

The South Australian Audit of Surgical Mortality (SAASM)

2015 - 2016 REPORT

For the Period:
1st January 2015 to 31st December 2016



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).

CHAIRMAN'S REPORT

This is the sixth Annual Report that I have supervised. As I have reviewed this annual report I have looked at what has been achieved by the SA Audit of Surgical Mortality in that time. Six years ago we were concerned about the level of participation that was around 80%. Now we are concerned about the remaining 2% of cases that have not had a completed surgical case form. The requirement for surgeons to be involved in the audit as a part of their CPD requirements has been a major step.

The involvement of the gynaecologists on a voluntary basis and orthopaedic surgeons as a part of their required CPD has been a major event. Cooperation with the anaesthetic audit has also been significant for both the RACS and ANZCA.

At an early stage in the audit we were concerned that not all hospitals were involved in the audit process. How things have changed - 100% of hospitals, both public and private, have been involved for several years.

As the data has accumulated we have been able to start using it for analysis. In the last 2 years journal articles have been published on neurosurgical deaths and written on urology deaths and vascular deaths. In addition papers are in the process of development on ASA grading, clinical leadership, spinal surgical deaths, laparoscopy deaths and upper GI malignancy deaths. Staff of SAASM are also actively involved in cooperation with other audits for scientific papers in many fields.

Glenn McCulloch FRACS

South Australian Audit of Surgical Mortality Clinical Director and Chairman

SHORTENED FORMS

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
CI	confidence interval
CT	computed tomography
DVT	deep vein thrombosis
FLA	first-line assessment
QP	qualified privilege
RACS	Royal Australasian College of Surgeons
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RR	risk ratio
SAAMC	South Australian Anaesthetic Mortality Committee
SAASM	South Australian Audit of Surgical Mortality
SCF	surgical case form
SLA	second-line assessment

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EXECUTIVE SUMMARY

The SAASM is an external, independent, peer-reviewed audit of the process of care associated with surgically-related deaths in South Australia.



97%
Surgeons

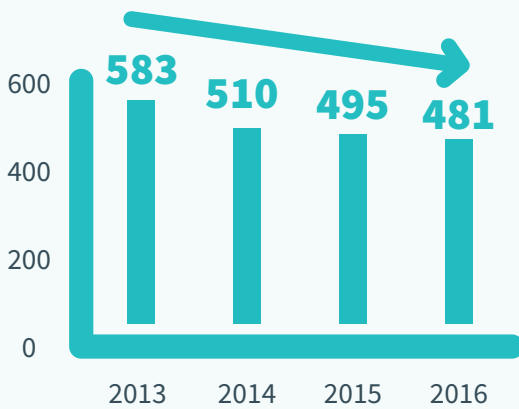
Participation



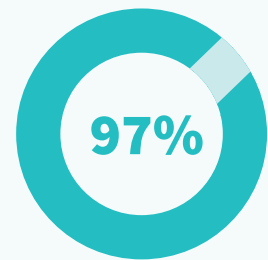
100%
Public Hospitals

100%
Private Hospitals

Surgical deaths*
*non-terminal care



Analysis & Audit Numbers



Return of surgical case forms
(1141 of 1182)



52%:48%
Male: Female

Risk Profile



87%

of audited deaths occurred in patients admitted as emergencies with acute life threatening conditions



Ages

Mean age of 80, ranged from 3 months to 101 years



91%

of patients had one or more significant coexisting illness



73%
of patients
underwent a
surgical procedure



18%
of the surgery patients
had an unplanned
return to the operating
theatre because of
complications



72%
of operations the
consultant was
present in theatre

32%
of operative patients
had postoperative
complications,
Most commonly:
1. postoperative
bleeding
2. anastomotic leak
3. tissue ischaemia

Patient Transfers

27% > **14%**
of patients were
transferred
between hospitals



14%
of transfers had issues of
concern, most commonly:
• delays
• inappropriate transfers
• insufficient clinical
information



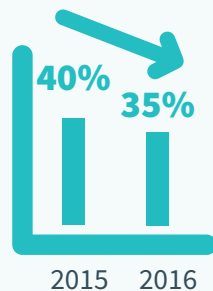
Diagnosis
6% of cases had a delay in diagnosis



Critical care units

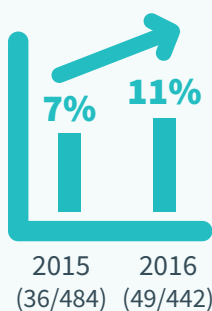
66% > **9%**
of patients
were admitted to
a CCU
of the non-CCU
patients would
have benefited from
CCU (according to
assessors)

Cases with
clinically
significant
infections



DVT prophylaxis
1%
DVT use or non-use considered inappropriate (by assessors)

Cases referred
for second line
assessment (SLA)



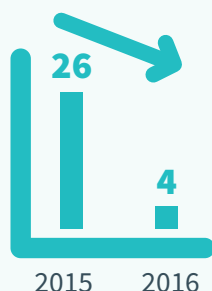
71%
of clinical management issues identified by assessors were
attributed (solely or partially) to the surgical team



Cases with
serious clinical
management issues

Year	Percentage	Count
2015	10%	49/482
2016	7%	30/432

Cases with adverse
event (most serious
category)



The most common criticisms made by assessors:
1. decision to operate 2. delay to surgery
3. inadequate assessment and/or diagnosis

Recommendations to surgeons and hospitals....



Patient care

- Surgeons should be expected to undertake comprehensive clinical assessments preoperatively, including clear documentation of risks and patient preference.
- Surgeons and other clinicians should carefully consider whether patients would benefit from admission to a critical care unit.
- The most common postoperative complication identified was 'significant postoperative bleeding'. This requires increased vigilance in the postoperative period to ensure early detection of this complication.
- The high risk of infection among comorbid surgical patients is an ongoing issue. Adherence to protocols and guidelines for best practice is essential, e.g. the Australian Guidelines for the Prevention and Control of Infection in Healthcare.



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 and systematisation of communication processes to minimise errors.
- Consultation with senior surgeons is essential when dealing with important decisions and unexpected complications.
- Surgeons are encouraged to share valuable assessor feedback and audit findings and recommendations with surgical colleagues. The findings and recommendations should be discussed at relevant meetings.

Recent and upcoming reports / activities



10th National Case Note Review Booklet from the ANZASM
Theme: Clinical leadership



RACS Annual Scientific Congress in Adelaide
SAASM contribution to the Quality & Safety Section and presentation of research



11th National Case Note Review Booklet from the ANZASM
Theme: Trauma



Individual Surgeons Reports to all participating SA surgeons



Seminar:
Nobody told me:
Poor communication kills

THANK YOU

to all participants & supporters

RECOMMENDATIONS AND KEY POINTS

Reduction in surgical deaths and clinical management issues

- Since 2013 there has been a consistent downward trend in the number of surgical deaths (excluding terminal cases), from 583 in 2013 to 481 in 2016. This corresponds with an increase in the proportion of surgical deaths identified as 'terminal care'.
- The increase in the proportion of patients treated with a palliative approach could reflect an increasing awareness of end of life issues and patient preferences. In recent years, the educational activities run by the South Australian Audit of Surgical Mortality (SAASM) have focused on issues such as the decision to operate (including decision-making tools and reducing futile care) and end of life issues including Advance Care Directives.
- There has also been a considerable reduction in the proportion of surgical deaths with serious clinical management issues identified by assessors, from 10.2% (49/482) in 2015 to 6.9% (30/432) in 2016. The most marked reduction has been in adverse events, the most serious category of clinical management issues. The total annual number of adverse events has decreased from 26 in 2015 to 4 in 2016. (Note: a small number of assessments from 2015 and 2016 are still in progress so the numbers may change slightly).

It is recommended that surgeons, hospitals and health departments consider the recommended actions below and establish or review their systems or processes to improve the 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).
- Surgeons and other clinicians should 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.

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 and systematisation 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.

Improving the audit

- Maintain the high return rate of surgical case forms (SCFs) with the aim of reaching 100% compliance (from 97% in 2015 to 2016).
- Identify opportunities to share assessor feedback with other (non-surgical) members of the treating surgical team, following the approved expansion of Qualified Privilege (QP) protection.
- Contribute to educational activities to inform and promote discussion about communication issues.

COMPARISON WITH NATIONAL DATA 2015 AND 2016

TABLE 1: National comparison, 2015-2016 audit periods

Area for comparison	SAASM*		ANZASM†	
	2015	2016	2015	2016
Cases	584	598	5,985	5,222
Excluded - terminal care	89	117	642	613
Closed cases	482	432	4,954	3,382
Surgeon participation	98%	97%	97%	98%
Hospital participation:				
Public	100%	100%	100%	100%
Private	100%	100%	92%	92%
Admissions:				
Emergency	86%	88%	85%	86%
Elective	14%	12%	15%	14%
Gender:				
Male	49%	56%	55%	55%
Female	51%	44%	45%	45%
Median age for males and females	78 and 81	78 and 82	76 and 81	75 and 82
ASA status ≥ 4	59%	58%	54%	58%
Admitted with one or more comorbidities	92%	91%	89%	90%
Cases with perceived risk of death considerable or expected (as perceived by the surgeon)	59%	56%	62%	62%
DVT prophylaxis use or non-use assessed as inappropriate by assessor	1.5%	0.9%	2%	2%
Issues with fluid balance	9%	9%	6%	7%
Patients who had one procedure‡	76%	77%	79%	79%
Consultant deciding to operate	89%	92%	88%	88%
Patients with unplanned return to theatre	18%	17%	15%	16%
Patients with postoperative complications	31%	33%	32%	34%
Procedures abandoned	6%	5%	5%	5%
Patients transferred	25%	29%	26%	26%
Total number of clinically significant infections	40.1%	35.0%	35.6%	32.9%
Total number of these infections acquired before admission§	43.1% (81/188)	42.6% (66/155)	41.4% (518/1,252)	42.5% (367/863)
Total number of these infections acquired after admission§	56.9% (107/188)	57.4% (89/155)	55.4% (694/1,252)	55.7% (481/863)
Request for second-line assessment	7%	11%	13%	13%
Areas of concern and adverse events	9% and 5%	8% and 1%	6% and 3%	7% and 4%

ASA: American Society of Anesthesiologists; DVT: deep vein thrombosis.

* South Australian Audit of Surgical Mortality

† Australian and New Zealand Audit of Surgical Mortality

‡ Audit patients who underwent an episode of surgery during their last admission.

§ National figures excludes New South Wales data

1. BACKGROUND

The SAASM is an external, independent, peer-reviewed audit of the process of care associated with surgically-related deaths in South Australia. The 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).

2. AUDIT PROCESS AND REPORTING CONVENTIONS

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

3. 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 process 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 a further anaesthetic assessment, in an attempt to achieve more complete capture of anaesthetic-related deaths.

4. REPORTING PERIOD

Data analysed for this report covers cases reported to the SAASM from 1 January 2015 to 31 December 2016. This report effects a transition from financial to calendar year reporting. Both 2015 and 2016 calendar years are included because the previous report, by financial year, only included cases from the first half of 2015. 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 figures in future reports may differ slightly.

5. AUDIT PARTICIPATION

All eligible public and private hospitals in South Australia currently participate in the audit (52 hospitals). This number is lower than the 53 eligible hospitals reported in 2014/15 due to one hospital no longer performing surgical procedures.

All participating hospitals have provided notifications of surgical deaths for 2015 and 2016. The majority of surgical deaths occurred in public hospitals (84.0%, 993/1,182), reflecting the higher number of complex procedures and high-risk patients treated in the public system.

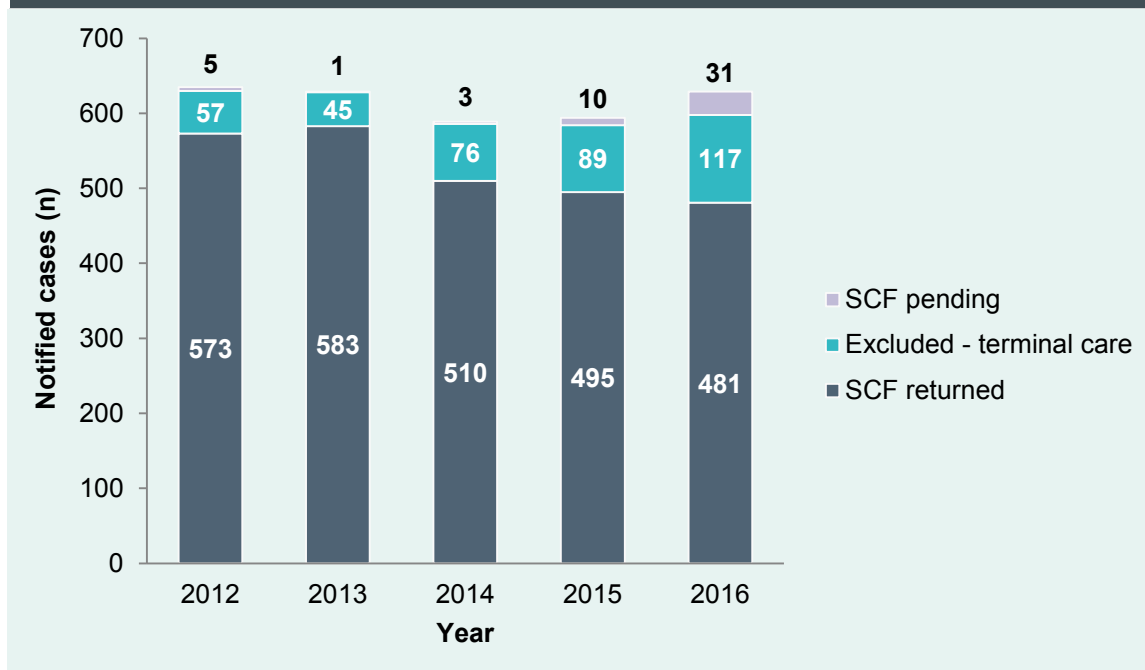
In terms of participation by South Australian surgeons, 96.5% (387/401) of practising Royal Australasian College of Surgeons (RACS) surgeons have provided signed consent to participate in the audit. There were 2 reported deaths associated with 2 of the 14 surgeons who have not yet returned a participation form.

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, 100% (9/9) of gynaecology deaths reported to the SAASM have been fully audited.

There has been an increase in the number of deaths reported to the SAASM during this reporting period (see **Figure 1**). A total of 584 deaths were reported in 2015 and 598 deaths in 2016.

As of the census date on 1 June 2017, a high proportion (96.5%, 1,141/1,182) of 2015 and 2016 SCFs had been returned. For those cases that subsequently underwent the full audit process, a large proportion of SCFs were completed by the consultant (79.1%, 740/935), with the remainder completed by a Surgical Education and Training Trainee (8.7%, 81/935), service registrar (7.7%, 72/935), Fellow (3.9%, 36/935) or International Medical Graduate (0.6%, 6/935).

FIGURE 1: Number of notified cases and SCF returned



6. ASSESSMENTS

During 2015 and 2016:

- 1,182 SCFs were sent to surgeons
- of the 1,141 cases for which the SCF was returned, 18.1% (206/1,141) were excluded because the patient was admitted for terminal care.
- Among the remaining cases, which were suitable for assessment (935),
 - 10 cases were undergoing SLA
 - 7 cases were undergoing FLA
 - 2 cases were delayed awaiting medical records
 - 2 cases required more information relating to the SCF
- The proportion of cases referred for SLA following completion of the FLA has increased during the reporting period, from 7.4% (36/484) in 2015 to 11.1% (49/442) in 2016.

7. CASES FOR ANALYSIS

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.

8. PATIENT SAMPLE DEMOGRAPHICS

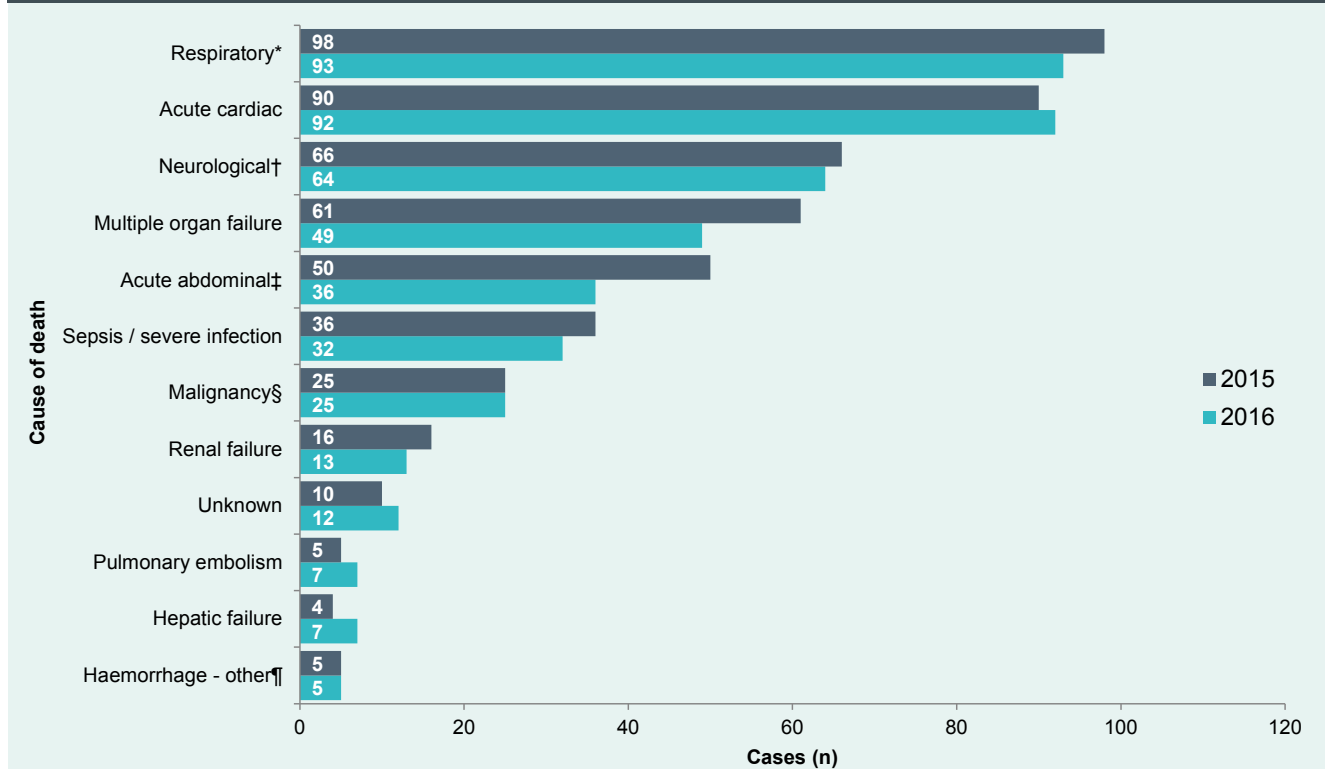
The majority of patients who died were elderly, had pre-existing health problems and were admitted as emergencies for acute life-threatening conditions. Emergency admissions accounted for 86.9% (805/926, missing data n=9) of all cases for which data were available, the remaining 13.1% (121/926) being elective admissions. The median age at death was 79.7 years (interquartile range, 68.7–87.2) and there were slightly more male patients (52.4%, 619/1,182) than female patients (47.6%, 563/1,182). **Table 2** shows the number of cases reported to the SAASM from each specialty.

TABLE 2: Number of death notifications by specialty, 2015 and 2016 (n=1,182)

Surgical specialty	Number of cases (%)	
	2015	2016
General Surgery	241 (41.3)	252 (42.1)
Orthopaedic Surgery	121 (20.7)	98 (16.4)
Neurosurgery	80 (13.7)	89 (14.9)
Vascular Surgery	61 (10.4)	61 (10.2)
Cardiothoracic Surgery	37 (6.3)	48 (8.0)
Urology	19 (3.3)	29 (4.8)
Plastic and Reconstructive Surgery	12 (2.1)	13 (2.2)
Otolaryngology Head and Neck Surgery	7 (1.2)	6 (1.0)
Gynaecology	4 (0.7)	1 (0.2)
Paediatric Surgery	2 (0.3)	1 (0.2)
Total	584 (100)	598 (100)

Of the cases in which the SCF was returned, 58.2% (492/845, missing data n=90) of patients had an American Society of Anesthesiologists (ASA) grade of 4 or higher (ASA 4 representing a severe systemic disease that is a constant threat to life), while 91.3% (852/933, missing data n=2) had at least one significant comorbidity that increased the risk of death. The most frequently occurring comorbidities were cardiovascular problems (62.7%, 585/933), advanced age (55.4%, 517/933) and respiratory disease (32.6%, 304/933) and these were reflected in the most common causes of death: respiratory and cardiac failure (see **Figure 2**). These figures represent the proportion of cases in which the patient was reported as having the comorbidities. Note that each case can list more than one comorbidity.

FIGURE 2: Frequency of reported causes of death (n=935)



Note: cause of death included if reported for five or more cases.

* 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.

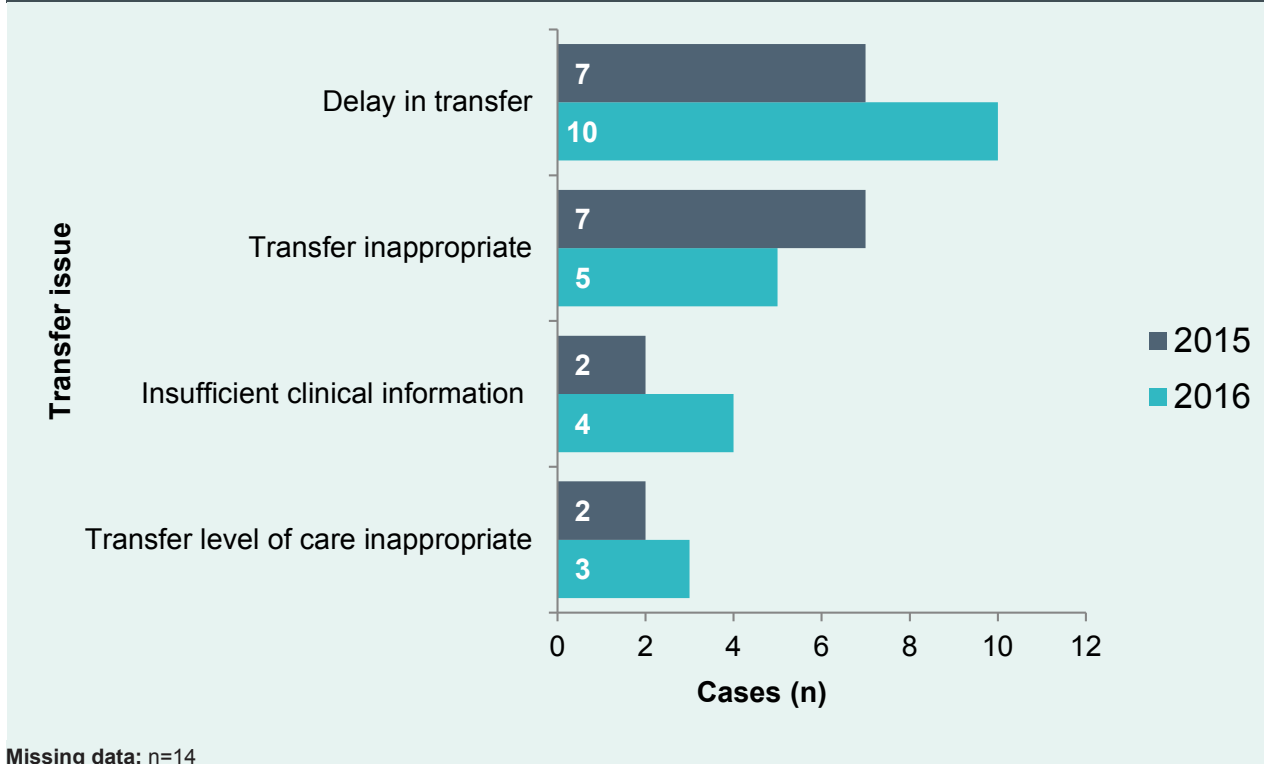
§ Malignancy (all areas of the body including abdominal) has been classed as a separate category.

¶ Non-abdominal

9. TRANSFERS

Treating surgeons reported that preoperative transfer between hospitals occurred in 26.8% (248/926, missing data n=9) of audited cases. Such 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 14.1% (33/234, missing data n=14) of transferred cases, issues relating to patient care were identified. **Figure 3** shows the frequency of each type of transfer issue. The most frequently reported issue among transferred cases was 'delay in transfer' (7.3%, 17/234). Some cases had more than one transfer issue.

FIGURE 3: Transfer issues identified by treating surgeon, 2015 and 2016 (n=234)



10. 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 65.5% (612/934, missing data n=1) 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 increased during this reporting period, from 7.7% (12/156, missing data n=5, answer 'not applicable' n=1) in 2015 to 11.7% (14/120, missing data n=4) in 2016.

DVT prophylaxis: treating surgeons reported that DVT prophylaxis was used in 77.1% (709/920, missing data n=15) of cases. In most of the cases in which DVT prophylaxis was not used, there was an active decision to withhold it or it was not considered appropriate (98.0%, 197/201, missing data n=10). In the remaining 2.0% (4/201) of cases prophylaxis was not considered. In 0.5% (5/910) 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 0.7% (6/910, missing data n=4) of cases.

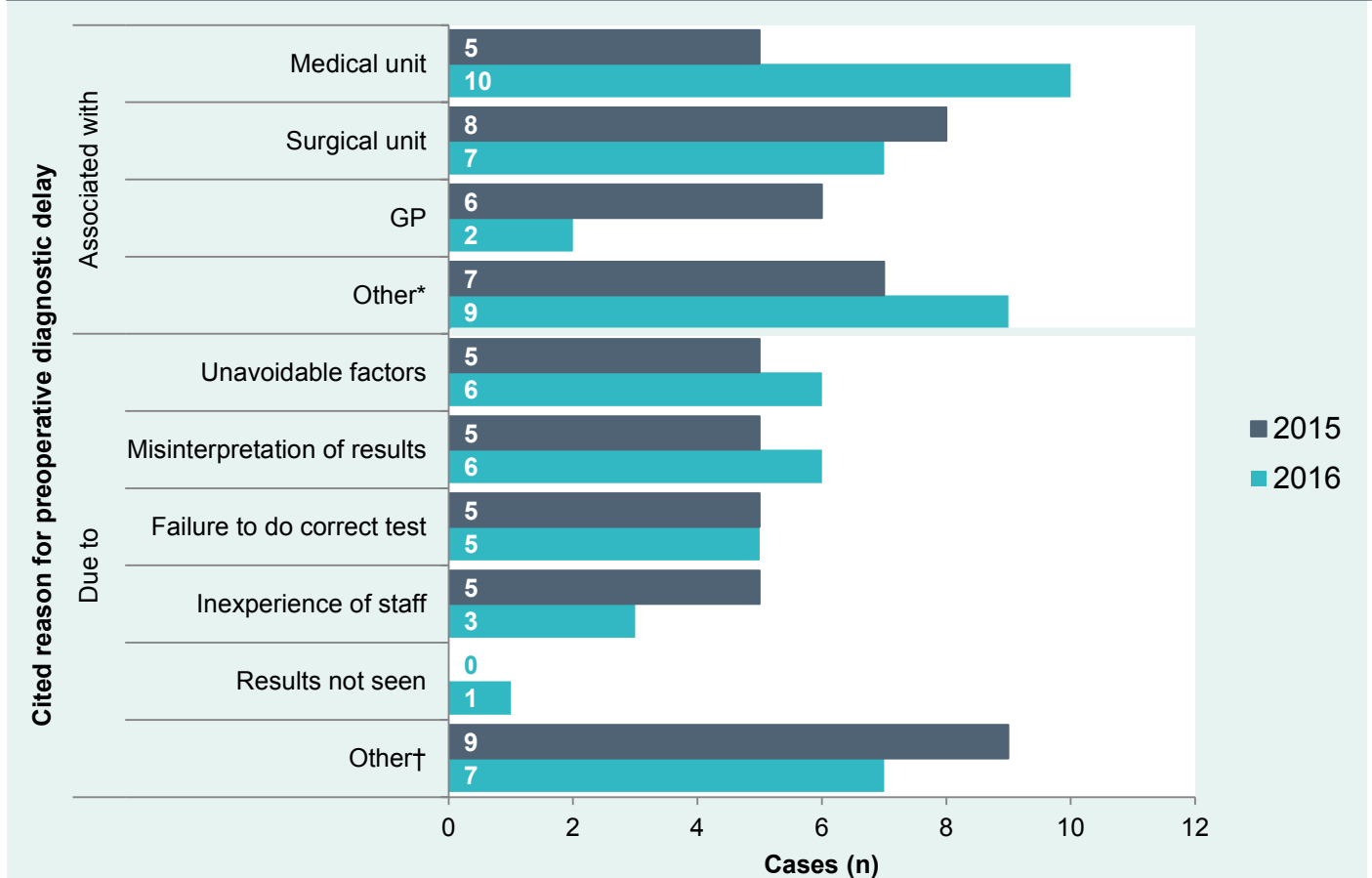
Fluid balance issues: the treating surgeon reported that fluid balance was an issue in 9.2% (84/909, missing data n=9, answer 'unknown' n=17) of cases. Fluid balance issues occurred with similar frequency among operative and nonoperative cases.

11. PREOPERATIVE DIAGNOSTIC DELAYS

A preoperative delay in diagnosis was identified by the treating surgeon in 5.5% (51/934, missing data n=1) of cases. In 29.4% (15/51) of cases in which there was a preoperative delay in diagnosis, the reporting surgeon felt that the delay was associated with the surgical unit.

Figure 4 shows the frequency of cited causes of diagnostic delays.

FIGURE 4: Preoperative diagnostic delays identified by the treating surgeon, 2015 and 2016



Note: More than one option can be selected.

GP: general practitioner

*Other includes transferring hospital, emergency department and patient factors

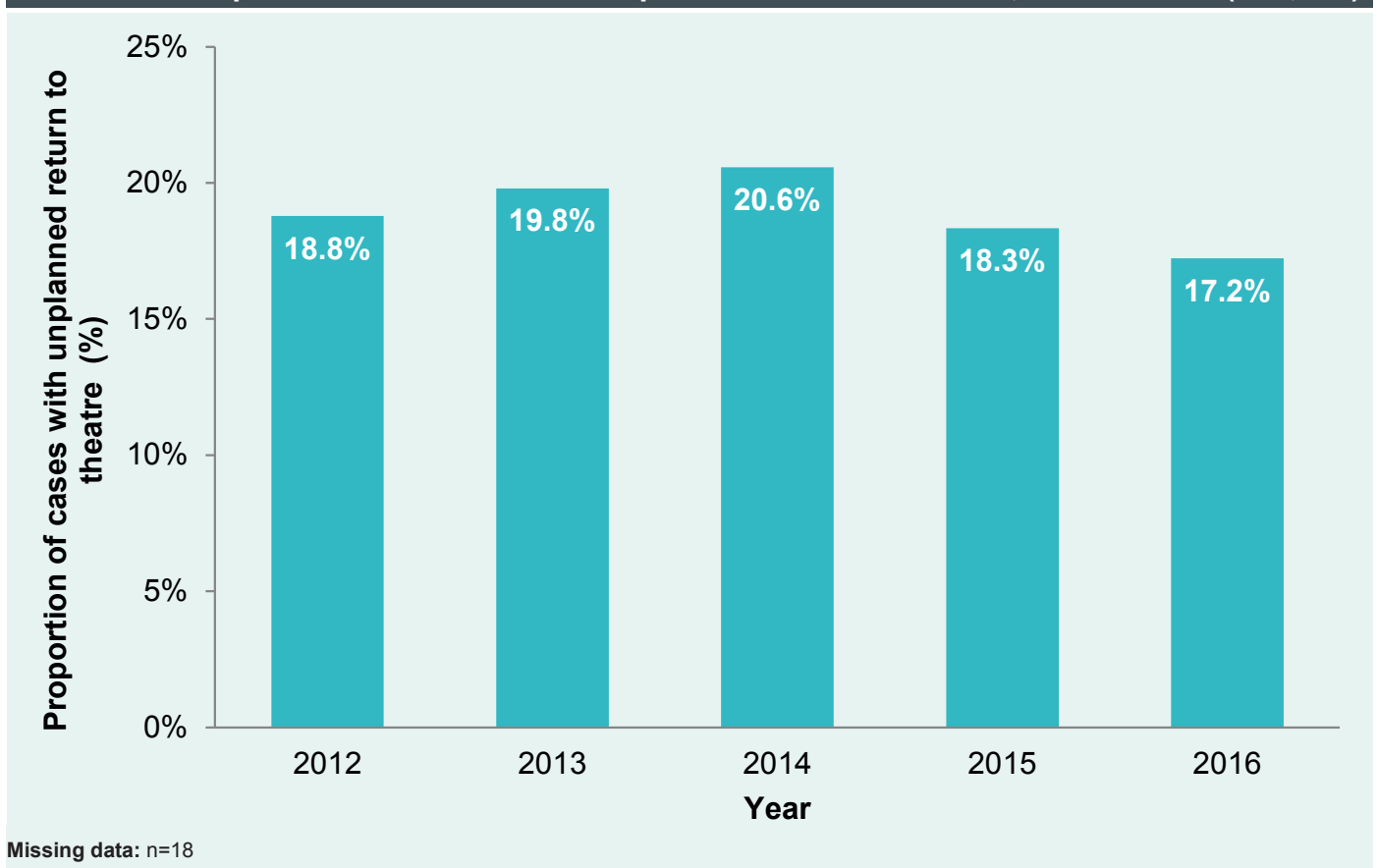
†Other includes unknown, communication, delay in transfer to tertiary hospital, rare diagnosis and atypical presentation

12. OPERATIVE AND NONOPERATIVE DEATHS

For 2015 and 2016 combined, there was no operation performed in 26.7% (250/935) of audited deaths. In 52.2% (117/224, missing data n=26) of those cases this was an active decision made by the surgeon. Other reasons for not operating included: not a surgical problem (71/224), refusal of treatment by the patient (48/224) and rapid death (41/224). In some cases more than one reason was selected for not operating.

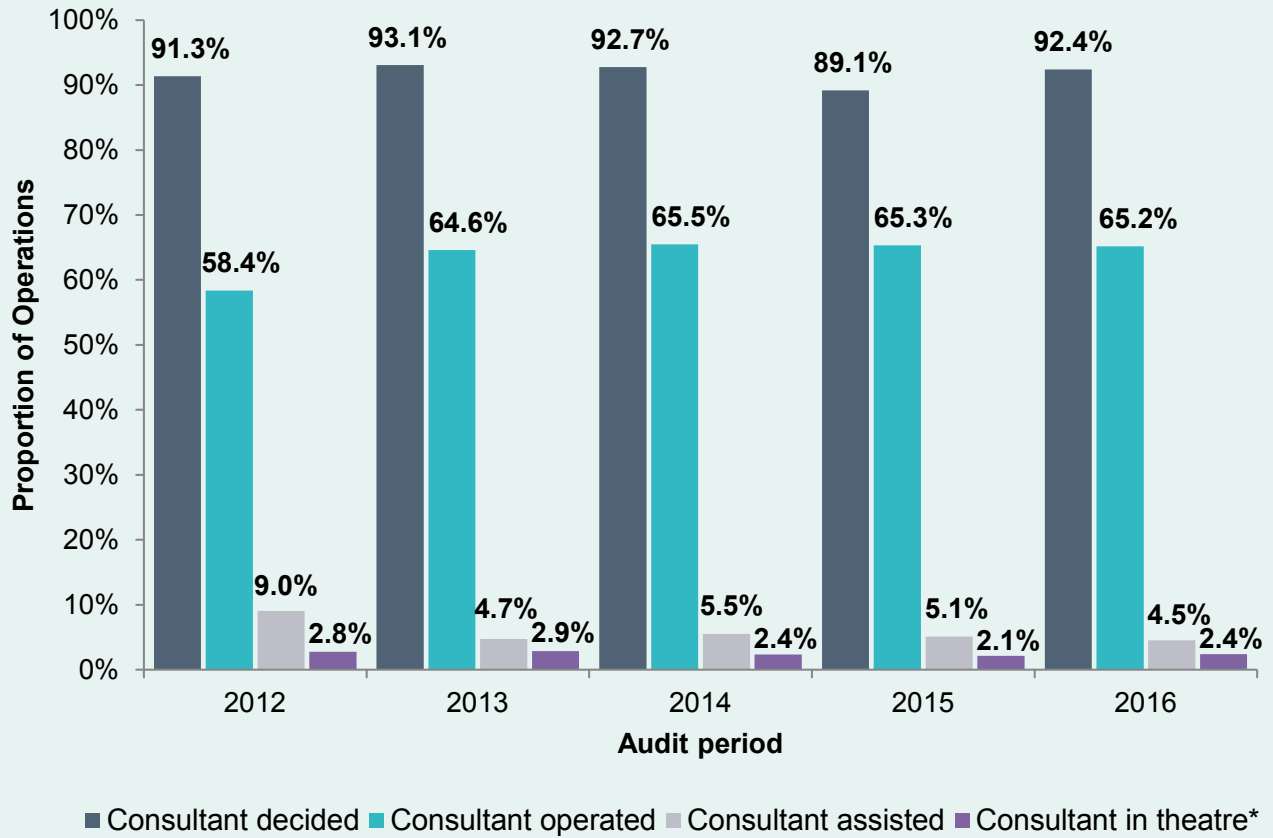
Overall, there were 928 surgical procedures performed on 685 patients. In 23.6% (162/685) of these cases the patient underwent two or more operations. Cases in which two or more operations were performed were twice as likely to have an area of concern or adverse event identified by the assessor (risk ratio [RR] 1.92, 95% confidence interval [CI] 1.31 to 2.79). In 6.0% (41/685) of operative cases an operation was abandoned because a terminal situation was found, and in 17.8% (122/685) of operative cases the surgeon reported an unplanned return to theatre (see **Figure 5**).

FIGURE 5: Proportion of cases with an unplanned return to theatre, 2012 to 2016 (n=1,833)



A consultant surgeon operated in 65.2% (582/892, missing data n=36) of the reported procedures and made the decision to proceed to surgery in 90.8% (810/892) of reported procedures (see **Figure 6**). Among cases with multiple operations, the level of consultant involvement (operating, assisting or in theatre) was higher for subsequent operations (79.8%, 174/218) compared with the first operation (70.0%, 471/674).

FIGURE 6: Consultant involvement in operations, 2012 to 2016



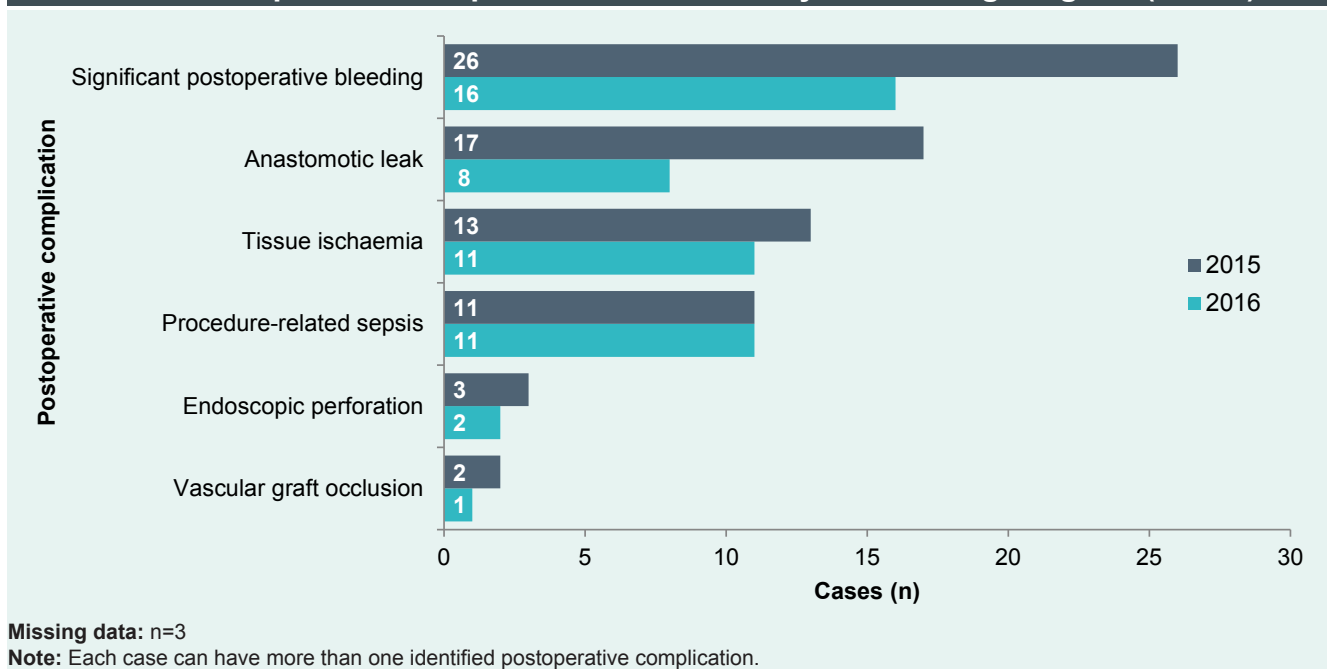
*in theatre indicates that the consultant was present in theatre but was not operating

13. POSTOPERATIVE COMPLICATIONS

Postoperative complications are considered a major contributor to mortality in surgical patients. Treating surgeons reported that a postoperative complication occurred in 31.8% (217/682, missing data n=3) of audited cases. This comprised a total of 264 complications among 217 patients. There has been a decrease in the proportion of cases with a postoperative complication in 2016 (30.7%, 99/322, missing data n=3) compared with 2015 (32.8%, 118/360).

Figure 7 shows the frequency of specific postoperative complications. The most frequently occurring postoperative complications were significant postoperative bleeding, tissue ischaemia and anastomotic leak. Please note that denominators were not provided as there can be more than one complication per case.

FIGURE 7: Postoperative complications identified by the treating surgeon (n=682)

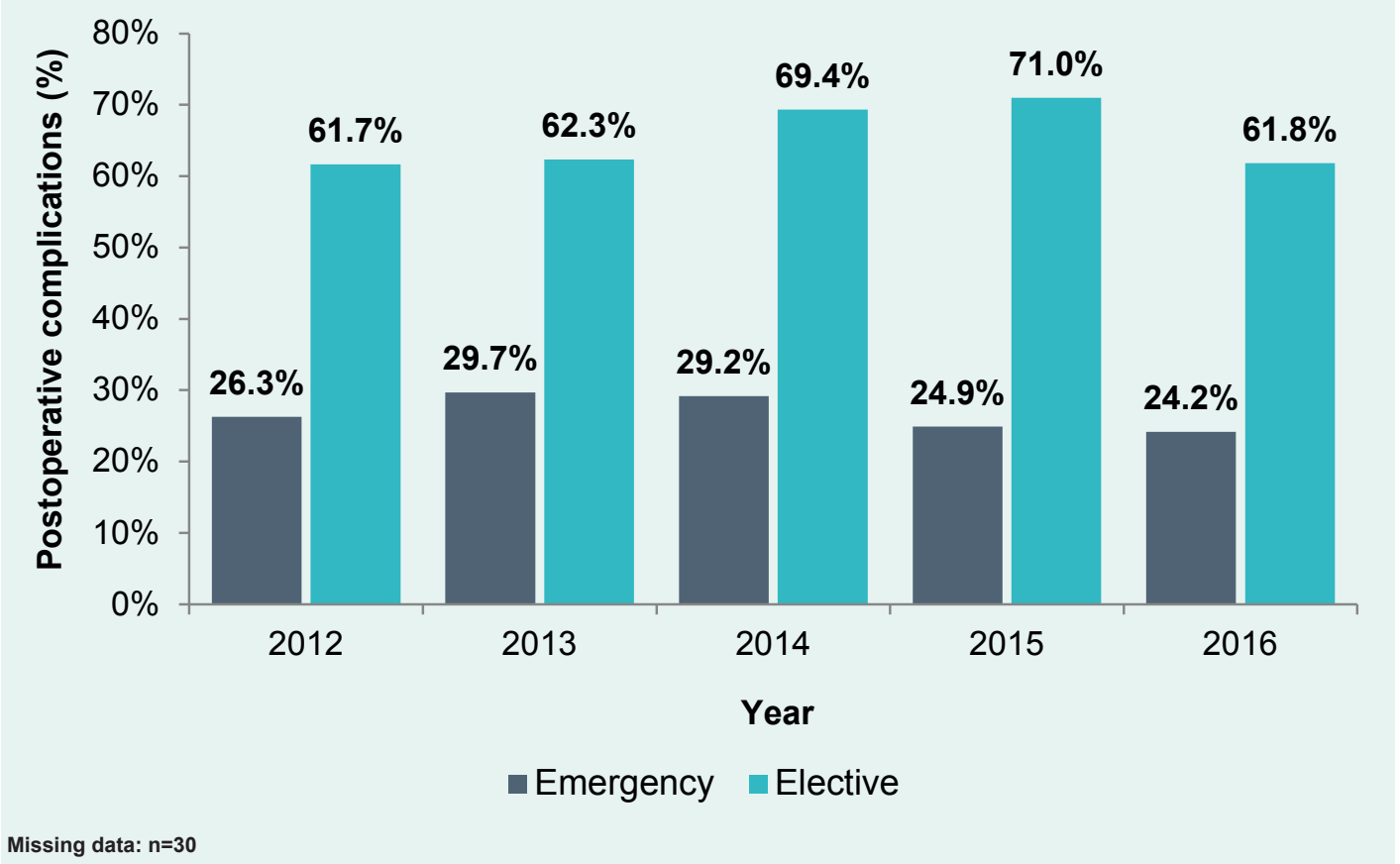


A total of 143 ‘other’ complications were identified and excluded from the graph, including: cardiac failure, intrapulmonary haemorrhage, intracerebral bleeding, acute or chronic renal failure, liver failure, pneumonia, perforated viscus, pulmonary embolism, respiratory failure, seizures, stroke and wound breakdown.

The postoperative complication section of the SCF will be revised to ensure clearer categorisation of complications and reduce the number of complications recorded as ‘other’.

Postoperative complications were identified almost three times as frequently for elective admissions compared with emergency admissions (66.7%; 78/117 vs. 32.5%; 137/421, missing data n=7. RR 2.72; 95% CI 2.24 to 3.30). This is consistent with previous years (see **Figure 8**). This apparent paradox is explained by recalling that emergency patients had a poorer state of health on admission. The proportion of emergency patients who had an ASA score of 4 or 5 was 61.7% (447/724), compared with 33.9% (38/112) for elective patients (missing data n=99). A possible explanation for the difference in postoperative complication frequencies is that the emergency patients were ‘primed’ for a bad outcome because of their comorbidities – they did not need a new event to cause their death. In contrast, elective patients were healthier and had more time in hospital during the last admission (median stay of 14 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 8: Postoperative complications by admission status and audit period, 2012 to 2016 (n=1,812)



14. INFECTIONS

The audit began collecting data on clinically significant infections in 2012. There was a decrease in the proportion of patients who died with a clinically significant infection in 2016 (35.0%, 157/448, missing data n=2), compared with 2015 (40.1%, 193/481, missing data n=4). The types of infection are shown in **Table 3**.

TABLE 3: Type of clinically significant infection reported in 2015 and 2016 (n=347)

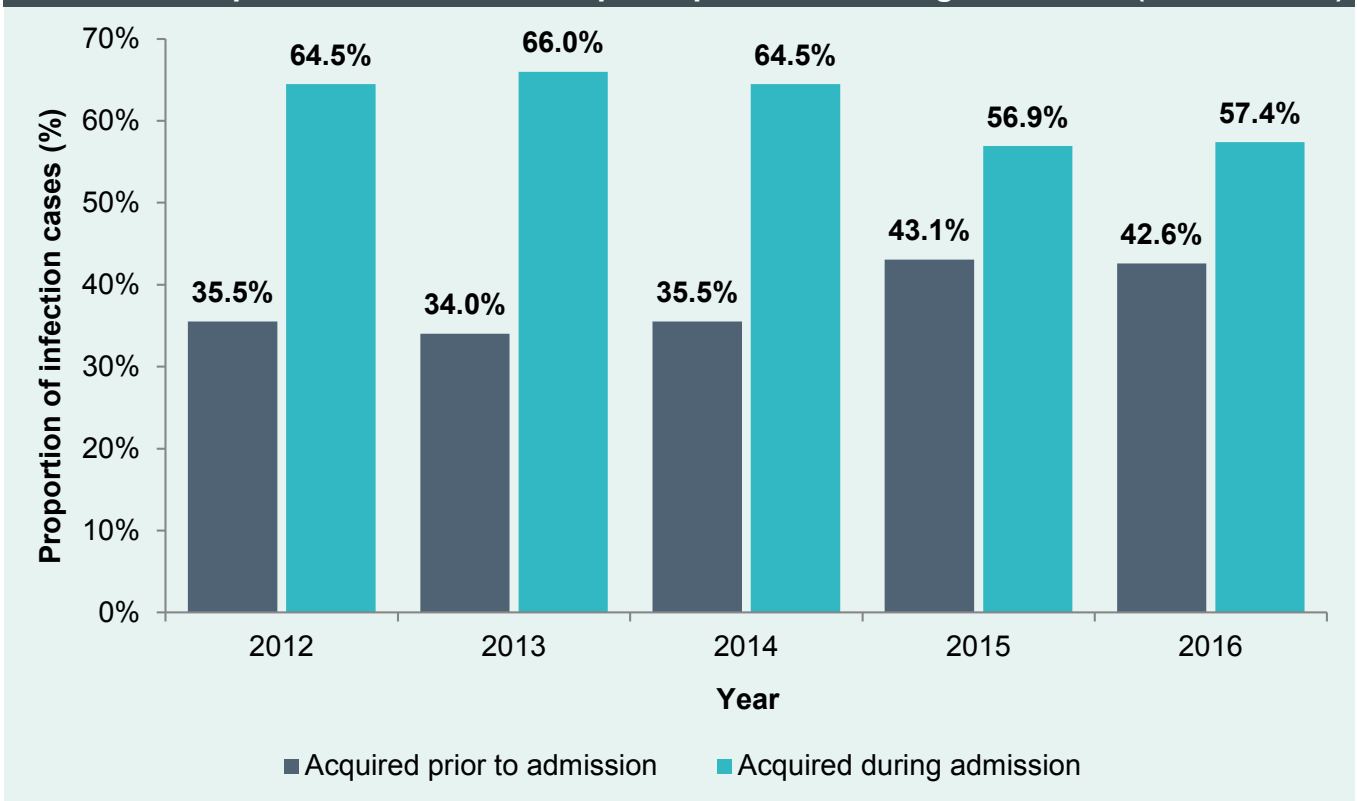
Infection Type	Number of cases (proportion of infections %)	
	2015	2016
Pneumonia	106 (55.8)	73 (46.5)
Intra-abdominal sepsis	30 (15.8)	26 (16.6)
Septicaemia	27 (14.2)	33 (21.0)
Other source*	26 (13.7)	25 (15.9)
Cranial/spinal infection	1 (0.5)	0 (0.0)
Total	190 (100)	157 (100)

Missing data: n=3

*Other source includes: Escherichia coli, Staphylococcus aureus, Methicillin-resistant Staphylococcus aureus and Candida albicans.

There has been a decrease in the proportion of infections acquired during admission (**Figure 9**).

FIGURE 9: Proportion of infections acquired prior to or during Admission (2012 to 2016)



The timing of infections acquired during admission is shown in **Table 4**. Surgical site infections comprised 4.6% (4/87) of infections acquired during admission in 2016, a decrease from 6.0% (6/100) in 2015.

TABLE 4: Timing of infections acquired during admission

Infection timing	Number of cases (proportion of total infections acquired during admission %)	
	2015	2016
Acquired preoperatively	19 (19.0)	18 (20.7)
Surgical site infection	6 (6.0)	4 (4.6)
Acquired postoperatively	67 (67.0)	58 (66.7)
Other invasive site infection	8 (8.0)	7 (8.0)
Total	100 (100)	87 (100)

Missing data: n=9

In cases in which there was an infection, the treating surgeon reported that the antibiotic regime was appropriate in 96.7% (180/186, unknown=3, missing data=7) of cases in 2015 and 94.7% (145/153, unknown=7, missing data=4) of cases in 2016.

15. CLINICAL MANAGEMENT ISSUES IDENTIFIED BY ASSESSORS

For each case reported to the SAASM, the first-line assessor was asked to identify and describe any clinical management issues. In 8.0% (73/914) of audited cases a more comprehensive assessment (case note review) was completed 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.

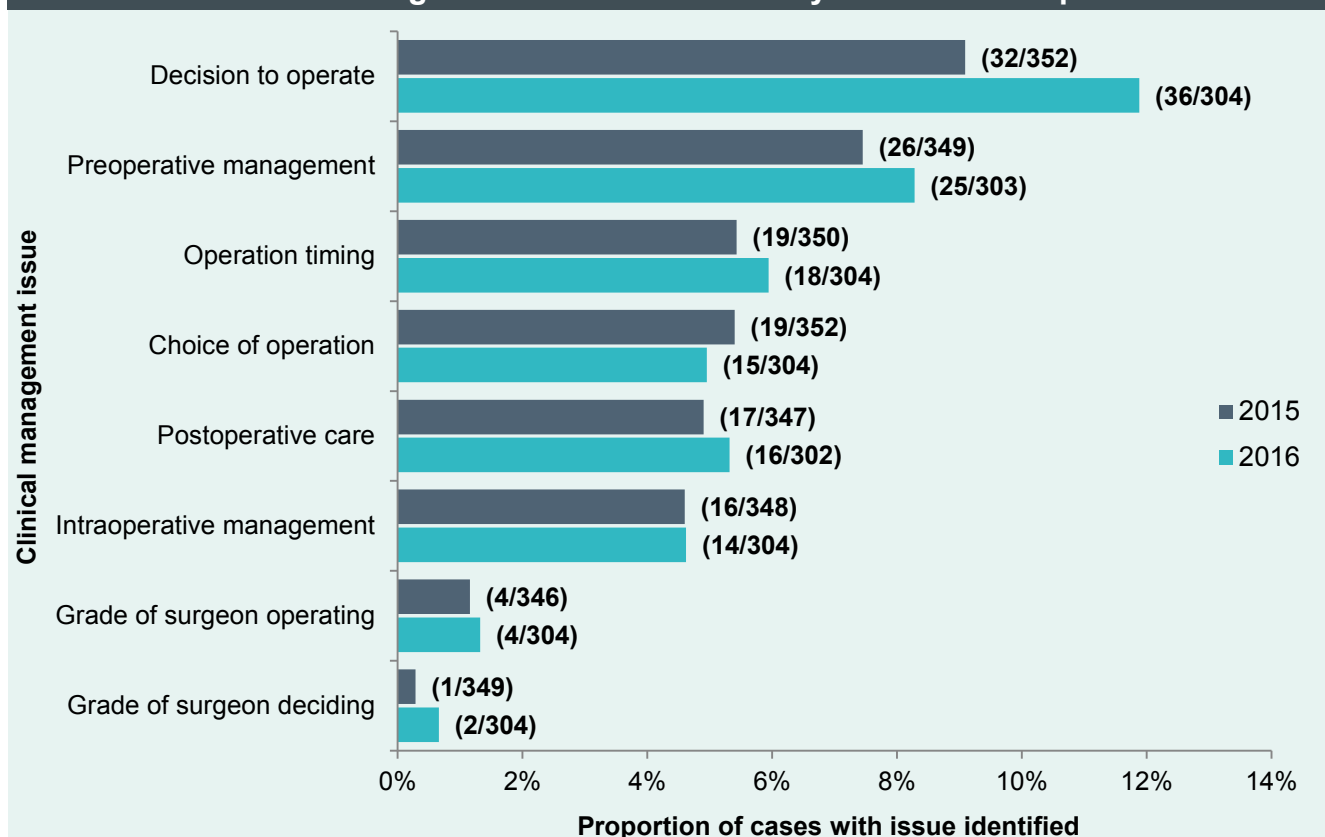
Clinical management issues are identified by assessors in two ways:

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

'Decision to operate' was the clinical management issue most frequently identified by assessors. This issue was identified more frequently among operative cases in 2016 (11.8%, 36/304, answer 'not applicable [N/A]' n=4) compared with 2015 (9.1%, 32/352, answer 'N/A' n=5). The next most frequently identified issue among operative cases was 'preoperative management', identified in 7.4% (26/349, missing data n=1, answer 'N/A' n=7) of cases in 2015 and 8.3% (25/303, missing data n=1, answer 'N/A' n=4) in 2016. **Figure 10** shows the frequency of each of the different issues.

FIGURE 10: Clinical management issues identified by assessors in operative cases



Note: where the assessor noted that an issue was 'not applicable', this has been excluded from analysis

Clinical management issues associated with all cases

There were no serious clinical management issues (adverse events or areas of concern) identified in 91.4% (835/914) of cases that completed the audit cycle in 2015 and 2016. 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 2016 (6.9%, 30/432) was lower than the proportion in 2015 (10.2%, 49/482). **Table 5** shows that the number of clinical management issues identified has decreased considerably between 2015 and 2016, most markedly within the most serious category, adverse events. Please note that not all cases have completed the audit process.

TABLE 5: Total number of clinical management issues (n=249)

Clinical management issue	Number of issues	
	2015	2016
Area of consideration	74	67
Area of concern	44	34
Adverse event	26	4
Total	144	105

Note: some cases had more than one issue.

The audited surgical team was considered responsible, either solely or partially, for 71.2% (166/233, missing data n=16) 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 6**.

TABLE 6: Responsible unit associated with areas of consideration, concern and adverse events

CLINICAL MANAGEMENT ISSUE	ASSOCIATION*							
	Surgical unit		Another clinical unit		Hospital		Other	
	2015	2016	2015	2016	2015	2016	2015	2016
Area of consideration	48	52	13	10	6	7	3	4
Area of concern	30	21	12	11	2	3	2	3
Adverse event	12	3	9	1	1	0	4	0
Total	90	76	34	22	9	10	9	7

Missing data: n=16 incidents

*Some clinical management issues were associated with more than one team.

Areas of consideration

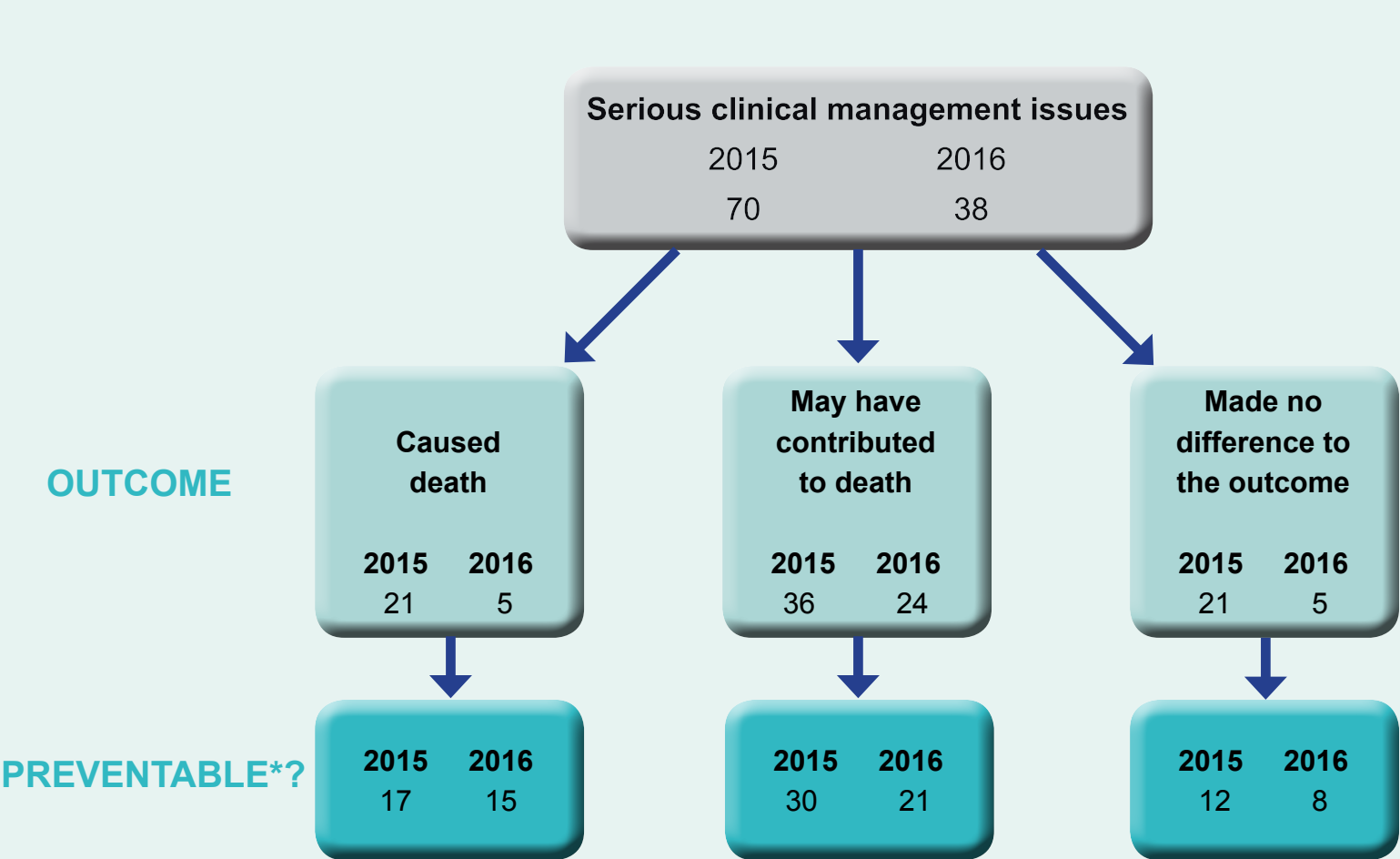
The majority of areas of consideration were in the preoperative period. The most frequently identified areas were:

- decision to operate (n=29)
- delay to surgery (n=22)
- different operation desirable (n=18)
- inadequate assessment / diagnosis (n=12)
- preoperative communication (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 108 most serious issues (those categorised as areas of concern or adverse events), 79.6% (86/108) were assessed as having caused or potentially contributed to the death of the patient, and of those issues, 84.9% (73/86) were considered preventable. An overview of the outcome and preventability of serious clinical management issues is provided in **Figure 11**.

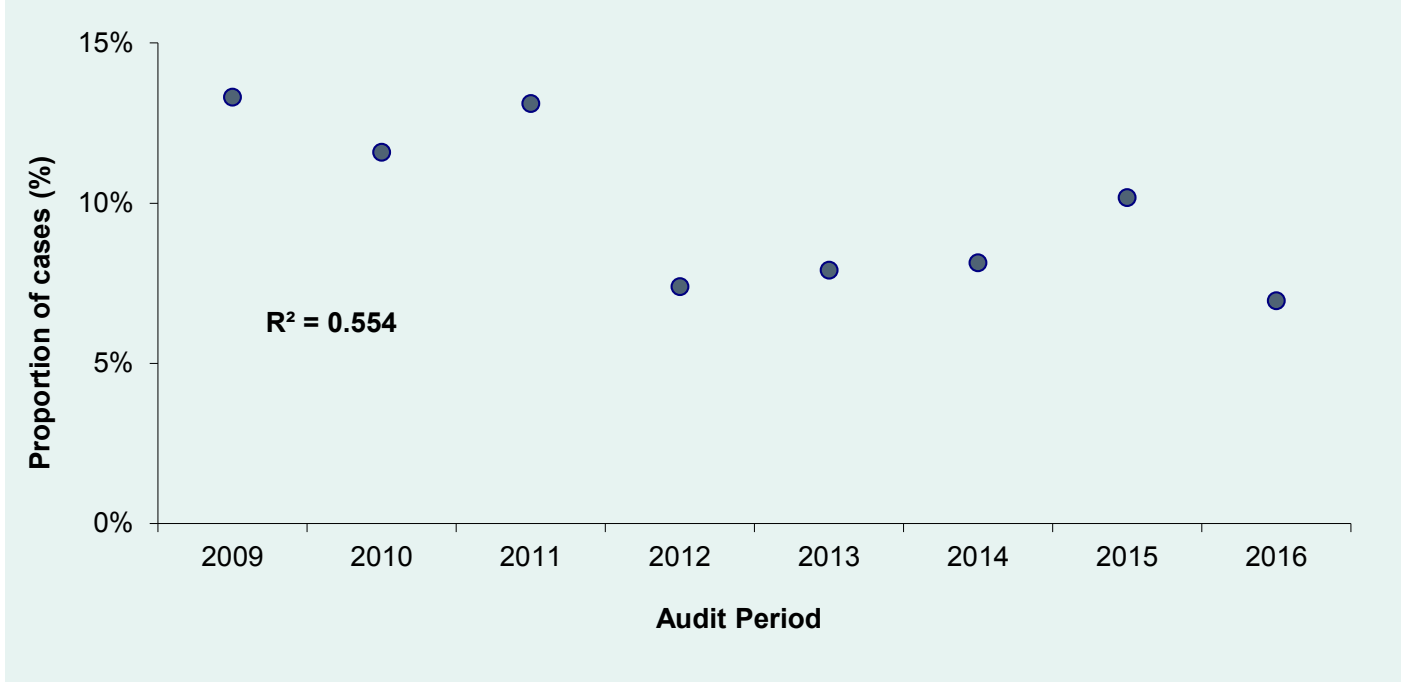
FIGURE 11: Outcome and preventability of serious clinical management issues (as viewed by assessor)



*Categorised by assessor as probably or definitely preventable

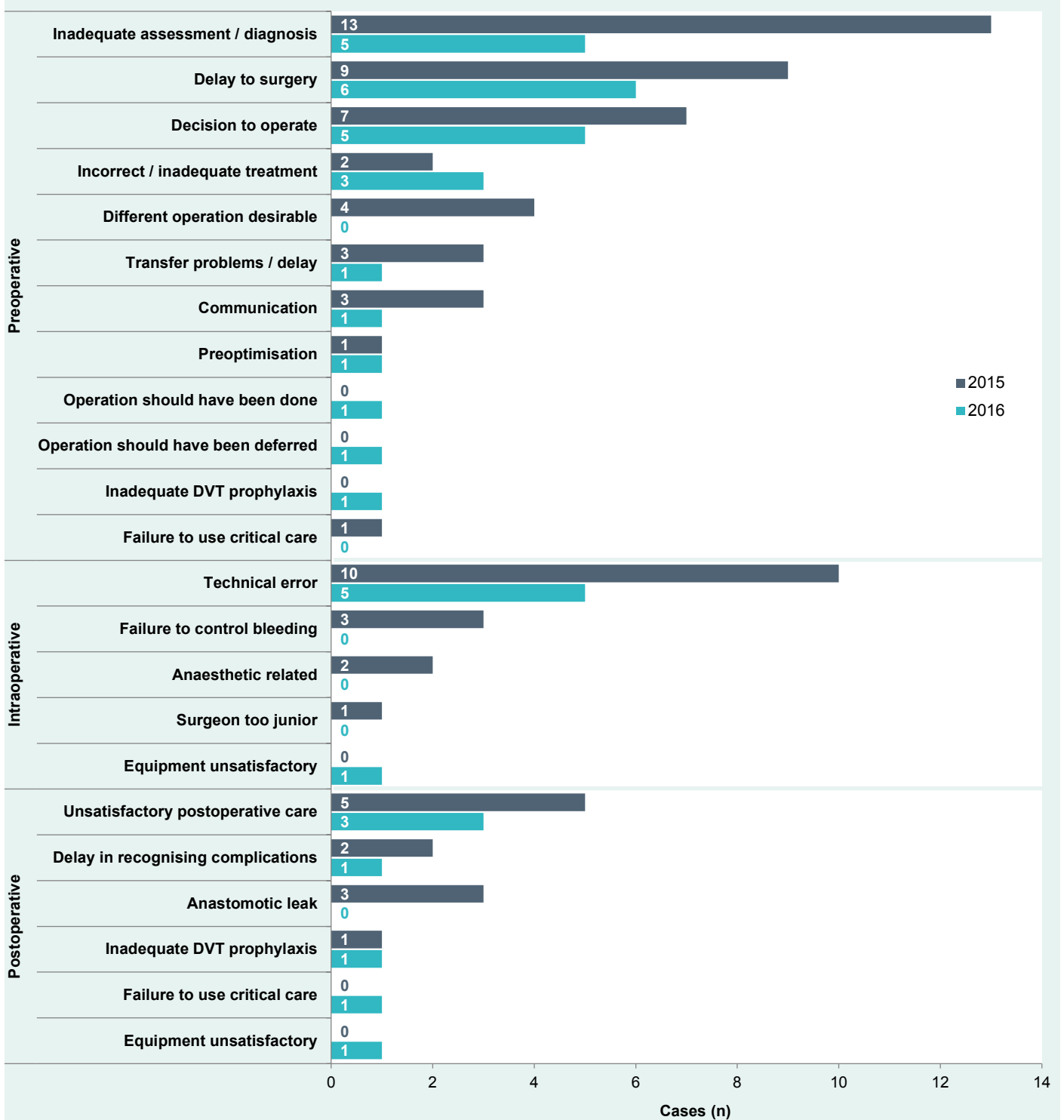
Since the audit commenced there has been a reduction in the proportion of cases with serious clinical management issues. **Figure 12** shows a weak decreasing trend over time, $R^2=0.554$.

FIGURE 12: Cases with a serious clinical management issue by audit period (2009 to 2016)



The type and frequency of serious clinical management issues are shown in **Figure 13**. Issues at the preoperative stage were the most commonly reported.

Figure 13: Serious clinical management issues (areas of concern and adverse events) identified by assessors, 2015 and 2016 cases n=914)

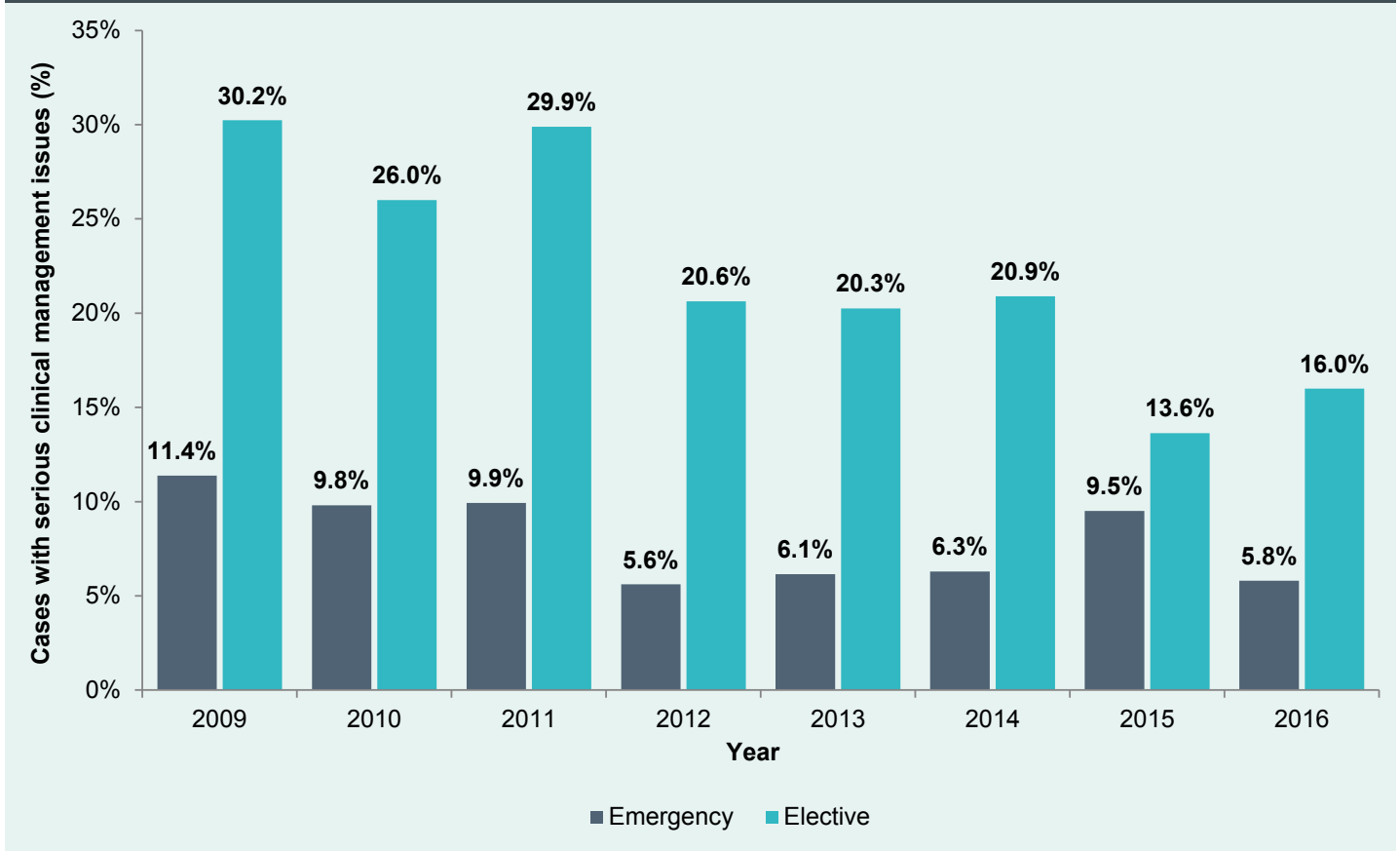


DVT: deep vein thrombosis

In terms of responsibility for serious clinical management issues (areas of concern and adverse events), assessors attributed 65.4% (68/104) to the audited surgical team, 31.7% (33/104) to another clinical team, 5.8% (6/104) to the hospital and 9.6% (10/104) to 'other' (missing data n=4). Please note: assessors can attribute responsibility to more than one area.

Serious clinical management issues were identified almost twice as frequently in elective admissions compared with emergency admissions (14.7%, 17/116 vs. 7.7%, 61/789, missing data n=9. RR 1.90; 95% CI 1.15 to 3.13), and this is consistent with previous years (see **Figure 14**). This apparent paradox may be related (as indicated in section 19) to emergency patients being sicker and "primed" for a more rapid death without the occurrence of a serious management issue. Consistent with this, emergency patients died on average one week earlier (median length of admission for emergency patients was 8 days, compared with 14 days for elective patients).

FIGURE 14: Serious clinical management issues by admission status and year (2009 to 2016)



16. PROGRESS UPDATE

A number of recommendations were contained in the 2014/15 Annual Report and a summary of the progress in implementing those recommendations is provided in Table 7.

TABLE 7: IMPLEMENTATION OF 2014/15 ANNUAL REPORT RECOMMENDATIONS: PROGRESS UPDATE

Recommendations	Progress
IMPROVING THE AUDIT	
Maintain the high return rate of SCFs with an aim to reach 100% compliance (from 96% in 2014/15).	An increased SCF return rate was achieved for 2015 and 2016 cases (97%). The return rate should continue to increase with SAASM participation recently becoming a mandatory component of the Australian Orthopaedic Association continuing professional development program. Participation was previously on a voluntary basis.
Continue to utilise the data obtained through the audit and disseminate important information through reports, scientific publications and educational seminars.	The SAASM disseminates targeted information through a variety of media including seminars, individual surgeon reports, clinical governance reports, themed National Case Note Review Booklets and scientific journal articles. A 2016 seminar was held on the topic of 'End of Life Matters'. A journal article focussing on clinical management issues in Neurosurgery has been published in the ANZ Journal of Surgery ¹ and articles addressing clinical management issues in other specialties are in progress.
Improve the completion of data collected on the SCFs to reduce the number of SLAs required due to insufficient information.	Ongoing. Audit staff are paying increased attention to ensuring that SCF questions are completed and a sufficient level of detail is provided. When a submitted form is incomplete, the treating surgeon is asked to resubmit the form (and is considered non-compliant pending resubmission). With the introduction of electronic-only submission, work is underway to make most of the SCF questions mandatory. In addition, SAASM has distributed communications to highlight the issue of poorly completed forms and provide guidance on how to complete the forms properly.
Initiate a formal collaboration with anaesthetists to expand the audit to include anaesthetic cases.	Completed. In 2016, SAAMC approved a collaboration with SAASM whereby all surgical deaths that have an identified anaesthetic component may undergo an additional anaesthetic review. The participation of anaesthetists is voluntary.

**TABLE 7: IMPLEMENTATION OF 2014/15 ANNUAL REPORT RECOMMENDATIONS:
PROGRESS UPDATE**

<p>Submit a revised QP application to enable sharing of feedback with nominated members of the treating surgical team.</p>	<p>Revised QP declarations, under both state and federal schemes, now permit sharing of audit feedback reports with other surgeons in the clinical care chain (if requested or approved by the nominated treating surgeon).</p>
<p>Undertake educational activities to inform and promote discussion about issues surrounding end of life care.</p>	<p>A 2016 seminar was held on the topic of 'End of Life Matters'. The seminar was very positively received, with close to 100 attendees from a range of clinical and non-clinical professions.</p>
<p>HOSPITALS AND HEALTH DEPARTMENTS</p>	
<p>Ensure that medical records are accurate and up to date.</p>	<p>In progress.</p>
<p>In response to the higher proportion of postoperative complications and serious clinical incidents among elective admissions, continue education on the importance of recognising the signs of the deteriorating patient.</p>	<p>In progress.</p>
<p>Continue to promote Advance Care Directives among health care professionals and the community. Improve systems to ensure that existing Advance Care Directives are easily identified at the point of care and are incorporated into patient management as appropriate.</p>	<p>In progress.</p>

17. SAASM 2016 SEMINAR: END OF LIFE MATTERS

Among cases audited by the SAASM, surgeons often report having to deal with challenging end of life issues. To inform and promote discussion about this issue, the SAASM held a seminar in October 2016 titled 'End of Life Matters'.

A diverse range of speakers addressed common issues and challenges relating to end of life decisions and discussed current tools and resources available to improve care.

The seminar was very positively received with approximately 100 attendees including surgeons, surgical trainees, anaesthetists, nurses, resident medical officers, physicians, and hospital quality and safety staff.

A post-seminar evaluation survey was sent to all attendees. Of the respondents to the survey, 98% reported that they found the presentations to be very informative and valuable, and 97% felt that the seminar increased their knowledge of the current issues surrounding end of life care.

Comments included:

"It is wonderful that a holistic approach is the aim in SA within the hospital and community-based systems. Biggest issue [medical emergency team (MET)] calls for terminally ill patients - glad to see this is moving in the right direction."

"Helped expand my previously stereotypical approach to end-of-life care. Will help me get out of some of the difficult situations that arise with surgical patients and their relatives."

"Thought provoking and useful forum"

The SAASM team is very grateful to presenters, staff, volunteers and attendees for contributing to the success of this event.

Further information and copies of the presentations can be viewed on the SAASM webpage under 'seminars':

<https://www.surgeons.org/for-health-professionals/audits-and-surgical-research/anzasm/saasm/#Seminar>

SAVE THE DATE!

The SAASM will continue to conduct educational seminars based on issues identified through the audit.

We propose to conduct the next seminar in March/April 2018, with the working title 'Nobody Told Me: Poor Communication Kills'. This will involve a multidisciplinary panel discussing a number of relevant cases, identifying problems with communication and considering how the issues could have been better addressed.

Further information will be provided in the coming months in direct communications, Surgical News, Fax mentis and RACS media.

18. A CLOSER LOOK: COMMUNICATION

Poor communication can lead to adverse outcomes for patients, in some cases clearly contributing to morbidity and mortality. A recent article published by SAASM investigated potentially avoidable issues in Neurosurgery mortality cases using national (ANZASM) surgical mortality audit data. Findings from the study showed that poor communication was the second most common issue identified by assessors¹. SAASM data show that issues of poor communication are reported from all specialties, are attributed to both surgeons and non-surgeons, and can occur across the entire spectrum of care.

On the SAASM SCF, the treating surgeon is asked the question “was there an issue with communication at any stage?” Since this question was introduced in 2010, surgeons have reported that communication was an issue in 4.2% (138/3,312) of audited cases. Similarly, 4.0% (54/1,346) of all clinical management issues identified by assessors were found to be associated with poor communication.

Areas where communication failures have been identified include:

- Between disciplines
 - > Surgeon, anaesthetist, physician, intensivist, intensive care unit, emergency department, nursing staff
- Within the surgical team, particularly involving communication between junior and senior staff
- During clinical handover, including inter-hospital transfers and poor documentation
- With patients and family

Among the various communication issues identified by SAASM, failure to seek the advice of a senior colleague is one of the most serious; there have been a number of cases where this has led to a delay in diagnosis or definitive treatment.

In one such case, a surgical registrar misdiagnosed a deteriorating patient with abdominal pain as having faecal loading. The case was not discussed with the consultant and a computed tomography (CT) scan was arranged. Further deterioration prompted another assessment by a surgical resident medical officer who diagnosed colonic ischaemia and a laparotomy was promptly performed. The reporting surgeon felt that the CT scan had been unnecessary and the lack of communication delayed the patient going to theatre by several hours; such delays can clearly have devastating consequences.

Surgical care can often be complex and involve multiple health professionals. Clinical handover, either between teams or hospitals, is another common area where communication issues occur.

One example involved a transfer that was arranged from a regional to tertiary hospital being delayed by 5 hours with no communication from the transferring hospital regarding the unexpected delay. In addition, the treating team only became aware postoperatively of the patient’s pre-existing ‘not for resuscitation’ order. This case is an unfortunate example of futile surgery that could have easily been avoided with adequate communication.

Guidance and resources

National Standards

The Australian Commission on Safety and Quality in Healthcare has identified clinical handover as one of the 10 National Safety and Quality Health Standards. SA Health provides guidelines and resources on its webpages to educate health professionals and improve clinical handover practice. <http://www.sahealth.sa.gov.au/wps/wcm/connect/Public+Content/SA+Health+Internet/Clinical+resources/Clinical+topics/Clinical+handover/>

Case Note Review Booklet

ANZASM released a Case Note Review Booklet focussing on events arising as a consequence of communication failures. This publication can be accessed at: http://www.surgeons.org/media/24088222/2016-04-28_rpt_anzasm_cnr_vol_9.pdf.

Recommendations

- Standardisation and systematisation of communication processes to minimise errors.
- Clinical handover should involve a clear, structured process including transfer of relevant patient information, accountability and responsibility.
- Clear clinical leadership in patient management, including regular team meetings that involve all disciplines to ensure that the treatment plan is understood by all.
- Good record keeping, including clear and concise documentation.

19. REFERENCES

¹ Gupta, A. K., Stewart, S. K., Cottell, K., McCulloch, G. A. J., Babidge, W. and Maddern, G. J. (2017), Potentially avoidable issues in neurosurgical mortality cases in Australia: identification and improvements. *ANZ J Surg*, 87: 86–91. doi:10.1111/ans.13542

20. ACKNOWLEDGEMENTS

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 - Health System Management, Information and Communication Technology Services
- the South Australian State Committee of RACS
- staff in the Research, Audit and Academic Surgery Division of RACS, particularly:

- Professor Guy Maddern	Chair, ANZASM Steering Committee
- Associate Professor Wendy Babidge	Director, Research, Audit and Academic Surgery Division
- Mr Gordon Guy	ANZASM Manager
- Ms Felicity England	Projects Contracts Manager
- past and present members of the SAASM Management Committee:

- Mr Glenn McCulloch	Clinical Director, SAASM Chair and Surgical Representative
- Dr Dayan De Fontgalland	Surgical Representative
- Mr Benjamin Teague	Surgical Representative
- Associate Professor Graham Mercer	Surgical Representative
- Mr David Walsh	Surgical Representative
- Mr Paul Dolan	Surgical Representative
- Dr Roy Watson	RANZCOG Representative
- Dr Simon Jenkins	Anaesthetist Representative
- Dr Stephen Christley	The South Australian Department for Health and Ageing
- Ms Michele McKinnon	The South Australian Department for Health and Ageing
- Ms Elaine Golding	Community Representative
- Mr David Walters	South Australian Regional Committee Representative
- Dr Sonja Latzel	South Australian Regional Committee Representative
- SAASM staff:

- Ms Sasha Stewart	SAASM Project Manager
- Ms Kimberley Penglis	SAASM Senior Project Officer
- the regional audits of surgical mortality:
 - Australian Capital Territory Audit of Surgical Mortality
 - Collaborating Hospitals' Audit of Surgical Mortality
 - Northern Territory Audit of Surgical Mortality
 - Queensland Audit of Surgical Mortality
 - Tasmanian Audit of Surgical Mortality
 - Victorian Audit of Surgical Mortality
 - Western Australian Audit of Surgical Mortality.

The background of the page is a complex, abstract geometric pattern composed of numerous overlapping triangles in various shades of teal, ranging from light, airy tones to deep, dark forest greens. The pattern is dense and fills the entire page, creating a textured, crystalline effect.

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