The Western Australian Audit of Surgical Mortality (WAASM)

2018 REPORT

Royal Australasian College of Surgeons

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists

Excellence in Women's Health

WAASM Western Australian Audit of Surgical Mortality

ANZASM Australian and New Zealand Audit of Surgical Mortality

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The information contained in this annual report has been prepared by the Royal Australasian College of Surgeons, Western Australian Audit of Surgical Mortality Management Committee, which, as part of the Australian and New Zealand Audit of Surgical Mortality is a declared quality assurance activity under the *Health Insurance Act 1973 (Cth)*, Part VC (gazetted 2nd May, 2017).

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'The wind of change is blowing through this continent. Whether we like it or not, this growth of national consciousness is a political fact'[1]

Harold Macmillan's historic speech to the Parliament of South Africa in 1960 accurately predicted the changes that have since occurred in that continent. A similar safety and quality wind is beginning to blow through Australia and previous inconsistent and undirected quality and safety zephyrs, which disappeared almost before being detected, are now being replaced by a breeze that is increasing in strength and becoming more consistent in direction. A key difference to Macmillan's observation regarding the separation and independence of former colonies is that the move here is towards greater state unity.

The harsh reality is that Australia has lagged behind other countries in the development of its national safety and quality, notably in regard to its openness and transparency. Certainly Australia has beacons of international excellence, such as the Australian Orthopaedic Association National Joint Registry, but these are very much the exception. At a national level, Australia falls a long way short of well-established international programmes such as the American College of Surgeons National Surgical Quality Improvement Program, the UK National Health Service Healthcare Quality Improvement Partnership and various national hip fracture audits. These projects have demonstrated unequivocal improvements and it is difficult to understand why Australia has not, even now, understood that a relatively small investment will recover its costs many times over.

This accelerated change is being driven at various levels. The events in Bacchus March prompted the Victorian government to commission Dr Stephen Duckett to undertake a comprehensive review of its safety and quality activities. All the recommendations in his report, *'Targeting Zero'*[2], were accepted by the Victorian government and led to the establishment of Safer Care Victoria. The Western Australian Department of Health's proactive review of safety and quality in the WA health system, the Mascie-Taylor report,[3] included many similar recommendations. A central tenet of both reports was the timely capture and feedback of high quality data to both hospitals and clinicians. Both reports made reference to their states' Audit of Surgical Mortality.

Whilst the jurisdictions welcome and acknowledge the contributions of the Audit of Surgical Mortality they remain frustrated that the Audit of Surgical Mortality's Qualified Privilege prevents greater sharing of data. Qualified Privilege facilitates frank and honest reporting, with the assessment of cases being fed back to participants as well as being used for education. This protection allows for the highest quality and completeness of data, however it does prevent identification of individuals. Various reports are provided to governments and hospitals to give an indication of areas where performance could be improved.

During these discussions, the Royal Australasian College of Surgeons has emphasised the importance of peri-operative morbidity and near misses. These far out-number mortality and their associated costs, and the profound and long-term impact they may have on outcome, have not been fully appreciated. The Royal Australasian College of Surgeons has repeatedly noted that if it is only the Audit of Surgical Mortality that is aware of poor care, it can only be because hospitals do not have the proper processes and structures in place.

The Royal Australasian College of Surgeons has recently made a significant contribution to this debate with its well-received guidelines for the conduct of effective Mortality and Morbidity meetings. This has attracted interest from the Western Australian Department of Health, and has been utilised in its revision of the Review of Death Policy. It is essential that surgeons work with Boards and hospitals to ensure that the Royal Australasian College of Surgeons' recommendations are enacted.

To address these issues, the Royal Australasian College of Surgeons has invited Dr Stephen Duckett to chair a national workshop. It has invited Health Departments and others to discuss and agree on common ground and to reach a mutually acceptable position that balances the demands of Qualified Privilege with the openness and transparency now demanded. Addressing morbidity will be a central part of this workshop, as well as openness and transparency. Australia has been reluctant to publicise identifiable data as has been done in some other countries.

Although the demands of regulation and accreditation are getting greater, the medical profession still enjoys considerable autonomy. This is a privilege not normally offered to other safety critical industries, or even other professions. However, clinicians have not always discharged their obligations as they should. The sooner Australian clinicians address this, the better chance they have of guiding future changes.

The report that follows is the work of the Western Australia Audit of Surgical Mortality staff. The change in format last year was well received. I congratulate them, both for this report and their outstanding work during the year. I would also like to note the departure of the Australian and New Zealand Audit of Surgical Mortality Manager, Mr Gordon Guy, and acknowledge his excellent work over many years in linking, co-ordinating and supporting the Western Australia Audit of Surgical Mortality and the other Audit of Surgical Mortality offices.

Turning to the report itself, the stand out observation relating to transfers is discussed in section 9. Almost one third of patients were transferred and three quarters of these transfers were to a tertiary hospital. Over the audit period there appears to have been a rising trend. Mortality related to transfers has been a long standing concern to the Western Australia Audit of Surgical Mortality; data has been included in many previous reports [4], and in 2015 it was the theme of its symposium.[5]

Care close to home is desirable for many reasons. However, low volume procedures and high-risk patients, many of whom are emergencies, are often better managed in tertiary hospitals. High-risk patients who attend their local hospital, only to be transferred, will incur a delay and in many cases this may have a direct adverse effect on outcome. . The majority of inter-hospital transfers were from a metropolitan hospital to a tertiary hospital that was often acting as a 'rescue' hospital. Transfers are now so frequent that the process needs to be robust and dependable. The implications for service delivery are potentially very significant. Clearly Western Australia has an emerging transfer problem. Action is well overdue.

RJ Aitken
Clinical Director
Western Australian Audit of Surgical Mortality

SHORTENED FORMS

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
CCU	critical care unit
CNR	case note review
DVT	deep vein thrombosis
FLA	first-line assessment
HDU	high dependency unit
ICU	intensive care unit
RAAS	Research, Audit and Academic Surgery
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
SPSS	Statistical Package for Social Sciences
UWA	University of Western Australia
WA	Western Australia/n
WAAMRC	Western Australian Anaesthetic Mortality Review Committee
WAASM	Western Australian Audit of Surgical Mortality

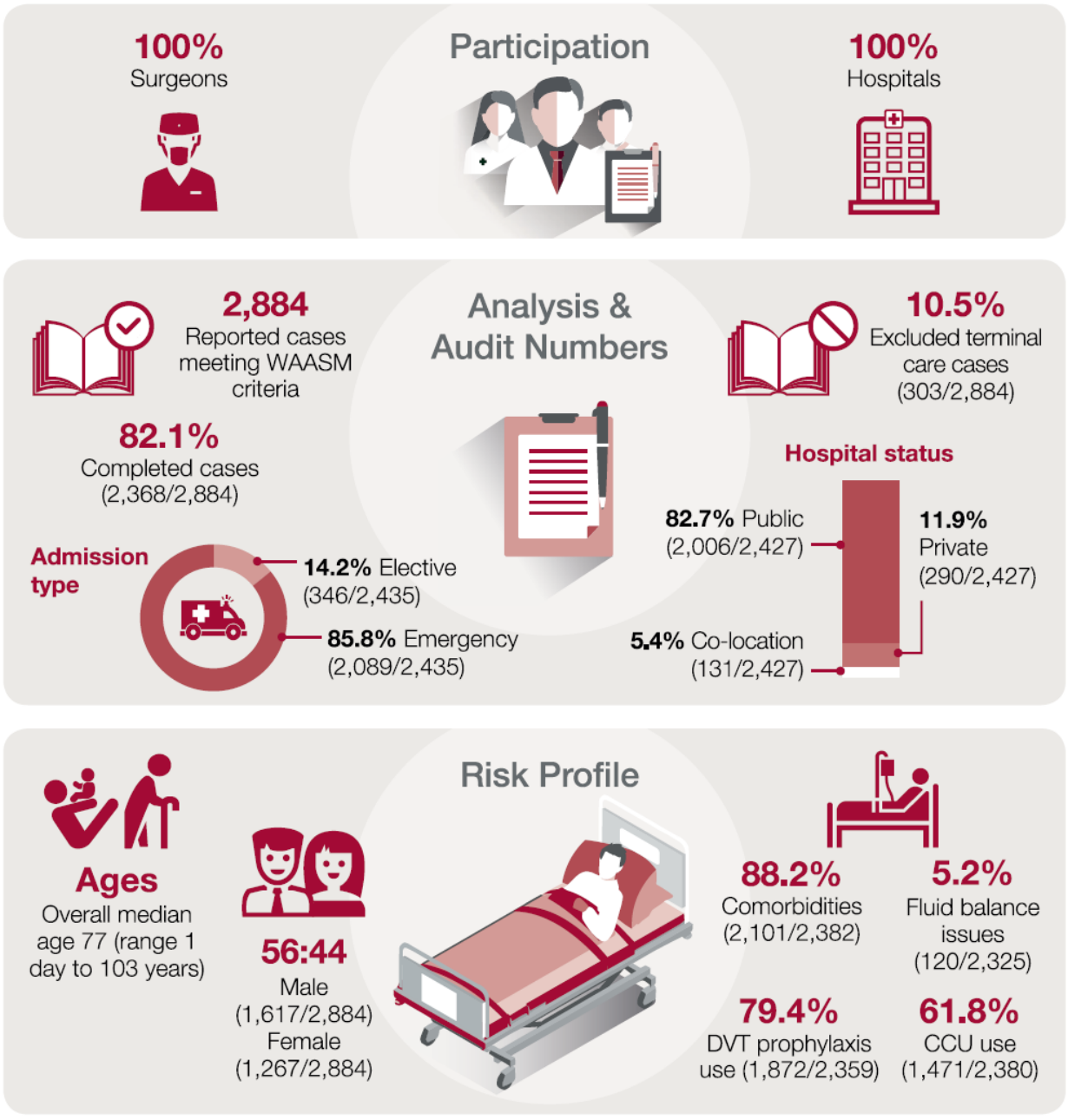
EXECUTIVE SUMMARY

Background

The Western Australia Audit of Surgical Mortality (WAASM) is an external, independent, peer reviewed audit of the process of care associated with surgically-related deaths in Western Australia (WA). The WAASM was established in 2001. It is funded by the WA Department of Health and has protection under federal legislation.

Reporting period

This report covers cases reported to the WAASM from **1 January 2013 to 31 December 2017**. Please note that for the data analysed the denominator may sometimes change in this report. This is mainly due to questions left unanswered by surgeons, which result in missing data.



Patient Transfers

28.8% Patients transferred (667/2,313)

8.8% Delay in transfer (54/617)

4.5% Inappropriate transfer (28/621)

2.9% Inappropriate level of care (17/595)

5.9% Insufficient clinical information (35/589)

Operations

67.1% Patients that had surgery (1,656/2,468)

15.5% Unplanned returns to theatre (249/1,611)

5.3% Operations abandoned on finding a terminal situation (110/2,082)

87.7% Consultant Surgeons who made the decision to operate (2,011/2,293)

63.4% Consultant surgeons who performed surgery (1,454/2,293)

Infection

31.7% Patients with clinically significant infection (736/2,320)

Most common infections

40.2% Pneumonia (295/734)

25.6% Septicaemia (188/734)

19.8% Intra-abdominal sepsis (145/734)

Peer Review Outcomes

17.4% Cases with one or more clinical management issues (411/2,368)

26.9% Number of clinical management issues (636/2,368)

11.6% Adverse events (74/636)

63.0% Adverse events that caused death (46/73)

28.3% Definitely preventable adverse events that caused death (13/46)

RECOMMENDATIONS

The WAASM makes the following recommendations:

Audit management

- Through the Royal Australasian College of Surgeons (RACS) WA Regional Office, continue to increase the profile of the WAASM through regular correspondence in the Regional Office quarterly newsletter distributed to all WA surgeons.
- Continue to promote the mandatory use of the Fellows' Interface (online platform) for completion and submission of surgical case forms (SCFs) and first-line assessments (FLAs).
- Facilitate the Australian and New Zealand Audit of Surgical Mortality (ANZASM) processes to develop and test ongoing enhancements to the Fellows' Interface, Delegates' Interface and the Bi-national Audit System. These improvements include: a redesigned new look to both the Fellows' Interface and Delegates' Interface; ongoing security updates to the Fellows' Interface, Delegates' Interface and Bi-national Audit System; and mandatory completion of all questions on the SCFs.
- Maintain the high return rate of SCFs (98.0%; 580/592) set in 2016.

Research and reporting on audit data

- Undertake longitudinal analysis of key data, such as transfers, and compare WA with other states.
- Study in detail cases returned as terminal care cases and review their management.
- Collaborate with the Patient Safety Surveillance Unit, WA Department of Health, to produce and distribute a combined hospital report incorporating the hospital performance summary report, identifying trends in clinical management issues and comparing each hospital with like-state and like-national hospitals.
- Continue to progress the joint initiative between the WAASM and the University of Western Australia (UWA), which aims to utilise the ANZASM data to examine the impact of process and regulatory changes on the quality of audit data.

Clinical management

- Monitor and report trends observed in the proportion of surgical patients who die from clinically significant infections for an additional year. Between 2013 and 2017, clinically significant infections were reported in 31.7% (736/2,320) of cases. Pre-admission infections comprised 46.1% (330/716) and infections acquired during admission were reported for 53.9% (386/716) of cases with infections.
- Monitor trends in communication issues observed at any stage of treatment in cases of surgical mortality for the next three years.

Education

- Disseminate audit findings through reports and publications.
- Collate, analyse and produce a report on the Peer Review Feedback Evaluation Forms received from WA surgeons, where cases have gone on for a second-line assessment (SLA) or an FLA with identified clinical management issues.

1. INTRODUCTION

1.1 Background

The WAASM is an external, independent, peer reviewed audit of the process of care associated with surgically-related deaths in WA. The project is funded by the WA Department of Health.

The WAASM commenced in June 2001 as a pilot study under the management of the UWA. In 2005, the WAASM's management was transferred to the Research, Audit and Academic Surgery (RAAS) division of the RACS. In the same year, the RACS formed the ANZASM with the purpose of establishing similar mortality audits in other states and territories. All Australian states and territories are now participating.

1.2 Objectives

The objective of the audit is to improve the safety and quality of surgical care through a peer review process. A vital part of the process is the provision of feedback and information to surgeons, with the aim of educating, facilitating change and ultimately, improving practice. The audit is a patient safety and quality improvement initiative designed to highlight emerging trends in outcomes from surgical care and system errors. Its focus is on education and performance improvement.

1.3 Structure and governance

The WAASM project falls under the governance of the ANZASM. The WAASM governance structure is illustrated in Figure 1. The WAASM receives protection under the Commonwealth Qualified Privilege Scheme, part VC of the *Health Insurance Act 1973* (gazetted 2nd May, 2017).

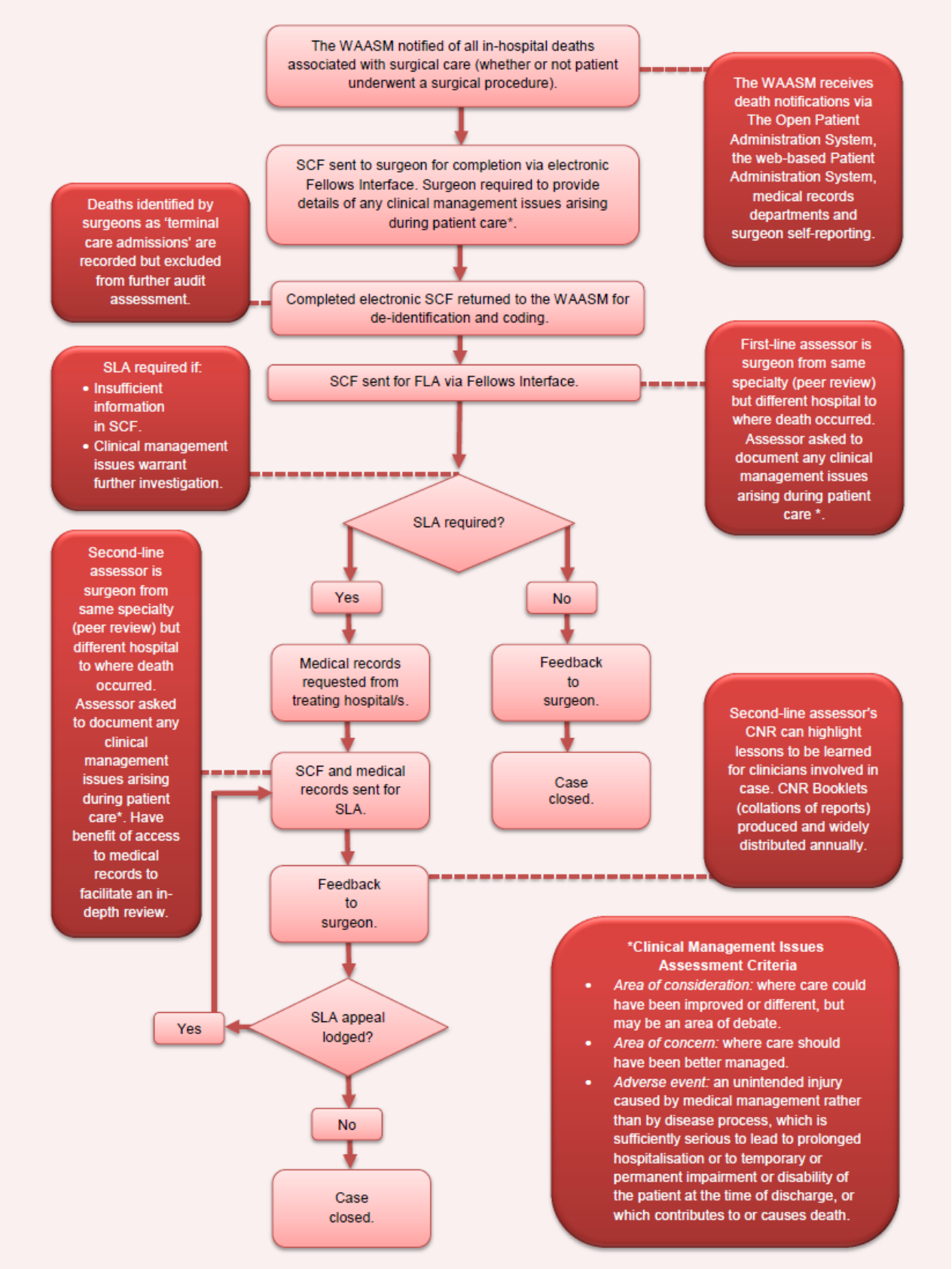
Figure 1: WAASM governance structure

RACS: Royal Australasian College of Surgeons; WA: Western Australian; ANZASM: Australian and New Zealand Audit of Surgical Mortality; WAASM: Western Australian Audit of Surgical Mortality.

1.4 Audit process

The WAASM audit process is outlined below (Figure 2).

Figure 2: WAASM audit process



*See Clinical Management Issues Assessment Criteria
WAASM: Western Australian Audit of Surgical Mortality; SCF: Surgical Case Form; FLA: First-line Assessment; SLA: Second-line Assessment; CNR: Case Note Review.

1.5 Data analysis

The WAASM audits all deaths occurring in WA hospitals while the patient was under the care of a surgeon. Terminal care cases are excluded from the full audit process. The 2018 report covers deaths reported to the WAASM from 1 January 2013 to 31 December 2017, censored on 29 March 2018. The full audit process can take three months or longer from notification of death to completion. Some 2017 cases were still under review as of the census date, and these case outcomes were not available for this report. Numbers in previous reports may vary from this report because some cases were completed after the census dates of these reports.

Data is entered and stored in the Bi-national Audit System database and analysed using the Statistical Package for Social Sciences (SPSS version 24), and Microsoft Office Excel (2010). The total number of cases used in the analyses may vary as each data point may not have been completed for every case reported.

1.6 Hospital and Hospital Performance Summary Reports

The WAASM and the ANZASM monitor trends and identify clinical management issues via independent peer review assessments in order to assist and inform improvements in patient safety. In 2015, the WAASM released the first series of individualised Hospital Reports, and the most recent series was sent out in 2018.

The Hospital Reports are released annually to hospitals that have three or more operating surgeons and where there have been five or more deaths (with the audit process complete). The Hospital Reports can assist hospital accreditation for certain National Safety and Quality Health Service Standards. These include:

- Standard 1, Governance for Safety and Quality in Health Service Organisations
- Standard 3, Preventing and Controlling Healthcare Associated Infections
- Standard 6, Clinical Handover
- Standard 9, Recognising and Responding to Clinical Deterioration in Acute Health Care
- Standard 10, Preventing Falls and Harm from Falls.[6]

The Hospital Reports can be used to monitor clinical management issues within a hospital, and they also provide comparisons with other participating peer-grouped hospitals both within the state and nationally. These reports can be presented and discussed at relevant meetings, such as Clinical Governance Committee meetings, Mortality and Morbidity meetings and Hospital Quality and Safety Managers/Representatives meetings.

The first Hospital Performance Summary Report was released in 2017 and shows individual hospital performance on potentially preventable clinical management issues. It gives the percentage of potentially preventable clinical management issues within the state, as well as nationally.

Both reports can assist the audit team, the WA Department of Health and WA hospitals to identify and address potentially preventable errors and clinical management issues.

2. AUDIT OVERVIEW

Over the five year reporting period:

- **2,884 deaths met the WAASM criteria.**
- **82.1% (2,368/2,884) of cases had completed the audit process.**
- **There was a 3.1% relative decrease in deaths per 100,000 population.**
- **96.2% of SCFs were returned.**
- **29 hospitals were associated with the 2,884 cases that met the WAASM criteria.**

2.1 Audit numbers

Participation in the WAASM has been a mandatory requirement for surgeons since 2010 and it has been monitored through the RACS Continuing Professional Development[7] since 2013. During the period 1 January 2013 to 31 December 2017, the WAASM was notified of 2,984 deaths. Of these, 2,884 fell within the WAASM criteria (Table 1).

Table 1: Deaths reported to WAASM

Reporting period (year)	Number of deaths reported	Excluded error*	Deaths falling within WAASM criteria
2013	593	27	566
2014	598	20	578
2015	596	15	581
2016	604	12	592
2017	593	26	567
Total	**2,984**	**100**	**2,884**

*Cases reported as WAASM deaths that do not fall within the WAASM inclusion criteria.
WAASM: Western Australian Audit of Surgical Mortality.
Refer to Appendix A.3 for further information on data.

Deaths that occur while a patient is under the care of a surgeon are reported to the WAASM by the WA Department of Health or the hospital medical record department. The surgeon involved in the care of the patient can also self-report the death using the online Fellows' Interface. Over the reporting period, the WAASM has observed an overall relative decrease of 3.1% (22.6% in 2013 to 21.9% in 2017) in the rate of deaths under a treating surgeon per 100,000 population (Table 2).

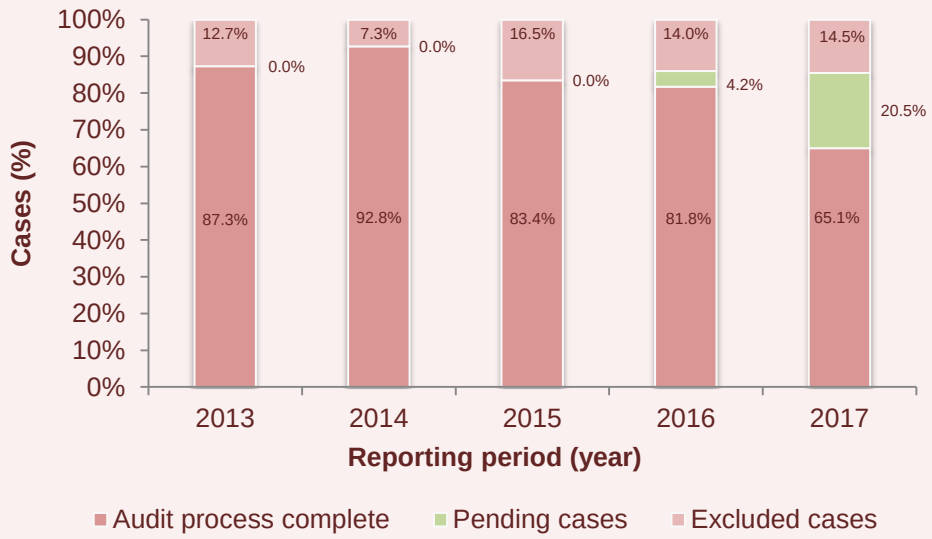
Table 2: Number of deaths per 100,000 population

Reporting period (year)	Number of deaths falling within WAASM criteria	WAASM reported surgical mortality (rate per 100,000 population)[8]
2013	566	22.6
2014	578	22.8
2015	581	22.8
2016	592	23.1*
2017	567	21.9**

*From January 2013 to June 2016, based on actual census data; from July 2016 to December 2016, based on projected data.
**Projected data, only available up to September 2017.
WAASM: Western Australian Audit of Surgical Mortality.
Refer to Appendix A.3 for further information on data.

As at the census date, 82.1% (2,368/2,884) of cases had completed the audit process. There were 4.9% (141/2,884) of cases where the SCFs, FLAs or SLAs were pending and a large proportion of these came from 2017 (4.0%; 116/2,884). While the 2017 audit period has a higher number of pending cases, it is expected that this number will decrease and become more in line with the previous years as more of these cases are finalised. Where cases have not been received within two years from the notification of death, follow up of these cases ceases ('lost to follow-up'). A total of 13.0% (375/2,884) of cases were excluded from the audit as a result of terminal care admissions or being 'lost to follow-up' (Figure 3).

Figure 3: Audit case status

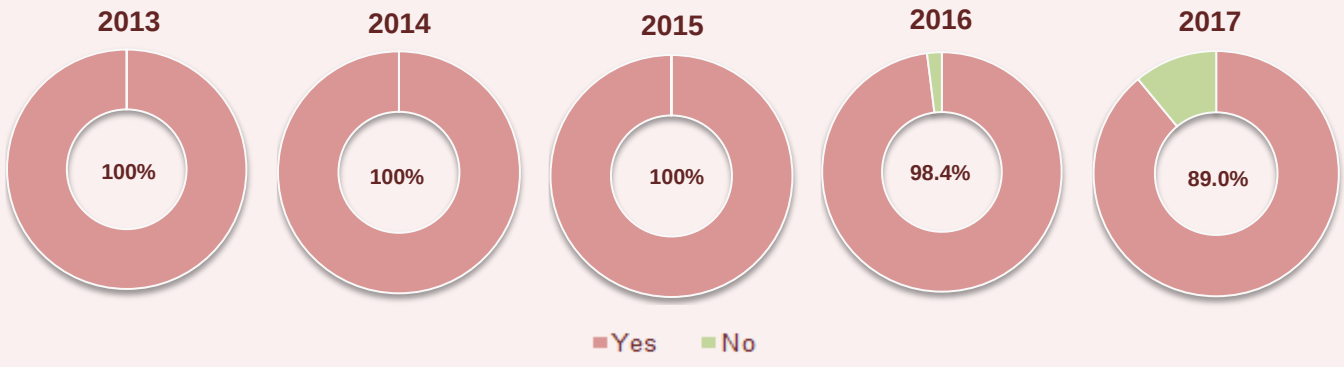


Refer to Appendix A.2 for further information on data.

Patients admitted under the care of a surgeon with a decision made for terminal care were excluded from the full audit process and this accounted for 10.5% (303/2,884) of cases during the reporting period. The return rate for SCFs, including terminal care cases, during the reporting period was 96.2% (2,774/2,884).

All cases, apart from terminal care cases, are sent for FLA. The FLA is a critical assessment, and many cases can be closed at this point if the treating surgeon supplied adequate information in the SCF. Figure 4 shows the breakdown of FLAs returned by year. The rate of FLA returns over the reporting period was 97.7% (2,413/2,471).

Figure 4: First-line assessments returned



Refer to Appendix A.2 for further information on data.

Some cases need to undergo further review and are therefore referred for an SLA. The need for an SLA may be due to the treating surgeon not supplying adequate information for the first-line assessor to be able to make a judgement, or the first-line assessor being of the view that the case needs to be investigated in more detail. Of the 2,413 FLAs returned over the reporting period, 15.1% (364/2,413) were referred for an SLA. Table 3 shows the breakdown of cases referred for an SLA by year.

Table 3: Second-line assessments

Reporting period (year)	FLAs returned	Cases referred for SLA	
		Number	Percentage (%)
2013	494	76	15.4
2014	536	75	14.0
2015	485	71	14.6
2016	492	71	14.4
2017	406	71	17.5
Total	**2,413**	**364**	**15.1**

FLA: First-line Assessment; SLA: Second-line Assessment.
Refer to Appendix A.3 for further information on data.

2.2 Surgeon participation

As at 1 January 2017, the WAASM mandated the use of Fellows' Interface for completing and submitting SCFs and FLAs. The Fellows' Interface is a web-based application developed by the RACS specifically for the audits of surgical mortality. It is intended to be a faster, more efficient and convenient way to complete forms.

Table 4: Surgeon involvement in deaths falling within WAASM criteria

Reporting period (year)	Deaths	SCF returns*		Surgeons associated with SCF returns
		Number	Percentage (%)	
2013	566	520	91.9	159
2014	578	565	97.8	168
2015	581	571	98.3	168
2016	592	580	98.0	203
2017	567	538	94.9	191

*Includes terminal care cases.
SCF: Surgical Case Form; WAASM: Western Australian Audit of Surgical Mortality.
Refer to Appendix A.3 for further information on data.

The SCF return rate has improved over the years, with an overall rate of 96.2% (2,774/2,884). While the 2017 audit period currently has a slightly lower return rate, it is expected that this will increase to become more in line with the previous years as additional cases are finalised. Apart from 2017, there has been a steady increase in the number of treating surgeons returning their SCFs. (Table 4).

Table 5: Deaths falling within WAASM criteria by specialty		
Surgical speciality	Cases	
	Number	Percentage (%)
General Surgery	999	39.7
Neurosurgery	457	18.2
Orthopaedic Surgery	435	17.3
Vascular Surgery	239	9.5
Cardiothoracic Surgery	193	7.7
Urology	89	3.5
Plastic Surgery	57	2.3
Otolaryngology Head & Neck Surgery	27	1.1
Obstetrics & Gynaecology	8	0.3
Paediatric Surgery	8	0.3
Ophthalmology	4	0.2
Oral & Maxillofacial Surgery	1	0.04

WAASM: Western Australian Audit of Surgical Mortality.
Refer to Appendix A.3 for further information on data.

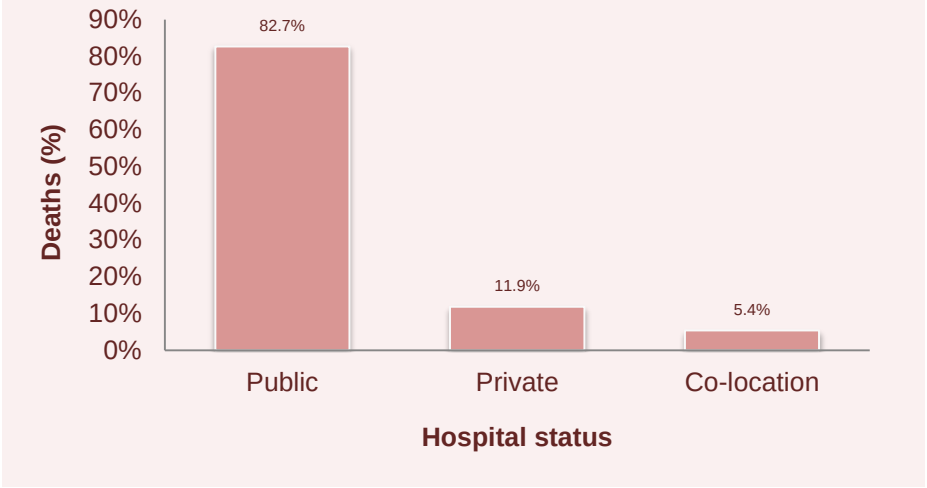
Table 5 shows the number of cases reported to the WAASM from each surgical specialty (where the information was provided in the SCF). General Surgery reported the most deaths at 39.7% (999/2,517), followed by Neurosurgery with 18.2% (457/2,517).

Members of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) participate voluntarily in the ANZASM. Several years of collaboration resulted in the first volume of the ANZASM National Case Note Review Booklet being produced jointly with the RANZCOG in 2017.[9] The booklet provides valuable lessons specific to the specialty.

2.3 Hospital participation

All eligible hospitals in WA where surgery is performed currently participate in the audit. Over the reporting period, there were 29 hospitals associated with the 2,884 deaths meeting the WAASM criteria. Figure 5 shows the number of patients admitted to public, private or co-location hospitals (where the information was provided on the SCF). Public hospitals accounted for over three-quarters (82.7%; 2,006/2,427) of admissions, while private and co-location hospitals had 11.9% (290/2,427) and 5.4% (131/2,427) of admissions respectively.

Figure 5: Deaths by hospital status

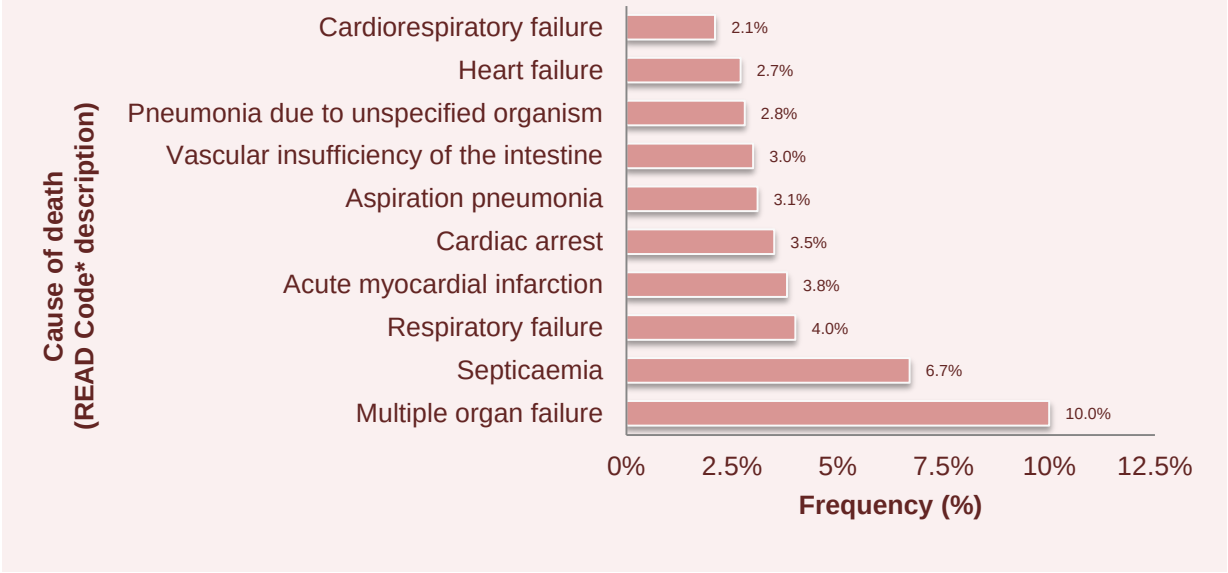


Refer to Appendix A.2 for further information on data.

2.4 Causes of death

The cause of death is recorded in the SCF by the treating surgeon. This is based on the patient diagnosis during the last admission, taking into account test results, operations and post mortem reports when available. The cause of death may be related to existing comorbidities. In 2014, an Australian study concluded that potentially modifiable comorbidities are associated with poorer postoperative outcomes.[10] The most frequent causes of death were multiple organ failure, septicaemia, respiratory failure, acute myocardial infarction and cardiac arrest (see Figure 6). Some cases have more than one cause of death listed.

Figure 6: Most common causes of death



*READ Code: Surgical diagnoses categorised using coded thesaurus of clinical terms (READ Codes). READ Codes are a clinical decision tree that contains terms, synonyms, and abbreviations covering all aspects of patient care. It is a precursor to ICD9 coding.
Refer to Appendix A.2 for further information on data.

3. DEMOGRAPHICS

Over the five year reporting period:

- **Males comprised 56.1% of deaths.**
- **The median age at death was 77 years.**
- **Most surgical deaths occurred in patients aged 81-90 years.**
- **There was a 2.0% increase in the proportion of surgical deaths in co-location hospitals.**
- **Emergency admissions accounted for 85.8% and elective admissions 14.2% of deaths.**

3.1 Age and gender distribution

This section gives an overview of patient demographics over the reporting period.

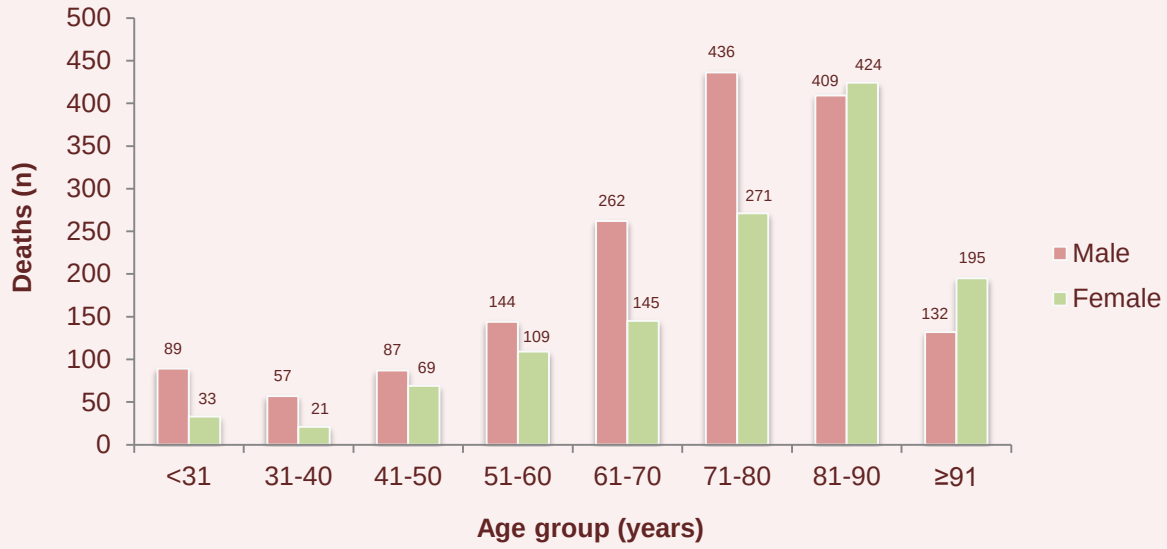
Table 6: Median age by gender

Gender	Number of deaths	Median age (years)	Interquartile range (years)
Males	1,617	75	62-84
Females	1,267	80	67-88
All patients	2,884	77	64-86

Refer to Appendix A.3 for further information on data.

The median age at death for all patients was 77 years (interquartile range, 64-86 years). Males accounted for 56.1% (1,617/2,884) and females 43.9% (1,267/2,884) of all deaths (Table 6).

Figure 7: Deaths by age group and gender



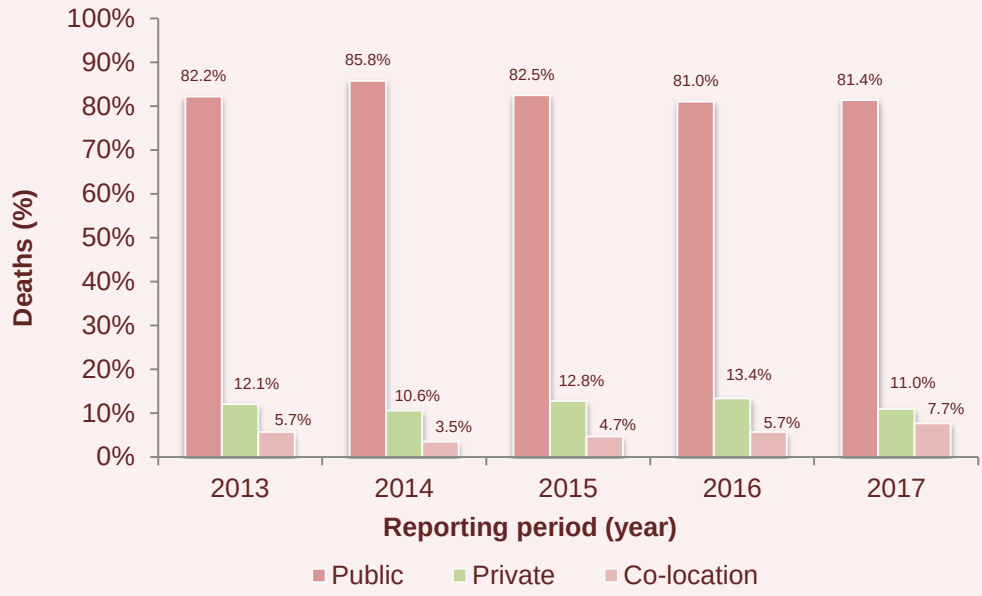
Refer to Appendix A.2 for further information on data.

For patients aged 80 years and below, males represented a greater proportion of deaths than females. This was reversed for patients aged 81 years and above, with females representing the greater proportion of deaths.

3.2 Hospital status

The status of hospitals (public, private or co-location) in which patients died is shown in Figure 8.

Figure 8: Deaths by hospital status by year



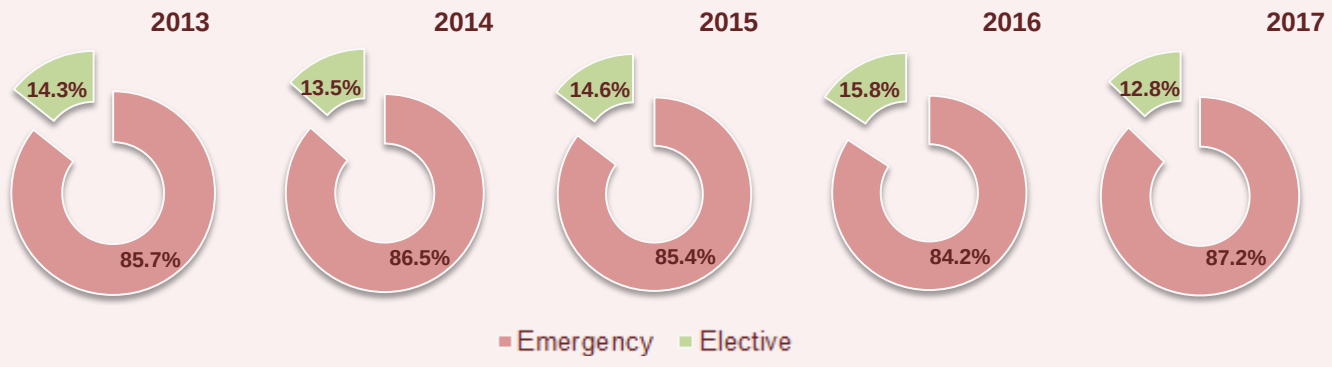
Refer to Appendix A.2 for further information on data.

Overall, there was a 2.0% increase in the proportion of deaths in co-location hospitals, from 5.7% (26/456) in 2013 to 7.7% (35/456) in 2017. In part, this is likely due to the opening of an additional co-location hospital in 2016. Deaths in public and private hospitals reduced by 0.8% (82.2%; 375/456 in 2013 to 81.4%; 371/456 in 2017) and 1.1% (12.1%; 55/456 in 2013 to 11.0%; 50/456 in 2017) respectively.

3.3 Hospital admission

The type of hospital admission, emergency or elective, is shown in Figure 9.

Figure 9: Hospital admission by year



Refer to Appendix A.2 for further information on data.

Emergency admissions accounted for 85.8% (2,089/2,435) of all deaths where data was available, with the remaining 14.2% (346/2,435) being elective admissions.

4. CLINICAL RISK PROFILE

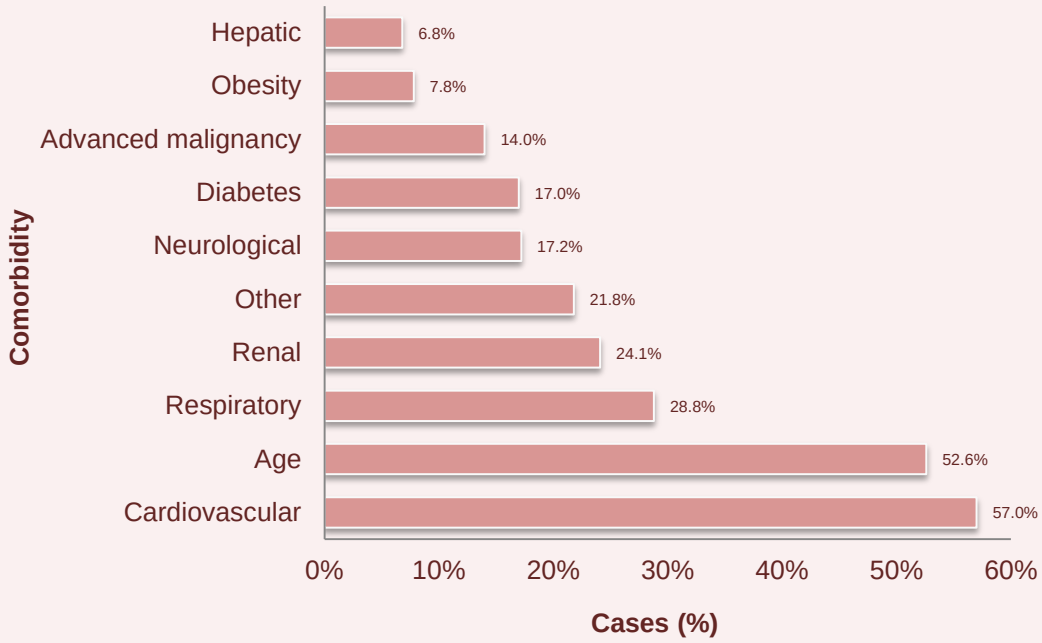
Over the five year reporting period:

- **One or more comorbidities were present in 88.2% of cases.**
- **The most commonly assigned ASA grade was grade 4 (42.0%).**
- **There was a preoperative diagnostic delay in 5.7% of cases; of these 40.5% were associated with the surgical unit.**
- **Fluid balance issues were reported in 5.2% of cases.**

4.1 Comorbidities

Treating surgeons are asked on the SCF to indicate if there were any known significant co-existing factors (comorbidities) associated with each case. A patient could have one or more comorbidities associated with an increased risk of death (see Figure 10).

Figure 10: Cases with specific comorbidities



'Other' includes comorbidities other than those listed on the surgical case form and may include the presence of other chronic illnesses, haematological or drug-related conditions, vasculopathy, hypertension, dementia, malnutrition, alcoholism and cachexia.
Refer to Appendix A.2 for further information on data.

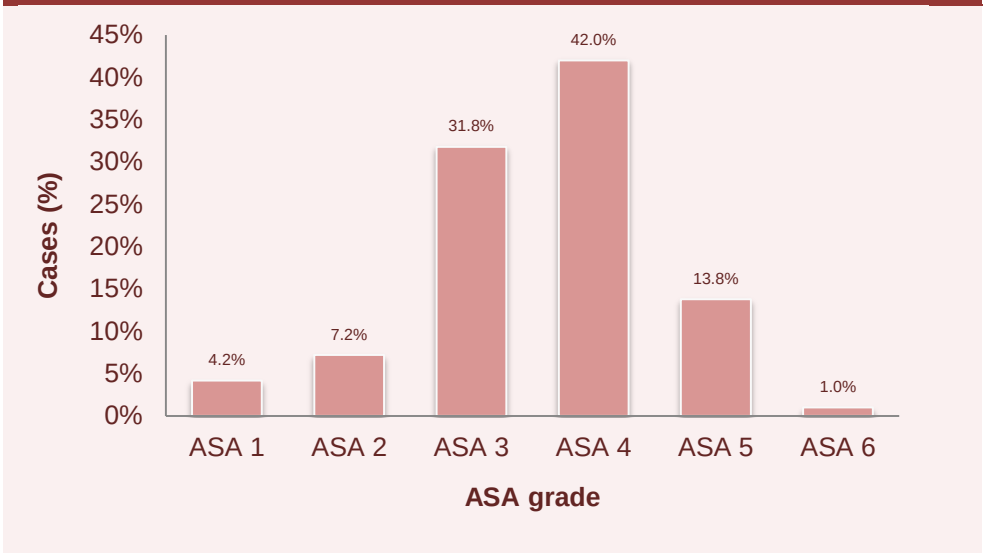
Most patients (88.2%; 2,101/2,382) had at least one significant comorbidity that increased their risk of death. The most frequently occurring comorbidities were cardiovascular disease (57.0%; 1,357/2,382), advanced age (52.6%; 1,253/2,382) and respiratory disease (28.8%; 687/2,382).

Age is an important comorbidity in surgical care; the older the patient, the greater the risk.[11] Frailty is being increasingly recognised as an important determinant of surgical outcomes. However, there is no consensus as to the preferred 'frailty scale',[12] with a recent review documenting 21 different scales used in surgical patients.[13] The degree of frailty is relevant when advising patients of their likely discharge destination, and quality and duration of life after surgery. For patients, these parameters are of equal, if not greater, importance than the immediate post-operative mortality.

4.2 American Society of Anesthesiologists grades

The American Society of Anesthesiologists (ASA) grade is an internationally recognised measure of a patient's preoperative physical status.[14] It is a simple but important indication of the overall health status of a patient. ASA grade definitions can be found in Appendix A.1.

Figure 11: Frequency of ASA grades



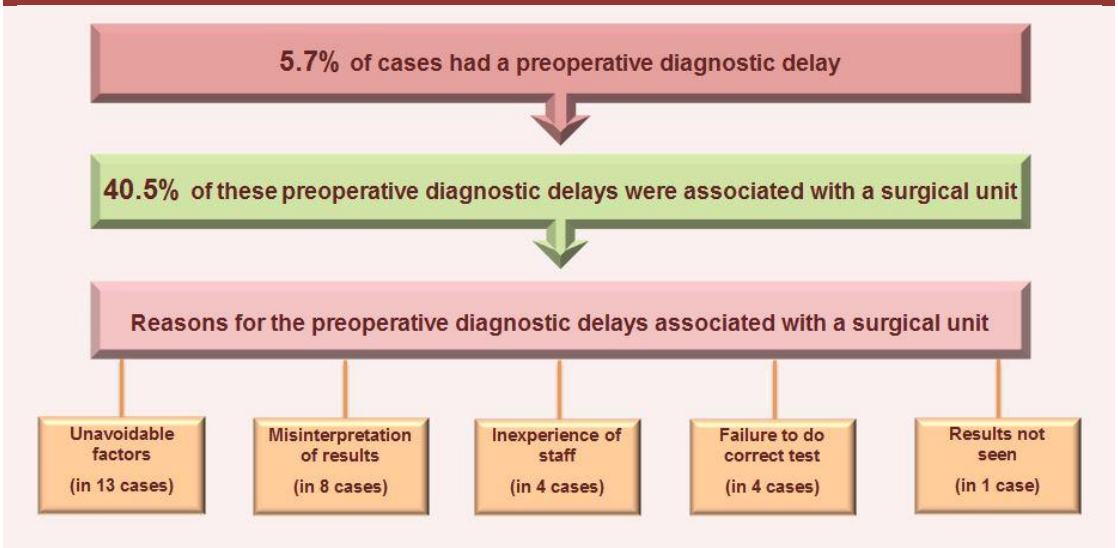
ASA: American Society of Anesthesiologists.
Refer to Appendix A.1 for definitions of ASA grades.
Refer to Appendix A.2 for further information on data.

Over the reporting period, patients were assigned ASA grade 4 (severe degree of systemic disease) in 42.0% (896/2,132) of cases. The second most commonly assigned was ASA grade 3 (moderate degree of systemic disease) with 31.8% (678/2,132) of cases.

4.3 Preoperative diagnostic delays

Treating surgeons were asked to indicate if there was a preoperative delay in the confirmation of the main surgical diagnosis. There may be many reasons for delay, and delays in diagnosis may be associated with the surgical unit, medical unit, general practitioner or emergency department.

Figure 12: Cases with preoperative diagnostic delays



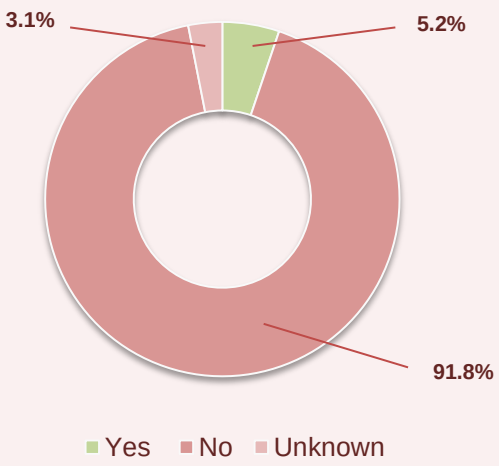
Refer to Appendix A.2 for further information on data.

Overall, a preoperative delay in diagnosis was indicated by the treating surgeon in 5.7% (134/2,359) of cases, and of these delays, 40.5% (32/79) were associated with the surgical unit. The most common reason for preoperative diagnostic delays associated with a surgical unit was 'Unavoidable factors', listed in 13 cases.

4.4 Fluid balance

Fluid balance can be difficult to manage, especially in frail, elderly patients. Over the reporting period, the treating surgeon indicated that there was an issue with fluid balance in 5.2% (120/2,325) of cases (Figure 13). Operative cases had more fluid balance issues (5.9%; 95/1,607) than non-operative cases (3.5%; 25/717). Treatment decisions must be based on a careful assessment of patient needs.

Figure 13: Cases with fluid balance issues



Refer to Appendix A.2 for further information on data.

5. CLINICAL RISK MANAGEMENT

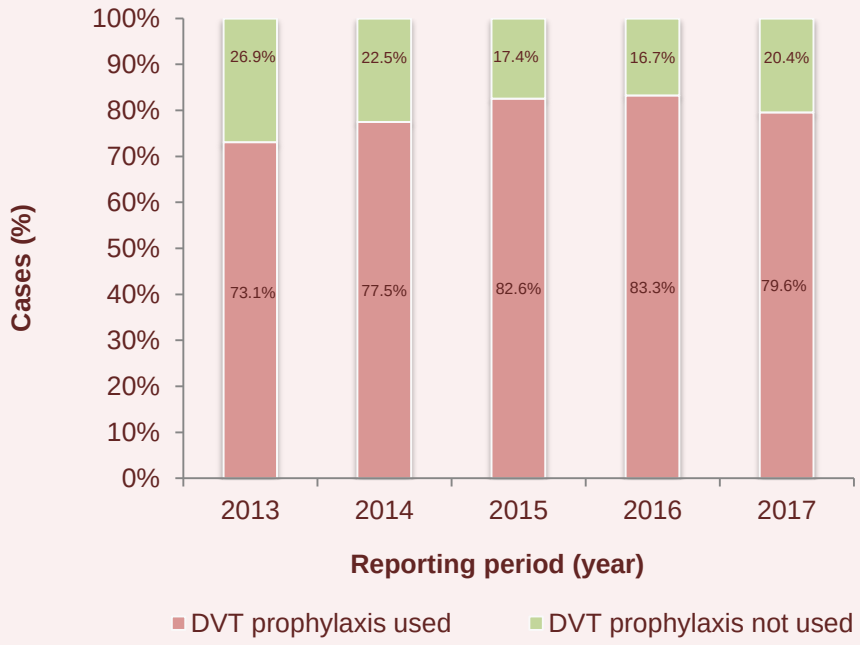
Over the five year reporting period:

- **Patients received DVT prophylaxis in 79.4% of cases.**
- **Heparin was the most frequently used DVT prophylaxis (42.0%).**
- **Patients did not receive critical care support in 38.2% of cases.**

5.1 Deep vein thrombosis prophylaxis

Treating surgeons are asked on the SCF whether deep vein thrombosis (DVT) prophylaxis was used and, if not, the reason it was withheld. The Clinical Practice Guidelines for the Prevention of Venous Thromboembolism in Patients Admitted to Australian Hospitals[15, 16] are regularly reviewed and updated to ensure the best care is made available to patients. Figure 14 shows the breakdown of use and non-use of DVT prophylaxis by year.

Figure 14: DVT prophylaxis

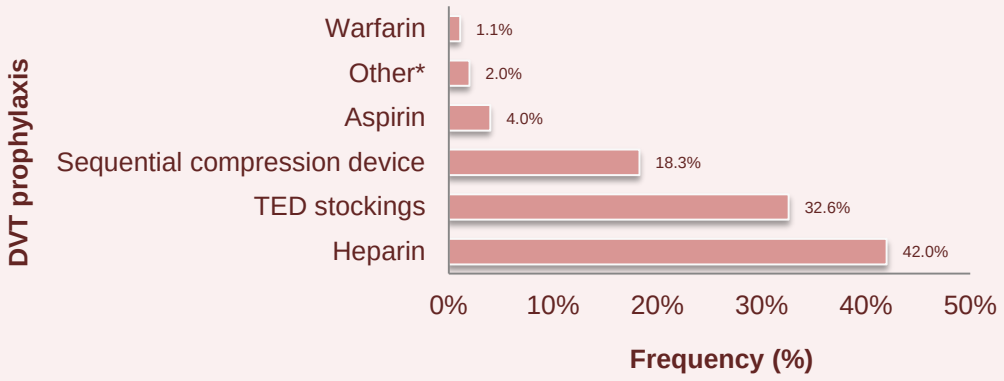


DVT: Deep Vein Thrombosis.
Refer to Appendix A.2 for further information on data.

Overall, DVT prophylaxis was used in 79.4% (1,872/2,359) of cases. In the 20.6% (487/2,359) of cases in which it was not used, it was because it was not appropriate (69.2%; 301/435), there was an active decision to withhold it (28.0%; 122/435) or it was not considered (2.8%; 12/435).

The treating surgeon is also asked to record the types of DVT prophylaxis used. The frequency of use of the different types of DVT prophylaxis over the reporting period is illustrated in Figure 15.

Figure 15: Type of DVT prophylaxis



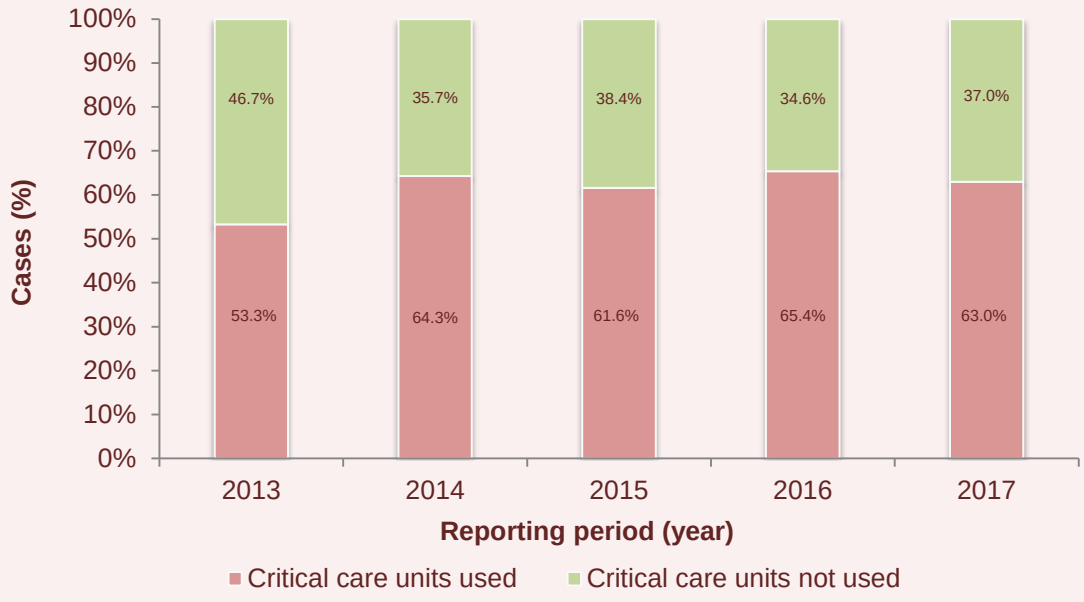
* 'Other' includes enoxaparin sodium, clopidogrel bisulfate, danaparoid sodium, enoxaparin sodium combined with early mobilisation.
DVT: Deep Vein Thrombosis; TED: Thromboembolic Deterrent.
Refer to Appendix A.2 for further information on data.

More than one type of DVT prophylaxis was used for most patients. Heparin (42.0%; 1,436/3,421) and TED stockings (32.6%; 1,116/3,421) were the most frequently used prophylaxis.

5.2 Allocation of critical care units

The treating surgeon is asked to indicate the use of a critical care unit (CCU) during the admission. This includes care in either an intensive care unit (ICU) or a high dependency unit (HDU) [see Figure 16].

Figure 16: Critical care units



Refer to Appendix A.2 for further information on data.

Across the reporting period, CCUs were utilised in 61.8% (1,471/2,380) of cases. Overall, the proportion of audited cases where a CCU was used has increased from 53.3% (221/415) in 2013 to 63.0% (286/454) in 2017.

6. HOSPITAL TRANSFERS

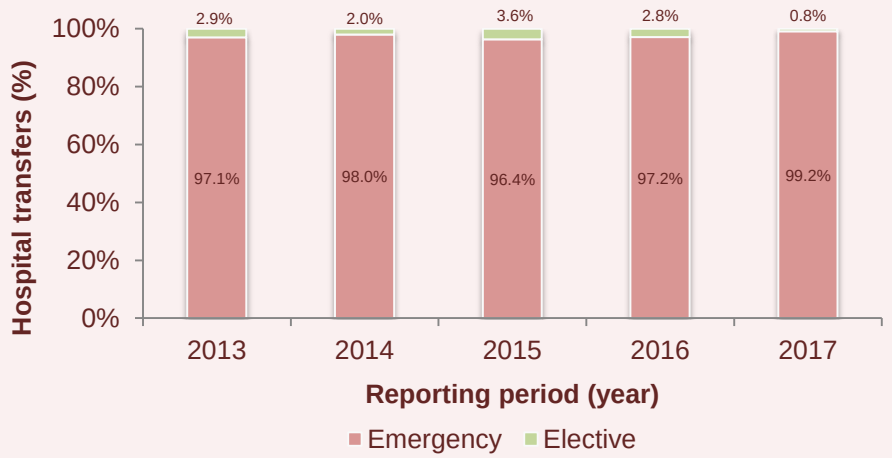
Over the five year reporting period:

- **Patients had a preoperative transfer in 28.8% of cases.**
- **Emergency admissions comprised 97.6% of transfers.**
- **Issues related to 'delay in transfer' were reported in 8.8% of transferred cases.**

6.1 Frequency of hospital transfers

Treating surgeons indicated that 28.8% (667/2,313) of patients had a preoperative transfer between hospitals. Such transfers occur in response to the need for a higher level of care or for specific expertise. Figure 17 shows the breakdown of transfers by year and admission type.

Figure 17: Hospital transfers by year and admission type



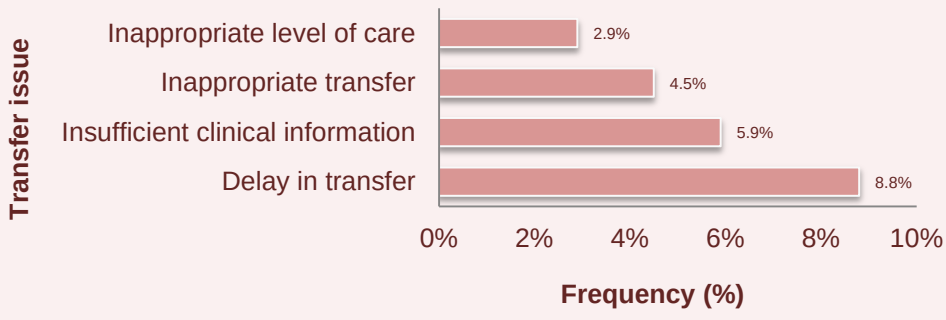
Refer to Appendix A.2 for further information on data.

Overall, a greater proportion of transfers occurred in emergency admissions (97.6%; 647/663). The frequency of elective admission transfers remained low and relatively steady over the reporting period.

6.2 Hospital transfer issues

For the majority of transfer cases, treating surgeons did not report a transfer issue. Of those surgeons who reported transfer issues, Figure 18 shows the frequency of the issues raised, with some cases having more than one issue. The most frequently reported transfer issue was 'Delay in transfer' (8.8%; 54/617). Delays in transfer are discussed in more detail in section 9.

Figure 18: Hospital transfer issues



Refer to Appendix A.2 for further information on data.

7. OPERATIVE AND NON-OPERATIVE DEATHS

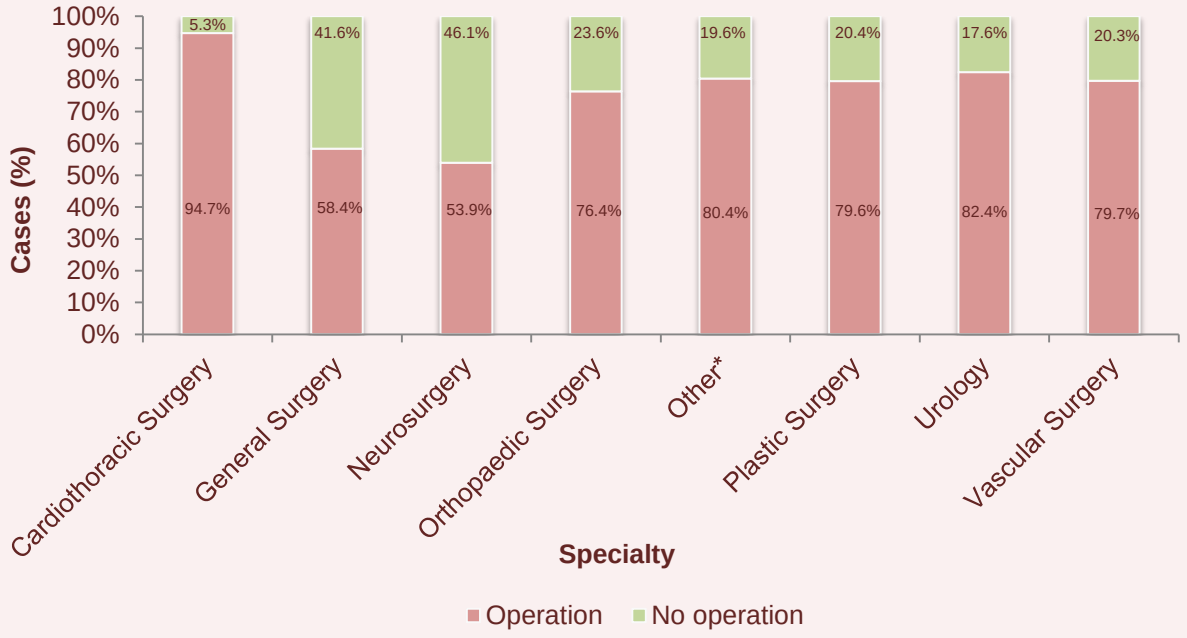
Over the five year reporting period:

- **Patients had one or more operations in 67.1% of cases.**
- **Of those 67.1% of patients who had an operation, consultant surgeons made the decision to proceed to theatre in 87.7% of cases.**
- **Of all operative cases, 32.0% had postoperative complications.**
- **Of the non-operative cases, 50.7% were associated with 'an active decision not to operate'.**
- **A clinically significant infection was reported in 31.7% of patients.**

7.1 Operative cases

The majority of surgical patients underwent one or more operations. Figure 19 shows the breakdown of operative and non-operative cases by specialty.

Figure 19: Operative and non-operative cases by specialty

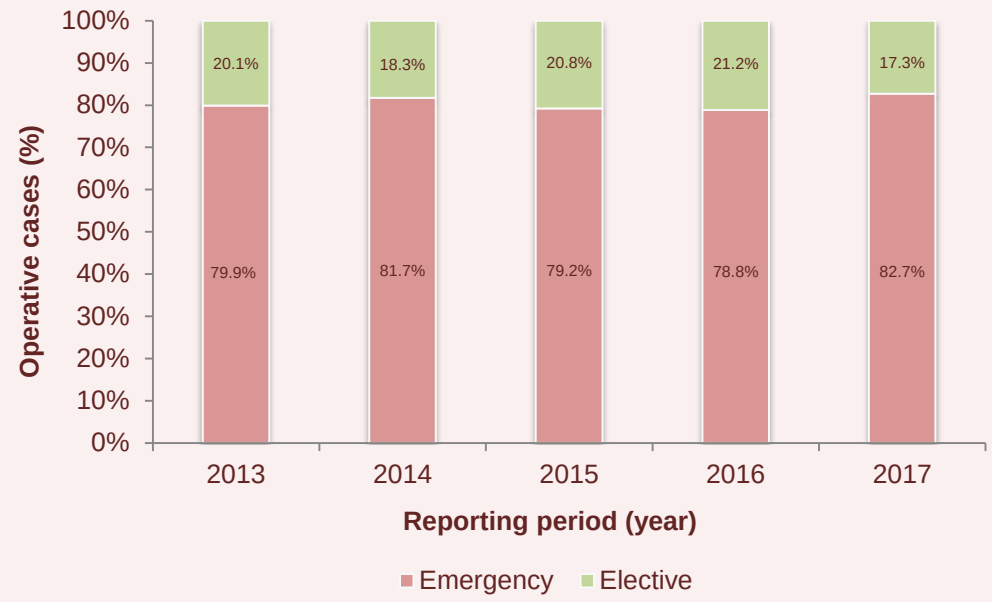


*'Other' includes Otolaryngology, Head and Neck Surgery, Ophthalmology, Paediatric Surgery, Obstetrics and Gynaecology, Oral/Maxillofacial Surgery.
Refer to Appendix A.2 for more information on data.

Overall, 67.1% (1,656/2,467) of patients had one or more operations. Cardiothoracic Surgery had the highest operation rate (94.7%; 178/188) while Neurosurgery had the lowest operation rate (53.9%; 244/453).

The proportion of emergency and elective admissions involving an operation remained steady over the reporting period (Figure 20). Overall, 2,293 operations were performed on 1,656 patients. Over the reporting period, 80.5% (1,314/1,633) of patients who died after having one or more operations were admitted as an emergency.

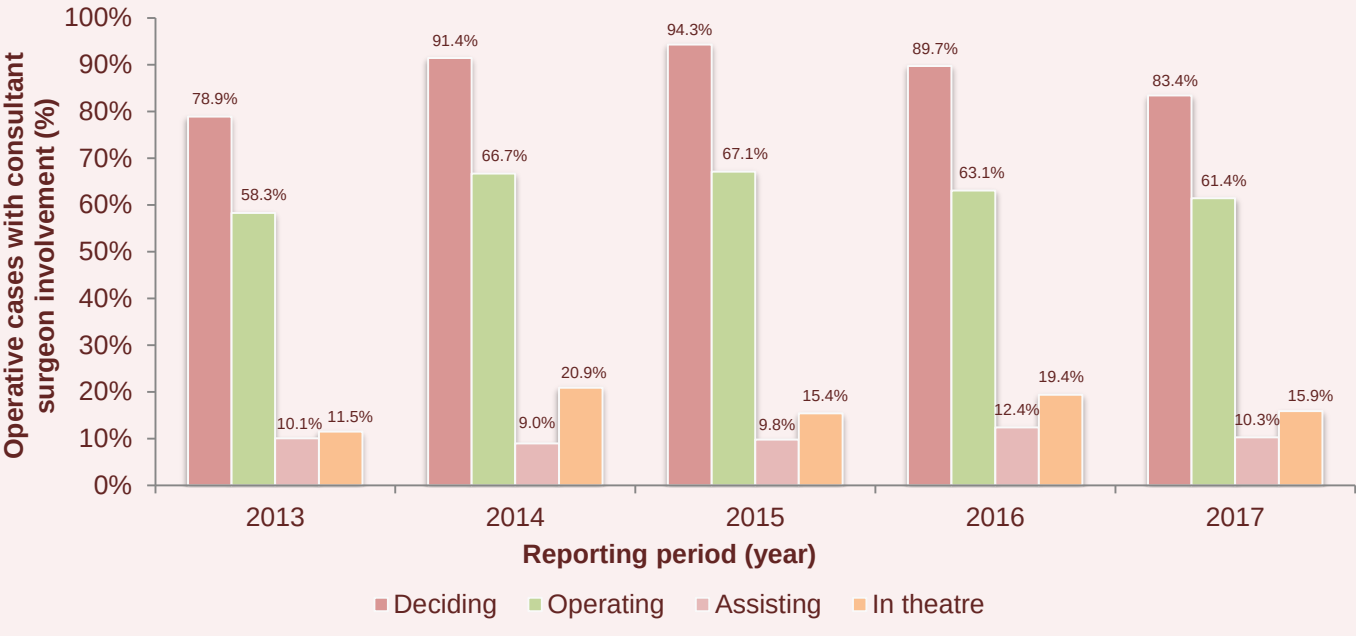
Figure 20: Operative cases by admission type and year



Refer to Appendix A.2 for more information on data.

In the SCF, consultant surgeons are asked to indicate their involvement in these operations (Figure 21).

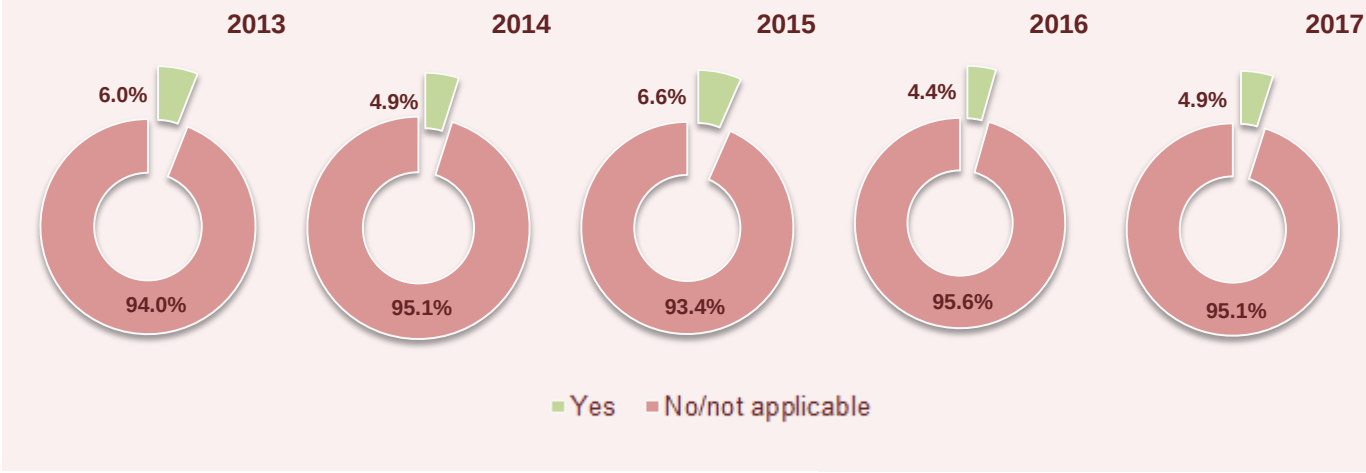
Figure 21: Consultant surgeon involvement in operations



Refer to Appendix A.2 for further information on data.

A consultant surgeon operated in 63.4% (1,454/2,293) of the reported operations. The consultant surgeon made the decision to proceed to surgery in 87.7% (2,011/2,293) of the reported operations, which is very similar to comparable data in the 2016 ANZASM national mortality report.[17]

Figure 22: Operations abandoned due to finding a terminal situation

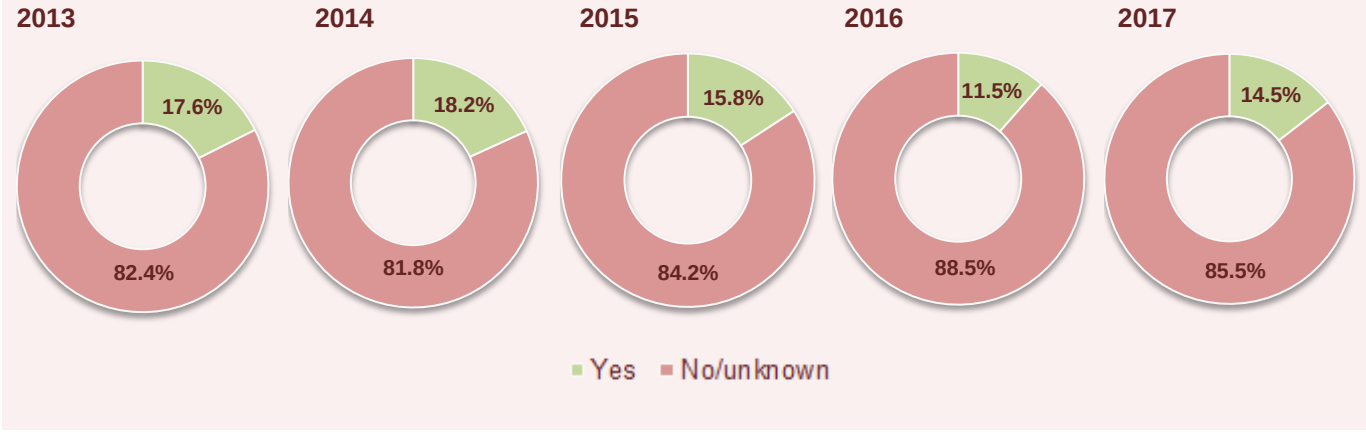


Refer to Appendix A.2 for further information on data.

Overall, an operation was abandoned on finding a terminal situation in 5.3% (110/2,082) of operations (Figure 22).

The consultant surgeon is asked to report on any unplanned returns to the operating theatre after an initial operation (Figure 23). Unplanned returns to the operating theatre may indicate that there was a complication from the previous operation.

Figure 23: Unplanned returns to operating theatre

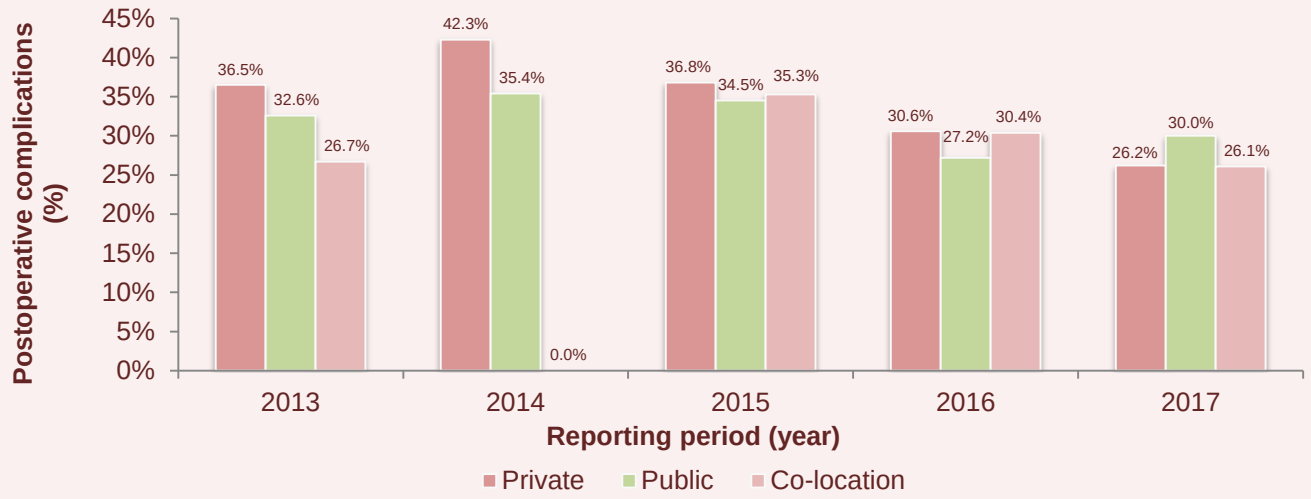


Refer to Appendix A.2 for further information on data.

Overall, 15.5% (249/1,611) of patients who underwent an operation had an unplanned return to the operating theatre. Over the reporting period, this rate has fluctuated between 11.5% (in 2016) and 18.2% (in 2014).

Many operations are free of complications but when complications occur, they have been shown to be a major contributor to surgical mortality.[18] The consultant surgeon is asked to report on any complications that occurred following an operation. Figure 24 provides a breakdown of postoperative complications by hospital status and year. It is possible for a patient to have more than one postoperative complication.

Figure 24: Postoperative complications by hospital status by year



Refer to Appendix A.2 for further information on data.

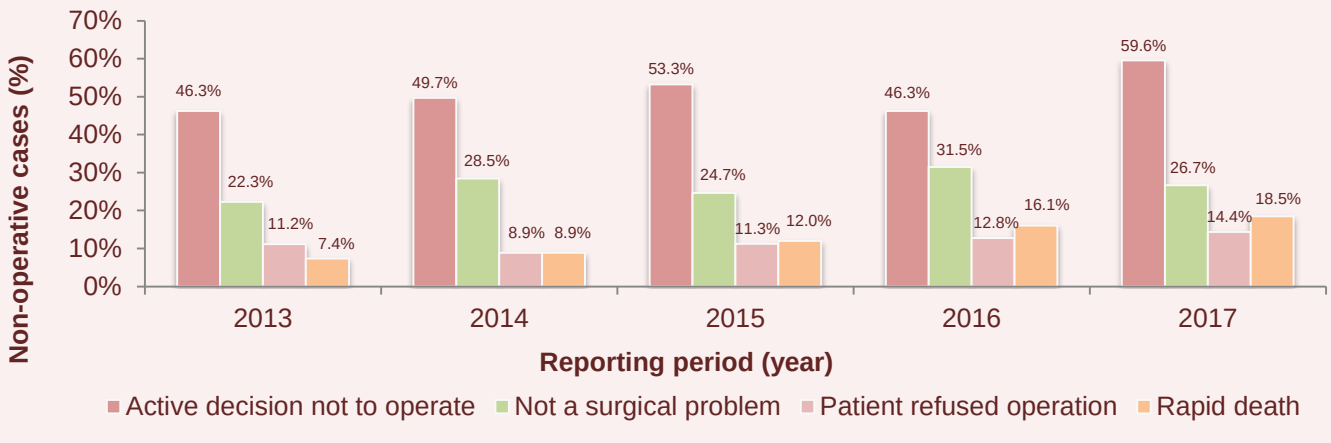
Over the reporting period, 32.0% (530/1,656) of operative patients had a postoperative complication. There were a total of 646 postoperative complications amongst 530 operative patients. The most frequently reported postoperative complications were tissue ischemia (13.8%; 89/646), postoperative bleeding (11.8%; 76/646) and sepsis (10.7%; 69/646).

Overall, postoperative complications were most frequently reported in private hospitals (34.7%; 92/265), followed by public hospitals (31.8%; 407/1,279) and then co-location hospitals (25.0%; 23/92). A higher proportion of elective patients (57.7%; 184/319) had a postoperative complication compared to emergency patients (26.0%; 342/1,314).

7.2 Non-operative cases

Not all patients underwent surgery. For some patients, consultant surgeons considered that an operation was not the best treatment option (Figure 25).

Figure 25: Reasons for not operating



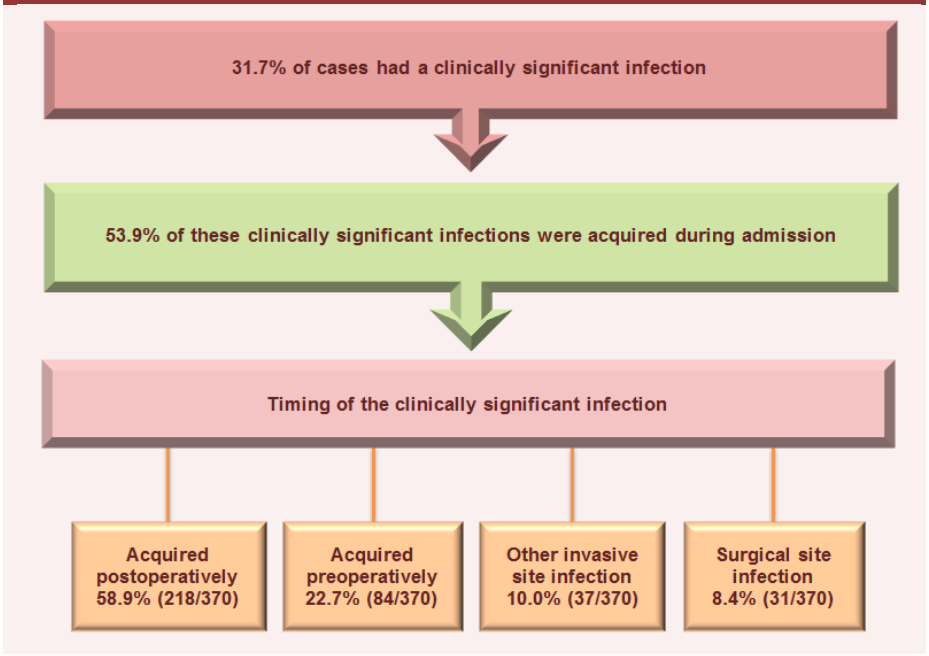
Refer to Appendix A.2 for further information on data.

Over the reporting period, 32.9% (812/2,468) of patients did not undergo an operation. A patient may not have an operation for a variety of reasons; 50.7% (412/812) of patients did not undergo an operation due to an active decision by the consultant surgeon. In 2017 there was an active decision not to operate in more cases than previously, which potentially reflects better discussions with patients and their families regarding end-of-life care. In its position paper on 'End of Life Care', the RACS has highlighted the need for realistic expectations of surgery and informed choices, and the benefits of Advance Care Directives.[19]

7.3 Infections

It has been revealed by the ANZASM that surgical patients are at an increased risk of developing infections.[20] Infections are significant in contributing to the cause of death in surgical patients. Figure 26 illustrates the stage at which these clinically significant infections were acquired.

Figure 26: Clinically significant infections



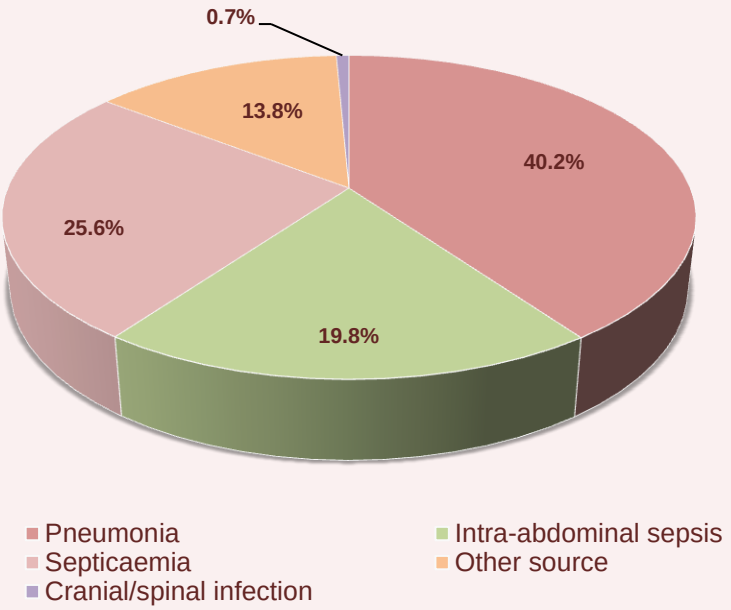
Refer to Appendix A.2 for further information on data.

The proportion of patients who died with a clinically significant infection over the reporting period was 31.7% (736/2,320).

Treating surgeons reported that the infection was acquired prior to admission in 46.1% (330/716) of cases. In 53.9% (386/716) of cases the infection was acquired during admission and, of these infections, over half were acquired postoperatively (58.9%; 218/370).

The types of infections reported by treating surgeons, both prior to and during admission, are shown in Figure 27.

Figure 27: Type of clinically significant infection



Refer to Appendix A.2 for more information on data.

The most common type of clinically significant infection reported was pneumonia, accounting for 40.2% (295/734) of cases. Septicaemia accounted for 25.6% (188/734) of cases, intra-abdominal sepsis accounted for 19.8% (145/734), while other source and cranial/spinal infection accounted for 13.8% (101/734) and 0.7% (5/734) of cases respectively.

Antibiotic prophylaxis is a good infection control measure and should be considered.[21] Where information was provided, treating surgeons reported that the antibiotic regime was appropriate in 95.6% (688/720) of cases with infections. In 3.5% (25/720) of these cases, the appropriateness of the antibiotic regime was unknown, and in 1.0% (7/720), it was considered inappropriate.

8. PEER REVIEW OUTCOMES

Over the five year reporting period:

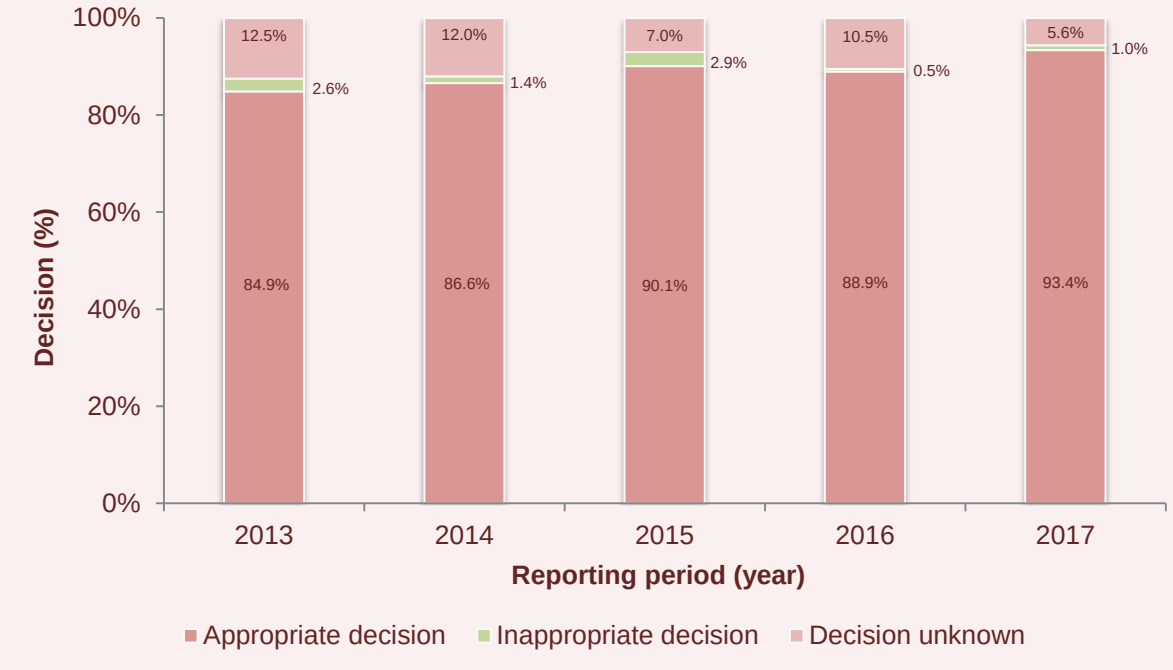
- **Assessors reported an appropriate decision on the use of DVT prophylaxis in 88.5% of cases.**
- **In 7.6% of cases in which critical care units were not used, assessors were of the opinion that patients would have benefited from the use of a critical care unit.**
- **Assessors identified 636 clinical management issues in 411 cases.**
- **Of the 636 clinical management issues identified, 11.6% (74/636) of these were classified as adverse events.**
- **Of the adverse events identified, 63.0% (46/73) caused the death of a patient.**
- **Of the adverse events that caused the death of a patient, 28.3% (13/46) were considered definitely preventable.**

The peer review process is a retrospective assessment of the clinical management of patients who died whilst under the care of a surgeon. Assessors must therefore decide whether or not the management of the patient was appropriate. All cases, with the exception of terminal care admissions, undergo an FLA. At this stage, the case will either be closed or be sent for an SLA, which includes a review of the patient's medical record. Where cases underwent both an FLA and an SLA, the analysis in this section uses data from the SLA. Data from the FLA is used for cases not referred for SLA.

8.1 Decision on deep vein thrombosis prophylaxis

As part of the assessment process, assessors are asked to indicate whether they think the decision on DVT prophylaxis was appropriate. Figure 28 shows assessor opinion on the appropriateness of DVT prophylaxis by year.

Figure 28: Assessor opinion on appropriateness of DVT prophylaxis decision



DVT: Deep Vein Thrombosis.
Refer to Appendix A.2 for further information on data.

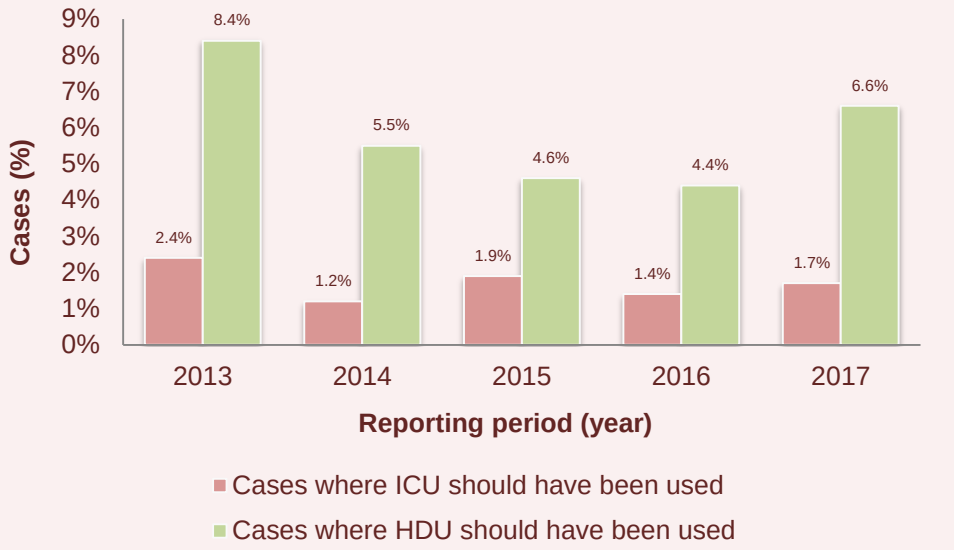
Overall, assessors indicated that the decision to use or withhold DVT prophylaxis was appropriate in 88.5% (1,652/1,867) of cases. In 1.7% (32/1,867) of cases, assessors reported that there had been an inappropriate decision on the use of DVT prophylaxis. It is important to note that any death secondary to inappropriate DVT

prophylaxis must be considered potentially preventable. Assessors could not comment on the appropriateness of the DVT prophylaxis decision in 9.8% (183/1,867) of cases.

8.2 Non-use of critical care units

When treating surgeons indicate that a CCU (ICU or HDU) was not used in the management of a patient, assessors are asked to consider whether the patient would have benefited from the use of a CCU. Figure 29 provides a summary of assessor opinions on the non-use of CCUs by year.

Figure 29: Assessor opinion on non-use of critical care units



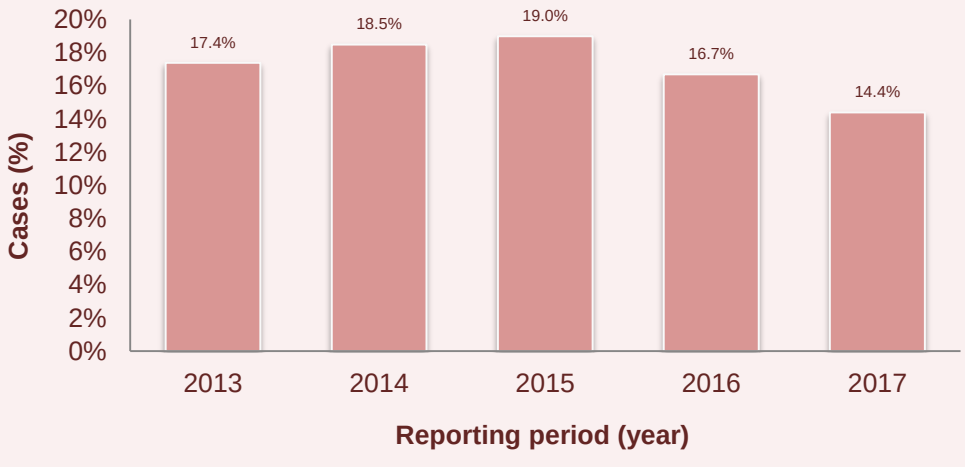
ICU: Intensive Care Unit; HDU: High Dependency Unit.
Refer to Appendix A.2 for further information on data.

Over the reporting period, assessors were of the opinion that 1.7% (13/747) and 5.9 % (44/740) of patients would have benefited from the use of an ICU and HDU respectively.

8.3 Clinical management issues

An overview of the proportion of cases in which clinical management issues were identified is provided in Figure 30.

Figure 30: Cases with clinical management issues

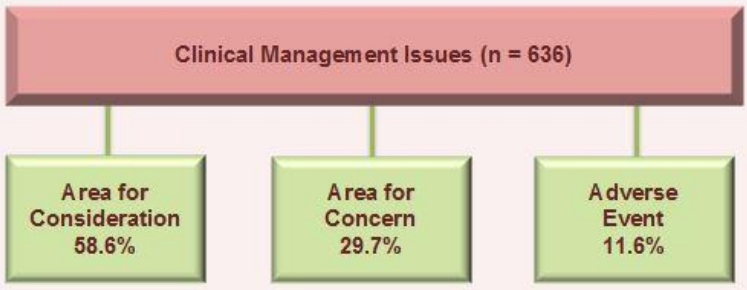


Refer to Appendix A.2 for further information on data.

Over the reporting period, 17.4% (411/2,368) of cases had one or more clinical management issues. There were no clinical management issues identified in 82.6% (1,957/2,368) of cases, with death resulting from the disease process.

Assessors may identify more than one clinical management issue for each patient. Please note that Figures 31 – 33 show data based on the number of issues rather than the number of patients.

Figure 31: Categories of clinical management issues

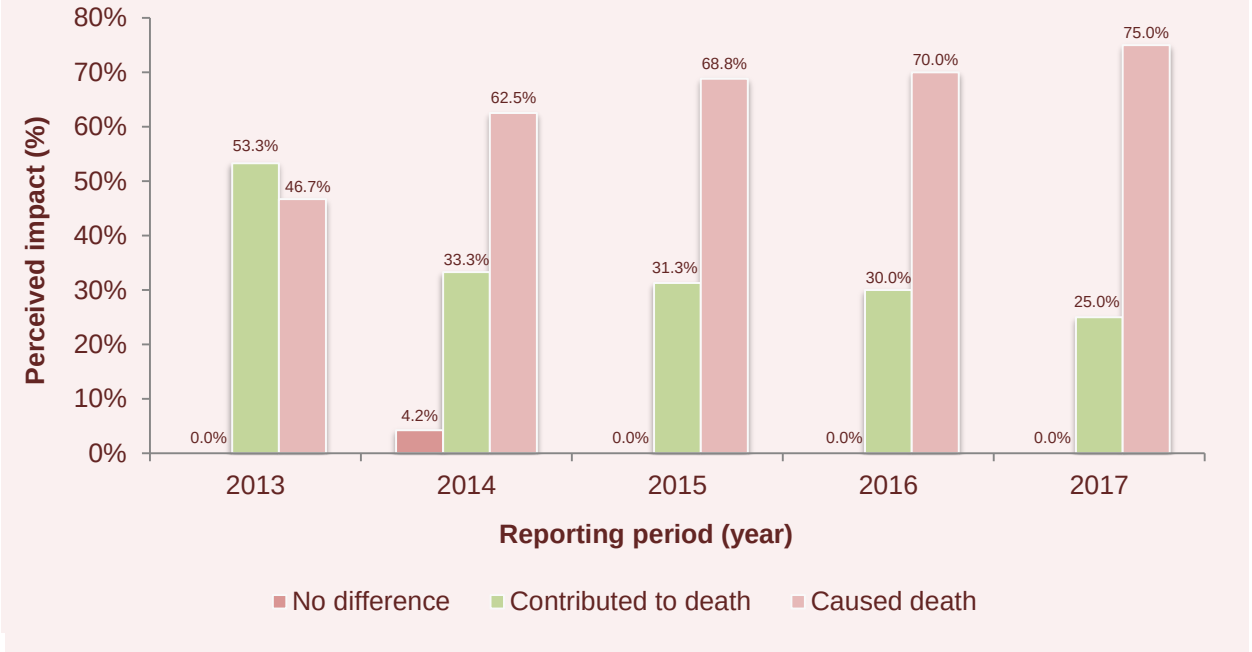


Refer to Appendix A.2 for further information on data.

There were 636 clinical management issues identified in 411 completed cases. Figure 31 provides an overview of the classification of identified clinical management issues. Over the reporting period, more than half (58.6%; 373/636) of the clinical management issues were areas for consideration. Areas for concern and adverse events comprised 29.7% (189/636) and 11.6% (74/636) of clinical management issues respectively.

Assessors are asked to indicate the degree of impact that an adverse event may have had on the clinical outcome. Figure 32 shows a breakdown by year of the impact of adverse events on clinical outcomes, as perceived by assessors.

Figure 32: Perceived impact of adverse event on clinical outcome

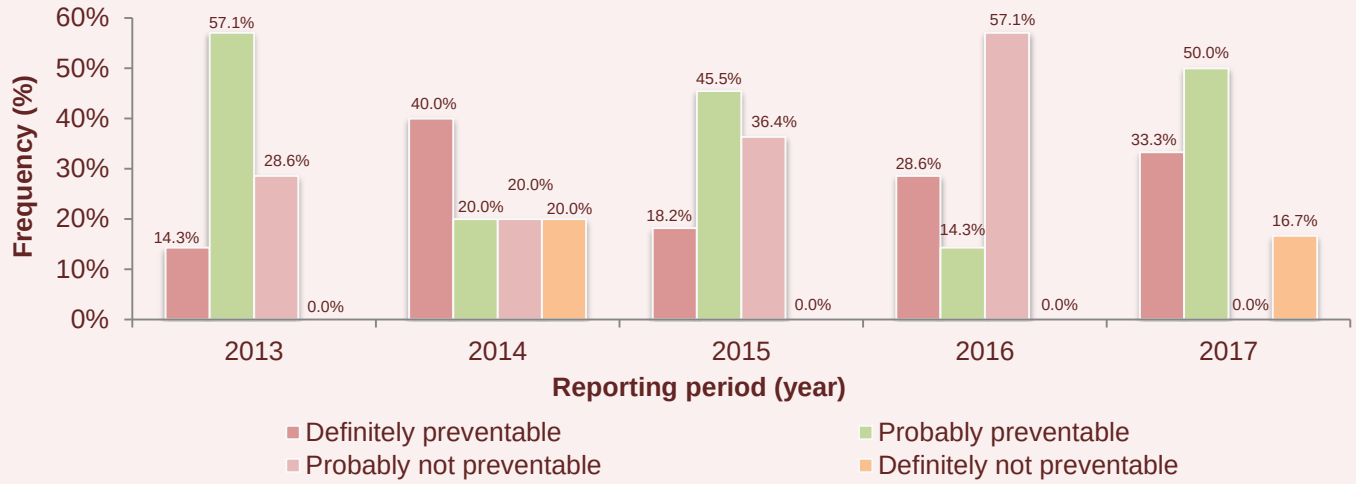


Refer to Appendix A.2 for further information on data.

Of the adverse events identified over the reporting period, assessors perceived that 35.6% (26/73) may have contributed to death and that 63.0% (46/73) caused the death of the patient.

Assessors are also asked whether or not adverse events that cause the death of a patient were preventable (Figure 33).

Figure 33: Perceived preventability of adverse events that caused death



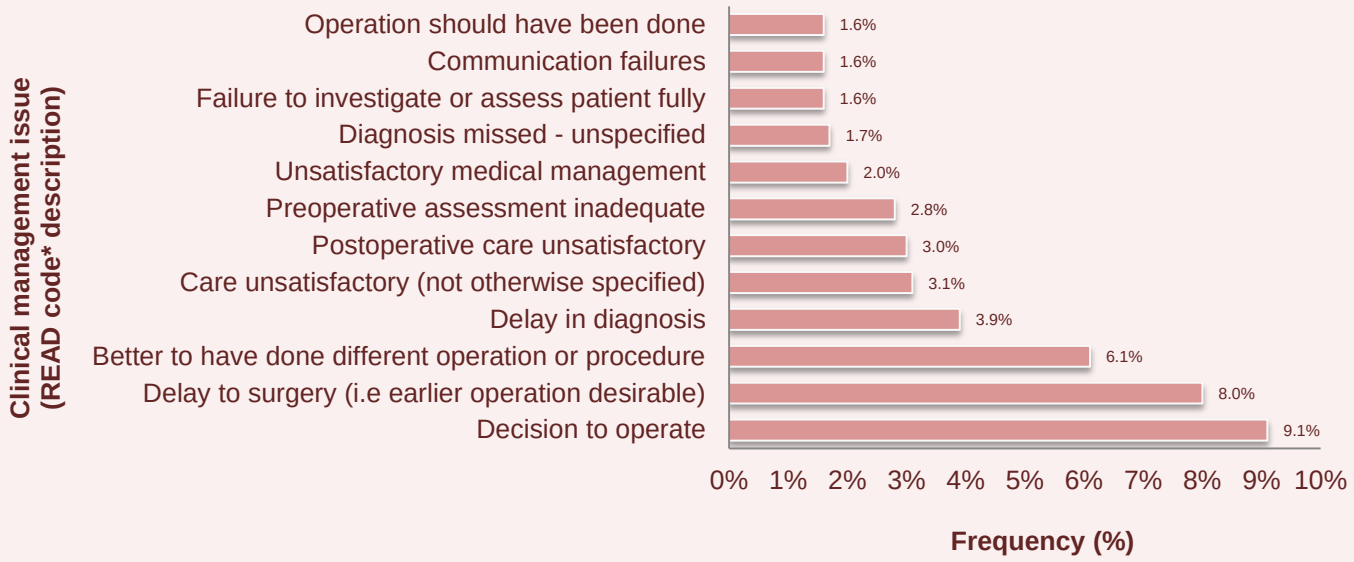
Refer to Appendix A.2 for further information on data.

Assessors indicated that 8.7% (4/46) of adverse events that caused the death of the patient were definitely not preventable and that 28.3% (13/46) were probably not preventable. Assessors considered that 34.8% (16/46) of adverse events that resulted in the death of a patient were probably preventable, and that 28.3% (13/46) were definitely preventable. In 2017, assessors indicated that there were six adverse events that caused the death of a patient. Assessors considered that two of these adverse events were definitely preventable, three probably preventable and the other definitely not preventable.

8.4 Frequency of clinical management issues

The frequency of the 12 most common clinical management issues is shown in Figure 34.

Figure 34: Frequency of clinical management issues



*READ Code: Surgical diagnoses categorised using coded thesaurus of clinical terms (READ Codes). READ Codes are a clinical decision tree that contains terms, synonyms, and abbreviations covering all aspects of patient care. It is a precursor to ICD9 coding.
Refer to Appendix A.2 for further information on data.

The assessor identified more than one clinical management issue in some patients. 'Decision to operate', at 9.1% (58/636), and 'Delay to surgery', at 8.0% (51/636), were the two most frequent clinical management issues.

9. A CLOSER LOOK: DELAY IN TRANSFER TO WA MAJOR TERTIARY HOSPITALS

Treating surgeons indicated that 28.8% (667/2,313) of patients had a preoperative transfer. Of the 667 surgical patients transferred, 78.3% (522/667) were transferred to the major tertiary hospitals; Sir Charles Gairdner Hospital, Royal Perth Hospital and Fiona Stanley Hospital. Table 7 shows the breakdown of the transfers to these tertiary hospitals by year.

Table 7: Transfers to WA major tertiary hospitals

Reporting period (year)	Transferred cases	Transferred to major tertiary hospitals	
		Number	Percentage (%)
2013	105	63	60.0
2014	152	99	65.1
2015	141	124	87.9
2016	142	129	90.8
2017	127	107	84.3

Refer to Appendix A.3 for further information on data.

Transfers to the major tertiary hospitals in WA have increased over the reporting period. While the 2017 audit period shows a lower percentage, this could increase in line with 2015 and 2016, as more of the 2017 cases are finalised.

Where there have been transfers, treating surgeons are asked to record any issues arising from such transfers. The most frequently reported transfer issue has been 'delay in transfer'.[22] Table 8 provides the breakdown of delays in transfer to the major tertiary hospitals in WA.

Table 8: Delays in transfer to WA major tertiary hospitals

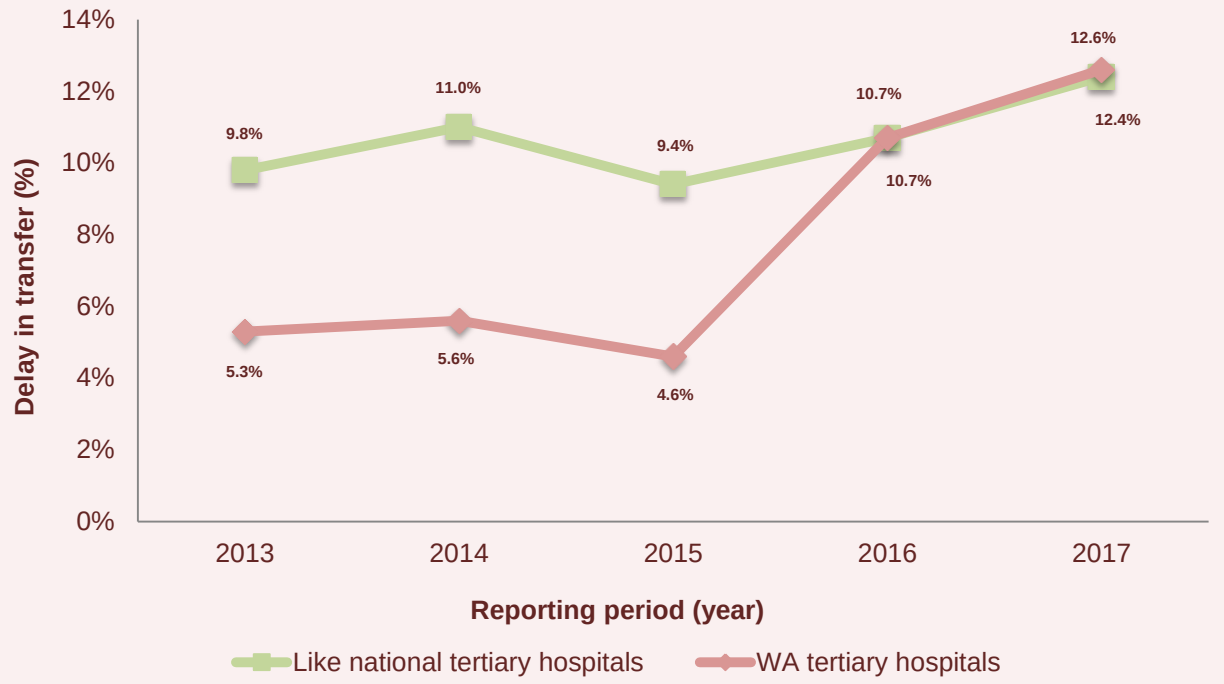
Reporting period (year)	Cases transferred to major tertiary hospitals*	Delays in transfer to major tertiary hospitals	
		Number	Percentage (%)
2013	57	3	5.3
2014	89	5	5.6
2015	108	5	4.6
2016	122	13	10.7
2017	103	13	12.6

* Cases transferred to major tertiary hospitals with a response to 'Delay in transfer' question in SCF.
Refer to Appendix A.3 for further information on data.

Over the reporting period, there was a 7.3% (5.3%; 3/57 in 2013 to 12.6%; 13/103 in 2017) increase in delays in transfer of patients to the major tertiary hospitals in WA. Delays in transfer increase risk to both the patient and the clinical teams. As such, there needs to be measures put in place to minimise such delays.

In August 2015, the WAASM held a symposium on "Transferring Surgical Patients: better organisation is required".[5] Speakers addressed the topic and related issues from both medical and hazardous industry perspectives. Two years on from this symposium, there is an increasing trend in delays in transfer to the major tertiary hospitals in WA. Figure 36 compares delays in transfer to the major tertiary hospitals in WA and nationally.

Figure 35: Delays in transfer to WA major tertiary and like national tertiary hospitals



Refer to Appendix A.2 for further information on data.

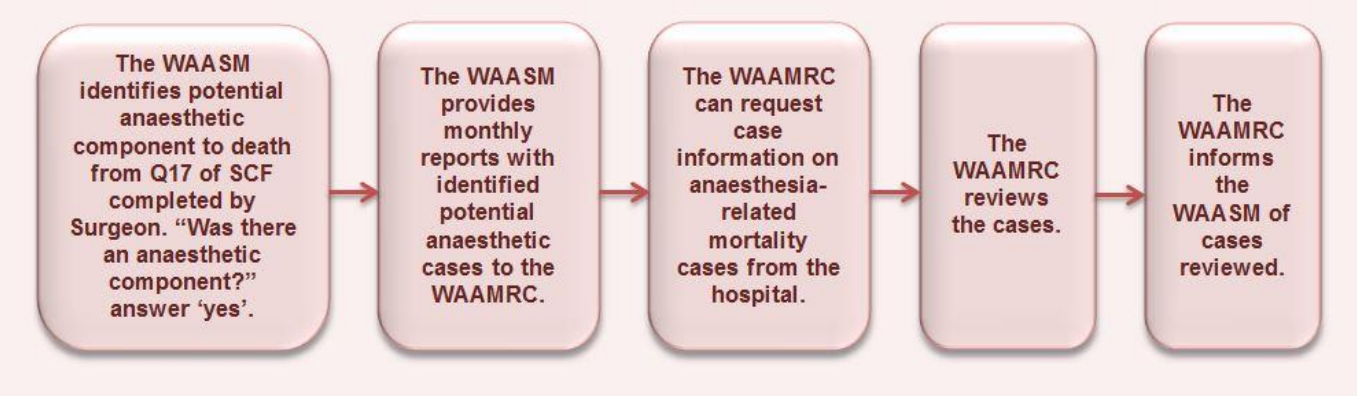
The percentage of cases with delays in transfer to the major tertiary hospitals in WA has increased over the reporting period and is now similar to that for like national tertiary hospitals. This calls for review and for plans to be put in place to identify the causes and address the issues.

10. COLLABORATION WITH THE WA ANAESTHETIC MORTALITY REVIEW COMMITTEE

Following detailed discussions during 2017, the WAASM commenced formal collaboration with the Western Australian Anaesthetic Mortality Review Committee (WAAMRC) in March 2018. The approval for this collaboration was agreed at the March 2018 meeting of the WA branch of the Australian and New Zealand College of Anaesthetists.

The flowchart below shows the WAASM reporting process for potential anaesthetic cases to the WAAMRC.

Figure 36: WAASM reporting process to the WAAMRC



WAASM: Western Australian Audit of Surgical Mortality; SCF: Surgical Case Form; WAAMRC: Western Australian Anaesthetic Mortality Review Committee.

Reporting processes have been established and a formal request was made by the WAAMRC for data back dating to January 2018. The WAASM reports to the Data Manager, Statutory Mortality Committee, Public Health and Clinical Services, on a monthly basis irrespective of there being cases or not. The Chief Health Officer, Department of Health, is notified by letter only in the event of a relevant case.

Where the treating surgeon has indicated an anaesthesia-related death in the SCF (Question 17), the WAASM will report the following information to the WAAMRC;

- Patient name
- Gender
- Date of birth
- Date of death
- Unit Medical Record Number
- Hospital name
- Date of operation
- Operation performed
- ASA grade (if stated)

These cases are referred to the WAAMRC for an anaesthetic assessment, with the aim of closing the loop. The WAAMRC will notify the WAASM when cases have been assessed.

11. PERFORMANCE REVIEW

This section reviews progress relating to each of the recommendations in the 2017 WAASM Report.

Audit management

Collaborate closely with the WA regional office during the WA, SA and NT Annual Scientific Meeting (August 2017) to further raise awareness of the audits of surgical mortality.

In the lead up to the WA, SA and NT Annual Scientific Meeting, the WAASM liaised closely with the WA regional office, particularly regarding registrations and preparation for the WAASM symposium held in conjunction with the meeting. The WAASM staff members were on hand during the meeting to assist with general enquiries and logistical issues. There was also the opportunity for the WAASM to share an information booth with the RACS Library and Information Department and to promote audit activities to meeting attendees, as well as interact with other key stakeholders. A WAASM promotional banner and flyers were designed and created specifically for this event.

Continue to maintain and promote the mandatory use of the Fellows' Interface (online platform) for submission of surgical case forms (SCFs) and first-line assessments (FLAs), and provide support and assistance to WA surgeons throughout the process.

The mandatory use of the Fellows' Interface continues to be well promoted by the WAASM through various communications with surgeons, including regional and WAASM newsletters and information packages for new audit participants. The WAASM team offers and provides personalised support and assistance to individual surgeons at all stages of the audit process, as well as ensuring access to up-to-date user guides for the Fellows' Interface.

Participate in the ANZASM's development and testing of ongoing enhancements to the Fellows' Interface and the National Audit System. These improvements include: migrating the Fellows' Interface to the newer, more secure Delegates' Interface format; viewing the FLA form and the SCF adjacently on screen for ease of assessment completion; and the ability for surgeons working in multiple regions to switch locations at time of login.

Throughout 2017, the WAASM undertook thorough and extensive User Acceptance Testing for ongoing enhancements to the Fellows' Interface and the Bi-national Audit System. Following this testing, Version 5.0 of the Fellows' Interface and the Bi-national Audit System had a limited release in August 2017. This was a 'soft' launch, incorporating a selection of surgeons from whom feedback was collected after the trial period, to accommodate final modifications prior to the wider release of the new system to all users. A number of WAASM surgeons participated in this process, and positive feedback was particularly received in relation to the ability to view SCFs and FLAs adjacently on the screen when undertaking reviews. The full launch of Version 5.0 of the Fellows' Interface and the Bi-national Audit System is anticipated in 2018.

Maintain the high return rate of SCFs (98.6%; 573/581) set in 2015.

Of the 592 deaths in 2016 falling within the WAASM criteria, SCFs were returned for 580 cases - a return rate of 98.0%. Although a minimal decrease compared to 2015, this continues to reflect the maintenance of a high SCF return rate.

Research and reporting on audit data

Finalise and produce a two page Hospital Performance Summary Report that identifies trends in potentially preventable mortalities covering a five-year period and distribute to the WA Department of Health and private hospitals.

Hospital Performance Summary Reports were provided to the WA Department of Health in October 2017 and subsequently distributed to public hospitals. The WAASM sent the reports directly to private hospitals in early November 2017.

Continue to progress the joint initiative between the WAASM and the UWA, which aims to utilise the ANZASM data to examine the impact of process and regulatory changes on audit data quality.

The joint initiative between the WAASM and the UWA continues to progress. Data analysis is now being finalised and writing of the research paper for publication is currently underway. It is anticipated that the paper will be ready for journal submissions in the latter part of 2018.

Clinical management

Initiate a formal and close collaboration with WA anaesthetists; thereby ensuring that cases with potential anaesthetic components are identified and reviewed.

Discussions were initiated in 2017, and a formal collaboration with the WAAMRC commenced in March 2018, with reporting protocols now established. Details are outlined in Section 10 of this report.

Monitor trends in the proportion of surgical patients who die from clinically significant infections for the next two years. Between 2013 and 2016, clinically significant infections were reported in 31.9% (584/1,829) of cases. Pre-admission infections comprised 45.7% (258/564) and infections acquired during admission were reported for 54.3% (306/564) of cases.

Between 2013 and 2017, clinically significant infections were reported in 31.7% (736/2,320) of cases, a minimal reduction since the last reporting period (note: collection of data on clinically significant infections commenced in 2013, so the last reporting period covered the four years, from 2013-2016). Overall, pre-admission infections comprised 46.1% (330/716) of these infections, reflecting a slight increase. Infections acquired during admission were reported for 53.9% (386/716) of cases, a small decrease since the last reporting period. Please see Appendix B.1 for breakdown of data by year.

Monitor trends in the proportion of preoperative diagnostic delays reported by treating surgeons, given the potential impact on mortality. Between 2012 and 2016, such preoperative delays were reported in 6.3% (141/2,221) of surgical mortalities.

Between 2013 and 2017, preoperative diagnostic delays were reported by treating surgeons in 5.7% (134/2,359) of surgical mortalities. This represents a slight decrease in such delays since the last reporting period. Please see Appendix B.2 for breakdown of data by year.

Education

Disseminate audit findings through reports and publications.

The *WAASM 2017 Case Note Review Booklet*, containing 20 case studies, was released in November 2017. It was emailed to all surgeons (accompanied by a WAASM Newsletter) and other key stakeholders. It was also made available on the WAASM website.

The *WAASM 2017 Report* was published on the RACS website on 13 October 2017, accompanied by a RACS media release via the website and RACS Twitter account. The online link to the report was sent to all surgeons and other key stakeholders. There was also an accompanying article in *The West Australian* newspaper.

Hospital Reports for both public and private hospitals were distributed to hospitals in May 2017. These reports provided a comparative analysis of WAASM cases with like state and national hospitals from the Australian Institute of Health and Welfare peer group classification.

Hospital Performance Summary Reports for public and private hospitals were distributed to hospitals in October and November 2017 respectively. These reports reflected individual hospital performance relating to potentially preventable clinical management issues.

Following a successful 12 week pilot study on emergency laparotomies in WA, and increasing national interest, conduct a symposium on 'The Perth Emergency Laparotomy Audit – Where to Now?' in conjunction with the 2017 WA, SA and NT Annual Scientific Meeting.

On 24 August 2017, in conjunction with the RACS WA, SA and NT Annual Scientific Meeting at the Pan Pacific Hotel in Perth, the WAASM held a symposium entitled *"The Perth Emergency Laparotomy Audit – Where to Now?"*. Chaired by Professor Guy Maddern (Chair of ANZASM and RACS Surgical Director of Research and Evaluation), eight invited local and interstate speakers addressed a full capacity audience of 79 attendees who were well-engaged throughout the two hour event (see Appendix B.3 for programme details).

A summary of the symposium evaluation is outlined in Appendix B.4. Symposium attendees were provided with a hardcopy evaluation form as they arrived at the event, as well as being given the option to complete the form online. A return box for paper forms was located on the registration table. All respondents returning the evaluation form were provided with a Certificate of Attendance. A total of 45 evaluation forms were returned, with a response rate of 57.0%.

12. ACKNOWLEDGEMENTS

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- RACS for their infrastructure and oversight of this project
- ANZASM Steering Committee

- **WAASM Management Committee:**

Mr James Aitken	Clinical Director, WAASM Chair and general surgical representative
Mr Tom Bowles	Consultant General Surgeon, rural surgical representative
Mr Ian Gollow	Consultant Paediatric Surgeon, paediatric surgical representative
Mr Stuart Salfinger	Consultant Obstetrician and Gynaecologist, obstetrics & gynaecology representative
Mr Rasa Subramaniam	Consumer representative
Dr Jennifer Bruce	Consultant Anaesthetist, anaesthetic representative
Mr Gregory Janes	Consultant Orthopaedic Surgeon, orthopaedic representative

- **WAASM staff:**

Dr Franca Itotoh	WAASM Project Manager
Ms Natalie Zorbas-Connell	WAASM Senior Project Officer
Ms Sonya Furneyvall	WAASM Project Officer

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Professor Guy Maddern	Chair, ANZASM Steering Committee
A/Prof Wendy Babidge	Director, RAAS Division
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REFERENCES

1. Harold Macmillan: The wind of change [Cited 2018, 4 June]. Available from: http://www.africanrhetoric.org/pdf.
2. Department of Health and Human Services. Targeting zero: supporting the Victorian hospital system to eliminate avoidable harm and strengthen quality of care. The Report of the Review of Hospital Safety and Quality Assurance in Victoria: *Department of Health and Human Services;* 2016 [Cited 2018, 13 June]. Available from: https://www2.health.vic.gov.au/about/publications/researchandreports/report-of-the-review-of-hospital-safety-and-quality-assurance-in-victoria
3. Department of Health. Review of Safety and Quality in the WA health system – a strategy for continuous improvement: *Government of Western Australia, Department of Health;* 2017 [Cited 2018, 13 June]. Available from: https://ww2.health.wa.gov.au/Improving-WA-Health/Safety-and-quality-review
4. Western Australian Audit of Surgical Mortality. WAASM Reports. [Cited 2018, 6 June]. Available from: https://www.surgeons.org/for-health-professionals/audits-and-surgical-research/anzasm/waasm/
5. Western Australian Audit of Surgical Mortality. WAASM Symposium on transfer. [Cited 2018, 6 June]. Available from: https://www.surgeons.org/media/21979921/2015-08-19_waasm_flyer_2015.pdf
6. Australian Commission on Safety and Quality in Health Care. *National Safety and Quality Health Service Standards* 2012 [Cited 2018, 25 May]. Available from: https://www.safetyandquality.gov.au/wp-content/uploads/2011/09/NSQHS-Standards-Sept-2012.pdf.
7. The Royal Australasian College of Surgeons. Continuing Professional Development Guide 2017 [Cited 2018, 17 May]. Available from: https://www.surgeons.org/cpd/
8. Australian Bureau of Statistics. Australian Demographic Statistics, Sep 2017 [Cited 2018, 5 April]. Available from: http://www.ausstats.abs.gov.au/ausstats/ABS@Archive.nsf/0/E9F3439742C0062DCA2582570013F7E3/$File/310104.xls-A2060847T.
9. ANZASM. Royal Australian and New Zealand College of Obstetricians and Gynaecologists. RANZCOG Case Note Review Booklet 2017. *Royal Australasian College of Surgeons;* 2017. Available from: https://issuu.com/entegy/docs/anzasm_o_g_college_national_case_bo
10. Pham C, Gibb C, Field J, Gray J, Fitridge R, Marshall V, et al. Managing high-risk surgical patients: modifiable co-morbidities matter. *ANZ J Surg*. 2014; 84 (12) :925-31
11. Allen J, North JB, Wysocki AP, Ware RS, Rey-Conde T. Surgical care for the aged: a retrospective cross-sectional study of a national surgical mortality audit. *BMJ open.* 2015; 5 (5). 1
12. Patridge JSL, Harari D, Dhesi JK. Frailty in the older surgical patient: a review. *Age and Ageing* Vol 41, Issue 2 1 March 2012. Pages 142-147
13. Lin HS, Watts JN, Peel NM, Hubbard RE. Frailty and post-operative outcomes in older surgical patients: a systematic review. *BMC Geriatrics*. 2016; 16 (1):157.
14. American Society of Anesthesiologists (ASA) Physical Status Classification System [Cited 2018, 18 May]. Available from: http://www.asahq.org/resources/clinical-information/asa-physical-status-classification-system
15. The Australian and New Zealand Working Party on the Management and Prevention of Venous Thromboembolism. Prevention of Venous Thromboembolism: Best Practice Guidelines for Australia and New Zealand: *Royal Australasian College of Surgeons* 4th [Cited 2018, 25 May].Available from: https://www.surgeons.org/media/19372/VTE_Guidelines.pdf
16. National Health and Medical Research Council. Clinical practice guideline for the prevention of venous thromboembolism in patients admitted to Australian hospitals. Melbourne: NHMRC; 2009. Available from: https://www.nhmrc.gov.au/guidelines-publications/cp115
17. Australian and New Zealand Audit of Surgical Mortality. ANZASM 2016 National Report: *Royal Australasian College of Surgeons*; 2016 [Cited 2018, 29 May]. Available from: https://www.surgeons.org/media/25514879/2017-10-05_rpt_racs_anzasm_national_report_2016.pdf
18. Woodfield JC, Jamil W, Sagar PM. Incidence and significance of postoperative complications occurring between discharge and 30 days: a prospective cohort study. *J Surg Res*. 2016; 206 (1): 77-82
19. Royal Australasian College of Surgeons. Position Papers, Guidelines and Reports. End of Life Care: *Royal Australasian College of Surgeons*; 2016 [Cited 2018, 18 May]. Available from: https://www.surgeons.org/policies-publications/publications/position-papers/

20. Allen J, Rey-Conde T, North JB, Kruger P, Babidge WJ, Wysocki AP, et al. Processes of care in surgical patients who died with hospital-acquired infections in Australian hospitals. *The Journal of Hospital Infection.* 2017; 99 (1): 17-23
21. Australian Commission on Safety and Quality in Health Care. Antimicrobial prescribing practice in Australian hospitals. Results of the 2015 Hospital National Antimicrobial Prescribing Survey December 2016 [Cited 2018, 29 May]. Available from: https://www.naps.org.au/Resources/Antimicrobial-prescribing-practice-in-Australian-hospitals-Results-of-the-2015-National-Antimicrobial-Prescribing-Survey.pdf.
22. Western Australian Audit of Surgical Mortality. WAASM 2017 Report. [Cited 2018, 13 June]. Available from: https://www.surgeons.org/media/25508573/rpt_waasm_2017_report-final.pdf

APPENDIX A: DATA DEFINITIONS

Appendix A.1 American Society of Anesthesiologists grade definitions

ASA grade	*Characteristics*
1	A normal healthy patient
2	A patient with mild systemic disease and no functional limitation
3	A patient with moderate systemic disease and definite functional limitation
4	A patient with severe systemic disease that is a constant threat to life
5	A moribund patient unlikely to survive 24 hours, with or without an operation
6	A brain dead patient for organ donation

Appendix A.2 Figures

Figure 3: Audit case status	
Definition	Deaths falling within WAASM criteria and audit case status. *Audit process complete* comprised all cases which have completed the entire audit process. *Pending cases* comprised 'surgical case pending', 'first-line assessment pending', and 'second-line assessment pending'. *Excluded cases* comprised 'excluded-terminal care' and 'lost to follow-up'.
Data included	All deaths falling within WAASM criteria (n=2,884).
Data excluded	All 'excluded error' cases.
Figure 4: First-line assessments returned	
Definition	Percentages of all cases where a first-line assessment has been returned.
Data included	All deaths falling within WAASM criteria (n=2,884).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases.
Figure 5: Deaths by hospital status	
Definition	Percentages of all cases by hospital status. *Co-location* comprised hospitals with both public and private health services in the same location.
Data included	All deaths falling within WAASM criteria where hospital status was reported (n=2,427).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. Data missing = 44.
Figure 6: Most common causes of death	
Definition	Percentages of the ten most common causes of death.
Data included	All deaths falling within WAASM criteria. Some cases had more than one cause of death reported (n=3,786).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases.
Figure 7: Deaths by age group and gender	
Definition	Counts of deaths by age groups and gender.
Data included	All deaths falling within WAASM criteria (n=2,884).
Data excluded	'All 'excluded error' cases.
Figure 8: Deaths by hospital status by year	
Definition	Percentages of admissions by hospital status and year. *Co-location* comprised hospitals with both public and private health services in the same location.
Data included	All deaths falling within WAASM criteria where hospital status was reported (n=2,427).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. Data missing = 44.
Figure 9: Hospital admission by year	
Definition	Percentages of cases by hospital admission and year.
Data included	All deaths falling within WAASM criteria where admission type was reported (n=2,435).
Data excluded	'All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. Data missing = 36.
Figure 10: Cases with specific comorbidities	
Definition	Percentages of cases with comorbidities.
Data included	All deaths falling within WAASM criteria where comorbidities were reported (n=2,382).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where no comorbidities were reported. Data missing = 89.

Figure 11: Frequency of ASA grades	
Definition	Percentages of cases by ASA grades.
Data included	All deaths falling within WAASM criteria where ASA grades were reported (n=2,132).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where no ASA grades were reported. Data missing = 339.
Figure 12: Cases with preoperative diagnostic delays	
Definition	Percentages and counts of cases with preoperative diagnostic delays.
Data included	All deaths falling within WAASM criteria where preoperative diagnostic delays were reported (n=2,359).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where no preoperative diagnostic delays were reported. Data missing = 112.
Figure 13: Cases with fluid balance issues	
Definition	Percentages of cases with fluid balance issues.
Data included	All deaths falling within WAASM criteria where presence/non-presence of fluid balance issues were reported (n=2,325).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where presence/non-presence of fluid balance issues were not reported. Data missing = 146.
Figure 14: DVT prophylaxis	
Definition	Percentages of DVT prophylaxis use/non-use.
Data included	All deaths falling within WAASM criteria where use (n= 1,872) and non-use (n= 487) of DVT prophylaxis was reported.
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where use/non-use of DVT prophylaxis was not reported. Data missing = 112.
Figure 15: Type of DVT prophylaxis	
Definition	Percentages of DVT prophylaxis used.
Data included	All deaths falling within WAASM criteria. Some cases reported more than one type of DVT prophylaxis agent used (n= 3,421).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where type of DVT prophylaxis agent was not reported. Data missing = 0.
Figure 16: Critical care units	
Definition	Percentages of critical care units (intensive care and high dependency units) use/non-use.
Data included	All deaths falling within WAASM criteria where use (n= 1,471) and non-use (n= 909) of critical care units was reported.
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where use/non-use of critical care units was not reported. Data missing = 91.
Figure 17: Hospital transfers by year and admission type	
Definition	Percentages of hospital transfers by year and admission type.
Data included	All deaths falling within WAASM criteria where emergency (n=647) and elective (n=16) transfers were reported.
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where transfer was not reported. Data missing = 4.
Figure 18: Hospital transfer issues	
Definition	Percentages of issues associated with hospital transfers.
Data included	All deaths falling within WAASM criteria where transfer issues were reported.
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where transfer and transfer issues were not reported. Data missing: 'inappropriate level of care' = 72; 'inappropriate transfer' =46; 'insufficient clinical information' =78; and 'delay in transfer' =50.
Figure 19: Operative and non-operative cases by specialty	
Definition	Percentages of operative and non-operative cases by surgical specialty.
Data included	All deaths falling within WAASM criteria where operative and non-operative status was reported. Surgical specialty 'Other' includes Otolaryngology, Head and Neck, Ophthalmology, Oral/Maxillofacial, Paediatrics and Obstetrics and Gynaecology. Cardiothoracic Surgery (n=188), General Surgery (n=982), Neurosurgery (n=453), Orthopaedic Surgery (n=423), Others (n=46), Plastic Surgery (n=54), Urology (n=85), Vascular Surgery (n=236).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. Data missing = 4.

Figure 20: Operative cases by admission type and year	
Definition	Percentages of operative emergency and elective admissions by year.
Data included	All deaths falling within WAASM criteria where operative admission type was reported (n=1,633).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where an operation was not reported. Data missing = 23.
Figure 21: Consultant surgeon involvement in operations	
Definition	Percentages of consultant surgeons making decisions, operating, assisting and supervising in theatre by year.
Data included	All deaths falling within WAASM criteria where the number of operations performed was reported (n=2,293).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where an operation was not reported. Data missing = 0.
Figure 22: Operations abandoned due to finding a terminal situation	
Definition	Percentages of operations abandoned on finding a terminal situation.
Data included	All deaths falling within WAASM criteria where operations abandoned were reported (n=2,082).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All non-operative cases and all operative cases where a terminal situation was not reported. Data missing = 211.
Figure 23: Unplanned returns to operating theatre	
Definition	Percentages of unplanned returns to operating theatre.
Data included	All deaths falling within WAASM criteria where unplanned returns to theatre was reported (n=1,611).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All non-operative cases and all operative cases where unplanned return to theatre was not reported. Data missing = 45.
Figure 24: Postoperative complications by hospital status by year	
Definition	Percentages of postoperative complications by hospital status and year. It is possible for patients to have more than one postoperative complication.
Data included	All deaths falling within WAASM criteria where postoperative complication by hospital status was reported (n=522).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All non-operative cases and all operative cases where postoperative complication was not reported. Data missing = 8.
Figure 25: Reasons for not operating	
Definition	Percentages of cases with reasons for not operating.
Data included	All deaths falling within WAASM criteria where reasons for no operation was reported (n=812).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where an operation was reported. Data missing = 3.
Figure 26: Clinically significant infections	
Definition	Percentages and counts of cases with clinically significant infection.
Data included	All deaths falling within WAASM criteria where clinically significant infections was reported (n=736).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where a clinically significant infection was not reported. Data missing = 20.
Figure 27: Type of clinically significant infection	
Definition	Percentages of type of clinically significant infection.
Data included	All deaths falling within WAASM criteria where type of clinically significant infection was reported (n=734).
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where a clinically significant infection was not reported. Data missing = 2.
Figure 28: Assessor opinion on appropriateness of DVT prophylaxis decision	
Definition	Percentages of appropriateness of DVT prophylaxis decision as reported by assessors.
Data included	All deaths falling within WAASM criteria using the highest level of assessment in completed cases where appropriateness of DVT prophylaxis decision was reported (n= 1,867).
Data excluded	All 'excluded error', 'surgical case pending', 'first-line assessment pending', 'second-line assessment pending', 'excluded-terminal care' and 'lost to follow-up' cases. All neurosurgery cases. Data missing = 50.

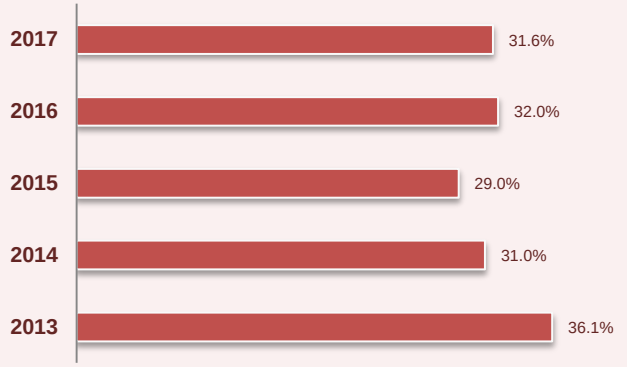
Figure 29: Assessor opinion on non-use of critical care units	
Definition	Percentages of cases where use of critical care units (intensive care and high dependency units) would have been beneficial as reported by assessors.
Data included	All deaths falling within WAASM criteria using the highest level of assessment in completed cases where critical care units was reported (ICU; n=747, HDU; n=740).
Data excluded	All 'excluded error', 'surgical case pending', 'first-line assessment pending', 'second-line assessment pending', 'excluded-terminal care' and 'lost to follow-up' cases. All neurosurgery cases. Data missing; ICU = 82, HDU = 89.
Figure 30: Cases with clinical management issues	
Definition	Percentages of cases with clinical management issues as reported by assessors.
Data included	All deaths falling within WAASM criteria with the highest level of assessment in completed cases where clinical management issues was reported (n=411).
Data excluded	All 'excluded error', 'surgical case pending', 'first-line assessment pending', 'second-line assessment pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where clinical management issue was not reported.
Figure 31: Categories of clinical management issues	
Definition	Count and percentages of categories of clinical management issues as reported by assessors. Based on the number of incidents of clinical management issues and not the number of patients.
Data included	All deaths falling within WAASM criteria with the highest level of assessment in completed cases where categories of clinical management issues was reported (n=636).
Data excluded	All 'excluded error', 'surgical case pending', 'first-line assessment pending', 'second-line assessment pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where clinical management issue was not reported. Data missing = 3.
Figure 32: Perceived impact of adverse event on clinical outcome	
Definition	Percentages of perceived impact of adverse events as reported by assessors. Based on the number of incidents of clinical management issues and not the number of patients.
Data included	All deaths falling within WAASM criteria with the highest level of assessment in completed cases where the perceived impact of adverse events was reported (n=73).
Data excluded	All 'excluded error', 'surgical case pending', 'first-line assessment pending', 'second-line assessment pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where clinical management issue was not reported. All cases where 'areas for consideration' and 'areas for concern' was reported. Data missing = 1.
Figure 33: Perceived preventability of adverse events that caused death	
Definition	Percentages of perceived preventability of adverse events causing death as reported by assessors. Based on the number of incidents of clinical management issues and not the number of patients.
Data included	All deaths falling within WAASM criteria with the highest level of assessment in completed cases where preventability of adverse events causing death was reported (n=46).
Data excluded	All 'excluded error', 'surgical case pending', 'first-line assessment pending', 'second-line assessment pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where clinical management issue was not reported. All cases where 'areas for consideration' and 'areas for concern' was reported. All cases where adverse events not causing death was reported. Missing data = 0.
Figure 34: Frequency of clinical management issues	
Definition	Percentages and descriptions (in READ Codes) of the 12 most common clinical management issues as reported by assessors.
Data included	All deaths falling within WAASM criteria where clinical management issues was reported.
Data excluded	All 'excluded error', 'surgical case pending', 'first-line assessment pending', 'second-line assessment pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where clinical management issue was not reported.
Figure 35: Delays in transfer to WA major tertiary and like national tertiary hospitals	
Definition	Percentages of cases with delay in transfer to WA major tertiary hospitals – Sir Charles Gairdner Hospital, Royal Perth Hospital and Fiona Stanley Hospital; as well as like national tertiary hospitals.
Data included	All deaths falling within WAASM criteria where delay in transfer to WA major tertiary hospitals and like national tertiary hospitals was reported.
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where transfer was not reported in WA and nationally. All cases where delay in transfer to WA major tertiary hospitals and like-national tertiary hospitals was not reported.

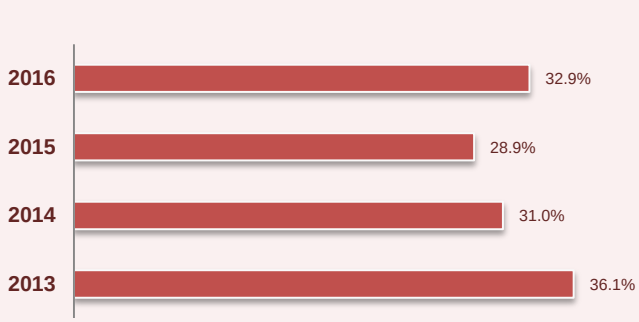
Appendix A.3 Tables

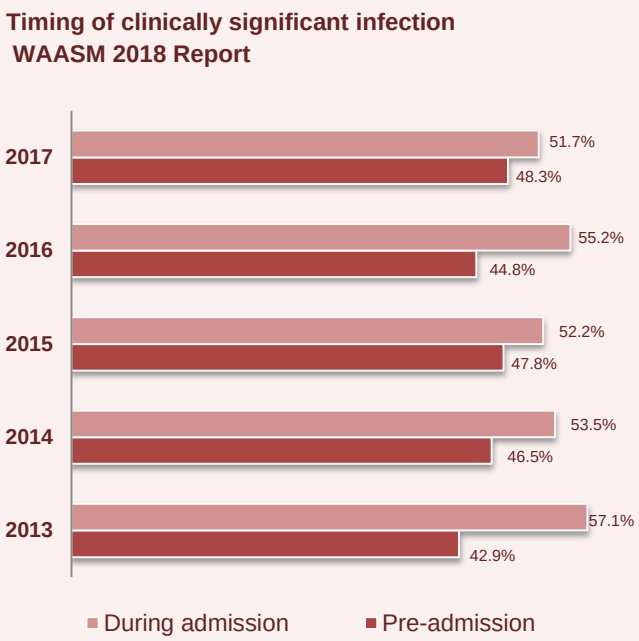
Table 1: Deaths reported to WAASM	
Definition	Count of deaths reported to the WAASM.
Data included	All data collected between 2013 and 2017. Total number of deaths reported to WAASM, including 'Excluded error' cases.
Data excluded	No exclusions.
Table 2: Number of deaths per 100,000 population	
Definition	Number of deaths falling within WAASM criteria per year as a function of surgical mortality rates per 100,000 population.
Data included	All deaths falling within WAASM criteria. Population data compiled from the Australian Bureau of Statistics (January 2013 to June 2016 data is based on the information from the *2016 Census of Population and Housing*; July 2016 and onwards data is based on projected data. Population data is only available for up until September 2017).
Data excluded	All 'excluded error' cases.
Table 3: Second-line assessments	
Definition	Counts and percentages of cases referred to second-line assessments.
Data included	All deaths falling within WAASM criteria where the first-line assessor recommended an SLA.
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases.
Table 4: Surgeon involvement in deaths falling within WAASM criteria	
Definition	Counts and percentages of surgical mortality data in relation to surgeon involvement in cases.
Data included	All deaths falling within WAASM criteria. Counts of surgeons associated with deaths reported. Terminal care cases included in counts of surgical case forms returned.
Data excluded	All 'excluded error', 'surgical case pending' and 'lost to follow-up' cases.
Table 5: Deaths falling within WAASM criteria by specialty	
Definition	Counts and percentages of surgical mortality data in relation to surgeon specialty.
Data included	All deaths falling within WAASM criteria.
Data excluded	All 'excluded error' cases. Data missing = 367.
Table 6: Median age by gender	
Definition	Median age by gender for all cases.
Data included	All deaths falling within WAASM criteria.
Data excluded	All 'excluded error' cases.
Table 7: Transfers to WA major tertiary hospitals	
Definition	Counts and percentages of cases transferred to WA major tertiary hospitals – Sir Charles Gairdner Hospital, Royal Perth Hospital and Fiona Stanley Hospital.
Data included	All deaths falling within WAASM criteria where transfer to WA major tertiary hospitals was reported.
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where no transfer was reported.
Table 8: Delays in transfer to WA major tertiary hospitals	
Definition	Counts and percentages of cases with delays in transfer to WA major tertiary hospitals – Sir Charles Gairdner Hospital, Royal Perth Hospital and Fiona Stanley Hospital.
Data included	All deaths falling within WAASM criteria where there was a transfer to major tertiary hospitals, with a response to 'Delay in transfer' question in SCF.
Data excluded	All 'excluded error', 'surgical case pending', 'excluded-terminal care' and 'lost to follow-up' cases. All cases where transfer was not reported. All cases where delay in transfer to WA major tertiary hospitals was not reported. Data missing: 2013=6; 2014=10; 2015=16; 2016=7; and 2017=4.

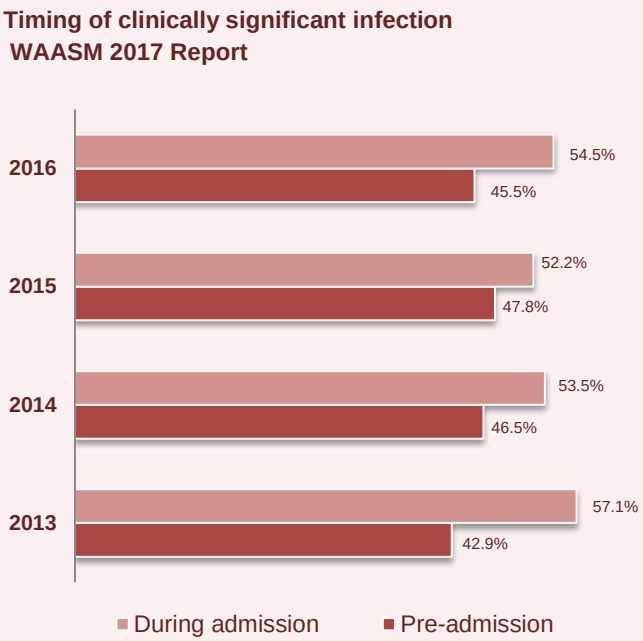
APPENDIX B: PERFORMANCE REVIEW DATA

Appendix B.1 Reporting period comparisons of clinically significant infections

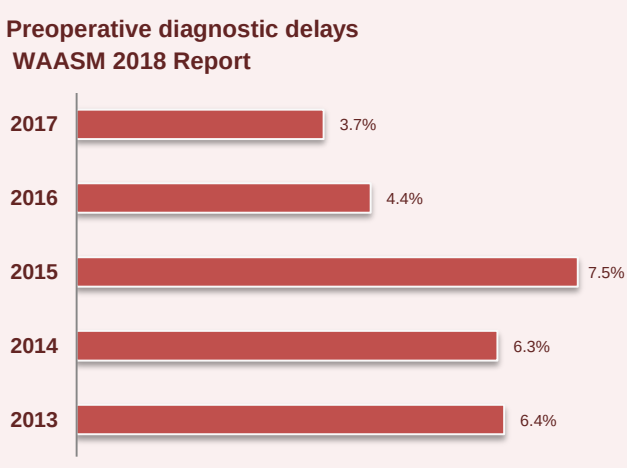


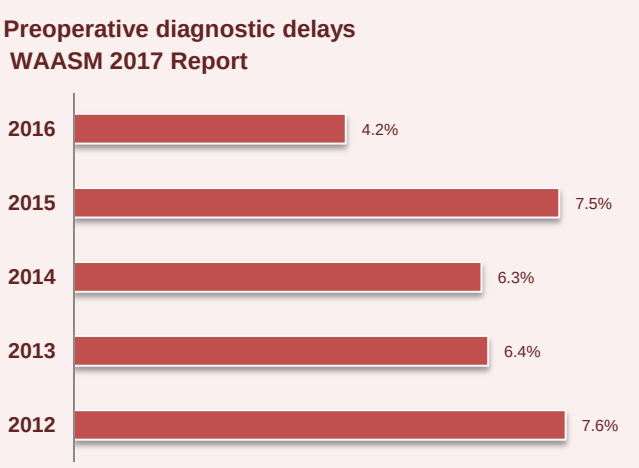






Appendix B.2 Reporting period comparisons of preoperative diagnostic delays





Appendix B.3 WAASM symposium flyer 2017

A Symposium by the Western Australian Audit of Surgical Mortality

WAASM Western Australian Audit of Surgical Mortality

Royal Australasian College of Surgeons

The Perth Emergency Laparotomy Audit - Where to Now?

5pm, Thursday 24 August 2017
Pan Pacific Hotel, 207 Adelaide Terrace, Perth

Speaker	Topic
Prof Guy Maddern Chair of ANZASM & Surgical Director of Research & Evaluation (RACS); Professor of Surgery, University of Adelaide	Introduction and concluding discussion
Mr James Aitken Clinical Director, WAASM; Clinical Lead PELA; General Surgeon, Sir Charles Gairdner Hospital	National Australian data in an international context
Dr Peter Pockney Senior Lecturer, John Hunter Hospital, NSW	Emergency laparotomy audit in NSW
Dr Claire Stevens General Surgeon, University of Adelaide	Outcome of emergency laparotomy in Victoria – Dr Foster's diagnosis
Dr Mary Theophilus General Surgeon; Head of Dept., General Surgery, SJOG Midland Public & Private Hospitals	A hospital's response
Assoc Prof David Mountain Emergency Physician, Sir Charles Gairdner Hospital	An emergency department's response
Prof Marina Wallace Colorectal Surgeon, Fiona Stanley Hospital	Who should operate on emergency laparotomies
Dr Audrey Koay Director of Quality & Safety, The WA Dept. of Health	What a Department of Health would want from a national audit
Prof David Fletcher Professor of Surgery, Fiona Stanley Hospital; Perth Member, RACS Sustainability in Healthcare Committee	A proposed Australian and New Zealand emergency laparotomy audit

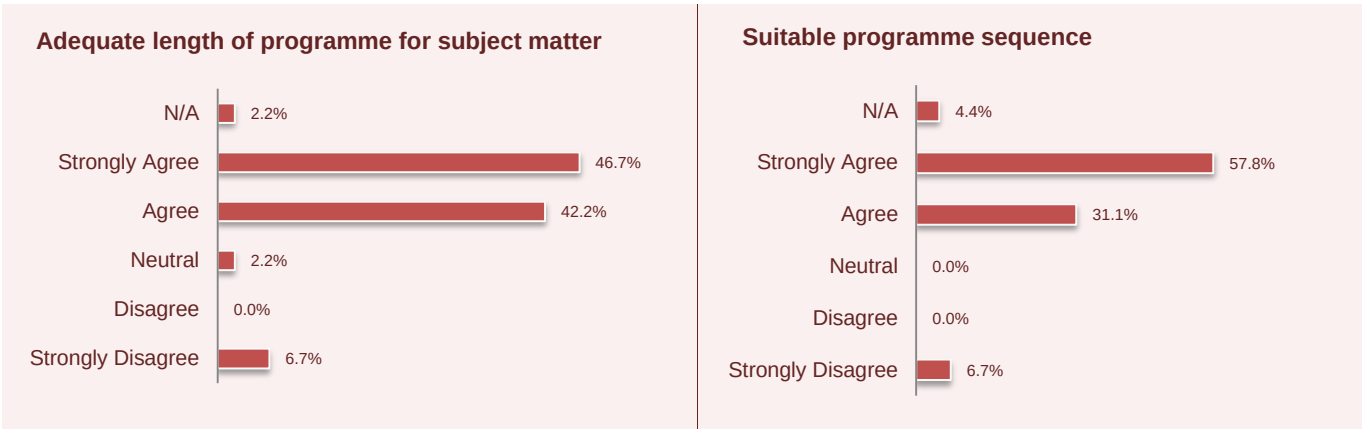
RACS CPD Approved

For more information or to register:
E: waasm@surgeons.org
T: (08) 6389 8650

Appendix B.4 Overview of WAASM symposium 'Evaluation Findings'

Symposium Structure

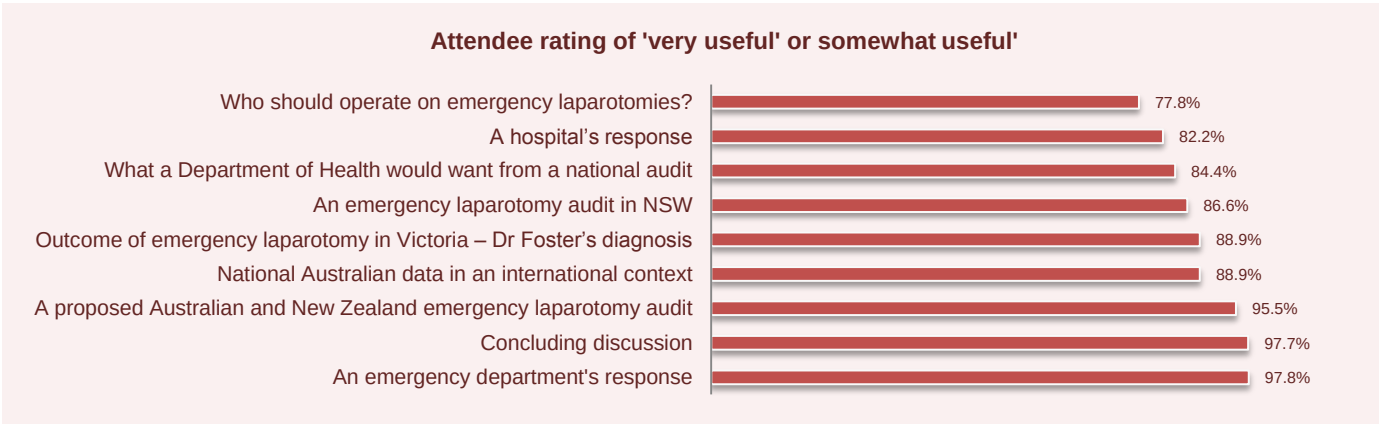
A large majority of attendees felt the length of the programme was adequate in covering the symposium topics (88.9%) and that the sequence of presentations was suitable (88.9%).



N/A = Not applicable

Symposium Topics

Overall, the evenings programme was well received and the majority of attendees found all topics to be 'very useful' or 'somewhat useful'.



Feedback provided on the content included:

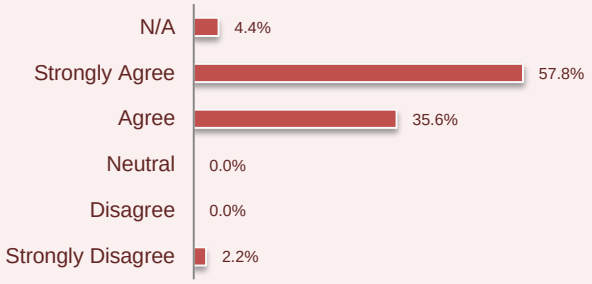
"Especially [need] *clarification that ANZELA Quality Improvement will not be subject to Qualified Privilege"*

"Great presenting data collected by interstate studies"

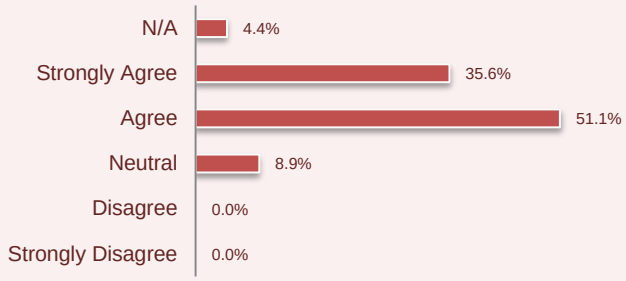
" …… It was interesting and well presented"

Symposium Outcomes

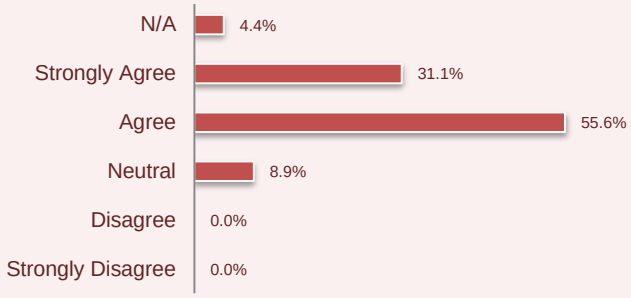
Found subject matter informative



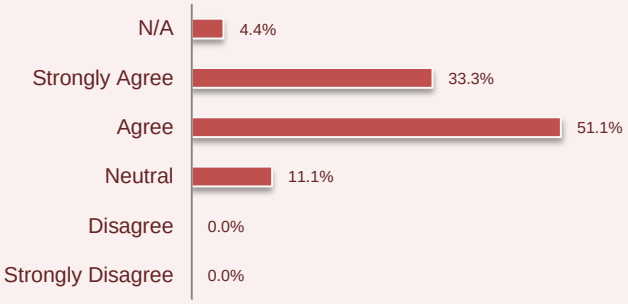
Gained necessary knowledge to identify issues amenable to improvement



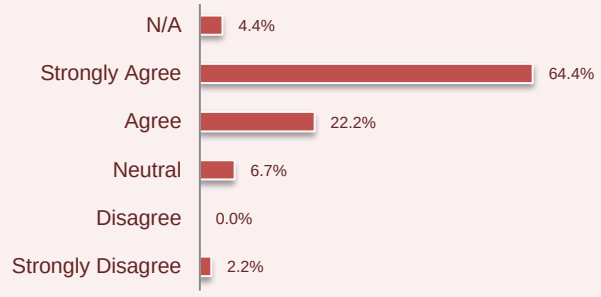
Greater awareness of useful strategies to improve areas of suboptimal care



Better understanding of the importance of a multispecialty approach to patient care



See PELA advance into a national quality improvement program



N/A = Not applicable
PELA = Perth Emergency Laparotomy Audit

The full report on the evaluation findings is available at:
https://www.surgeons.org/media/25678383/2017-12-31_waasm-2017-symposium-evaluation-report.pdf