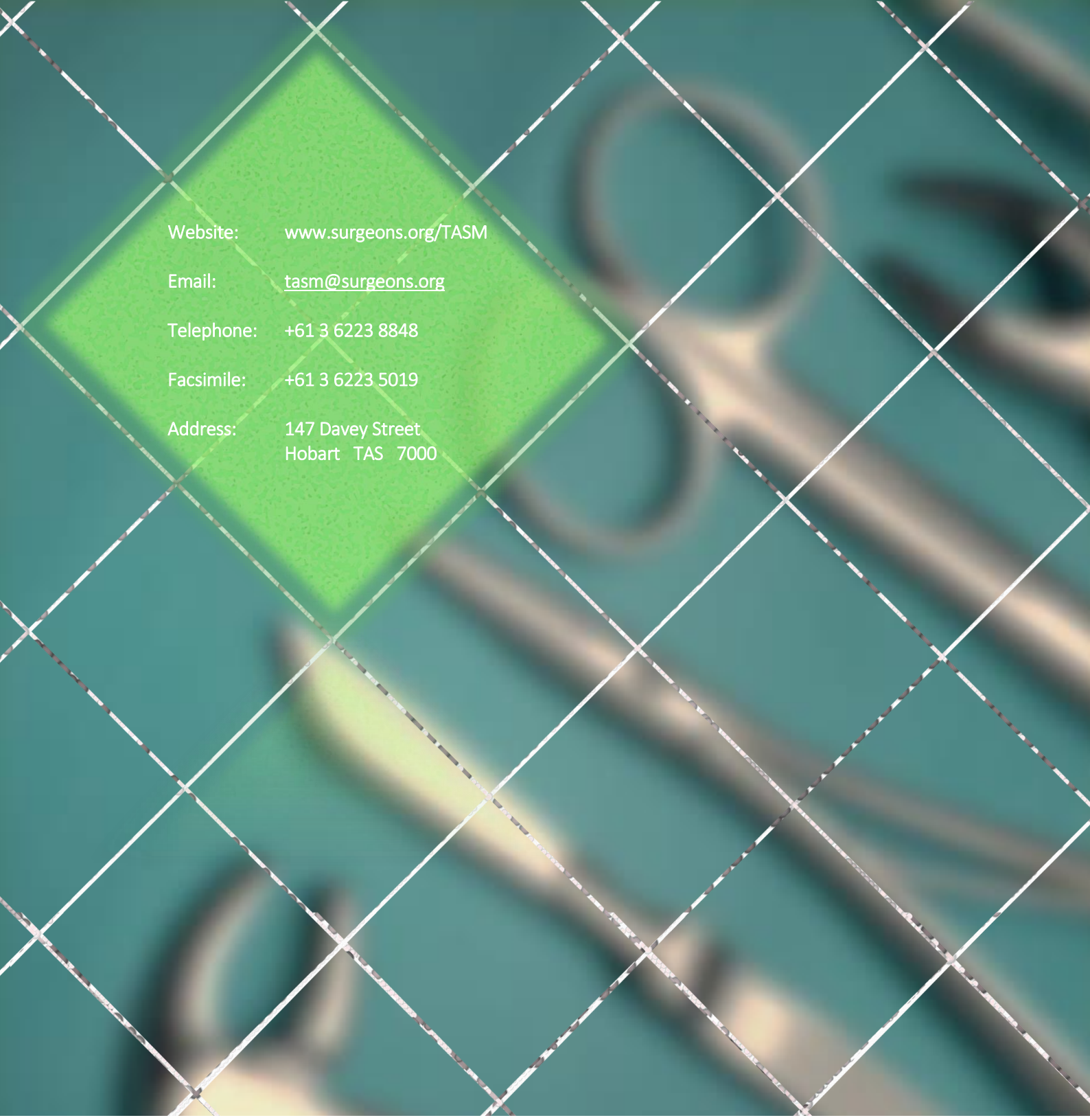
Data that might identify surgical groups, patients or hospitals have been excluded from this report, as have extreme values.

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 or 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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