COLLABORATING HOSPITALS’ AUDIT OF SURGICAL MORTALITY (CHASM)

SUMMARY REPORT

JULY 2009 – DECEMBER 2010

Royal Australasian College of Surgeons
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Chair’s message

Dear Colleague,

This is a summary report of the NSW audit of surgical mortality (CHASM) data for the 18-months from July 2009 to December 2010. We have compared this data to the previous 18-months from January 2008 to June 2009. Future reports will cover a 12-month calendar period.

During July 2009 to December 2010, reporting has increased, as more surgeons have participated in the audit. In the subsequent years, 2011-12, participation has again increased, stimulated by the requirement of the Royal Australasian College of Surgeons (RACS) that surgeons participate in a State-based audit of surgical mortality, in order to satisfy continuing professional development requirements.

We have highlighted issues in clinical management (section 4.4) as identified by participating surgeons and first- and second-line assessors, together with potentially preventable deficiencies of care (section 4.5). It is readily acknowledged that the decision to operate and the operation performed are matters for clinical judgment made at the time. Hindsight may not always reflect the actual situation.


CHASM is an educational process which aims to improve surgical care through reflective learning, by providing individual comment on clinical management from a peer surgeon.

CHASM provides de-identified, aggregated data on an annual basis to the bi-national Australian and New Zealand Audit of Surgical Mortality (ANZASM) for its annual national report.

We hope you find this summary document useful and would value any feedback you may care to offer. In particular, we would like to hear about other areas you would like us to include in the summary.

Michael R Fearnside, AM  
Chairman CHASM

Clifford F Hughes, AO  
Chief Executive Officer  
Clinical Excellence Commission
CHASM Membership from July 2009 to December 2010

- A/Prof Michael Fearnside, AM, Chair
- Dr Joseph Lizzio, Deputy Chair NSW State Committee Chairman of the Royal Australasian College of Surgeons (RACS)
- Dr Allysan Armstrong-Brown, anaesthetist
- Dr Graham Beaumont, human factors safety specialist
- Prof Belinda Bennett, Professor of Health and Medical Law
- Dr Lewis Chan, urologist
- Prof Stephen Deane, general and trauma surgeon
- Prof Anthony Eyers, colorectal surgeon
- Dr Charles Fisher, vascular surgeon
- Dr Hamish Foster, general surgeon
- Dr Warren Hargreaves, general surgeon
- Dr Kim Hill, Director, Clinical Governance
- Prof John Hilton, forensic pathologist
- Prof Clifford Hughes, AO, CEO CEC, ex-officio
- Dr Michael King, general surgeon
- Dr Hugh Martin, AM, paediatric surgeon
- Dr Charles Pain, Director, Health Systems Improvement
- Prof Allan Spigelman, surgical oncologist
- Dr Warwick Stening, neurosurgeon
- Dr Mauro Vicaretti, vascular surgeon
- Dr Shane Waddell, orthopaedic surgeon
- A/Prof Peter Zelas, OAM, colorectal surgeon
1. Introduction

The Collaborating Hospitals’ Audit of Surgical Mortality (CHASM) is an education program led by surgeons for surgeons. It reviews deaths of patients who were under the care of a surgeon, or where a surgeon had major input to care, irrespective of whether an operation has been performed or not. Based on the audit findings, CHASM provides constructive feedback to surgeons to facilitate reflective learning and improvement in surgical care. The feedback process involves:

- a confidential report on each audited death to the surgeon(s) involved
- an annual case book with selected cases to feature a clinical issue identified for improvement
- an annual individualised report providing summary of the surgeon’s data and aggregated data of his or her peers and other participating surgeons, to enable comparison
- an annual program report with de-identified and aggregated data to enable benchmarking and monitoring of trends
- annual submission of audit data for national reporting to the Royal Australasian College of Surgeons.

2. Surgeon participation

In 2010, the Royal Australasian College of Surgeons (RACS) mandated participation in the Australian and New Zealand Audit of Surgical Mortality (ANZASM), a requirement for re-certification through the Continuing Professional Development Program, if a surgeon is in operative-based practice, has a surgical death and an audit of surgical mortality is available in the surgeon’s hospital. CHASM is the NSW component of ANZASM.

Surgeon participation in CHASM is based on the return of a signed participation form and/or the return of a completed surgical case form. By the end of December 2010, 798 of 1483 (53.8%) active fellows in NSW were participating in CHASM, with 325 and 241 of them also agreeing to be first- and second-line assessors, respectively. This participation rate exceeded the target of 50 per cent set in the last report. Table 1 shows the improvement in the number and rate of surgeon participation in CHASM between the last and current reporting periods.

Table 1: Change in surgeon participation in CHASM between the last and current report periods

<table>
<thead>
<tr>
<th></th>
<th>Last reporting period Jan 2008 – Jun 2009</th>
<th>This reporting period Jul 2009 – Dec 2010</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. and % of participating active fellows in NSW</td>
<td>563 or 39.8%</td>
<td>798 or 53.8%</td>
<td>↑ 235 or 14%*</td>
</tr>
<tr>
<td>No. of first-line assessors</td>
<td>261</td>
<td>325</td>
<td>↑ 64</td>
</tr>
<tr>
<td>No. of second-line assessors</td>
<td>185</td>
<td>241</td>
<td>↑ 56</td>
</tr>
</tbody>
</table>

* Statistically significant (P<0.01)
Most of the participants (n = 648, 81.2%) were from the specialties of general surgery, orthopaedics, urology, neurosurgery and vascular surgery, due to the large numbers of surgical fellows in the general and orthopaedic specialties and the commitment to and support of the peer review by these participants.

The figure below shows the participation rates of NSW active RACS fellows in CHASM. The rate is calculated as a percentage by dividing the number of participating surgeons by the total number of active surgical fellows in the surgical specialty.

Figure 1: Participation rates\(^1\) of NSW active RACS fellows in CHASM by surgical specialties at 31 December 2010

![Figure 1: Participation rates of NSW active RACS fellows in CHASM by surgical specialties at 31 December 2010](chart.png)

\* This list of surgical specialties is based on the list published in the RACS Activities Report for the period: 1 January – 31 December 2010.

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\(^1\) The denominators, i.e., total number of active surgical fellows, for calculation of percentages, are based on figures reported in the RACS Activities Report for the period: 1 January - 31 December 2010 (Royal Australasian College of Surgeons, 2011), Accessed: 27/04/2011
3. Audit progress

Between 1 July 2009 and 31 December 2010, there were approximately 580,000 hospitalisations by 11 surgical service-related groups\(^2\) in NSW. In the same period CHASM:

- recorded 3351 deaths associated with surgical care (2549 in the last reporting period)
- received the surgical case forms (SCF) for 2278 deaths
- completed the audit of 2380 deaths, including 568 terminal cases.

The following figure summarises the output data during this reporting period.

**Figure 2: Summary of CHASM process from 1 July 2009 to 31 December 2010**

1. The audit process is complete once the reported death has been assessed by a first +/- second line assessor(s).
2. Cases awaiting first or second line assessment. The time taken to have the case notes available for assessment can delay the assessment process considerably.
3. No response refers to cases of which the surgeon has not returned a completed SCF after three reminder letters. Non-participants refer to cases of which the surgeons have indicated that they do not wish to participate in CHASM. There were 306 surgeons who did not respond to or participate in CHASM during the reporting period.
4. SCF/First or second line assessments that were sent/requested in the previous reporting period and returned in this reporting period

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There has been considerable improvement in the engagement of surgeons and in efficiency of the audit process. The table below shows changes in the audit outputs since the last reporting period.

**Table 2: Change in audit outputs between the last and current reporting periods**

<table>
<thead>
<tr>
<th></th>
<th>Last reporting period Jan 2008 – Jun 2009</th>
<th>This reporting period Jul 2009 – Dec 2010</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Surgical Case Forms (SCF) returned</td>
<td>1251</td>
<td>2304</td>
<td>↑ 1053</td>
</tr>
<tr>
<td>Median days to return a SCF</td>
<td>29</td>
<td>31</td>
<td>↑ 2</td>
</tr>
<tr>
<td>Number of First-line Assessments (FLA) completed</td>
<td>896</td>
<td>1811</td>
<td>↑ 557</td>
</tr>
<tr>
<td>Median days to return a FLA</td>
<td>19</td>
<td>13</td>
<td>↓ 6*</td>
</tr>
<tr>
<td>Number of Second-line Assessments (SLA) completed</td>
<td>74</td>
<td>225</td>
<td>↑ 61</td>
</tr>
<tr>
<td>Median days to return a SLA</td>
<td>25</td>
<td>27</td>
<td>↑ 2*</td>
</tr>
</tbody>
</table>

*Statistically significant (p<0.01)

A number of factors have contributed to these improvements, including:

- Better staffing of the project team to record notifications, collect and enter/code data and process cases for auditing
- Chair’s regular weekly visits to advise project team on cases for auditing and issues relating to the efficiency of the audit process and quality of the audit data
- Availability of a clinical expert to review and advise on general surgical deaths
- Designated staff at former area health services providing notification to CHASM weekly, fortnightly or monthly
- A five-working-day rule for mailing SCFs to surgeons when a notification is received, to help surgeons recall the case and complete the form
- A three-reminder-letter procedure to improve return of SCF, FLA and SLA
- Mandatory participation in ANZASM (CHASM in NSW) to meet the Continuing Professional Development (CPD) requirements of the RACS.

The increase in the number of median days to return a SLA could be due to complexity and large volumes of the case notes for reviewing. Some second-line assessors had misplaced or lost the assessment pack, which required re-sending and resulted in prolonged assessment time. The project team has sourced a brightly coloured satchel to hold the case notes and assessment documents, so that they can be easily identified in a busy surgeon’s office. The team will continue to monitor this performance data.
4. Audit findings

The following points summarise the main characteristics of the 1812 non-terminal audited deaths:

- The median age of the patients was 77 years (range < 1 month – 104 years)
- There were 975 (53.8%) males and 837 (46.2%) females
- Most patients:
  - had an emergency admission (n=1504, 83.0%)
  - had an ASA grade of 3 or 4 (n=1300, 71.7%)
  - were at considerable or expected risk of death (n=1072, 59.2%)
- The most common co-morbid factors increasing the risk of death were cardiovascular, age and respiratory conditions
- Most patients (n=1601, 88.4%) had at least one operation.

4.1 Confirmed admission diagnoses

The next table lists the three most reported confirmed surgical diagnoses by surgical specialty.

Table 3: The three most reported confirmed surgical diagnoses of 1812 audited patient deaths by surgical specialty

<table>
<thead>
<tr>
<th>Surgical specialty</th>
<th>Three most reported confirmed admission diagnoses in Read code description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First</td>
</tr>
<tr>
<td>Cardiothoracic</td>
<td>Coronary artery disease</td>
</tr>
<tr>
<td>General</td>
<td>Intestinal obstruction</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>Subdural haematoma</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>*</td>
</tr>
<tr>
<td>Orthopaedics</td>
<td>Fracture of proximal femur</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>*</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>*</td>
</tr>
<tr>
<td>Plastic</td>
<td>*</td>
</tr>
<tr>
<td>Urology</td>
<td>Malignant neoplasm of urinary bladder</td>
</tr>
<tr>
<td>Vascular</td>
<td>Ruptured abdominal aortic aneurysm</td>
</tr>
</tbody>
</table>

* This data is omitted, due to small numbers (n ≤ 5)
### 4.2 Operations performed

A total of 2194 operations were recorded for the 1601 audited patients who had at least one operation. The following table shows the three most frequently reported operations by surgical specialty. When two or more operations are equal in numbers for ranking, they are listed in the same cell.

**Table 4: The three most frequently reported operations (in Read code description) on 1601 audited patients by surgical specialty**

<table>
<thead>
<tr>
<th>Surgical specialty</th>
<th>Three most reported operations in Read code description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First</td>
</tr>
<tr>
<td>Cardiothoracic</td>
<td>Coronary artery bypass</td>
</tr>
<tr>
<td>General</td>
<td>Operations on small bowel</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>Burrhole(s) for ventricular external drain</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>*</td>
</tr>
<tr>
<td>Orthopaedics</td>
<td>Reduction and internal fixation of proximal femoral fracture</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>*</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>*</td>
</tr>
<tr>
<td>Plastic</td>
<td>Debridement of skin/burnt skin</td>
</tr>
<tr>
<td>Urology</td>
<td>Construction of ileal conduit</td>
</tr>
<tr>
<td>Vascular</td>
<td>Operation on aneurysm of aorta</td>
</tr>
</tbody>
</table>

* This data is omitted, due to small numbers (n ≤ 5)
4.3 Cause of death

Surgeons reported 2369 causes of death in 1718 (94.8%) audited patients. The next table shows the three most frequently reported causes of death for each surgical specialty. When two or more causes are equal in numbers for ranking, they are listed in the same cell.

Table 5: The three most frequently reported causes of death, in Read code description, by surgical specialty

<table>
<thead>
<tr>
<th>Surgical Specialty</th>
<th>First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiothoracic</td>
<td>Heart failure</td>
<td>Respiratory failure</td>
<td>Multiple organ failure</td>
</tr>
<tr>
<td>General</td>
<td>Multiple organ failure</td>
<td>Respiratory failure</td>
<td>Septicaemia</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>Subarachnoid haemorrhage</td>
<td>Intracerebral haemorrhage</td>
<td>Severe head injury Traumatic subdural haemorrhage</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Orthopaedics</td>
<td>Acute myocardial infarction</td>
<td>Respiratory failure</td>
<td>Cardiac arrest</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Plastic</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Urology</td>
<td>Multiple organ failure</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Vascular</td>
<td>Ruptured abdominal aortic aneurysm</td>
<td>Multiple organ failure</td>
<td>Acute myocardial infarction</td>
</tr>
</tbody>
</table>

* This data is omitted, due to small numbers (n ≤ 5).
4.4 Clinical management

CHASM has selected 12 indicators to track changes in the clinical management of audited deaths as reported by surgeons and assessors. The following table compares the data on these indicators between this and the last reporting period.

Table 6: Change in surgical management of audited deaths as reported by surgeons and assessors over two 18-month periods up to 31 December 2010

<table>
<thead>
<tr>
<th></th>
<th>No. and % of audited deaths</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan 2008 to June 2009</td>
<td>July 2009 to Dec 2010</td>
</tr>
<tr>
<td>Delay and/or problems with transfer</td>
<td>31 13.4</td>
<td>61 12.9</td>
</tr>
<tr>
<td>Elective surgery performed as planned</td>
<td>82 85.4</td>
<td>250 95.1</td>
</tr>
<tr>
<td>Consultant surgeon in theatre</td>
<td>417 68.1</td>
<td>1103 68.9</td>
</tr>
<tr>
<td>Would have benefited from care at intensive care unit (ICU) or high-dependency unit (HDU)</td>
<td>18 5.7</td>
<td>42 7.2</td>
</tr>
<tr>
<td>Use of prophylaxis against venous thromboembolism</td>
<td>587 72.6</td>
<td>1473 81.3</td>
</tr>
<tr>
<td>Pre-operative delay or errors in confirmation of main surgical diagnosis</td>
<td>73 9.0</td>
<td>165 9.0</td>
</tr>
<tr>
<td>Definable post-operative complications</td>
<td>238 29.5</td>
<td>573 31.6</td>
</tr>
<tr>
<td>Unplanned return to theatre</td>
<td>98 16</td>
<td>250 15.6</td>
</tr>
<tr>
<td>Unplanned admission to ICU</td>
<td>124 15.3</td>
<td>321 17.7</td>
</tr>
<tr>
<td>Unplanned re-admission within 30 days of surgery</td>
<td>23 2.8</td>
<td>65 3.6</td>
</tr>
<tr>
<td>Hospital acquired infection</td>
<td>193 23.9</td>
<td>409 22.6</td>
</tr>
<tr>
<td>Potential preventable deficiency of care identified by assessors</td>
<td>114 14.1</td>
<td>262 14.5</td>
</tr>
</tbody>
</table>

*Statistically significant (p<0.01)

There was a statistical difference in the data in two indicators between the two reporting periods. In this period, the proportion of audited deaths in which the patient had:

- elective surgery performed as planned, is 9.2 per cent more than in the last period. This difference is statistically significant, \( \chi^2(1, N=359) = 9.397, p=0.002 \)
- prophylaxis against venous thromboembolism, is 8.7 per cent more than in the last period. It is also statistically significant, \( \chi^2(1, N=2497) = 22.684, p=0.000 \).
4.5 Potentially preventable deficiency of care

CHASM assessors identified 386 potential deficiencies of care that were definitely, or probably, preventable in 262 (14.5%) of the 1812 patients who were not assessed as being admitted for terminal care. The table below shows the frequency of the 12 most identified potentially preventable deficiencies of care in this, compared to the last, reporting period.

Table 7: Frequency of the 12 most identified potentially preventable deficiencies of care in this reporting period and their frequency in the last reporting period

<table>
<thead>
<tr>
<th>Preventable deficiencies of care</th>
<th>Jan 2008 to June 2009</th>
<th>July 2009 to Dec 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision to operate</td>
<td>16 2.0</td>
<td>28 1.5</td>
</tr>
<tr>
<td>Delay to surgery (i.e., earlier operation desirable)</td>
<td>21 2.6</td>
<td>28 1.5</td>
</tr>
<tr>
<td>Better to have done different operation or procedure</td>
<td>15 1.9</td>
<td>23 1.3</td>
</tr>
<tr>
<td>Delay in transfer to tertiary hospital</td>
<td>7 0.9</td>
<td>17 0.9</td>
</tr>
<tr>
<td>Delay in diagnosis</td>
<td>8 1.0</td>
<td>14 0.8</td>
</tr>
<tr>
<td>Post-operative care unsatisfactory</td>
<td>10 1.2</td>
<td>12 0.7</td>
</tr>
<tr>
<td>Poor documentation</td>
<td>11 1.4</td>
<td>12 0.7</td>
</tr>
<tr>
<td>Pre-operative assessment inadequate</td>
<td>6 0.7</td>
<td>11 0.6</td>
</tr>
<tr>
<td>Delay in transfer to surgical unit</td>
<td>4 0.5</td>
<td>9 0.5</td>
</tr>
<tr>
<td>Delay in recognising complications</td>
<td>5 0.6</td>
<td>7 0.4</td>
</tr>
<tr>
<td>Unsatisfactory medical management</td>
<td>5 0.6</td>
<td>7 0.4</td>
</tr>
<tr>
<td>Fluid balance unsatisfactory</td>
<td>2 0.2</td>
<td>7 0.4</td>
</tr>
</tbody>
</table>

The decision to operate was the most frequently reported potentially preventable deficiency of care during this reporting period. It refers to the clinical decision to operate or not operate, generally in elderly patients with advanced disease and other co-morbidities, with the benefit of hindsight. In some instances, the assessors noted that it was the patient or the family who wanted the surgeon to operate.

Delay to surgery refers to delay before operation. It ranged from 14 hours to seven weeks between diagnosis and surgery. Repair of irreducible/strangulated femoral hernia, insertion of permanent pacemaker, internal fixation for fracture, surgical drainage and laparotomy were some of the delayed surgery reported. In a few instances, the delay to surgery was due to change from an initial decision to treat conservatively, when the patient started to deteriorate.

Whether a different operation should have been performed, refers to the choice by the surgeon. In some instances, the assessor felt that the surgeon might have performed more limited surgery or taken a different surgical approach, as an option. Some assessors included literature on the best-practice surgical management for the clinical condition in their constructive feedback to the surgeon.
Delay in transfer to tertiary hospitals was mainly related to admissions to rural and district hospitals for patients who required specialist care such as neurosurgery, cardiothoracic and plastic surgery, which were not available in the primary hospital. Some of the reasons identified for delay in transfer to a tertiary hospital are delay in reviewing clinical results, delay in making a decision to transfer at the referral hospital and the lack of critical-care beds at the tertiary hospital.

Delay in diagnosis was related to a number of factors. Assessors identified the diagnostic delay to be associated with clinicians of the emergency department, the medical team and the surgical team. Leaking abdominal aortic aneurysm, pneumothorax, hernia, intestinal obstruction, gastric perforation, septic arthritis and peri-prosthetic hip infection were reported as some delayed diagnoses. Diagnostic delays associated with emergency department and medical teams would inevitably lead to delayed referral to surgical team for treatment, i.e., delay in transfer to surgical unit.

Pre-operative assessment refers to inadequate preparation, assessment and investigation of patients. Some issues mentioned include lack of knowledge of patient’s medical history, lack of pre-anaesthetic assessment and poor interpretation of investigation results, which ultimately affect decision making to surgery and the choice of operation performed.

Both post-operative care, or medical management deemed unsatisfactory, refer to sub-standard care that is not consistent with protocols, such as premature feeding leading to aspiration, omission of vital medications, failure to treat sepsis and inappropriate management of fluid balance and coagulation.

Poor documentation was reported by assessors after a case notes review. It referred to poor record-keeping by surgical or other teams. Some issues reported included inconsistency of information recorded in notes, poor or no documentation of admission, lack of a pre-anaesthetic assessment, anaesthesia administration and the operation, or record of surgery.
Executive and project staff based at the CEC

Prof Clifford Hughes, Chief Executive Officer
Dr Tony Burrell, Director, Patient Safety
Paula Cheng, Project Co-ordinator
Bruce Czerniec, Data Analyst
Adeline Nguyen, Project Officer
Lisa Huang, Project Officer (September 2009 to May 2010)
Ruth Murphy, Project Officer
Erin Gilmore, Project Assistant

Clinical audit managers based at former area health services

Nicole Smith, Greater Southern
Angela Bannon, Jane Bowen-Jones, Louise Robinson & Maree Carolan, Greater Western
Anne Barry, Hunter New England
Maureen Lawrence, North Coast
Angie Pang, Northern Sydney Central Coast
Ann Morgan, Cynthia Redmond, Joseph Pendon, Nancy Morieson & Wendy Bowker, South Eastern Sydney Illawarra
Belinda Irwin, Sydney South West (Eastern Zone)
Honora Hewett, Sydney South West (Western Zone)
Karenjit Kaur & Jean Cook, Sydney West
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