Royal Australasian College of Surgeons

Tasmanian Audit of Surgical Mortality

Annual Report 2019

Royal Australasian College of Surgeons

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Australian and New Zealand Audits of Surgical Mortality

Tasmanian Government

UTAS FACULTY OF HEALTH SCIENCE School of Medicine

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Excellence in Women's Health

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(i) Abbreviations

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ANZCA	Australian and New Zealand College of Anaesthetists
AOA	Australian Orthopaedic Association
ASA	American Society of Anaesthesiologists
CCU	Critical care unit
CHASM	Collaborating Hospitals' Audit of Surgical Mortality
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
IQR	Inter quartile range
NOD	Notification of death
NSQHS	National Safety and Quality Health Service
PE	Pulmonary embolism
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

(ii) Acknowledgements

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- Australian and New Zealand Audit of Surgical Mortality (ANZASM)
- Research, Audit and Academic Surgery (RAAS)
- participating hospitals
- participating Fellows and International Medical Graduates
- treating surgeons and surgeon assessors for time and effort providing detailed and valuable case note reviews
- 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
- National Coroners Information System
- South Australian Audit of Surgical Mortality
- Queensland Audit of Surgical Mortality
- Collaborating Hospitals' Audit of Surgical Mortality
- Department of Health for funding the project
- Royal Australasian College of Surgeons (RACS) for infrastructure and oversight

(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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Dr Brett Daniels	BSc (Hons), PhD, MBBS (Hons), FRANZCOG
Ms Lisa Lynch	Project Manager – TASM – Registered Nurse

(iv) Executive Summary

Summary of key findings based on **102** peer reviewed cases from the audit period **1 July 2018** to **30 June 2019:**

- majority of TASM clinical indicators are comparable to the national audit data
- majority of patients (84.8%) were admitted as emergencies with acute life-threatening condition
- 83.2% of patients had at least one operation during their hospital admission
- surgical consultants were involved in most surgeries, particularly when a patient was re-admitted to theatre
- top 3 comorbidities contributing to death were advanced age, cardiovascular and respiratory
- top 3 causes of death were multiorgan failure, sepsis and respiratory failure
- most infections were acquired postoperatively
- adverse events of concern were found to be not preventable
- futile surgery (as reflected in the decision to operate), is one of the top clinical management issues; high-risk treatment needs to be avoided in very complex and frail patients
- falls occur mostly at home and at care facilities.

1. Demographic and operative profile

The demographic and surgical risk profiles of audited cases reveal similar trends to those identified in previous reports. The majority of surgical deaths occurred in elderly patients with underlying health problems who were admitted via the emergency department with an acute life-threatening condition. The cause of death was often linked to the pre-existing health status. In these cases, review assessors often determined that death was unpreventable or a direct result of the disease processes, rather than a consequence of the treatment provided. The most commonly reported causes of death were multiorgan failure, septicaemia and respiratory failure. This is congruent with the most common comorbidities in Tasmanian patients and is similar to the national audit findings.[1]

This report presents recommendations and key findings for the period 1 July 2018 to 30 June 2019 (102 cases). Tables and figures provide information obtained for the 7-year period (1 July 2012 to 30 June 2019) (816 cases) to illustrate changes in trends over time. Percentages in this report are calculated after excluding any unavailable data, accounting for occasional differences in the denominator.

To further assess emerging trends and to benchmark outcomes of surgical care, case comparisons have been made between the Tasmanian Audit of Surgical Mortality (TASM) and the national counterpart—the Australian and New Zealand Audit of Surgical Mortality (ANZASM). Clinical information forming the basis of the review was generally provided by the treating consultant, not junior medical staff.

2. Hospital admission and operative patient profile

The majority of surgical deaths since 2012 (84.8%; 692/816) occurred in elderly patients with underlying health problems who were admitted via the emergency department with an acute life-threatening condition. Eighty-eight patients did not proceed to have surgery after admission.

If surgery was not performed, this was due to an active decision by the patient, family or clinician not to proceed. This decision often occurred in patients with an untreatable clinical problem who were admitted as emergency cases.

The most frequently described operations were for orthopaedic injuries in older patients and patients with acute abdominal pathology. This reflects the high percentage of patients admitted as emergencies. Patients may have more than one operation during their hospital stay. In total, 74.0% (604/816) of patients had at least one operation during their final hospital admission. The consultant was present in theatre for 78.8% (679/862) of operations.

Of the patients who had surgery, 17.2% (107/622) had an unplanned return to the operating theatre due to complications.

Clinical factors to prioritise

Based on clinical trends identified nationally, specific areas of clinical priority have been identified for monitoring, such as deep vein thrombosis prophylaxis use, fluid balance management, critical care management and clinical management issues in surgical care.

Deep vein thrombosis (DVT) prophylaxis

Use of DVT prophylaxis is important in the prevention of pulmonary embolus. From 1 July 2012 to 30 June 2019, 75.0% (612/816) of cases involved use of DVT prophylaxis. The use of DVT prophylaxis was similar to the national data (80.1%; 19,546/24,401).

In 1.4% (12/832) of Tasmanian cases, both first- and second-line surgical assessors considered the DVT prophylaxis usage to be inappropriate, compared to 1.7% (417/23,858) in the national database.

Fluid balance management

In-depth investigations identified a subset of cases where surgeons have reported problems with fluid balance management. This analysis is ongoing; however, dissemination of information to surgeons on fluid management has raised awareness within the surgical community in each state. Fluid balance was an issue in 11.8% (12/102) of audited deaths in Tasmania in the current audit period (2018–2019), which is higher than the national finding of 8.2% (286/3,477) for the same period.

Critical Care Unit (CCU)

Surgeons reported an unplanned admission to CCU in 16.6% (135/816) of audited deaths from 1 July 2012 to 30 June 2019, which is comparable to the national figure of 15.1% (4,423/29,197).

3. Clinical management issues

Clinical management issues—minor issues, areas of concern and adverse events—that occurred during a patient's hospital stay are identified in this audit. Audited cases may have more than one identifiable clinical management issue (CMI) per patient. The most serious CMI per patient is presented in this report.

In the current year, minor issues of patient management were perceived to have occurred in 19.6% (22/112) of cases, areas of concern were identified in 3.6% (4/112) of cases, and clinical issues serious enough to be categorised as an adverse event occurred in 13.4% (15/112) of cases. The number of CMIs in the current audit period is not markedly different than in previous reporting periods (Table 18).

In 2018–2019 in Tasmania, 29.4% (30/102) of patients audited had a clinically significant infection, slightly less than the national figure of 34.0% (1,180/3,469).

4. Outcomes of the peer review

Potentially preventable clinical outcomes are based on CMIs identified in TASM peer reviews. The most common CMIs identified were delays; issues of preoperative, intraoperative and postoperative care; and protocol issues. A patient may have multiple CMIs associated with one episode of care.

No CMIs assessed as definitely or probably preventable were identified (0/112).

5. Conclusion

Key TASM recommendations in this report reflect the Six National Safety and Quality Health Service (NSQHS) Standards used by hospitals and health professionals to address areas of clinical practice and patient safety needing improvement.

TASM, along with other surgical audits and research and quality assurance collaborators, is paving the way towards conquering educational goals to improve patient care. These goals ensure that all surgical Fellows and participating health organisations are accountable for providing the highest standards of care.

(v) Future goals/objective for TASM

Since inception of the TASM audit in 2004 there has been much progress in monitoring quality and safety across Tasmania. Many of the core objectives of the Tasmanian Department of Health (DoH) are already aligned to the work of the audit. TASM has developed successful partnerships with clinicians to review and respond to episodes of surgical mortality across the state. Several ways of improving the TASM audit process have been identified and implementation of these improvements commenced in late 2018.

The new goals are:

- presentation of TASM information to consumers
- development of a fast-tracking method for cases having potentially preventable adverse events
- reporting of information about the care pathway identified in the peer-reviewed feedback to individual surgeons, hospitals and other stakeholders
- identification of changes in clinical management to be implemented by the treating surgeon and the shared-care team in response to the peer-reviewed outcome of a case, based on evaluation surveys received from the treating surgeon once feedback is provided.

National Safety and Quality Health Service Standards

This report can assist hospitals with accreditation for the National Safety and Quality Health Service (NSQHS) Standards[2] aligned with the TASM key recommendations below and clinical risk management issues outlined in Section 3.

Figure 1: National Safety and Quality Health Service Standards

National Safety and Quality Health Service Standards		TASM Key Recommendations
Standard 1 Clinical Governance		• improve leadership in patient care
Standard 2 Partnering with Consumers		• assess if the decision to operate is appropriate • consider quality of life and end-of-life care
Standard 3 Preventing and Controlling Healthcare-Associated Infection		• control and manage infections with appropriate investigation, rapid administration of treatment and timely involvement of expert teams
Standard 5 Comprehensive Care		• improve perioperative management • improve awareness of surgical emergencies and shared care • involve patients in planning their treatment • reduce falls in hospitals and residential care
Standard 6 Communicating for Safety		• improve documentation of care plans and clinical events • improve communication amongst health professionals and their patients
Standard 8 Recognising and Responding to Acute Deterioration		• act on evidence of clinical deterioration

Improved leadership in patient care

NSQHS Standard 1 emphasises clinical leadership, improved governance and culture. Complex cases must have clear and demonstrable leadership in patient management, and treatment plans should be understood by all involved in each patient's care. The lead clinicians must be identifiable, accountable and responsive; they must be prepared for challenges and focus on optimal patient care. Involvement of senior surgical colleagues should be encouraged, and their opinion sought when dealing with surgical complications. Collaboration should not be delayed, although patient care team members have different areas of expertise, they all share similar goals and resources, and appreciate leadership support.

Futile surgery and end-of-life care

NSQHS Standard 2 encourages partnership with consumers. NSQHS Standard 5 promotes the implementation of a comprehensive care plan in collaboration with the patient when considering surgery as part of end-of-life care. It was the opinion of a number of treating surgeons and TASM assessors that some of the surgical procedures performed during the audit were considered futile. Decisions regarding continuation of active treatment and surgery can be very complex in frail patients, particularly when the treatment has a high risk of death or the end of life is near.[3] Discussions and shared decision-making about these difficult cases is important and must be adequately documented.

Transfer

NSQHS Standard 1 highlights the need for leadership by senior clinicians, while Standard 6 outlines the importance of communication in improving patient care. Patient transfer is a vital facet of patient care that should improve management, whether the transfer is within the same hospital for a diagnostic procedure or to another hospital or health service with specialised advanced care. However, transferring deteriorating patients may induce various physiological alterations that may adversely affect the final outcome. Important elements to be considered for high-standard transfer include when to transfer (before or after surgery), appropriate communication, pre-transfer stabilisation and preparation, identification of the ideal mode of transfer, personnel to accompany the patient, monitoring equipment during transfer, and documentation and patient handover at the receiving facility. Transfers should be coordinated by the most senior team members at each site, not delegated to junior staff.

Infection control

NSQHS Standard 3 promotes prevention and control of healthcare-associated infections. The audit shows that most infection occurs in the postoperative period. Key actions to be taken for infection control and management are timely recognition and involvement of expert teams, appropriate investigation, and rapid administration of treatment. TASM endorses the use of current hospital protocols and guidelines to reduce the incidence of infection.[4]

Improved perioperative management

NSQHS Standard 5 outlines the implementation of a comprehensive care plan for a patient's care and treatment. Comprehensive care plans must be adequately documented. Appropriate preoperative, intraoperative and postoperative preparation and management should aim to decrease operative complications and promote successful recovery. Delays in investigating or recognising complications can have fatal consequences.

Improved awareness of surgical emergencies and sharing of care

NSQHS Standard 5 encourages improvements in shared care. To improve the quality and safety of patient care all admitted patients should have an agreed core treating consultant as the primary point of senior contact.

Improved communication

NSQHS Standard 6 highlights better communication for clinical handover. Health professionals and institutions should collaborate and share information to coordinate patient care at all stages during admission. The line of communication is a vital component of any surgical team and this remains an important focus for RACS.

In-house falls prevention

NSQHS Standard 5 outlines the implementation of a comprehensive care plan and assessments to minimise patient harm from falls. The audit revealed that patients admitted as surgical emergencies have a greater risk of falling while in hospital. All health professionals should increase their awareness of this risk to improve the quality and safety of patient care. TASM endorses the use of current hospital protocols and guidelines to reduce the incidence of in-hospital falls.[5]

Better documentation of care plans and clinical events

NSQHS Standard 6 outlines the importance of adequate documentation in the patient healthcare record to ensure patient safety. The case record is an essential tool for identifying the clinical sequence and documenting appropriate clinical management plans. The increasing hospital use of electronic medical records (EMR) will be closely monitored and suggestions for enhancements proposed.

Action of evidence of clinical deterioration

NSQHS Standard 8 highlights the need for action when clinical deterioration occurs. Clinical deterioration is an issue recognised throughout Australia and internationally. If deterioration occurs without a clear cause identified, consideration should be given to causes beyond the treating surgeon's specialty, expertise or experience, and timely appropriate assistance sought. Clinical deterioration must be acted upon, not merely recorded. Clinical findings must be considered alongside the results of investigations. Futile surgery should be avoided.

1. Introduction

1.1 Background

TASM is part of the ANZASM 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 the Royal Australasian College of Surgeons (RACS). TASM is funded by the Tasmanian DoH to review all deaths associated with surgical care and identify preventable adverse outcomes. The governance structure for TASM is outlined in Figure 2.

1.2 Objectives

The objective of the audit is to identify preventable or contributing factors associated with surgical mortality via a process of peer review 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 problematic system issues, with a focus on education and performance improvement.

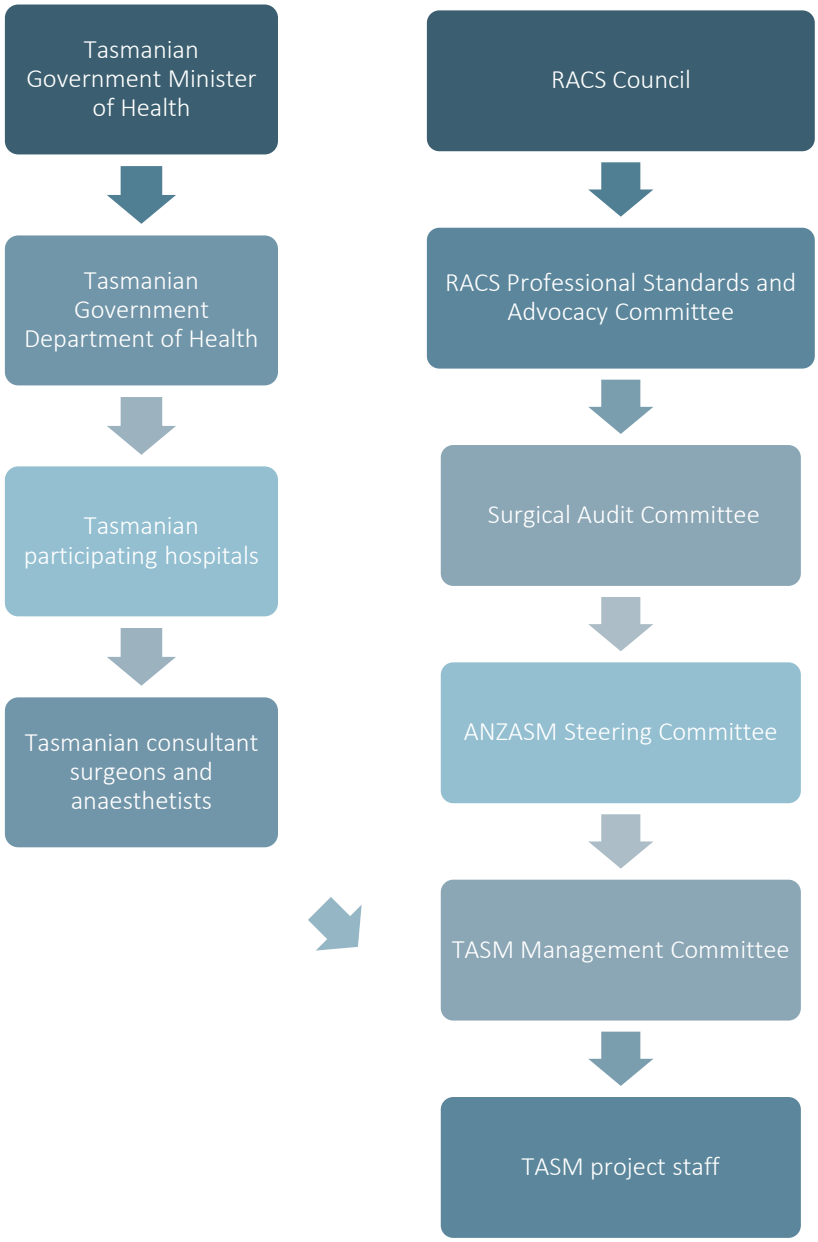
TASM audits all deaths that occur in a hospital when:

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.

Cases that do not fulfil either of these criteria are excluded from the audit by the notifying hospital or by audit staff. Deaths identified by the reporting surgeon as terminal care cases are recorded but excluded from further assessment in the audit. Terminal care is nominated by the surgeon on the surgical case form (SCF) and cannot be identified from the notification of death information received by the TASM office.

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

Figure 2: Governance structure of ANZASM and TASM



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 is within the scope of the audit, whether or not the patient underwent a surgical procedure.

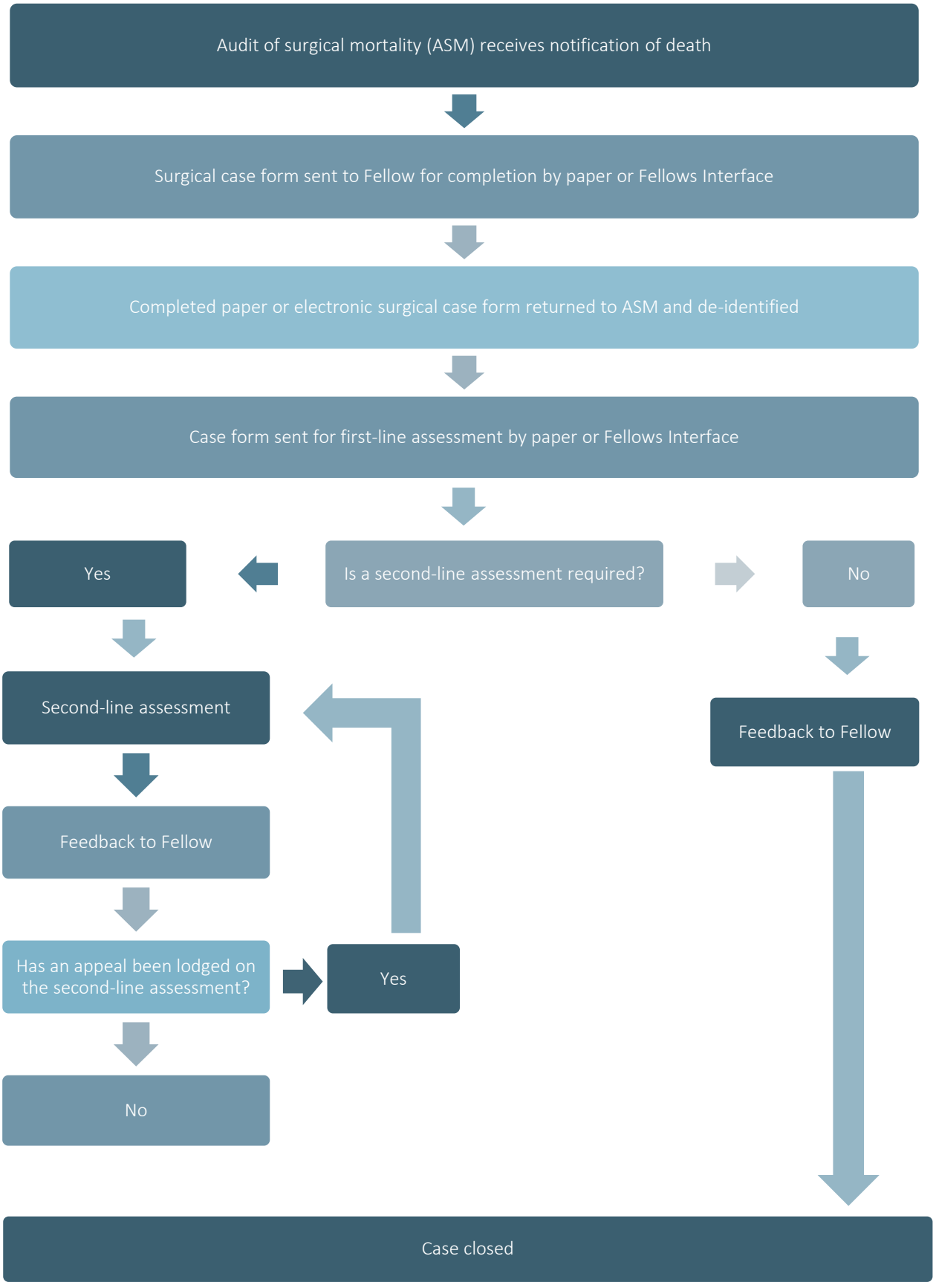
Clinical details pertaining to the management of each patient are recorded on a standard, structured SCF completed by the consultant or treating surgeon associated with the case. The completed SCF is submitted to the audit office, where the information is de-identified and sent for first-line assessment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

There are two possible outcomes of an FLA:

- Information provided by the treating surgeon enables the assessor to reach a conclusion about the case and identify any issues of clinical management.
- The case is referred for a second-line assessment (SLA) in the form of an in-depth case note review. An SLA may be requested as a result of:
    - necessity to clarify issues of patient management identified or suspected by the first-line assessor
    - insufficient information provided by the treating surgeon on the SCF, preventing the first-line assessor from reaching a conclusion on 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 (Figure 3).

Figure 3: The audit process



2. Audit participation and audit processes

2.1 Audit numbers

TASM aims to have all mortality cases reviewed within 3 months of notification. For the audit period 1 July 2012 to 30 June 2019, TASM received 963 notifications of deaths associated with surgical care (Table 1).

Table 1: Total audit cases, 1 July 2012–30 June 2019

Case status	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	7-year audit period
Closed	89.6% (121/135)	84.9% (118/139)	90.4% (132/146)	86.5% (141/163)	83.2% (94/113)	80.6% (108/134)	76.7% (102/133)	**84.7% (816/963)**
Terminal care	10.4% (14/135)	15.1% (21/139)	9.6% (14/146)	13.5% (22/163)	16.8% (19/113)	19.4% (26/134)	23.3% (31/133)	**15.3% (147/963)**
All cases	**100.0% (135/135)**	**100.0% (139/139)**	**100.0% (146/146)**	**100.0% (163/163)**	**100.0% (113/113)**	**100.0% (134/134)**	**100.0% (133/133)**	100.0% (963/963)

TASM recorded zero cases in non-participant, reported in error, lost to follow-up or pending cases between 1 July 2012 to 30 June 2019.

Cases recorded as admissions for terminal care (15.3%; 147/963) were excluded from the review process. There were 31 terminal-care cases in the current audit period (1 July 2018 to 30 June 2019).

2.2 Audit participation rates

To comply with the audit process, surgeons must agree to participate and return completed SCFs and assessment forms in a timely and accurate manner. The hospitals in which the surgeons work must provide notifications of deaths on a regular basis, since this is the main trigger for the audit process to begin.

2.3 Hospital participation

All Tasmanian public (n = 4) and private (n = 9) hospitals providing relevant surgical services participate in the audit and provide notifications of deaths. There has been 100% participation every year from 2012 to 2019.

2.4 Participation by Fellows

Since January 2010, participation in the audit has been a mandatory component of attaining continuing professional development (CPD) approval. The RACS CPD program conducts an annual verification of CPD activities claimed by surgeons.

In August 2012, the Board of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) approved formal collaboration with ANZASM, and gynaecological specialists were invited to participate in the audit. TASM accordingly 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.

In the current audit year (1 July 2018 to 30 June 2019), there were 149 RACS participants. Of these, 40 were International Medical Graduates, locums and interstate assessors, the remaining 109 comprised of the eligible Tasmanian RACS Fellows. There has been 100% participation by RACS and RANZCOG Fellows every year since 2012 (Table 2).

Table 2: Surgeon participation in the audit, 2012–2019

	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
RACS	93	93	96	137	137	137	149
RACOGS	44	44	44	44	44	44	44

Currently, 100.0% (44/44) of gynaecological specialists invited to participate have enrolled in the TASM audit.

RANZCOG and RACS Fellows perform assessments as either first- or second-line assessors.

2.5 Demographics and characteristics of audited deaths

Figure 4 shows the demographics and characteristics of TASM audited deaths in the current audit period (1 July 2012 to 30 June 2019). Comparisons to the national data appear in Table 3.

Figure 4: Characteristics of TASM audited deaths from 1 July 2018 to 30 June 2019

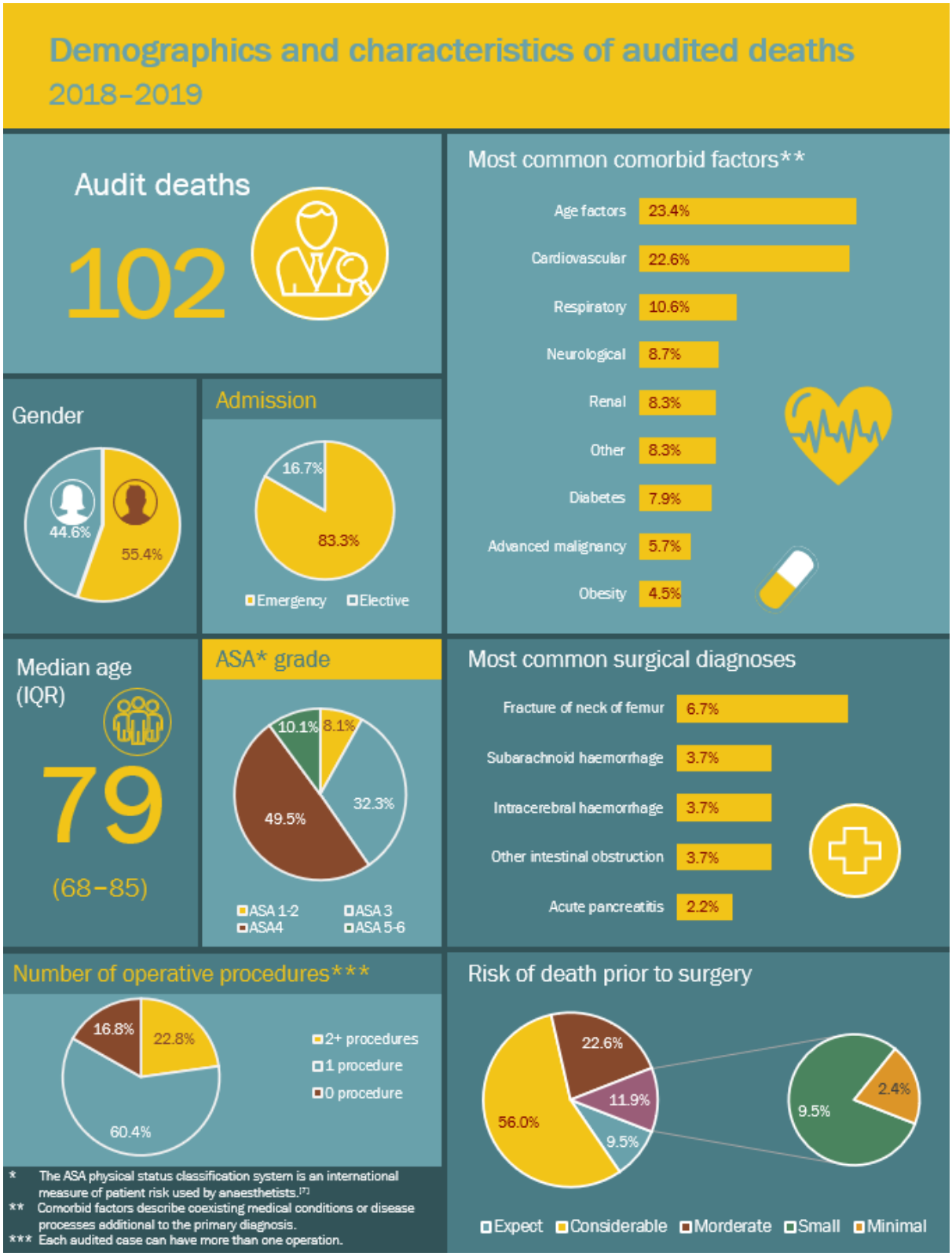


Table 3: Characteristics of audited deaths, 1 July 2018 to 30 June 2019 (TASM and national data)

Audit Region	TASM n = 102	National n = 3,505
Demographic and audit factors		
Median age in years (IQR)	79 (68–85)	77 (65–85)
Gender		
Male (%)	55.4	58.2
Female (%)	44.6	41.8
Admission status		
Elective (%)	16.7	13.8
Emergency (%)	83.3	86.1
American Society of Anesthesiologists (ASA)* grade		
ASA 1–2 (%)	8.1	6.4
ASA 3 (%)	32.3	30.0
ASA 4 (%)	49.5	48.7
ASA 5–6 (%)	10.1	14.9
Risk of death prior to surgery		
Expected (%)	9.5	11.5
Considerable (%)	56.0	50.3
Moderate (%)	22.6	25.8
Small (%)	9.5	9.5
Minimal (%)	2.4	2.9
Most common comorbid factors**		
Age (%)	23.4	20.8
Cardiovascular (%)	22.6	21.5
Respiratory (%)	10.6	11.4
Neurological (%)	8.7	7.0
Renal (%)	8.3	10.0
Other (%)	8.3	11
Diabetes (%)	7.9	7.4
Advanced malignancy (%)	5.7	7.5
Obesity (%)	4.5	3.4
Most common surgical diagnoses		
Fracture of neck of femur (%)	6.7	7.7
Subarachnoid haemorrhage (%)	3.7	2.0
Intracerebral haemorrhage (%)	3.7	0.9
Other intestinal obstruction (%)	3.7	0.3
Acute pancreatitis (%)	2.2	1.1
Number of operative procedures performed***		
2+ (%)	22.8	18.5
1 (%)	60.4	63.2
0 (%)	16.8	18.3

* The ASA physical status classification system is an international measure of patient risk used by anaesthetists.[6]
** Comorbid factors describe coexisting medical conditions or disease processes additional to the primary diagnosis.
*** Each audited case can have more than one operation.

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 unclear a postmortem examination may be requested. Figure 5 outlines the causes of deaths recorded for the total audit period (1 July 2012 to 30 June 2019).

Figure 5: Frequency of reported causes of deaths, 2012–2019

n = 1,048 conditions that were reported causes of deaths for 816 patients, 1 July 2012 to 30 June 2019.
A cause of death has been included in this figure if the total count was >10.
NOS = Not otherwise specified

From 1 July 2012 to 30 June 2019, there were 1,048 conditions perceived to have caused death. The most frequently cited causes of death were multiple-organ failure (11.0%; 115/1,048), septicaemia (10.1%; 106/1,048) and respiratory failure (6.5%; 68/1,048). Existing comorbidities may contribute to the final cause of death. [7-11]

2.7 Postmortem

Postmortem examinations when the cause of death is undetermined, with the average being 14.6% in the period 2012–2019. Postmortems are deemed to provide educational information and valuable insights, so the increased rate in 2018–2019 (20.6%) is welcomed.

Table 4: Postmortems performed, 2018–2019

Postmortem performed	Number	Percentage (%)
Yes - hospital	2	2.0
Yes - coroner	19	18.6
No	56	54.9
Unknown	25	24.5

n = 21 postmortems performed on 102 patients from 1 July 2018 to 30 June 2019.

Data is incomplete for postmortem rates associated with elective or emergency surgery admissions; however, the available data shows that the majority were coronial postmortems arising from deaths associated with emergency admissions.

Table 5: Postmortems performed for elective and emergency admissions, 2012–2019

Postmortem performed	Elective	Emergency
Yes - hospital	3	8
Yes - coroner	24	81

2.8 Peer-review process

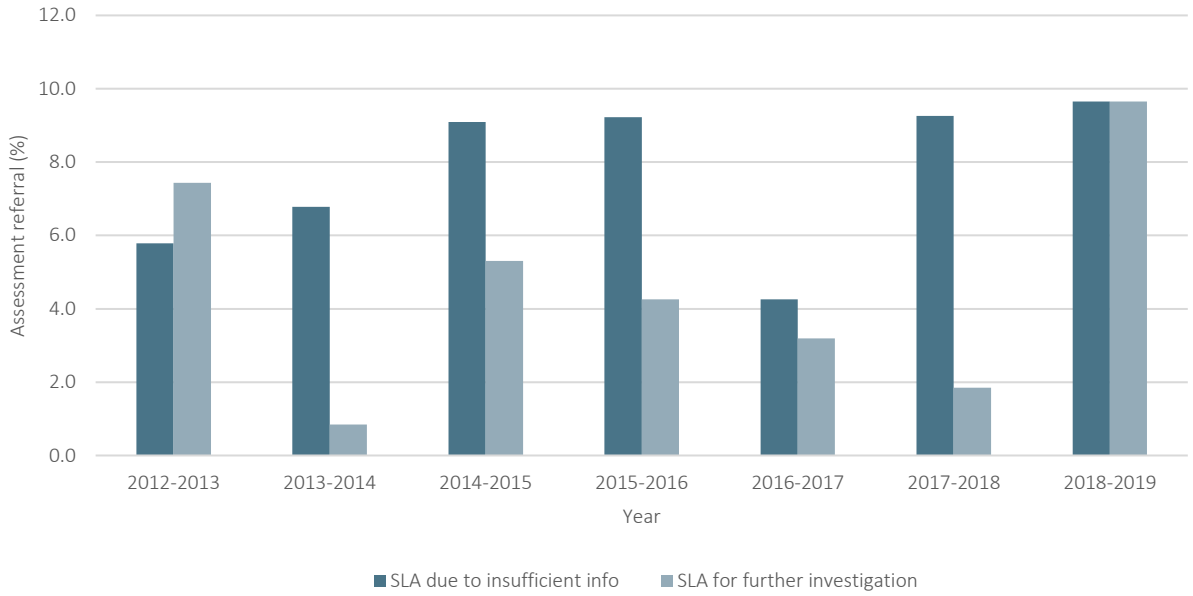
The TASM peer-review process is a retrospective examination of the clinical management of patients who died while under the care of a surgeon. All assessors (first- and second-line) must decide whether the death was a direct result of the disease process alone, or if aspects of the management of the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

Between 2012–2019, FLAs were completed for all 816 cases (excluding 147 cases of terminal care). Each first-line assessor is asked whether the treating surgeon had provided adequate information in the SCF to enable a conclusion to be reached. If the information is deemed inadequate, an SLA is requested. Other triggers for requesting an SLA are:

- requirement for a more detailed review of the case to better clarify events leading up to death and any lessons emanating from the case
- an unexpected death, such as that occurring in a young fit patient with benign disease, or a day surgery case.

The number of SLAs required due to lack of information in the SCF is an indirect measure of surgeon compliance with the audit process. The number of SLAs required for other reasons is more likely to represent suspected issues of clinical management. This number has decreased since the beginning of the audit in 2012 but could improve further. Reasons given for SLA referral are provided in Figure 6.

Figure 6: Reasons for referral for second-line assessment, 2012–2019



n = 102 of 816.
SLA: second-line assessment.

From 1 July 2012 to 30 June 2019, FLAs were completed for 816 cases and 12.5% of these (n = 102) were sent for SLA (Table 6). Of those cases referred for SLA, 63.7% (n = 65) were deemed by the first-line assessor to have provided insufficient information.

Table 6 shows referrals for SLAs according to surgical specialty. No obvious trends have emerged between 1 July 2012 and 30 June 2019 (data not shown), except for neurosurgery, with 8 cases being referred to SLA in 2018–19 (66.6% total cases 2012 to 2019).

Table 6: Referral for second-line assessment by surgical specialty, 2012–2019

Specialty	SLA (n = 102)	Total cases
Cardiothoracic Surgery	10 (23.2%)	43
General Surgery*	52 (13.4%)	387
Gynaecology	1 (50.0%)	2
Neurosurgery	12 (10.7%)	112
Orthopaedic Surgery	15 (10.0%)	150
Other**	1 (33.3%)	3
Otolaryngology Head and Neck	1 (8.3%)	12
Paediatric Surgery	0 (0.0%)	3
Plastic Surgery	0 (0.0%)	11
Urology	3 (5.9%)	51
Vascular Surgery	6 (14.3%)	42
Total	**102 (12.5%)**	**816**

n = 102 for 1 July 2012 to 30 June 2019. Data not available: n=1
* includes Colorectal Surgery
** includes Oral and Maxillofacial Surgery and Ophthalmology

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 repeat surgery.

It is the role of the treating surgeon to take responsibility for the overall success of the operation. He or she must ensure that the operation proceeds smoothly with the lowest possible risk of complications or unplanned return to theatre. Table 7 shows the frequency of surgical procedures performed within the 7-year audit period (1 July 2012 to 30 June 2019). Table 8 shows the distribution of these procedures via surgical specialty.

Table 7: Frequency of individual surgical procedures, 2012–2019

Surgical procedure	Number*	Percentage of total procedures (%)
Exploratory laparotomy	142	12.9
Burrhole(s) for ventricular external drainage	42	3.8
Closed (or no) reduction of fracture and internal fixation	19	1.7
Prosthetic cemented hemiarthroplasty of hip	18	1.6
Prosthetic hemiarthroplasty of hip, other	17	1.5
Diagnostic cystoscopy	15	1.4
Bypass of coronary artery, other	14	1.3
Reopening of laparotomy site	14	1.3
Abdominal aortic aneurysm, ruptured	13	1.2
Change of dressing	12	1.1
Laparotomy approach NEC	12	1.1
Debridement of skin NEC	12	1.1
Intestinal adhesions with obstruction	12	1.1
End colostomy	11	1.0
Extended right hemicolectomy and end-to-end anastomosis	11	1.0
Right hemicolectomy and anastomosis NEC	11	1.0
Endoscopic insertion of ureteric stent	11	1.0
Debridement of muscle NEC	10	0.9

*only procedures with 10 or more occurences listed
n = 1,102 procedures, 1 July 2012 to 30 June 2019
NEC = not elsewhere classified

Almost three quarters of audit patients (74.0%; 604/816) underwent operative treatment (Table 8). A total of 1,102 separate procedures were performed on these patients, with some patients undergoing multiple procedures during their admission or during the same surgical session.

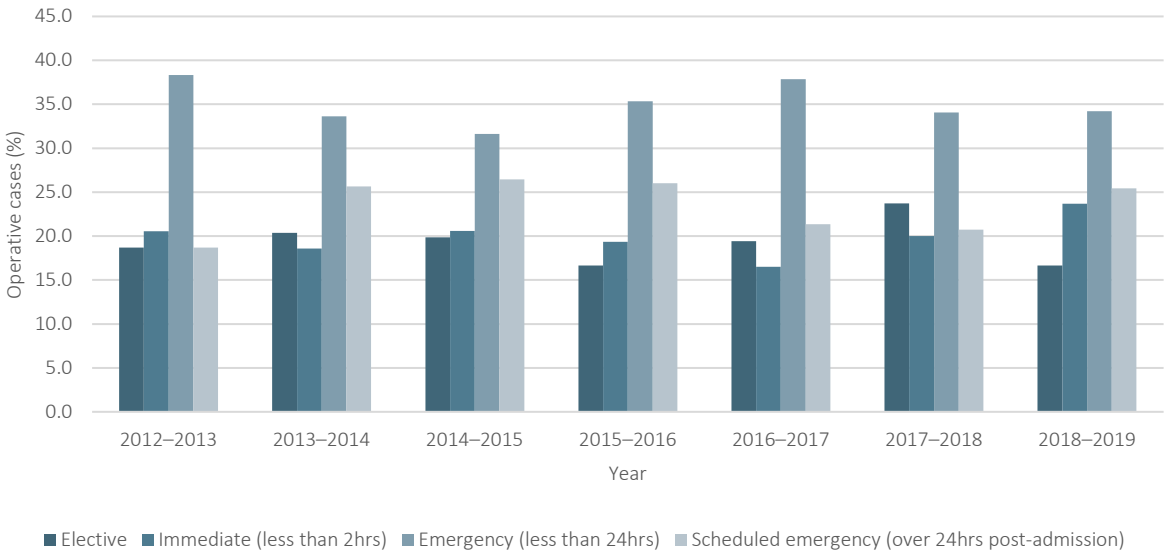
Table 8: Frequency of operative mortality by specialty, 2012–2019

Specialty	Operated	Total cases
Cardiothoracic Surgery	40 (93.0%)	43
General Surgery*	260 (67.2%)	387
Gynaecology	2 (100.0%)	2
Neurosurgery	89 (79.5%)	112
Orthopaedic Surgery	116 (77.3%)	150
Other **	2 (66.7%)	3
Otolaryngology Head and Neck	9 (75.0%)	12
Paediatric Surgery	3 (100.0%)	3
Plastic Surgery	8 (72.7%)	11
Urology	37 (72.5%)	51
Vascular Surgery	38 (90.5%)	42
Total	**604 (74.0%)**	**816**

* includes Colorectal Surgery
** includes Oral and Maxillofacial Surgery and Ophthalmology
n = 604 patients who underwent 1,102 separate surgical procedures, 1 July 2012 to 30 June 2019

The urgency of a patient's condition predicts the timing of emergency surgery. Figure 7 shows the timing of operative procedures for emergency and elective admissions. For emergency admissions that underwent surgery, 19.9% of surgical procedures occurred within 2 hours of admission; 34.8% occurred within 24 hours. Scheduled emergency surgery (more than 24 hours post-admission) comprised 23.7% (203/858) of emergency cases.

Figure 7: Timing of operative procedures, 2012–2019



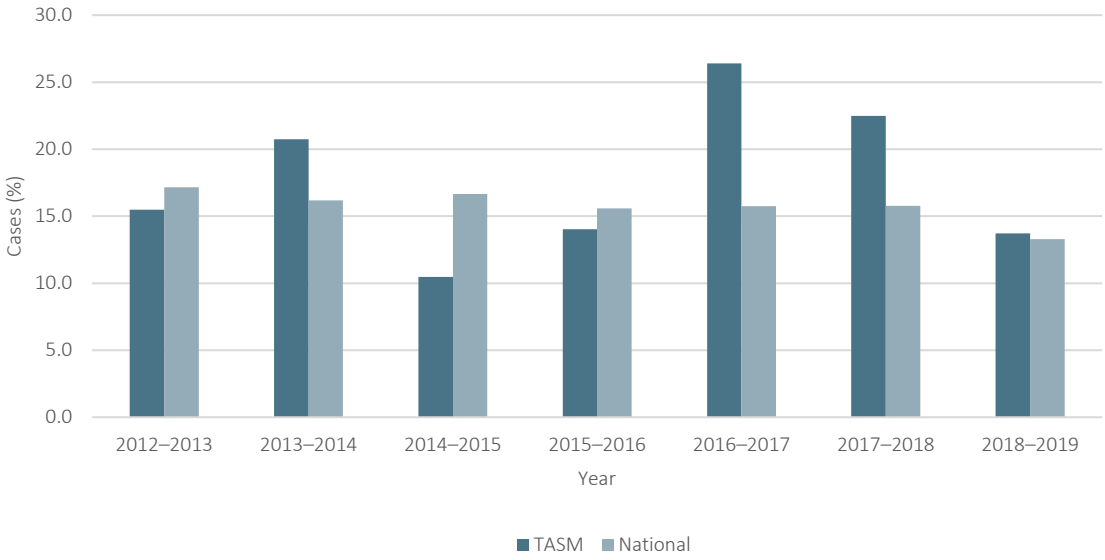
n = 862 separate surgical operations on 604 patients from 1 July 2012 to 30 June 2019

Overall, 54.8% (470/858) of surgical procedures on emergency admission patients occurred within 24 hours of admission. Strategies to address scheduling of emergency surgery are being implemented to ensure all emergency surgeries are performed within 24 hours of admission. This involves government, surgeons and hospitals.[12]

3.2 Unplanned return to the operating room

During a patient's hospital stay an unplanned return to the operating room (OR) is usually necessitated by the development of a complication requiring further surgical intervention. Some complications following complex surgery are expected due to a patient's pre-existing comorbidity profile, surgical risk status and the nature of the disease being treated. However, any returns to the OR may indicate that improvements to care are needed. TASM would like to see a decrease in unplanned returns to the OR over future audit periods. Figure 8 shows unplanned returns to OR over the total audit period (1 July 2012 to 30 June 2019).

Figure 8: Unplanned return to Operating Room, 2012–2019



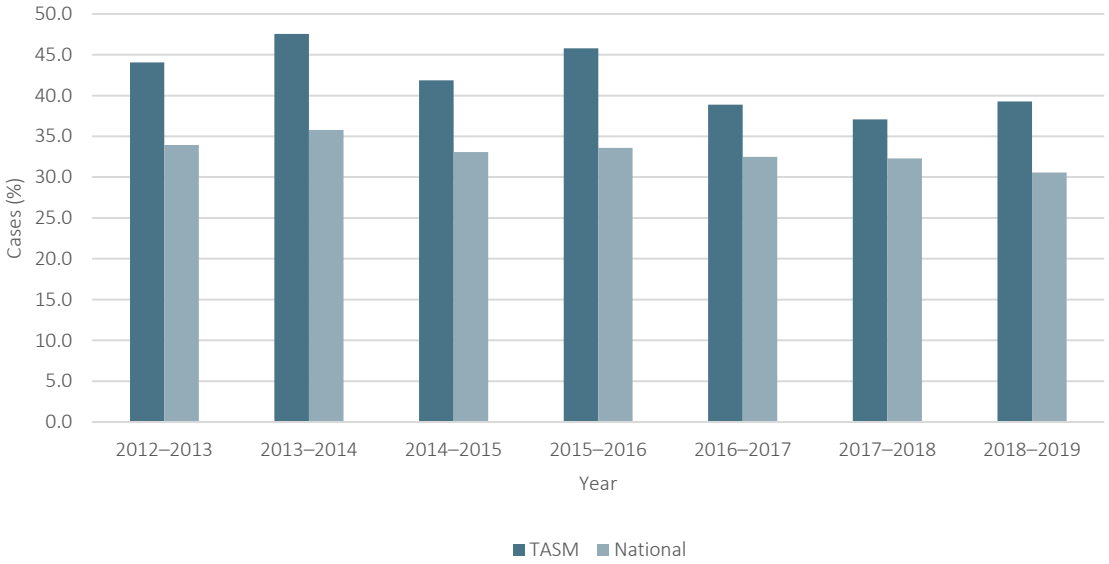
n = 622 patients, 1 July 2012 to 30 June 2019

Over the 7-year audit period (1 July 2012 to 30 June 2019), 17.2% (107/622) of TASM patients had an unplanned return to the OR, slightly more than the national figure of 15.7% (3,199/20,430). In the last 2 years, unplanned returns to OR have decreased compared to 2012–2013 to 2015–2016. TASM will continue to monitor this trend.

3.3 Postoperative complications

Figures 9, 10 and 11 show postoperative complications recorded in Tasmania and nationally, and the range and urgency of specific complications. The rate of postoperative complications differed among specialties (Figure 11). The percentage of patients with complications ranged from 11.1% for Otolaryngology, Head and Neck Surgery to 85.0% for Cardiothoracic Surgery.

Figure 9: Postoperative complications recorded by treating surgeons, 2012–2019

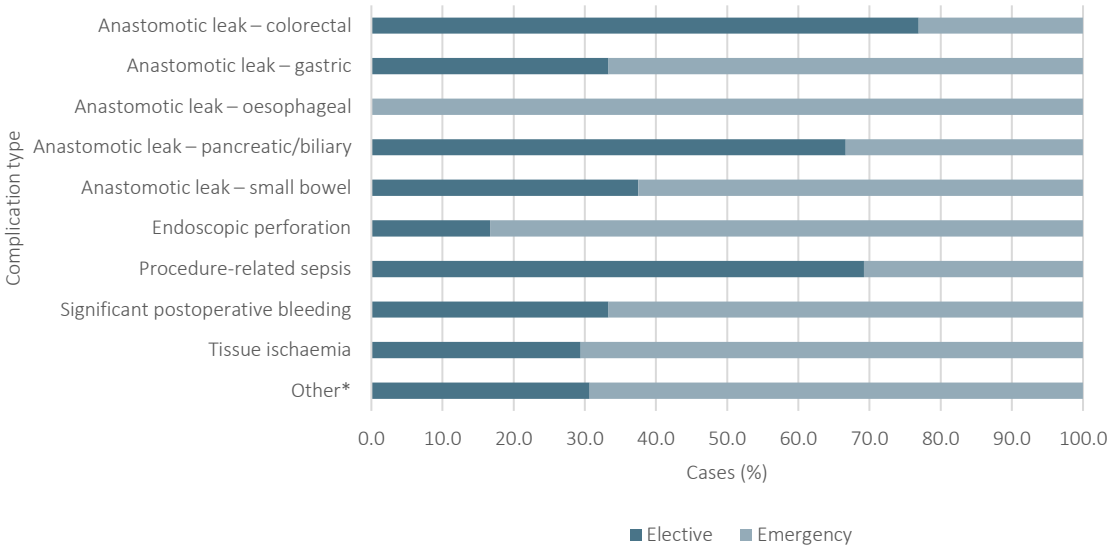


n = 255 complications in 604 operative cases in Tasmania, 1 July 2012 to 30 June 2019

Over the total audit period (1 July 2012 to 30 June 2019), 57.8% (349/604) of TASM patients who underwent operative treatment had no complications, which is fewer than the national figure of 66.9% (13,255/19,801). The TASM audit shows that postoperative complications rates are decreasing.

Of the deaths from 1 July 2012 to 30 June 2019, surgeons reported a delay in recognising postoperative complications in 11.0% of cases (28/254; data not available n = 2).

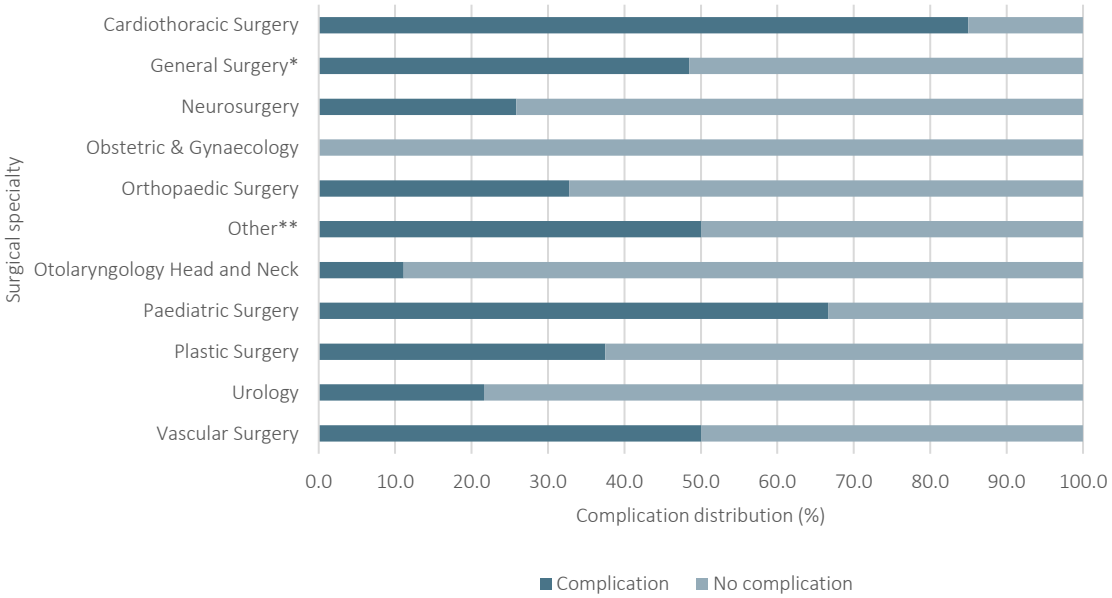
Figure 10: Frequency of specific postoperative complications by urgency status, 2012–2019



n = 255 complications in 604 operative cases (some operations had multiple complications)

*includes aspiration pneumonia, cardiac arrest, pulmonary embolus, myocardial infarction, respiratory failure and wound dehiscence

Figure 11: Postoperative complications by specialty, 2012–2019



n = 255 complications in 604 operative cases
* includes Colorectal Surgery
** includes Oral and Maxillofacial Surgery, Paediatric Ophthalmology and Gynaecology

3.4 Clinically significant infections

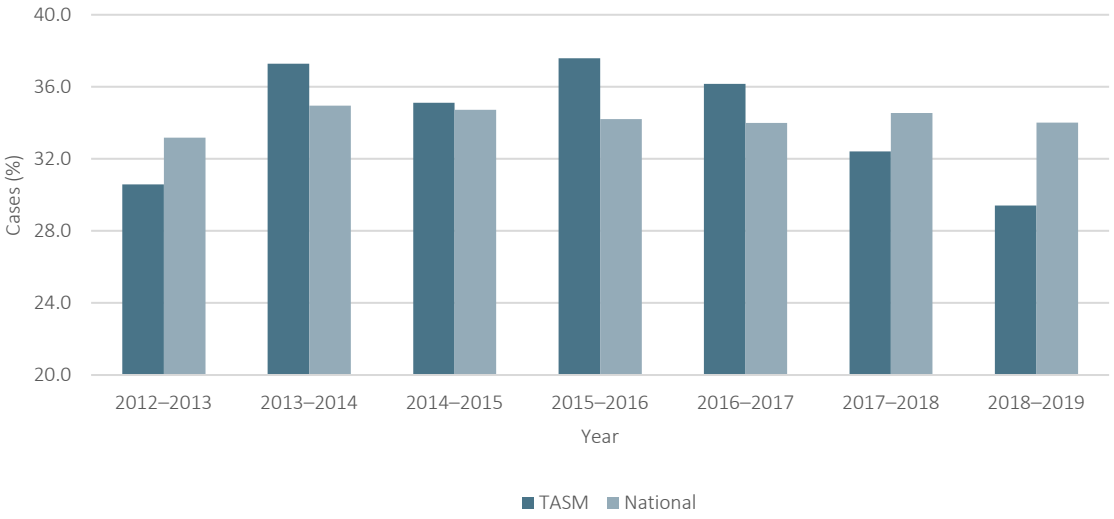
Surgeons are asked to report if, at the time of death, a patient had a clinically significant infection associated with an intervention that occurred during hospital admission. The number of patients with a surgery-associated infection has continued to decrease over the audit period; however, postoperative infection remains the leading cause of overall infection.

Over the 7-year audit period (1 July 2012 to 30 June 2019), surgeons reported a clinically significant infection in 34.2% (279/816) of audited deaths in Tasmania.

In the current audit year (1 July 2018 to 30 June 2019), 29.4% (30/102) of patients had a clinically significant infection in Tasmania, similar to the national finding of 34.0% (1,180/3,469) (Figure 12). Most reported infections were acquired postoperatively, accounting for 70.0% (14/20) of infection cases in Tasmania and 68.2% (428/628) nationally (Table 9).

The infective organism was identified in 31.2% (87/279) of the infection cohort. Combined, pneumonia and septicaemia comprised 69.5% (194/279) of the reported cases of infection (Table 10). Antibiotic prophylaxis is a good infection control measure in surgery and should be considered. Strategies for reducing surgical-site infections have been implemented overseas and in Australia.[13] The timeframe in which an infection is acquired can play a role in a patient's recovery following a surgical procedure.

Figure 12: Audited deaths with a clinically significant infection compared to national data, 2012–2019



n = 279 of 816 patients had a clinically significant infection in audited deaths in Tasmania, 1 July 2012 to 30 June 2019
Data not available: n = 1

Table 9 shows the distribution of clinically significant infections acquired during admission. Over the 7-year audit period (1 July 2012 to 30 June 2019), the proportion of other invasive-site infections in Tasmania was markedly lower than the national figure, and the proportion of infections acquired preoperatively was also lower than the national figure.

Table 9: Audited deaths with a clinically significant infection acquired during admission, 2012–2019

Infection acquired	TASM	National
Postoperatively	74.4% (119/160)	67.6% (3,002/4,442)
Preoperatively	15.6% (25/160)	17.5% (778/4,442)
Other invasive-site infection	3.1% (5/160)	7.1% (314/4,442)
Surgical-site infection	6.9% (11/160)	7.8% (348/4,442)

n = 279 of 816 patients had a clinically significant infection
Data collection for clinically significant infections commenced 2011–2012
Data not available: n = 1

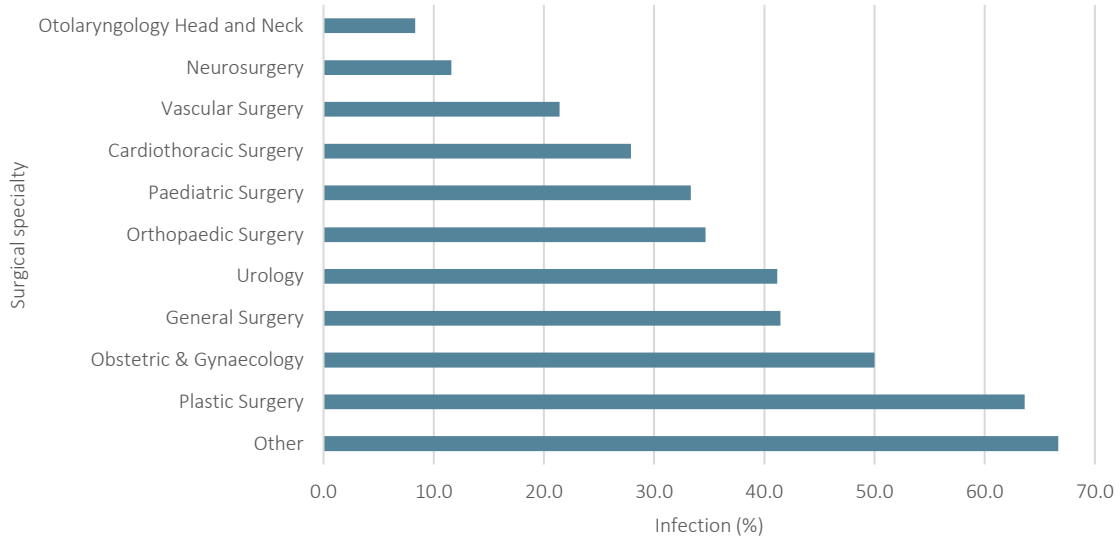
Of those infections acquired during admission, 74.4% (119/160) were acquired postoperatively, 15.6% (25/160) were acquired preoperatively, 6.9% (11/160) were surgical site infections and 3.1% (5/160) were attributed to other infections. Trends for these figures will be monitored in years to come.

Table 10: Clinically significant infections by type, 2012–2019

Type	Number	Percentage (%)
Pneumonia	114	40.9
Septicaemia	80	28.7
Intra-abdominal sepsis	55	19.7
Other source*	30	10.8
All	**279**	**100.0**

* includes *Klebsiella*, *Clostridium difficile*, *Escherichia coli* and methicillin-resistant *Staphylococcus aureus*
n = 279 infections in 816 patients
Data not available: n = 1

Figure 13: Clinically significant infections by specialty, 2012–2019



n = 279 infections in 816 patients

The infection rate varied across individual surgical specialties, reflecting the differing case mix between 1 July 2012 and 30 June 2019 (Figure 13). In the current audit year (2018–2019), these three specialties listed had the highest infection rate – Urology had an infection rate of 57.1% (4/7), General Surgery – colorectal 50.0 % (1/2) and General Surgery 45.2% (19/42) (data not shown in Figure 13).

3.5 Delay in diagnosis

Treating surgeons were asked to record any perceived delays in establishing a diagnosis and proceeding to definitive treatment (Tables 11 and 12). Treating surgeons identified delays in establishing the diagnosis in 8.0% (65/816) of audited cases. This rate has remained relatively constant over time.

Table 11: Delays associated with establishing a diagnosis, 2012–2019

Delay association	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	7-year audit period
GP	0 (0.0%)	1 (9.1%)	1 (12.5%)	0 (0.0%)	1 (20.0%)	1 (7.7%)	0 (0.0%)	4 (6.2%)
Medical unit	4 (40.0%)	2 (18.2%)	1 (12.5%)	0 (0.0%)	2 (40.0%)	4 (30.8%)	2 (16.7%)	15 (23.1%)
Surgical unit	0 (0.0%)	2 (18.2%)	3 (37.5%)	2 (33.3%)	1 (20.0%)	3 (23.1%)	4 (33.3%)	15 (23.1%)
Other*	6 (60.0%)	6 (54.5%)	3 (37.5%)	4 (66.7%)	1 (20.0%)	5 (38.5%)	6 (50.0%)	31 (47.7%)
Total delays	**10 (100.0%)**	**11 (100.0%)**	**8 (100.0%)**	**6 (100.0%)**	**5 (100.0%)**	**13 (100.0%)**	**12 (100.0%)**	**65 (100.0%)**
Closed	121	118	132	141	94	108	102	816

n = 65 issues from 816 cases; one case can have multiple delay associations
GP: general practitioner
*includes delay from hospital in the home, nursing home and emergency department

Table 12: Perceived delays in proceeding to definitive treatment, 2012–2019

Reason for delay	Number	Percentage (%)
Unavoidable factors	15	23.1
Other*	15	23.1
Inexperienced staff	14	21.5
Misinterpretation of results	12	18.5
Incorrect test	9	13.8
Results not seen	0	0.0
Total	**65**	**100.0**

n = 65 issues identified in 816 cases; one case can have multiple reasons for delays
*includes delay to imaging, delay in emergency department and incorrect consultation

3.6 DVT prophylaxis

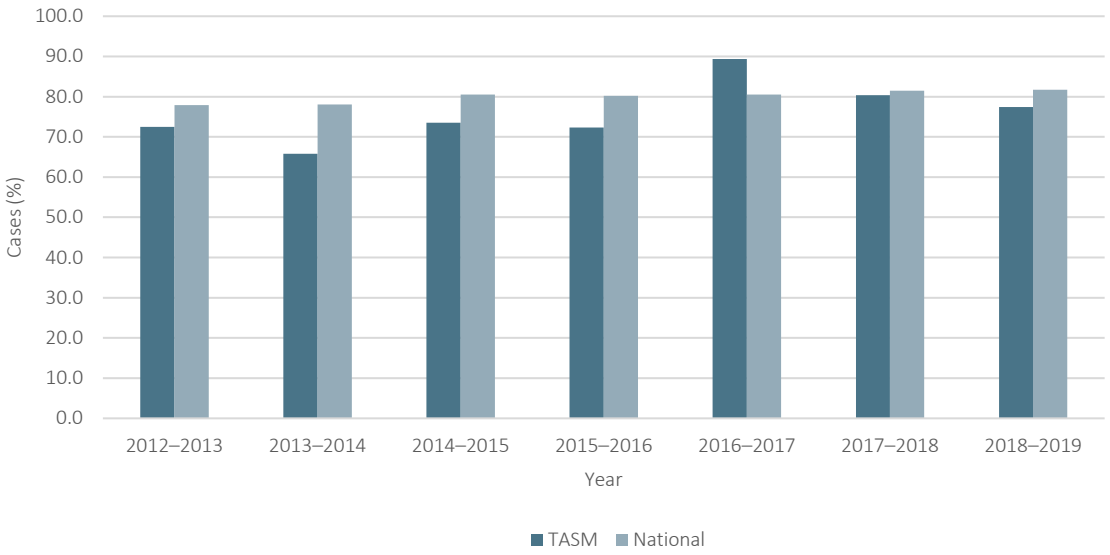
Despite the availability of effective pharmacological and mechanical preventative options, DVT remains a major cause of mortality in hospital patients across Australia. Clinical practice guidelines for the prevention of venous thromboembolism in patients admitted to Australian hospitals[14] are reviewed and updated periodically to facilitate the best available care to patients. Recommendations within the guidelines are intended to encapsulate the available evidence for prevention of DVT. These guidelines should be followed in conjunction with the professional opinion of clinicians caring for individual patients and the preferences of each patient.

TASM seeks to determine if appropriate strategies are being used to prevent DVT and subsequent pulmonary embolism in patients at risk. The treating surgeon was asked to record whether DVT prophylaxis was provided, and if so, which type of prophylaxis was used. Overall, DVT prophylaxis was used in 75.0% (612/816) of operative cases between 1 July 2012 and 30 June 2019 (Figure 13). The use of DVT prophylaxis was higher in elective admission patients 82.4% (14/17) than it was in emergency admissions 76.5% (65/85) (Figure 15).

The type of prophylaxis used is subject to the judgement of clinicians caring for individual patients. Use of DVT prophylaxis has been consistent between 1 July 2012 and 30 June 2019, with heparin the most frequently prescribed form (Figure 16).

Assessors were asked to comment on the appropriateness of withholding prophylaxis (Table 14). First-line assessors felt that the decision to withhold DVT prophylaxis on clinical grounds was appropriate in 89.6% (655/731) of cases, whereas second-line assessors felt that the decision to withhold DVT prophylaxis on clinical grounds was appropriate in 83.2% (84/101) of cases. The tendency of second-line assessors to be more critical of clinical management events is to be expected after reviewing patient medical records.

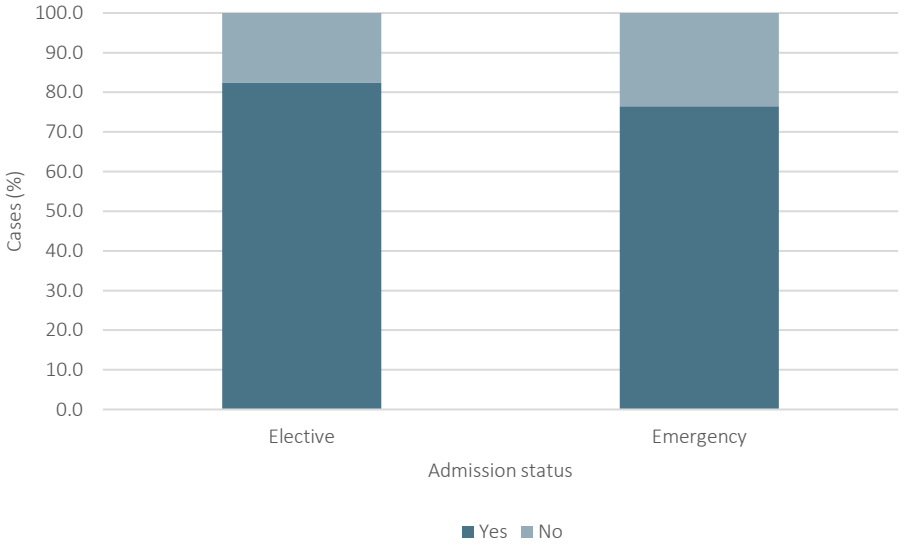
Figure 14: DVT prophylaxis use during the audit period, 2012–2019



n = 813 Tasmanian patients having an operative procedure from 1 July 2012 to 30 June 2019; unknown cases = 3.

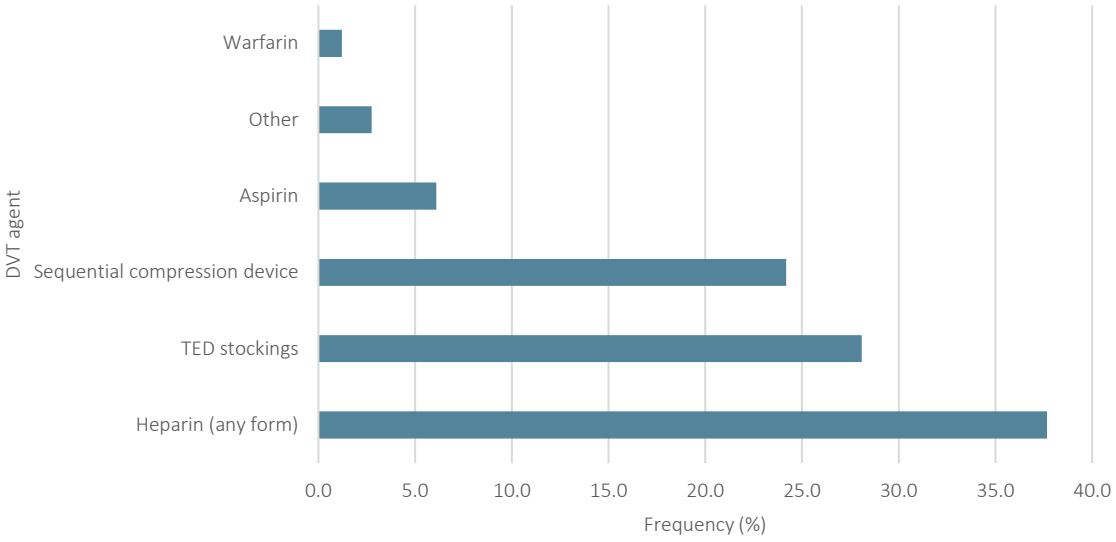
n = 24,401 national patients having an operative procedure from 1 July 2012 to 30 June 2019; unknown cases = 4,765.

Figure 15: DVT prophylaxis use by admission type, 2018–2019



n = 813 Tasmanian patients; unknown cases n = 3

Figure 16: Type of DVT prophylaxis used, 2012–2019



n = 612 patients received DVT agents, 1 July 2012 to 30 June 2019.
Other includes calf stimulators, clopidogrel, epidural, full anticoagulation for non-ST segment elevation myocardial infarction, and inferior vena cava filter and infusion.

Table 13: Reasons given by treating surgeons for non-provision of DVT prophylaxis, 2012–2019

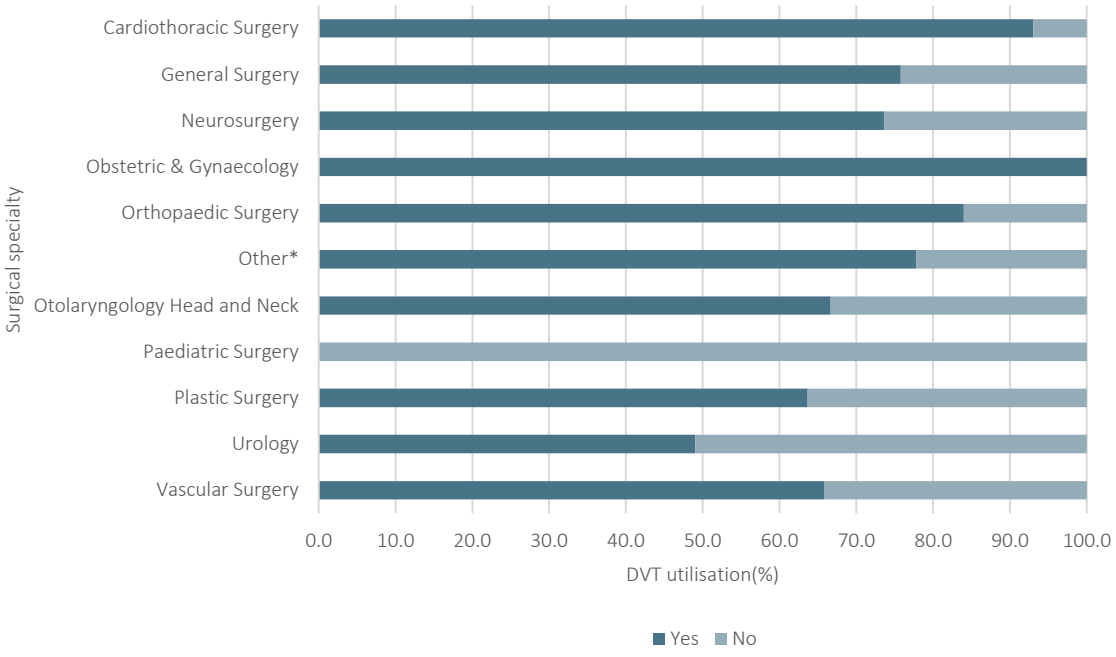
Reason for no use	Frequency	Percentage (%)
Appropriate	724	88.7
Not appropriate	12	1.5
Unknown	80	9.8
Total	**816**	**100.0**

Table 14: Assessor perception of appropriateness of the decision to withhold DVT prophylaxis, 2012–2019

Reason for no use	First-line assessor	Second-line assessor
Appropriate	655 (89.6%)	84 (83.2%)
Not appropriate/unknown	76 (10.4%)	17 (16.8%)
Total assessments with no use of DVT	**731 (100.0%)**	**101 (100.0%)**

DVT: deep vein thrombosis.

Figure 17: DVT prophylaxis use by specialty, 2012–2019



*includes Colorectal, and Oral and Maxillofacial Surgery

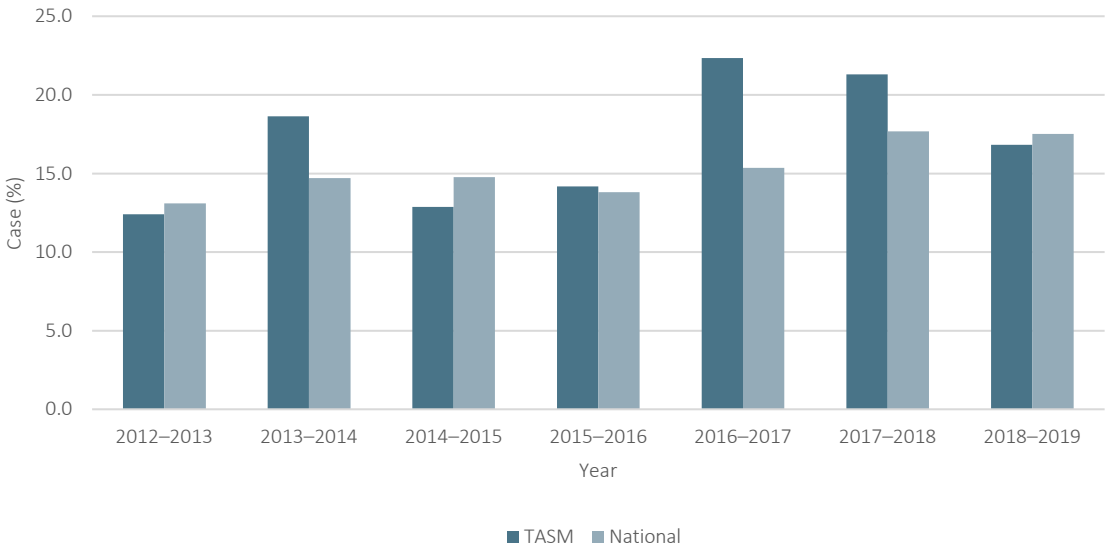
3.6.1 Unplanned Admission to Critical Care Unit

Critical care management is an important area of clinical priority that TASM has been monitoring. Figure 18 illustrates how unplanned admissions to Tasmanian and national CCUs have changed over time.

Between 1 July 2012 and 30 June 2019, surgeons reported an unplanned admission to CCU in 16.6% (135/816) of audited deaths in Tasmania, which is comparable to the national figure of 15.1% (4,423/29,197).

There has been a reduction in the number of unplanned admissions to CCU in the most recent audit period 2018–2019. From 2016–2017 to 2018–2019, it has reduced from 22.3% (21/94) to 16.8% (17/101).

Figure 18: TASM deaths with unplanned admission to CCU compared to national data, 2012–2019

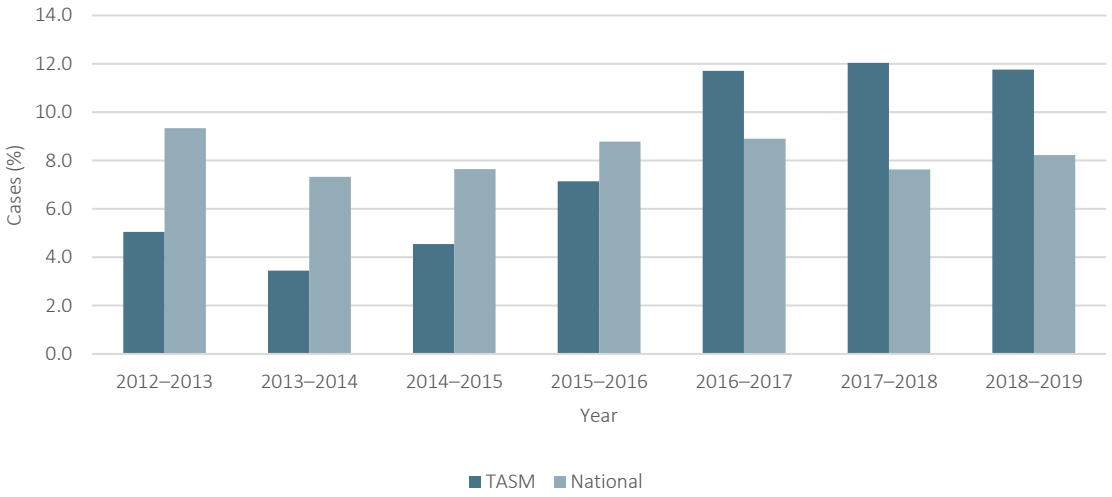


3.7 Issues with fluid balance

Surgical consultants and clinical teams should be competent in fluid management strategies. Determining the optimum volume of intravenous fluids to be administered to surgical patients and the best rate at which to give them can be complex. Treatment decisions must be based on careful assessment of individual patient needs, with the overall goal being provision of sufficient fluids and electrolytes to meet losses, maintain the normal status of body fluid components and enable renal excretion of waste products. The interaction between fluid balance and disease severity for critically ill patients indicates that 'early adequate fluid resuscitation together with conservative late fluid management may provide better patient outcomes.[15]

Treating surgeons and assessors were asked to comment on the appropriateness of fluid balance during the episode of care. Surgeons reported issues with fluid balance in 7.6% (62/811) of cases in Tasmania over the total 7-year audit period (1 July 2012 to 30 June 2019), slightly lower than the national audit figure of 8.2% (1,992/24,160) (Figure 19). In the current audit year (1 July 2018 to 30 June 2019), surgeons reported that 11.8% (12/102) of TASM audited deaths had fluid balance issues, which shows increases since 2013–2014.

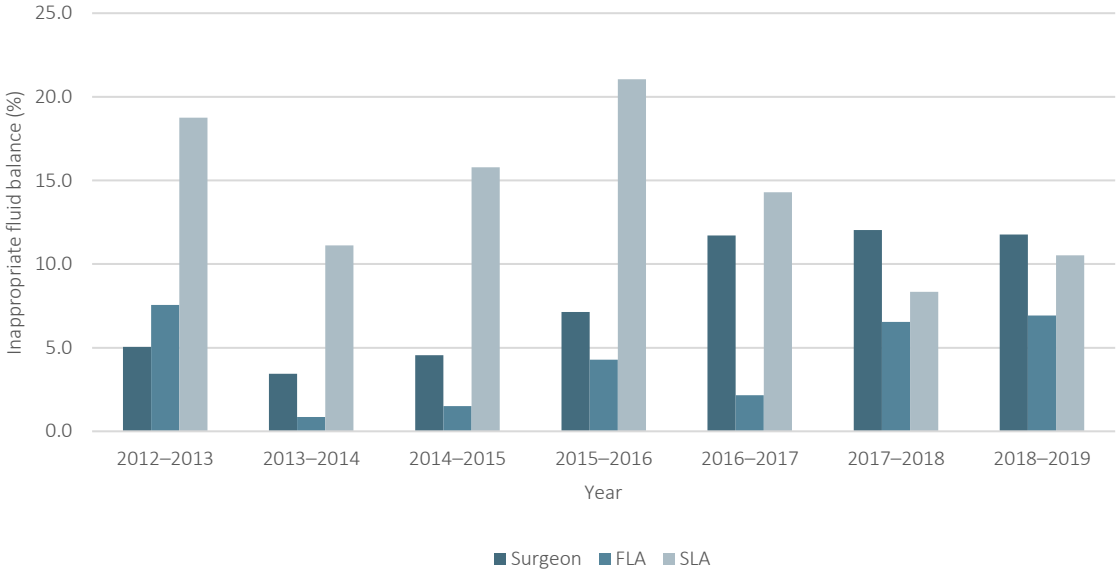
Figure 19: TASM deaths with fluid balance issues compared to national data, 2012–2019



n = 62 of 811 patients had issues with fluid balance reported, 1 July 2012 to 30 June 2019.

Over the 7-year audit period (1 July 2012 to 30 June 2019), treating surgeons felt that in 7.6% (62/811) of cases the patient's fluid balance had been inappropriately managed by the clinical team (Figure 20). First-line assessors perceived that the fluid balance was inappropriate in 4.2% (34/811) of cases; second-line assessors perceived the fluid balance to be inappropriate in 14.9% (15/101) of the cases they reviewed.

Figure 20: Perception of inappropriateness of fluid balance management, 2012–2019

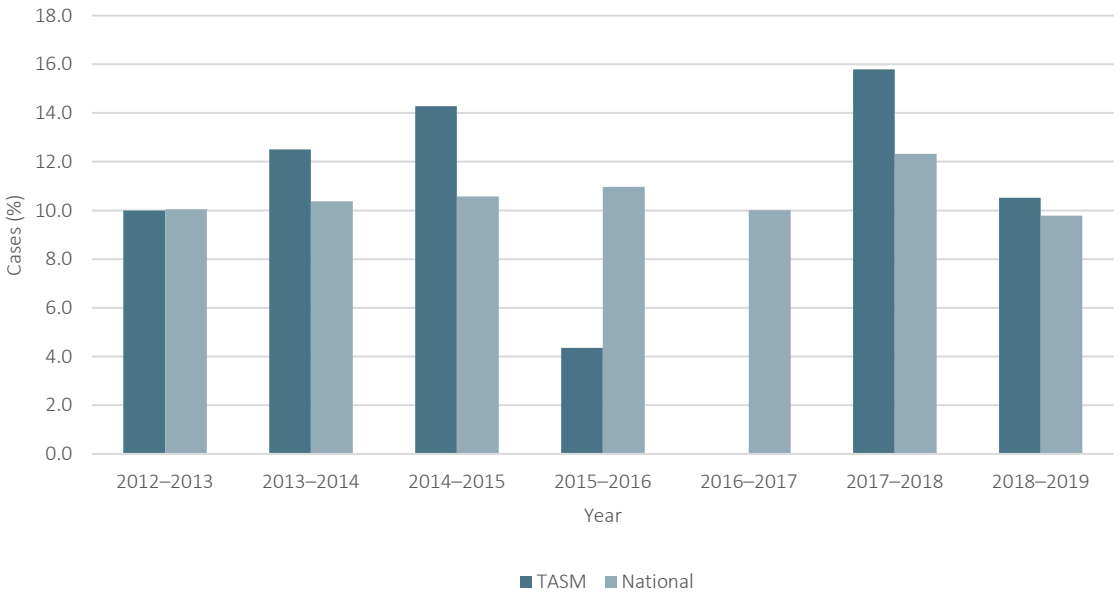


3.8 Delay in transfer to another hospital

Over the 7-year audit period (1 July 2012 to 30 June 2019), 16.4% (130/793) of patients were transferred to another hospital in Tasmania, a figure that has remained reasonably constant between 1 July 2012 and 30 June 2019. Surgeons reported that 10.2% of those transferred (13/128) to another hospital had a delay in transfer (Figure 21).

In the current audit year (1 July 2018 to 30 June 2019), 19 patients were transferred to another hospital, and 10.5% (2/19) of these were reported to have experienced delays in the transfer. (In all instances, percentages were calculated after excluding cases with no additional information provided.)

Figure 21: TASM deaths with delays associated with transfer to another hospital compared to national data, 2012–2019



n = 130 patients of 793 had delays in transfers reported (1 July 2012 to 30 June 2019). Data not available: n = 21.
It should be highlighted that Tasmania had 1 out of 23 and 0 out of 10 of delay in transfer in 2015–2016 and 2016–2017 respectively which resulted in very low (4.3%) and zero (0.0%) percentage in those 2 audit years.

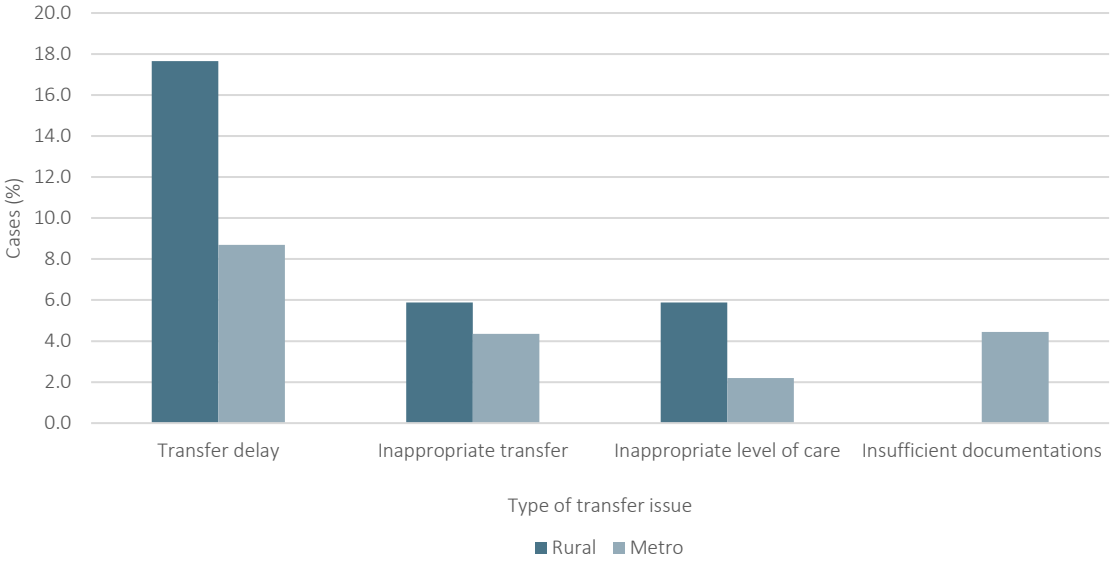
The rate of inappropriate transfer was 4.7% (6/128). An inappropriate level of care during transfer was identified for 2.4% (3/127) of transfer cases, while inadequate clinical information and documentation was provided to the receiving hospital in 3.2% (4/126) of transfer cases.

Comparing Tasmanian data to the national findings reveals very little difference in transfer delays, being 10.2% (13/128) for Tasmanian patients and 10.6% (621/5,861) for patients in the national audit.

3.8.1 Inter-hospital transfer issues by region

A major reason for transfer to another hospital is to provide a higher level of care, such as access to critical care support and surgical specialties. It is expected that rural hospitals will have a greater need to transfer patients. Figure 22 shows that transfer delays occurred more frequently in regional areas 17.6% (3/17) than in metropolitan areas 8.7% (8/94).

Figure 22: Issues associated with patient transfers from rural or metropolitan areas, 2012–2019



RACS recognises the need for clinical support in rural areas, where appropriate care and the availability of well-trained doctors is often limited.[16] RACS is examining ways to improve the surgical training program by assisting rural hospitals to meet training standards currently designed for metropolitan training hospitals. RACS is also encouraging highly trained surgeons to relocate to and practice in rural settings.[17]

Table 15 shows how transfer issues have varied between 1 July 2012 and 30 June 2019. Transfer delays and problems increase the risks to patients and are one of the challenges associated with shared care. Communication between patient care teams is an area of particular focus. The transfer of patients remains an area in which further improvements are required to ensure patient safety.

Table 15: Types of issues associated with patient transfer, 2012–2019

Patient Transfer	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	7-year audit period
Inappropriate transfer	0 (0.0%)	1 (6.3%)	3 (14.3%)	0 (0.0%)	0 (0.0%)	1 (5.3%)	1 (5.3%)	**6 (4.7%)**
Insufficient documentation	1 (5.0%)	0 (0.0%)	2 (10.0%)	1 (4.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**4 (3.2%)**
Inappropriate level of care	0 (0.0%)	0 (0.0%)	3 (15.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**3 (2.4%)**
Transfer delay	2 (10.0%)	2 (12.5%)	3 (14.3%)	1 (4.3%)	0 (0.0%)	3 (15.8%)	2 (10.5%)	**13 (10.2%)**
Total transfer issues	**3 (3.8%)**	**3 (4.8%)**	**11 (13.4%)**	**2 (2.2%)**	**0 (0.0%)**	**4 (5.3%)**	**3 (3.9%)**	26 (5.1%)

n = 26 issues with 130 patients transferred

3.9 Outcomes of the peer review

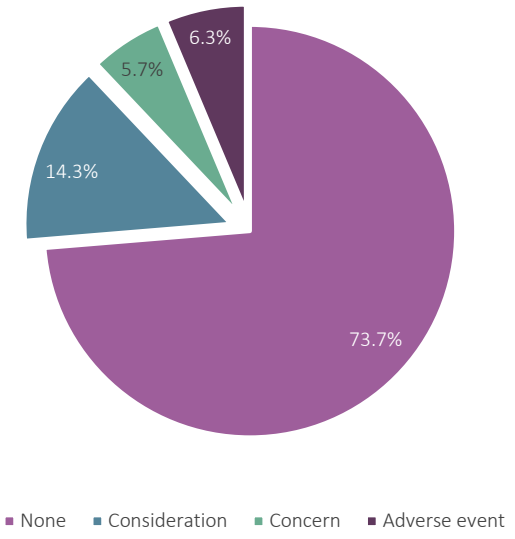
The audit process outlined in section 1.3 highlights the quality assurance loop in the review process, providing feedback and recommendations to the treating Fellow, the surgical team, the clinical community and participating hospitals.

A primary objective of the TASM peer review process is ascertaining whether death was a direct result of the disease process alone and clinical management had no impact on the outcome, or if aspects of patient management may have contributed to the death of the patient. For cases in which there is a perception that the clinical management may have contributed to the outcome, TASM has a spectrum of criticism from which the assessor can select a level of severity, as outlined below:

- Area for **consideration**: The assessor believes an area of care **could** have been improved or done differently, but recognises that the issue is debatable. This represents very minor criticism.
- Area of **concern**: The assessor believes that an area of care **should** have been better.
- **Adverse event**: An occurrence defined as an unintended injury or event **caused** by the medical management of the patient rather than by the disease process, which was sufficiently serious to lead to prolonged hospitalisation or temporary or permanent impairment or disability of the patient, or which contributed to or caused death.

For 87.9% (722/821) of audit cases there were no or only minor (area of consideration) perceived issues of patient management (Figure 23). Areas of concern were identified in 5.7% (47/821) of cases and adverse events—the most serious form of criticism—were identified by assessors in 6.3% (52/821) of patient cases.

Figure 23: Clinical management issues as identified by assessors, 2012–2019



n = 821

3.9.1 Areas of clinical incidents

Table 16 is a reference table showing the severity of criticism of perceived clinical management issues. More than one clinical management issue may be identified for each patient. It is the percentage of patients affected that is the important measure.

The severity of clinical incidents focuses on the accountability of the surgical team because this is the primary focus of the TASM audit. Patients often require input from other clinical teams during the course of their treatment and management issues raised may be attributable to any of these teams. Table 19 shows the frequency of clinical management issues over the audit period.

Trends in, and causes of, clinical management issues are monitored closely by TASM and remain the focus of reports and educational events.

Over the 7-year audit period (1 July 2012 to 30 June 2019), 22.6% (225/915) of issues were considered to be preventable. The preventability of clinical management issues continues to be a focus for TASM.

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

Table 17: Surgeons reporting of clinical management issues, 2012–2019

Perceived impact of clinical issues on patient outcome	Total occurrences of CMI	Percentage (%)
No issues of management identified	605	64.5
Did not affect clinical outcome	72	7.7
May have contributed to death	211	22.5
Probably contributed to death	50	5.3
Total	**938**	**100.0**

Perceived preventability of clinical issues	Total occurrences of CMI	Percentage (%)
No issues identified	605	66.1
Definitely preventable	67	7.3
Probably preventable	158	17.3
Probably not preventable	75	8.2
Definitely not preventable	10	1.1
Total	**915**	**100.0**

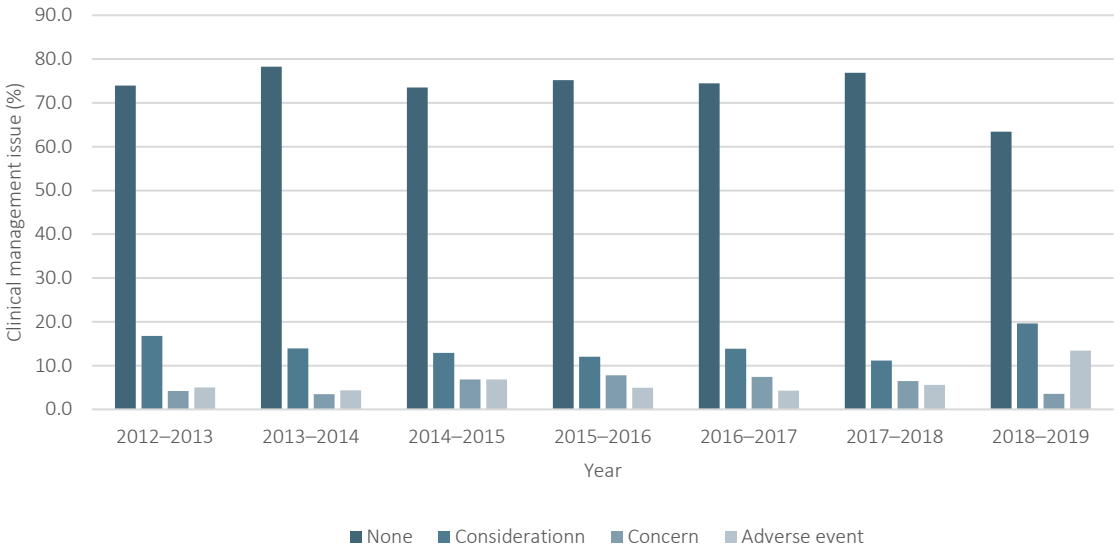
Clinical team responsible for management issue	Total occurrences of CMI	Percentage (%)
No issues identified	605	63.6
Surgical team	199	20.9
Other clinical team	101	10.6
Hospital issue	34	3.6
Other factors*	12	1.3
Total	**951**	**100.0**

CMI: clinical management issue
One patient case can be associated with more than one CMI. 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.

Overall, 20.9% (199/951) of clinical management issues were attributable to the surgical team. Other clinical teams, for example medical and emergency departments, were responsible for 10.6% (101/951) of issues. Hospital issues accounted for 3.6% (34/951) of clinical management issues and 1.3% of issues (12/951) were attributed to other factors. These findings are similar to the national audit results.[1]

Figure 24 shows that the distribution of clinical issues has remained constant over the audit period (1 July 2012 to 30 June 2019).

Figure 24: Frequency and classification of clinical management issues by audit period, 2012–2019



n = 821.

In the current audit year, minor issues of patient management were perceived to have occurred in 19.6% (22/112) of cases; areas of concern were perceived in 3.6% (4/112) (Table 18). Peer review identified that there was a clinical issue serious enough to be categorised as an adverse event in 13.4% (15/112) of cases.

Table 18: Areas of clinical management issues by assessors, 2012–2019

Characteristics	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
No issues identified	73.9% (88/119)	78.3% (90/115)	73.5% (97/132)	75.2% (106/141)	74.5% (70/94)	76.9% (83/108)	63.4% (71/112)
Area of consideration	16.8% (20/119)	13.9% (16/115)	12.9% (17/132)	12.1% (17/141)	13.8% (13/94)	11.1% (12/108)	19.6% (22/112)
Area of concern	4.2% (5/119)	3.5% (4/115)	6.8% (9/132)	7.8% (11/141)	7.4% (7/94)	6.5% (7/108)	3.6% (4/112)
Adverse event	5.0% (6/119)	4.3% (5/115)	6.8% (9/132)	5.0% (7/141)	4.3% (4/94)	5.6% (6/108)	13.4% (15/112)
Preventable issues	16.0% (19/119)	11.3% (13/115)	16.7% (22/132)	16.3% (23/141)	14.9% (14/94)	14.8% (16/108)	20.5% (23/112)
Adverse event or area of concern that was preventable	5.9% (7/119)	5.2% (6/115)	11.4% (15/132)	10.6% (15/141)	8.5% (8/94)	9.3% (10/108)	0.0% (0/112)

In the current audit year, no adverse events or areas of concern occurred that were perceived to be preventable. Over the 7-year audit period (1 July 2012 to 30 June 2019), this was 7.4% (61/821). TASM is aware of the higher percentage of adverse events in 2018–2019. Evidence showed no linkage to specific specialties. It is believed the increase is due to better reporting. TASM will continue to monitor the situation closely.

3.9.2 Frequency of clinical management issues

Table 19 shows the frequency of specific issues of clinical management. A greater number of clinical management issues indicates the requirement for improved surgical care in that area.

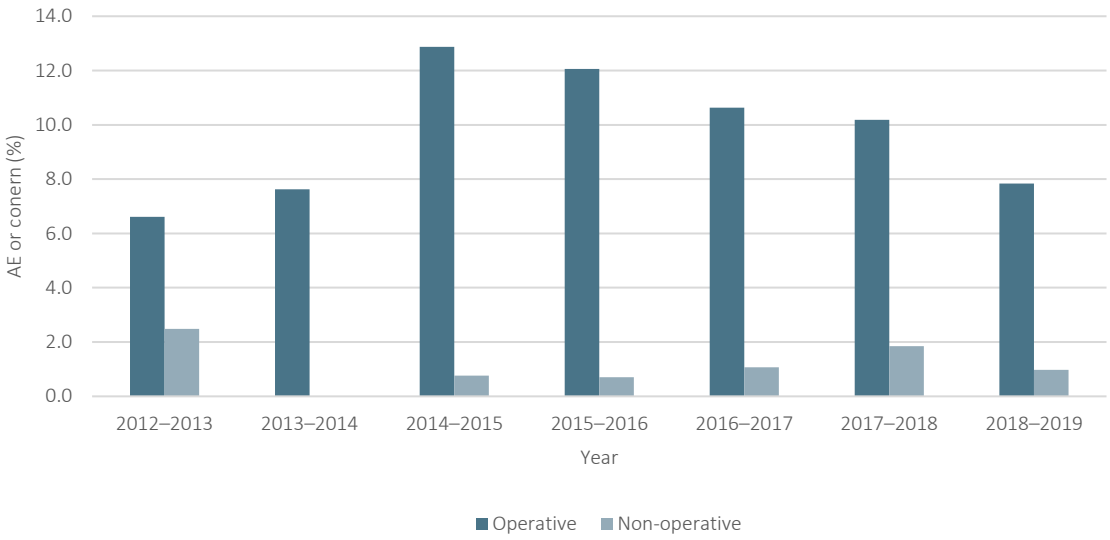
Table 19: Frequency of clinical management issues, 2012–2019

Clinical management issue	Total
Adverse factors in management	11
General complications of treatment	9
Decision to operate	8
Better to have done different operation or procedure	7
Diagnosis-related complications	7
Delay to surgery (i.e. earlier operation desirable)	5
Assessment problems	5
Postoperative care unsatisfactory	4
Poor documentation	4
Postoperative bleeding after open surgery	4
Operation should not have been done or was unnecessary	3
Wrong operation performed	3
Delay to operation caused by missed diagnosis	3
Failure to fully investigate or assess patient	3
Delay in diagnosis	3
Unsatisfactory medical management	3
Wrong surgical approach used	3

n = 290 clinical management issues identified from 1 July 2012 to 30 June 2019
Clinical management issues included if frequency >3

The frequency of adverse events classified according to operative status is shown in Figure 25. Together, areas of concern and adverse events amounted to 10.9% (89/816) during the total 7-year audit period (1 July 2012 to 30 June 2019). Nonoperative procedures had fewer areas of concern and adverse events 1.1% (9/816) compared with cases in which an operative procedure was performed 9.8% (80/816).

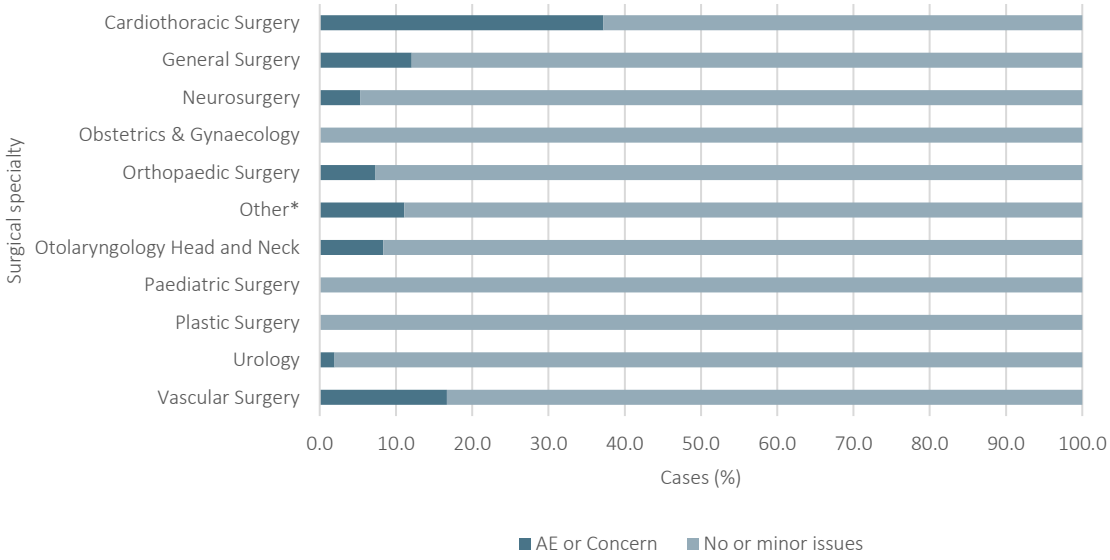
Figure 25: Frequency of adverse events and areas of concern by operative status, 2012–2019



n = 89 areas of concern and adverse events amongst 816 cases.
AE: adverse event.

Figure 26 shows adverse events and areas of concern classified according to surgical specialty. TASM has initiated the surgeon's individual aggregate report to enable benchmarking and monitoring of clinical management trends.

Figure 26: Adverse events and areas of concern by surgical specialty, 2012–2019



AE: adverse event
Other includes Colorectal Surgery, and Oral and Maxillofacial Surgery

3.9.3 Conclusions

Surgery in Tasmania is safe and well regulated. Only a small proportion of surgical patients die. When a death does occur, it is reviewed by peer surgeon assessors coordinated by RACS via TASM. The de-identified and aggregated results of those investigations are presented in this report.

As our population ages, more work and more challenges will confront the surgical community. The surgeons who form this vital part of our healthcare system will rise to these challenges—learning from the issues in these pages, from scientific achievements from around the world and from the opportunities for self-reflection that TASM offers.

4. Trauma

In 2016, TASM began collecting data on trauma cases to monitor trends, especially those relating to falls. Trauma cases are those in which a patient received severe bodily injury or shock from a fall, accident or violence. Monitoring will ensure strategies are implemented to prevent and minimise harm from trauma in the future.

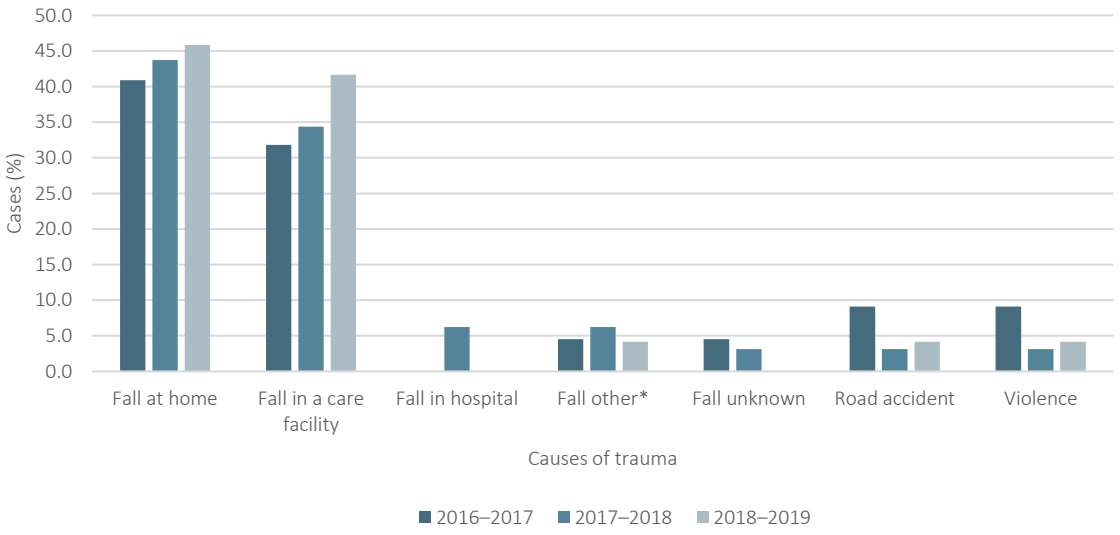
Results for the 3-year period (1 July 2016 to 30 June 2019) show that falls occurred mostly at home and at care facilities (Figure 27). Preventative measures need to consider these sites as part of the healthcare strategic planning to reduce the total number of falls. Falls in hospital can impact or be a cause for further surgical or medical intervention.

In this 3-year period (1 July 2016 to 30 June 2019), 25.7% (78/304) of mortalities were attributed to trauma. Of those trauma events, 89.7% (70/78) were due to falls, 5.1% (4/78) were due to traffic accidents and 5.1% (4/78) were associated with violence. Of the 70 falls, 40.0% (28/70) occurred in hospitals or care facilities, while 48.6% (34/70) occurred at home. Only 11.4% of falls (6/70) occurred elsewhere.

The TASM surgical population is at increased risk of falls due to the extent of life-threatening pre-existing conditions, comorbidities, and frailty associated with advanced age. The 40.0% (28/70) of TASM-audited falls occurring in hospitals or care facilities, should be addressed and strategies implemented to reduce this number. The 2016 census,[18] released by the Australian Bureau of Statistics in 2017, shows that Tasmania had the highest proportion of the population aged 70 years and above (13.0%) when compared with the rest of Australia (10.7%).

TASM hopes to see a reduction in falls and will include this in its future educational programs. Reviewing falls in trauma and orthopaedic cases can be a powerful tool to unite institutions motivated to assess changing demographics and standards of treatment, and to institute change.[19] One study found a reduction in postoperative falls in patients who participated in a preoperative education program.[20] Similar educational strategies could be implemented at Tasmanian healthcare facilities.[21]

Figure 27: Audited deaths with causes of trauma, 2016–2019



n = 78 trauma cases reported in 304 patients (1 July 2016 to 30 June 2019)
*includes public venues

5. Audit limitations and data management

Data quality is an essential component of all audits. Inaccurate and incomplete clinical information will impair the audit process and prevent identification of trends.[22]

TASM audit data are primarily collected, managed, peer-reviewed and analysed to provide feedback to surgeons rather than for academic research. The data are of high quality as every case undergoes external peer review.

The data are self-reported, thus a certain level of bias may be present. Independent assessors make their own assessments on the facts presented.

Appropriate responses to TASM questions are important, because incomplete or missing data hinders the ability of the audit to identify and address adverse trends. Where data integrity issues are identified the format of the questions generating the data must be reviewed. ANZASM has revised the SCF to improve the quality of audit data.

In 2016, ANZASM upgraded the Electronic Fellows Interface for enhanced data submission, which should lead to continuously improving data quality and integrity.

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7. Appendix

7.1 Data management and statistical analysis

All deaths occurring in Tasmanian hospitals while the patient is under the care of a surgeon, which 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 2018–2019 report includes deaths reported to TASM since data collection commenced on 1 July 2012 up to 30 June 2019. Multiple rate-limiting steps in the audit process result in a mean time to completion of 3 months, meaning information on some deaths that occurred during the reporting period may be still under review and are thus not included in this report.

Data are encrypted in the web database. These data are submitted for storage 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 are downloaded from the secure database and then analysed using Microsoft Office Excel 365. Demographic data and summary statistics are presented. Variables have also been tested for yearly trends. Numbers in parentheses in the text (n) represent the number of cases analysed. These numbers vary as not all data fields are completed by all surgeons.

7.2 Exclusion of identifiable data

Extreme values and data that may identify surgical groups, patients or hospitals have been excluded from this report.

7.3 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.

7.4 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 that 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 include 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 not conforming to guidelines and unsatisfactory medical management.
- Operation inappropriate includes decision to operate and consideration of different operation or operation should not have been done.
- Preoperative care issues include 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 include drug-related complication, failure to use high dependency unit postoperatively, fluid balance unsatisfactory, fluid overload and inadequate postoperative assessment.

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