

**Royal Australasian College of Surgeons  
Queensland Audit of Surgical Mortality (QASM)**

**REPORT 2007-2016**



ROYAL AUSTRALASIAN  
COLLEGE OF SURGEONS



Queensland  
Government



## Contact

### Queensland Audit of Surgical Mortality

Royal Australasian College of Surgeons  
PO Box 7476  
East Brisbane 4169 QLD  
Australia

Telephone: +61 07 3249 2903

Fax: +61 07 3391 7915

Email: [qasm@surgeons.org](mailto:qasm@surgeons.org)

Website: <http://www.surgeons.org/QASM>

The information contained in this annual report has been prepared on behalf of the Steering Committee of the Queensland Audit of Surgical Mortality (QASM) for the Royal Australasian College of Surgeons (RACS). The QASM has protection under the Commonwealth Qualified Privilege Scheme under Part VC of the Health Insurance Act 1973 (gazetted 25 July 2016). It has also been gazetted under section 31 of the Health Services Act 1991 (QLD), as an 'approved quality assurance committee'.

# CONTENTS

<b>TABLES</b> . . . . .	<b>2</b>
<b>FIGURES</b> . . . . .	<b>3</b>
<b>CHAIRMAN’S REPORT</b> . . . . .	<b>4</b>
<b>SHORTENED FORMS</b> . . . . .	<b>5</b>
<b>EXECUTIVE SUMMARY</b> . . . . .	<b>6</b>
<b>QASM COMPARISON OF FINDINGS (2007 TO 2016)</b> . . . . .	<b>7</b>
<b>RECOMMENDATIONS AND KEY POINTS</b> . . . . .	<b>8</b>
<b>1 INTRODUCTION</b> . . . . .	<b>9</b>
1.1 Background . . . . .	9
1.2 Structure and governance . . . . .	9
1.3 Methodology . . . . .	11
1.4 Providing feedback . . . . .	14
1.5 Reporting conventions . . . . .	14
<b>2 AUDIT PARTICIPATION</b> . . . . .	<b>16</b>
2.1 Surgeons . . . . .	16
2.2 Hospitals . . . . .	16
2.3 Patients . . . . .	16
<b>3 COMPARISON BETWEEN PRIVATE AND PUBLIC HOSPITALS</b> . . . . .	<b>18</b>
<b>4 DEMOGRAPHIC PROFILE OF AUDITED CASES 2007-2016</b> . . . . .	<b>20</b>
4.1 Age . . . . .	20
4.2 Gender . . . . .	21
4.3 Admission status . . . . .	22
4.4 American Society of Anesthesiologists grade . . . . .	23
4.5 Comorbidities . . . . .	24
<b>5 PROFILE OF OPERATIVE INTERVENTIONS</b> . . . . .	<b>26</b>
5.1 Operative rate . . . . .	26
5.2 Frequency of operative procedures . . . . .	27
5.3 Postoperative complications . . . . .	28
5.4 Unplanned returns to theatre . . . . .	29
5.5 Case study: postoperative complications . . . . .	30
<b>6 RISK MANAGEMENT STRATEGIES</b> . . . . .	<b>31</b>
6.1 DVT prophylaxis . . . . .	31
6.2 Case study – DVT prophylaxis . . . . .	32
6.3 Provision of critical care support to patients . . . . .	33
6.4 Fluid management . . . . .	34
6.5 Postoperative complications . . . . .	35
<b>7 INFECTIONS</b> . . . . .	<b>36</b>
7.1 Prevalence of infection . . . . .	36
7.2 Infections acquired in hospital . . . . .	37
7.3 Infections acquired in hospital – sites of infections (2011 to 2016) . . . . .	37
7.4 Case study – Hospital-acquired infections . . . . .	39

<b>8 TRAUMA</b> . . . . .	<b>41</b>
8.1 Prevalence of trauma . . . . .	41
8.2 Causes of trauma . . . . .	41
8.3 Accidents and violence . . . . .	42
<b>9 SECOND-LINE ASSESSMENTS</b> . . . . .	<b>43</b>
9.1 Second-line assessments data . . . . .	43
<b>10 CLINICAL INCIDENTS</b> . . . . .	<b>45</b>
10.1 Distribution of clinical incidents . . . . .	46
10.2 Classifications of clinical incidents . . . . .	46
10.3 Trend of preventable serious clinical incidents . . . . .	46
10.4 Preventable, serious clinical incidents by surgical specialty . . . . .	47
10.5 Perceived impact of clinical incidents . . . . .	47
<b>11 ABORIGINAL AND TORRES STRAIT ISLANDER PATIENTS</b> . . . . .	<b>49</b>
11.1 Surgically related deaths . . . . .	49
11.2 Age . . . . .	49
11.3 Age and comorbidities . . . . .	50
11.4 Aboriginal and Torres Strait Islander persons and clinical management . . . . .	51
<b>12 CONCLUSIONS</b> . . . . .	<b>52</b>
<b>13 REFERENCES</b> . . . . .	<b>53</b>
<b>ACKNOWLEDGEMENTS</b> . . . . .	<b>55</b>
<b>QASM STAFF 2015/2016</b> . . . . .	<b>55</b>

## **TABLES**

Table 1: QASM comparison, 2007/2008 and 2015/2016 audit periods . . . . .	7
Table 2: Comparison of surgically related findings between private hospitals and public hospitals (2013-2016) . . . . .	18
Table 3: Proportion of patients with preventable, serious clinical incidents in each surgical specialty . . . . .	47
Table 4: Perceived impact of clinical incidents on clinical outcomes – 2007/2008 to 2015/2016 . . . . .	48
Table 5: Perceived preventability of clinical incidents over the total audit period of 2007/2008 to 2015/2016 . . . . .	48
Table 6: The clinical team considered mostly responsible for the serious clinical incidents 2007/2008 to 2015/2016 . . . . .	48
Table 7: Age in years at death of Aboriginal and Torres Strait Islander persons and non-Indigenous persons since 2012 . . . . .	49
Table 8: Prevalence of comorbidities in Aboriginal and Torres Strait Islander persons, and non-Indigenous persons, aged younger than 50 years . . . . .	50
Table 9: Prevalence of comorbidities in Aboriginal and Torres Strait Islander persons, and non-Indigenous persons, aged 50 years or older. . . . .	51
Table 10: Clinical management areas requiring improvement in Aboriginal and Torres Strait Islander persons and non-Indigenous persons, according to assessors . . . . .	51

## FIGURES

Figure 1:	Governance structure of the Queensland Audit of Surgical Mortality (QASM) . . . . .	10
Figure 2:	The Queensland Audit of Surgical Mortality (QASM) audit process . . . . .	13
Figure 3:	The Queensland Audit of Surgical Mortality (QASM) process results 2007/2008 to 2015/2016 . .	15
Figure 4:	Numbers of notifications of death received by year . . . . .	17
Figure 5:	Grouped ages of patients audited, 2007/2008 to 2015/2016 . . . . .	20
Figure 6:	Median age of patients in years, 2007/2008 to 2015/2016 . . . . .	21
Figure 7:	Emergency or elective admission status of surgical patients who died, 2007-2016 . . . . .	22
Figure 8:	ASA grade distribution by percentages and frequencies . . . . .	23
Figure 9:	Percentage of patients presenting with specific types of comorbidities from 2007/2008 to 2015/2016. . . . .	24
Figure 10:	Percentage of cases in which obesity was a significant comorbidity by year . . . . .	25
Figure 11:	Procedures in order of frequency from 2007/2008 to 2015/2016 . . . . .	27
Figure 12:	Percentages of cases that had unplanned returns to theatre by year . . . . .	29
Figure 13:	Distribution of types of prophylaxis for deep vein thrombosis used for patients, 2007-2016. . . .	31
Figure 14:	Provision of critical care support by year . . . . .	33
Figure 15:	Percentages of patients with an unplanned admission to Intensive Care Units by year . . . . .	34
Figure 16:	Distribution of fluid balance issues according to assessors compared with the opinions of surgeons .	34
Figure 17:	Distribution of fluid balance issues according to the opinions of assessors . . . . .	35
Figure 18:	Percentages of clinically significant infections that were acquired before hospital admission and during hospital admission by year in surgical patients who died with infections present . . .	36
Figure 19:	Distribution of timing and distribution of sites of infections acquired in hospital 2011 to 2016 . .	37
Figure 20:	Distribution of locations associated with falls . . . . .	41
Figure 21:	Distribution of types of road traffic accidents associated with patients who experienced trauma .	42
Figure 22:	Percentage of cases sent for second-line assessment by year . . . . .	44
Figure 23:	Proportion of cases undergoing second-line assessments by specialty, 2007/2008 to 2015/2016 . .	44
Figure 24:	Distribution of clinical management issues by criticism classification, 2007/2008 to 2015/2016 .	45
Figure 25:	Percentage of cases with preventable serious clinical incidents by year . . . . .	46
Figure 26:	Age distribution by age group of Aboriginal and Torres Strait Islander patients and non-Indigenous patients, 2011 to 2016 . . . . .	50

## CHAIRMAN'S REPORT

It has been an honour to serve as Clinical Director of the Queensland Audit of Surgical Mortality (QASM) for another year. I must thank and pay tribute to the QASM team who, as faithful staff members, have consistently committed themselves to the audit process.

Our aim has been to collect the data, interrogate the data and through publishing and presentations, learn from the findings. We trust that QASM has made this learning process easier for all who consider the outcomes of surgical process in Queensland, in both private and public hospital facilities.

The audit process is a dynamic team-based activity involving all surgeons in Queensland, and almost all healthcare organisations that involve surgical process. We believe that all health professionals can benefit through the acquisition of this knowledge, and improve skills and consider careful use of resources. The data confirms that teamwork in the diagnostic process is critical. Healthcare providers, healthcare administrators and healthcare funders must all facilitate this teamwork. Communication and collaboration between all medical specialties in delivering high quality and safe healthcare is always our primary recommendation.

The QASM believes that learning is always the foundation for improving performance, not only in the diagnostic process, but in clinical reasoning, complex decision making, improving teamwork, and in communication with patients, their families and other healthcare professionals. In looking at the data from the QASM data set we can note that there was an overall downward trend in preventable serious clinical incidents in Queensland over the audit period. I would ask you to consider carefully as you read this report, the importance of surgical input into the data set.

I would also thank the surgeons for their continuing support of, and completion of, surgical case forms (SCFs). I must also thank the assessors for their time and comprehensive support of this sometimes difficult process.

May I remind all that this audit of surgical mortality process is a learning exercise at every step, through its comprehensive, peer-reviewed, feedback process.

I trust that through this process we will enhance both safety and quality in the surgical care we aim to deliver to all our patients.



**Dr John North**  
Clinical Director, QASM

## SHORTENED FORMS

ANZASM	Australian and New Zealand Audits of Surgical Mortality
ASA	American Society of Anaesthesiologists
ATSI	Aboriginal and Torres Strait Islander
CI	confidence interval
CT	computed tomography
DVT	deep vein thrombosis
eGFR	estimated glomerular filtration rate
FLA	first-line assessment
IQR	interquartile range
m/c/s	micro urine culture and sensitivity
QASM	Queensland Audit of Surgical Mortality
QLD	Queensland
RACS	Royal Australasian College of Surgeons
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SCF	surgical case form
SLA	second-line assessment
SPC	suprapubic catheter
TED	thromboembolic deterrent

## EXECUTIVE SUMMARY

The QASM is an independent, external peer review of surgical mortality in Queensland.

### 1. Participation

- 100% public hospitals (2016)
- 100% private hospitals (2016)

### 2. Risk profile

- 57.2% (Male); 42.8% (Female)
- 87.1% (6,568/7,542) of deaths occurred in patients admitted as emergencies with acute life-threatening conditions.
- 89.6% (6,789/7,577) of audited patients had one or more significant coexisting illness.
- Median age of 76 years (range: 1 day to 105 years).

### 3. Operations

- 75.5% (5,743/7,604) of patients underwent a surgical procedure.
- 14.8% (849/5,743) of surgical patients who had operations had an unplanned return to the operating theatre because of complications.

### 4. Infection (from 2011 to 2016)

- 34.7% (1,588/4,573) of patients died with a clinically significant infection.
- 57.2% (877/1,533) of those patients who died with a clinically significant infection acquired their infection during their hospital stay. (Note: this proportion is steadily increasing.)
- *Staphylococcus aureus* was the most commonly isolated organism causing infection.

### 5. Peer review outcomes

- 68.8% (5,804/8,434) of cases had no clinical incidents.
- The most frequent type of clinical incident was “a problem with assessment”.

### 6. Aboriginal and Torres Strait Islander patients

- There was a gap of 20 years between the median age of Aboriginal and Torres Strait Islander patients (57 years) and patients of a different ethnicity (77 years).
- Often resulting from delays in presentations, the timing of operations was more frequently a problem for Aboriginal and Torres Strait Islander persons (14.2%; 22/155) than for non-Indigenous persons (7.8%; 363/4,632).

## QASM COMPARISON OF FINDINGS (2007 TO 2016)

Table 1 below shows a comparison between the audit start (2007) and current findings (2016).

Only those hospitals that were participating from 2007 (n=14) are included in this comparison.

Those hospitals include: Cairns Base Hospital, Gold Coast University Hospital, Ipswich Hospital, Logan Hospital, Mackay Base Hospital, Nambour General Hospital, Prince Charles Hospital, Princess Alexandra Hospital, QEII Jubilee Hospital, Redcliffe Hospital, Rockhampton Base Hospital, Royal Brisbane and Women's Hospitals, and Toowoomba Hospital.

<b>Table 1: QASM comparison, 2007/2008 and 2015/2016 audit periods</b>			
<b>Areas for comparison</b>		<b>2007/2008</b>	<b>2015/2016</b>
Surgeon participation		74%	100%
Hospital participation:	Public	45%	100%
	Private	0%	100%
Closed cases		452	563
Admissions:	Emergency	84.1%	90.6%
	Elective	15.9%	9.4%
Gender:	Male	55.7%	57.2%
	Female	44.3%	42.8%
Median age (in years):	Males (IQR)	74 (63–81)	75 (65–82)
	Females (IQR)	79 (66–86)	76 (63–85)
ASA status $\geq$ 4		61.1%	58.7%
Admitted with one or more comorbidities		91.3%	89.7%
Cases with risk of death as considerable or expected (as perceived by the surgeon)		67.0%	67.8%
Issues with fluid balance		11.7%	11.4%
Patients who had at least one operation		75.5%	76.3%
Patients with an unplanned return to theatre		9.1%	11.9%
Patients with postoperative complications		31.6%	31.6%
Patients with anaesthetic-related issues		1.5%	2.6%
Patients transferred		32.5%	33.7%
Delays in inter-hospital transfers		14.5%	14.3%
Requests for second-line assessment		14.6%	11.0%
Proportion of cases with areas of concern		5.6%	5.5%
Proportion of cases with adverse events		8.2%	6.4%

ASA: American Society of Anaesthesiologists; IQR: interquartile range.

## RECOMMENDATIONS AND KEY POINTS

The recommendations and key points arising from this report include:

- Surgeons need to improve the completeness of data collected on the surgical case forms (SCFs), because this is the most frequent cause of referral for second-line assessment (SLA). Surgeons should try to reduce the number of SLAs required for that reason. Lack of information on the SCFs did account for 76.4% (55/72) of referrals in 2007/2008 and 68.1% (64/94) of referrals in 2015/2016.
- Patients should be transferred to a medical unit if:
  - Very frail (74.7% had an American Society of Anaesthesiologists [ASA] grade of 3 or 4). See section 4.4.
  - Elderly (mode of 82 years). See section 4.1.
  - At high risk – 89.8% (5,064/5,639) were at least at moderate risk of death.
  - During the admission, medical issues are the prominent clinical factor.
- Private hospitals have lower rates of delays in surgical diagnoses (5.2%; 40/765).
- Public hospitals with 8.7% (581/6,670) of cases affected should investigate diagnostic systems in private hospitals to improve their diagnostic systems. Both private and public hospitals should invest more in steps to prevent procedure-related sepsis (4.0% of cases). See Table 2.
- All hospitals should be more vigilant in the early detection of postoperative bleeding (Postoperative bleeding was an issue in 1.6%% (10/628) of all cases in 2007/2008 and was still 1.6% (20/1,248) of all cases in 2015/2016). See section 5.3.
- Cardiothoracic patients should have echocardiograms immediately before surgery to check for additional deterioration before the operation commences.
- Hospitals should have high-grade screens in theatres to provide improved imaging quality. This will help enable surgeons to identify at-risk cardiac patients.
- Facilities should be made available to assist patients to present to their health professionals early in their disease processes, especially in the Aboriginal and Torres Strait Islander population. See Section 11.4.

# 1 INTRODUCTION

## KEY POINTS

- ▶ The QASM is an external peer-review audit of deaths that occur while a patient is under the care of a surgeon, whether or not the patient had undergone a surgical procedure.
- ▶ This report is a review of all deaths notified during the period 1 July 2007 to 31 June 2016.
- ▶ This report is an analysis of the 7,613 cases that have completed the full audit process.

## 1.1 Background

The RACS became responsible for the management of the Western Australian Audit of Surgical Mortality (WAASM) in 2005. The WAASM was modelled on the Scottish Audit of Surgical Mortality, which has operated since 1988. The RACS has expanded the program to all other states and territories under the umbrella of the Australian and New Zealand Audit of Surgical Mortality (ANZASM).

The principal aims of the audit are to inform, educate, facilitate change and improve the quality of practice within surgery. The primary mechanism is peer review of all deaths associated with surgical care. The audit process is designed to highlight system and process errors, and to identify trends in surgical mortality. It is intended as an educational rather than punitive process.

## 1.2 Structure and governance

The QASM covers Queensland cases and is part of ANZASM. The ANZASM is managed by the Research, Audit and Academic Surgery Division of RACS. The ANZASM oversees the implementation and standardisation of each regional audit to ensure consistency in audit processes and the governance structure across all jurisdictions (see Figure 1).

The QASM is funded by the Queensland Health Department. The RACS provides infrastructure support and oversight to the project.

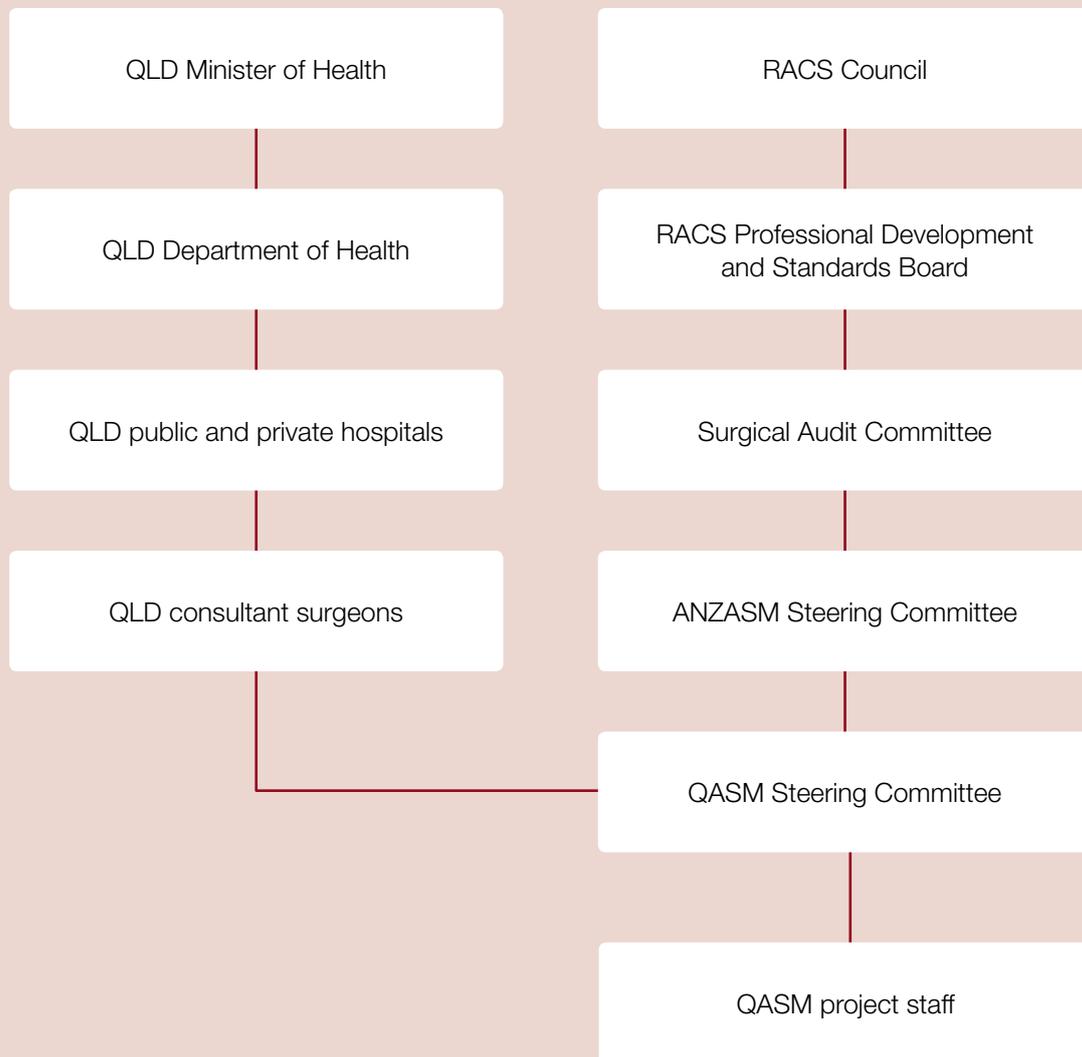
Participation by surgeons has been mandated as part of the RACS Continuing Professional Development Program since January 2010.

The ANZASM, and thus the QASM, receives protection under the Commonwealth Qualified Privilege Scheme, part VC of the Health Insurance Act 1973 (gazetted 25 July 2016).

In accordance with section 31 of the Health Services Act 1991 (QLD), the RACS-QASM has been gazetted as an 'approved quality assurance committee'.

Section 62M of the Health Services Act 1991 and the Hospital and Health Boards Act 2011 with Regulation 2012 provide a specific exception to the s 62A statutory duty of confidentiality.

**Figure 1: Governance structure of the Queensland Audit of Surgical Mortality (QASM)**



RACS: Royal Australasian College of Surgeons; ANZASM: Australian and New Zealand Audit of Surgical Mortality; QLD: Queensland.

## 1.3 Methodology

The QASM is notified of in-hospital deaths associated with surgical care. This notification is independent of the surgeon, but surgeons are also able to self-report deaths. All cases in which a surgeon was responsible for, or had some involvement in, the care of a patient are included in the audit, whether or not the patient had undergone a surgical procedure.

The clinical details relating to the management of each case are recorded on a standard, structured SCF completed by the consultant or treating surgeon associated with the case. The completed SCF is returned to QASM by hardcopy or electronically. It is de-identified and sent for first-line assessment (FLA) to a surgeon of the same surgical specialty but from a different hospital. De-identification means the first-line assessor is unaware of the names of the deceased, the treating surgeon or the hospital in which the death occurred.

The clinical information from these deaths provides the data presented in this report.

There are two possible outcomes of an FLA:

- The information provided by the treating surgeon is adequate to reach a conclusion about the case and to identify any issues of management.
- A further, in-depth, second-line assessment (SLA) is necessary:
  - to clarify issues of patient management that the first-line assessor identified or suspected
  - because the treating surgeon provided inadequate information to reach a conclusion.

Where an SLA is deemed necessary, the assessor is selected using the same criteria as for first-line assessors.

The audit process is outlined in Figure 2.

### 1.3.1 Audit inclusion and exclusion criteria

The QASM audits all deaths that occur in Queensland hospitals while the patient was under the care of a surgeon. However, patients who are deemed terminal before admission and do not have operations are excluded from the full audit process.

QASM includes all deaths which meet one of the following criteria:

- the patient was under the care of a surgeon (surgical admission), whether or not an operation was performed
- the patient was under the care of a physician (medical admission) and subsequently underwent a surgical procedure
- it was a gynaecology-related case
- it was possibly or definitely an anaesthetic-related death, or a death which occurred within 48 hours of surgery.

Cases that do not meet the inclusion criteria are excluded from the audit by the notifying hospital. A case will also be excluded in instances where the QASM is notified of a death but subsequently decides that the case does not fall within the inclusion criteria.

### 1.3.2 Data analysis

This report covers deaths reported to the QASM from 1 July 2007 to 30 June 2016. Nine years of data collection is included in this report. All data presented in this report is from the QASM database unless otherwise specified. The nature of the audit process means that some cases reported during this period will still be undergoing review as at the census date (1 July 2016). These cases will be included in the next report.

Surgeons can complete the SCF and first-line assessment online. Data from hardcopy forms is entered into the system by audit staff. Data is entered and stored in a specifically designed database – a central Structured Query Language server database which includes a reporting engine.

Data is encrypted in the database with Secure Sockets Layer Certificates. All transactions are time stamped and all changes to audit data are written to an archive table, enabling a complete audit trail for each case. Security for this system is high. An integrated workflow rules engine supports the creation of letters, reminders and management reports.

To maintain data integrity, all data are routinely checked against the original SCF and assessment forms by the project manager or another project officer. Data is cross-checked and the resources used include medical record departments, surgeons, and coroner's reports. Data is cleaned using logic testing and manually reviewed before analysis. Variables are checked for extreme or illogical values and corrections are made to the original data.

Once cleaned, the data are downloaded again before analysis. A total of 28 tables are downloaded into Excel and then copied across to Statistical Package for Social Sciences (IBM-SPSS version 24.0) for analysis. A key variable that is common to all tables can be used to combine tables. Generally, simple frequencies and cross tabulations are used to create the report. Graphs are produced using either SPSS or Excel.

Qualitative analysis is performed using standard techniques. The QASM project manager and Clinical Director independently classify all qualitative information into groups. These groupings are then compared and any differences discussed until consensus is reached.

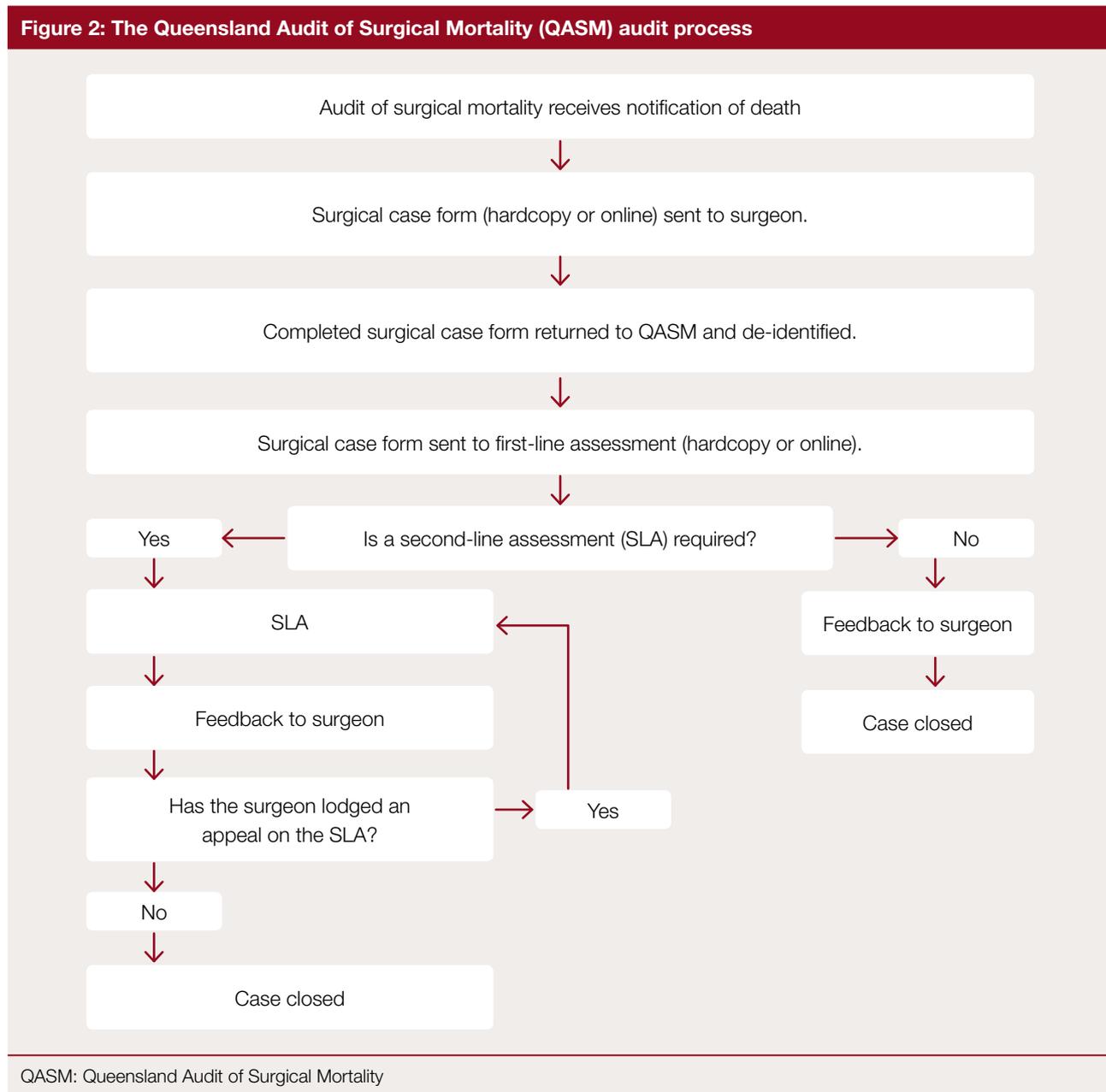
In this report the numbers in parentheses (n) in the figures and tables represent the number of cases analysed. The total number of cases used in the analyses varies, because not all data points were completed. The numbers of cases included in each analysis are provided for all tables and figures in the report. Low case numbers for some surgical specialties may compromise confidentiality and the de-identification process. In these circumstances, the surgical specialty will not be listed and all deaths will be aggregated under the specialty "Other".

### 1.3.3 Statistical analysis

Cross tabulations are used to calculate risk ratios (RRs). The RR is an intuitive way to compare the risks for two groups. That is, it is the ratio of the probability of an event occurring (e.g. developing a disease) in an exposed group compared to the probability of the event occurring in a non-exposed group. If the RR is 1 (or close to 1), it suggests no difference or little difference in risk (incidence in each group is the same). A RR > 1 suggests an increased risk of that outcome in the exposed group. A RR < 1 suggests a reduced risk in the exposed group.

All RRs are reported with a 95% confidence interval (CI).

Medians are reported together with the interquartile range (IQR). The IQR shows the values for the data within the 25% and 75% limits. It overcomes the problems that arise with the simple range because extreme values are ignored. It represents the middle 50% of values in a rank ordered series.



## 1.4 Providing feedback

One of the primary aims of the QASM is education. Therefore, participation in the audit is a mandatory component of a surgeon's continuing professional development. Education is achieved by providing commentary obtained during the audit process directly to the treating surgeon, as well as highlighting lessons learned from de-identified cases in QASM's *Lessons from the Audit*. The QASM also produces annual reports, which highlight important issues in patient management in Queensland.

The case studies within this report form part of the feedback educational process. This is essential to the quality improvement process that QASM follows. The case studies in this report are from a variety of specialties and a variety of authors, and are chosen to highlight certain aspects of the report. Some have been edited to focus on a few points in a complex story or to reduce their length.

## 1.5 Reporting conventions

### 1.5.1 Reporting clinical incidents

In the structured SCF, the surgeon is asked to document whether there were any clinical incidents during the care of the patient. If a clinical incident or event took place the surgeon is asked to provide more information on the incident. The surgeon is asked to provide information on the following.

- Report on the perceived impact of the incident on the outcome by stating whether the incident:
  - made no difference to the outcome
  - may have contributed to death
  - caused the death of a patient who would otherwise have been expected to survive.
- Provide their perception as to preventability, using the following categories:
  - definitely preventable
  - probably preventable
  - probably not preventable
  - definitely not preventable.
- Indicate which clinical area was most responsible for the incident or event:
  - audited surgical team
  - another clinical team
  - hospital
  - other.

First- and second-line assessors complete the same assessment matrix.

### 1.5.2 Analysis of clinical incidents

A primary objective of the QASM peer-review process is ascertaining whether death was a direct result of the disease process alone, or if aspects of management of the patient might have contributed to that outcome. Where there is a perception that the clinical management may have contributed to death, the QASM specifies the following spectrum of criticism for use by assessors.

- **Area for consideration.** The assessor believes an area of care could have been improved or different, but recognises that the issue is perhaps debatable.
- **Area of concern.** The assessor believes that an area of care should have been better.
- **Adverse event.** An unintended injury or event that was caused by the medical management of the patient rather than by the disease process, and that was sufficiently serious to lead to prolonged hospitalisation or which contributed to or caused death. Specific complications (e.g. pulmonary embolus, anastomotic leak) are by definition always adverse events but may not be preventable.

### 1.5.3 Results

The 2016 report covers deaths reported to the QASM from 1 July 2007 to 31 June 2016. See Figure 3.

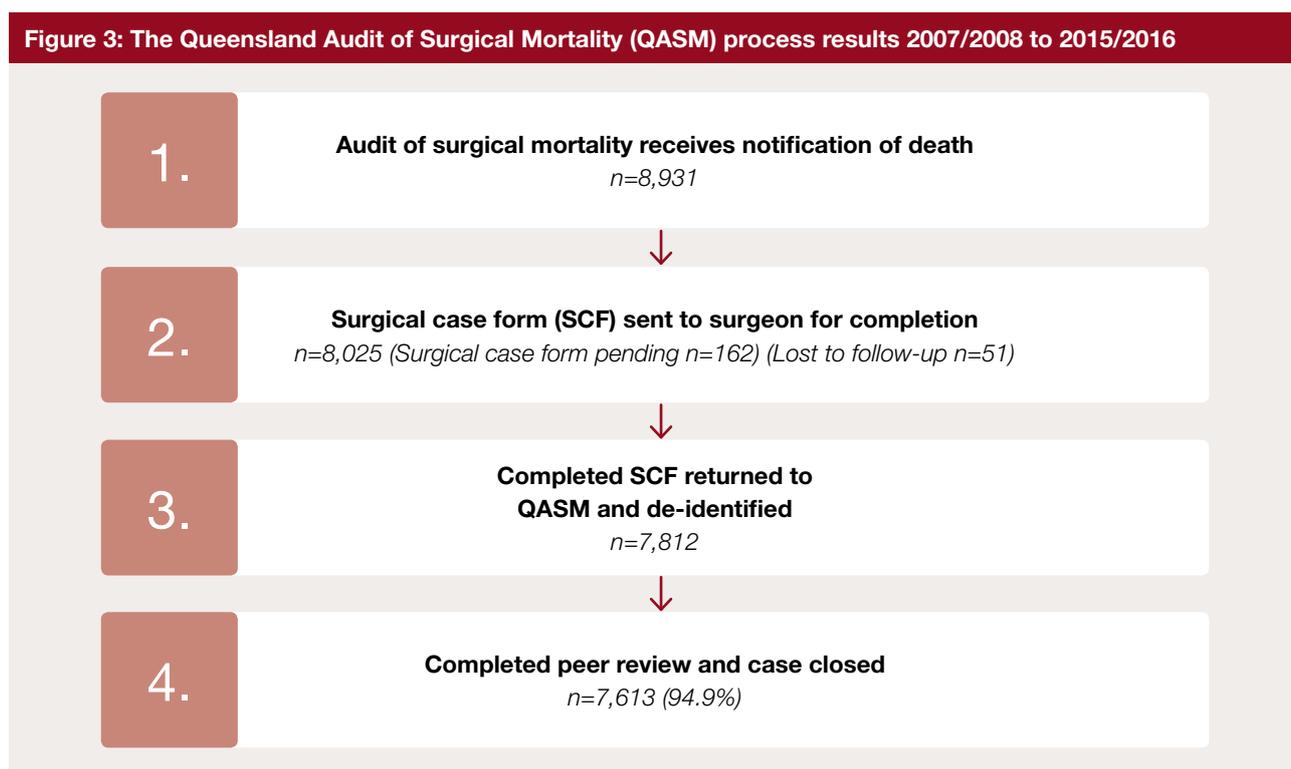
Data was downloaded for analysis on 1st July 2016. Some cases were still under review as at the census date of 1st July 2016 and the case outcomes were not available for this report. These particular cases will be featured in the next report. Patients admitted for terminal care are excluded from the full audit process.

For the purposes of collating data for the report, data are encrypted, sent to and stored in a central Structured Query Language server database with a reporting engine. All transactions are time-stamped. All changes to audit data are recorded in an archive table enabling a complete audit trail for each case. An integrated workflow rules engine supports the creation of letters, reminders and management reports.

The 2016 report data were analysed using the Statistical Package for Social Sciences, version 22.0 and Microsoft Office Excel (2010).

Numbers in parentheses in the text (n) represent the number of cases analysed. As not all data points were completed, the total number of cases used in the analyses varies. The total numbers of cases (n) included in individual analyses are provided in all tables and figures in the report.

Data for the financial years 2006/2007 to 2015/2016 have been grouped in figures and tables for the purpose of clarity. It should be noted that where no comparative data are given, there was no significant difference for the 2006/2007 to 2015/2016 audit periods.



## 2 AUDIT PARTICIPATION

### KEY POINTS

- ▶ All Queensland surgeons are participating in the audit.
- ▶ All Queensland hospitals are participating (public and private).

The total participation by surgeons and hospitals in Queensland indicates that surgery is under scrutiny whenever a death occurs. Both surgeons and hospital systems benefit from this scrutiny with the ultimate advantage being for the Queensland patient.<sup>(2,3)</sup>

### 2.1 Surgeons

All surgeons operating in hospitals in Queensland participate.

There are 1,084 participating consultants as of 01/07/2016.

Nearly half of these surgeons also act as first-line assessors, 45.8% (497/1,084), and as second-line assessors, 43.1% (467/1,084).

In 2015/2016, surgeons completed their SCFs in 95.2% (1,178/1,237) of cases.

In that same time period, surgeons took a median of 32 days to return the SCF (interquartile range [IQR 9days–72days]). There were 8.5% (105/1,237) of SCFs returned by surgeons on the same day they were notified, while in 10.0% (124/1,237) of cases, surgeons took nearly 6 months to return their forms.

### 2.2 Hospitals

All public hospitals and private hospitals with surgical services participate in the audit.<sup>(3)</sup>

As of July 2016 there were 69 hospitals actively participating:

- 30 public hospitals (100% of QLD public hospitals)
- 39 private hospitals (100% of QLD private hospitals).

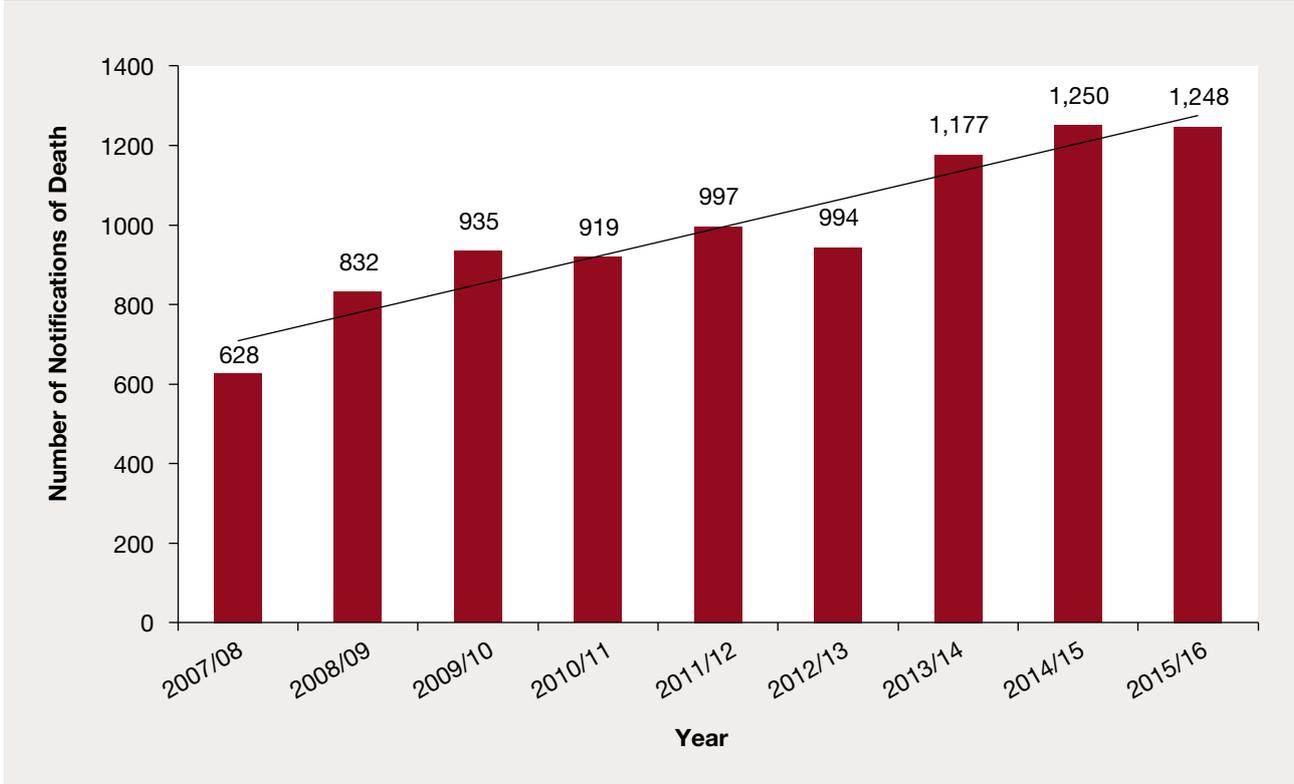
In addition, 43.8% (14/32) of private day hospitals voluntarily cooperate with QASM.

### 2.3 Patients

#### Audit numbers

- There were 238,485 admitted patient episodes of care in Queensland acute public hospitals in the 2015/2016. All of these patients underwent anaesthesia.<sup>(1)</sup>
- There were 883 patients in 2015/2016 who died after having had a general anaesthetic. All of those patients had been patients in a Queensland public hospital.<sup>(1)</sup>
- Also during the same time period, there were 744 notifications to the QASM of comparable patients who died. This revealed a 15.7% difference between Queensland Health numbers of deaths and QASM notifications of deaths. After investigation, we determined that two hospitals had been under-reporting. QASM notified these hospitals and they made changes to their reporting procedures
- Because of privacy regulations, it is not yet possible to check the accuracy of the notifications from private hospitals.
- There were 7,604 cases reviewed in this audit. There were 75.5% of surgical patients who underwent anaesthesia and had operations (5,743/7,604).
- Private hospitals were included in the audit from 2013/2014, when a sharp increase in numbers recorded by QASM can be seen (Figure 4).

**Figure 4: Numbers of notifications of death received by year (n=8,930)**



In 2007/2008, there were 14 hospitals submitting NODs to QASM. This grew to 49 hospitals in 2015/2016. One hospital changed site, and another hospital changed owners. No hospital withdrew from the audit between 2007 and 2016.

The number of notifications per year was validated using Queensland Health data. This data comparison was of surgical admissions only.

### 3 COMPARISON BETWEEN PRIVATE AND PUBLIC HOSPITALS

#### KEY POINTS

- ▶ Of surgical patients who died, those in private hospitals had:
  - a longer median length of stay in hospital
  - a lower likelihood of being emergency admissions
  - fewer transfers.

Surgical care occurs in both Queensland private and public hospitals. Often the complexities of operations are different, as are the complexities of patients' conditions.

The data in Table 2 (below) does not provide a comparison between patients who died and those who did not die in either hospital sector, as baseline denominator data is not available to the audit.

Some of the characteristics of the patients treated surgically in private hospitals are different from those treated in public hospitals. These differences may be due to the different demographic and surgical profiles of the two groups (see Table 2).

**Table 2: Comparison of surgically related findings between private hospitals and public hospitals (2013-2016)**

	Private hospital patients (n=771)	Public hospital patients (n=2,770)	Relative risk of private hospitals compared with public hospitals	95% confidence intervals
Median age in years (IQR)	82 (74–89)	74 (63–84)		
Median length of stay in days (IQR)	13 (6–24)	8 (3–18)		
Emergency admissions	69.4 (562/810)	90.2 (2,476/2,746)	0.77*	0.73 to 0.81
Malignancy present	40.0% (161/402)	26.5% (408/1,539)	1.47*	1.34 to 1.71
Comorbidities present	94.5% (725/767)	89.0% (1,991/2,237)	1.06*	1.04 to 1.09
Transferred	15.7% (119/756)	30.6% (672/2,196)	0.51*	0.43 to 0.51
Surgical diagnosis delay	5.2% (40/767)	8.5% (189/2,225)	0.60*	0.44 to 0.82
Operation within 30 days	85.2% (656/769)	75.0% 1,680/2,239	1.15*	1.11 to 1.19
Postoperative complication from surgeons' own assessments	40.7% (263/645)	30.6% (510/1,664)	1.32*	1.18 to 1.49
Unplanned return to theatre	14.7% (110/746)	11.7% (253/2,169)	1.26*	1.03 to 1.56
Clinically significant infection	32.5% (247/761)	35.7% (781/2,190)	0.91	0.81 to 1.02

**Table 2: Comparison of surgically related findings between private hospitals and public hospitals (2013-2016)**

	Private hospital patients (n=771)	Public hospital patients (n=2,770)	Relative risk of private hospitals compared with public hospitals	95% confidence intervals
Died with infections acquired during admission	20.8% (160/771)	31.4% (704/2,242)	0.66*	0.57 to 0.77
Admitted to ICU	56.8% (437/769)	57.9% (1,292/2,231)	0.98*	0.91 to 1.05
Surgeon said (in retrospect) they would have done something differently	14.9% (111/ 747)	13.9% (299/2,157)	1.07	0.80 to 1.31
Assessors define clinical incident as “decision to operate” in all patients	9.2% (69/747)	4.3% (97/2,243)	2.13*	1.59 to 2.88

Denominators differ because questions were answered only when appropriate or possible.  
Missing data (n=34). Some patients were co-located (n=51).  
ICU: intensive care unit; IQR: interquartile range.  
\*Statistically significant.

## 4 DEMOGRAPHIC PROFILE OF AUDITED CASES 2007-2016

### KEY POINTS

- ▶ 87.1% (6,568/7,542) of audited deaths were patients admitted as emergencies with acute conditions.
- ▶ The median age and spectrum of comorbidities in audited deaths indicate that surgical mortality predominantly occurs in individuals who are sick, elderly and have major pre-existing comorbidities.
- ▶ 89.6% (6,789/7,577) of patients had one or more pre-existing medical conditions present.
- ▶ 74.7% (5,390/7,216) of patients had an ASA grade of 3 or 4.

Patients who die after being surgical admissions often are admitted to hospital with many physical challenges. These patients are generally older, sicker and have more serious conditions compared with surgical patients who do not die.

### 4.1 Age

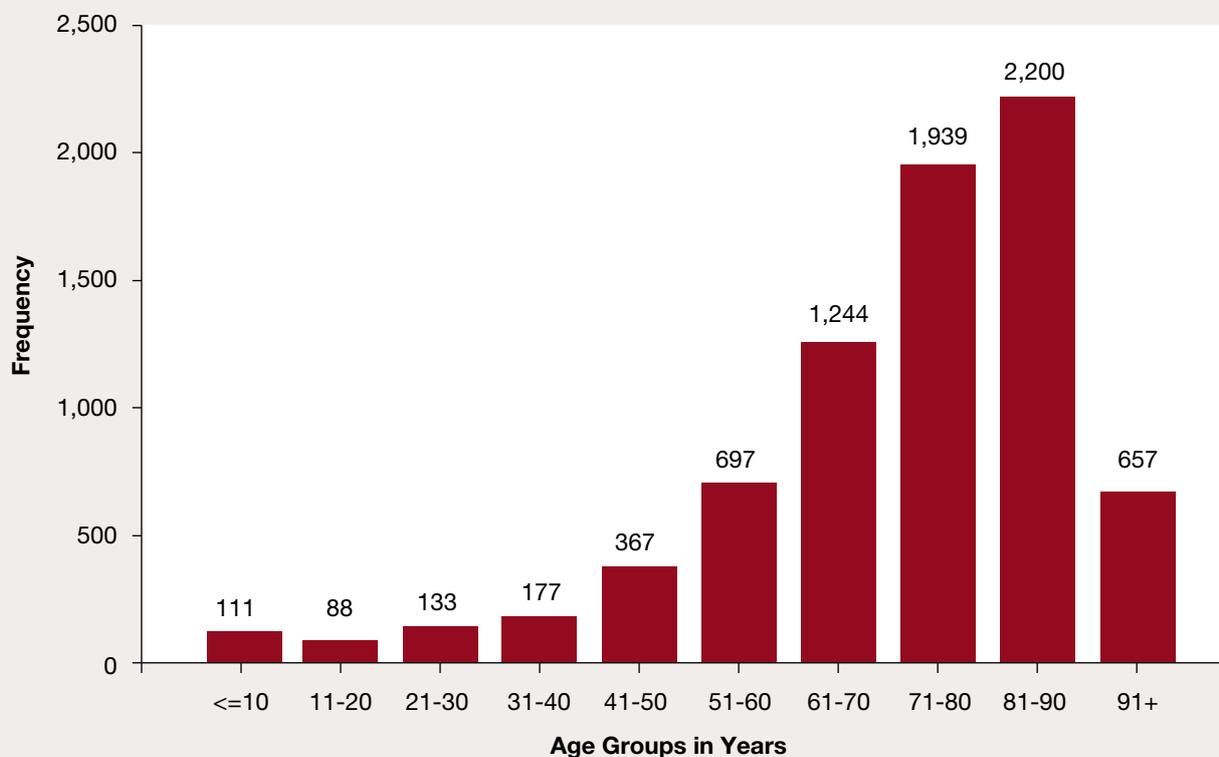
Age is an important risk factor in surgical care: the older the patient, the higher the risk.<sup>(4)</sup> Very young patients are at high risk as well.

While the median age was 76 years (IQR, 64–84), the mode (the most frequently recorded age) was 82 years (see Figure 5) during the years of the audit 2007/2008 to 2015/2016.

There were 68 deaths in patients younger than 1 year – 0.9% (68/7,613).

There were 18 deaths in patients aged 100 years or older – 0.2% (18/7,613).

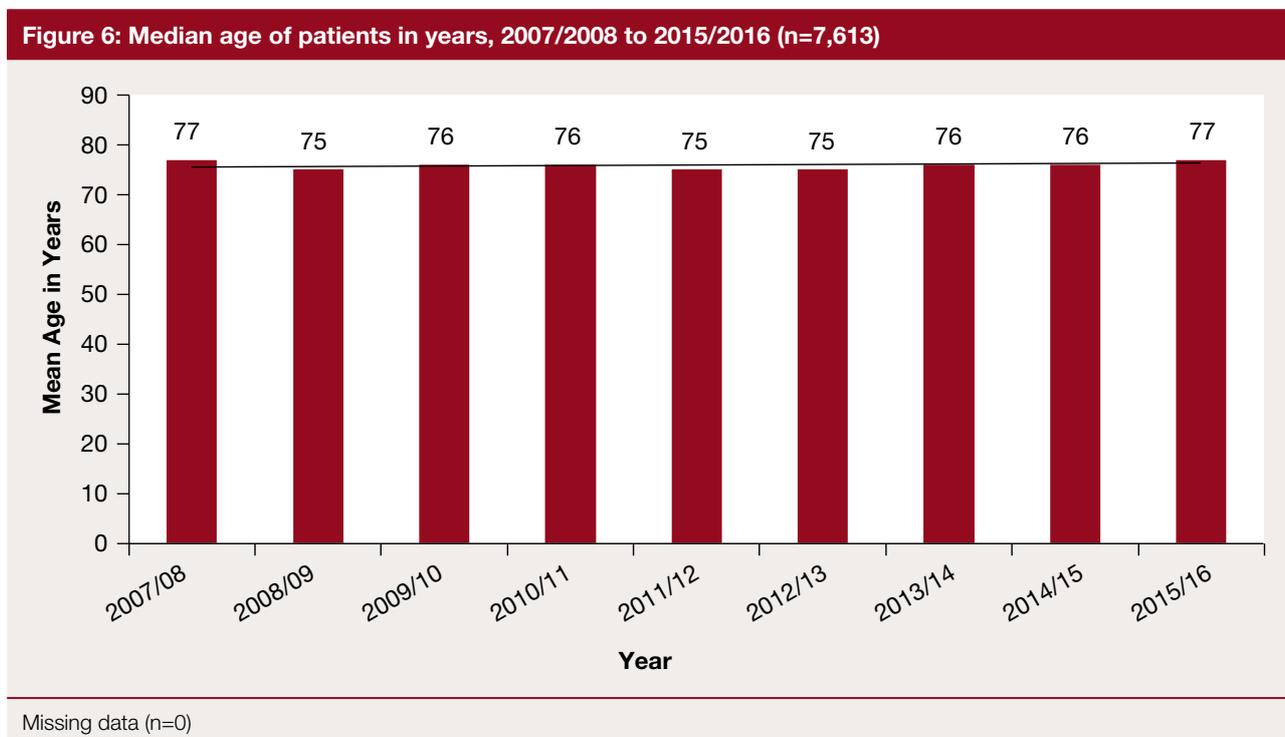
**Figure 5: Grouped ages of patients audited, 2007/2008 to 2015/2016 (n=7,613)**



Missing data (n=0)

The median age in 2007 was 76 years (IQR, 63–84; n=515). The median age was very similar in 2016 at 77 years (IQR, 66–86; n=855).

The effect of the ageing Queensland population is not obvious. The changing of the median age was not significant over the 9 years of the audit (see Figure 6).



## 4.2 Gender

Surgical patients who died were more likely to be male than female:

- 57.2% (4,351/7,613) of cases were males.
- 42.8% (3,260/7,613) of cases were females.

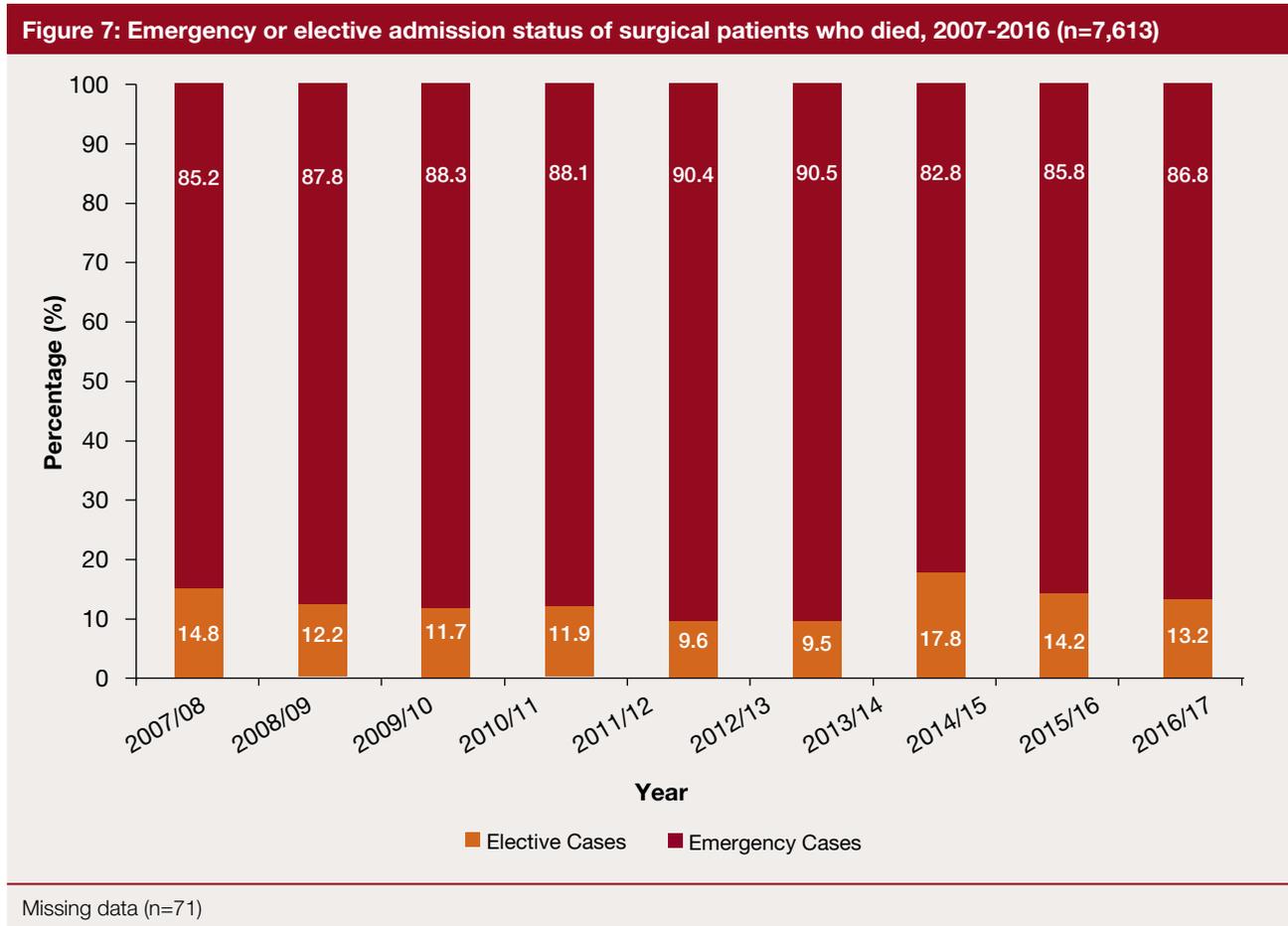
There was no gender recorded for two cases.

The gender distributions seen over the 9 years of the audit have not changed significantly.

### 4.3 Admission status

Emergency surgical admission is a strong predictor of death. Patients were predominantly hospital emergency admissions with life-threatening conditions (87.1%; 6,568/7,542).<sup>(5-7)</sup>

See Figure 7.



Some surgical patients did not have operations. Across the reporting period, 6.9% (67/972) of elective admission patients, and 27.1% (1,779/6,561) of emergency admission patients, did not undergo an operation prior to death.

Of those patients who did not have an operation, who were 24.9% of surgical cases (1,952/7,833), the decision “not to operate” was generally an active decision to palliate an irretrievable situation.

Decisions not to operate were:

- generally an active decision (48%; 833/1,737)
- nearly always made by the consultant (95.9%; 774/807)

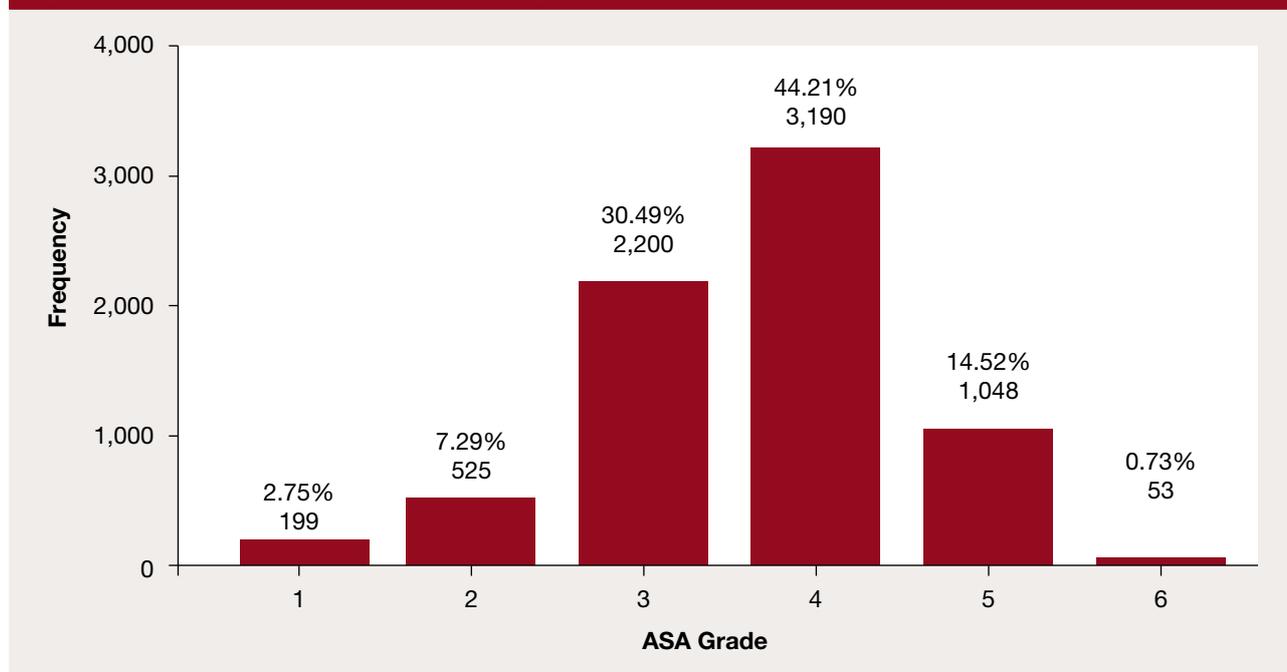
## 4.4 American Society of Anesthesiologists grade

The American Society of Anesthesiologists (ASA) physical status classification system is a system for assessing the fitness of patients before surgery. The ASA grade is an international measure of patient risk used by anaesthetists and surgeons.<sup>(20,21)</sup>

The ASA grades and their characteristics are:

1. A normal healthy patient
2. A patient with mild systemic disease
3. A patient with moderate systemic disease
4. A patient with severe systemic disease that is a constant threat to life
5. A moribund patient unlikely to survive 24 hours, who is not expected to survive without an operation
6. A declared brain-dead patient whose organs are being removed for donor purposes.

**Figure 8: ASA grade distribution by percentages and frequencies (n=7,216)**



Missing data (n=397); ASA: American Society of Anesthesiologists.

An ASA grade of 3 or 4 was assigned to 74.7% (5,390/7,216) of patients. This indicates that a relatively severe degree of systemic disease was present in the majority of patients at the time of treatment. See Figure 8.

According to surgeons, 89.8% (5,064/5,639) of patients had at least a moderate risk of death prior to their operation.

## 4.5 Comorbidities

Surgeons recorded all known comorbidities (coexisting medical conditions), in addition to the primary medical (presenting) problem.

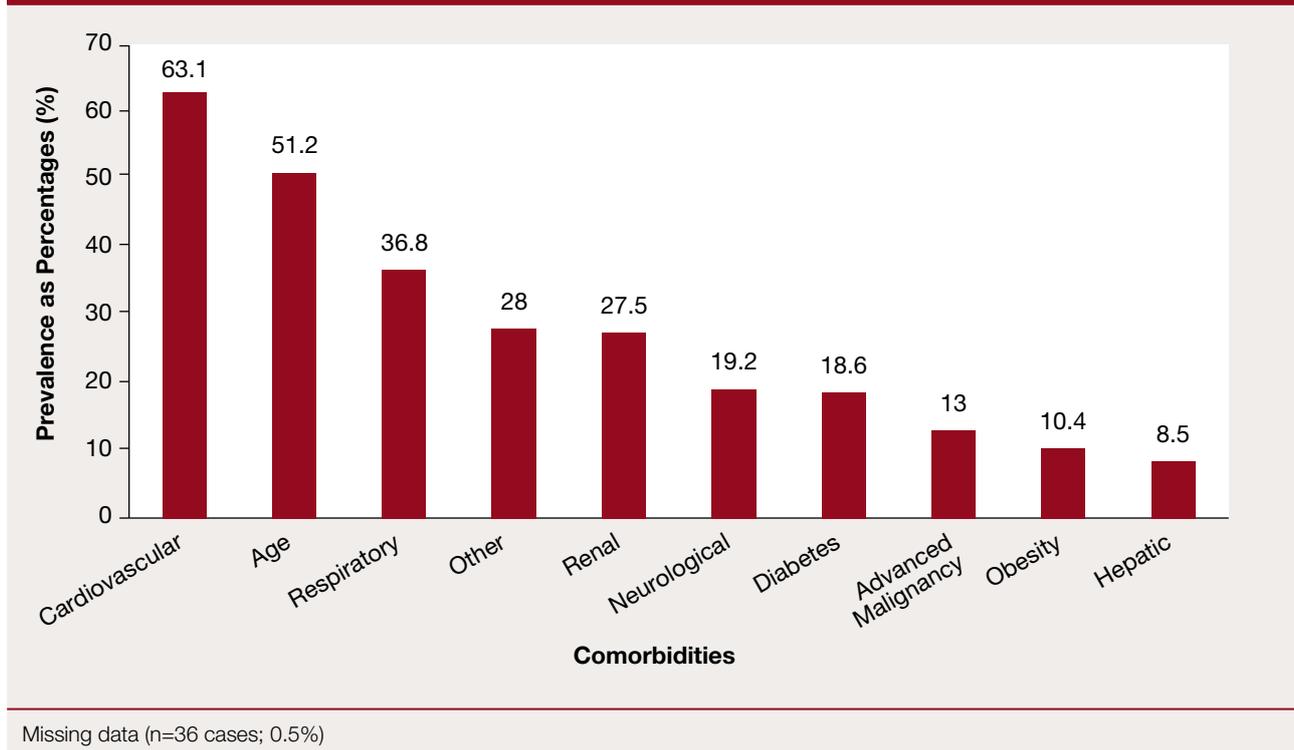
- One or more comorbidities was reported in 89.6% (6,789/7,577) of cases.
- 69.9% (5,298/7,577) of patients had at least two comorbidities, emphasising the high risk profile of this group of patients.

This population of older patients has more comorbidities than a younger population would have.

- The most prevalent comorbidity was cardiovascular disease, with 63.1% (4,778/7,577) of patients presenting with this condition.
- Age itself was also a common comorbidity, with 51.2% (3,880/7,577) of patients having age as a factor in their presentation. Patient demographics also reflected this, with a median age of 76 years (IQR, 64–84).

The prevalence of each of the individual comorbidities is presented in Figure 9. Most surgical patients who died had several comorbidities.<sup>(6)</sup>

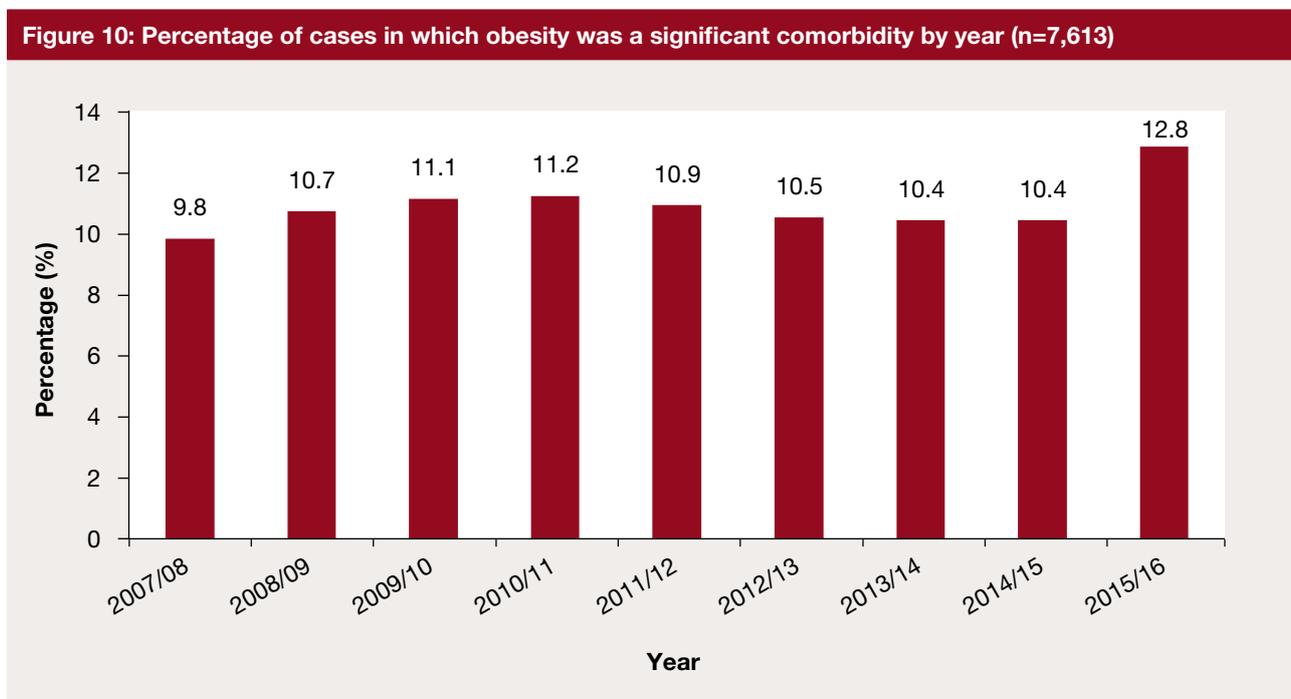
**Figure 9: Percentage of patients presenting with specific types of comorbidities from 2007/2008 to 2015/2016 (n=7,577)**



### 4.5.1 Obesity

Obesity is a risk factor for surgical care.<sup>(9)</sup>

The prevalence of obesity has not shown a significant increase over the nine years of the audit (see Figure 10).



## 5 PROFILE OF OPERATIVE INTERVENTIONS

### KEY POINTS

- ▶ A surgical procedure was performed on 75.5% (5,743/7,613) of patients.
- ▶ More than one visit to the operating room was required for 27.9% (2,225/7,969) of patients during their hospital stay.

Patients are admitted to hospital for surgical care because an operative procedure is viewed by health professionals as essential for their wellbeing. Surgeons decide whether an operation is in the patient's best interests.

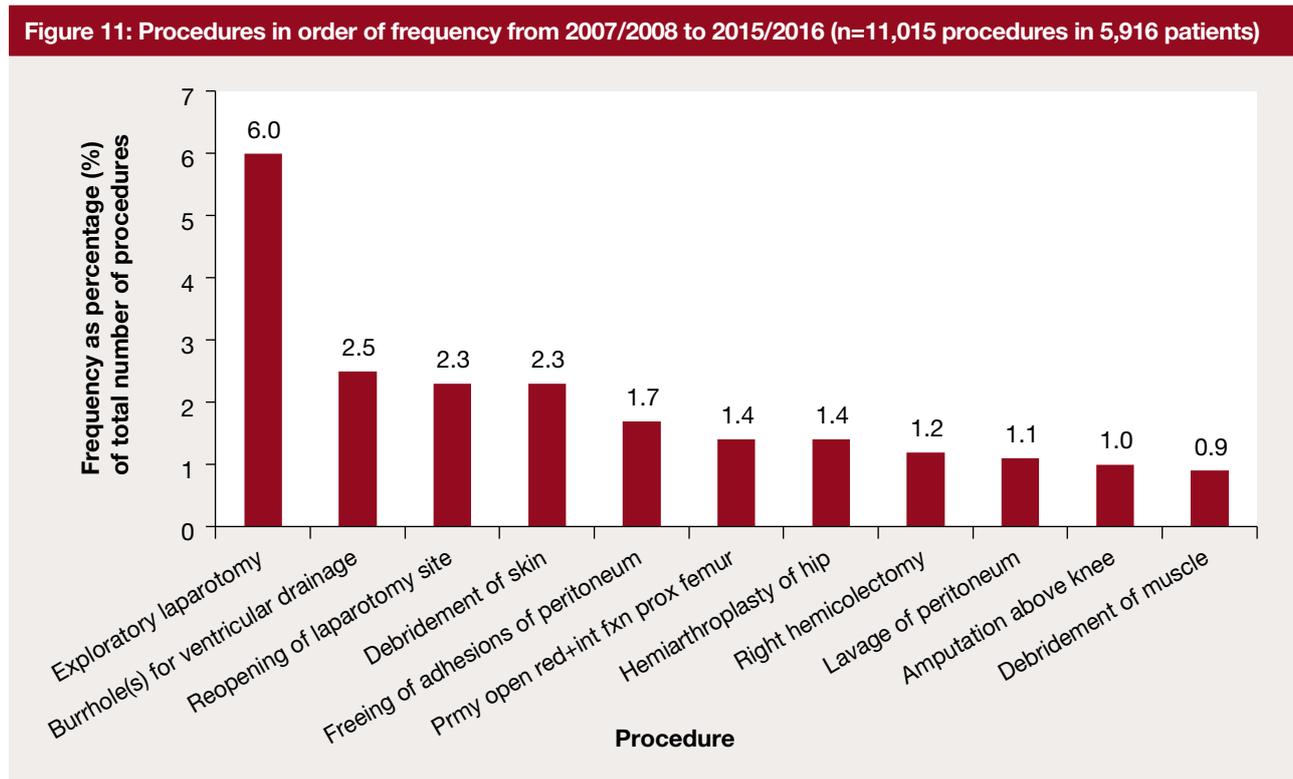
### 5.1 Operative rate

- 75.5% (5,743/7,604) of patients underwent an episode of surgery during their last admission.
- 24.5% (1,861/7,604) of patients had no surgery during their final admission.
- A total of 7,969 operative episodes were undertaken on the 5,743 patients who had surgery, reflecting the fact that an individual patient may have more than one episode of surgery during their admission. One burns patient, had 16 operations in their last admission.
- 74.6% (4,283/5,743) of patients who had an operation had just one operation.
- 25.4% (1,460/5,743) of patients had more than one visit to the operating theatre during their hospital stay.

## 5.2 Frequency of operative procedures

A patient may undergo multiple procedures during the same admission and during the same surgical episode. There was a wide variety of procedures performed over the period of the audit, with all of the surgical subspecialties included in the audit.

There were 1,935 different procedures performed. The most frequently performed procedure was the exploratory laparotomy (see Figure 11).



### 5.3 Postoperative complications

Most patients (66.7%; 3,831/5,743) who died after an operative procedure did not have a postoperative complication. (Note: Some surgeons did not answer this question.)

Postoperative complications are a strong predictor of death in a surgical patient.<sup>(10,11)</sup>

The most common postoperative complications as percentages of operative cases for 2007/2008 to 2015/2016 were:

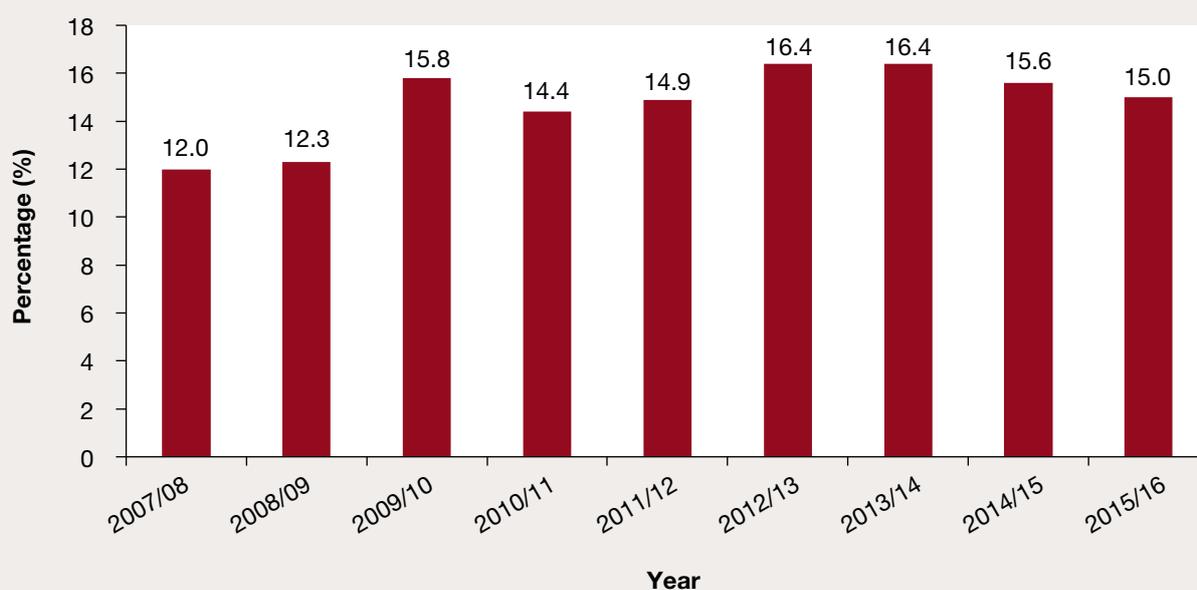
Postoperative complications	Percentage	Numbers
Procedure-related sepsis	4.0%	(231/5,743)
Postoperative bleeding	3.9%	(222/5,743)
Tissue ischaemia	3.7%	(215/5,743)
Anastomotic leak	3.4%	(196/5,743)
Myocardial infarct	1.2%	(67/5,743)
Aspiration pneumonia	1.1%	(62/5,743)
Cerebrovascular accident	0.8%	(48/5,743)
Pneumonia	0.8%	(46/5,743)
Pulmonary complications	0.7%	(40/5,743)
Renal failure	0.6%	(34/5,743)
Respiratory failure	0.5%	(29/5,743)
Multiple organ failure	0.3%	(19/5,743)
St elevation myocardial infarction	0.3%	(16/5,743)
Ileus	0.2%	(12/5,743)
Pulmonary embolus	0.2%	(10/5,743)
Deep vein thrombosis (DVT)	0.1%	(7/5,743)

## 5.4 Unplanned returns to theatre

As with other postoperative complications, unplanned returns to theatre are a strong predictor of death.<sup>(12)</sup>

- The overall rate of subsequent (unplanned) returns to theatre was 14.8% (849/5,743), with some patients requiring multiple episodes of surgery.
- There was no clear trend over the years of the audit in the percentage of unplanned returns to theatre (see Figure 12).

**Figure 12: Percentages of cases that had unplanned returns to theatre by year (n=5,743)**



Missing data (n=166; 2.9%); "unknown" (n=10; 0.2%).

There was a higher rate of return to theatre in the private hospitals (16.8%; 108/642) compared with public hospitals (14.7%; 717/4,862), risk ratio 1.14 (95% confidence interval [CI] 0.95 to 1.37). While this risk may be significant in practical terms, it is not statistically significant.

## 5.5 Case study: postoperative complications

### **Urosepsis in a patient with suprapubic catheter (SPC) with a fracture of proximal femur.**

An 85-year-old man was admitted to the hospital with a fracture of the right proximal femur. He had a long term SPC in place that had been changed approximately 3 weeks prior to this admission. He also had a past history of chronic renal failure, hypothyroidism, atrial fibrillation, DVT and depression. He was on warfarin.

His admission haemoglobin was 116 g/L, creatinine 212 mmol/L and international normalised ratio of 1.8. Estimated glomerular filtration rate (eGFR) results were not documented in the admission notes. Surgery was planned once coagulation profile was acceptable while warfarin was withheld.

50 mL of urine was drained from the catheter in the emergency department. The offer to send this for microscopy was declined by the emergency department physician. Preoperative nursing notes stated that the urine was cloudy or 'pus looking' but there was no documentation to indicate that nursing staff had taken any further action.

#### **Surgery**

Surgery was performed 2 days postadmission with no adverse events. He was admitted to the intensive care unit (ICU) postoperatively for 1 day and then transferred to the ward. Postoperative haemoglobin was 112 g/L and creatinine was 181 mmol/L. Nursing notes on day 4 postoperation noted that urine m/c/s showed increased leucocytes and a stat dose of norfloxacin was given.

Eleven days postoperatively the patient was reviewed by a district medical officer for hypotension. A septic screen was performed to rule out an infection: C-reactive protein was 77 mg/L, white cell count  $8.1 \times 10^9/L$ , haemoglobin 99 g/L and eGFR of 22 mL/min/1.73m<sup>2</sup>. The medical officer also noted that urine results from 8 days earlier showed more than 1,000 leucocytes/high power field and grew *Pseudomonas aeruginosa*. Norfloxacin was started and a recommendation was made to change the SPC.

Sixteen days postoperation a medical emergency team call was made for a change in neurological status of the patient, which was again attributed to urosepsis and recommended for ongoing medical review. A family meeting was held and it was decided that he was not for resuscitation. The patient's condition deteriorated and he was pronounced dead 18 days after the operation.

#### **Considerations**

This case highlights the possible presence of infection in patients with chronic bladder catheterisations. Every effort should be made to identify such infections and treat as early as possible, especially in the presence of chronic renal failure. This would minimise the risk of septicaemia and other organ failure.

The nursing staff should be aware that if abnormal findings are noted, they should be brought to the medical officer's attention rather than just written in the notes. Test results always require review by the team requesting the test.

#### **Comments**

The issues that arose from this case were:

- failure to identify urosepsis early in a patient with chronic SPC.
- failure to follow up the results of urine m/c/s.
- failure of nursing staff to inform the medical team when the urine was noted to be 'pus looking'.

## 6 RISK MANAGEMENT STRATEGIES

### KEY POINTS

- ▶ DVT prophylaxis is a well-established practice with surgical patients.
- ▶ There were very few patients who needed ICU support but did not receive it.
- ▶ Fluid management issues continue to be challenging with elderly surgical patients.

Surgery can be risky, so surgeons take all the measures possible to ensure good outcomes for their patients.

### 6.1 DVT prophylaxis

DVT prophylaxis is regularly used as a prophylaxis measure in all Queensland hospitals.<sup>(13)</sup>

The treating surgeons recorded that:

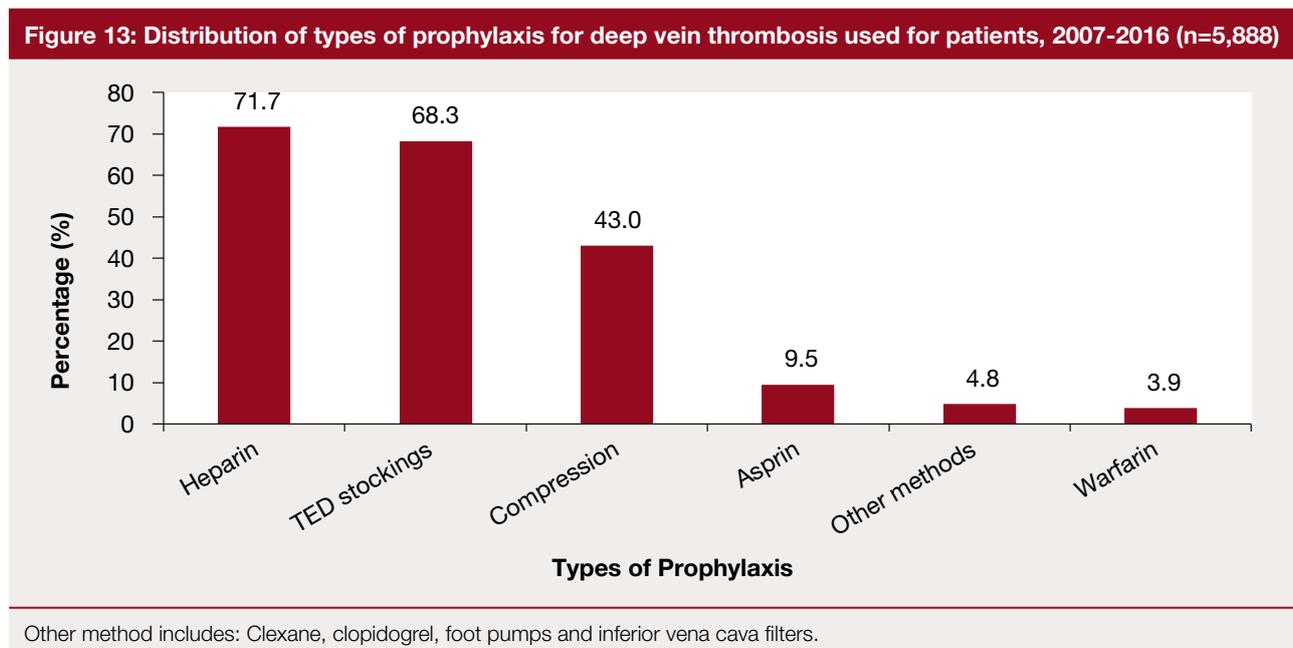
- 78.8% (5,888/7,475) of patients had DVT prophylaxis.
- 12.5% (938/7,475) of patients did not receive DVT prophylaxis because it was not appropriate for them.
- 5.2% (390/7,475) of patients were receiving other forms of DVT prophylaxis; generally, that was Clexane. Please see figure 13.

(Note: There was missing data for this question in 138 cases.)

Assessors considered that in nearly all cases the DVT prophylaxis had been appropriately handled. In only 2.9% (210/7,306) of cases did the assessors report that the prophylaxis had been inappropriate. (Note: There was missing data for this question in 305 cases. More assessors answered this question than surgeons.)

The most frequently used prophylaxis agents were Heparin (in any form) and thromboembolic deterrent (TED) stockings (see Figure 13).

More than one type of DVT prophylaxis was used in two-thirds of patients (66.7%; 3,928/5,888).



As shown in Figure 12, 71.7% of patients had heparin as their prescribed main drug for DVT prophylaxis. They may also have had TED stockings (used in 68.3% of patients) or compression on their legs (used in 43% of patients).

## 6.2 Case study – DVT prophylaxis

### Massive probable pulmonary embolism causing death

This 55-year-old patient presented at a major regional hospital with a history of increasing back and neck pain with numbness and weakness in his right arm. The patient was noted to have evidence of myelopathy and was investigated appropriately.

Computed tomography (CT) scan demonstrated a tumour in the posterior elements of the cervical spine at approximately C6, with significant compression of the cervical spinal cord. The tumour was described on CT scan as being aggressive and destructive. It was thought to be either a metastasis or myeloma.

The patient was transferred rapidly to a major metropolitan hospital for spinal surgery. The timing of the transfer was appropriate. On admission to the metropolitan hospital, the records do not show any evidence to suggest that there had been any clinical deterioration since presentation. The patient was reviewed by the relevant surgical spinal team. A decision was made to undertake a posterior cervical spinal decompression with instrumented fusion. There was a minor delay until surgery due to some equipment issues.

### Surgery

Surgery was performed the day after the admission. The expertise of the surgeon undertaking the operation was appropriate. The decision to operate and the surgery performed were appropriate. It would appear that the imaging had been reviewed preoperatively, and it was felt that the lesion in the posterior elements of the cervical spine was an aneurysmal bone cyst. The surgery took approximately four hours.

The patient was transferred to the ICU following the operation. The surgical notes state that no chemical thromboprophylaxis was to be given without discussion with the spinal team. The postoperative course was uneventful and the patient was recovering quite well.

The patient was transferred back to the ward in an appropriate manner. However, on the morning of postoperative day four the patient suffered a cardiac arrest while sitting in a chair. It was felt from the clinical signs that the patient had suffered a massive thromboembolic event. Resuscitation was instigated but was unsuccessful and the patient was declared deceased.

### Discussion

This patient's care was very appropriate at all levels. Mechanical DVT prophylaxis was used both immediately postoperatively and upon transfer to the ward. The patient may have been managed with calf compressors during the surgery as well.

It would appear from the history that there was a period of immobility prior to presenting for medical care and this probably increased the risk of DVT. However, there is no basis for any criticism of the care based on the information provided.

There is no consensus in the spinal surgical literature as to the value of chemical prophylaxis in the postoperative period in any spinal surgery. In spinal injury units it is common for patients with a significant cord injury (e.g. quadriplegia) to be placed on chemical DVT prophylaxis after a safe period following surgery. The main risk associated with chemical prophylaxis following surgery is spinal haematoma, which can result in significant and permanent neurological deficits. The decision to use chemical prophylaxis following spinal surgery is an individual surgeon's choice based on the risk to the patient. There are no universally accepted guidelines with respect to this.

No autopsy was performed so there was no definitive cause of death, and this is an area for concern.

**Comments**

This patient passed away despite receiving appropriate care at all levels. The patient had a benign spinal tumour that can cause significant destruction at a local level, and has a high incidence of recurrence.

It is likely that the patient died from a massive thromboembolic event to the lungs. As such, it is possible that the outcome may have been the same, even if chemical prophylaxis was used, as the formation of the thrombus may have occurred prior to the patient’s presentation for medical care. It is not uncommon for patients on chemical prophylaxis to suffer a pulmonary embolus.

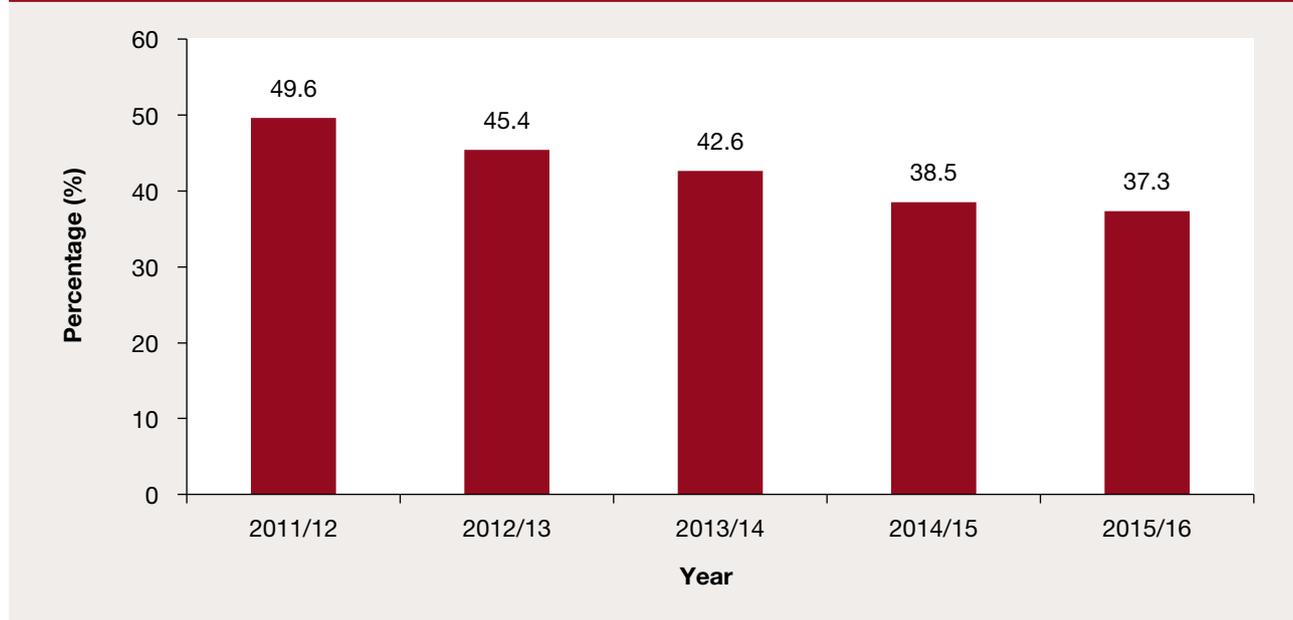
**6.3 Provision of critical care support to patients**

Critical care support is an essential component in the care of most surgical patients.

Treating surgeons from QASM recorded whether or not a patient received critical care support in an intensive care or high dependency unit before or after surgery. The first- and second-line assessors reviewed the appropriateness of the use, or non-use, of critical care support. It is recognised that this is a subjective assessment of needs and potential benefits.

Two-thirds of all surgical patients were treated in critical care units (64.2%; 4,230/6,591) from 2007/2008 to 2015/2016. However, there were differences between the years in the percentage of cases in which critical care was used (see Figure 14).

**Figure 14: Provision of critical care support by year (n=6,591)**



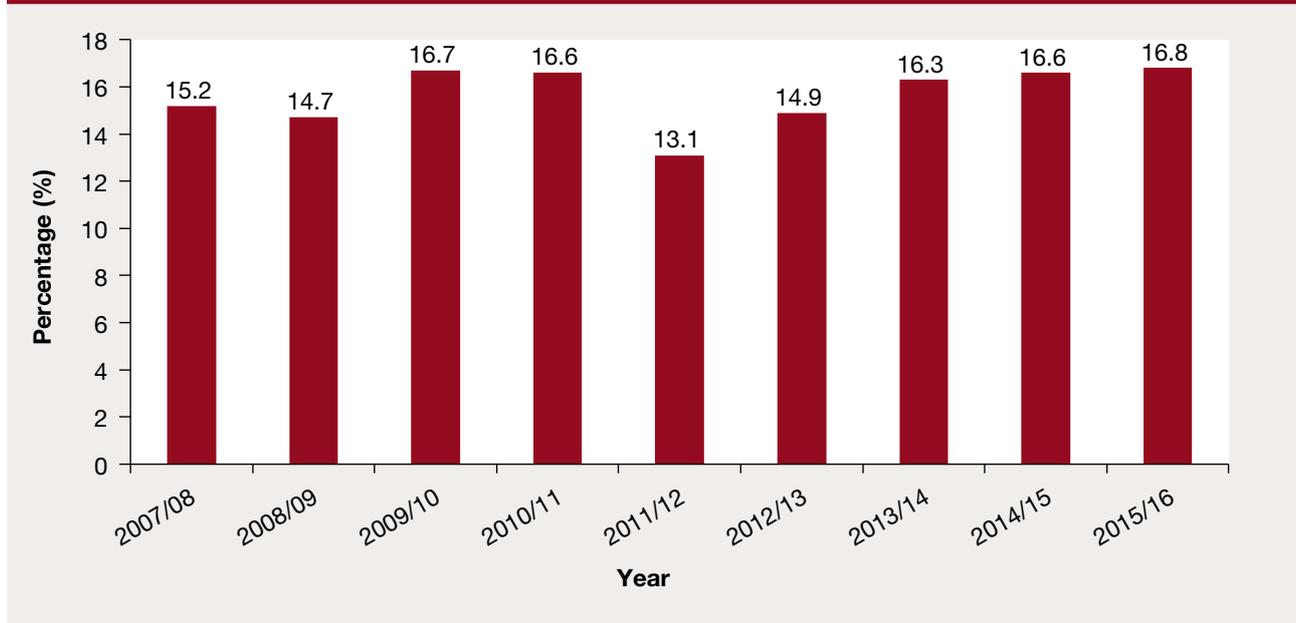
Missing data (n=1,022; 13.4%) Critical care question was changed in 2010. (Critical care question was changed in 2010.)

If a patient did not receive critical care, it did not necessarily indicate a lack of facilities.

Over 9 years, surgeons reported that in 88 instances, patients should have had, but didn’t receive, either ICU care ( 34 cases) or HDU care ( 54 cases).

An unplanned admission to the ICU is noted as being an important risk factor for mortality.<sup>(14,15)</sup> The numbers varied over the years but overall, an unplanned admission to the ICU was reported for 15.7% (1,136/7,230) of patients (see Figure 15).

**Figure 15: Percentages of patients with an unplanned admission to Intensive Care Units by year (n=7,230)**



Missing data (n=359; 4.7%); ICU: Intensive Care Unit

## 6.4 Fluid management

In the ageing surgical population, with their corresponding decrease in renal function, fluid balance management can often be challenging. As the age of the surgical population increases, related problems can be predicted to increase in the future.

The presence or not of fluid balance issues was reviewed by assessors in every audited case.

- 8.6% (726/8,399) of patients did have fluid balance issues present, according to assessors (see Figure 16).

No fluid balance issues were identified in 63.2% (5,312/8,399) of patients. There was no data for 382 cases. Assessors answered this question in 8,399 cases.

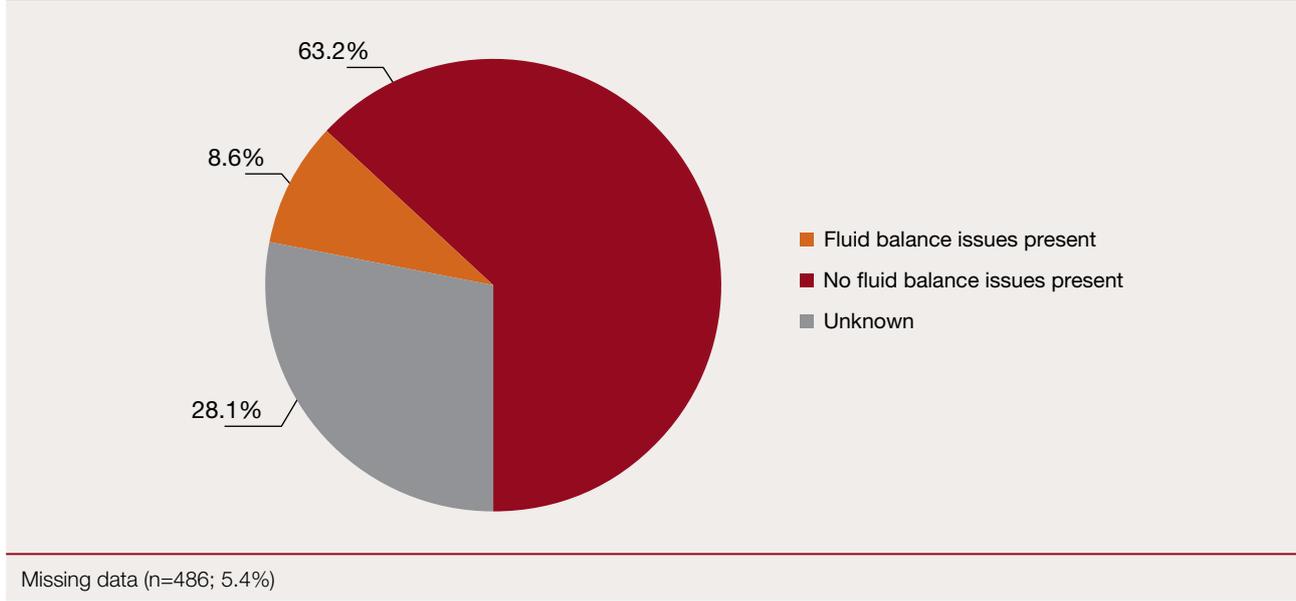
In 28.1% (2,361/8,399) of cases, the assessor could not determine whether fluid balance was an issue from the information provided on the SCF.

The treating surgeons considered that a slightly higher percentage of their patients had fluid balance issues (10.4%; 754/7,239). Fewer surgeons than assessors answered this question.

**Figure 16: Distribution of fluid balance issues according to assessors compared with the opinions of surgeons (n=7,613)**

Fluid Balance Issue present	According to Assessors		According to Surgeons	
Yes	8.6%	726/8,399	10.4%	754/7,239
No	63.2%	5,312/8,399	86.5%	6,264/7,239
Can't determine	28.1%	2,361/8,399	3.1%	221/7,239
Missing data		382		379

**Figure 17: Distribution of fluid balance issues according to the opinions of assessors (n=7,613)**



While most patients did not have fluid balance issues, there was a difference in the prevalence of fluid balance issues in younger patients compared with older patients.

The prevalence of fluid balance issues was:

- 6.1% (182/2,972) in patients aged fewer than 70 years
- 10% (544/5,427) in patients aged 70 years or older.

This shows a statistically significant lower risk ratio of 0.61 (95% CI 0.52 to 0.72) for younger patients to have fluid balance issues compared with patients aged 70 years or older.

Whether this difference is also clinically important depends on the conditions of each case.

## 6.5 Postoperative complications

Another strong predictor of death is the development of postoperative complications.

The treating surgeon recorded any definable complications that occurred following a surgical procedure, and the most frequently reported complications are listed below.

Surgeons reported that one-third of their patients had a postoperative complication (33.3%; 1,892/5,679).  
(Note: data was missing in 64 cases.)

This is very similar to the national rate of complications (32.5%; 7,317/22,506).<sup>(16)</sup>

The total number of complications listed for all patients for the nine years of the audit was 2,251.  
(Note: some patients had more than one complication.)

The most common complications in the QASM data included:

- procedure-related sepsis (10.3%; 231/2,251)
- postoperative bleeding (9.9%; 222/2,251)
- tissue ischaemia (9.6%; 215/2,251)
- anastomotic leaks (8.6%; 196/2,251).

These specific complications are also similar to the complications reported nationally.<sup>(16)</sup>

## 7 INFECTIONS

### KEY POINTS

- ▶ More than one-third of surgically-related deaths were associated with an infective process.
- ▶ Nearly two-thirds of those patients whose death was associated with an infective process acquired their infection(s) while in hospital.

Infections remain an issue for hospital inpatients, especially in vulnerable patients who need surgical care.<sup>(17)</sup>

The current level of detail for the infection question in the SCF began in 2011.

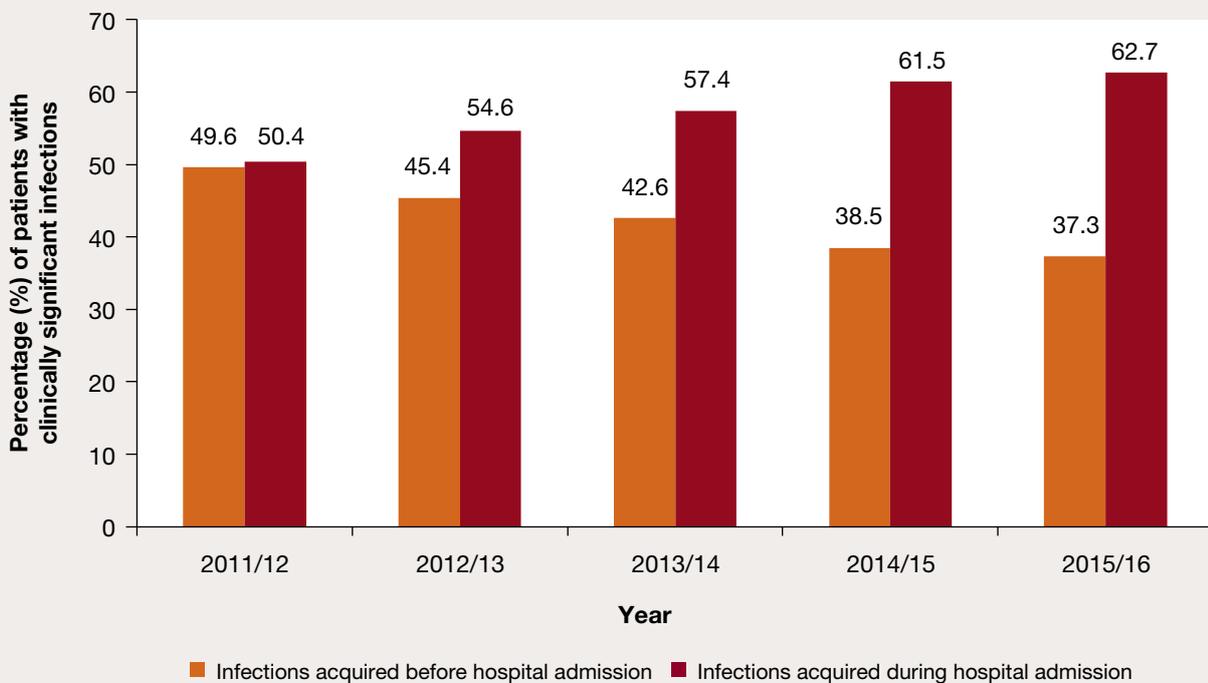
### 7.1 Prevalence of infection

A clinically significant infection was present in 34.7% (1,588/4,573) of all surgical patients who died in Queensland hospitals. This percentage has remained steady for the last five years.

When a patient dies with a clinically significant infection present, the surgeon reports both the timing of the acquisition of the infection (before admission or during admission), and the site of the infection (surgical site or other invasive site).

There was a lower overall rate of acquiring infections before hospital admission (42.0%; 636/1,513), than the overall rate for acquiring infections during the hospital stay (57.2%; 877/1,533). See Figure 18. The most common of these infections was pneumonias (41.2%; 643/1,562).

**Figure 18: Percentages of clinically significant infections that were acquired before hospital admission and during hospital admission by year in surgical patients who died with infections present (n=1,588)**



## 7.2 Infections acquired in hospital

This audit is most interested in the percentage of surgical patients who acquired their infections once they had been admitted for surgery. The proportion of patients who had infections, and acquired them as inpatients, is trending upwards. This trend predicts increases in costs for hospital systems for the future.<sup>(18)</sup>

This is a statistically significant trend (see Figure 18).

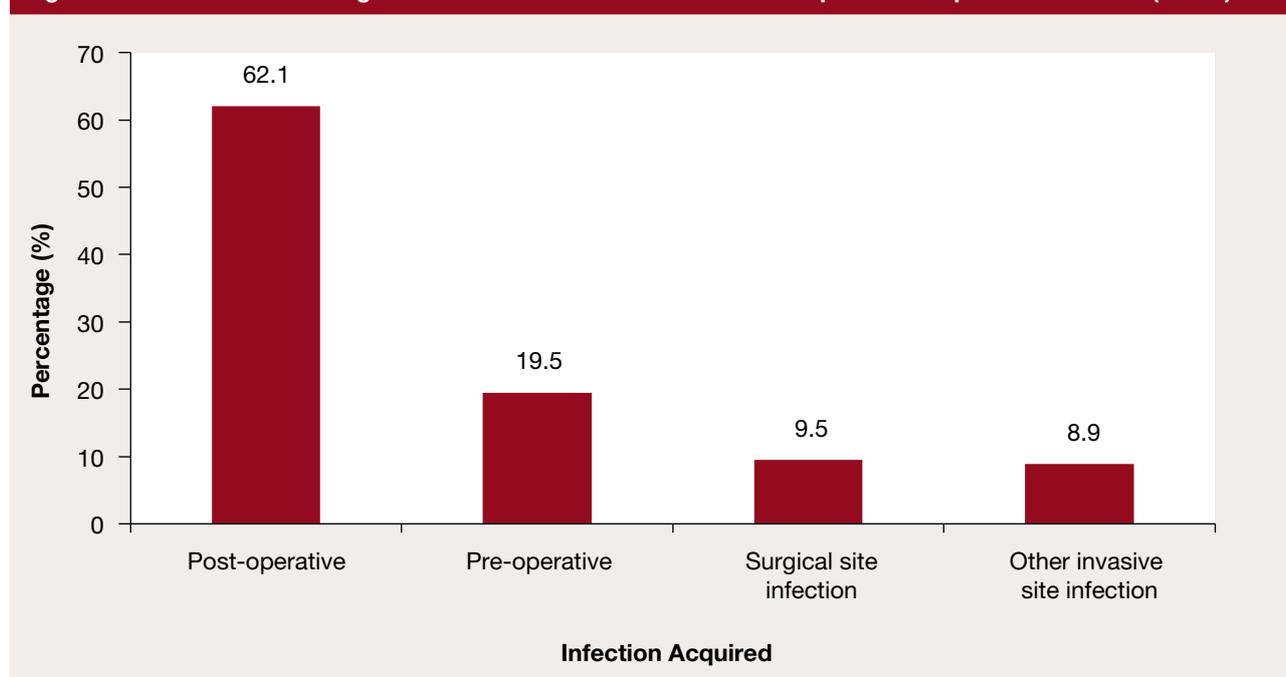
(Note: Not all surgeons gave details about the infections of their patients, so denominators vary.)

Infections were most commonly detected in the postoperative period (62.1%; 504/811).

## 7.3 Infections acquired in hospital – sites of infections (2011 to 2016)

Surgical site infections (9.5%; 77/811) were not as frequent as infections in other sites, but are the infection site of most concern to surgeons.<sup>(19)</sup> See Figure 19. This question was answered in 811 cases.

Figure 19: Distribution of timing and distribution of sites of infections acquired in hospital 2011 to 2016 (n=811)



**1. Infection acquired post admission and post operatively:** 62.1% (504/811) of all patients who acquired infections in hospital.

Identified organisms (order of frequency):

- a) Pseudomonas
- b) Escherichia coli
- c) Staphylococcus
- d) Klebsiella

**2. Infection acquired post admission and pre operatively:** 19.5% (158/811) of all patients who acquired infections in hospital.

Identified organisms (order of frequency):

- a) Staphylococcus
- b) Klebsiella
- c) Pseudomonas
- d) Clostridium
- e) Streptococcus

**3. Infection acquired post admission and surgical site:** 9.5% (77/811) of patients who acquired infections in hospital.

Identified organisms (order of frequency):

- a) Staphylococcus
- b) Candida
- c) Escherichia coli
- d) Enterobacter

**4. Infection acquired post admission and other invasive site:** 8.9% (72/811) of patients who had acquired infections in hospital.

Identified organisms (order of frequency):

- a) Pseudomonas
- b) Staphylococcus
- c) Klebsiella

It is clear from the organisms listed that there are four main types of organisms acquired in hospital. This group does not vary with the timing of acquisition of the infection. However, the order of prevalence does vary.

Those organisms are mainly:

1. Pseudomonas
2. Escherichia coli
3. Staphylococcus
4. Klebsiella.

These are predominantly Gram negative organisms, common causes of enteric and urinary tract infections.

There were also a high number of Gram positive infections with *Staphylococcus* species.

At present, it is not possible to determine the sources of these infections. It is possible the infections became established in surgical patients because of exposure to pathogens in the hospital environment; it is also possible they occurred because of the inherent physical vulnerability of elderly patients experiencing the stresses of surgical procedures.<sup>(20)</sup>

## 7.4 Case study – Hospital-acquired infections

### **Serious complications occurring after the patient has left hospital should be the primary and immediate responsibility of the treating surgeon.**

A 63-year-old morbidly obese diabetic patient presented to hospital with pain and weakness of the legs. There was a past history of nephrectomy for renal cell carcinoma. While an inpatient and over the next week, the patient had CT and magnetic resonance imaging scans of the spine that showed severe multilevel degeneration with severe spinal canal stenosis in the lower lumbar spine.

Eleven days after admission the patient underwent spinal decompression at two levels, and a single level fusion with pedicle screws. Prior to surgery, 1-gram of intravenous Cephazolin was given. The postoperative recovery was slow and apparently without complication. On the night before discharge it was noted by nursing staff that the wound looked inflamed, and that there was a small amount of wound discharge. A swab was taken for culture. The patient was discharged the following day into the care of the local medical officer.

At review after 1 week, the local medical officer noted that the wound was infected and thought that treatment with Flucloxacillin was appropriate. The local medical officer was not, however, aware that the pre-discharge wound swab had grown Methicillin-resistant *Staphylococcus aureus* (MRSA).

The patient was readmitted to hospital two weeks after discharge with pus draining from the surgical wound. The patient subsequently had five surgical washouts and debridement. During the third of these procedures the metalwork was removed from the spine.

During this time the patient's health deteriorated and they were admitted to the ICU with pulmonary oedema and signs of sepsis. With continued deterioration it was decided that palliative care was appropriate, and this decision was made in conjunction with family members. The patient died soon after. The cause of death was an extradural abscess and sepsis, which occurred as complications of surgery for degenerative spondylosis with severe spinal stenosis.

### **Considerations**

This case highlights the need for awareness of hospital-acquired infection, of the risk factors for infection and of prophylactic measures to minimise wound infection. This patient was obese and diabetic – both significant risk factors for wound infection.

The operative risk factors included the type of surgery – spinal surgery with implants; and the duration of surgery – more than three hours.

The patient was in hospital for 10 days prior to the operation and was almost certainly colonised by hospital-acquired organisms. Prophylaxis was directed towards MRSA. The use of Cephazolin was probably a poor choice under the circumstances and the dosage inadequate for the patient's weight.

The current trend to discharge a postoperative patient into the care of the GP is fraught with problems, and under some circumstances could be seen as the surgeon discharging his or her responsibilities. A local medical officer is not best qualified to manage late postoperative complications, and may continue to treat the patient to the patient's detriment rather than refer back to the surgeon early.

Instructions to notify the surgeon immediately should a major complication occur after major surgery might be more prudent than having the GP continue to treat the patient without success.

Furthermore, the procedures and clinical pathways of the infection control need to be reviewed. A wound swab grew MRSA yet was not followed up other than to note that handling precautions should be taken the next time the patient attends hospital. Due diligence suggests that the chart should have been reviewed to see what measures had been taken for a wound infection.

As the patient had been discharged from hospital, a telephone follow-up would have expedited the return to hospital. By the time the patient was eventually readmitted the outcome was probably inevitable.

**Comments:**

In summary, the issues that arise from this case are:

- Awareness of the risk factors for wound infection – particularly MRSA.
- Consideration that all patients who have been in hospital for more than two or three days are likely to have been colonised by hospital-acquired organisms.
- Use of maximum prophylactic measures – Vancomycin should be used for patients who have been in hospital for a period prior to surgery.
- Disregard for the appearance of the wound; inflammation and discharge are signs of infection and should be treated as such, even if subsequently proven to be over treatment.
- Follow up of tests such as wound swabs; treatment instituted when appropriate.
- Occurrence of serious complications after the patient's leaving hospital should be the primary and immediate responsibility of the treating surgeon.

## 8 TRAUMA

### KEY POINTS

- ▶ Nearly one-third of surgically-related deaths were associated with trauma
- ▶ Falls were the most frequent cause of trauma.

Trauma can cause serious injury in patients of any age. Surgeons often engage in many challenges to repair the damage that has been caused by trauma. For the best outcomes, this repair should be done as soon as possible after the trauma.<sup>(22)</sup>

### 8.1 Prevalence of trauma

A large proportion of patients had experienced trauma before admission to hospital. During the period July 2012 to June 2016, a traumatic event was attributed to 30.5% (1,396/4,574) of cases.

(Note: QASM began including this question in the SCF in 2012.)

### 8.2 Causes of trauma

The types of traumatic events leading to injury or shock vary, but falls (81.4%; 1,128/1,386) were the most frequent cause of trauma in this audit. (Note: data missing on trauma in 10 cases.)

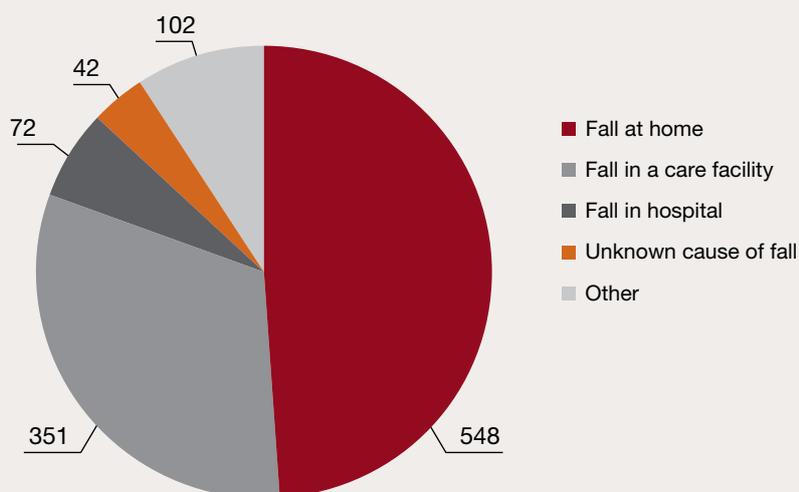
For those cases associated with falls (see Figure 20):

- Nearly half of the falls occurred in homes (49.1%; 548/1,115).
- One-third occurred in care facilities (31.5%; 351/1,115).
- 6.5% (72/1,115) occurred in hospitals.
- Unknown sites of falls were 3.8%; (42/1115)
- “Other” occurrences of falls were 9.1% (102/1115)

(“Other” included: work, farms, shopping centres, boom gates, bowls club, casino, funeral, GP practice.)

(Note: data missing on locations of falls in 13 cases.)

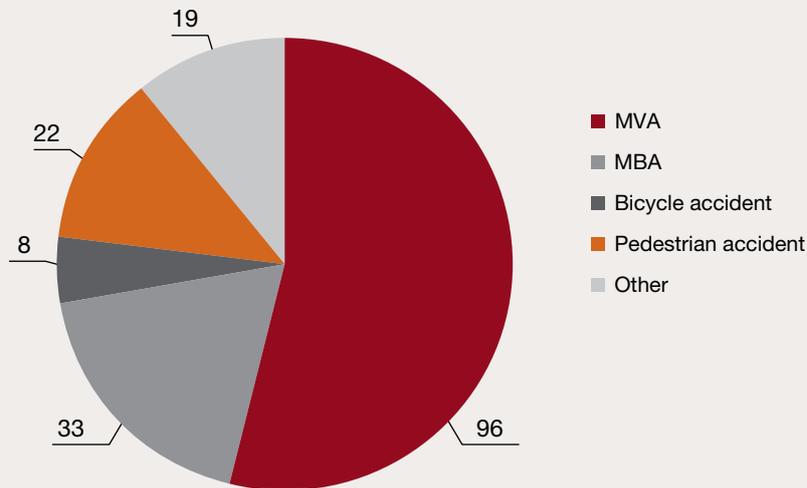
**Figure 20: Distribution of locations associated with falls (n=1,128)**



### 8.3 Accidents and violence

Accidents and violence result in trauma to patients. Road traffic accidents were associated with 12.8% (179/1,396) of trauma cases, while violence was associated with 4.1% (57/1,396) of trauma cases.

**Figure 21: Distribution of types of road traffic accidents associated with patients who experienced trauma (n=178)**



"Other" included: quad bikes, moving cars, mobility scooters, work-related (crane), ultralight plane, train, motor vehicle into gas cylinders.

Of the road traffic accidents (n=179), there were four main groups. As shown in Figure 21:

- motor vehicle accidents (53.6%; 96/179)
- motorbike accidents (18.4%; 33/179)
- pedestrian accidents (12.3%; 22/179)
- bicycle accidents (4.5%; 8/179).

(Note: data missing on types of accidents in 20 cases.)

## 9 SECOND-LINE ASSESSMENTS

### KEY POINTS

- ▶ Between 2007/2008 and 2015/2016, an SLA was requested for 14.4% (1,084/7,547) of cases. Lack of information provided by the treating surgeon was the most frequent cause of referral for SLA, accounting for 67.5% (729/1,080) of referrals.
- ▶ Overall, 4.7% (351/7,547) of cases were sent for SLA due to concerns over clinical issues.
- ▶ The most common criticism by both first- and second-line assessors was problems in patient assessment.
- ▶ A total of 7,304 clinical management issues were identified.
- ▶ Issues of clinical management were perceived to have caused the death of the patient in 4.9% (370/7,547) of cases.

The information gleaned by the forensic review of cases provides rich learning material that the QASM is able to pass on to all healthcare professionals.

### 9.1 Second-line assessments data

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

A total of 7,547 cases underwent FLA. The first-line assessor decides whether the treating surgeon has provided enough information to allow them to reach an informed decision on the appropriateness of the management of the case. If inadequate information was provided then the first-line assessor requests an SLA.

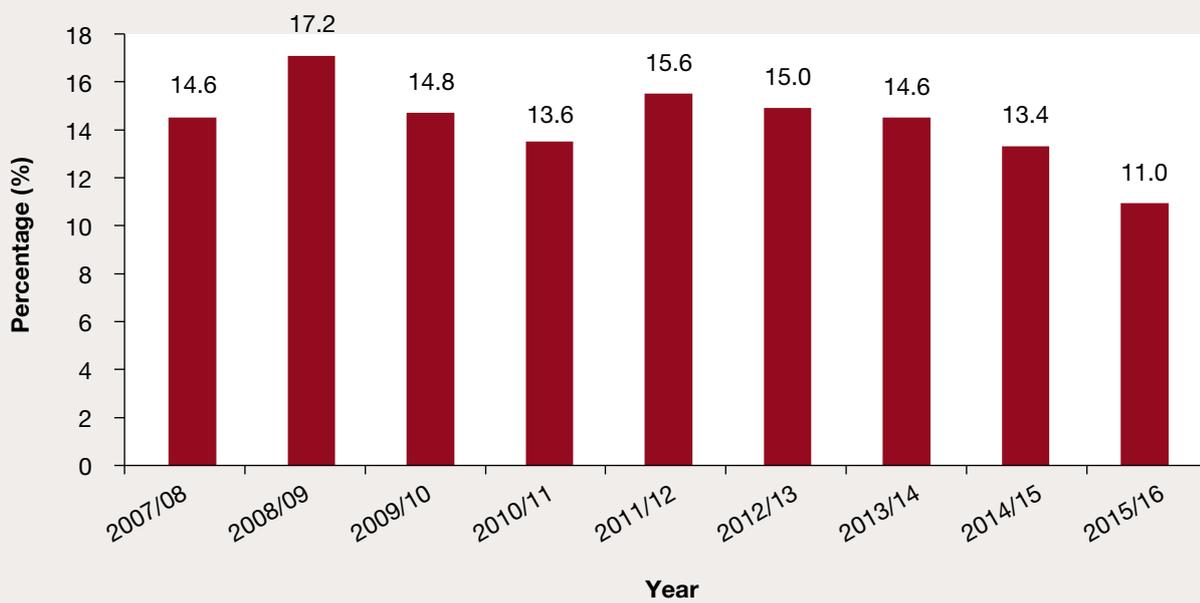
Other triggers for requesting an SLA include:

- instances where a more detailed review of the case could better clarify events leading up to death and any lessons arising from the case
- an unexpected death, such as the death of a young and fit patient with benign disease, or a day surgery case.

The number of SLAs required due to a lack of clinical information has dropped (from 76% (56/73) in 2007/2008 to 70.4% (85/125) in 2015/2016). This is possibly an indirect measure of surgeon compliance with the audit process, with surgeons providing more detailed and more accurate information in the SCFs.

Although in later years there would seem to be a downward trend in the number of SLAs requested, the overall trend is inconclusive. See Figure 22.

**Figure 22: Percentage of cases sent for second-line assessment by year (n=7,547)**



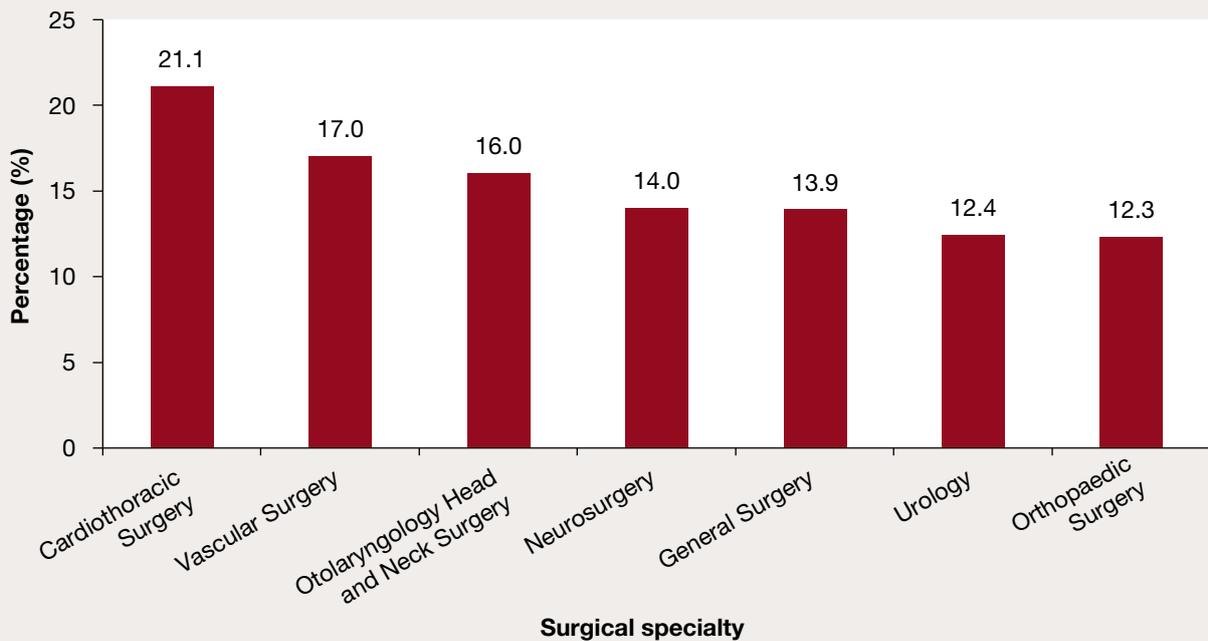
Not all data may be present for 2015/2016.

There is a downward trend of cases being sent for second-line assessment, although the effect is not very strong.

The proportion of cases that underwent an SLA was different for each specialty.

Cardiothoracic cases are considered by surgeons to be the most complicated and challenging, and Cardiothoracic Surgery had the highest proportion of SLAs during the review period (see Figure 23).

**Figure 23: Proportion of cases undergoing second-line assessments by specialty, 2007/2008 to 2015/2016**



Note: surgical specialties with fewer than 10 cases referred for SLA are not included in this graph (Ophthalmology, Paediatric Surgery, Obstetrics and Gynaecology, Plastic and Oral/Maxillofacial)

## 10 CLINICAL INCIDENTS

The study of the clinical incidents identified by assessors gives surgeons the building blocks they need to understand the complex processes that occur when there is a surgical death.

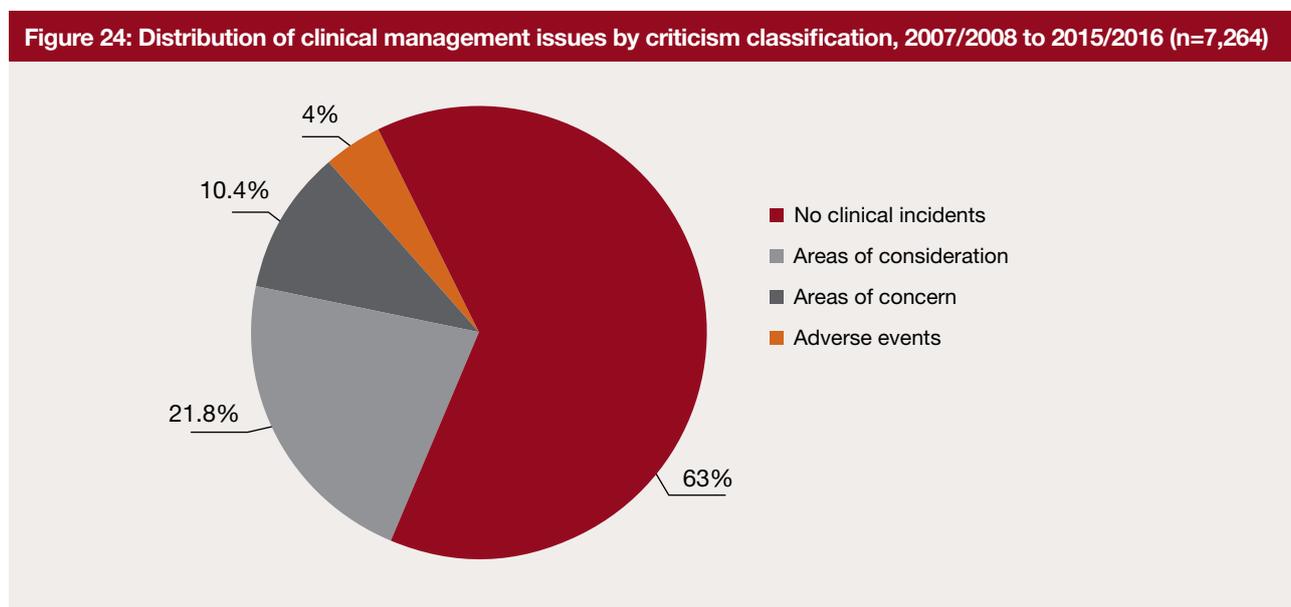
There are two possible outcomes for the peer-review process:

1. The death of the patient was a direct outcome of the disease process, with clinical management having no impact on the outcome.
2. A perception that aspects of patient management may have contributed to the death of the patient.

In making an assessment of contributing factors, the assessor can identify an:

- **Area of consideration:** the assessor believes an area of care could have been improved or different, but recognises the issue is debatable. It represents a suggestion regarding treatment options or a minor criticism.
- **Area of concern:** the assessor believes that an area of care should have been better.
- **Adverse event:** an unintended injury or event that was caused by the medical management of the patient rather than by the disease process. The injury or event was sufficiently serious that it led to prolonged hospitalisation; temporary or permanent impairment or disability; or contributed to or caused the death of the patient. In addition, there are predetermined outcomes classified as adverse events (e.g. anastomotic leak or pulmonary embolus). It must be emphasised that an adverse event does not imply negligence. Some adverse events will occur even with the best of care, for example a fatal pulmonary embolism despite the use of the best DVT prophylaxis available. An adverse event is not necessarily preventable and may not always contribute to the death of the patient.

The distribution of classified clinical management issues (areas of consideration, areas of concern and adverse events) is shown in Figure 24.



### 10.1 Distribution of clinical incidents

Two-thirds of patients who died (63.8%; 5,804/8,434) had no clinical incidents at all.

The lowest classification of clinical incident – areas of consideration – were described by assessors in 21.8% (1,584/7,264) of cases. See figure 24.

The most serious class of events – adverse events – were found in 4.0% (289/7,264) of cases. Cases featuring an adverse event(s) are a key focus of the audit, particularly when there is a perception by assessors that the treatment provided may not have been optimal.<sup>(23)</sup>

Most of those serious clinical incidents in this audit were preventable (72%; 208/289).

### 10.2 Classifications of clinical incidents

More than one issue was identified for some patients. Of the patients with a clinical incident of any class (area of consideration, concern or adverse event), one-quarter had an incident that was considered to be preventable (25%; 1,014/4,054).

The largest group (according to the READ code classification system) of clinical incidents was the “assessment” group. That group includes:

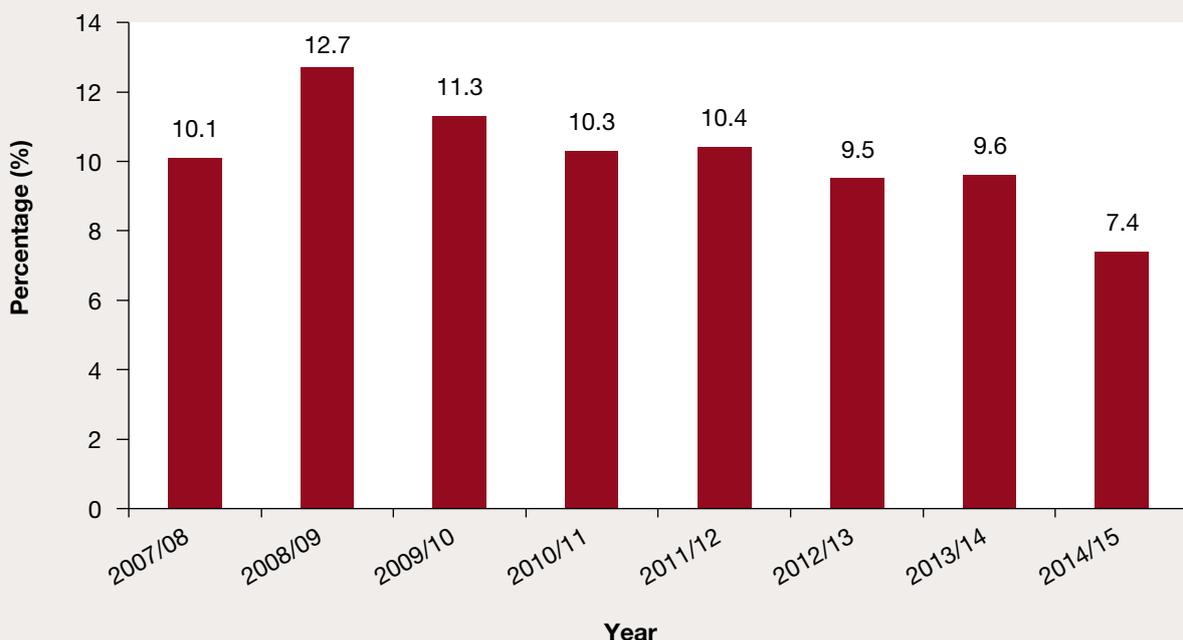
- *decision to operate* (19.7%; 200/1,041)
- *better to have done different operation or procedure* (19.2%; 195/1,014)
- *delay to surgery* (18.1%; 184/1,014)
- *delay in diagnosis* (12.5%; 127/1,014)
- *post-operative care unsatisfactory* (11.9%; 121/1,014).

### 10.3 Trend of preventable serious clinical incidents

A downward trend in preventable (definitely preventable or probably preventable) serious clinical incidents (areas of concern or adverse events) is evident in the 9 years of the audit. See Figure 25.

The 2015/2016 results are not included here as they are not yet complete and so the findings may not be reliable.

**Figure 25: Percentage of cases with preventable serious clinical incidents by year (n=7,613)**



## 10.4 Preventable, serious clinical incidents by surgical specialty

Table 3 shows the proportion of patients by specialty who had a preventable, serious (area of concern or adverse event) clinical incident.

<b>Surgical Specialty</b>	<b>Proportion of patients with preventable serious clinical incidents</b>
Cardiothoracic Surgery	36.6%
Oral/Maxillofacial Surgery	28.6%
Vascular Surgery	19.0%
Neurosurgery	18.5%
Otolaryngology Head and Neck Surgery	18.4%
General Surgery	18.2%
Plastic	16.1%
Orthopaedic Surgery	15.8%
Urology	11.8%

The high proportion of cases with clinical incidents in Cardiothoracic Surgery could reflect the complexity of the surgery in that specialty.

The high proportion of cases with clinical incidents in Oral/Maxillofacial Surgery could be due to low numbers and therefore low denominators.

## 10.5 Perceived impact of clinical incidents

First- and second-line assessors were asked to indicate:

- what impact any perceived issues of patient management might have had on the clinical outcome
- whether or not these issues were preventable
- which clinical team was responsible for the issues.

### **Impact of clinical incidents:**

The class of clinical incidents is determined by the assessor for each case with an incident.

Please see explanation above.

The impact of the clinical incidents (Table 4), the preventability of the incidents (Table 5) and the responsibility for the incidents (Table 6) are shown below.

### Impact of Clinical Incidents

**Table 4: Perceived impact of clinical incidents on clinical outcomes – 2007/2008 to 2015/2016 (n=7,613 patients) and (1,173 patients had more than one incident)**

Impact of serious clinical incident on clinical outcome	Number of patients	Percentage of patients
Made no difference	1,010	13.3%
May have contributed to death	2,438	32.0%
Caused the death of a patient who would otherwise be expected to live	375	4.9%
Data not available (n=250; 3%)		

### Preventability of clinical incidents:

**Table 5: Perceived preventability of clinical incidents over the total audit period of 2007/2008 to 2015/2016 (n=7,613)**

Perceived preventability of serious clinical incidents	Number of patients	Percentage of patients
No issues identified	5,804	76.2
Definitely	676	8.9%
Probably	1,642	21.6%
Probably not	1,141	15.0%
Definitely not	121	1.6%
Data not available (n=474; 5.7%)		

The assessors considered that 8.9% – 676/7,613 of the clinical incidents were definitely preventable in the reporting period.

### Responsibility for clinical incidents:

**Table 6: The clinical team considered mostly responsible for the serious clinical incidents 2007/2008 to 2015/2016 (n=7,613)**

Clinical team believed to be responsible	Number of patients	Percentage of patients
Surgical team	822	42.3%
Other clinical team	659	33.9%
Hospital	214	11.0%
Other*	249	12.8%
Total	1,944	100.0%
*Includes: anaesthetics, referring hospital, cardiology, community hospital, emergency department, GP, intensive care unit, medical team, nursing home, patient factors and radiology.		

Assessors considered that the surgical team was responsible for 42.3% (822/1,944) of the clinical incidents.

# 11 ABORIGINAL AND TORRES STRAIT ISLANDER PATIENTS

## KEY POINTS

- ▶ Aboriginal and Torres Strait Islander patients were considerably younger than non-Indigenous patients.
- ▶ Delays in presentation for Aboriginal and Torres Strait Islander patients led to problems with delays in operations.

The surgical healthcare needs and conditions of Queensland’s Aboriginal and Torres Strait Islander patients are described in this section.

The QASM started collecting data on Aboriginal or Torres Strait Islander persons in 2011.

### 11.1 Surgically related deaths

An overview of audit patients identifying as Aboriginal and Torres Strait Islanders is provided below.

- Since 2011 there have been 137 cases involving a patient who identified as an Aboriginal or Torres Strait Islander person.
- Aboriginal or Torres Strait Islander patients who died comprised 3.2% (139/4,408) of audit patients.

(Note: data not available: n=401; 8.4%.)

Aboriginal and Torres Strait Islander patients comprised 5.7% (13,558/238,485) of the admitted patient episodes of care in Queensland hospitals in 2015/2016.

Source: Queensland Hospital Admitted Patient Data Collection (QHAPDC), Statistical Services Branch, Department of Health, Queensland. Prepared by: Statistical Reporting and Coordination Unit, Statistical Services Branch, Department of Health.

Queensland Aboriginal and Torres Strait Islanders comprise 28.2% (188,954/669,881) of the entire Aboriginal and Torres Strait Island population of Australia.

The final estimated resident Aboriginal and Torres Strait Islander population of Australia as at 30 June 2011 was 669,900 people, or 3% of the total Australian population.<sup>(25)</sup>

### 11.2 Age

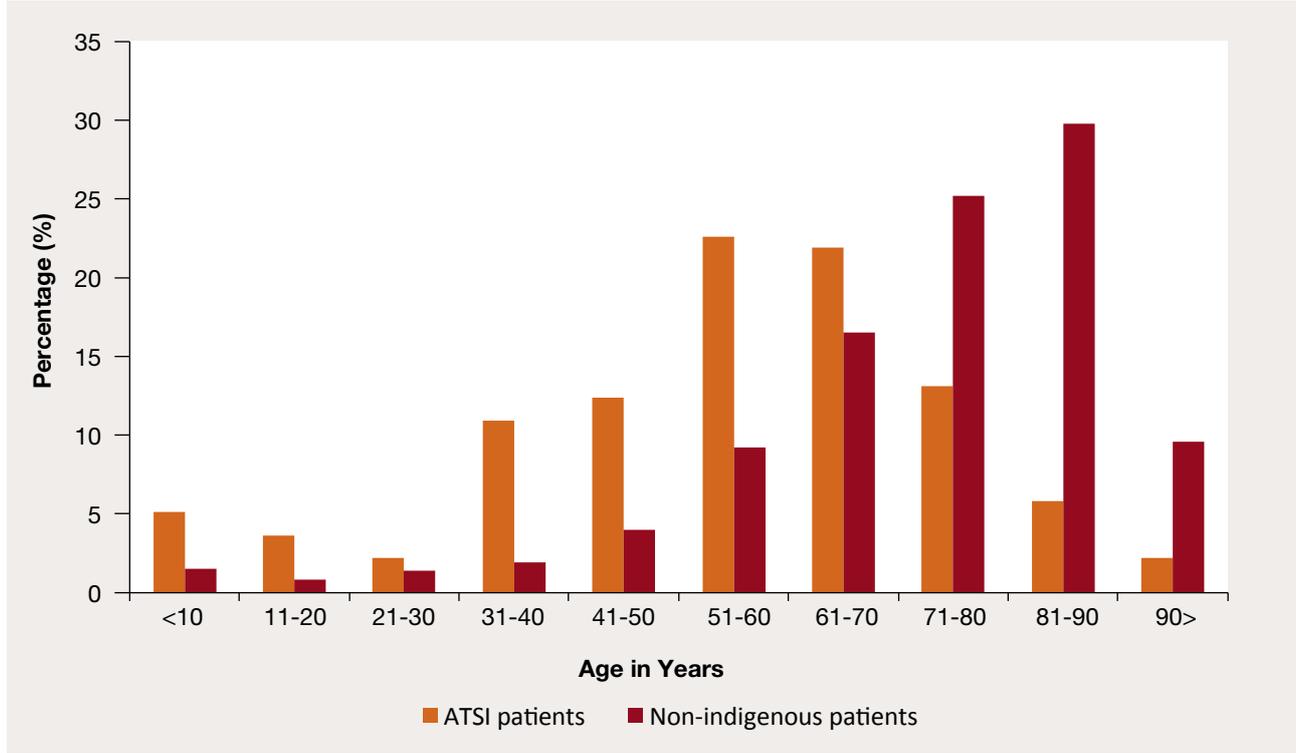
There was a 20-year gap in the median age at death of Aboriginal and Torres Strait Islander patients and non-Indigenous patients (see Table 7).

**Table 7: Age in years at death of Aboriginal and Torres Strait Islander persons and non-Indigenous persons since 2012 (n=4,369)**

	Age at death of Aboriginal and Torres Strait Islander persons (n=137)	Age at death of non-Indigenous persons (n=4,232)
Median (Interquartile range)	57 years (43 – 67)	77 years (65 – 85)
Minimum	0	0
Maximum	93	102

There was a higher number of children in the Aboriginal and Torres Strait Islander group compared with the non-Indigenous group, while there were fewer elderly people in the Aboriginal and Torres Strait Islander group compared with the non-Indigenous group (Figure 26).

**Figure 26: Age distribution by age group of Aboriginal and Torres Strait Islander patients and non-Indigenous patients, 2011 to 2016 (n=4,369)**



### 11.3 Age and comorbidities

The prevalence of serious comorbidities in the Aboriginal and Torres Strait Islander and non-Indigenous populations was dependent on the age of the patient. In both population age groups presented in Table 8, the prevalence of life threatening comorbidities was higher in the Aboriginal and Torres Strait Islander population compared with the non-Indigenous population. However, even though this may be clinically significant for some patients, this finding was not statistically significant (risk ratio 1.12 [95% CI 0.90 to 1.40])

For the Aboriginal and Torres Strait Islander population born in 2010–2012, life expectancy was estimated to be 10.6 years lower than that of the non-Indigenous population for males (69.1 years compared with 79.7 years) and 9.5 years for females (73.7 years compared with 83.1 years).<sup>(24)</sup>

#### 11.3.1 Surgical patients younger than 50 years

**Table 8: Prevalence of comorbidities in Aboriginal and Torres Strait Islander persons (n=45), and non-Indigenous persons (n=374), aged younger than 50 years**

	Percentage of patients with comorbidities present	Number of cases with comorbidities present
Aboriginal and Torres Strait Islander persons	66.7%	30/45
Non-Indigenous persons	59.4%	222/374

### 11.3.2 Surgical patients older than 50 years

**Table 9: Prevalence of comorbidities in Aboriginal and Torres Strait Islander persons (n=92), and non-Indigenous persons (n=3,845), aged 50 years or older**

	Percentage of patients with comorbidities present	Number of cases with comorbidities present
Aboriginal and Torres Strait Islander persons	96.7%	89/92
Non-Indigenous persons	93.0%	3,574/3,845

As shown in Table 9, Aboriginal and Torres Strait Islander persons aged 50 years or older were more likely to have comorbidities compared with non-Indigenous persons of the same age group.

This difference was statistically significant (risk ratio 1.04 [95% CI 1.00 to 1.08]) and may be clinically significant.

### 11.4 Aboriginal and Torres Strait Islander persons and clinical management

Clinical management issues were similar for the two population groups, with the exception of issues that relate to the time of presentation of the patient, such as the timing of the operation. See Table 10.

**Table 10: Clinical management areas requiring improvement in Aboriginal and Torres Strait Islander persons and non-Indigenous persons, according to assessors (n=4,369)**

Management area requiring improvement	Aboriginal and Torres Strait Islander persons (n=137)	Non-Indigenous persons (n=4,232)	Risk ratio (95% CI)
Preoperative management	17.9% (28/156)	11.9% (552/4,628)	1.50* (1.07 to 2.12)
Choice of operation	5.1% (8/156)	6.1% (283/4,642)	0.84 (0.42 to 1.67)
Timing of operation	14.2% (22/155)	7.8% (363/4,632)	1.81* (1.21 to 2.70)
Decision to operate	12.3% (19/155)	9.4% (437/4,650)	1.30 (0.85 to 2.00)
Intraoperative management	6.0% (9/151)	5.7% (261/4,604)	1.05 (0.55 to 2.00)
Postoperative care	12.9% (19/147)	7.8% (356/4,588)	1.67* (1.08 to 2.56)

CI = confidence interval; \* = statistically significant

Aboriginal and Torres Strait Islander patients compared with non-Indigenous patients needed more attention in clinical management issues, according to assessors.

Those areas were:

- preoperative management
- timing of operation
- post-operative care.

There was a statistically significant difference between the groups in those three areas.

## **12 CONCLUSIONS**

Surgery in Queensland is safe and well regulated. Only a very small proportion of surgical patients die. However, when a death does occur, it is reviewed by peer surgeon assessors. This is the responsibility of the RACS through the QASM. The de-identified and aggregated results of those investigations are presented in this document.

As our population ages, there will be more work and more challenges presented to the surgical community. The surgeons who form this vital part of our healthcare system will rise to these challenges.

They will learn from the issues raised in these pages, learn from the scientific achievements from around the world, and learn from the opportunities for self-reflection that the QASM offers them.

## 13 REFERENCES

1. Statistical Analysis and Linkage Unit, Statistical Services Branch, Strategy, Policy and Planning Division Department of Health, Queensland Government.
2. Federman AD, Keyhani S. Physicians' participation in the Physicians' Quality Reporting Initiative and their perceptions of its impact on quality of care. *Health Policy*. 2011.
3. Campbell D, Englesbe M, Kubus J, Phillips S, Shanley C, Velanovich V, et al. Accelerating the Pace of Surgical Quality Improvement – the power of hospital collaboration. *Archives of Surgery*. 2010;145(10):985-91.
4. Allen J, North JB, Wysocki AP, Ware RS, Rey-Conde T. Surgical care for the aged: a retrospective cross-sectional study of a national surgical mortality audit. *BMJ open*. 2015;5(5). 1
5. Alcock M, Chilvers CR. Emergency surgery in the elderly: a retrospective observational study. *Anaesth Intensive Care*. 2012;40(1):90-4.
6. Matsushima K, Goldwasser ER, Schaefer EW, Sangster W, Armen SB, Indeck MC. Consultation for 'dead gut': who needs an emergent exploratory laparotomy? *Am J Surg*. 2014;80(6):624-7.
7. Pedersen T, Watt SK, Tolstrup MB, Gogenur I. 30-Day, 90-day and 1-year mortality after emergency colonic surgery. *Eur J Trauma Emerg Surg*. 2016
8. Wu CH, Cheng RM, Tsai HC, Chang CC, Chang H, Liao CC, et al. How comorbidities and preoperative expenditures correlate with postoperative adverse outcomes. *Am J Manag Care*. 2012;18(11):e405-15.
9. Esemuede IO, Murray AC, Lee-Kong SA, Feingold DL, Kiran RP. Obesity, regardless of comorbidity, influences outcomes after colorectal surgery-time to rethink the pay-for-performance metrics? *J Gastrointest Surg*. 2014;18(12):2163-8.
10. Woodfield JC, Jamil W, Sagar PM. Incidence and significance of postoperative complications occurring between discharge and 30 days: a prospective cohort study. *J Surg Res*. 2016;206(1):77-82
11. Fernandez-Bustamante A, Frendl G, Sprung J, Kor DJ, Subramaniam B, Martinez Ruiz R, et al. Postoperative Pulmonary Complications, Early Mortality, and Hospital Stay Following Noncardiothoracic Surgery: A Multicenter Study by the Perioperative Research Network Investigators. *JAMA Surg*. 2016.
12. Marini H, Merle V, Derrey S, Lebaron C, Josset V, Langlois O, et al. Surveillance of unplanned return to the operating theatre in neurosurgery combined with a mortality--morbidity conference: results of a pilot survey. *BMJ Qual Saf*. 2012;21(5):432-8.
13. Queensland Department of Health Guidelines, [https://www.health.qld.gov.au/\\_\\_data/assets/pdf\\_file/0023/147533/qh-gdl-951.pdf](https://www.health.qld.gov.au/__data/assets/pdf_file/0023/147533/qh-gdl-951.pdf) Accessed 24/02/2017
14. Penk JS, Loke YH, Waloff KR, Frank LH, Stockwell DC, Spaeder MC, et al. Unplanned admissions to a pediatric cardiac critical care unit: a review of 2 years' experience. *Pediatr Crit Care Med*. 2015;16(2):155-60.
15. Vlayen A, Verelst S, Bekkering GE, Schrooten W, Hellings J, Claes N. Exploring unplanned ICU admissions: a systematic review. *JBI Libr Syst Rev*. 2011;9(25):925-59.
16. Australian and New Zealand Audits of Surgical Mortality National Report 2015, p44. [https://issuu.com/entegy/docs/anzasm\\_national\\_report\\_2015?e=23935167/40835880](https://issuu.com/entegy/docs/anzasm_national_report_2015?e=23935167/40835880)
17. Hicks CW, Bronsert M, Hammermeister KE, Henderson WG, Gibula DR, Black JH, 3rd, et al. Operative variables are better predictors of postdischarge infections and unplanned readmissions in vascular surgery patients than patient characteristics. *J Vasc Surg*. 2016.

18. Thaden JT, Li Y, Ruffin F, Maskarinec SA, Hill-Rorie JM, Wanda LC, et al. Increased Costs with Multidrug Resistant Gram Negative Bloodstream Infections Are Primarily Due to Patients with Hospital-Acquired Infections. *Antimicrob Agents Chemother.* 2016.
19. Woltmann J, Schaffzin JK, Washam M, Connelly BL. Pathogen and Procedure Trends Among Surgical-Site Infections at a Children's Hospital: A 20-Year Experience. *Infect Control Hosp Epidemiol.* 2016:1-3.
20. Turrentine, F. E., et al. (2006). "Surgical risk factors, morbidity, and mortality in elderly patients." *J Am Coll Surg* 203(6): 865-877.
21. Gibbs NM. Risks of anaesthesia and surgery in elderly patients. *Anaesth Intensive Care.* 2012;40(1):14-6.
22. Pape HC, Andruszkow H, Pfeifer R, Hildebrand F, Barkatali BM. Options and hazards of the early appropriate care protocol for trauma patients with major fractures: Towards safe definitive surgery. *Injury.* 2016;47(4):787-91.
23. Shiozaki K, Morimatsu H, Matsusaki T, Iwasaki T. Observational Study to Assess and Predict Serious Adverse Events after Major Surgery. *Acta Med Okayama.* 2016;70(6):461-7.
24. Source: AIHW Mortality and life expectancy of Indigenous Australians 2008 to 2012. Cat. no. AIHW 140. Canberra: AIHW. Accessed 23/02/2017.
25. Australian Bureau of Statistics, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/3238.0.55.001> Accessed 23/02/2017.

## ACKNOWLEDGEMENTS

The QASM would like to acknowledge the support and assistance of those individuals and institutions that have helped in the continuation and development of this project, including:

- participating surgeons
- first-line assessors
- second-line assessors
- hospital medical records departments
- hospital surgical departments
- Queensland Health (project funding)
- RACS (project infrastructure)
- ANZASM manager
- QASM & RAAS editorial review teams

### Epidemiology-statistics consultant

Professor Robert Ware	Menzies Health Institute Queensland, Griffith University
-----------------------	--

### QASM Steering Committee members

Dr John North	Clinical Director, QASM, RACS
Kirstine Sketcher-Baker	Executive Director, Patient Safety & Quality Improvement Service, Queensland Health
Mary Jo Katter	Community representative
Dr Greg Coffey	Directors of Medical Services Advisory Committee (DOMSAC) representative
Dr Owen Ung	Chair, QLD Regional Committee, RACS
Dr Brian McGowan	Deputy Chair, QLD Regional Committee, RACS
Dr John Quinn	Executive Director Surgical Affairs, Australia, RACS
Dr Lew Perrin	RANZCOG representative

### QASM STAFF 2015/2016

Clinical Director	Dr John North MBBS, FRACS, FAOrthA
Project Manager	Therese Rey-Conde, BApp Sc, MAACB, MPH, AFAAQHC
Senior Project Officer	Sonya Faint, BApp Sc, MA
Senior Project Officer	Jenny Allen, BSc
Project Officer	Candice Postin, BCom
Administration Officer	Kyrsty Webb







## Contact

### Queensland Audit of Surgical Mortality

Royal Australasian College of Surgeons  
PO Box 7476  
East Brisbane 4169 QLD  
Australia

Telephone: +61 07 3249 2903

Fax: +61 07 3391 7915

Email: [qasm@surgeons.org](mailto:qasm@surgeons.org)

Website: <http://www.surgeons.org/QASM>

The information contained in this annual report has been prepared on behalf of the Steering Committee of the Queensland Audit of Surgical Mortality (QASM) for the Royal Australasian College of Surgeons (RACS). The QASM has protection under the Commonwealth Qualified Privilege Scheme under Part VC of the Health Insurance Act 1973 (gazetted 25 July 2016). It has also been gazetted under section 31 of the Health Services Act 1991 (QLD), as an 'approved quality assurance committee'.