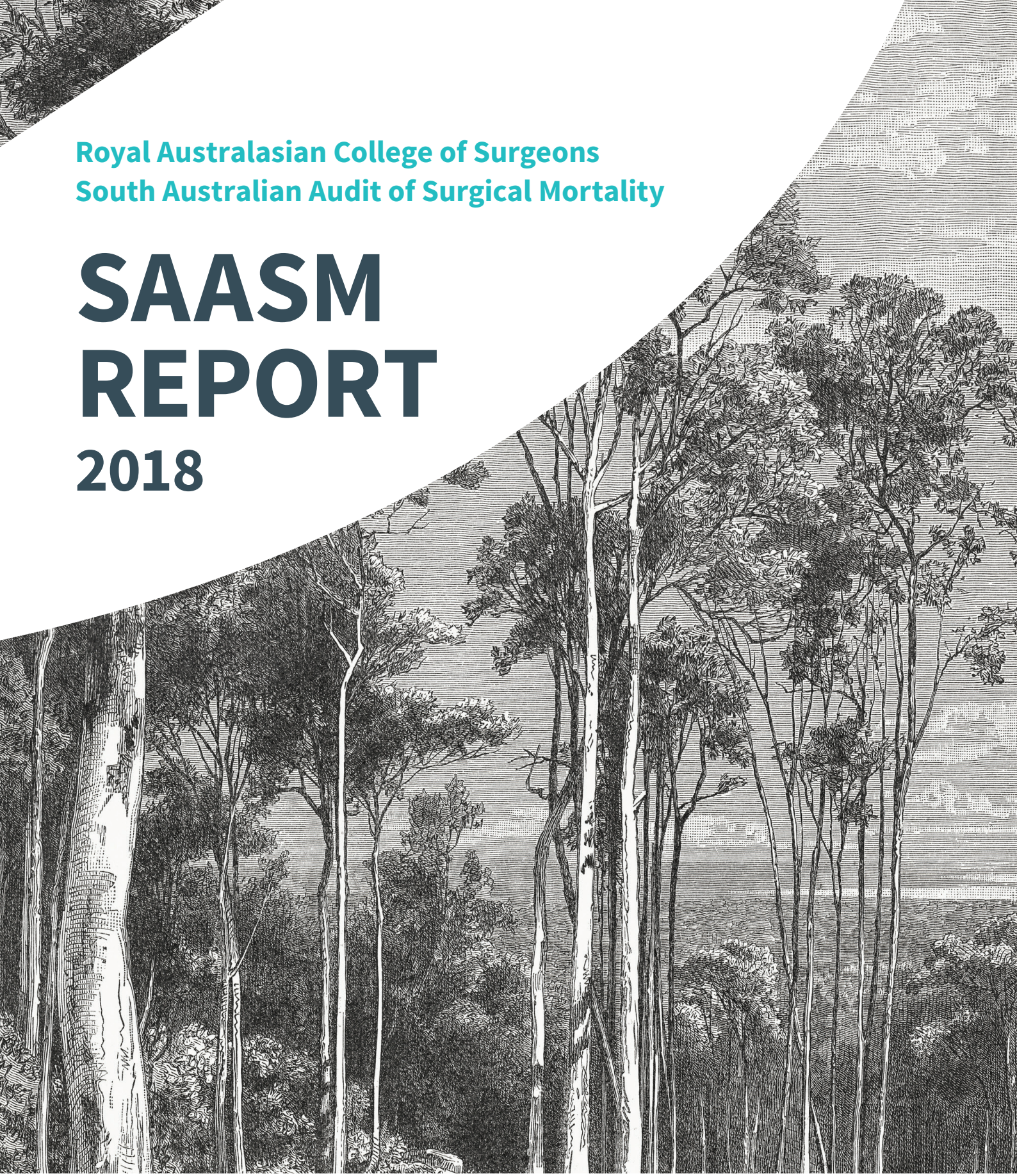
Royal Australasian College of Surgeons
South Australian Audit of Surgical Mortality

SAASM REPORT 2018



Royal Australasian College of Surgeons

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
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SAASM South Australian Audit of Surgical Mortality

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South Australian 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, South Australian Audit of Surgical Mortality Management Committee.

The South Australian Audit of Surgical Mortality is a confidential project with legislative protection at a state level by the *Health Care Act 2008* under Part 7 (Quality improvement and research) (gazetted April 2017).

The Australian and New Zealand Audit of Surgical Mortality, including the South Australian Audit of Surgical Mortality, also has protection under the Commonwealth Qualified Privilege Scheme under Part VC of the *Health Insurance Act 1973* (gazetted 25 July 2016).

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1 Chairman's report

This is my first Chairman's Report for the SAASM Annual Report since taking over the position of Clinical Director from Glen McCulloch from 1 July 2018. During this time I am pleased to report:

1. participation of hospitals in SA (public and private) remains at 100%
2. 98.3% of practising Royal Australasian College of Surgeons (RACS) Fellows are committed to the process
3. an increasing and high proportion (97%) of surgical case forms were completed in 2018
4. a reduction in the proportion of cases with serious clinical management issues
5. a continued, although small, decrease in the number of deaths reported to SAASM, despite an increasing and ageing population
6. continued collaboration with Anaesthetic colleagues in cases where there is an anaesthetic component
7. continued engagement of Gynaecological colleagues in gynaecological cases
8. continued involvement of South Australian medical students and new graduates in research studies resulting in published papers using the data from the Australian and New Zealand Audit of Surgical Mortality (ANZASM)
9. dedication of SAASM staff to their important role in improving surgical outcomes.

A pleasing aspect of this last year has been the increase in completion of surgical case forms (SCFs) from 89.3% in 2017 to 96.6% in 2018. This is partly attributable to the new Royal Adelaide Hospital (nRAH) addressing challenges in reporting surgical deaths to SAASM, associated with the move to the new site; and also to a correction of the communication issues between the IT systems of RACS CPD and ANZASM. Although the Audit is now a mandatory component of Continuing Professional Development (CPD) for RACS Fellows, there have been a very small number of surgeons who complete their SCFs poorly (with inadequate information), return the forms late, or do not return them at all. Ongoing efforts to optimise the integration of IT systems between ANZASM and RACS CPD should result in continuing improvements in monitoring of compliance.

I must stress to all surgeons that as communications with the Australian Health Practitioner Regulation Agency (AHPRA) consolidate there will be consequences of failure to satisfy the CPD requirements. A compulsory part of CPD and medical registration is full participation in the SAASM.

I encourage all to complete their SCFs in a thorough and timely fashion, ideally by early self-reporting; and I encourage departmental heads and hospital administrative staff to facilitate this process.

Finally, I thank my many colleagues for their first- and second-line assessments. These assessments form the foundation of the educational and functional benefits of the Audit.

Tony Pohl FRACS, FA OrthA.
South Australian Audit of Surgical Mortality Clinical Director and Chairman

2 Recommendations

It is recommended that surgeons, hospitals and health departments consider the recommended actions below and establish or review their systems or processes to improve outcomes and experiences for their patients.

Patient care

- Surgeons should be expected to undertake comprehensive clinical assessments preoperatively, including clear documentation of risks and patient preferences (particularly in relation to end of life treatment).
- There has been a decrease in assessors' concerns about failure to use critical care units (in cases where it was indicated). Nevertheless, it remains a potential risk and surgeons are encouraged to continue to carefully consider whether patients would benefit from admission to a critical care unit.
- The most common postoperative complication was 'significant postoperative bleeding'. Reducing the impact of this complication requires increased vigilance in the postoperative period to ensure early detection.
- The high risk of infection among comorbid surgical patients is an ongoing issue. Adherence to protocols and guidelines, such as the Australian Guidelines for the Prevention and Control of Infection in Healthcare, is essential to ensure best practice.
- Preoperative transfer between hospitals occurred in 26% of audited cases. Management concerns were identified in 15% of these cases. Surgeons and clinicians should aim to actively prevent delay in transfer, ensure sufficient clinical information is provided, and consider whether transfer, or the level of care during transfer, is inappropriate.

Improved leadership and communication

- Communication failures have been identified in association with clinical handover and interhospital transfers, and between junior and senior clinicians. There should be a continued focus on standardisation of communication processes to minimise errors. Consultation with senior surgeons is essential when dealing with important decisions and unexpected complications.
- Surgeons are encouraged to discuss valuable assessor feedback, audit findings and recommendations with surgical colleagues and at relevant meetings, recognising that reflection and learning, especially following adverse outcomes, has been shown to improve surgical practice.

Improving the audit

- To increase the return rate of surgical case forms (SCFs) from 97% in 2018 SAASM will continue to work with hospitals, to ensure timely reporting of surgical mortality, and with RACS CPD, to optimise the monitoring of non-compliance.
- To improve the timeliness and accuracy of SCFs, SAASM will continue to encourage self-reporting of deaths by the treating surgeon, either directly or through mortality and morbidity meetings of surgical departments.
- To close the feedback loop, SAASM will continue to engage with hospitals to improve and monitor the effectiveness of reporting to hospitals.
- In 2018, a high proportion (26%) of audited cases involved transfers. Issues relating to patient care were identified in 15% of these transfers. SAASM will continue to contribute to educational activities to inform and promote discussion about transfer issues.
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3 Background of the Audit process and reporting

SAASM is an external, independent, peer-reviewed audit of the process of care associated with surgically-related deaths in South Australia. SAASM commenced data collection on 1 July 2005 and is funded by SA Health. The SAASM project falls under the governance of the Australian and New Zealand Audit of Surgical Mortality Steering Committee and has protection at a state level under the *Health Care Act 2008* (Part 7: Quality improvement and research) (gazetted 26 April 2017), in addition to federal coverage under the Australian and New Zealand Audit of Surgical Mortality (ANZASM) through the Commonwealth Qualified Privilege Scheme, Part VC of the *Health Insurance Act 1973* (gazetted 25 July 2016).

Data analysed for this report covers cases reported to SAASM with date of death from 1 January 2018 to 31 December 2018. Please note that the denominator may change throughout the report. This is primarily due to unanswered questions, which result in missing data. Since not all reported cases have completed the full audit process, the data in future reports may differ slightly.

SAASM is notified of deaths in all South Australian hospitals when a surgeon was involved in the care of the patient. The SAASM team contacts the treating surgeon to request completion of an online surgical case form (SCF) to obtain the full clinical picture. Surgeons are asked to report against the following criteria:

- ***area of consideration:*** where care could have been improved or different, but may be an area of debate
- ***area of concern:*** where care should have been better managed
- ***adverse event:*** an unintended injury, caused by medical management rather than by disease, which is sufficiently serious to lead to prolonged hospitalisation or to temporary or permanent impairment or disability of the patient, which contributes to, or causes, death.

The completed SCF is de-identified, then reviewed by another consultant surgeon from the same specialty; this process is referred to as first-line assessment (FLA). The assessor completes an FLA form, providing comments on the case management and level of care provided to the patient. If the first-line assessor considers that there is insufficient information on the SCF to come to a conclusion, or if there are factors that warrant further investigation, a second-line assessment (SLA) is recommended. Data from the SLA (rather than the FLA) is used in the analyses for cases that underwent SLA. FLA data was used for cases that did not undergo SLA.

On completion of the assessment(s) the SAASM team provides the feedback to the treating surgeon.

3.1 Anaesthetic mortality review collaboration

The role of the South Australian Anaesthetic Mortality Committee (SAAMC) is to analyse adverse event information, specifically patient mortality, from health services related to anaesthesia with the objective of recommending quality improvement initiatives. Anaesthetists and other health professionals voluntarily submit reports to the committee for review. The SAASM commenced collaboration with the SAAMC in June 2016, identifying cases in which the patient may have had a potential anaesthetic component to their death. The identification of an anaesthetic case is based on information provided by the treating surgeon on the SCF (Question 17: "*Was there an anaesthetic component to this death?*"). The SAASM refers these cases to SAAMC for an anaesthetic review (in addition to the surgical audit process), to assist SAAMC to achieve more complete capture of anaesthetic-related deaths.

4 Hospital and Surgeon participation

All eligible public and private hospitals in South Australia currently participate in the audit (53 hospitals).

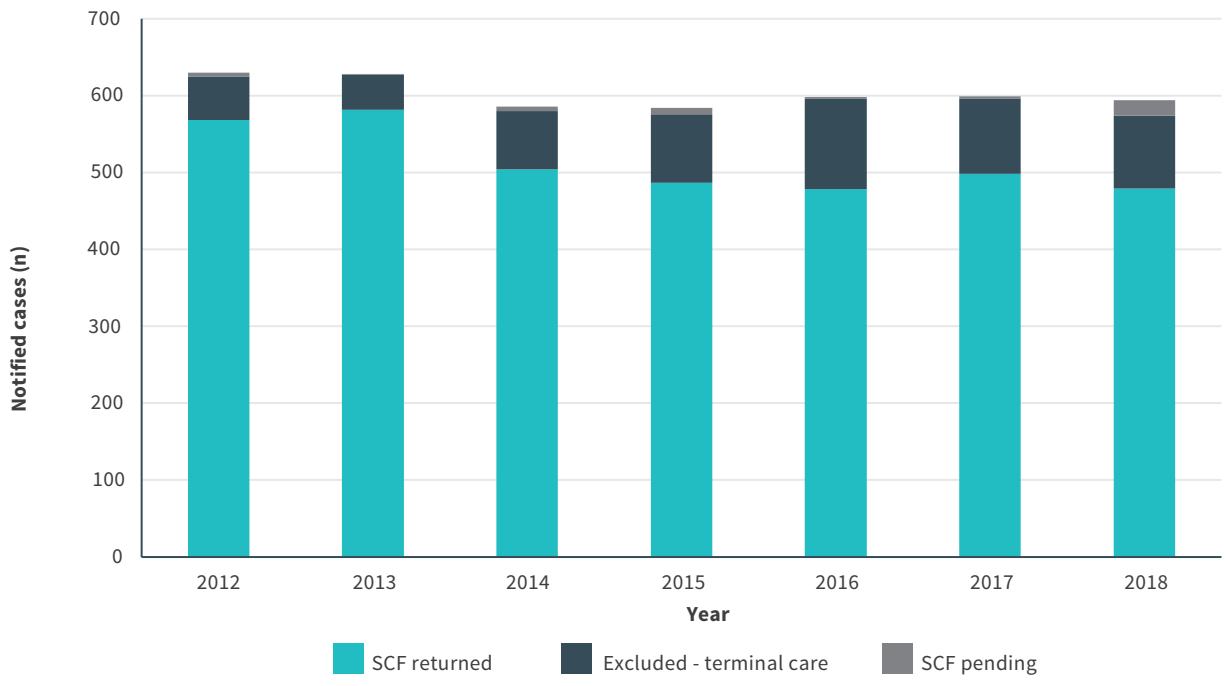
All participating hospitals have provided notifications of surgical deaths for 2018*. The majority of surgical deaths occurred in public hospitals (88.0%, 523/594), reflecting the higher number of complex procedures and high-risk patients treated in the public system.

In terms of participation by South Australian surgeons, 98.3% (396/403) of practising Royal Australasian College of Surgeons (RACS) Fellows have provided signed consent to participate in the audit. There were two reported deaths associated with one of the seven surgeons who have not yet returned a participation form (there have been no deaths reported under the care of the other six surgeons).

In 2012, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Board approved a formal collaboration with the SAASM. All gynaecology surgical deaths are now reported to the audit and RANZCOG Fellows are invited to participate voluntarily. To date, 81.8% (9/11) of eligible gynaecology deaths reported to the SAASM have been fully audited. An additional three gynaecology cases have been identified as terminal care cases not requiring audit (according to SAASM criteria).

There has been a slight decrease in the number of deaths reported to the SAASM during the 2018 reporting period (Figure 1). A total of 599 deaths were reported in 2017 and 594 deaths in 2018.

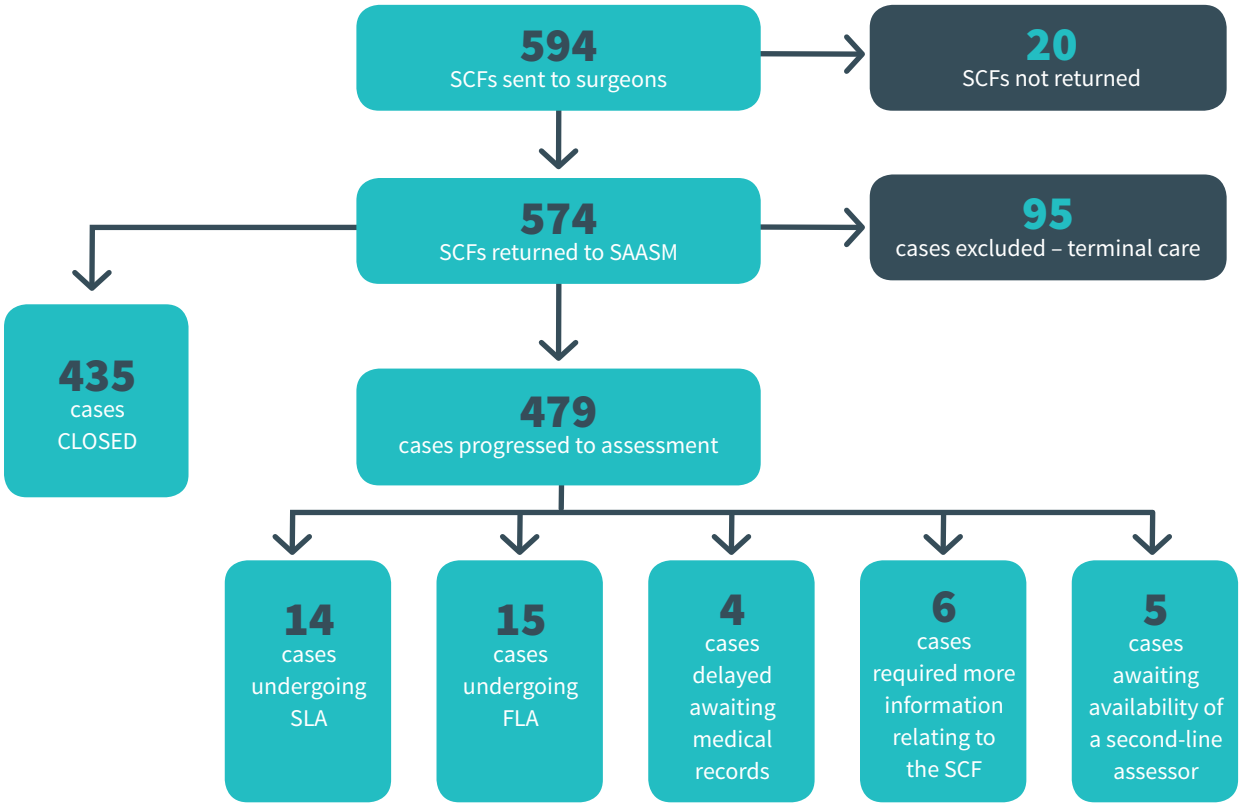
Figure 1: Number of notified cases and SCF returned by year



Note: see Table 1 Appendix A.

At the time of reporting, a high proportion (96.6%, 574/594) of 2018 SCFs had been returned (Figure 2). Among returned cases eligible for audit (i.e. not those reported as 'terminal care'), a large proportion of SCFs were completed by the consultant (78.7%, 377/479), with the remainder completed by a Surgical Education and Training Trainee (13.4%, 64/479), service registrar (4.6%, 22/479) or Fellow (3.3%, 16/479).

Figure 2: Audit process and case status 2018



Note: The proportion of cases referred for SLA following completion of the FLA is 11.1% (51/458).

5 Patient demographics

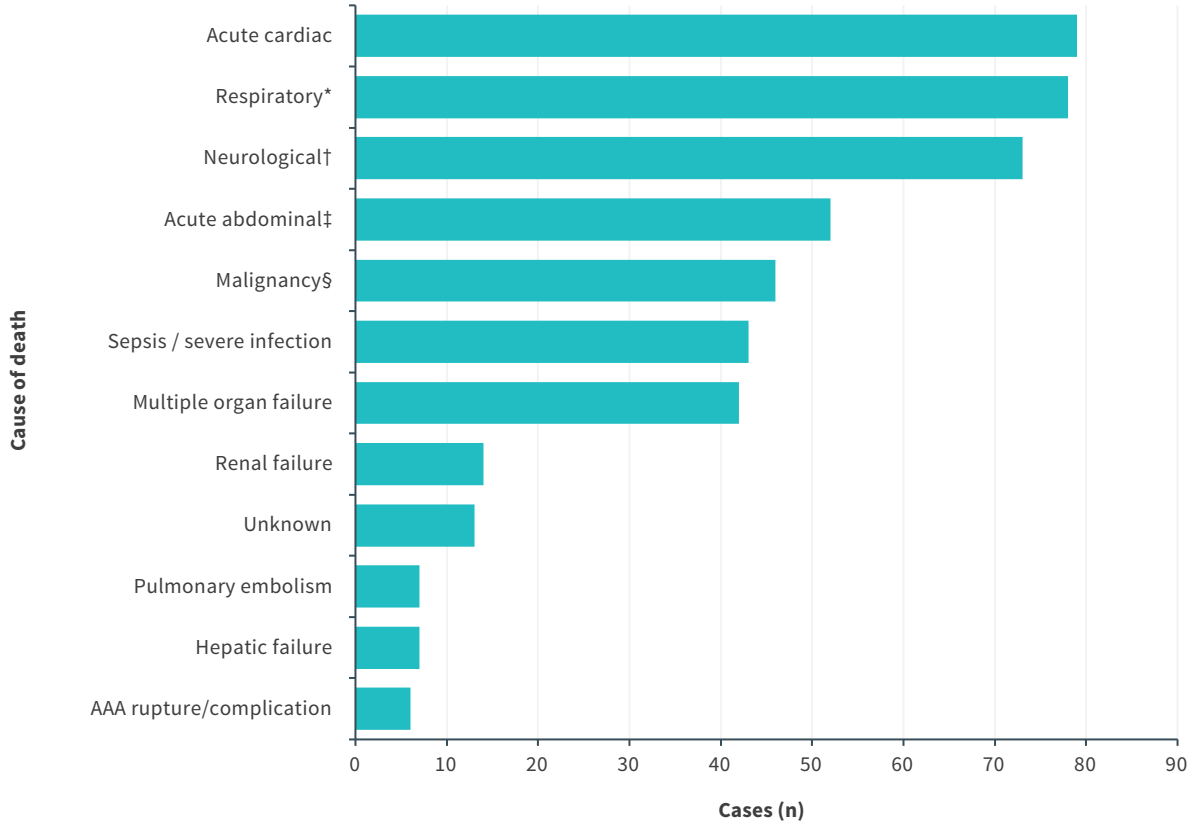
The majority of deaths reported to the SAASM were for patients who were elderly, had pre-existing health problems and were admitted as emergencies for acute life-threatening conditions. Emergency admissions accounted for 85.2% (404/474, missing data n=5) of all cases for which data were available, with the remaining 14.8% (70/474) being elective admissions. The median age at death was 76.9 years (interquartile range, 65.1–86.2) and there more males (57.7%, 343/594) than females (42.3%, 251/594). Table 1 shows the number of cases reported to SAASM from each specialty.

Table 1: Number of death notifications by specialty 2018 (n=594)

Surgical specialty	Number of cases (%)
General Surgery	258 (43.4)
Orthopaedic Surgery	100 (16.8)
Neurosurgery	74 (12.5)
Vascular Surgery	51 (8.6)
Cardiothoracic Surgery	40 (6.7)
Urology	38 (6.4)
Plastic and Reconstructive Surgery	20 (3.4)
Otolaryngology Head and Neck Surgery	6 (1.0)
Gynaecology	2 (0.3)
Paediatric Surgery	5 (0.8)
Total	**594 (100)**

Of the SCFs returned, 62.5% (268/429, missing data n=50) of patients had an American Society of Anesthesiologists (ASA) grade of 4 or higher (ASA 4 represents a severe systemic disease that is a constant threat to life), while 91.2% (437/479) had at least one significant comorbidity that increased the risk of death. The most frequently occurring comorbidities (of all cases for which a comorbidity was reported) were advanced age (56.8%, 272/479), cardiovascular problems (55.5%, 266/479) and respiratory disease (28.0%, 134/479). These were reflected in the most common causes of death: cardiac and respiratory failure (Figure 3). A case can have more than one comorbidity.

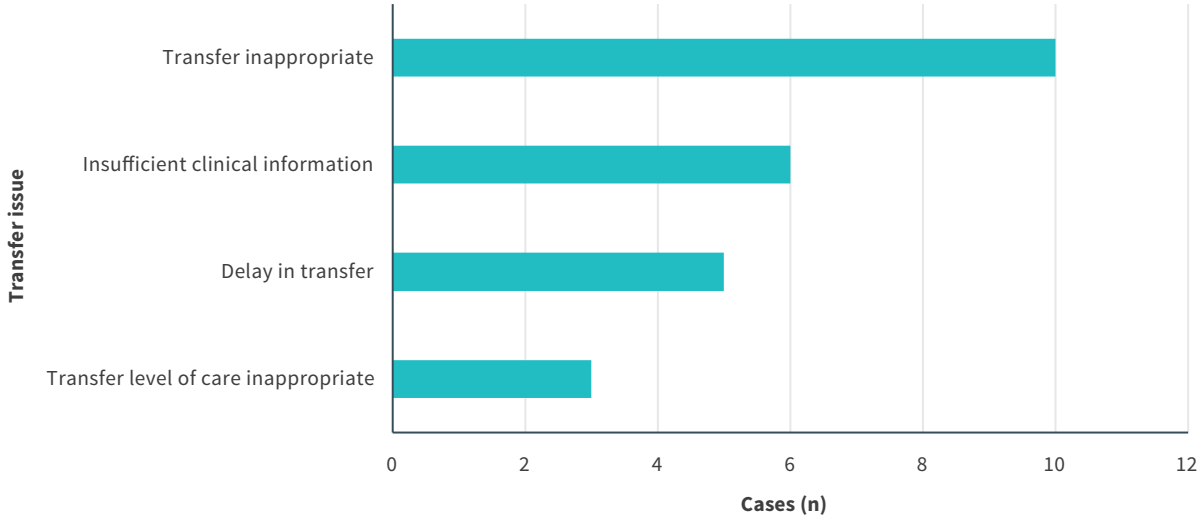
Figure 3: Frequency of reported causes of death 2018 (n=479)



Note:
* Includes respiratory infections.
† Includes intracranial haemorrhage, cerebral oedema, cerebrovascular accident, anoxic brain damage and head injury.
‡ Includes bowel obstruction, ischaemia, gastrointestinal haemorrhage, pancreatitis and perforation. Excludes abdominal malignancy and sepsis.
§ Malignancy (all areas of the body including abdominal) has been classed as a separate category.
Cause of death only reported if there are five or more cases.

6 Patient transfers

Figure 4: Transfer issues identified by treating surgeon 2018 (n=118)



Note: some cases can have more than one transfer issue. Missing data: n=4

Treating surgeons reported that preoperative transfer between hospitals occurred in 26.1% (122/468, missing data n=11) of cases. These transfers were in response to the need for higher levels of care or specific expertise. In the majority of transfers, no patient management concerns were identified. In 15.3% (18/118, missing data n=4) of transferred cases, issues relating to patient care were identified. Figure 4 shows the frequency of each type of transfer issue. The most frequently reported issue among transferred cases was 'delay in transfer' (8.5%, 10/118). Some cases can have more than one transfer issue.

7 Risk management

The audit collects data relating to aspects of patient care that are particularly important for high-risk surgical patients, including deep vein thrombosis (DVT) prophylaxis, fluid balance management, and the utilisation of, and level of satisfaction with, critical care units.

Utilisation of critical care units:

Critical care facilities were utilised in 65.8% (315/479) of cases. In closed cases in which the patient did not receive critical care, the proportion of assessors who considered that the patient would have benefited from critical care has decreased, from 6.3% (10/160, missing data n=1) in 2017 to 2.6% (4/152, missing data n=2) in 2018.

DVT prophylaxis:

Treating surgeons reported that DVT prophylaxis was used in 74.2% (348/469, missing data n=10) of cases. In most cases in which DVT prophylaxis was not used, it was not considered appropriate or there was an active decision to withhold it (97.5%, 115/118, missing data n=3). In the remaining 2.5% (3/118) of cases, prophylaxis was not considered. In 0.5% (2/433) of audited cases assessors identified that DVT prophylaxis was not used when they considered it should have been. Assessors considered the use of DVT prophylaxis inappropriate in 1.6% (7/433, missing data n=2) of cases.

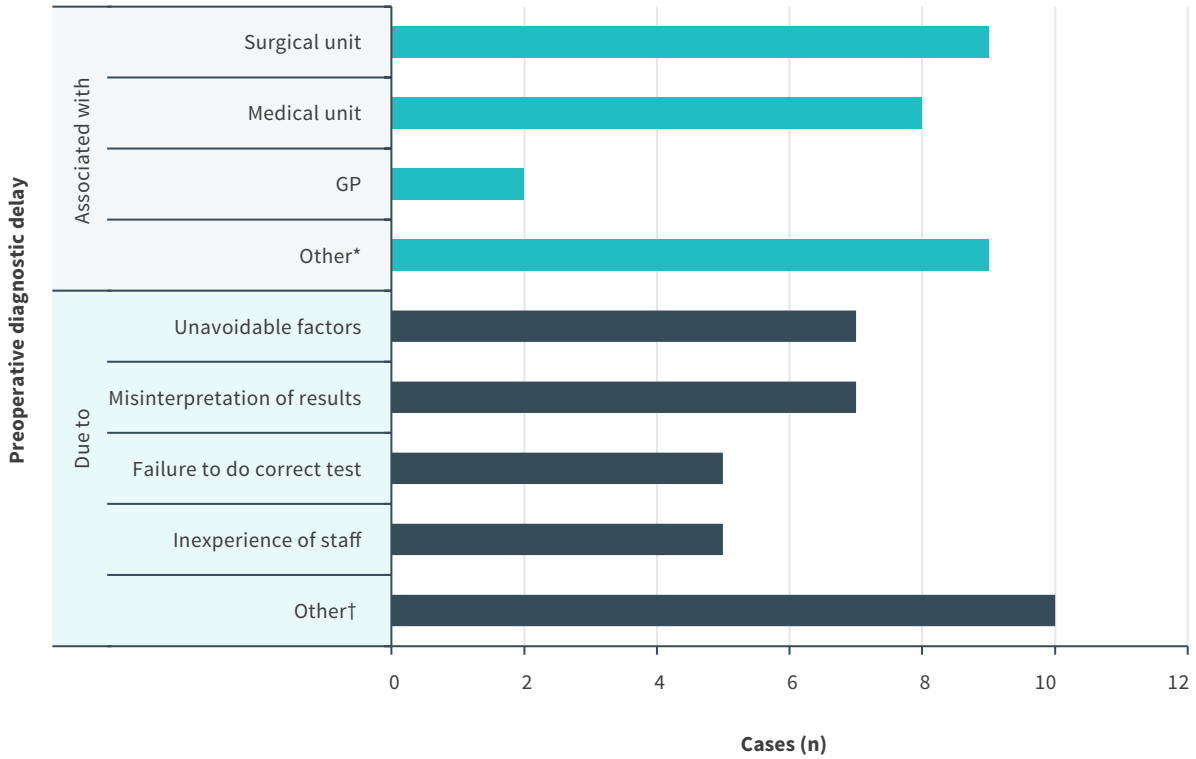
Fluid balance issues:

The treating surgeon reported that fluid balance was an issue in 6.9% (32/465, answer 'unknown' n=14) of cases. Fluid balance issues were reported more frequently among operative cases (8.1%, 29/358, missing data n=13) compared with nonoperative cases (2.8%, 3/106, missing data n=2), which is consistent with the increased challenge of maintaining fluid balance in operative patients.

8 Preoperative diagnostic delays

A preoperative delay in diagnosis was identified by the treating surgeon in 5.4% (26/478, missing data n=1) of cases. In 34.6% (9/26) of cases where there was a preoperative delay in diagnosis, the reporting surgeon felt that the delay was associated with the surgical unit (Figure 5).

Figure 5: Preoperative diagnostic delays identified by the treating surgeon 2018



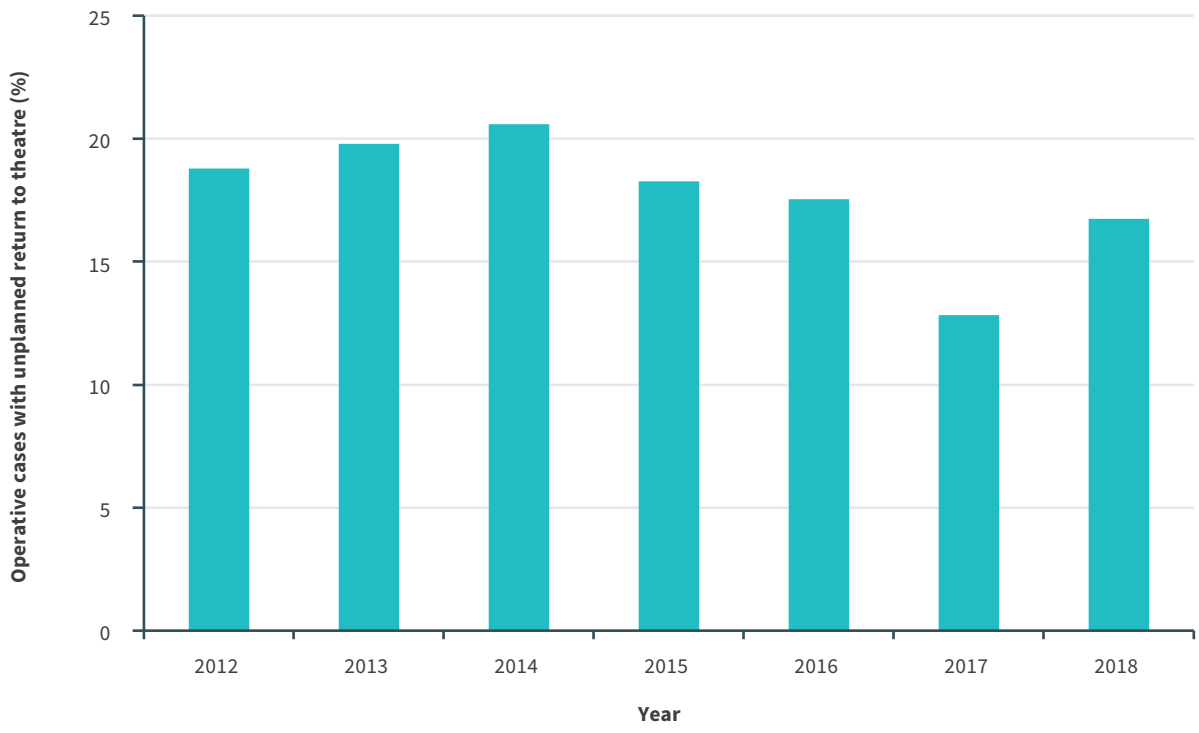
Note:
There can be more than one preoperative diagnostic delay per case.
GP: general practitioner
*includes transferring hospital, emergency department and patient factors
†includes rare diagnosis, staffing issues and atypical presentation

9 Operative and nonoperative deaths

There was no operation performed in 22.5% (108/479) of deaths. In 54.5% (54/99, missing data n=9) of those cases this was an active decision made by the surgeon. Other reasons for not operating included: not a surgical problem (36/99), rapid death (15/99) and refusal of treatment by the patient (11/99). In some cases, more than one reason was selected for not operating.

Overall, there were 545 surgical procedures performed on 371 patients. In 22.9% (85/371) of these cases the patient underwent two or more operations. Cases in which two or more operations were performed were three times as likely to have an area of concern or adverse event identified by the assessor (relative risk [RR] 3.19, 95% confidence interval [CI] 1.74 to 5.84). In 7.4**%** (26/350, missing data n=21) of operative cases an operation was abandoned because a terminal situation was found, and in 16.8% (62/370, missing data n=1) of operative cases the surgeon reported an unplanned return to theatre (Figure 6).

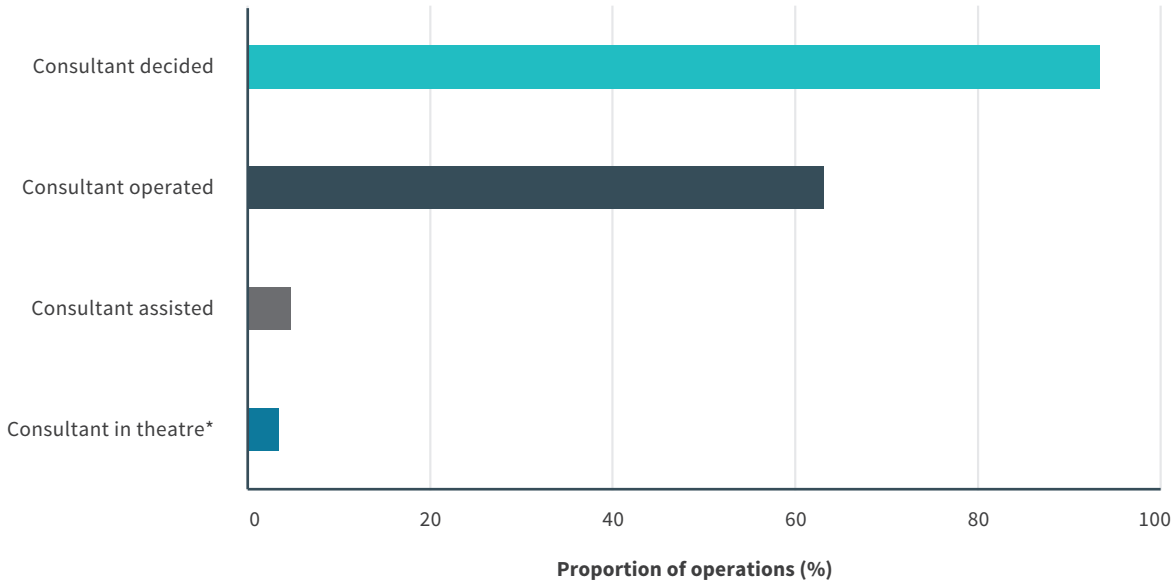
Figure 6: Proportion of operative cases with an unplanned return to theatre, 2012 to 2018 (n=2,586)



Note: see Appendix A Table 2. Missing data: n=20

A consultant surgeon operated in 63.1% (329/521, missing data n=24) of the reported procedures and made the decision to proceed to surgery in 93.3% (486/521) of reported procedures (Figure 7). Among cases with multiple operations, the level of consultant involvement (operating, assisting or in theatre) was slightly higher for subsequent operations (73.9%, 122/165) compared with the first operation (70.2%, 250/356).

Figure 7: Consultant involvement in operations 2018

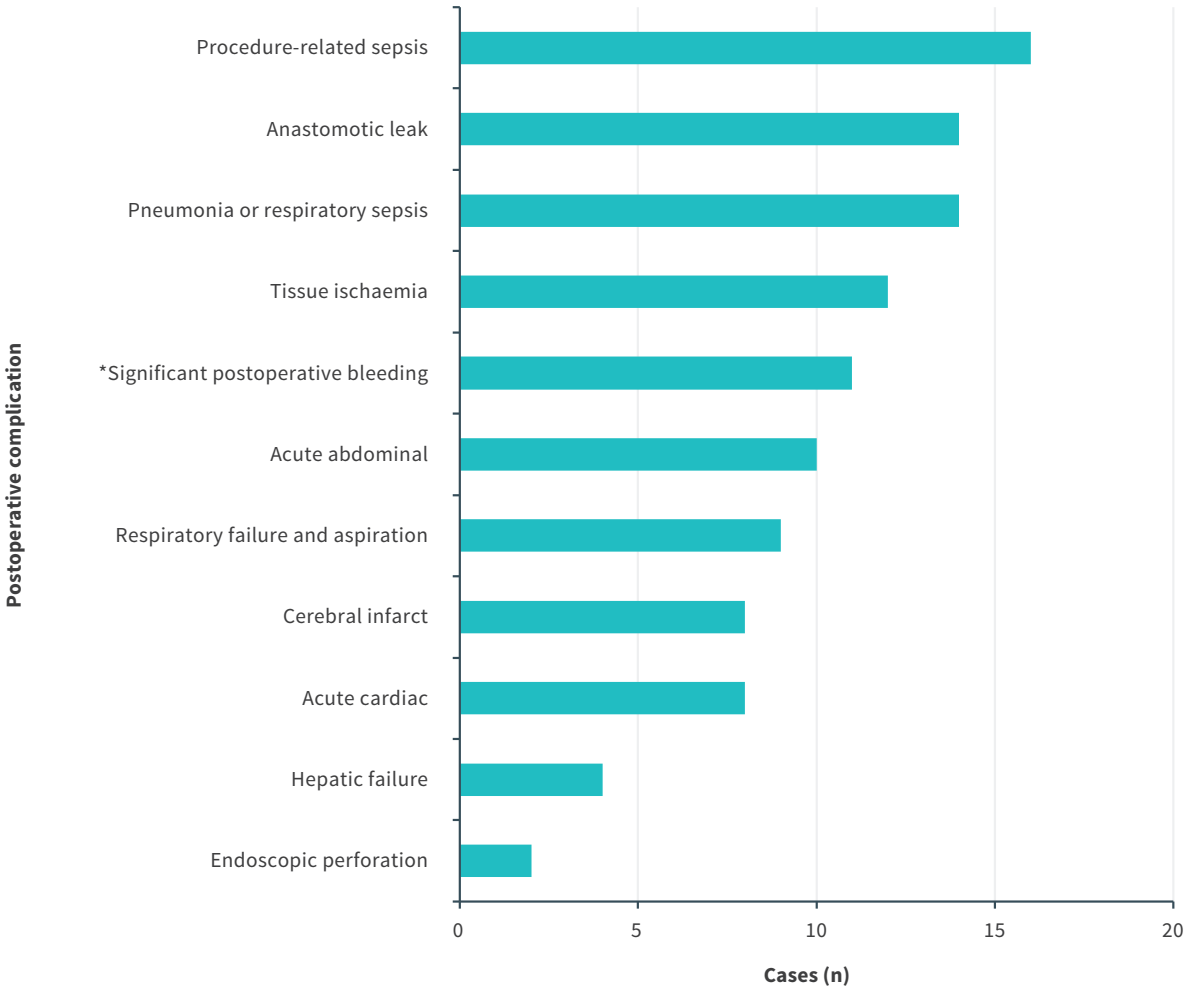


Note:
*in theatre indicates that the consultant was present in theatre but was not operating or assisting
see Appendix A Table 3.

10 Postoperative complications

Postoperative complications are considered a major contributor to mortality in surgical patients. Treating surgeons reported that a postoperative complication occurred in 30.3% (112/370, missing data n=1) of operative cases. This comprised a total of 130 complications among 112 patients. Figure 8 shows the frequency of specific postoperative complications. The most frequently occurring postoperative complications were procedure-related sepsis, anastomotic leak and pneumonia or respiratory sepsis.

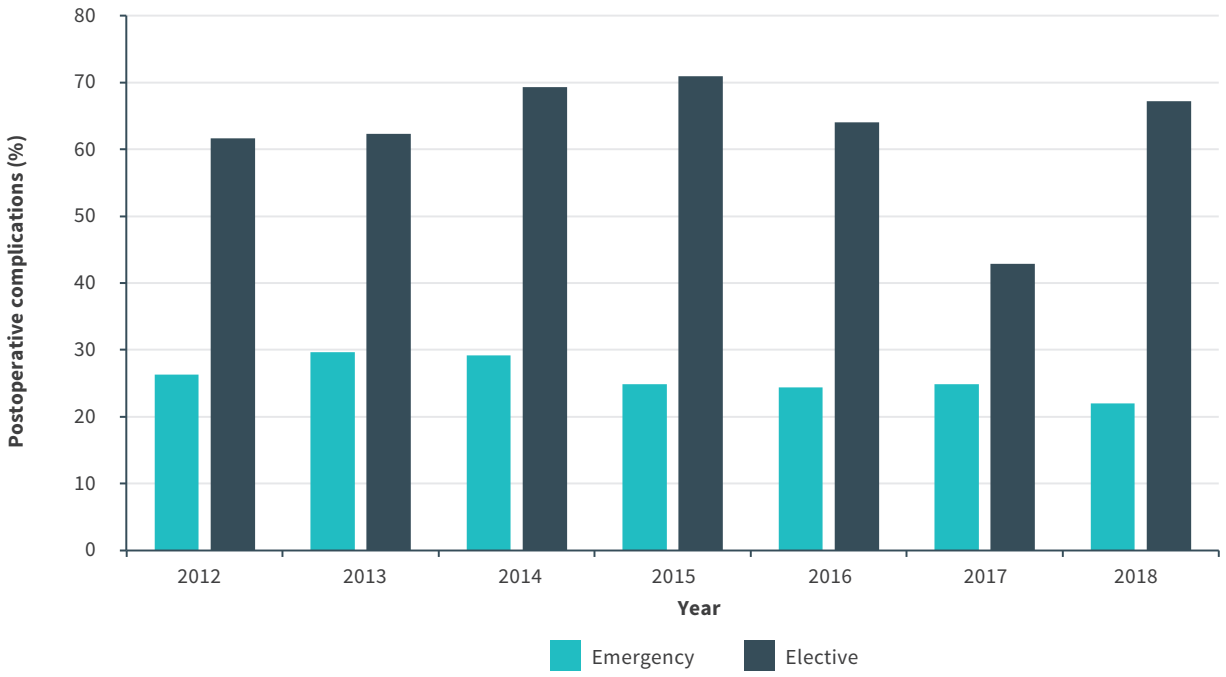
Figure 8: Postoperative complications identified by the treating surgeon 2018 (n=369)



Note:
Each case can have more than one postoperative complication. Missing data: n=2
Complications in 'other' category not shown (n=10).

Postoperative complications were three times more likely for elective admissions compared with emergency admissions (67.2%; 45/67 vs. 22.0%; 66/300, missing data n=4, RR 3.06; 95% CI 2.33 to 4.00). This is consistent with previous years (Figure 9). The lower rate of postoperative complications among emergency patients may be related to their poorer state of health on admission. The proportion of emergency patients who had an ASA score of 4 or higher was 65.1% (233/358), compared with 46.3% (31/67) for elective patients (missing data n=50). This suggests that emergency patients were already at higher risk of rapid deterioration because of their comorbidities. In contrast, elective patients were healthier and had more time in hospital during the last admission (median stay of 15 days compared with 8 days for emergency patients). Elective patients were more likely to die as a consequence of a new event, which shows in the data as a specific postoperative complication.

Figure 9: Postoperative complications by admission status and audit period, 2012 to 2018 (n=2,558)



Note: see Appendix Table 4. Missing data: n=35

11 Infections

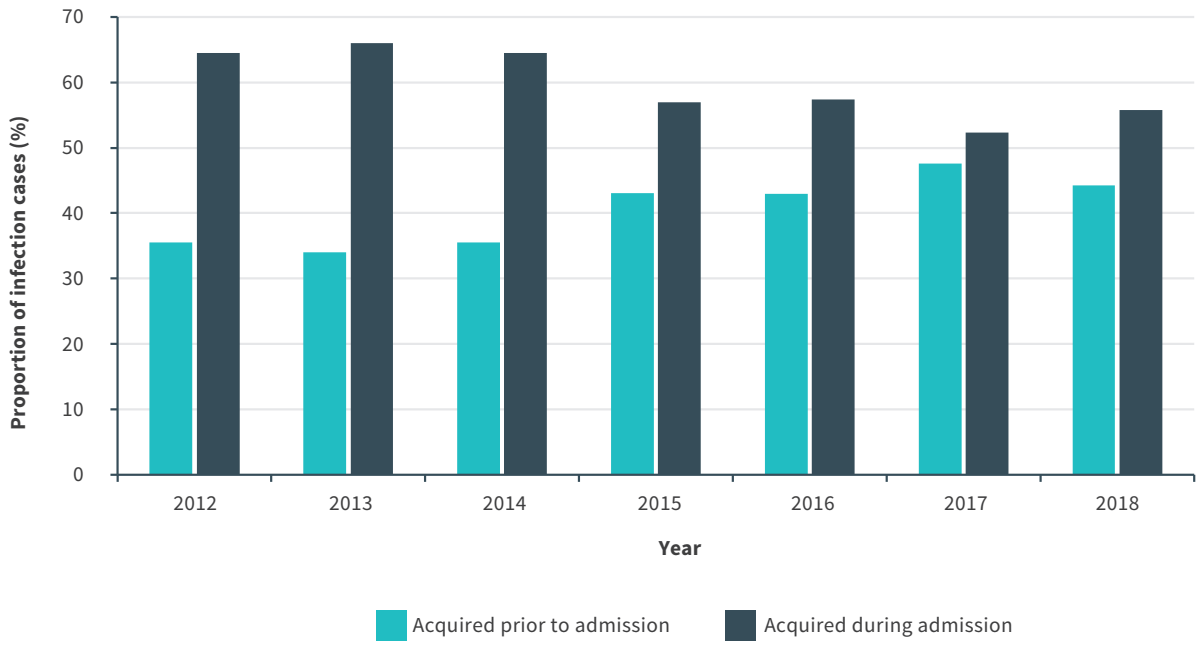
The audit began collecting data on clinically significant infections in 2012. More than one-third of patients were reported as having died with a clinically significant infection in 2018 (37.8%, 179/474, missing data n=5), which is a similar proportion to previous years. The types of infection are shown in Table 2.

Table 2: Type of clinically significant infection reported in 2018

Infection type	Number of cases (proportion of infections (%)
Pneumonia	73 (40.8)
Septicaemia	43 (24.0)
Intra-abdominal sepsis	37 (20.7)
Other source*	26 (14.5)
Total	**179 (100)**

There has been a decrease in the proportion of infections acquired during admission (Figure 10). This is largely due to the number of hospital acquired infections declining whereas the number of pre-admission infections has remained relatively stable.

Figure 10: Proportion of infections acquired prior to or during admission, 2012 to 2018



Note: see Appendix Table 5.

The timing of infections acquired during admission is shown in Table 3. Surgical site infections comprised 11.8% (11/93) of infections acquired during admission in 2018, which is an increase from 4.6% (4/87) in 2017. In cases in which there was an infection, the treating surgeon reported that the antibiotic regime was appropriate in 99.4% (168/169, unknown=8, missing data=3) of cases.

Table 3: Timing of infections acquired during admission 2018

Infection timing	Number of cases (proportion of total infections acquired during admission %)
Acquired postoperatively	63 (67.7)
Acquired preoperatively	13 (14.0)
Surgical site infection	11 (11.8)
Other invasive site infection	6 (6.5)
Total	**93 (100)**

Note: missing data: n=4

12 Clinical management issues identified by assessors

For each case reported to SAASM, the first-line assessor was asked to identify and describe any clinical management issues. In 11.1% (51/458) of audited cases a more comprehensive assessment (SLA or case note review) was requested for completion by a second-line assessor. An SLA occurs when the first-line assessor considers that insufficient information was provided on the SCF, or there were factors that warranted further investigation. The SLA is used in this analysis for cases that underwent both FLA and SLA.

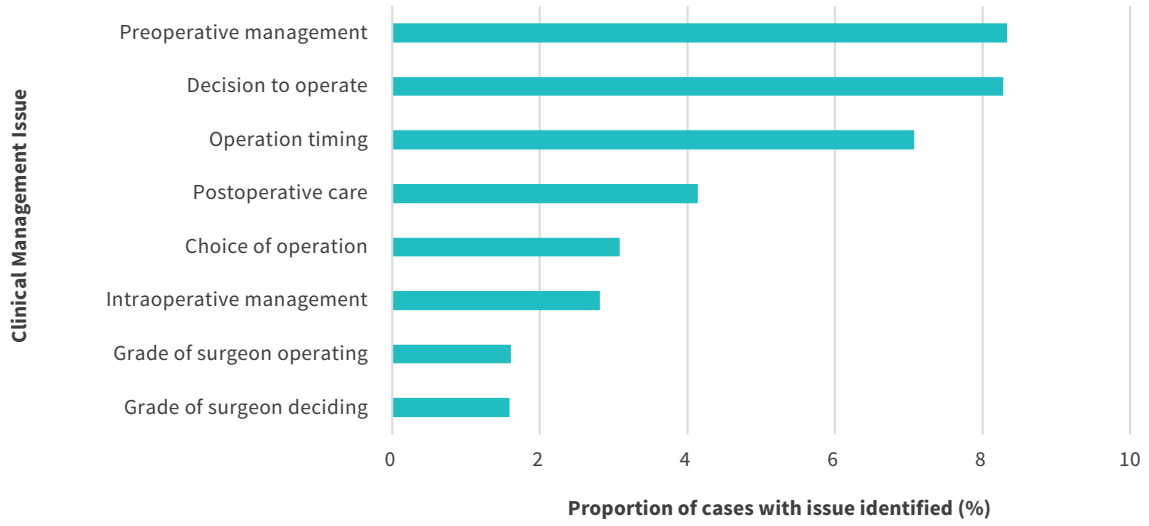
Clinical management issues are identified by assessors in two ways:

1. by indicating (yes or no) whether there were any concerns about specific categories of patient management (operative cases only)
2. by identifying and describing any perceived deficiencies of care in the management of the patient (both operative and nonoperative cases).

Clinical management issues associated with operative cases

Surgical assessors were asked to identify any management issues in the categories shown in Figure 11. 'Preoperative management' was one of the clinical management issues most frequently identified. This issue was identified less frequently among operative cases in 2018 (8.3%, 27/324, missing data = 1, answer 'not applicable [N/A]' n=8) compared with 2017 (11.6%, 32/276, missing data n=3, answer 'N/A' n=4). Another frequently identified issue among operative cases was 'decision to operate', identified in 8.3% (27/326, missing data n=1, answer 'N/A' n=6) of cases in 2018 and 10.0% (28/279, missing data n=1, answer 'N/A' n=3) in 2017. Figure 11 shows the frequency of each of the different issues.

Figure 11: Clinical management issues identified by assessors in operative cases 2018



Note: where the assessor noted that an issue was 'not applicable', this has been excluded from the Figure. See Appendix Table 6.

Clinical management issues associated with all cases

Assessors are asked to identify any areas of care that could have been better. Complications can occur with all treatments, but only those that are due to aspects of patient management (rather than the disease process) are considered in this section. It should also be noted that SAASM records all clinical management issues relating to the final admission, not only those relating to surgical care. Assessors are asked to attribute responsibility for the clinical management issue, for example to the audited surgical team or another clinical team.

Assessors are asked to identify clinical management issues against the following criteria:

- ***area of consideration:*** where care could have been improved or different, but may be an area of debate
- ***area of concern:*** where care should have been better managed
- ***adverse event:*** an unintended injury, caused by medical management rather than by disease, which is sufficiently serious to lead to prolonged hospitalisation or to temporary or permanent impairment or disability of the patient, which contributes to, or causes, death.

There were no serious clinical management issues (adverse events or areas of concern) identified in 93.8% (408/435) of cases that completed the audit cycle in 2018. For these patients, death was due either to the disease process or to complications that were unavoidable given the presence of serious comorbidities.

The proportion of cases in which areas of concern or adverse events were identified in 2018 (6.2%, 27/435) was lower than the proportion in 2017 (7.9%, 39/493). Table 4 shows the number of clinical management issues identified in each category in 2018. It should be noted that, at the time of analysis, not all cases had completed the audit process; the number of issues may increase after all cases have been fully audited.

Table 4: Total number of clinical management issues

Clinical management issue	Number of issues
Area of consideration	48
Area of concern	27
Adverse event	9
Total	**84**

Note: cases can have more than one issue.

The surgical team was considered responsible, either solely or partially, for 72.2% (52/72, missing data n=12) of the clinical management issues (some issues were associated with more than one team). An overview of the attribution of responsibility for clinical management issues is provided in Table 5.

Table 5: Responsible unit associated with areas of consideration, concern and adverse events

	Assoication*			
Clinical management issue	**Surgical unit**	**Another clinical unit**	**Hospital**	**Other**
Area of consideration	30	15	3	3
Area of concern	17	9	1	4
Adverse event	5	2	2	1
Total	**52**	**26**	**6**	**8**

Note:*Some clinical management issues were associated with more than one team. Missing data: n=12

Areas of consideration

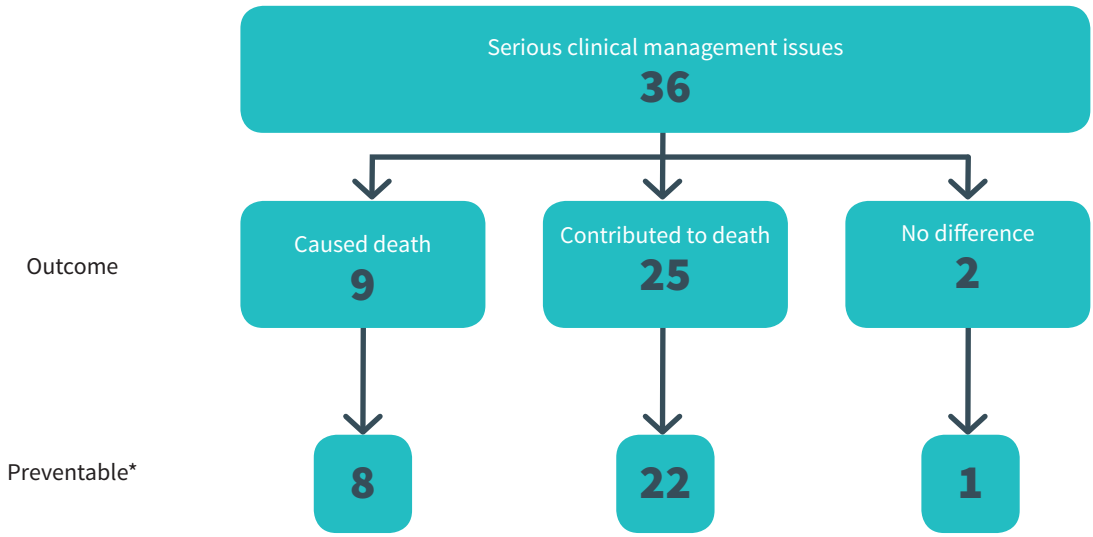
The majority of areas of consideration were in the preoperative period. The most frequently identified areas were:

- decision to operate (n=13)
- delay to surgery (n=6)
- inadequate preoperative assessment / diagnosis (n=6)
- different operation desirable (n=5).

Serious clinical management issues

Assessors were asked whether the identified issue caused or contributed to the patient's death and whether it could have been prevented. Of the 36 most serious issues (those categorised as areas of concern or adverse events), 94.4% (34/36) were assessed as having caused or potentially contributed to the death of the patient, and of those issues, 88.2% (30/34) were considered preventable. An overview of the outcome and preventability of serious clinical management issues is provided in Figure 12.

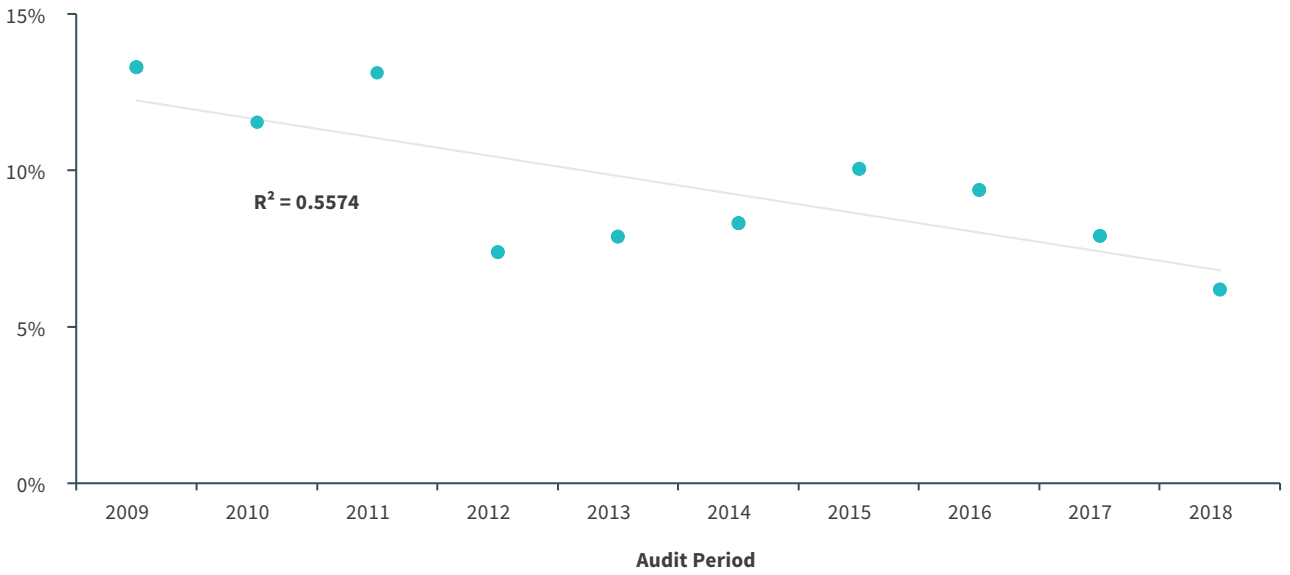
Figure 12: Outcome and preventability of serious clinical management issues (as viewed by assessor) 2018



*Categorised by assessor as probably or definitely preventable

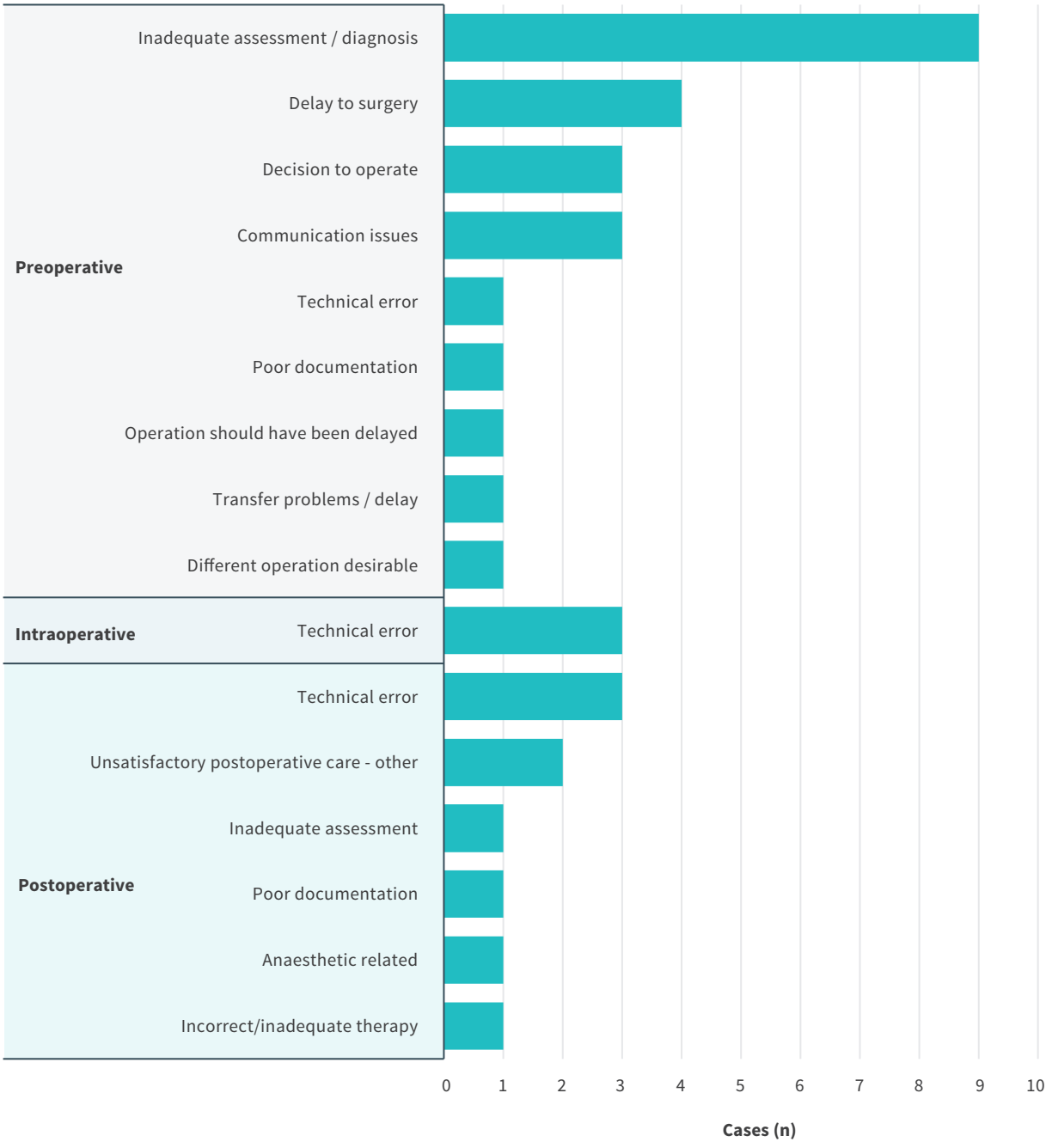
Since the audit commenced in 2005, there has been a reduction in the proportion of cases with serious clinical management issues. Figure 13 shows a decreasing trend over time.

Figure 13: Cases with a serious clinical management issue by audit period, 2009 to 2018



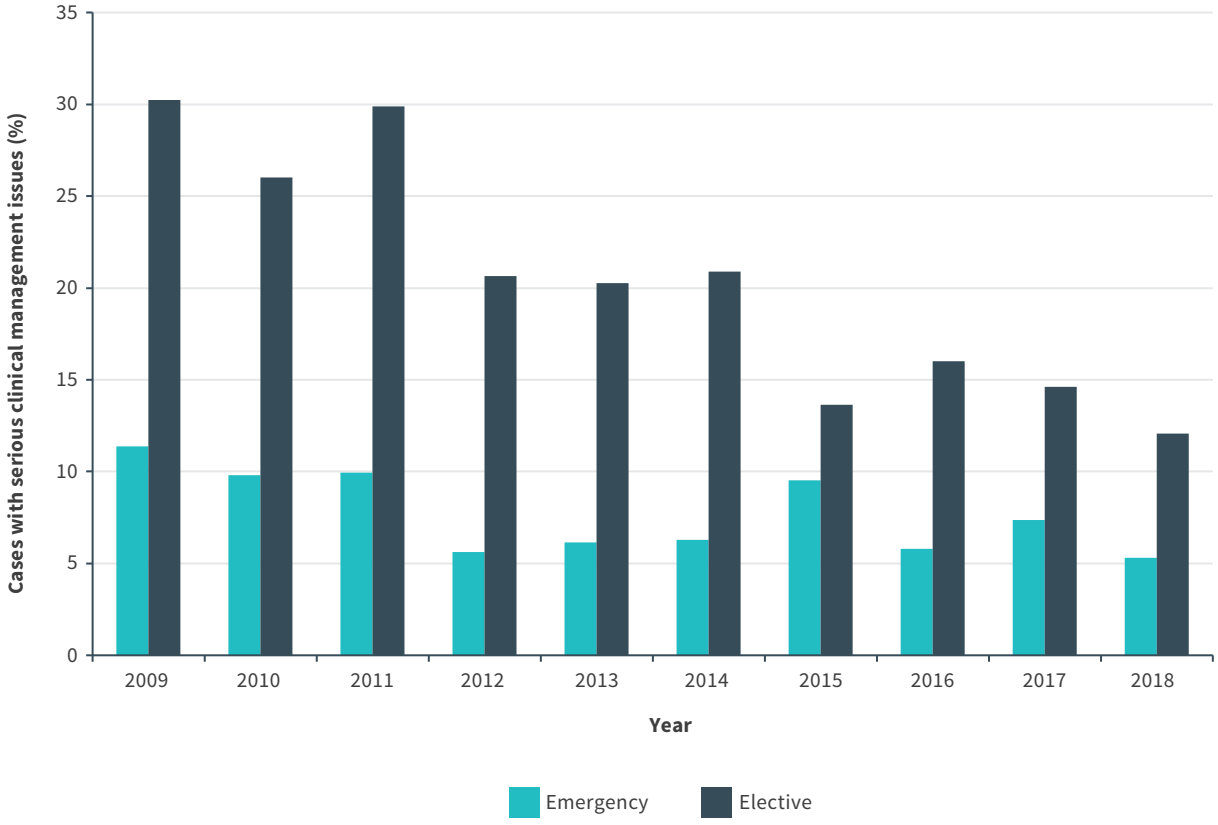
Note: see Appendix Table 7.

Figure 14: Serious clinical management issues (areas of concern and adverse events) identified by assessors 2018 (n=36)



The type and frequency of serious clinical management issues are shown in Figure 14. Issues at the preoperative stage were the most commonly reported.

Figure 15: Serious clinical management issues by admission status and year, 2009 to 2018



Note: see Appendix Table 8.

Serious clinical management issues were identified more than twice as often in elective admissions compared with emergency admissions (12.1%, 7/58 vs. 5.3%, 20/377; RR 2.28; 95% CI 1.01 to 5.14), and this is consistent with previous years (Figure 15). As described in section 10, this may be related to emergency patients being in poorer health and having a slightly shorter time in hospital prior to death, reducing the possibility for the occurrence of a serious clinical management issue.

13 Progress update

A number of recommendations were contained in the 2017 Annual Report and a summary of the progress in implementing those recommendations is provided in Table 6. SAASM and SA Health are working together to implement the recommendations.

Table 6: Implementation of 2017 Annual Report recommendations: progress update

Recommendations	Progress
PATIENT CARE	
Surgeons should be expected to undertake comprehensive clinical assessments preoperatively, including clear documentation of risks and patient preferences (particularly in relation to end of life treatment).	In progress. Recommendation discussed at Action Plan meeting between SAASM and SA Health, February 2018.
Surgeons and other clinicians should carefully consider whether patients would benefit from admission to a critical care unit.	In progress. Recommendation discussed at Action Plan meeting between SAASM and SA Health, February 2018.
The most common postoperative complication was 'significant postoperative bleeding'. Reducing the impact of this complication requires increased vigilance in the postoperative period to ensure early detection.	In progress. Recommendation discussed at Action Plan meeting between SAASM and SA Health, February 2018.
The high risk of infection among comorbid surgical patients is an ongoing issue. Adherence to protocols and guidelines, such as the Australian Guidelines for the Prevention and Control of Infection in Healthcare, is essential to ensure best practice.	In progress. Recommendation discussed at Action Plan meeting between SAASM and SA Health, February 2018.
IMPROVED LEADERSHIP AND COMMUNICATION	
Communication failures have been identified in association with clinical handover and inter-hospital transfers, and between junior and senior clinicians. There should be a continued focus on standardisation and systematisation of communication processes to minimise errors.	In progress. Recommendation discussed at Action Plan meeting between SAASM and SA Health, February 2018.
Consultation with senior surgeons is essential when dealing with important decisions and unexpected complications.	In progress. Recommendation discussed at Action Plan meeting between SAASM and SA Health, February 2018.
Surgeons are encouraged to discuss valuable assessor feedback, audit findings and recommendations with surgical colleagues and at relevant meetings.	In progress. Recommendation discussed at Action Plan meeting between SAASM and SA Health, February 2018.

IMPROVING THE AUDIT	
Increase the return rate of surgical case forms (SCFs) with the aim of reaching 100% compliance (from 89% in 2017). This requires timely reporting of surgical mortality by hospitals and monitoring of non-compliance by CPD.	A higher SCF return rate was achieved for 2018 cases (97%). The return rate should continue to increase with SAASM participation now being a mandatory component of both RACS and Australian Orthopaedic Association continuing professional development programs.
Encourage self reporting by surgeons either directly or through mortality and morbidity meetings of surgical departments.	SAASM staff have met with representatives of all of the Local Health Networks covering metropolitan Adelaide to (1) discuss the importance of surgeons reporting their own cases and (2) request assistance with promoting and encouraging self-reporting. The self-reporting option has been promoted, and the process described, in SAASM newsletters distributed to all SA Fellows.
Contribute to educational activities to inform and promote discussion about transfer issues.	In September 2019, SAASM presented a symposium entitled 'Navigating safe patient transfer – What can go wrong?'. The seminar was in the form of a panel discussion with input from surgery, nursing and transfer services. For the first time, this seminar was held in a regional location – Port Lincoln.

14 A closer look: The value of surgical research and innovation

Throughout the history of surgery, research and innovation have been at the forefront of improving patient outcomes. Often the significance of a research project is not realised when original protocols are developed, and it is only years later that the benefits of translating research into practice can be seen. Looking back at the past, we can see just how much some discoveries have changed practice and how fundamental they are in patient care today.

Current practice in hospitals today would appear incredibly foreign to a surgeon who practised 200 years ago. Prior to the development of anaesthetics, speed was one of the most important factors contributing to a successful procedure. Surgeons were often timed by spectators in the operating theatre gallery, with an above-the-knee amputation taking as little as 25 seconds from incision to wound closure. Procedures were limited to trephining, amputation and removing external tumours as the pain of any other procedure was too much for the patient. Surgery was considered a lifesaving but horrific ordeal. Anaesthetic gases changed the nature of surgery with ether gas being used to render a patient unconscious and allow for more invasive and methodical procedures.

Prior to 1865, sepsis from infected wounds ran rife through surgical wards with miasma or 'bad air' thought to be the cause. This all changed when Joseph Lister became aware of research on food spoilage in anaerobic conditions by French chemist, Louis Pasteur. Lister took this research and began to experiment with developing antiseptic techniques for wounds, finding success following the discovery of phenol, also known as carbolic acid, by Friedlieb Ferdinand Runge. Lister introduced improvements in sterilisation of equipment and handwashing within his own hospital and news of his successful outcomes soon led to the adoption of more widespread changes in practice. Gone were the days of stains on unwashed operating gowns being a display of experience; instead, sterile operating theatres and the development of better surgical tools became the norm.

Another major innovation in modern surgery began in 1895, when Wilhelm Roentgen was testing the effects of cathode rays passing through glass. One test involved having the glass tubes covered in heavy black paper and Roentgen was surprised to discover that the rays passed through the paper. Further experimentation showed that the light would pass through most substances including human tissue but leave shadows of more solid substances. News of his discoveries spread quickly, and the unknown rays referred to as 'x-rays' soon found an important clinical application. This provided surgeons with the first opportunity to see inside a patient prior to surgery and transformed the care of many patients including those with fractures and gunshot wounds, and eventually led to the development of computed tomography (CT) and magnetic resonance imaging (MRI).

While the earliest surgical research was largely limited to the publication of case reviews, today clinical research and the development of new and improved practices and technologies are recognised and valued as an essential component of high-quality healthcare. From biomedical engineers who develop new devices to epidemiologists involved in evaluating patient outcomes, many professions play a role in this research. Collaborations not only within our hospitals but also between universities, not-for-profits and other industries can be instrumental in facilitating innovative research.

Innovation is key to improving surgical outcomes and this relies on a high level of involvement across a range of clinical specialties. Leaders in healthcare play an important role in encouraging clinical research through favourable policies and initiatives. Surgeons have the opportunity to mentor surgical researchers of the future and universities can contribute through an increased focus on teaching research methodologies. Audits like SAASM could have a greater role in informing research priorities by identifying the most common areas where there are gaps between best evidence and practice. The next major surgical innovations may be unknown, but with each study we move one step closer to their discovery.

15 Acknowledgements

Sasha Stewart, Eloise Spooner and Nathan Procter from the SAASM team at the Royal Austalian College of Surgeons (RACS) authored this report. Valuable guidance, advice and assistance were provided by Helena Kopunic and Wendy Babidge.

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The Department for Health and Wellbeing, Safety and Quality Unit funds this project, the SAASM team acknowledges the valuable commitment and support from the department.

Appendix A: Data tables

Table 1: Number of notified cases and SCF returned by year

Year	SCF returned	Excluded - terminal care	SCF pending	Total
2012	568	57	5	630
2013	582	45	1	628
2014	504	76	6	586
2015	487	89	8	584
2016	478	118	2	598
2017	498	98	3	599
2018	479	95	20	594
2012-2018	**3596**	**578**	**45**	**4219**

Table 2: Proportion of operative cases with an unplanned return to theatre, 2012 to 2018 (n=2,586)

Year	Unplanned return to theatre (n)	Total operative cases (n)	Unplanned return to theatre (%)
2012	74	394	18.8
2013	80	404	19.8
2014	72	350	20.6
2015	66	361	18.3
2016	61	348	17.5
2017	46	359	12.8
2018	62	370	16.8
2012-2018	**461**	**2586**	**17.8**

Table 3: Consultant involvement in operations 2018

Consultant involvement	Yes	No	Proportion (%)
Consultant in theatre*	18	503	3.5
Consultant assisted	25	496	4.8
Consultant operated	329	192	63.1
Consultant decided	486	35	93.3

Note:
more than 1 category can be selected per operation.
* in theatre indicates that the consultant was present in theatre but was not operating or assisting

Table 4: Postoperative complications by admission status and audit period, 2012 to 2018 (n=2,558)

Year	Admission status	Postoperative complication (n)		Total (n)	Proporation (%)
		Yes	No		
2012	Elective	37	23	60	61.7
	Emergency	88	247	335	26.3
	Total	**125**	**270**	**395**	**31.6**
2013	Elective	43	26	69	62.3
	Emergency	98	232	330	29.7
	Total	**141**	**258**	**399**	**35.3**
2014	Elective	43	19	62	69.4
	Emergency	82	199	281	29.2
	Total	**125**	**218**	**343**	**36.4**
2015	Elective	44	18	62	71
	Emergency	73	220	293	24.9
	Total	**117**	**238**	**355**	**33**
2016	Elective	41	23	64	64.1
	Emergency	68	211	279	24.4
	Total	**109**	**234**	**343**	**31.8**
2017	Elective	18	24	42	42.9
	Emergency	78	236	314	24.8
	Total	**96**	**260**	**356**	**27**
2018	Elective	45	22	67	67.2
	Emergency	66	234	300	22
	Total	**111**	**256**	**367**	**30.2**

Table 5: Proportion of infections acquired prior to or during admission, 2012 to 2018

Year	Infection acquired	Number (n)	Proportion (%)
2012	Prior to admission	70	35.5
	During admission	127	64.5
	Total	**197**	**100**
2013	Prior to admission	67	34
	During admission	130	66
	Total	**197**	**100**
2014	Prior to admission	70	35.5
	During admission	127	64.5
	Total	**197**	**100**
2015	Prior to admission	81	43.1
	During admission	107	56.9
	Total	**188**	**100**
2016	Prior to admission	66	42.6
	During admission	89	57.4
	Total	**155**	**100**
2017	Prior to admission	80	47.6
	During admission	88	52.4
	Total	**168**	**100**
2018	Prior to admission	77	44.3
	During admission	97	55.7
	Total	**174**	**100**

Table 6: Clinical management issues identified by assessors in operative cases 2018

Clinical Management Issue	Yes	No	Total	Proportion (%)
Decision to operate	27	299	326	8.3
Preoperative management	27	297	324	8.3
Operation timing	23	302	325	7.1
Postoperative care	13	301	314	4.1
Choice of operation	10	314	324	3.1
Intraoperative management	9	311	320	2.8
Grade of surgeon deciding	5	310	315	1.6
Grade of surgeon operating	5	306	311	1.6

Table 7: Cases with a serious clinical management issue by audit period, 2009 to 2018

Year	Cases with serious CMIs (n)	Total audited cases (n)	Proportion of cases with serious CMIs (%)
2009	62	466	13.3
2010	49	424	11.6
2011	68	518	13.1
2012	42	568	7.4
2013	46	582	7.9
2014	42	504	8.3
2015	49	487	10.1
2016	45	479	9.4
2017	39	492	7.9
2018	27	435	6.2
2009-2019	290	3547	8.2

CMI — clinical management issues

Table 8: Serious clinical management issues by admission status and year, 2009 to 2018

Year	Admission status	Serious clinical management issue(s)			
		Yes	No	Number (n)	Proportion (%)
2009	Elective	13	30	43	30.2
	Emergency	47	366	413	11.4
	Total	**60**	**396**	**456**	**13.2**
2010	Elective	13	37	50	26
	Emergency	36	331	367	9.8
	Total	**49**	**368**	**417**	**11.8**
2011	Elective	26	61	87	29.9
	Emergency	42	381	423	9.9
	Total	**68**	**442**	**510**	**13.3**
2012	Elective	13	50	63	20.6
	Emergency	28	471	499	5.6
	Total	**41**	**521**	**562**	**7.3**
2013	Elective	16	63	79	20.3
	Emergency	30	458	488	6.1
	Total	**46**	**521**	**567**	**8.1**
2014	Elective	14	53	67	20.9
	Emergency	27	402	429	6.3
	Total	**41**	**455**	**496**	**8.3**
2015	Elective	9	57	66	13.6
	Emergency	39	371	410	9.5
	Total	**48**	**428**	**476**	**10.1**
2016	Elective	8	42	50	16
	Emergency	22	357	379	5.8
	Total	**30**	**399**	**429**	**7**
2017	Elective	6	35	41	14.6
	Emergency	33	416	449	7.3
	Total	**39**	**451**	**490**	**8**
2018	Elective	7	51	58	12.1
	Emergency	20	357	377	5.3
	Total	**27**	**408**	**435**	**6.2**

Appendix B

FIGURES

TABLES

SAASM
South Australian Audit of Surgical Mortality

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