TASMANIAN AUDIT OF SURGICAL MORTALITY

ROYAL AUSTRALASIAN COLLEGE OF SURGEONS

2014 REPORT

Royal Australasian College of Surgeons

Tasmanian Government

ANZASM Australian and New Zealand Audit of Surgical Mortality

TASM Tasmanian Audit of Surgical Mortality

Contact

Tasmanian Audit of Surgical Mortality (TASM)
Royal Australasian College of Surgeons
147 Davey Street
Hobart TAS 7000
Australia

Website: www.surgeons.org/TASM

Email: tasm@surgeons.org

Telephone: +61 3 6223 8848

Facsimile: +61 3 6223 5019

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Clinical Director's Report

Learning from mortality outcomes.

I am pleased to present the 11th Report of the Tasmanian Audit of Surgical Mortality (TASM). This year we present the data in a different and more informative way. Previous reports have mostly analysed each year's cases in isolation. The relatively small number of deaths in Tasmania in any one year has placed limitations on the interpretation of this information. With over a decade of data collection now behind us, this year's report is able to present outcomes over time, representing our experience of over 1,300 deaths audited. This gives a more reliable picture of the pattern of results, and an indication of where progress has been made in the last decade.

Mortality review has gradually moved from being something new to now being simply a normal part of surgical practice. It has 100% adherence in Tasmania, and TASM sits under the umbrella of the Australian and New Zealand Audits of Surgical Mortality (ANZASM), which has seen the mortality review system established throughout Australia. The imprimatur of the Royal Australasian College of Surgeons (RACS), and then its requirement for involvement as a part of continuing professional development (CPD), has no doubt been very important, but most surgeons saw the need for and value of this activity for themselves. Its extension to gynaecological surgeons is evidence of this.

The last year or two have also seen a move toward online forms as the means by which surgeons enter data upon their own cases. This format should make it easier to ensure that all relevant data fields are filled in. One of the major triggers for second-line assessments is a lack of information- the first-line reviewer may well suspect that nothing of consideration or concern has occurred, but cannot be certain because the relevant information is missing. The prompts within the online system will hopefully reduce this particular source of inefficiency.

In last year's introduction, I commented on how useful I found it carrying out first- and second-line reviews. The same benefits are available to all surgeons in the form of outputs from ANZASM. The greater scale of the national process, and the longer period of case accrual, has meant that more reports and case booklets are now being produced. In addition though, cases appear regularly in Surgical News, and hopefully many of you have also seen and used the RACS National Case Note Review App, which brings second-line reviews to your tablet or phone, in a searchable form.

ANZASM has sought to use its findings to understand the areas where educational activities might most effectively be targeted. In recent years, workshops have been organised on such topics as deep vein thrombosis (DVT) prophylaxis, interhospital transfers, communication breakdowns, and fluid management, based on patterns in the data showing that these are 'frequent flyers' among the areas of concern in case reviews. As this is being written, a session in the upcoming joint Victorian/Tasmanian state meeting is about to occur looking at a range of cases under the heading of 'Would you have changed the management?' This is of course the key to the mortality review system- that we all use the reviews to learn, and thereby to lessen the chance of similar misadventures in our own practice. This is all the more relevant in the current environment of renewed and increased political interest in our activity. If we do not critically review what we do and how we do it, someone else will undertake the task for us.

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

Mr Rob Bohmer

Clinical Director, TASM

Shortened Forms

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
CCU	critical care unit
CPD	continuing professional development
DRG	diagnosis-related group
DHHS	Department of Health and Human Services
DVT	Deep vein thrombosis
FLA	first-line assessment
GP	general practitioner
OR	operating room
RACS	Royal Australasian College of Surgeons
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SCF	surgical case form
SLA	second-line assessment
TASM	Tasmanian Audit of Surgical Mortality

Acknowledgements

TASM would like to acknowledge the support and assistance of the many individuals and institutions that have helped in the development of this project, including:

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

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), F.A.N.Z.C.A. – *Anaesthetist*
Dr Helen McArdle	BMedSci, MBBS, MPH, FOEM, FRACMA, FAICD – *Medical Adviser* - Safety & Quality DHHS
Prof Richard Turner	MBBS(Hons),BMedSc,FRACS,PhD
Mr James Roberts –Thomson	BMedSci, MBBS, FRCS, FRACS – *General Surgeon*
Dr Brett Daniels	BSc(Hons), PhD, MBBS (Hons), FRANZCOG
Ms Lisa Lynch	RN – *Project Manager – TASM*

Executive Summary

Audit participation and processes

From its commencement on 1 July 2004 to the end of the current audit period (30 June 2014) TASM received 1,590 notifications of death that had been associated with surgical care. By the census date, 87% (1,376) of the deaths had been fully audited and 11% (174) were closed as terminal care cases and 2% (40) were lost to follow up. 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.

There has been increasing participation in TASM by Tasmanian Fellows, from 95% in 2004–2011 to 100% in 2012–2014. The submission and return of surgical case forms (SCFs), a pivotal step in the audit process has reached 100%. Inaccurate or incomplete clinical information impairs the quality of the audit and prevents the accurate identification of trends. Compliance in completing the mandatory data fields (and therefore the overall data quality) has improved. By the end of 2015 it is anticipated that there will be mandatory reporting via the web-based Fellow's Interface. This will accelerate the TASM feedback process while improving the accuracy and completeness of clinical information reported and ultimately published by TASM.

The treating consultant, rather than a junior member of the team, usually provides the information on the reported cases to TASM. This indicates an ongoing high level of 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. Instead it likely reflects the casemix of patients cared for in the private hospital sector that tend to be elective, which tends to be of lower complexity than that of the public hospital sector.

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

The main trigger for an SLA was a lack of clinical information, and 62% (109/175) of cases who underwent an SLA were referred for this reason. The need for an SLA was similar among surgical specialties and between metropolitan and rural hospitals. Importantly, the rate of SLA referral has decreased from 14% in the 2004–2011 audit period to 7% in the 2013–2014 audit period and this rate is similar to other jurisdictions.[1]

Demographic and operative profile

The demographic and surgical risk profiles of the audited cases reveal similar trends to those identified in previous reports. The majority of surgical deaths have occurred in elderly

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

There was no operative intervention performed in 35% (482/1,376) of audited cases. This was most commonly an active decision not to proceed. A total of 1,267 separate episodes of surgery occurred in 894 patients. The most frequent operative procedures described were for trauma or acute abdominal pathology. This reflects the high percentage of patients admitted as emergencies for irretrievable clinical problems. A consultant performed the surgery in 40% (455/1,149) of instances, and made the decision to proceed to surgery in 93% (1,074/1,149) of cases. The remaining 9% (118 [1,267 – 1,149]) cases have no data available.

Clinical risk management

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

1 DVT prophylaxis to reduce the likelihood of pulmonary embolus;

2 use of critical care facilities; and

3 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.

Deep vein thrombosis

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 90% (1,239/1,376) of audited 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. However, in 4% (48/1,225) of cases where it was withheld the assessors felt that the decision was questionable or unknown, although the decision did not affect the final outcome (11% (151 cases) with data unavailable). 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 2004–2014, 61% (542/894) of cases received critical care support and underwent an operation during the course of their hospital stay. The utilisation of critical care support has remained constant from 2004 to 2014. The non-use of critical care was viewed as inappropriate by first-line assessors in 1% (10/894), of cases and by second-line assessors in 5% (8/175) of cases. 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 only 5% (52/1,060) of cases. The volume of intravenous fluids to be administered to surgical patients and the rate at which to administer fluids 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 surgical care provided. In 92% (1,262/1,376) of audited cases assessors perceived either no, or only minor, issues of patient management. Areas of concern were identified in 5% (66) of patients. In 3% (48) of patients the assessors felt that the clinical issues were serious enough to be categorised as adverse events. The incidence of more major criticisms of clinical care was similar among the surgical specialties. These 2014 results are consistent with the national audit findings.[1]

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

TASM monitors trends of commonly avoidable factors. The most common avoidable factors among the 328 issues identified were:

- decision to operate (11%);
- adverse event factors in management (6%);
- better to have done different operation or procedure (5%); and
- delay to surgery (5%).

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. 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 27% (344/1,267) of patients who underwent a surgical procedure. However, direct consultant involvement in such cases has risen consistently during the audited period. TASM would like to see a continuation of this trend, which is to be commended.

Managing demand for emergency surgery

A significant challenge for the hospital system is managing the demand for emergency surgery. The demand for time in the OR relating to emergency cases remains a significant problem. Despite this, a low rate of postoperative complications reported by treating surgeons has remained constant throughout the audit period. There were 59% (527/894) of operative cases audited that had no complications, and a single complication was recorded in 38% of patients (339/894).

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% (240/1,376) of cases in the audited series 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% (13/240) of the cases. Delay in transfer was identified in 8% (19/240) 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.

Recommendations for TASM clinical stakeholders

1 Improved leadership in patient care

- In complex cases there must be clear demonstrable leadership in patient management.
- The treatment plan for each patient should be understood by all involved in their care.
- The lead clinician must be accountable, responsive, prepared for challenges and must focus on optimal patient care.
- During lengthy operations there should be a low threshold for seeking assistance from colleagues to avoid fatigue.

2 Better documentation of care plans and clinical events

- The case record is an essential tool for identifying clinical sequence and an appropriate clinical management plan. As such, the case record must contain clear and accurate documentation of events and plans.
- A repeated issue identified by reviewers is the lack of adequate and legible documentation.

3 Action on evidence of clinical deterioration

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

4 Improved preoperative management

- Appropriate preoperative preparation and management aims to decrease operative complications and promote successful recovery. Delays in, or unnecessary preoperative investigations can have fatal consequences.
- Preparation and management should include:
    - evaluation of both physical and psychological preparation;
    - complete medical history and physical examination; and
    - consent for the surgery and discussion of potential risks and outcomes.

5 Improved postoperative management

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

6 Improved awareness of surgical emergencies and sharing of care

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

7 Improved communication

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

TASM objectives for 2015

The TASM objectives for the coming year are:

- continue to maintain the return rate of surgical case forms (SCFs);
- continue to collaborate with agencies such as the coroner's office to ensure that there are no gaps in mortality reporting or the peer-review process;
- continue to disseminate important messages emanating from the audit via workshops and seminars;
- continue to improve the data collection forms and processes;
- contribute to the development of a national mortality audit report;
- retain complete uptake via the Fellows electronic interface;
- improve the structure of the database and the quality of data submissions;
- facilitate communication and information sharing with other state mortality audits;
- enhance analysis techniques; and
- enhance reporting methods for hospital accreditation processes.

1. Introduction

1.1 Background

TASM is part of ANZASM, a national network of regionally-based audits of surgical mortality that aim to ensure the highest standard of safe and comprehensive surgical care. TASM is a collaboration between the Tasmanian Government DHHS and RACS. The TASM project is funded by the Tasmanian DHHS to review all deaths associated with surgical care and ascertain adverse outcomes which are preventable.

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.

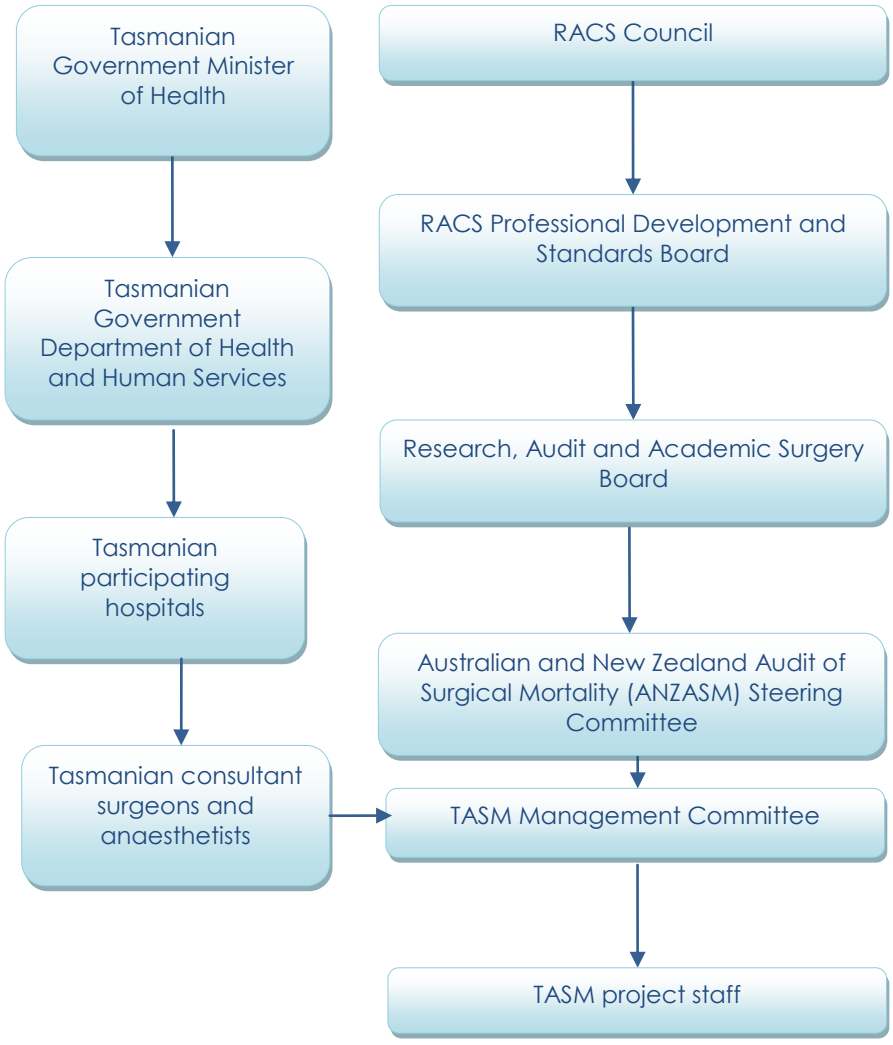
This audit includes deaths that occur in a Tasmanian hospital when:

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

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

TASM reviews notifications of patient deaths that have occurred in hospital following a 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 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)



Note: RACS: Royal Australasian College of Surgeons; TASM: Tasmanian Audit of Surgical Mortality.

1.3 Audit process

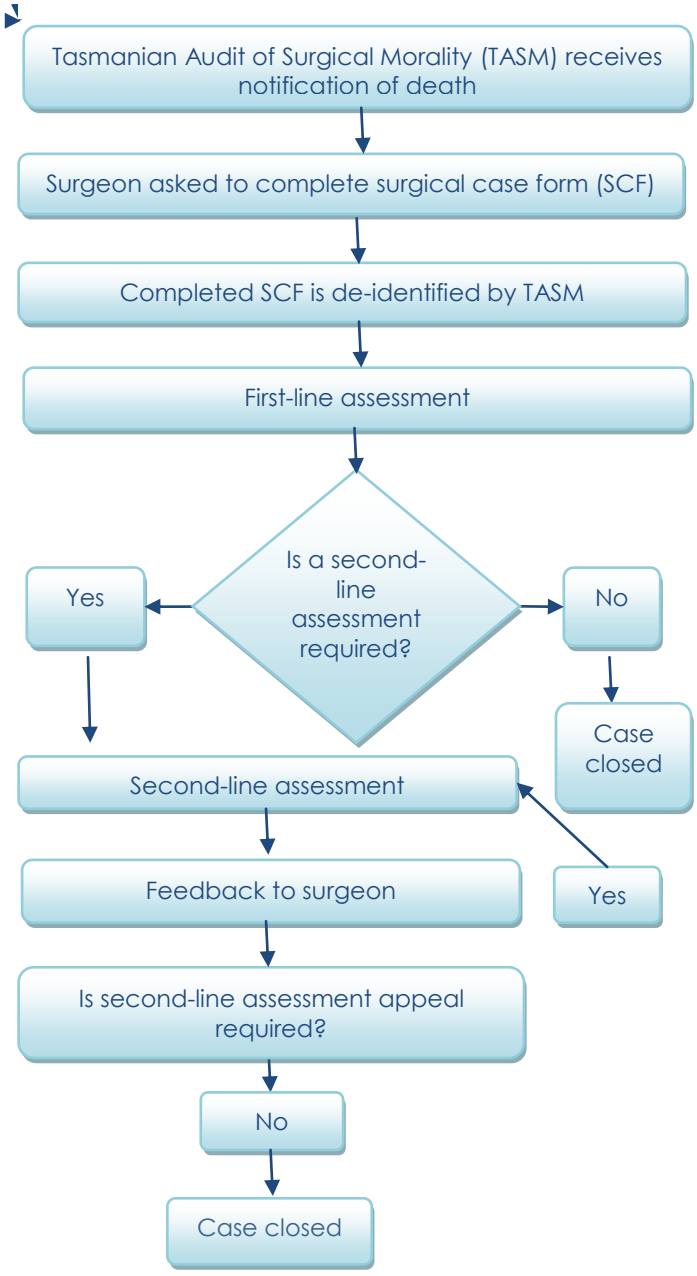
Individual regional audits of surgical mortality are notified of in-hospital deaths associated with surgical care. The mortality notifications in Tasmania are submitted by hospitals and directly from the treating surgeon. All cases in which a surgeon was responsible for, or had significant involvement 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 a SLA (case note review). A SLA may be requested as a result of:
    - A need to clarify issues of patient management identified or suspected by the first-line assessor; or
    - 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 a SLA is deemed necessary the assessor is selected using the same criteria as that used for the first-line assessor

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 2014) TASM received 1,590 notifications of deaths that have been associated with surgical care.

Table 1: Audit numbers over sequential audit periods (n=1,590)

Case status	2004-2011	2011-2012	2012-2013	2013-2014	Audit period
Closed	1,037 (86.9%)	101 (82.8%)	121 (89.6%)	117 (84.8%)	**1,376 (86.6%)**
Non-participant	7 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**7 (0.4%)**
Reported in error	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
Terminal care	118 (9.9%)	21 (17.2%)	14 (10.4%)	21 (15.2%)	**174 (11.0%)**
Lost to follow-up	28 (2.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**28 (1.8%)**
Pending cases (SCF / FLA / SLA)*	5 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**5 (0.3%)**
All cases	**1,195**	**122**	**135**	**138**	**1,590**

SCF: surgical case form; FLA: first-line assessment; SLA: second-line assessment. *Pending cases are awaiting submission.

Comments:

- TASM aims to have all mortality cases reviewed within three months of notification. The specialties with the highest casemix were General surgery, Orthopaedic surgery, Neurosurgery and Vascular surgery (data not shown).
- Clinical information and completed assessment reviews were available for 86.6% (1,376/1,590) of the reported cases. The outcomes from the peer-review process are restricted to these deaths and are the focus of this report.
- 11.0% (174/1,590) of cases were recorded as admissions for terminal care and were therefore excluded from the review process.
- 1.8% (28/1,195) of cases were deemed lost to follow-up due to the surgeon moving interstate, abroad, retiring, or the unattainability of medical records. These cases were excluded from the analysis.
- 0.4% (7/1,195) 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 1% in 2004–2011 to 0% in 2013–2014. Participation in TASM is now a mandatory component of attaining RACS CPD approval. There were 138 deaths in the 2013-2014 audit period that had completed the full audit process by the census date.

2.2 Verification of audit numbers

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

In parallel with TASM's audit process, the DHHS largely obtain the transaction/unit record level data from a number of source systems through an automated extraction process and store the data in the departmental data warehouse. It provides casemix information required for hospital activity based funding. The information allocates individual patient episodes to diagnosis related groups (DRGs). These DRGs are specialty specific and can therefore provide an alternative source of mortality data. The DHHS has provided TASM with a list of deaths that occurred in patients with surgical DRGs over the period 1 July 2009 to 30 June 2013. The comparison of Tasmanian admitted patient episode data against TASM reported mortalities is performed to ascertain gaps in hospital mortality reporting.

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

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

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

Comments:

The current match is high with the DHHS reported mortalities is 89.9%, however in the future TASM will focus on reducing the reporting gap.

2.3 Audit participation rates

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

2.4 Hospital participation

Table 3: Hospital participation in the audit

Hospital participation	2004-2011	2011-2012	2012-2013	2013-2014
Public	4(100%)	4(100%)	4(100%)	4(100%)
Private	9(100%)	9(100%)	9(100%)	9(100%)
Total	**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.

2.5 Participation by Fellows

Participation is now 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 on 7% 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 ANZASM. The TASM audit collects data on all deaths occurring after a gynaecological surgical procedure. The Council on Obstetric and Paediatric Mortality and Morbidity continues to separately review all maternal, perinatal and paediatric deaths in Tasmania.

Table 4: Surgeon agreement to participate

Fellow Participation	2004-2011	2011-2012	2012-2013	2013-2014
RACS	88(95%)	93(100%)	93(100%)	93(100%)
RANZCOG	42(95%)	44(100%)	44(100%)	44(100%)
Total	**130(95%)**	**137(100%)**	**137(100%)**	**137(100%)**

Comments:

- 100% of the 93 eligible Tasmanian RACS Fellows are currently participating in the audit. The increase in participation rate from 95% in 2004–2011 to the current level of 100% in 2011–2014 is encouraging, and is due to the RACS's CPD requirement.
- Currently, 100% (44/44) of the gynaecological specialists invited to participate have enrolled in the TASM audit. Invitations to gynaecological specialists to participate in the audit commenced in August 2012.
- Almost half of RANZCOG and RACS Fellows perform assessments as first- or second-line assessors.
- 100% (132) of enrolled RANZCOG and RACS Fellows submit data electronically.

Table 5: Compliance by surgical specialty from 2004-2014 audit period

Specialty	Compliant	Non-compliant
Vascular surgery	100%	0%
Urology	100%	0%
Plastic surgery	100%	0%
Paediatric surgery	100%	0%
Otolaryngology Head and Neck	100%	0%
Other *	100%	0%
Orthopaedic surgery	99%	1%
Gynaecology	100%	0%
Neurosurgery	98%	2%
General surgery	100%	0%
Cardiothoracic surgery	100%	0%

*includes Colorectal surgery, Ophthalmology, and Oral and Maxillofacial surgery

Comments:

- The return rate of specialties in other states and territories varies between 75% and 100%.[2]
- The audit process relies on active and ongoing participation of surgeons. Orthopaedic surgical Fellows may choose to do their CPD through the Australian Orthopaedic Association, for which ANZASM audits are not mandatory.
- In 2014, there is 100% participation across all specialties in Tasmania.
- TASM began producing hospital clinical governance reports in November 2014. These reports contain de-identified and aggregated data, enabling benchmarking and monitoring of clinical management trends both within a specific hospital and with other participating peer-grouped hospitals. Peer-grouped hospitals can be located within the region or throughout Australia.

2.6 Demographics and characteristics of audited deaths

Table 6: Characteristics of audited deaths from 1 July 2004 to 31 June 2014 (n=1,376)

Number of audited deaths		**1,376**
Mean age	Years:	75
	Range:	1 day to 104 years
Gender	Male:	53%
	Female:	47%
Admission status	Emergency:	84%
	Elective:	16%
ASA grade	ASA 1-2:	12%
	ASA 3:	30%
	ASA 4:	41%
	ASA 5-6:	17%
Risk of death prior to surgery	Expected:	12%
	Considerable:	53%
	Moderate:	24%
	Small:	8%
	Minimal:	3%
Most common comorbid* factors	Cardiovascular:	23%
	Age:	22%
	Respiratory:	15%
	Renal:	8%
	Neurological/psychiatric:	8%
	Diabetes:	4%
	Advanced malignancy:	5%
	Obesity:	3%
	Hepatic:	3%
Most common surgical diagnoses	Fracture of neck of femur:	27%
	Intracranial haemorrhage:	12%
	Intestinal obstruction:	11%
	Carcinoma:	9%
	Aortic aneurysm:	9%
	Coronary artery disease:	6%
Operative procedures performed	≥3:	5%
	2:	11%
	1:	52%
	0:	31%

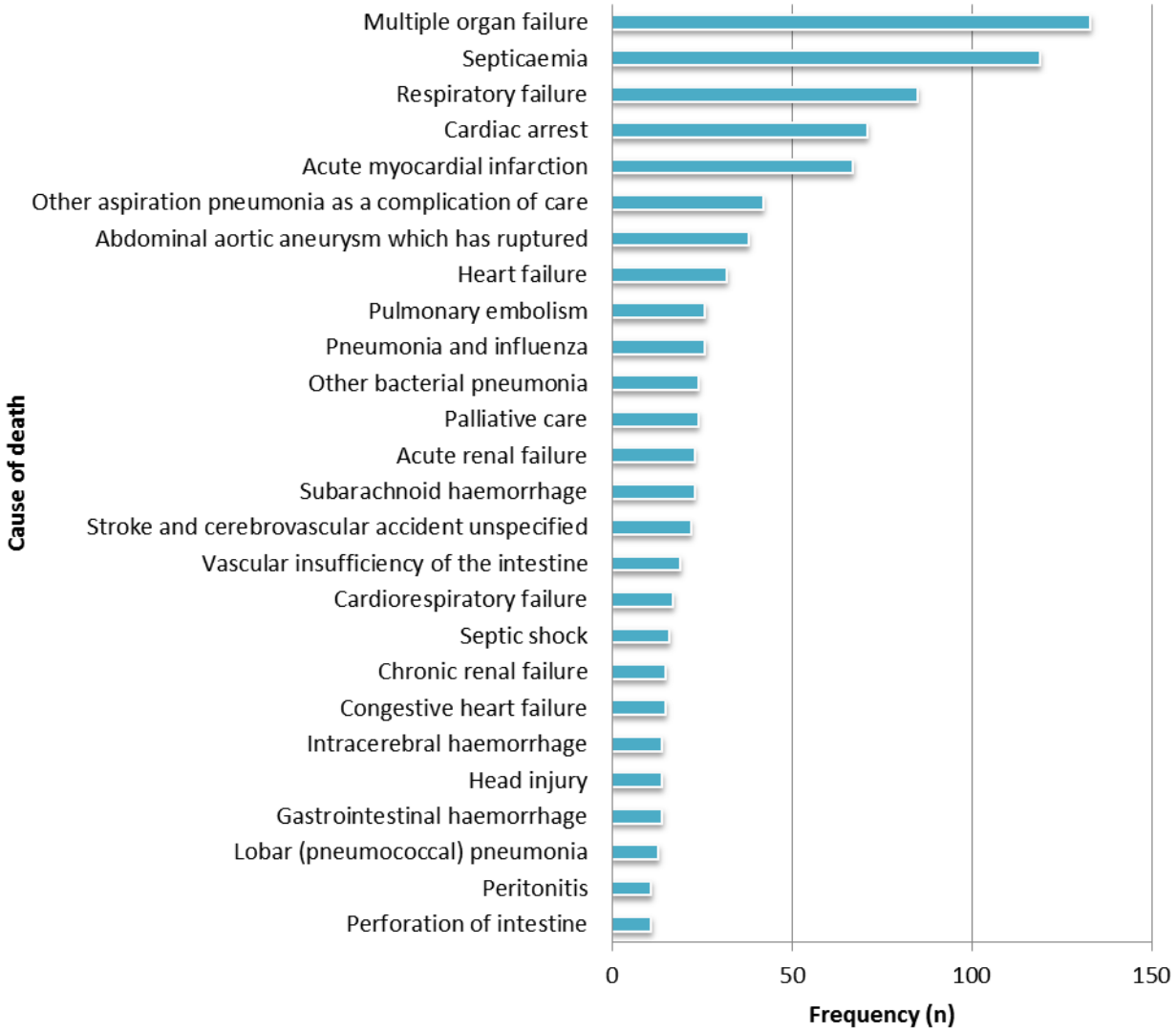
ASA: American Society of Anesthesiologists.

*Age and comorbid factors describe coexisting medical conditions or disease processes that are additional to the primary diagnosis.

2.7 Establishing the cause of death

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

Figure 3: Frequency of reported causes of death (n=914 causes of death reported for 1,376 patients)



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

Comments:

- Across 1,376 patients there were 914 conditions that were perceived to be responsible for death.
- The most frequently cited causes of death included multiple organ failure 10% (133), septicaemia 9% (119), respiratory failure 6% (85), cardiac arrest 5% (71) and acute myocardial infarction 5% (67). Death was attributed to these conditions in 35% of

cases (475/1,376) and similarly in a recent Australian study found that "potentially modifiable comorbidities are associated with poorer postoperative outcomes".[4]

- Postmortems, including coronial requested postmortems, were conducted in 11% of cases (152/1,376). This rate remained constant during the audit period and the reasons for the low postmortem referrals are unknown. Postmortems are deemed to provide educational information and valuable insights and these referral rates are worth further investigation.[5-8]

2.8 Peer review process

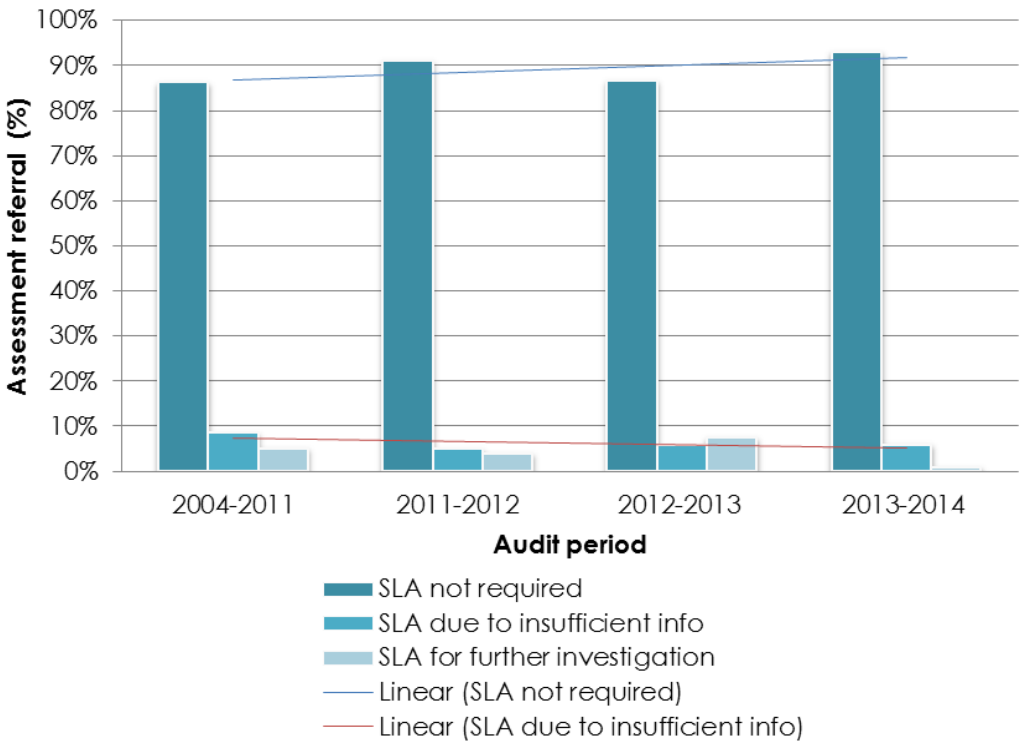
The TASM peer review process is a retrospective examination of the clinical management of patients who died while under the care of a surgeon. All assessors (first- and second-line) must decide whether the death was a direct result of the disease process alone, or if aspects of the management of the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

FLAs were completed in 1,376 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 a 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 under review.
- 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 4.

Figure 4: Reason for referral for second-line assessment (SLA) (n=1,376)



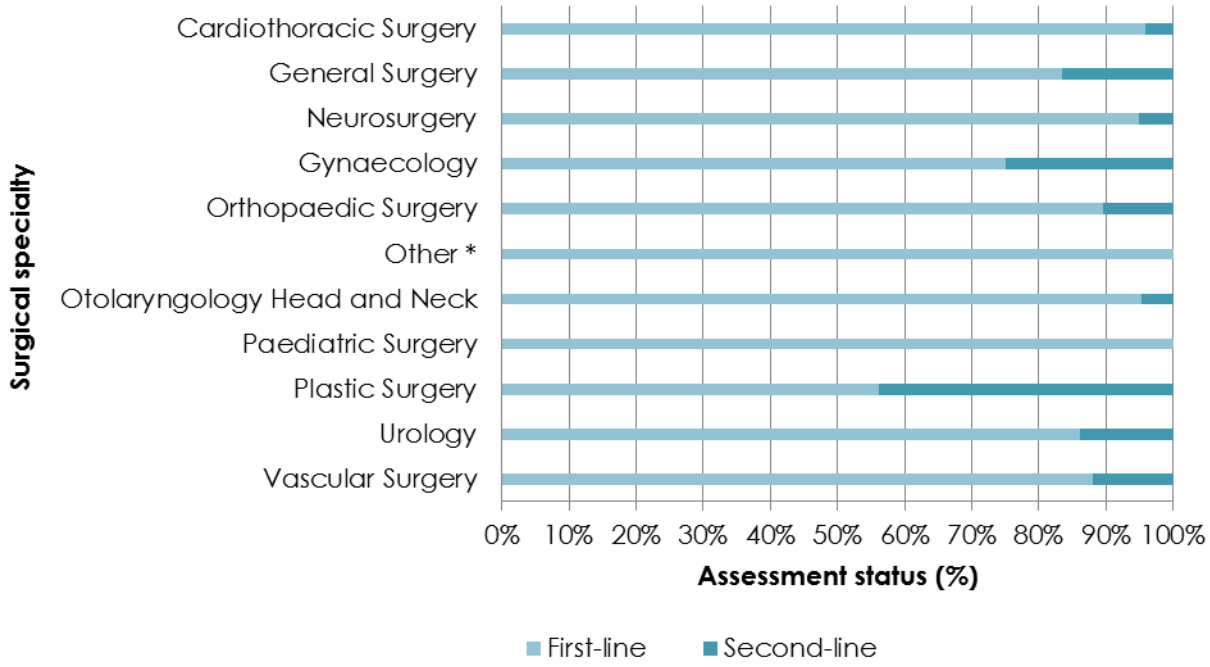
Note: SLA: Second-line assessment

Comments:

- Across the entire audit period, 87% (1,201/1,376) of cases were closed following FLA.
- The need for SLA has decreased over time, in part because the quality of the information provided in SCFs has improved. The percentage of cases referred for SLA has dropped considerably from 14% (142) in 2004–2011 to 7% (8) in 2013–2014. (P<0.001)
- Despite some improvement, the provision of insufficient clinical information by the treating surgeon remains the most common trigger for SLA, occurring in 62% of cases (109/175). The remaining 38% (66/175) 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 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 reduce the workload of colleagues who have agreed to act as first and second-line assessors, as well as that of the quality assurance and medical records representatives at collaborating hospitals.
- Of the 175 SLAs, at least one aspect of the medical record was deemed unsatisfactory in the cases that required further investigation. Criticisms included poor medical admission notes, insufficient follow-up records and unsatisfactory descriptions of the surgical procedure.
- Hospital case notes are a vital record of the treatment received by patients. Poor or inaccurate clinical notes exacerbate the difficulties associated with managing

patients in a complex hospital environment, particularly when there is an increasing lack of continuity of care provided to patients.

Figure 5: Referral for second-line assessment by surgical specialty (n=1,376)



*includes Oral and Maxillofacial surgery, Ophthalmology,

Comments:

- The need for SLA referral varied between specialties from 1% (1) to 65% (47).
- The need for referral for SLA was similar in metropolitan and rural regions (data not shown).

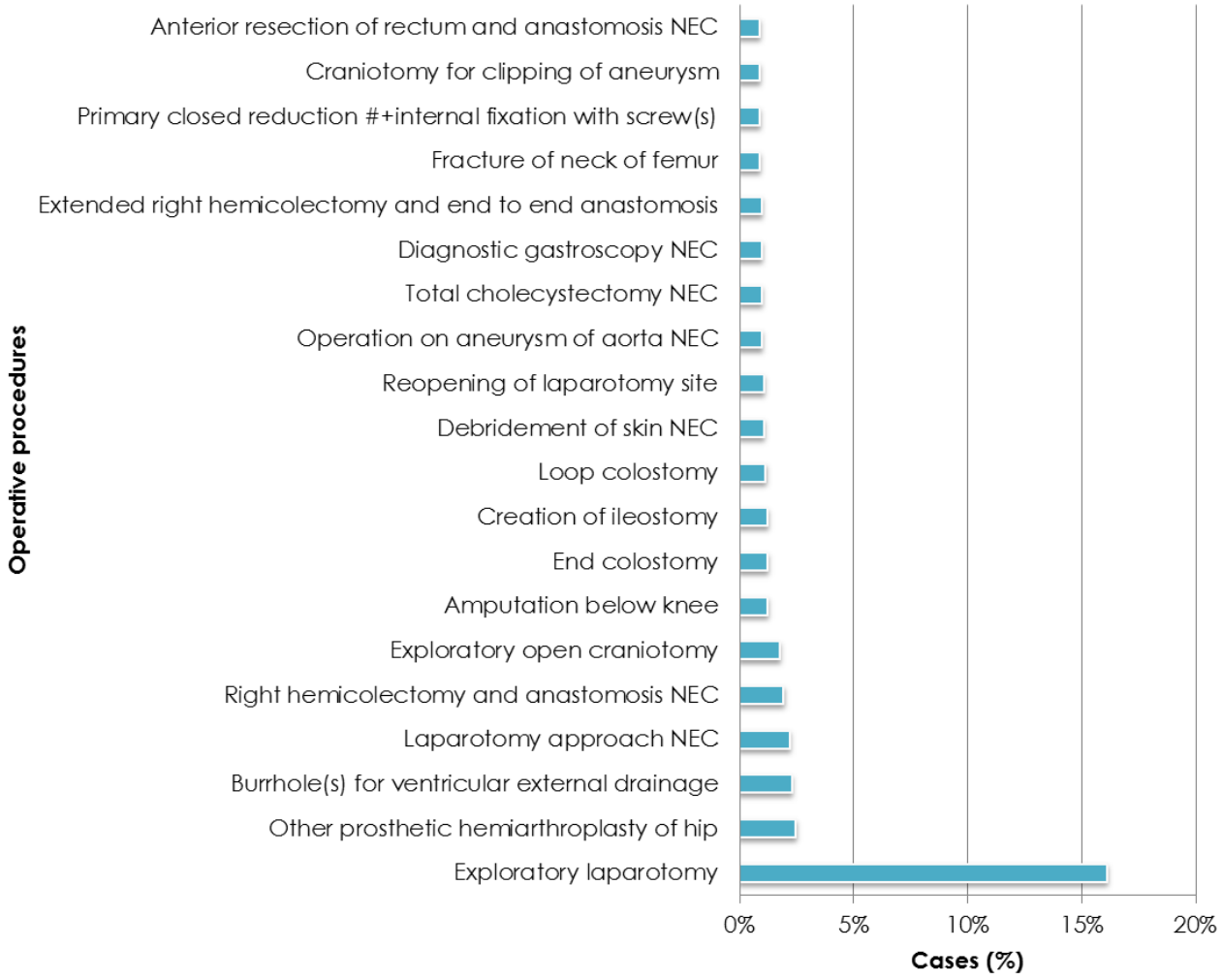
3. Clinical risk management

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.

Figure 6: Frequency of individual surgical procedures (n=1,267) in 894 patients



Missing data: n=132 (10%).

NEC: not elsewhere classified

Comments:

- 65% (894/1,376) of audit patients underwent operative treatment. There were 1,267 separate procedures performed, with some patients undergoing multiple procedures during their admission or during the same surgical session.

Table 7: Frequency of operative mortality by specialty (n=894 patients who underwent 1,267 separate surgical procedures).

Specialty	Frequency	%
General surgery	482	42%
Orthopaedic surgery	175	15%
Neurosurgery	173	15%
Vascular surgery	132	12%
Urology	64	6%
Cardiothoracic surgery	43	4%
Other*	19	2%
Plastic surgery	13	1%
Otolaryngology, Head and Neck surgery	12	1%
Paediatric surgery	10	1%
Gynaecology	6	1%
Ophthalmology	3	0%
Oral and Maxillofacial surgery	3	0%
All specialties	**1,135**	**100%**

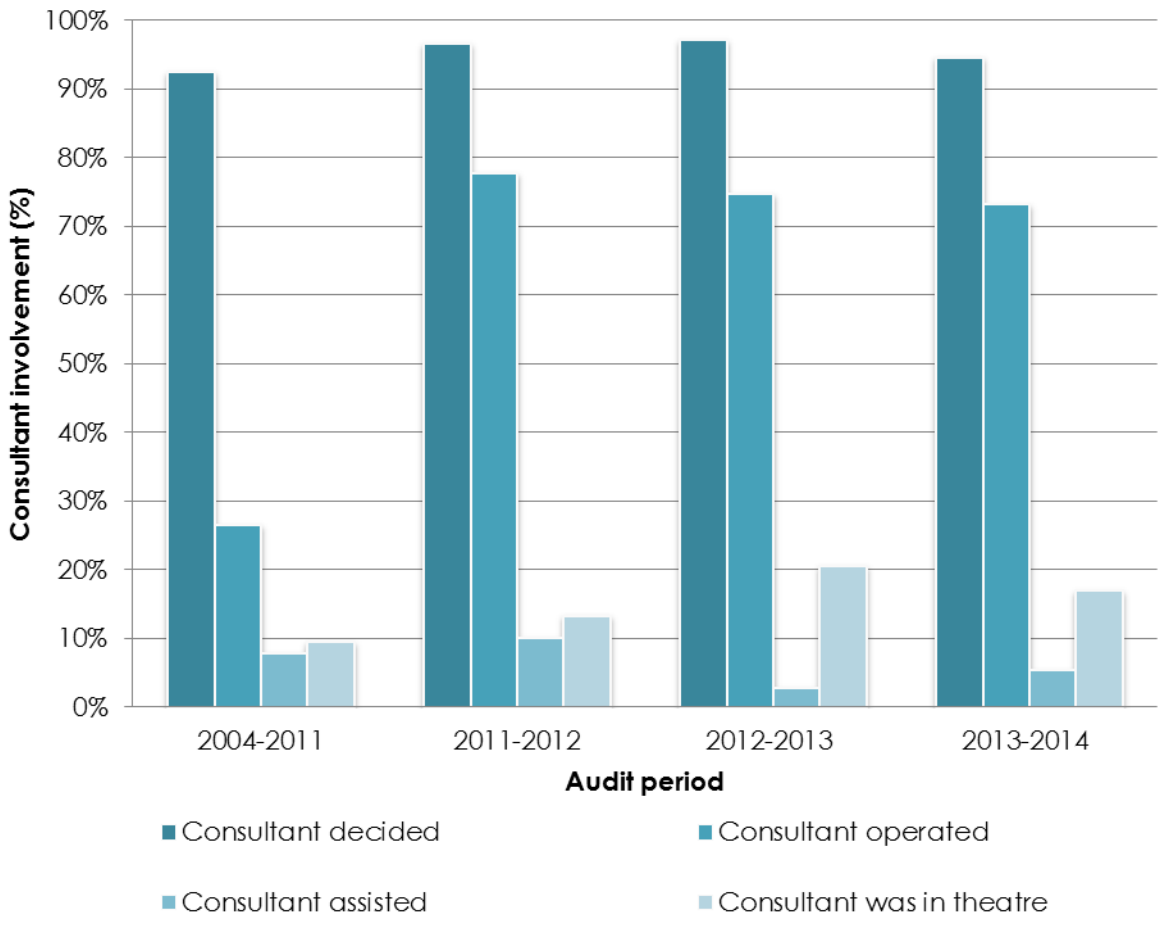
Note: Missing data: n=132 (10%).

* includes Gynaecology and Colorectal surgery.

Comments:

- The most frequently reported procedures were most commonly associated with general surgery, orthopaedic surgery and neurosurgery pathologies.
- 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. Only six gynaecology patients were included in this year's report.
- The 15% (213/1,376) of patients who were admitted electively had a higher rate of operative intervention than the 85% (1,163/1,376) of patients who were admitted as emergencies. This is not unexpected as most elective admissions to a surgical unit are for an operative procedure.
- The surgical procedure was abandoned in 5% (73/1,376) of cases due to the extent of the disease process precluding even short-term survival.

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



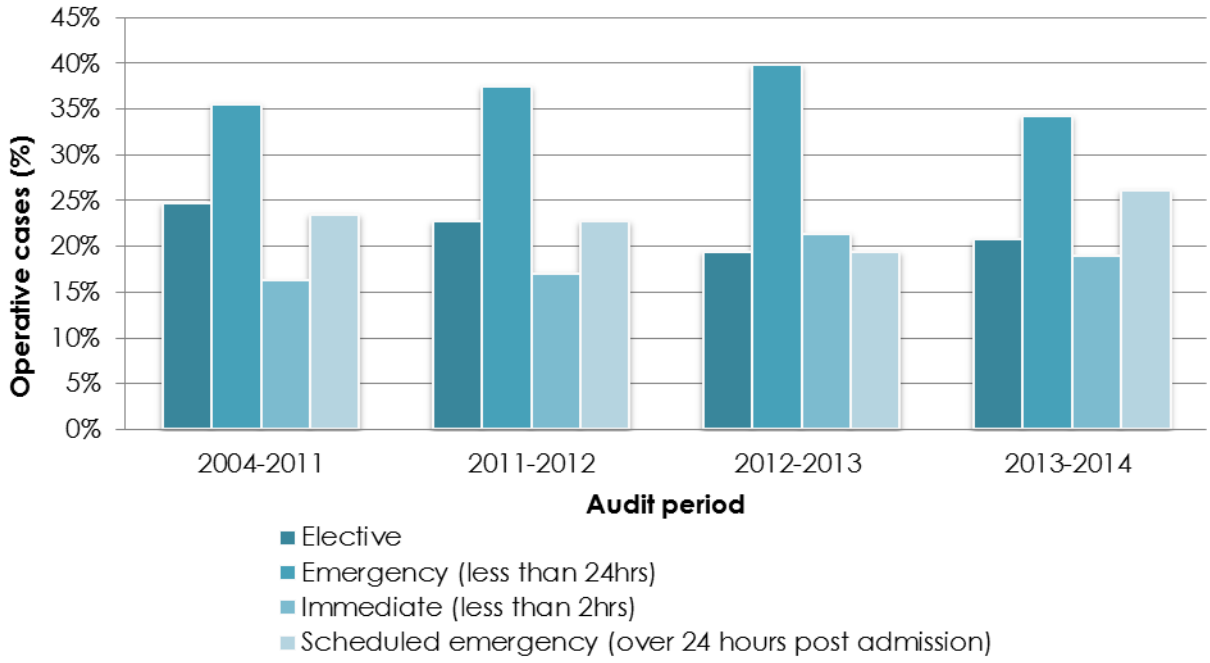
Note: n= 1,267 separate surgical episodes in 894 patients. Missing data: n=118 (9%)

Note: the consultant operated exponential linear trend line is constant.

Comments:

- A consultant surgeon performed the surgery in 40% of surgical episodes (455/1,149) and made the decision to proceed to surgery in 93% of episodes (1,074/1,149). TASM would like to see a further increase in these figures. There is some bias in these figures as data accuracy has been poor in this section of the SCF. The increase in consultant involvement is appropriate when the risk profile of the audited episodes is considered. The role of the consultant is to take responsibility for the overall success of the operation, and their presence in theatre is crucial.
- An anaesthetist was present in 94% of procedures (1,066/1,135) where an operative procedure occurred from the 1,376 audited series (data not shown).

Figure 8: Timing of operative procedures in emergency and elective admissions



Note: n=894 patients who underwent 1,267 separate surgical procedures

Missing data: n=30 (3%).

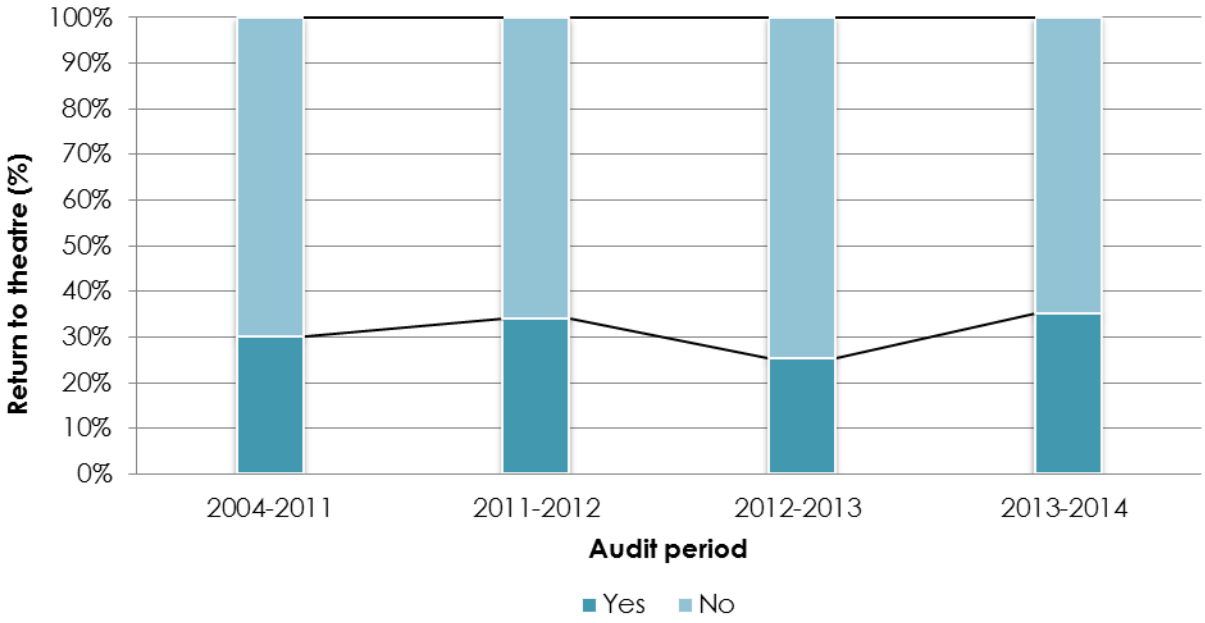
Comments:

- The time criticality of a patient's condition predicts the timing of emergency surgery. Of the 864 emergency admissions that underwent surgery, 22% (193) had surgery within two hours of admission, 47% (407) had surgery within 24 hours, and 31% (264) had surgery after 24 hours.
- Overall, 53% (600/1,132) of emergency admissions to a surgical unit had surgery within 24 hours of admission. Strategies to address the associated scheduling problems are being implemented by government, surgeons and hospitals.[9-11]

3.1.1 Unplanned return to the OR

An unplanned return to the OR is usually necessitated by the development of a complication requiring further operative intervention. Some complications following complex surgery are to be expected due to the patient's pre-existing comorbidity profile, surgical risk status and the nature of the disease being treated. However, a high rate of returns to the OR can indicate that improvements to care are needed. TASM's goal is to see the trend in unplanned returns to the OR decrease over future audit periods.

Figure 9: Unplanned return to the operating room



Missing data: n=135 (10%).

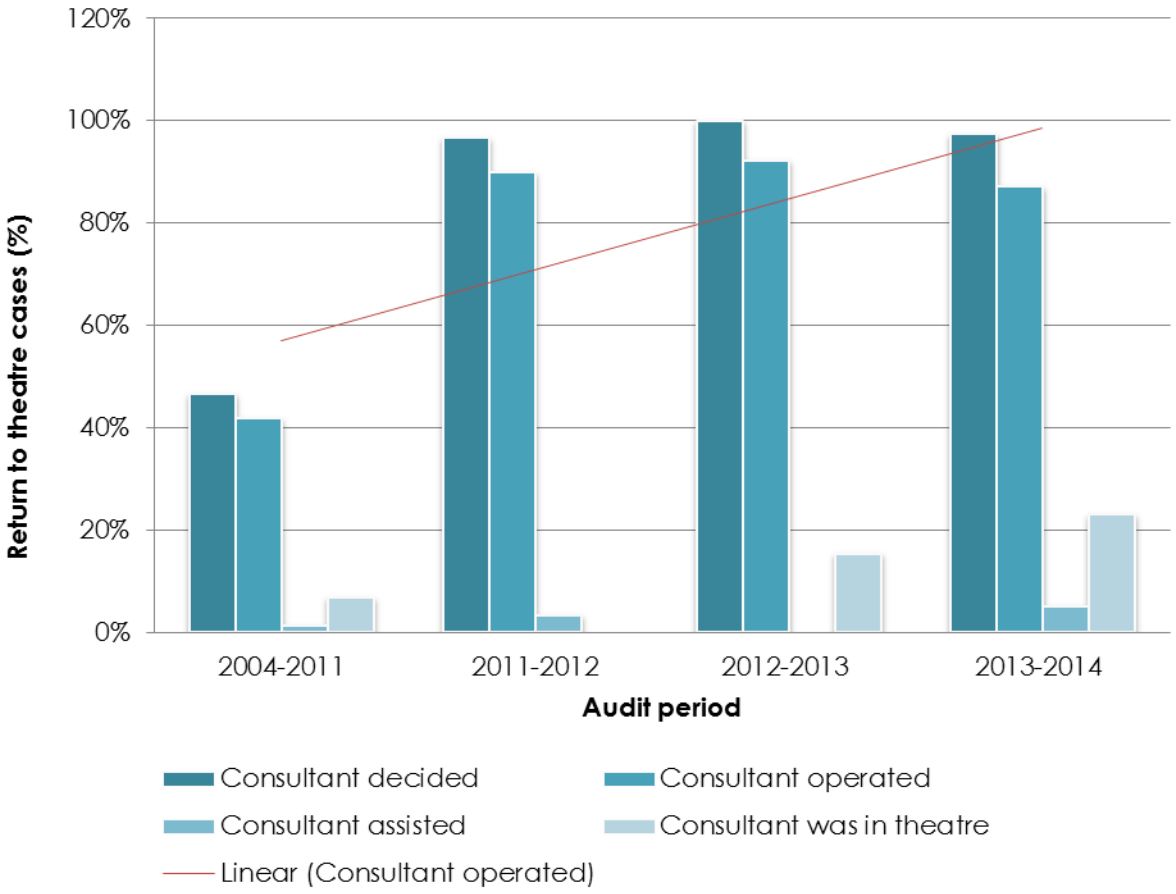
Note: n=894 patients having operative treatment with 1,267 episodes).

Comments:

- An unplanned return to the OR was reported in 27% (344/1,267) of cases where a surgical procedure was performed and these figures are similar to the national mortality audit findings in 2014.
- There has been a slight variation of the trend in the frequency of unplanned returns to the OR during the audit period, dropping from 34% (30) in the 2011-2012 period to 25% (26) in the 2012-2013 period. An overall decrease in this over the audit period would be beneficial to this high risk group of patients.

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

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



Missing data: n=18 (5%).

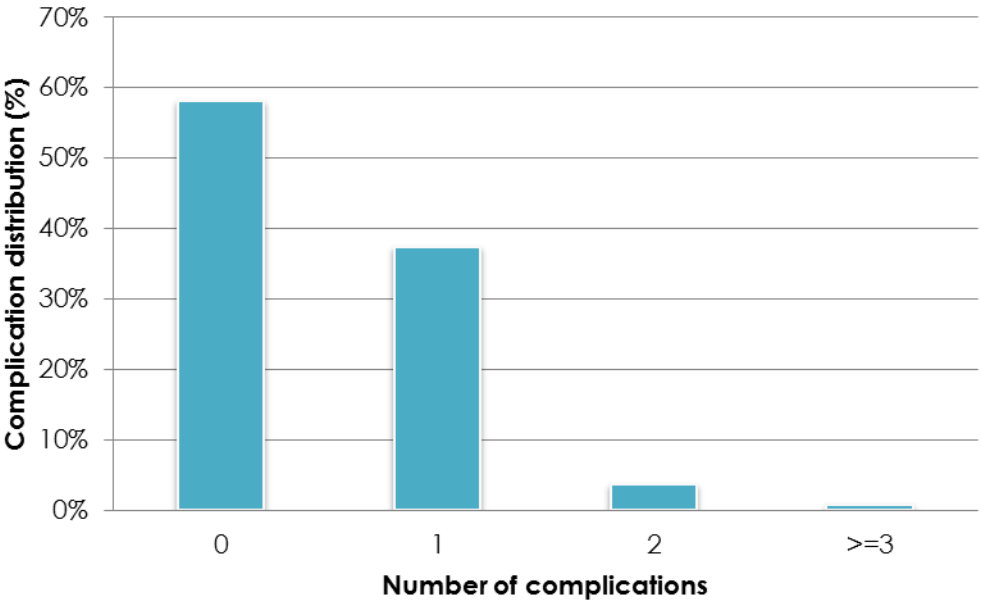
Note: the consultant operated exponential linear trend line is curved which highlights a considerable rise in consultant involvement. N=344 episodes in 1276 patients having operative treatment.

Comments:

- Active consultant participation was higher (55 % [189/344]) in procedures performed during an unplanned return to the OR compared with the initial operative group (40% [455/1,149]). This result is appropriate as such cases are more challenging and the risks are greater.

3.1.2 Postoperative complications

Figure 11: Postoperative complications recorded by treating surgeon.



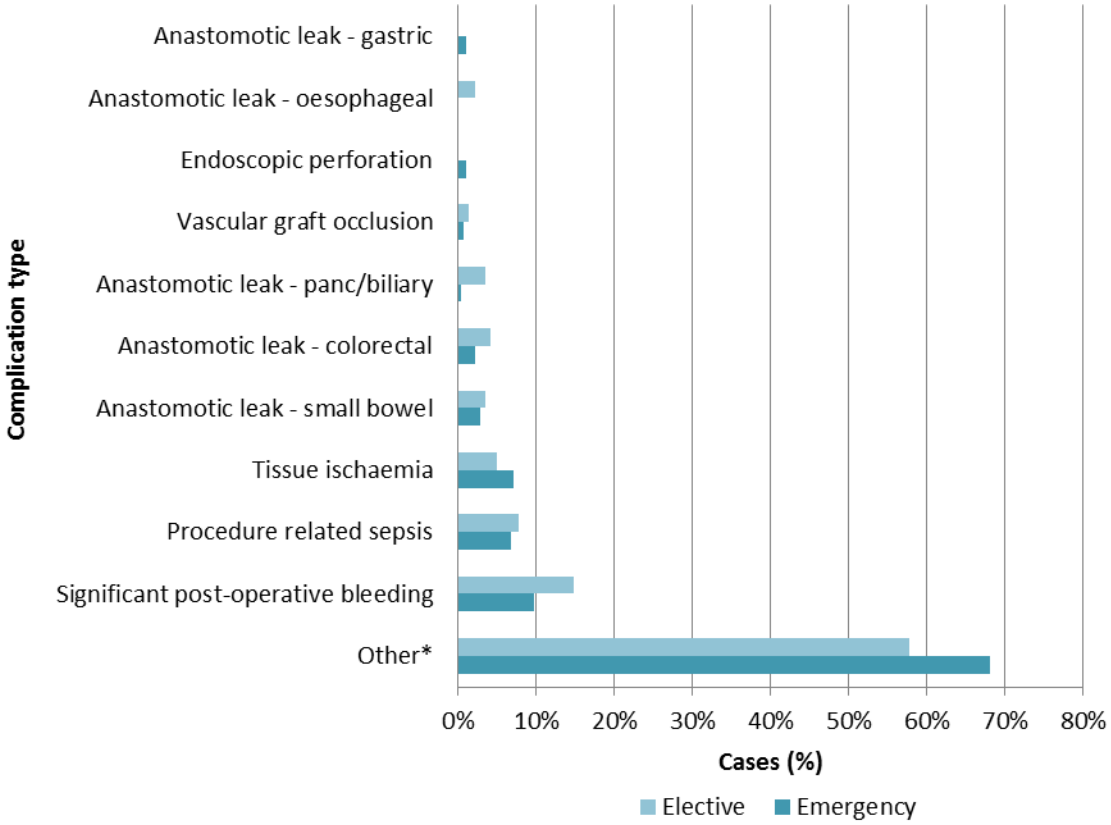
Note: n= 906 complications

Note: the postoperative complications exponential linear trend line is curved, which highlights a considerable decrease in postoperative complications recorded by the treating surgeon.

Comments:

- The low rate of postoperative complications reported by treating surgeons has remained constant throughout the audit period. (data not shown) Of the 894 patients, 59% (527) had no complications and only a single complication was recorded in 38% (339) of patients. The remaining 3% (30/906) of patients had two or more complications.

Figure 12: Frequency of specific postoperative complications by urgency status

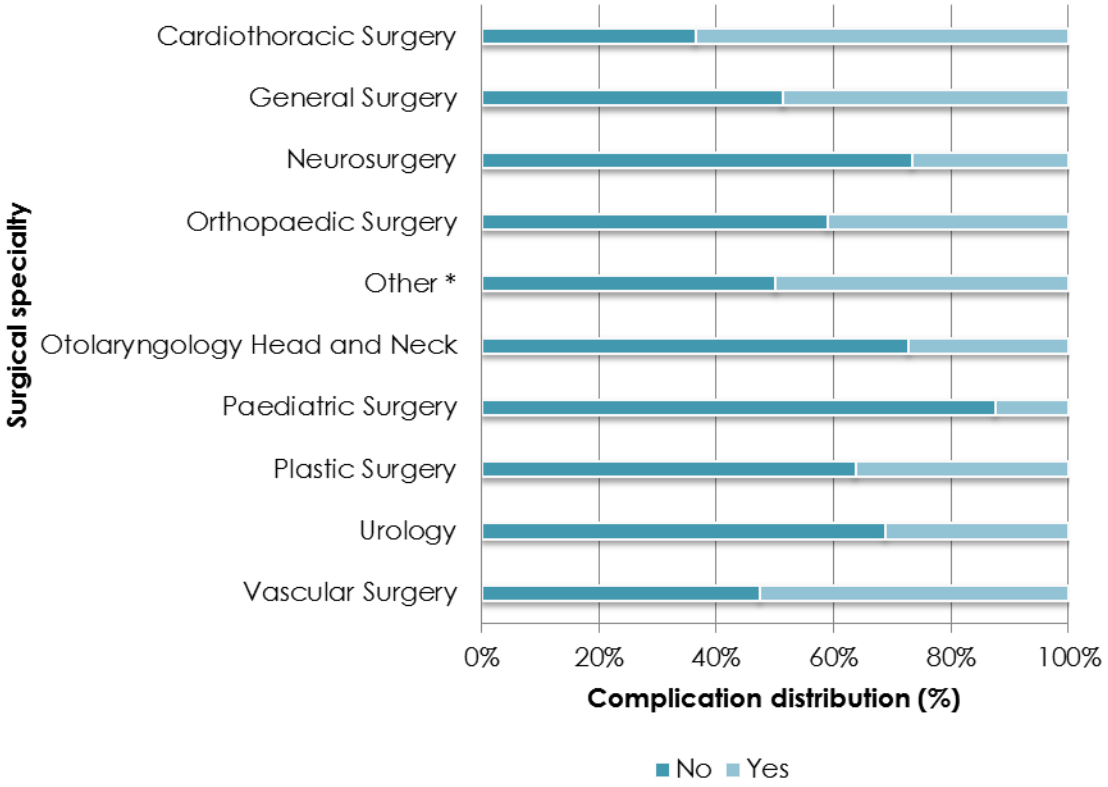


*Other complications identified include aspiration pneumonia, cardiac arrest, pulmonary embolus, myocardial infarction, pulmonary embolism, respiratory failure, and wound dehiscence. Note: n=421 complications recorded in 894 patients having operative treatment.

Comments:

- 66% (279/421) of reported complications occurred in patients admitted as emergencies

Figure 13: Postoperative complications by specialty



Note: n=894 patients having opertive treatment

Only eight paediatric patients were reported to TASM and included in this year's report .

*includes Oral and Maxillofacial Surgery, Ophthalmology and Gynaecology.

Comments:

- There were differences in the rate of postoperative complications among specialties ranging from 37% (14) to 80% (1). (note that low numbers may skew the data)

3.2 Clinically significant infections

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

Table 8: Clinically significant infection type

Infection	Frequency	Percent
Pneumonia	32	(40%)
Septicaemia	29	(36%)
Intra-abdominal	11	(14%)
Other*	9	(10%)
Total	**81**	**100%**

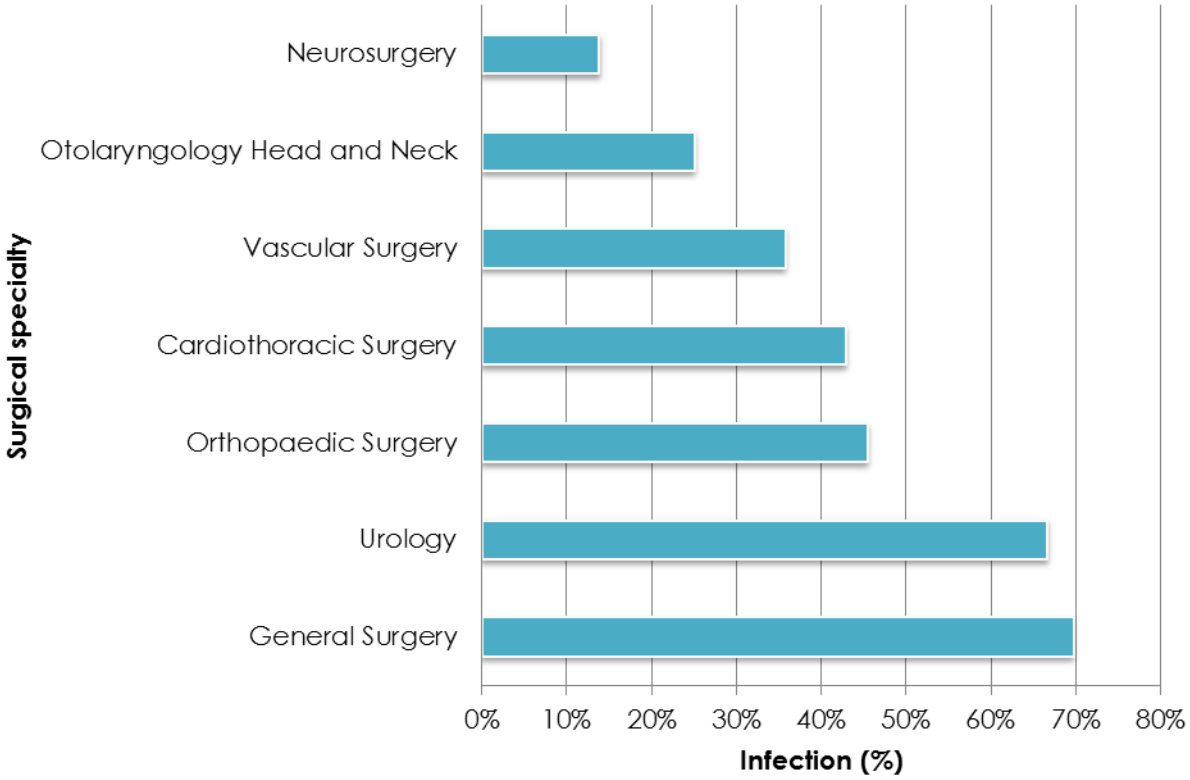
*includes *Klebsiella*, *Clostridium difficile*, *Escherichia coli* and methicillin-resistant *Staphylococcus aureus*.

Note: n=81 infections in 238 patients

Comment:

- An infection was reported in 34% (81/238) of cases audited in 2012–2014.
- Pneumonia and septicaemia were responsible for 76 (61/81) of the cases of infection.
- The infective organisms identified were: *Clostridium difficile*, *Candida albicans*, *Escherichia coli*, *Enterococcus*, *Klebsiella*, methicillin-sensitive *Staphylococcus aureus*, *Streptococcus mitis*, yeast and mixed organisms.

Figure 14: Clinically significant infections by specialty



Note: n=81 cases of infection in 238 patients

Table 9: Time frame when the clinically significant infection was acquired.

Infections	2012-14	
	Frequency	%
Acquired preoperatively	5	9%
Acquired postoperatively	33	57%
Surgical-site infection	3	5%
***Other invasive-site type infection**	17	29%
Total	**58**	**100%**

Note: n=81 cases of infection Missing data: n=23 (28%).

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

Comments:

- Of the cases of infection acquired during admission, 57% (33/58) were acquired postoperatively, 29% (17) were as a result of other invasive-site infections, 9% (5) were acquired preoperatively and 5% (3) were surgical-site infections. These figures will be monitored for trends in years to come.

3.3 Delay in diagnosis

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

Table 10: Delays associated with establishing a diagnosis.

Delay	2004-2011	2011-2012	2012-2013	2013-2014
GP	8(13%)	0(0%)	0(0%)	1(8%)
Medical unit	14(23%)	1(6%)	4(50%)	2(14%)
Surgical unit	20(32%)	7(39%)	0(0%)	2(14%)
Other*	20(32%)	10(56%)	4(50%)	9(64%)

GP: general practitioner.

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

Note: n= 102 issues from 1,376 cases

Table 11: Perceived delays in establishing a diagnosis.

Reason for delay	Frequency
Inexperienced staff	3(3%)
Misinterpretation of results	15(16%)
Incorrect test	12(13%)
Results not seen	9(10%)
Unavoidable factors	21(23%)
Other*	32(35%)
Total	**92(100%)**

Note: n=92 issues identified in 1,376 audited cases

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

Comments:

- The treating surgeons identified delays in establishing the diagnosis in 8% (105) of the 1,376 audited cases (data not shown). This rate has remained relatively constant over time.
- Delay resulting from misinterpretation of results (n=15) and incorrect tests (n=12) results in delay to implementing definitive treatment.
- It is important to note that delays are not always attributable to the surgical team. A review of care received by elderly patients undergoing surgery in the United Kingdom found that delay between admission and operation was related to risk assessment and that the risk assessment "should include input from senior surgeons [or] anaesthetists" [12]

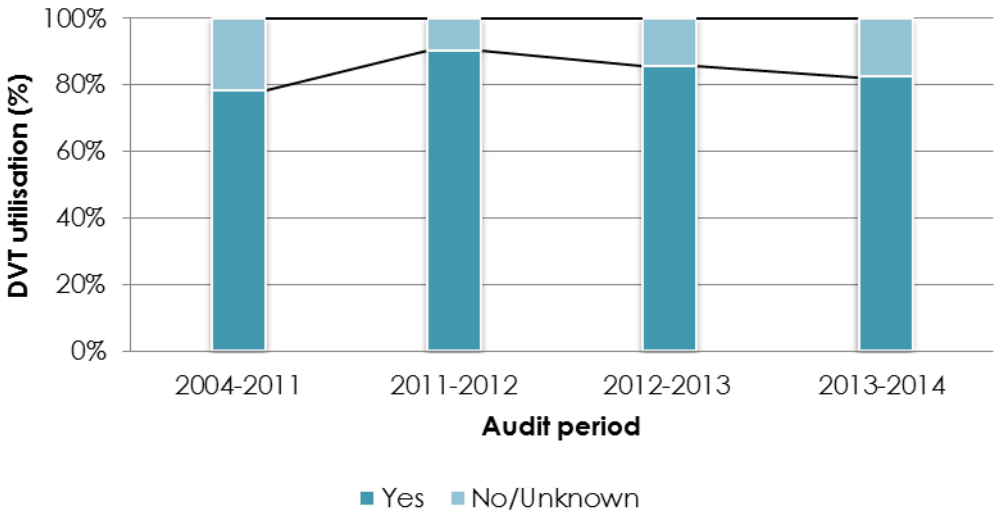
3.4 Prophylaxis for deep vein thrombosis

The overall aim is to identify whether appropriate strategies are being used to prevent the formation of deep vein thromboses and subsequent pulmonary embolisms 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 guideline for the prevention of venous thromboembolism in patients admitted to Australian hospitals"[13, 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 patients' own preferences.

The treating surgeon was asked to record whether DVT prophylaxis was given, and if it was, the type of prophylaxis that was used. The reasons given by surgeons for not providing DVT prophylaxis are also discussed in this section.

Figure 15: DVT prophylaxis use during the audit period



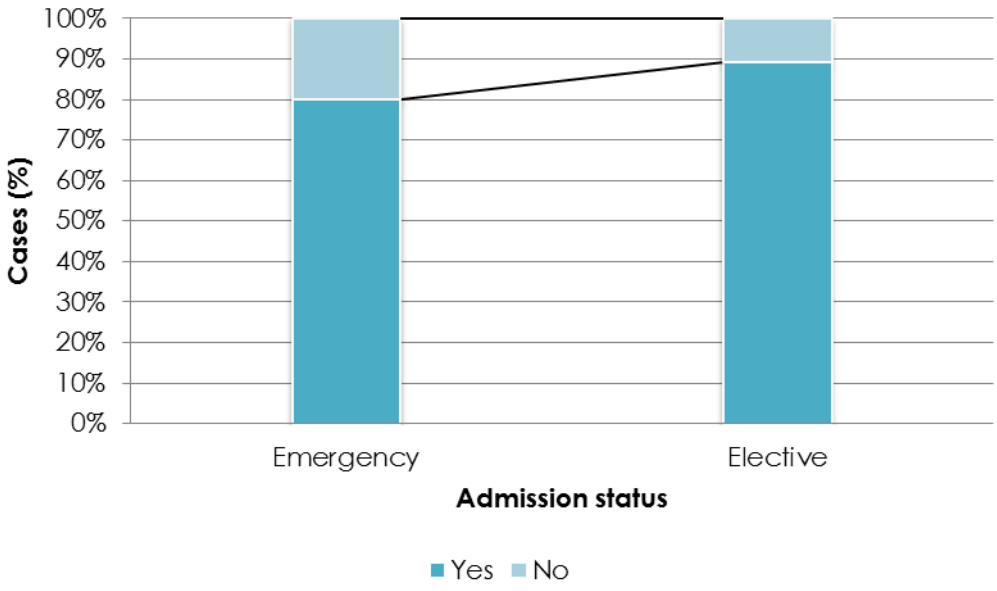
Missing data: n=176 (20%); Note: n=894 operative cases

DVT: deep vein thrombosis

Comments:

- The use of DVT prophylaxis has risen slightly, from (n=514/657) 78% in 2004–2011 to (n=66/80)83% in 2013–2014.

Figure 16: DVT prophylaxis use by admission type

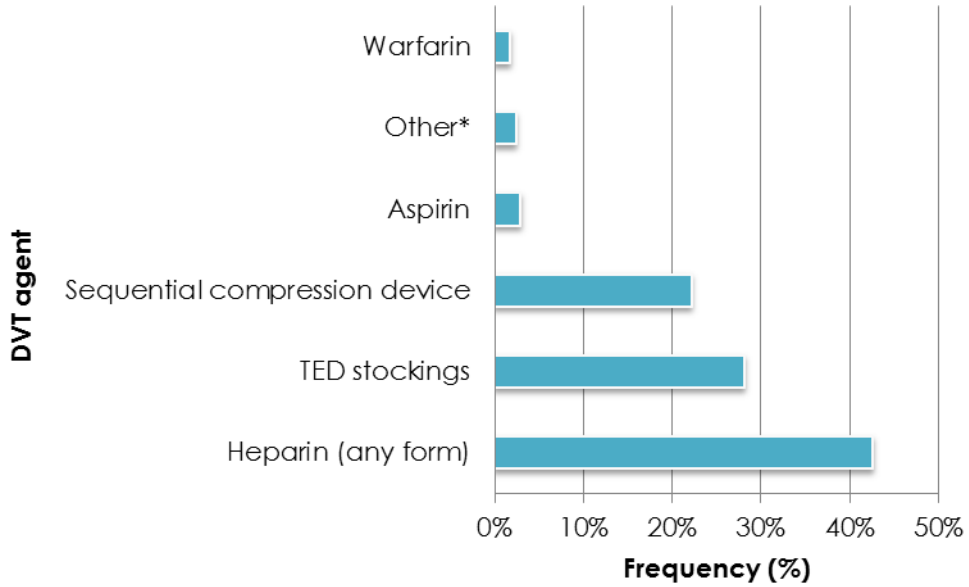


Note n=894 patients.

Comments

- TASM data suggests that the use of DVT prophylaxis is higher in elective than emergency cases during the audited period.

Figure 17: Type of DVT prophylaxis used



Note: Other *includes calf stimulators, clopidogrel, epidural, full anticoagulation for non-ST segment elevation myocardial infarction, and inferior vena cava filter and infusion. Note: n=1,506

DVT: deep vein thrombosis; TED: thrombo-embolic deterrent stockings.

Comments:

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

Table 12: Reasons given by treating surgeon for non-provision of DVT prophylaxis

Reason for no use	Frequency
Active decision to withhold	48
Not appropriate	86
Not considered	3
Total	137

Note: n=137

Comments:

- Overall, 10% (137/1,376) of patients from the audit pool received no prophylaxis. In the majority of cases where prophylaxis was not provided this was due to a conscious decision made by the treating team.

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

Reason for no use	FLA	SLA
Appropriate	110	11
Not appropriate or unknown	27	8

FLA: First-line assessor SLA: Second -line assessor

Comments:

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

- FLAs felt that the decision to withhold DVT prophylaxis on clinical grounds was appropriate in 80% of cases (110/137).
- SLAs felt that the decision to withhold DVT prophylaxis on clinical grounds was appropriate in 58% of cases (11/19).
- FLA could not accurately assess the appropriateness of the decision to withhold DVT prophylaxis in 20% of cases (27/137) due to insufficient evidence and missing data in the audit documentation.
- 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.

3.5 Adequacy of provision of critical care support to patients

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

Ideally, critical care facilities should be co-located with the emergency department and surgical departments, especially in larger acute hospitals. Close working relationships between the surgical team and critical care team is essential; however, not all surgical patients require critical care support.

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

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

CCU	2004-2011	2011-2012	2012-2013	2013-2014	Total
Yes	380 (84%)	46(69%)	59(70%)	57(70%)	**542(79%)**
No	74(16%)	21(31%)	25(30%)	24(30%)	**144(21%)**
Total	**454(100%)**	**67(100%)**	**84(100%)**	**81(100%)**	**686(100%)**

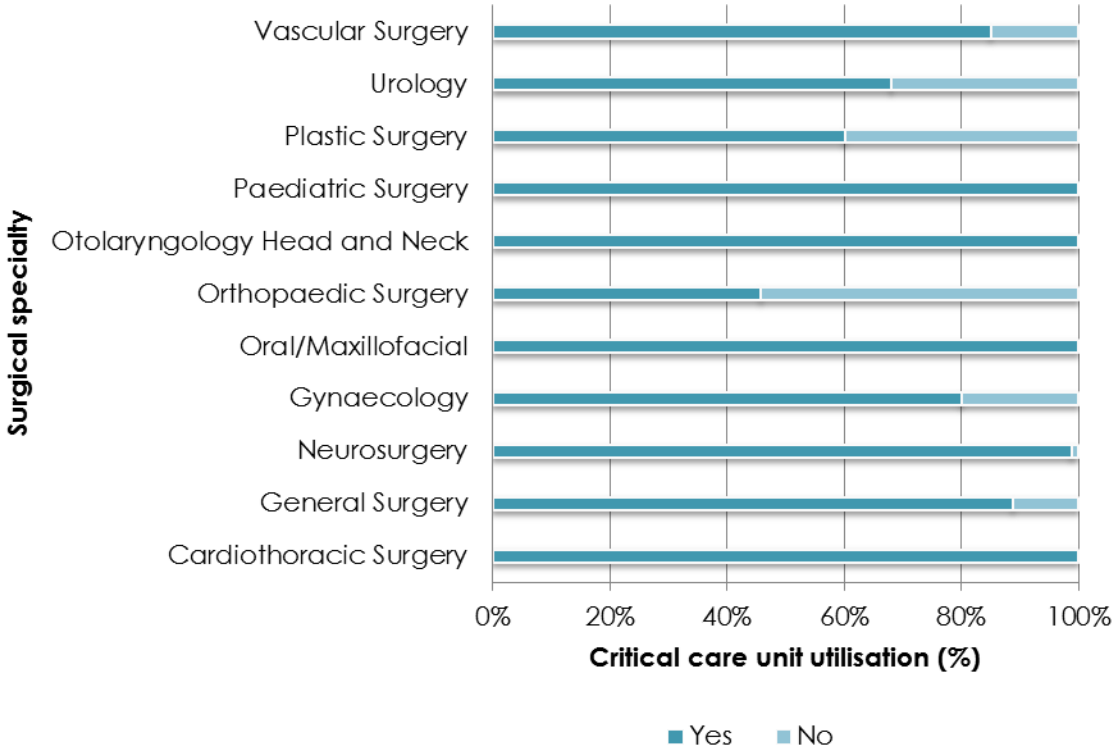
Missing data: n=208 (23%); Note; n=894 operative cases

CCU: critical care unit.

Comments:

- In 61% (542/894) of operative cases the patient received critical care support during their inpatient stay.
- The utilisation of critical care support where reviewed across the whole audit period has steadily increased, from 7% in 2011–2012 to 9% in 2013–2014 (data not shown).
- Emergency cases have a greater need for, and higher use of, critical care facilities (data not shown).
- It should be acknowledged that not all hospitals have critical care services.

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



Note: Missing data: n=208 (23%)

Comments:

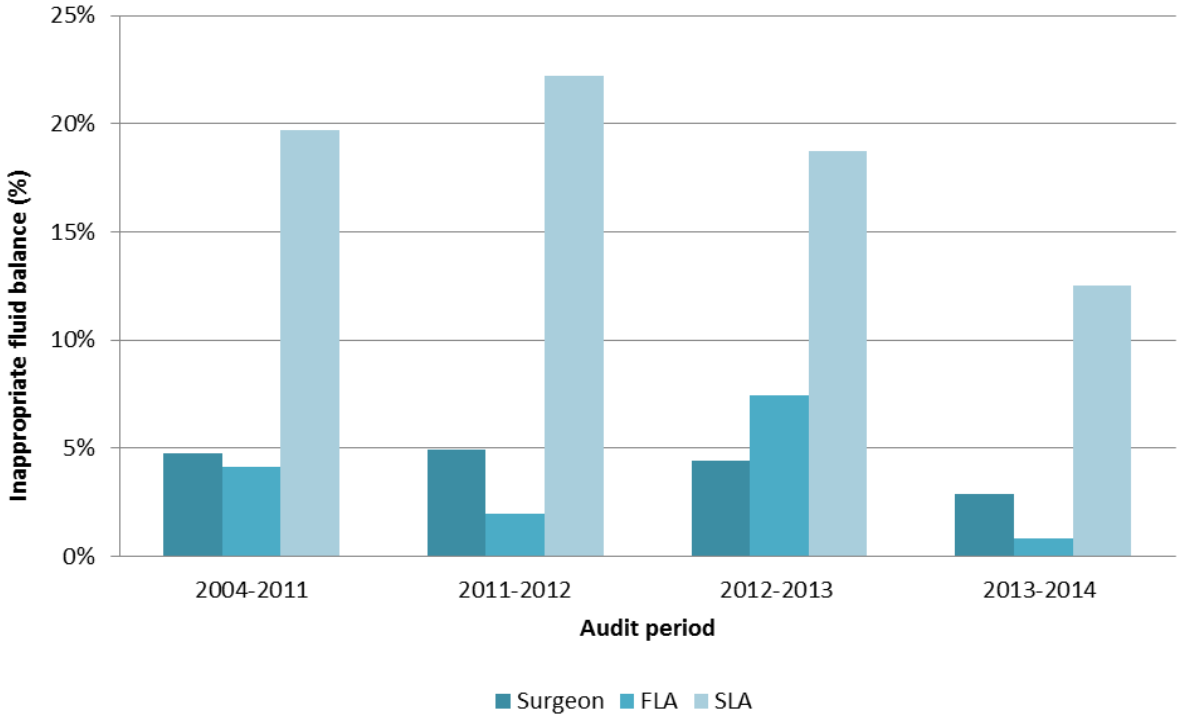
- Similar to previous years, orthopaedic patients have low referral rates for critical care support. This is thought to be due to a high number of elderly patients with fractured neck of femur who have been admitted from high-level care institutions.
- Of those patients who did not receive critical care support, the first-line assessors found that 1% (10/894) of patients would likely have benefitted from it. Second-line assessors perceived that 5% (8/175) of patients who did not receive critical care support would likely have benefitted from it.(data not shown)

3.6 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 are asked to comment on the appropriateness of a patient's fluid balance during the episode of care.

Figure 19: Perception of fluid balance inappropriateness



Note: Missing data: n=316 (20%) inn=1,376

Comments:

- Overall, the treating surgeons felt that in 95% (1,008/1,060) of cases the patient's fluid balance had been appropriately managed by the clinical team.
- First-line assessors and the treating surgeons perceived that the fluid balance was inappropriate in 5% of cases (52/1,060), while second-line assessors perceived it as inappropriate in 19% of cases (34/175).
- 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]

3.7 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.

Table 15: Types of issues associated with patient transfer.

Transfer issue type	2004-2011	2011-2012	2012-2013	2013-2014	Audit period
Transfer problems general	4(2%)	0(0%)	1(5%)	1(6%)	**6(3%)**
Inappropriate transfer	13(7%)	0(0%)	0(0%)	1(6%)	**14(6%)**
Insufficient documentation	15(8%)	2(11%)	1(5%)	2(12%)	**20(8%)**
Inappropriate level of care	11(6%)	1(5%)	0(0%)	1(6%)	**13(5%)**
Transfer delay	14(8%)	1(5%)	2(10%)	2(12%)	**19(8%)**
Total transfer issues	**57(31%)**	**4(21%)**	**4(20%)**	**7(41%)**	**72(30%)**

Note: n= 72 issues with 240 patients requiring transfer

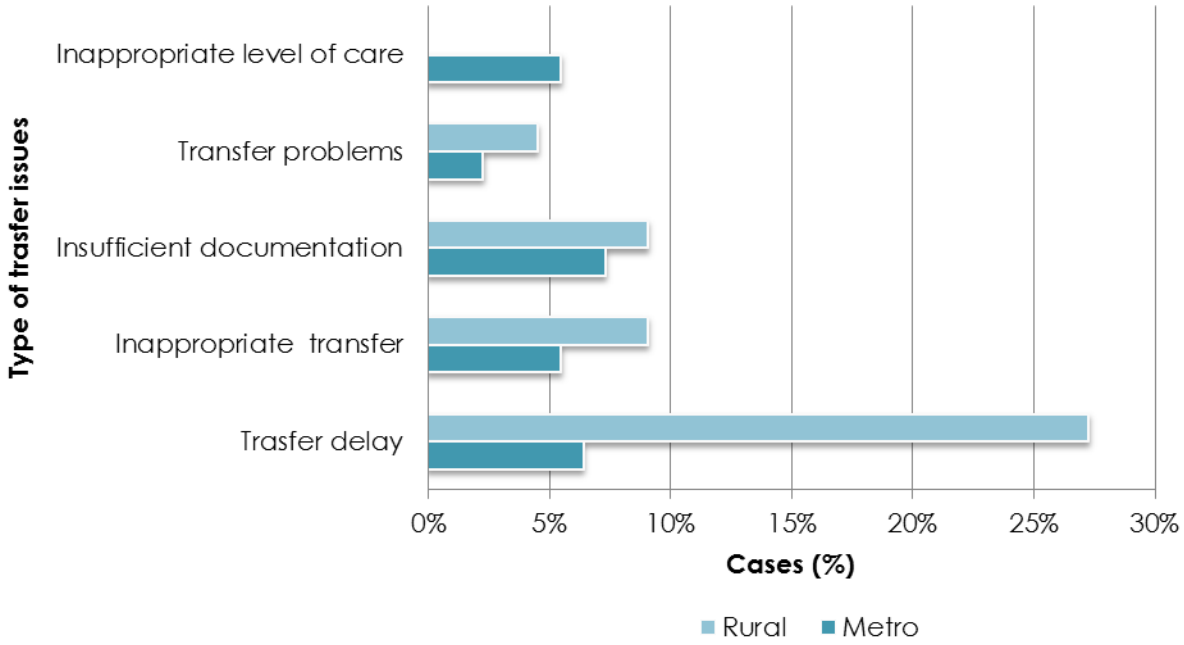
Missing data: n=36 (3%)

Comments:

- Overall, 17% (240/1,376) of patients required a transfer during the audit period.
- Of the 240 patients who underwent a transfer, 73% (176/240) had an operation. A transfer was required for 27% (64/240) of non-operative patients.
- The frequency of patients requiring a transfer for definitive care has remained similar throughout the years of the audit period.
- Various issues of care related to patient transfers were identified in 30% (72/240) of cases involving a patient transfer. This rate has been constant over time:
    - In 5% (13/240) of cases it was felt that there was an inappropriate level of care provided during transfer.
    - In 8% (20/240) of cases it was felt that inadequate clinical information and documentation had been provided to the receiving hospital.
    - In 8% (19/240) of cases it was felt that the transfer had occurred inappropriately late in the course of the illness.
- 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.
- TASM has identified a need to better define the transfer issue types in the SCF. These data collection points will be revised nationally.

3.7.1 Interhospital transfer issues by region

Figure 20: Types of issues associated with patient transfers



Metro: metropolitan.

Note: n= 70 issues in 240 transfers

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 as outlined in Figure 20.
- RACS supports the Rural Doctors Association of Victoria's recommendations to provide greater support and round the clock availability of well-trained rural doctors to ensure that appropriate patient care is provided to the patient prior to transfer.[16]
- Transfer delays were more frequently seen in rural regions than metropolitan areas.

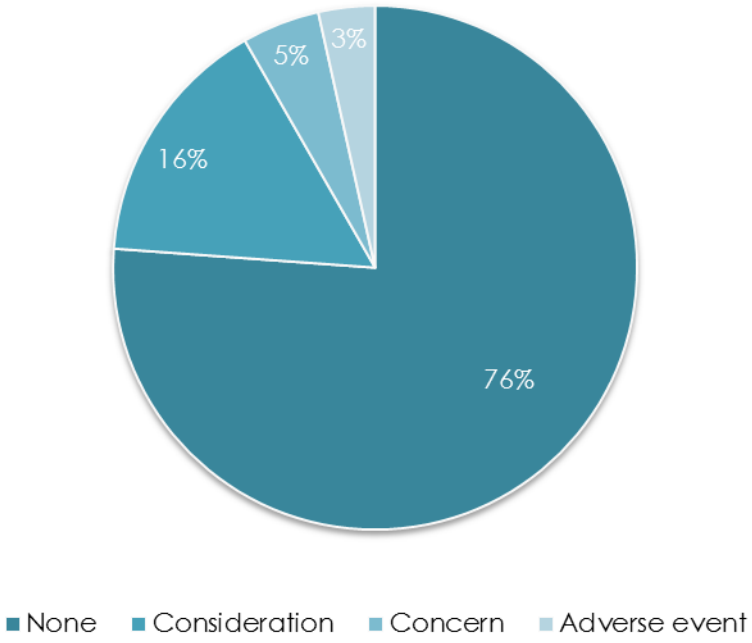
3.8 Outcomes of the peer review

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. 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:

- 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 21: Clinical management issues as identified by assessors



Note: n=1,376

Comments:

- In 92% (1,262/1,376) of audit cases there were either no or only minor perceived (area of consideration) issues of patient management.
- Areas of concern were identified in 5% of patients (66/1,376).
- Adverse events, the most serious form of criticism, were identified by assessors in 3% of patients (48/1,376).
- For more information, refer to Table 17.

3.8.1 Areas of clinical incidents

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

Table 16: Severity of criticism of perceived clinical management issues

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

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

Table 17: Frequency of clinical management issues

Degree of criticism of patient management	Total occurrences	%
No issues identified	1,048	76%
Area of consideration	214	16%
Area of concern	66	5%
Area of adverse event	48	3%
Missing data	0	0%
Total	**1,376**	**100%**

Perceived impact on patient outcome	Total occurrences	%
No issues of management identified	1,048	76%
Did not affect clinical outcome	89	7%
May have contributed to death	181	13%
Probably contributed to death	48	3%
Missing data	10	1%
Total	**1,376**	**100%**

Perceived preventability of clinical issues	Total occurrences	%
No issues identified	1,048	76%
Definitely preventable	35	3%
Probably preventable	125	9%
Probably not preventable	136	11%
Definitely not preventable	17	1%
Missing data	15	1%
Total	**1,376**	**100%**

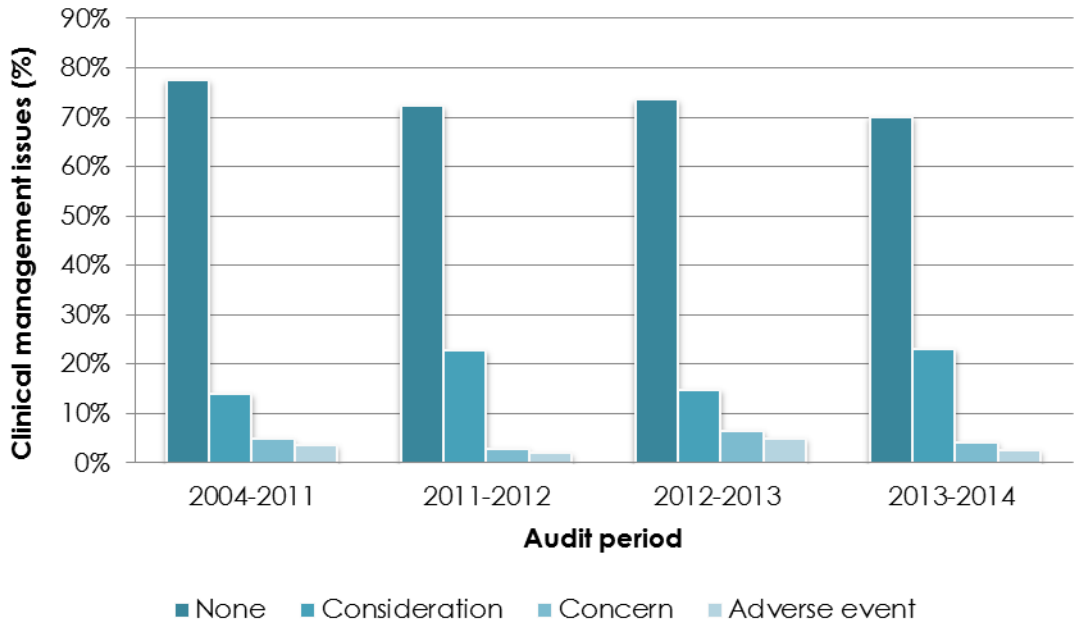
Clinical team responsible for management issue	Total occurrences	%
No issues identified	1,048	67%
Surgical team	232	15%
Other clinical team	195	13%
Hospital issue	58	4%
Other factors*	18	1%
Total	**1,551**	**100%**

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

Comments:

- Both sets of assessors perceived that clinical management issues occurred in 24% of cases (328/1,376).
- In 15% (232/1,551) of cases an issue was identified that was attributed to the surgical team. Another 13% (195) of cases had an issue attributed to other clinical teams (for example; medical and emergency departments), 4% (58) were attributed to hospital issues, and 1% (18) to other factors.
- These finding are similar to the national audit results.[2]

Figure 22: Frequency and classification of clinical management issues by audit period



Note: Missing data: n=13 (<1%) n=1,376.

Comments:

- The rate of clinical issues has remained constant over the 10-year audit period (see Figure 22).
- In the 2004–2011 audit period 78% (804/1037) of patients had no identified clinical management issues. This figure fell to 70% in 2013–2014 (82/117).
- The assessors perceived more clinical issues over the total audit period than the treating surgeon. The ratio of issues identified by treating surgeons compared with first-line assessors was 20%:26%. This means the first-line assessor identified more issues than the treating surgeon. This gap widens between the treating surgeon and the second-line assessor at 50%:60%. These results support the importance and the value of an independent peer review assessment (data not shown).

3.8.2 Frequency of clinical management issues

The frequency of specific clinical issues of management is shown in Table 18. The higher the frequency, the greater the requirement for improved surgical care in that particular area.

Table 18: Frequency of clinical management issues

Clinical management issue	Cases (n)	Cases (%)
Decision to operate	35	11%
Adverse event factors in management	21	6%
Better to have done different operation or procedure	15	5%
Delay to surgery	15	5%
Delay in diagnosis	14	4%
General complication of treatment	10	3%
Diagnosis related complications	10	3%
Delay to operation caused by missed diagnosis	8	2%
Anastomotic leak after open surgery	6	2%
Aspiration pneumonia after anaesthetic	6	2%
Delay in recognising complications	6	2%
Failure to investigate or assess patient fully	5	2%
Delay in investigating the patient	5	2%
Postoperative care unsatisfactory	5	2%
Delay to reoperation	5	2%
Unsatisfactory medical management	4	1%
Secondary haemorrhage	4	1%
Delays-inpatient care	3	1%
Diagnosis missed – unspecified	3	1%
Delay in recognising anastomotic leak	3	1%
Intraoperative bleeding during open surgery	3	1%
Postoperative bleeding after open surgery	3	1%
Communication failures	3	1%
Pulmonary embolus	3	1%
Aspiration pneumonia	3	1%
Anaesthesia related	3	1%

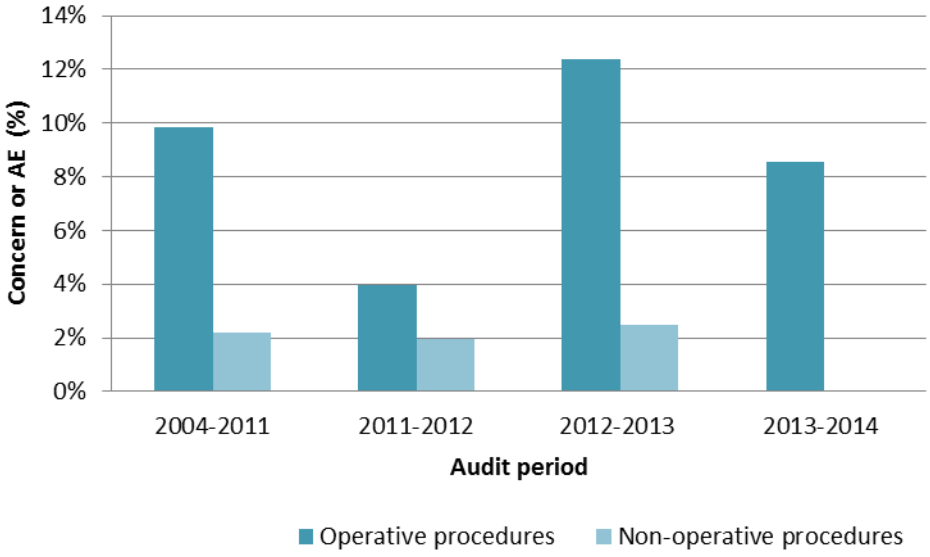
Note: more than one clinical management issue can be attributed to one audited case; n= 328 clinical management issues identified in 1,376 cases); categories with less than three not listed 36% (127).

Comments:

- The most common clinical issues were decision to operate, 11% (35/328), and adverse event factors in management, 6% (21/328). These are significant findings, highlighting that clinical deterioration must be acted on and not just recorded.
- The delay in definitive treatment category includes delays in transfer, establishing diagnosis and starting treatment. TASM's findings are similar to a number of studies on hip fracture patients found that delay to surgery was attributable to patient factors such as age[17],comorbidities[18], ASA status, gender, day of surgical admission relating to delay to surgery[19], waiting times[11, 20, 21] and reduction of theatre changeover time.[22]

- Criticism of the choice of operation including a failure to adequately consider or perform less extensive procedures on sicker patients with multiple comorbidities.

Figure 23: Frequency of adverse events and areas of concern by operative status and audit period

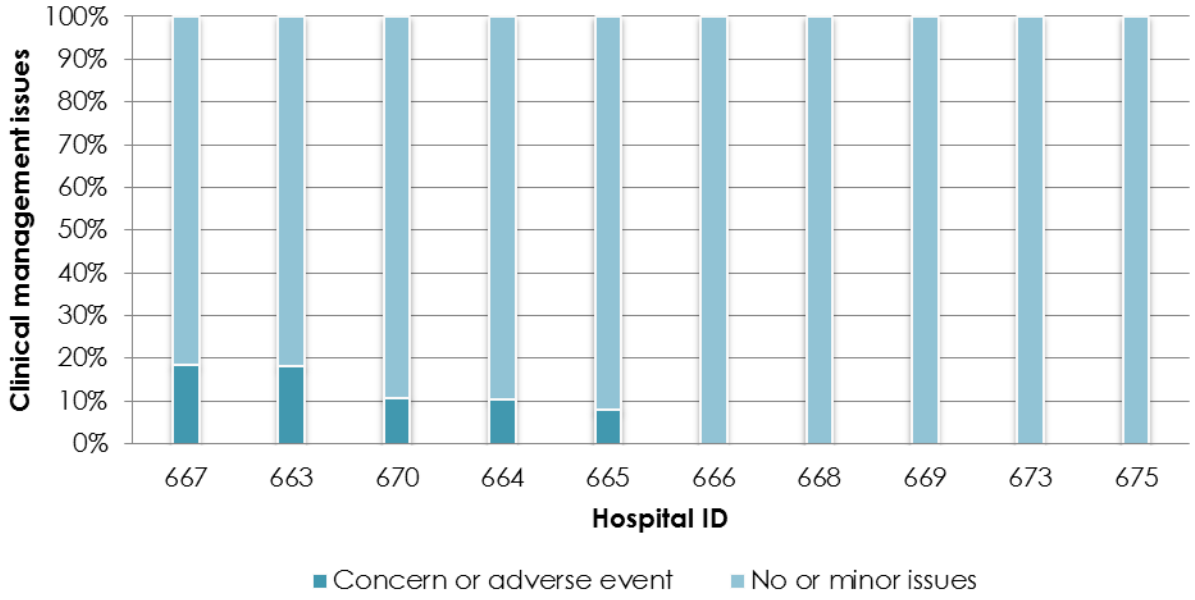


Note: AE: adverse event; n=1,376.

Comments:

- Overall, cases in which had non-operative procedures had a significantly lower rate of areas of concern and adverse events (2% [28/1,376]) than cases in which an operative procedure was performed (10% [131/1,376]).
- There was a reduction in the frequency of areas of concern and adverse events from 12% (14/121) during the 2012–2013 audit periods, to 7% (8/117) during the 2013–2014 audit period.

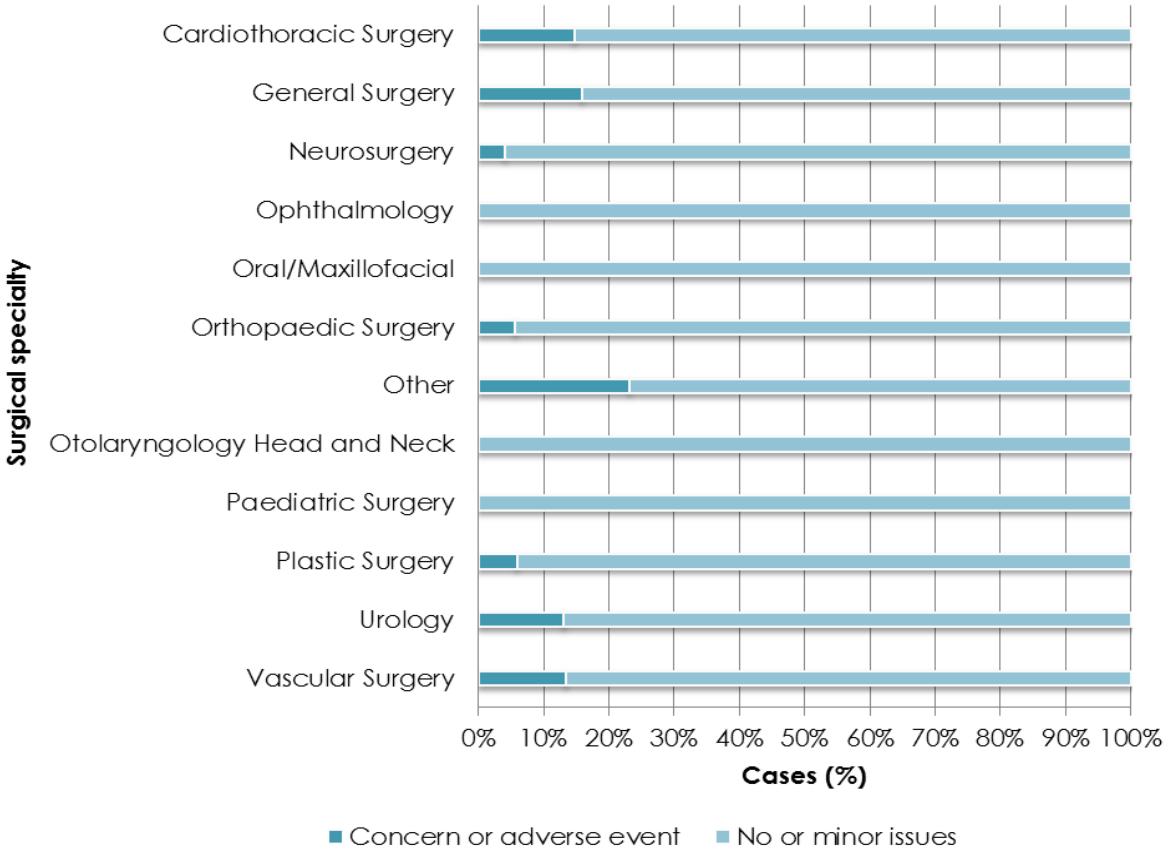
Figure 24: Adverse events and areas of concern by hospital during the audit period



Note: n= 159/1,376

Note: ID: identifier; Grey lines represent percentage grids.

Figure 25: Adverse events and areas of concern by surgical specialty



Note: n= 159/1,376; Other: Gynaecology and Colorectal surgery.

3.8.3 Conclusions

TASM would like to encourage participating stakeholders to improve their leadership approaches in patient care. Focus on better documentation of clinical events, show leadership, take action on evidence of clinical deterioration, focus on communication and improve awareness for shared care requirements. Also focus on improved pre-, intra- and postoperative management as outlined in the 'Emerging issues and recommendations to TASM clinical stakeholders' section of this report.

4. Audit limitations and data management

Audit data is collected to provide feedback to surgeons, rather than for academic research. The data is of a high quality as every case underwent external peer review.

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

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

The volume of missing data continues to be greatest in two sections: 'fluid balance management' (20%) and 'critical care utilisation' (30%). These questions are important if we are to identify and address adverse trends. Where data integrity issues are identified, it is important to review the format of the questions that will generate the data. ANZASM revised the surgical case record form to improve the quality of the audit data.

TASM will upgrade the electronic Fellows interface during 2015 for data submission and this should ease the data submissions and lead to improved data integrity in the future.

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Appendix

Data management and statistical analysis

All deaths occurring in Tasmanian hospitals while the patient is under the care of a surgeon that are notified to TASM are audited. Cases admitted for terminal care and deaths incorrectly attributed to surgery are excluded from the full audit process. The 2013–2014 report includes deaths reported to TASM since data collection commenced on 1 July 2004 up to 30 June 2014. 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 Alcidion Corporation. 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 have been completed by surgeons.

Exclusion of identifiable data

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

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.

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.

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists

Website: www.surgeons.org/TASM

Email: tasm@surgeons.org

Telephone: +61 3 6223 8848

Facsimile: +61 3 6223 5019

Address: 147 Davey Street
Hobart TAS 7000