



ROYAL AUSTRALASIAN COLLEGE OF SURGEONS

PROJECT REPORT 2007

Tasmanian Audit of Surgical Mortality



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The information contained in this Annual Report has been prepared by the Royal Australasian College of Surgeons Tasmanian Audit of Surgical Mortality Management Committee, which is a declared quality improvement committee under the *Health Act 1997 (Tas)*. The Australian and New Zealand Audit of Surgical Mortality, including the Tasmanian Audit of Surgical Mortality also has protection under the Commonwealth Qualified Privilege Scheme under Part VC of the *Health Insurance Act 1973* (Gazetted 6 November 2006).

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Abbreviations

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
CPD	Continuing Professional Development
DHHS	Department of Health and Human Services
DVT	Deep Vein Thrombosis
HDU	High Dependency Unit
ICU	Intensive Care Unit
QASM	Queensland Audit of Surgical Mortality
RACS	Royal Australasian College of Surgeons
RAAS	Royal Australasian College of Surgeons Research, Audit and Academic Surgery Division
SAAPM	South Australian Audit of Peri-operative Mortality
TAS	Tasmania
TASM	Tasmanian Audit of Surgical Mortality
UTAS	University of Tasmania
VASM	Victorian Audit of Surgical Mortality
WA	Western Australia
WAASM	Western Australian Audit of Surgical Mortality

Chairman's Report

This is the second report from the Tasmanian Audit of Surgical Mortality (TASM) since its inception in 2004. The TASM is now part of the Australian and New Zealand Audit of Surgical Mortality (ANZASM) overseen by the Royal Australasian College of Surgeons (the College), but maintains its own dataset and degree of independence. Tasmania is the only state to include an anaesthetic audit as part of the surgical mortality audit process. Participation has increased to 96% of surgeons associated with reported deaths. Fourteen percent (n=69) of deaths were associated with non-participating surgeons since the audit's inception; however, this has decreased to 3% within the last year.

The total number of reported deaths stands at 509 with 350 cases that have completed the audit cycle. With greater numbers the data becomes more reliable and valuable. Patients are often elderly with significant co-morbidities; despite this, the number of adverse events reported was small, with there being three cases (1%) in which assessors thought that an area of concern or adverse event caused the death. This compares favourably with similar figures from Western Australia (1.8%). It gives reassurance that surgery in Tasmania is very safe, with the number of surgical deaths due to a defined adverse event being very small. Participating surgeons should recognise this and be able to reassure the public that cases where death has occurred have been independently audited and reported.

Nevertheless, there is always room for improvement. For example in 72% of patients who received deep vein thrombosis (DVT) prophylaxis, the assessors noted that this was appropriate in 95% of cases. We should aim for 100%. Assessors also reported areas of concern or adverse events in 26/298 (9%) of cases, although the overall proportion of cases associated with areas for consideration, of concern, and adverse events decreased over the audit period.

The effect of theatre cancellations on patient outcome is not documented in an audit process such as this and it is an issue that needs to be considered in the future. Delays have been shown to cause adverse events but the reason for the delays are not detailed in the audit, neither is the lack of use of ICU/HDU in 5% of assessed cases. Both these issues may be resource related rather than related to clinical decision-making processes. Surprisingly, in only 80% of cases were consultants present at the second operation. The Committee would have expected this to have been closer to, if not, 100%. This needs to be better understood and, if appropriate, efforts made to increase the percentage. Improvement in the return of proformas, speed of return, details on the forms, and legibility are important to help improve the accuracy of the audit.

Overall, the audit is beginning to provide information that should be useful in the improvement of surgical care in Tasmania. With most states starting a similar surgical audit, comparison will be possible and with larger numbers, more data possessing more statistical power obtained. Those surgeons involved in the audit, and their future patients, can now be assured that an important aspect of surgical care is methodically and independently audited, and the experience to date has not revealed any significant systemic deficiencies in the standard of practice.

Rob Bohmer
Chairman

Executive Summary

The Tasmanian Audit of Surgical Mortality (TASM) is an external, independent, peer review audit of the process of care associated with deaths where a surgeon was involved in the management of the patient. The TASM is funded by the Tasmanian Department of Health & Human Services (DHHS) and is part of the Australian and New Zealand Audit of Surgical Mortality (ANZASM). The TASM has qualified privilege under State and Commonwealth legislation.

Audit Process

The TASM office is notified of deaths under a surgeon's care by all public and private hospitals in Tasmania. The associated consultant surgeon is sent a proforma for completion on the process of care associated with the patient. This is peer-reviewed by another consultant surgeon (first-line assessment). In approximately 10% of cases a further detailed case note review is requested. This is undertaken by another consultant surgeon from the same specialty as the surgeon who was responsible for the patient's care. All surgeons are sent feedback from the peer review process.

Participation

Participation in the TASM is voluntary. In 2007, 96% of surgeons associated with reported deaths in Tasmania participated in the TASM, as compared to 79% in 2005. At the time of analysis, 372 of 509 (73%) completed proformas had been returned to TASM by surgeons.

Analysis of Completed Cases

There were 350 cases that completed assessment. Fifty-two (15%) terminal care cases were excluded from further analysis, resulting in final sample size of 298 for this report. Fifty-six percent of cases were male, and the median age of all patients was 79 years. Over 90% of completed cases were associated with one or more significant co-morbidities and 55% of cases had a recorded ASA grade of 4 or higher. Public hospital admissions accounted for 81% of cases.

Areas for consideration, of concern or adverse events

Assessors reported areas of concern or adverse events in 26 of the 298 (9%) of audit cases. The proportion of cases associated with areas for consideration, of concern and adverse events all decreased over the total audit period. There were three cases (1%) where assessors concluded that an area of concern or adverse event had contributed to death.

Admissions

There were a greater number of emergency than elective admissions in the cohort (80% vs. 20%). Elective admissions were associated with a significantly higher proportion of areas of concern or adverse events than emergency admissions (20% vs. 6%). Ninety-seven percent (97%) of elective admissions underwent an operative procedure compared with 67% of emergency admissions.

Operative and non-operative deaths

Of the 298 completed cases, 72% underwent one or more operation. A further 19 cases had operations that were started but abandoned on encountering a situation where there was a poor prognosis and palliation was more appropriate. Cases where an operation was performed were associated with a significantly higher proportion of areas for concern or adverse events when compared to those cases that did not undergo operations (12% vs. 1%).

Grade of surgeon – teaching hospitals

Over 80% of operations conducted in teaching hospitals were performed by consultant surgeons. This percentage did not change when the patient was returned to theatre, as again over 80% of these procedures were undertaken by consultant surgeons.

DVT prophylaxis

Over the audit period, 72% of patients received DVT prophylaxis. In 95% of these cases, assessors noted that the use of DVT prophylaxis was appropriate.

Use of ICU and HDU

Intensive Care Unit (ICU) was used in 40% and High Dependency Unit (HDU) in 10% of audited cases. Previously, the TASM recommended that increased use and availability of ICU and HDU beds should be considered. This audit has subsequently revealed a small increase in the use of ICU beds. Data from 2007 should be monitored to ascertain whether the apparent increase continues.

Fluid Balance

In 9% of cases assessors reported problems with management of fluid balance.

Post-Mortems

A post-mortem was conducted in 40 (13%) of audited cases. Of these, the majority (30 cases) were conducted under the auspices of the Coroner. A further 21 surgeons indicated that they would have preferred a post-mortem where none had been performed. In 13 cases, a post-mortem was refused.

Recommendations

- The value of the audit would be improved if there were more proformas returned, if return was more timely, and more details were provided on the forms and legibility improved.
- The TASM will seek to improve communication channels on its audit findings with other states and territories where similar mortality audits are in progress.
- The second-line assessment by surgeons based interstate will be improved by the introduction of a cross-jurisdictional interstate assessor tracking system.
- The issue of improvements in the management of fluid balance will be disseminated to surgeons participating in the audit in the first instance, as well as to other audits in ANZASM.
- The TASM, the DHHS and the Coroner's Office will work together to ensure that post-mortem results are routinely returned to surgeons.
- Falls are reported as a leading cause of adverse events in South Australian and Western Australian audits but have not been linked to adverse events in Tasmania. Surgeons should consider falls as adverse events and report them as such.
- Delay in transferring to theatre is one of the most frequently reported causes for an area of concern or adverse event. The audit does not currently collect reasons for delays and the proforma will be modified to include these in the future.
- Consultant surgeon attendance if a patient returns to theatre is viewed as important and will continue to be monitored.
- The use of ICU or HDU should be increased, according to assessors. The reason for not using these facilities when they are required needs to be investigated. If it is due to lack of beds or nursing staff this will have impact on future hospital planning.
- The appropriate use of DVT prophylaxis has improved but should ideally be 100% where not contraindicated.
- Efforts will continue to ensure that all surgeons in Tasmania participate in the audit.

Performance Overview

The previous TASM annual report listed recommendations for the coming year. This section summarises these and reports the progress that has been made in each area.

Increased participation in TASM.

The number of surgeons participating in TASM has increased since the beginning of the project.

Review commitment of surgeons to become more accurate in completing data entry of the audit proforma.

There are still problems with some surgeons not completing all sections of the proforma. If more detailed information was provided it would result in fewer cases going to second-line assessment. Often, cases have to be referred to second-line assessment due to lack of information in the original report. Legibility is also a problem and the Coordinator is working with the College to implement electronic completion of the proforma to overcome this issue.

Liase with Coroner to establish a timely and robust mechanism for the return of post-mortem results to the responsible clinician.

An approach has been made to the Coroner in relation to this issue, which is yet to be resolved.

Increased communication with other states and territories where similar audits are in progress.

TASM is in communication with the Western Australian Audit of Surgical Mortality (WAASM), the South Australian Audit of Peri-operative Mortality (SAAPM) and the Queensland Audit of Surgical Mortality (QASM). These are managed through ANZASM. The Victorian Audit of Surgical Mortality (VASM) has recently been established and communication will commence shortly.

Establish interstate second-line assessment, particularly for specialties with small numbers of specialists based in Tasmania.

The ANZASM is establishing the feasibility of a secure, second-line assessment system interstate.

TASM will provide participating surgeons with their commencement date of participation in the audit for the College and Continuing Professional Development (CPD) records, and for submission to hospitals for clinical governance and accreditation purposes.

This information is available from the TASM Coordinator on request.

Areas of concern and adverse events that were considered preventable should be reviewed and recommendations made as to future action required to rectify practices.

These areas are reviewed through the second-line assessment and the information is then made available to the participating surgeon. It is then up to the surgeon to review and learn from any issues arising from that second-line assessment. Disclosure of individual case assessments is protected by privilege.

Increased use and the availability of HDU/ICU beds should be considered.

The Chairman has suggested that these decisions may be resource rather than decision related but the aim should be for 100% availability, when appropriate.

DVT prophylaxis should be reviewed.

The proportion of cases where assessors indicated that DVT prophylaxis was appropriate has increased over the audit period.

The grade of surgeon operating at second operation should be reviewed.

The audit data show that in 80% of cases the consultant surgeon performed the second operation when the patient was returned to theatre.

Introduction

Background

The Tasmanian Audit of Surgical Mortality (TASM) is an external, independent, peer review audit of the process of care associated with surgically-related deaths in Tasmania. The TASM commenced data collection in September 2004 and is part of the Australian and New Zealand Audit of Surgical Mortality (ANZASM) which was formed by the Royal Australasian College of Surgeons in 2005. The TASM is funded by the Tasmanian Department of Health and Human Services (DHHS) and is managed by a Management Committee (page 34).

Project Governance

The Royal Australasian College of Surgeons Tasmanian Audit of Surgical Mortality Management Committee is registered under the Tasmanian *Health Act 1997* and also has protection under the Commonwealth Qualified Privilege Scheme under Part VC of the *Health Insurance Act 1973* (Gazetted 6 November 2006).

Figures 1 and 2 illustrate the College and regional governance structures surrounding the audit of surgical mortality. An ANZASM Steering Committee oversees the functioning and strategic directions of the regional audits, and provides input into national reporting. Members of the Management Committee include the Chair of the Research, Audit and Academic Surgery Division (RAAS) of the College and all regional Clinical Directors (or designated proxies), and it is supported by RAAS Division staff.

Figure 1: Governance Structure of the Royal Australasian College of Surgeons, ANZASM

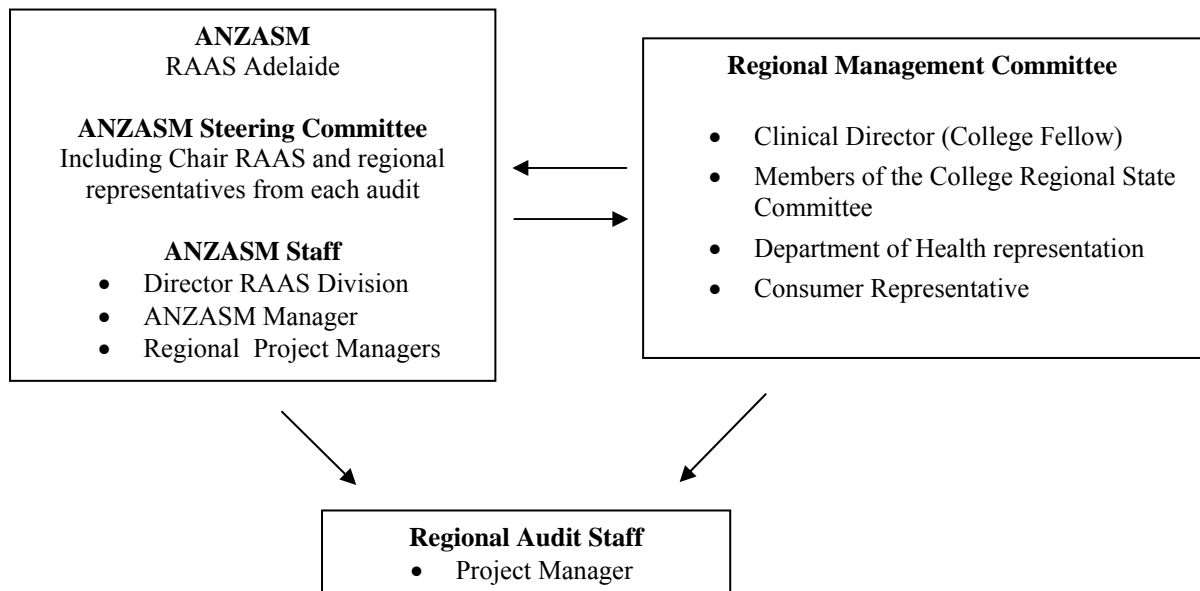
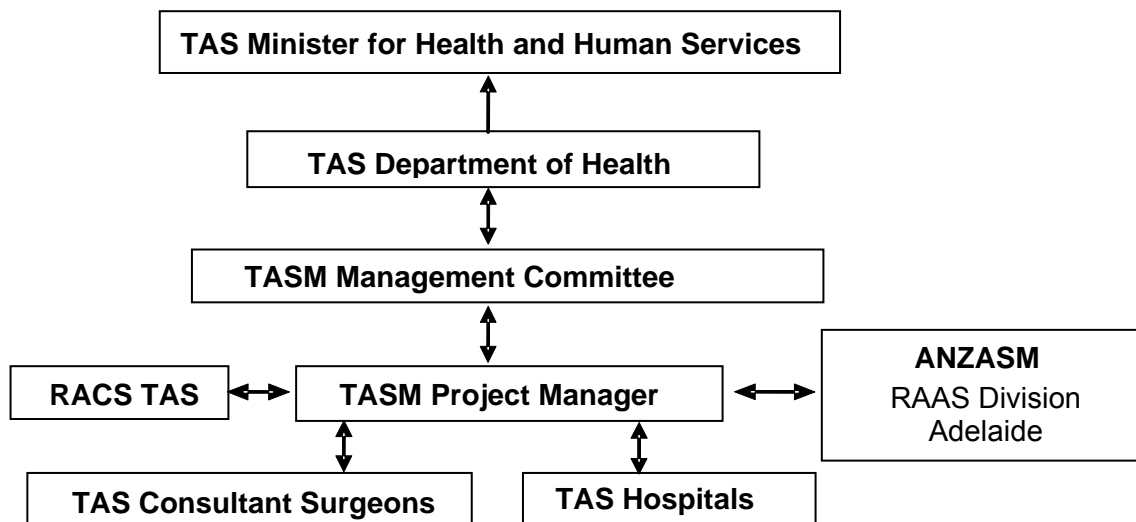


Figure 2: Regional Audit Governance Structure



The Audit Process

Notification of Deaths

The medical records departments of the hospitals notify TASM of deaths that occur in patients under the care of surgeons in private and public hospitals throughout Tasmania.

Participation

Participation in the TASM is voluntary. Surgeons consent to participate in the audit and agree to be first- and/or second-line assessors. Surgeons who indicate that they do not wish to participate (non-participants) are not sent TASM proformas.

Methods

After the TASM is notified of a death by the hospital, the associated consultant surgeon is sent a proforma for completion. The proforma is returned to the TASM office, de-identified and then anonymously assessed by a first-line assessor who is another consultant surgeon. He/she will determine if the case should undergo a second-line assessment. The second-line case note reviews are undertaken by another surgeon from the same specialty as the surgeon responsible for the patient's care. Second-line assessment is requested where possible deficiencies of care are thought to have occurred during the pathway of care before death, or where a review could usefully draw attention to lessons that might be learned, either for clinicians involved in the case or as part of collated assessments for wider distribution. Surgeons receive assessor feedback on their cases through the audit process. Feedback that is disseminated to surgeons, hospitals or the public is aggregated and de-identified. Issues are not linked to patients, surgeons or hospitals in an identifiable manner. The process is managed by the TASM Project Coordinator and co-ordinated through an extensive database. More detailed information on the audit process can be found in Appendix 1.

- Individual surgeons receive feedback on their cases from the reviewing surgeon
- The TASM reports results annually. Information is aggregated and anonymous. No information is available on individual patients, surgeons or hospitals.
- All surgeons receive summaries of selected second-line reviews, newsletters and copies of annual reports.

Audit Inclusion / Exclusion Criteria

The TASM audits all deaths that occur in hospital whilst under the care of a surgeon, irrespective of whether an operation was performed. If a patient is admitted under the care of a physician and subsequently undergoes an operative procedure, the case is included in the audit process. Terminal care cases are excluded.

Definitions

Assessment Outcomes

Surgeons and assessors report deficiencies of care in relation to the following criteria:

- **Area for Consideration:** where the clinician believes areas of care could have been improved or different, but recognises that it may be an area for debate.
- **Area of Concern:** where the clinician believes that areas of care should have been better.
- **Adverse Event:** an unintended ‘injury’ caused by medical management rather than by the disease process, which is sufficiently serious to lead to prolonged hospitalisation or to temporary or permanent impairment or disability of the patient at the time of discharge, or which contributes to or causes death.

Surgeons and assessors determine the impact of the incident on the outcome as to whether it:

- made no difference to the outcome
- may have contributed to death, or
- caused the death of the patient who would otherwise been expected to survive.

Surgeons and assessors give their opinion as to whether the incident was preventable:

- definitely
- probably
- probably not, or
- definitely not

The surgeon and assessors indicate with whom the incident was associated, i.e.:

- audited surgical team
- another clinical team
- the hospital, or
- other

Providing Feedback

The core purpose of TASM is to collect information to inform, educate and facilitate change and improve practice. TASM provides feedback in the following ways:

Reporting Conventions

Deficient care has primarily been referred to as an “area of concern” or an “adverse event”.

Areas for consideration have been excluded from analysis because these events are often found to make no difference to the outcome, and often reflect a difference of opinion rather than a firm, evidence-based conclusion that the care should have been different.

Some cases were associated with more than one event. Where there was more than one “event” identified in the analysis of any one case, the most serious event was ascribed to the case.

Numbers in parentheses in the text (n) represent the number of cases analysed. Not all data were complete; therefore, the total number of cases used in the analysis varies.

The analyses contained in this report are of events ascribed to the case by either the first- or second-line assessors.

The categorisation of the severity of the event, the effect on outcome, and the team or location the event was associated with is the opinion of the assessors.

This report covers deaths reported to TASM from 1st September 2004 to 30th June 2007. Due to the time lag associated with the review process, some cases reported to TASM during 2007 will, at the time of analysis, still be undergoing the audit process. These cases will be included in the next annual report. Similarly, figures in previous annual reports will vary from figures in this report, because cases completed after the return date are included in the dataset. Data are entered and stored in a Microsoft Access database and analysed using Statistical package for the Social Sciences (SPSS) and Microsoft Excel.

Audit Participation and Assessment

Key Points

- TASM participation is voluntary.
- Number of non-participating surgeons has decreased from eleven surgeons at audit inception to two in 2007.
- 509 cases were reported to the TASM from 1 September 2004 to 31 July 2007.
- At the time of analysis, 73% of proformas sent to surgeons had been returned.

Overview of Participation

Over the audit period (Sept 2004 to July 2007), 509 deaths were reported to the TASM, of which the peer review process was completed in 69% of cases (Table 1). The audit is a multi-step process with an associated time lag. The median time to receiving the completed proforma was approximately one month. The number of completed cases reported for January to July 2007 will increase as the audit process is completed for deaths in this period. If second-line assessment is required, the median time to completion is approximately two months.

Table 1: Deaths reported to TASM (Sept 2004 to July 2006; audit status as at July 2007, n=509)

	Sept-Dec 2004	2005	2006	Jan-July 2007	Total
Total deaths reported	62	183	162	102	509
Audit process complete	47 (76%)	127 (70%)	123 (76%)	53 (52%)	350 (69%)
Proforma complete, awaiting assessment*	0	1 (0%)	7 (4%)	14 (14%)	22 (4%)
Proforma not returned	1 (1%)	13 (7%)	22 (14%)	32 (31%)	68 (13%)
Case associated with non-participant	14 (23%)	42 (23%)	10 (6%)	3 (3%)	69 (14%)

* first- or second-line assessment

Figure 3: Status of proformas

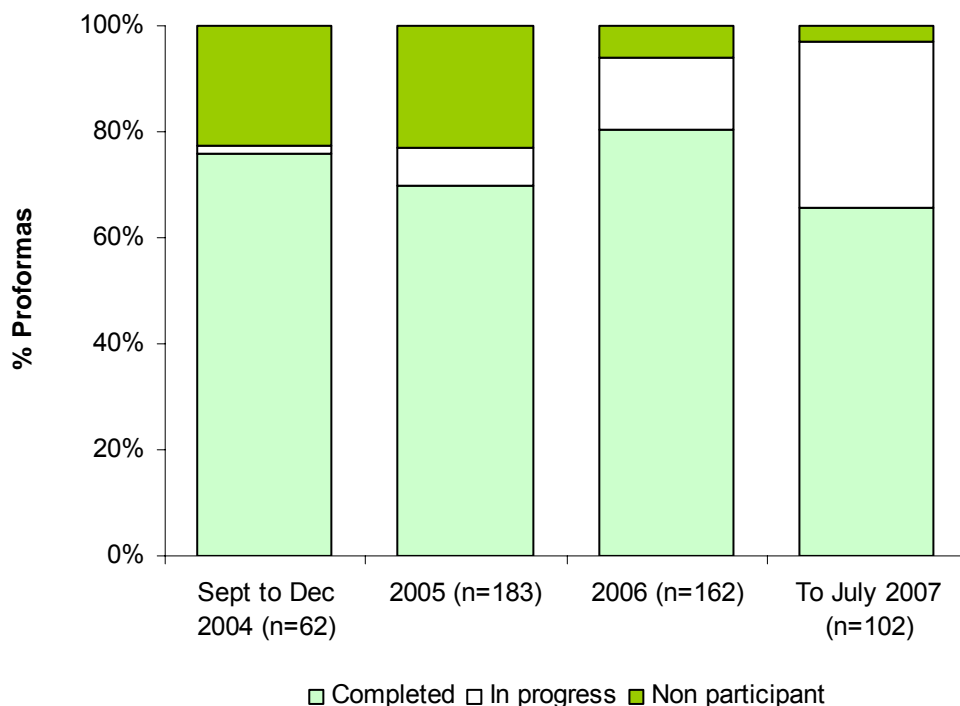


Figure 3 shows the proforma completion rate by year and includes cases still awaiting assessment (‘in progress’) and cases associated with non-participants (surgeon who have indicated they do not wish to participate in TASM). Over this time period, the number of cases attributed to non participating surgeons has decreased as more surgeons are participating. Of the 509 deaths reported to TASM over the audit period, 372 (73%) surgical proformas have been completed and returned to TASM

Surgeon Participation

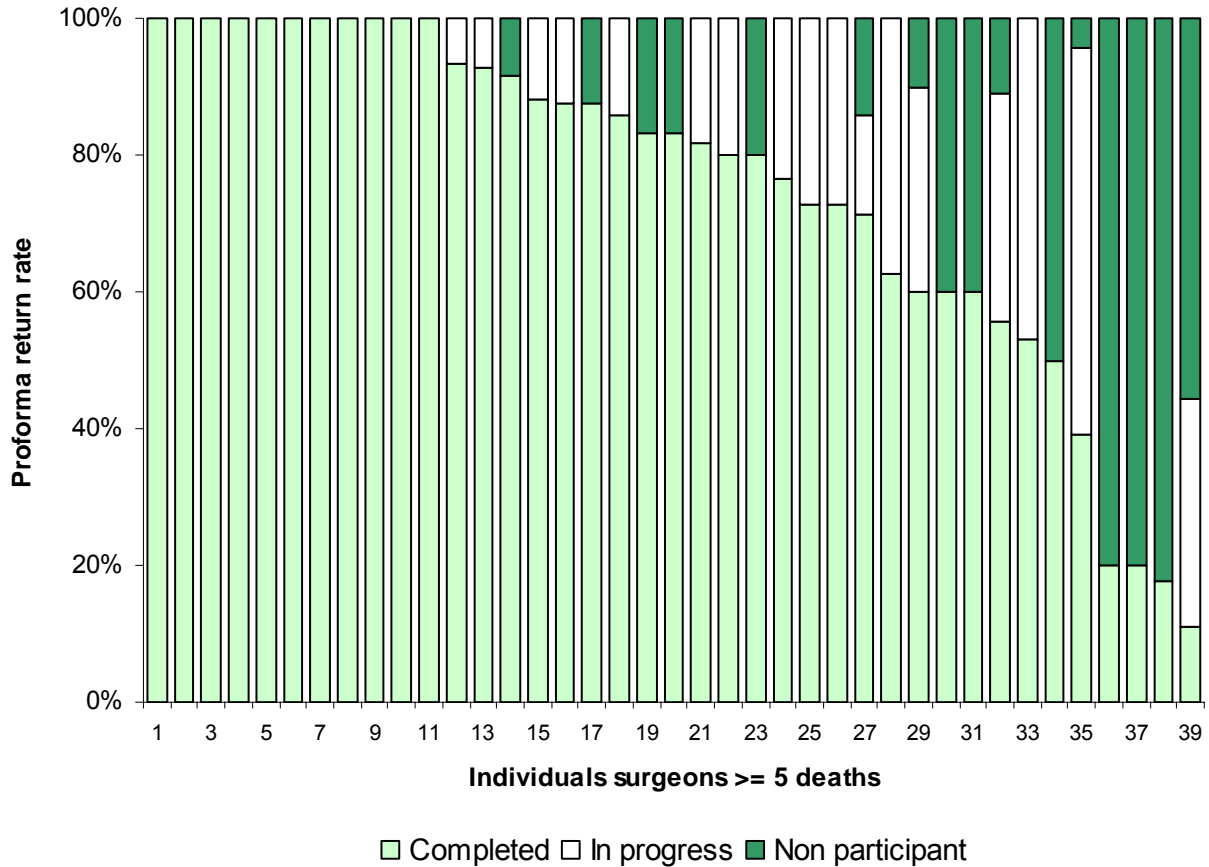
Over the three-year audit period, surgeon participation has increased overall as outlined in Table 2, which provides more information on this trend with data broken down by year. Overall, the proportion of surgeons associated with the audited cases who agreed to participate increased from 68% to 96%.

Table 2: Non-participants by year

Year	Deaths (n)	Associated Surgeons (n)	Non participants (%)
Sept-Dec 2004	62	34	11 (32%)
2005	183	57	12 (21%)
2006	162	50	2 (4%)
Jan-July 2007	102	54	2 (3%)

Overall, 80 consultants were associated with the 509 deaths reported to TASM. Thirty-nine consultants were associated with five or more deaths. The proportion of proformas returned by these consultants is reflected in Figure 4. Surgeons are anonymised.

Figure 4: Proportion of proformas returned by consultants who were associated with five or more deaths (n=39)

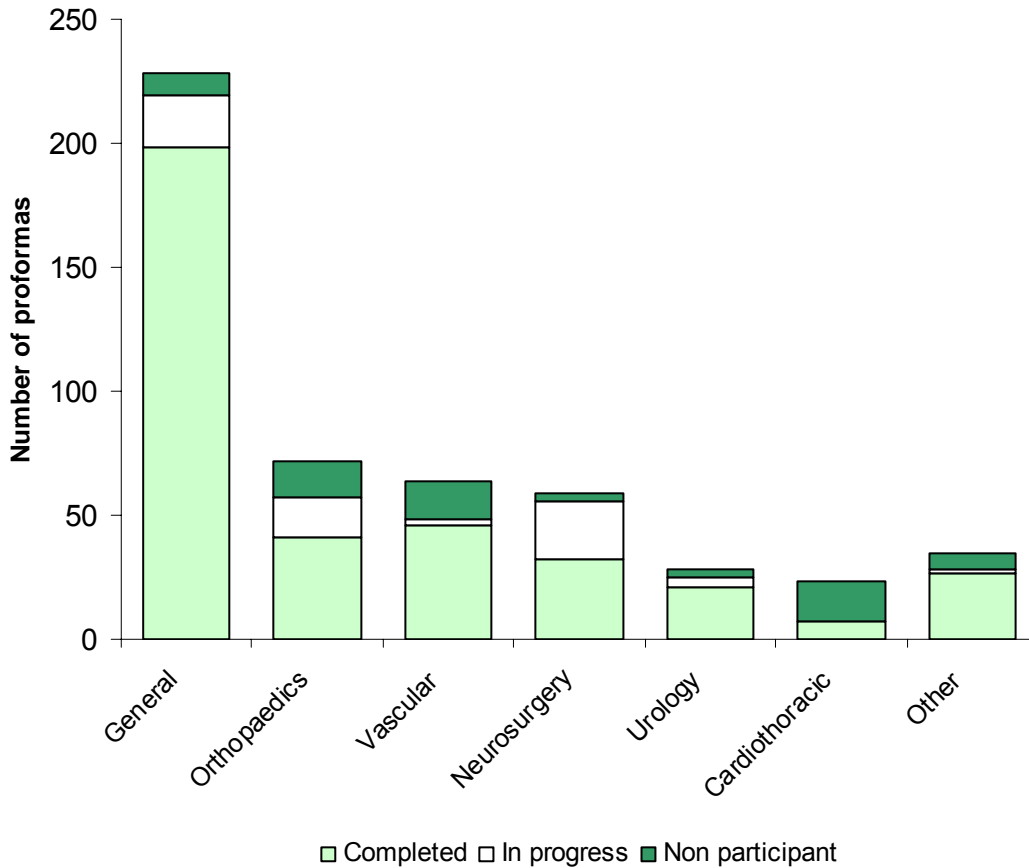


*Note that some surgeons have lower proforma completion rates because they started to participate in TASM after the inception of the audit.

Participation by Specialty

Over one-third of audited cases were general surgical admissions (n=350) and 94% of the proformas sent to consultant general surgeons were returned to TASM. Figure 5 illustrates the number of proformas completed by each specialty.

Figure 5: Number of proformas returned by specialty (n=509)



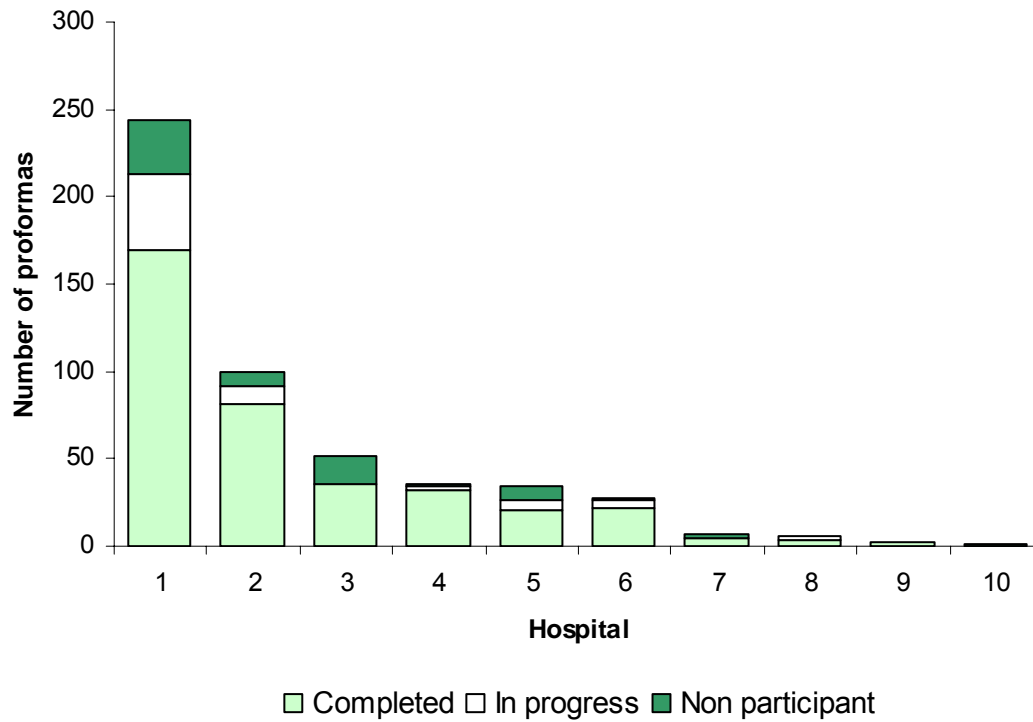
Other = Ear Nose and Throat, Obstetrics & Gynaecology, Plastic Surgery, Ophthalmology, Oral maxillo-facial

Hospital Participation

From September 2004 to July 2007, 509 deaths were reported to TASM from ten hospitals.

Hospitals in Tasmania range from small district hospitals to larger regional hospitals in Launceston, Latrobe, Burnie and Hobart. There are large public teaching hospitals in both the north and south of the state. Sixty-eight percent of hospital admissions were to two hospitals (Figure 6).

Figure 6: Reported deaths associated with 10 hospitals in Tasmania in which surgical procedures take place (n=509)



Results

Overview and patient sample demographics

Key Points

- There were 350 cases that completed the audit cycle from Sept 2004 to July 2007. Fifty-two cases required terminal care and were excluded from further analysis. The remaining 298 cases were examined in detail.
- Over 90% of audited cases had one or more significant co-morbidities that were judged to have contributed to the death.
- Fifty five per cent of audited cases had a recorded ASA score of 4 or more.
- The majority of cases were public patients (71%).
- Eighty one per cent of all patients were admitted to public hospitals.

Completed Cases – September 2004 to July 2007

Of the 509 cases reported from September 2004 to July 2007, 350 (69%) completed the audit process (Table 1). Included in this figure, were 52 terminal care cases which have been excluded from further analysis (Table 3). We report on 298 cases that completed the audit cycle by July 2007.

Table 3: Excluded terminal care cases

	Sept to Dec 2004	2005	2006	Jan to July 2007	Total
Completed Cases	47	127	123	53	350
Terminal care	10	14	16	12	52
Total included cases	37	113	107	41	298

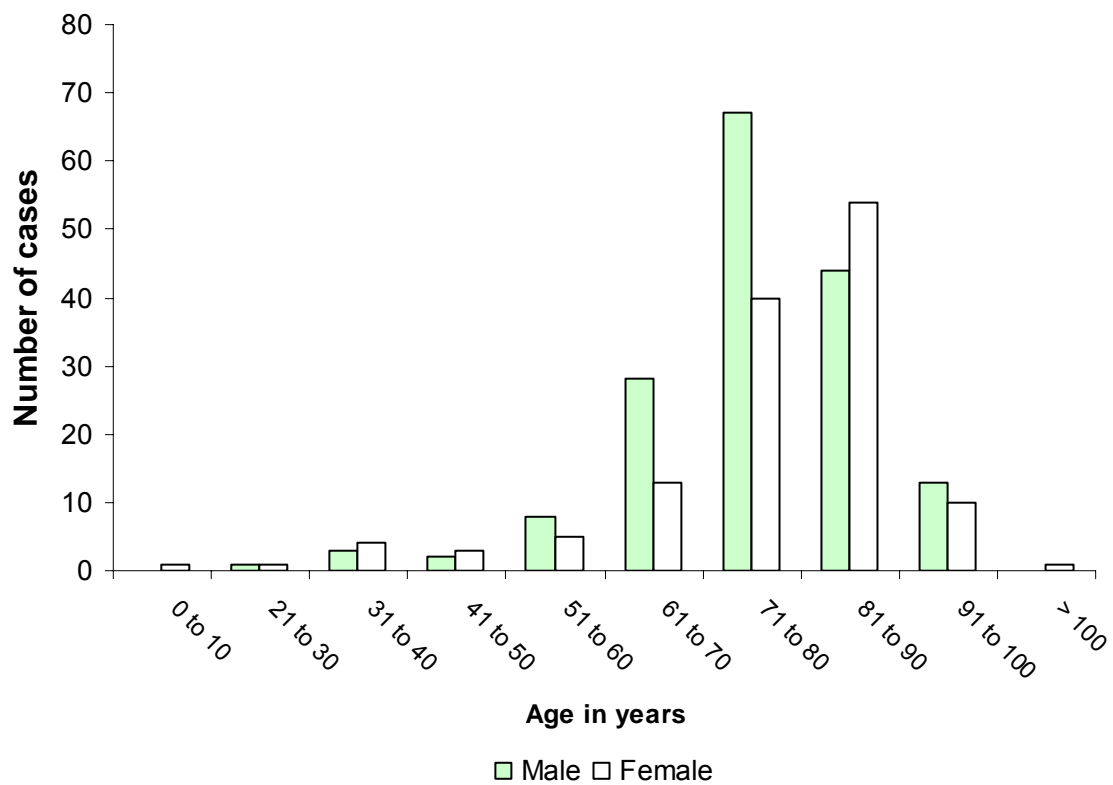
Patient Sample Demographics

There were more male patients (56%) than female patients in the audit, with females being on average older than males (Table 4). Figure 7 illustrates the age distribution of the sample by age decade, subdivided by gender, which shows a higher proportion of males under the age of 80 than females in the sample.

Table 4: Gender distribution (n=298)

Gender	n (%)	Median age (years) [Interquartile range]
Male	166 (56%)	77 [69 – 84]
Female	132 (44%)	80 [73 – 86]
Total	298	79 [71 – 84]

Figure 7: Age distribution of audited deaths by sex (n=298)



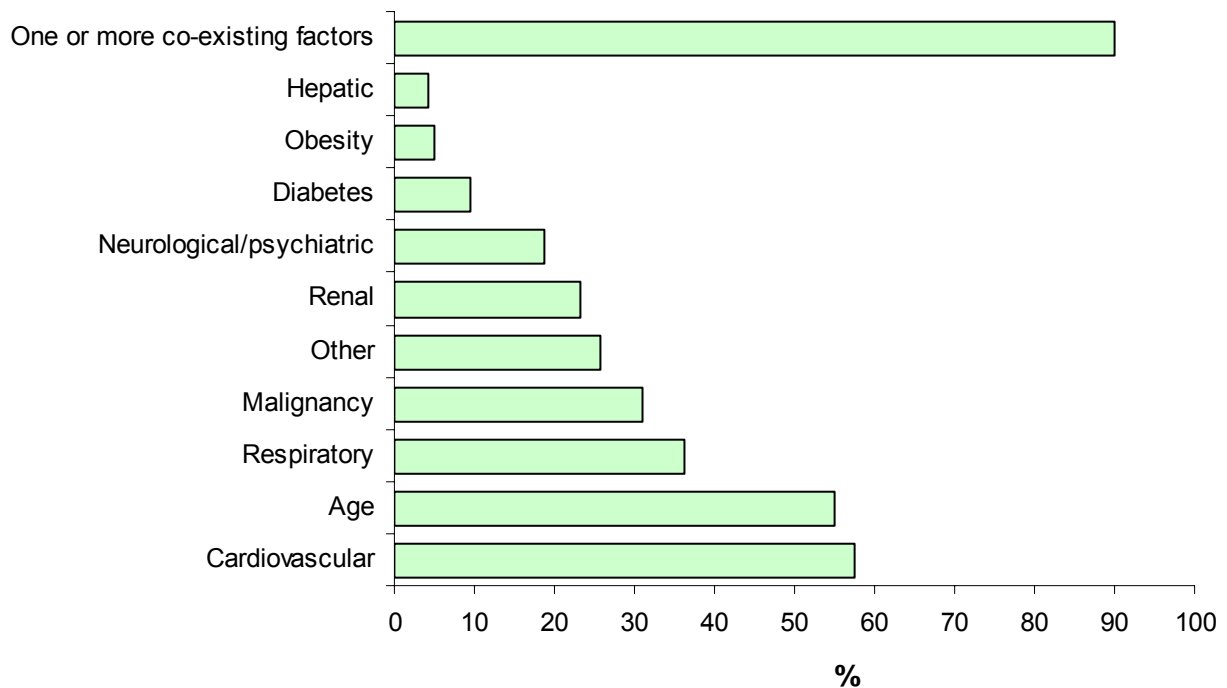
Co-morbidity

Over 90% of audited cases were reported as having at least one significant co-morbidity that was considered to have increased the risk of death (Figure 8).

Surgeons reported:

- Malignancy was present in 92 (31%) cases
- Malignancy contributed to death in 65 (22%) cases
- Significant co-morbidities contributed to death in 268 (90%) cases.

Figure 8: Reported co-morbidities in audited cases (n=298)



* Other – Alcoholism, Gastro-intestinal bleeding, malnutrition, genetic syndrome, on anti-coagulants

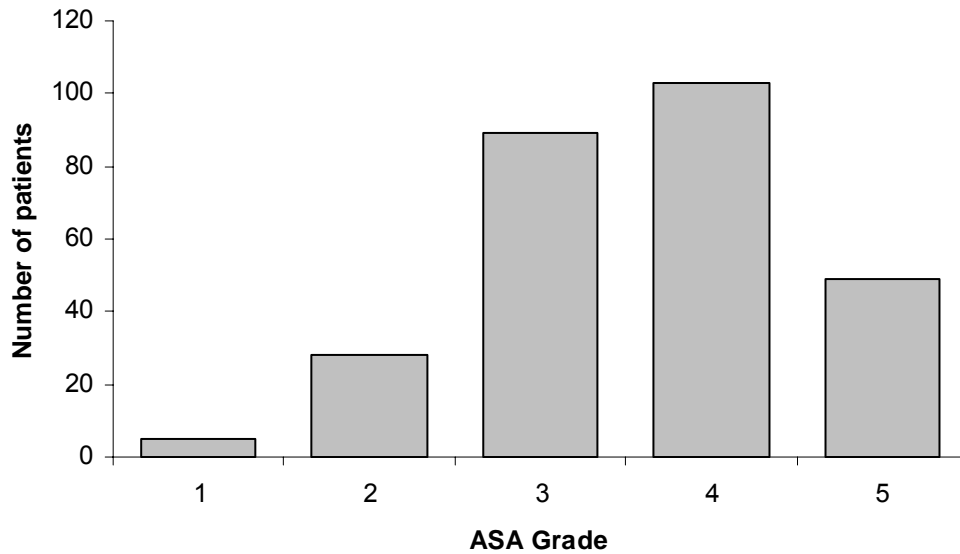
ASA Grade

The American Society of Anesthesiologists Grade (ASA grade) (Table 5) is an internationally recognised gross predictor of overall perioperative outcome and is assigned to the patient pre-operatively. The ASA grades of 274 cases were recorded. The distribution of grades is shown in Figure 9. There were 152 (55%) cases with a recorded ASA grade of 4 or more.

Table 5: ASA Grades

ASA 1	A normal healthy patient
ASA 2	A patient with mild systemic disease
ASA 3	A patient with severe systemic disease which limits activity, but is not incapacitating
ASA 4	A patient with an incapacitating systemic disease that is a constant threat to life
ASA 5	A moribund patient who is not expected to survive 24 hrs, with or without an operation
ASA 6	A brain-dead patient for organ donation

Figure 9: ASA grade of audited cases (n=274)



Hospital and Patient Status

The majority of completed cases were public patients (71%, Table 6).

Table 6: Patient status (private, public, veteran) (n=298)

	n
Public	211 (71%)
Private	56 (19%)
Veteran	19 (6%)
Missing Info	12 (4%)

Of the 298 completed cases, the majority (81%, Table 7) were admitted to public hospitals.

Table 7: Hospital status (private/public) (n=298)

	n
Public	242 (81%)
Private	58 (19%)

Clinical Incidents

Key points

- Twenty six (9%) cases were associated with either adverse events or areas of concern.
- The proportion of cases associated with areas for consideration, of concern or adverse events decreased over the audit period.
- There were three cases where an area of concern or adverse event was considered to have caused death.
- The use of DVT prophylaxis was considered appropriate in 83% of cases.

Surgeons and assessors indicated whether, in their opinion, the care of the audited case was associated with areas for consideration, of concern or adverse events (page 11).

Overall, 17% of completed cases were associated with areas for consideration and 26% were associated with areas of concern or adverse events (Table 8).

Table 8: Numbers of deaths associated with areas for consideration, of concern or adverse events by year (as reported by participants and assessors)

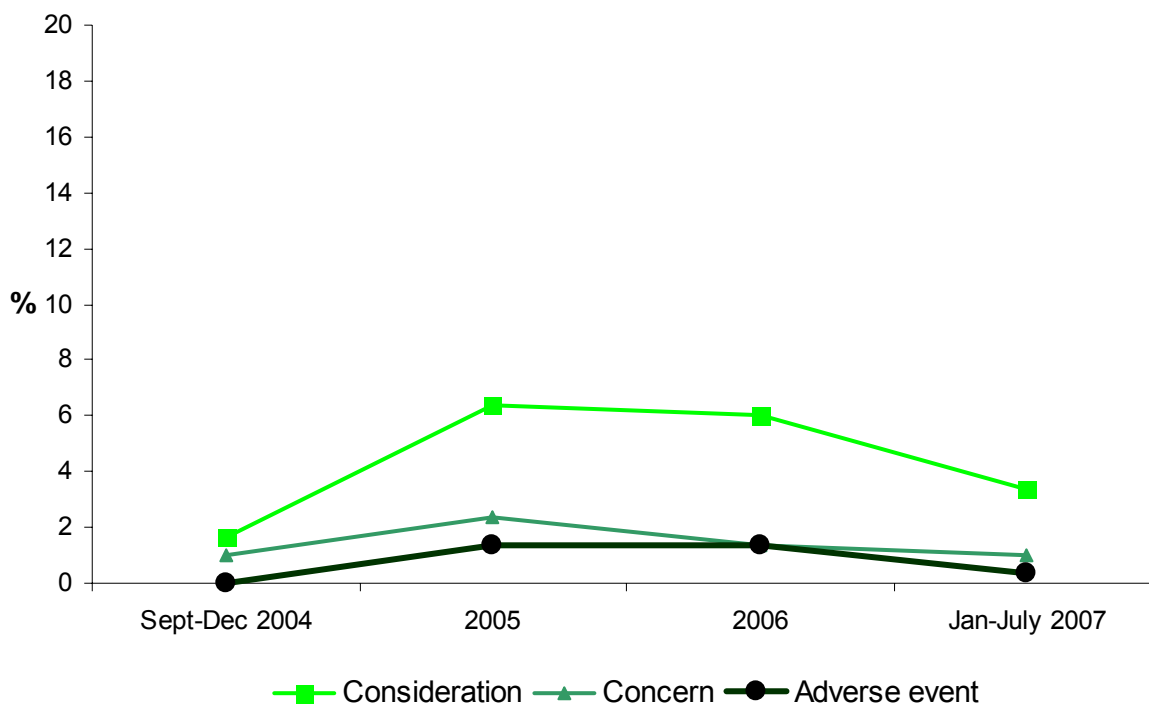
	2004*	2005	2006	2007 ⁺	Total
Consideration	5	19	18	10	52
Concern	3	7	4	3	17
Adverse event	0	4	4	1	9
None	29	83	81	27	220
Total	37	113	107	41	298

*Sept to Dec 04

⁺Jan to June 07

The overall proportion of cases associated with areas for consideration, of concern or adverse events has decreased over the TASM audit period (Figure 10).

Figure 10: Proportion of areas for consideration, of concern and adverse events by year



Assessors reported on the contribution that the event made to the death of the patient, and whether the event was preventable (Tables 9 and 10). Some deaths were associated with more than one event. In Table 10, only the most significant event was ascribed to the case.

Table 9: Numbers of deaths associated with areas for consideration, areas of concern or adverse events as reported by assessors (most significant event only)

	Made no difference to outcome	May have contributed to death	Caused death	Missing info	No events	Total
Area of Consideration	21	23	1	7		52
Area of Concern	2	13	1	1		17
Adverse event	1	6	2	0		9
No events	0	0			220	220
Total	24	42	4	8	220	298

Table 10: Assessors view on preventability of events

	Was the event preventable?					Total
	Definitely	Probably	Probably not	Definitely not	Missing information*	
Consideration	0	13	24	4	11	52
Concern	3	10	2		2	17
Adverse event	2	4	3			9
Total	5	27	29	4	13	78

*In 13 cases where areas for consideration were noted, the assessors did not provide an opinion as to preventability.

Admissions

Key Points

- Eighty per cent of audited cases were emergency admissions.
- Elective admissions were associated with a significantly higher proportion of areas of concern or adverse events when compared to emergency admissions (20% vs. 6%) $p= 0.001$.
- Ninety seven per cent of elective admissions underwent operation compared to 67% of emergency admissions ($p<0.0001$).

Figure 11 shows that a higher proportion of completed cases (n=298) were emergency admissions (80%) than elective admissions (20%). However, a higher proportion of elective admissions underwent operation than emergency admissions (Table 11).

Figure 11: Admission type (Elective/Emergency)

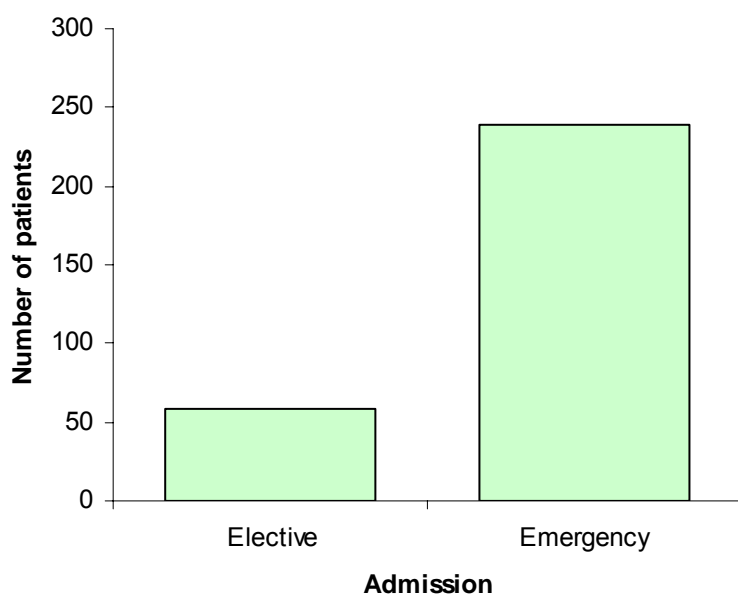


Table 11: Type of admission and whether an operation was performed

Admission	Operation	No operation	Total
Elective	57 (97%)	2 (3%)	59
Emergency	159 (67%)	80 (33%)	239
Total	216	82	298

- There was a significant difference between the proportion of elective admissions undergoing an operative procedure (97%) when compared with emergency admissions (67%), Pearson Chi squared test, $p < 0.0001$ (Table 11). This was not unexpected as in the elective cases a firm diagnosis and requirement for surgery had been established before admission.
- Elective admissions were associated with a significantly higher proportion of areas of concern or adverse events (20%) when compared to emergency admissions (6%), Fishers Exact test, $p=0.001$ (Table 12). These events are detailed in Table 13.

Table 12 identifies which of those cases associated with either an area of concern or adverse event were elective or emergency admissions. The results indicate that elective admissions are associated with more clinical events.

Table 12: Elective and emergency admissions that were associated with areas of concern or adverse events

Admission	Associated with area of concern or adverse event	Total
Elective	12 (20%)	59
Emergency	14 (6%)	239
Total	26 (9%)	298

Table 13: Reported areas of concern or adverse events associated with elective and emergency audited cases (n=26)

Elective Admissions (n=59)	n
Swab left in wound	1
Abdominal abscess	1
Post-operative obstruction after open surgery	1
Small bowel complication of laparoscopic operation	1
Delay in recognising complications	1
Surgeon too junior	1
Poor documentation	1
Poor communication between physician and surgeon	1
Poor communication between nursing and surgical staff	1
Better to have done different operation or procedure	1
Decision to operate	1
General complications of treatment	1
Total	12
Emergency Admissions (n=239)	
Perforation of rectum following open surgery	1
Perforation of duodenum during endoscopic operation	1
Delay to surgery, i.e. earlier operation desirable	2
Delay in diagnosis	1
Poor communication between physician and surgeon	1
Wrong surgical approach used	1
Better to have done different operation or procedure	1
Decision to operate	1
Wrong anaesthetic technique	1
Care unsatisfactory, not otherwise specified	1
Post-operative care unsatisfactory	1
Fluid balance unsatisfactory	1
Inadequate monitoring	1
Total	14

Operative and Non-Operative Cases

Key Points

- Seventy two per cent of audited cases underwent an operation.
- In 19 cases the operation was abandoned on finding a terminal situation where the disease process was too advanced: radical surgery was not appropriate and palliative care was preferable.
- Cases where an elective operative procedure was performed were associated with a significantly higher proportion of areas of concern or adverse events (12%) when compared to emergency admissions (1%), $p=0.002$.

Of the 298 audited cases reported to TASM over this audit period, 216 (72%) underwent an operation. There was an increase in the proportion of cases that underwent operation in 2006 (81/107, 31%) when compared to 2005 (78/113, 24%) (Figure 12).

Of the 216 cases where an operation was performed, surgeons reported that in 19 cases (9%), the operation was abandoned on finding a terminal situation. Surgeons also indicated the reason why an operation was not performed. Information was available on 42 of the 82 cases (51%) where no operation was performed.

Figure 12: Number of audited cases where an operation was performed

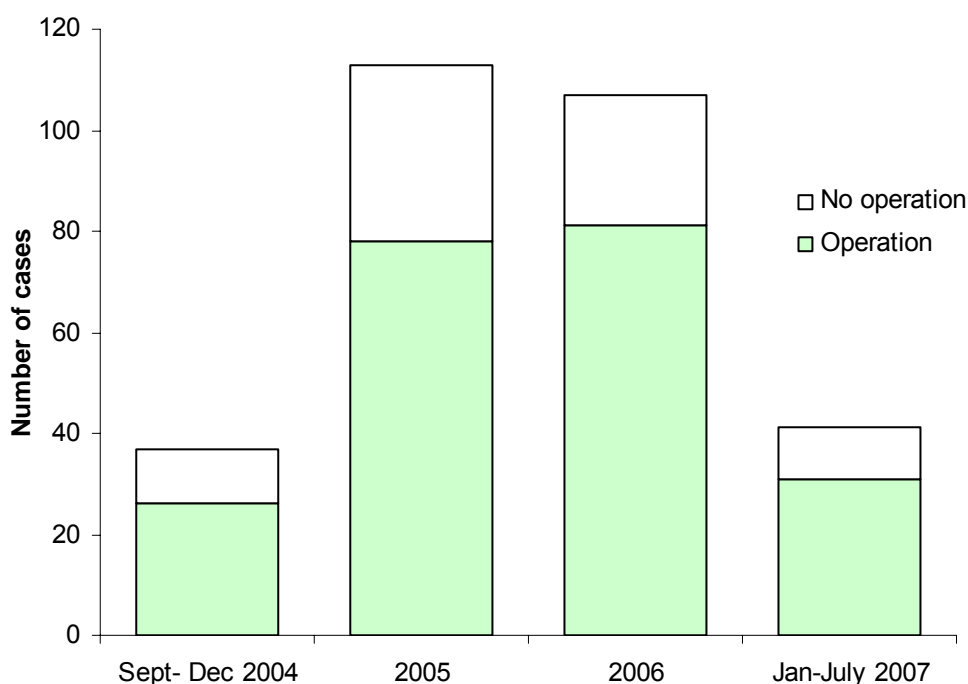


Figure 13 shows the number of operations performed by specialty. The majority of audited operations were performed by general surgeons.

Figure 13: Number of operations performed by specialty

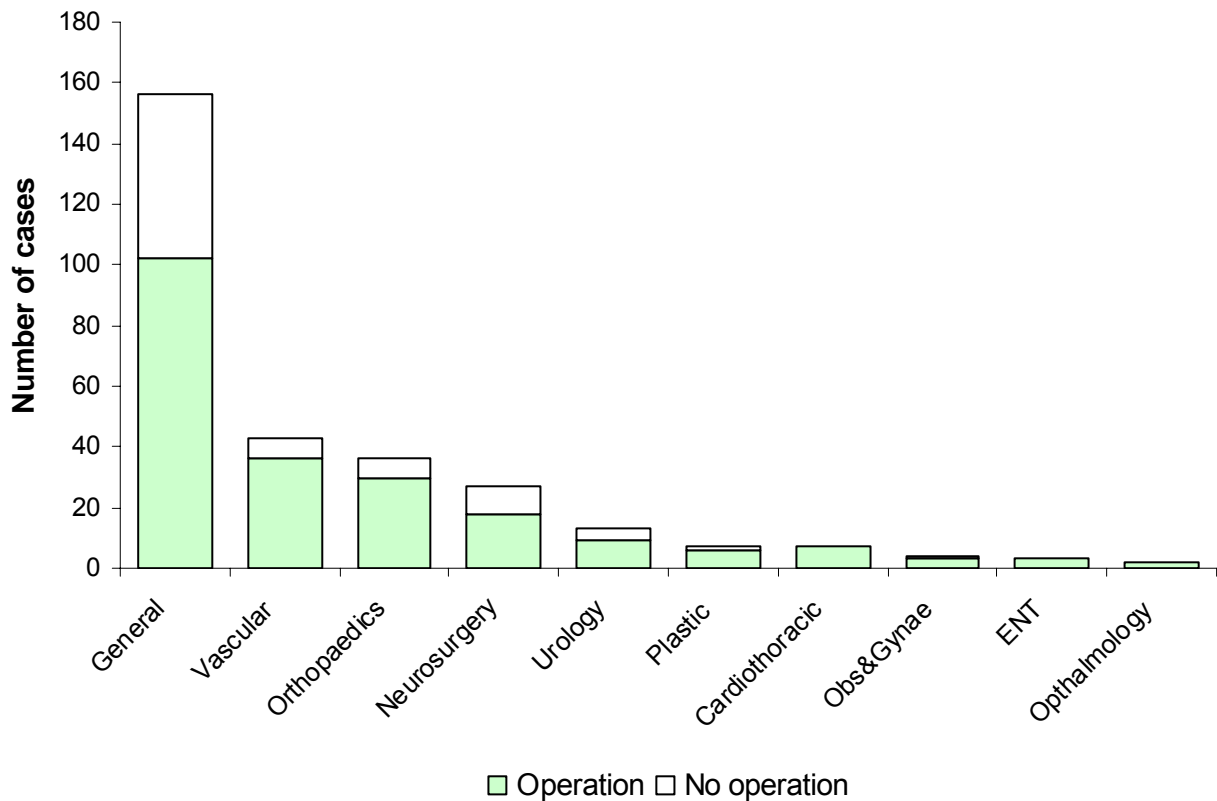
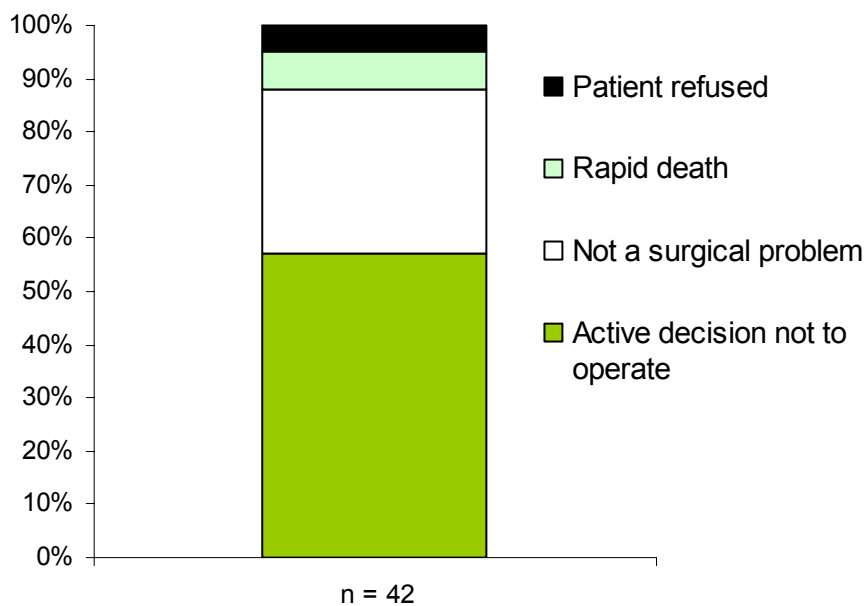


Figure 14 outlines the reasons behind the decision not to operate. In the majority of these cases, the surgeon made an active decision not to operate.

Figure 14: Reasons for no operation



Cases where an operative procedure was performed (n=216) were associated with a significantly higher proportion of areas of concern or adverse events (12%) when compared to cases in which no operation was performed (1%), Fishers Exact test, p=0.002 (Table 14).

Table 14: Proportion of areas of concern or adverse events associated with operative and non-operative cases

	Associated with area of concern or adverse event	Total
Operation performed	25 (12%)	216
No operation	1 (1%)	82
Total	26 (9%)	298

Table 15: Number of operations and associated events

	Associated with area of concern or adverse event		Total
	Yes	No	
Number of operations			
0	1 (1 %)	81	82
1	18 (12%)	132	150
2	6 (13%)	39	45
3+	1 (5%)	20	21
Total	26 (9%)	272	298

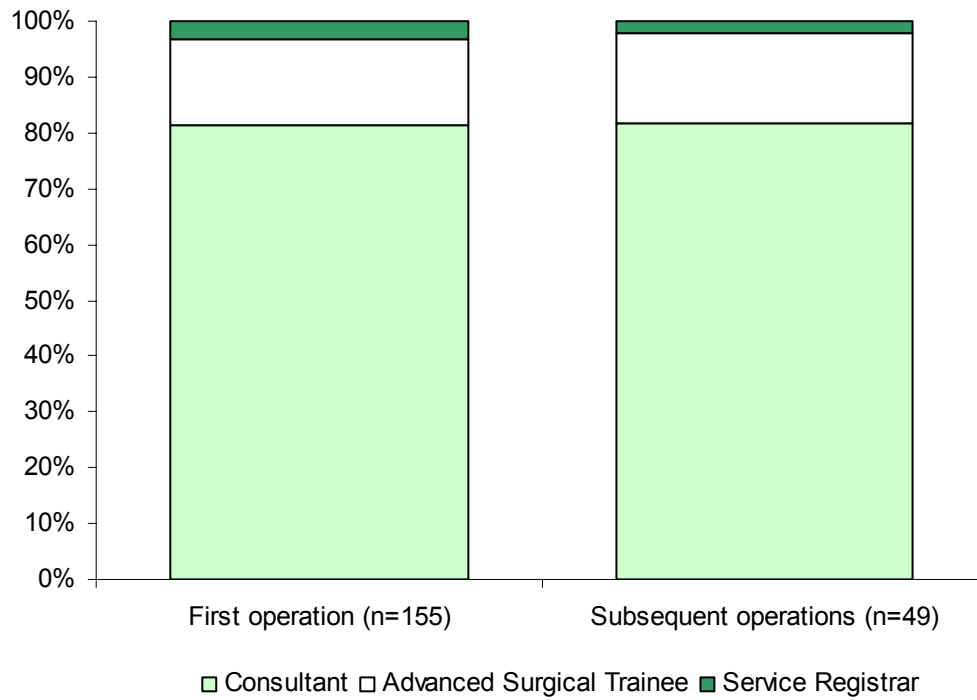
Grade/Status of Surgeon – Teaching Hospitals

Key points

- Over 80% of operations undertaken in teaching hospitals were performed by consultant surgeons.
- When patients were returned to theatre, over 80% of procedures were performed by consultant surgeons.

Of the 216 audited cases where operative procedures were performed, 168 (78%) of these were undertaken in teaching hospitals. Information on the grade/status of surgeon undertaking the first operative procedure was available in 155 cases (Figure 15). Of 168 cases in teaching hospitals, 42 underwent a further operation, and of these, 15 underwent a third procedure (Table 16). Information was recorded on 49 of the 58 subsequent operations in relation to grade/status of the operating surgeon. In both the first operation and subsequent operations, over 80% of operative procedures were undertaken by consultant surgeons (Figure 15).

Figure 15: Grade/Status of surgeon performing first and subsequent operations (teaching hospitals)



Approximately two thirds (65%) of patients had only one operative procedure. (Table 16).

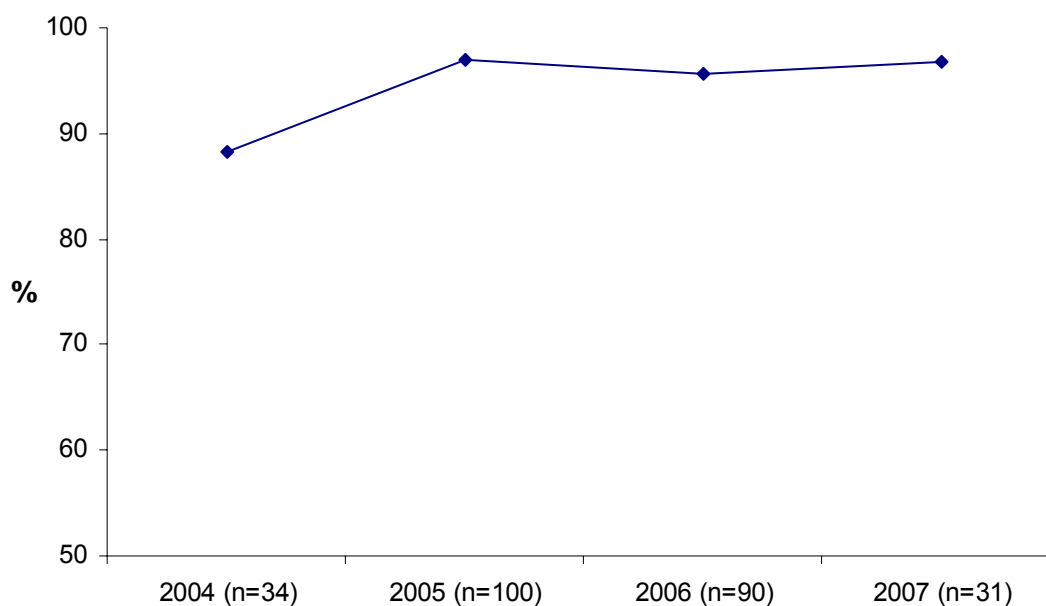
Table 16: Number of cases that underwent one, two or more operations at teaching hospitals

Number of operations performed	1	2	3	3+	Total
Number of cases	110	42	15	1	168

Prophylaxis and Thromboembolism

Surgeons reported on the use of DVT prophylaxis including the reasons it may have been withheld. At case review, assessors indicated whether they thought that the decision on the use of DVT prophylaxis was appropriate. Figure 16 shows the proportion of assessors by year who indicated that the use of DVT prophylaxis was appropriate.

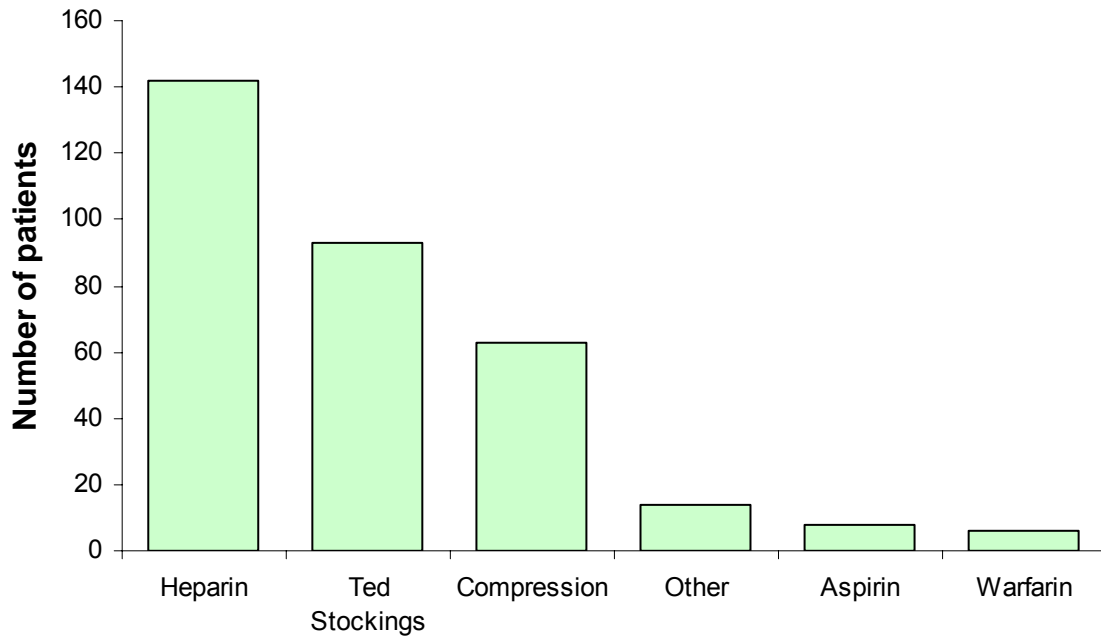
Figure 16: Proportion of assessors by year indicating appropriate use of DVT prophylaxis.



Of the 298 completed cases, there were 270 cases where DVT information was recorded by the surgeon (information was missing in 28 cases). Over the audit period, surgeons reported that in 193 of these 270 cases (72%), DVT prophylaxis had been given to patients where it was indicated.

Information on the appropriateness of DVT prophylaxis was supplied in 255/298 completed cases. In 43 cases this information was not provided. . DVT prophylaxis treatment was appropriate and in 12 cases (5%) DVT prophylaxis was inappropriate. The type of DVT prophylaxis used is outlined in Figure 17.

Figure 17: Type of DVT prophylaxis used



Other = Clexane, Clopidogrel

Use of ICU and HDU

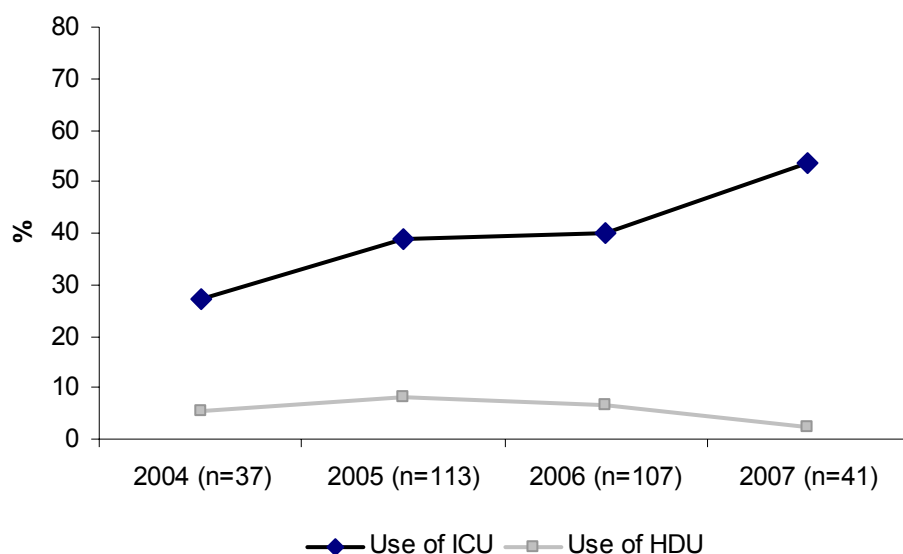
One of the recommendations in the previous TASM report suggested increased use and availability of HDU/ICU beds in Tasmanian hospitals offering surgical services. Table 17 details those cases in which ICU and HDU were used and also those cases where the assessors determined that these hospital resources should have been used, if available.

Table 17: Use of ICU and HDU (Assessors' response) (n=298)

	n (%)
ICU used	119 (40%)
HDU used	29 (10%)
ICU should have been used	14 (5%)
HDU should have been used	19 (6%)

The proportion of audited cases where ICU was used increased slightly from 2005 to 2006 (Figure 18). Complete figures for 2007, once available, will determine whether this increase continues.

Figure 18: Proportion of audited cases where ICU or HDU were used



Fluid Balance

Surgeons and assessors were asked whether there were problems with management of fluid balance. In 27 of 298 (9%) cases, surgeons or assessors indicated that this was a problem.

Post-Mortems

Forty (13%) of the 298 audited cases underwent post-mortem examination (Table 18).

Table 18: Post-mortems conducted (n=298)

Hospital post-mortem	10 (3%)
Coronial post-mortem	30 (10%)
No post-mortem conducted	200 (67%)
Post- mortem refused	13 (3%)
Consultant did not know if post-mortem conducted	35 (12%)
Missing information	10 (3%)
Total	298

Eleven (28%) surgeons indicated that they had read the post-mortem report and, of these, two indicated that the report had provided additional information. A further 21 (10%) surgeons indicated that they would have preferred a post-mortem where none had been performed. Information was not provided on 45 cases.

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- The Royal Australasian College of Surgeons
- Medical record departments and staff in all participating hospitals.

TASM Management Committee Membership

Mr Rob Bohmer <u>Chairman</u>	MBChB, FRACS - <i>General Surgeon</i>
Mr Robert Linacre Vice Chairman	FRCS(Ed), FRACS - <i>General Surgeon</i>
Professor Peter Stanton	BMedSci(Hons), MBBS(Hons), PhD(Glas) FRCPSG, FRACS <i>Head of Discipline, School of Medicine, University of Tasmania</i>
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Ms Lisa Lynch	RN - <i>Project Coordinator, TASM</i>
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APPENDIX 1 TASM Methodology

