Surgical Mortality Review

The Barwon Health Report for 2012-2016

Professor David A Watters
Surgical Mortality Review 2017

• Barwon Health Mortality Review
• Relevance of VASM to Barwon Health
  – Quality Assurance
  – Quality Improvement
• Perioperative Mortality Rates (POMR)
• Mortality from Emergency Laparotomy
• Mortality from Fractured Neck of Femur
How does Barwon Health Review Surgical Mortality?

- All hospital deaths are reviewed by the mortality review committee (multidisciplinary and chaired by Dr Rod Fawcett)
- All surgical deaths are reviewed in the relevant craft group surgical audit meeting and subjected to peer review
- All deaths under the care of a surgeon or who have an operative procedures are subjected to independent peer review by the Victorian Audit of Surgical Mortality (VASM)
- Cases with issues (serious adverse events in riskman or coroner cases) are subjected to a case review to identify system issues and opportunities for improvement
Targeting zero
Supporting the Victorian hospital system to eliminate avoidable harm and strengthen quality of care
Report of the Review of Hospital Safety and Quality Assurance in Victoria
Safer Care Victoria

- Safety and Quality a Health Service Priority
- Overseeing, Assisting and Incentivising Health Services to put safety and quality top of the agenda
- Continuous quality improvement
- Improved clinical governance and processes
- Reporting metrics on safety and quality
- Clinical Engagement – led by senior clinicians

Does safety and quality trump the bottom line when it comes to the crunch?
Perioperative Mortality Rate of 0.3%

Dr Foster (VAED) Barwon Health POMR: Elective 0.17%  Emergency 1.32%
Australian POMR

Fig. 1 Australian national perioperative mortality rate (%) across reference years 2009/2010–2012/2013
Age and Urgency effect on POMR

Australian Public Hospitals

The emergency rate is 1.4% and 0.08% for electives

Victorian Audit of Surgical Mortality (VASM)

REPORT

01/07/2015 - 30/06/2016

713 cases in Victoria
2,224 cases in Australia (ANZASM)
The Barwon Health Report
July 2012-June 2016

489 reported deaths
Barwon Health: Blue Background figures

Demographic

- 20.8% (832/3,948) patient transfers
- 84.2% (3,325/3,948) emergency admission

- 10.8%
- 86.8%

- 53% M
- 79.1

- 43.7% F  56.3%M
  Mean age: 73
  (1 day - 102 years)
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Cardiothoracic Surgery</td>
<td>11.5% (30/261)</td>
<td>13.9% (16/115)</td>
<td>5.3% (6/113)</td>
<td>10.6% (52/489)</td>
</tr>
<tr>
<td>General Surgery</td>
<td>40.6% (106/261)</td>
<td>32.2% (37/115)</td>
<td>32.7% (37/113)</td>
<td>36.8% (180/489)</td>
</tr>
<tr>
<td>Orthopaedic Surgery</td>
<td>27.2% (71/261)</td>
<td>33.9% (39/115)</td>
<td>36.3% (41/113)</td>
<td>30.9% (151/489)</td>
</tr>
<tr>
<td>Other*</td>
<td>0.4% (1/261)</td>
<td>0% (0/115)</td>
<td>0% (0/113)</td>
<td>0.2% (1/489)</td>
</tr>
<tr>
<td>Otolaryngology Head and Neck Surgery</td>
<td>3.1% (8/261)</td>
<td>0.9% (1/115)</td>
<td>0% (0/113)</td>
<td>1.8% (9/489)</td>
</tr>
<tr>
<td>Plastic Surgery</td>
<td>2.3% (6/261)</td>
<td>1.7% (2/115)</td>
<td>1.8% (2/113)</td>
<td>2% (10/489)</td>
</tr>
<tr>
<td>Urology</td>
<td>4.6% (12/261)</td>
<td>6.1% (7/115)</td>
<td>7.1% (8/113)</td>
<td>5.5% (27/489)</td>
</tr>
<tr>
<td>Vascular Surgery</td>
<td>10.3% (27/261)</td>
<td>11.3% (13/115)</td>
<td>16.8% (19/113)</td>
<td>12.1% (59/489)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (261/261)</td>
<td>100% (115/115)</td>
<td>100% (113/113)</td>
<td>100% (489/489)</td>
</tr>
</tbody>
</table>
Deficiences of Care identified in 86 cases

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Decision to operate</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Better to have done different operation or procedure</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Delay to surgery (ie earlier operation desirable)</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Unsatisfactory medical management</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>OPEN SURGERY, ORGAN RELATED TECHNICAL</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Delay in diagnosis</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Cardiac pre-operative assessment inadequate</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Failure to investigate or assess patient fully</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Pre-operative assessment inadequate</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Operation would have been better delayed</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Delay in transfer to tertiary hospital</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Surgeon too junior</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Failure to use DVT prophylaxis</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Failure to use HDU</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

+ 40 deficiences where there was only one instance 2012-2016
Specialty Completion of Case Reviews

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Cardiothoracic Surgery</td>
<td>100% (30/30)</td>
<td>100% (16/16)</td>
<td>83.3% (5/6)</td>
<td>98.1% (51/52)</td>
</tr>
<tr>
<td>General Surgery</td>
<td>75.5% (80/106)</td>
<td>89.2% (33/37)</td>
<td>89.2% (33/37)</td>
<td>81.1% (146/180)</td>
</tr>
<tr>
<td>Orthopaedic Surgery</td>
<td>95.8% (68/71)</td>
<td>94.9% (37/39)</td>
<td>95.1% (39/41)</td>
<td>95.4% (144/151)</td>
</tr>
<tr>
<td>Other*</td>
<td>100% (1/1)</td>
<td>0.0% (0/0)</td>
<td>0.0% (0/0)</td>
<td>100% (1/1)</td>
</tr>
<tr>
<td>Otolaryngology Head and Neck Surgery</td>
<td>87.5% (7/8)</td>
<td>100% (1/1)</td>
<td>0.0% (0/0)</td>
<td>88.9% (8/9)</td>
</tr>
<tr>
<td>Plastic Surgery</td>
<td>100% (6/6)</td>
<td>100% (2/2)</td>
<td>50% (1/2)</td>
<td>90% (9/10)</td>
</tr>
<tr>
<td>Urology</td>
<td>100% (12/12)</td>
<td>100% (7/7)</td>
<td>87.5% (7/8)</td>
<td>96.3% (26/27)</td>
</tr>
<tr>
<td>Vascular Surgery</td>
<td>100% (27/27)</td>
<td>100% (13/13)</td>
<td>73.7% (14/19)</td>
<td>91.5% (54/59)</td>
</tr>
<tr>
<td>Total</td>
<td>88.5% (231/261)</td>
<td>94.8% (109/115)</td>
<td>87.6% (99/113)</td>
<td>89.8% (439/489)</td>
</tr>
</tbody>
</table>

5385 (84.4%) is Victorian State average, but 92.8% National. This completion rate should be closer to 100% in the future.
Second Line Assessments (SLA)

<table>
<thead>
<tr>
<th>Year</th>
<th>Hospital</th>
<th>Like state hospitals</th>
<th>Like national hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012-2013</td>
<td>11.6% (11/95)</td>
<td>15.8% (65/411)</td>
<td>12.1% (217/1,795)</td>
</tr>
<tr>
<td>2013-2014</td>
<td>17.9% (15/84)</td>
<td>19.7% (91/462)</td>
<td>14.5% (260/1,798)</td>
</tr>
<tr>
<td>2014-2015</td>
<td>12.8% (10/78)</td>
<td>16.9% (91/539)</td>
<td>14.6% (271/1,854)</td>
</tr>
<tr>
<td>2015-2016</td>
<td>8.1% (5/62)</td>
<td>14.8% (64/433)</td>
<td>11% (173/1,572)</td>
</tr>
<tr>
<td>Total</td>
<td><strong>12.9% (41/319)</strong></td>
<td><strong>16.9% (311/1,845)</strong></td>
<td><strong>13.1% (921/7,019)</strong></td>
</tr>
</tbody>
</table>

12.9% at Barwon Health
16.9% at like State Hospitals (Regional)
13.1% at like national hospitals
Lack of sufficient information caused 28/41 SLA
Age, Gender and Urgency

<table>
<thead>
<tr>
<th></th>
<th>Hospital</th>
<th>Like state hospitals</th>
<th>Like national hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of audited deaths</td>
<td>319</td>
<td>1845 (231)</td>
<td>7,019 (334)</td>
</tr>
<tr>
<td>(average per hospital)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median age in years (IQR)</td>
<td>81.2 (71.9-88.0)</td>
<td>74.0 (61.6-83.6)</td>
<td>74.4 (61.3-83.9)</td>
</tr>
<tr>
<td>Male : Female</td>
<td>53% : 47.0%</td>
<td>60.3% : 39.7%</td>
<td>58.4% : 41.6%</td>
</tr>
<tr>
<td>Emergency admission</td>
<td>86.8%</td>
<td>85.6%</td>
<td>88.6%</td>
</tr>
<tr>
<td>Most common comorbid factors</td>
<td>Cardiovascular, Age, Respiratory</td>
<td>Cardiovascular, Age, Respiratory</td>
<td>Cardiovascular, Age, Respiratory</td>
</tr>
<tr>
<td>Had at least one operation</td>
<td>82.4%</td>
<td>91.1%</td>
<td>75.5%</td>
</tr>
</tbody>
</table>

Barwon Health surgical mortality in a slightly older age group
Almost one fifth of deaths had no operation.
Consideration: less futile surgery, better documentation of Goals of Management, end of life plans and advanced care directives
Low Mortality rate (2.8%) in ASA 1 & 2 compared with 8-10% nationally
90% were ASA 3 or 4, 97% ASA 3 or more
Are other hospitals more likely to grade ASA 5’s?
Surgeons do operate where they expect high risk of death – considerable/ expected
They do not operate if they believe it is futile to operate, or they do not admit to futility
NB No denominators for those cases that survive- an audit of deaths only
The figures have a similar pattern to the ASA grades assigned by the anaesthetist in theatre

**Preoperative Surgical Assessment of Risk of Death (made after the event)**

For those that had an operation

<table>
<thead>
<tr>
<th>Death Risk</th>
<th>Hospital</th>
<th>Like state hospitals</th>
<th>Like national hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal</td>
<td>2.7% (7/260)</td>
<td>1.9% (32/1,664)</td>
<td>1.8% (96/5,226)</td>
</tr>
<tr>
<td>Small</td>
<td>9.2% (24/260)</td>
<td>9% (149/1,664)</td>
<td>8.5% (446/5,226)</td>
</tr>
<tr>
<td>Moderate</td>
<td>28.5% (74/260)</td>
<td>22.5% (374/1,664)</td>
<td>23.3% (1,216/5,226)</td>
</tr>
<tr>
<td>Considerable</td>
<td>47.3% (123/260)</td>
<td>50.9% (847/1,664)</td>
<td>53.1% (2,774/5,226)</td>
</tr>
<tr>
<td>Expected</td>
<td>12.3% (32/260)</td>
<td>15.7% (262/1,664)</td>
<td>13.2% (692/5,226)</td>
</tr>
<tr>
<td>Futile</td>
<td>0% (0/260)</td>
<td>0% (0/1,664)</td>
<td>0% (2/5,226)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100% (260/260)</strong></td>
<td><strong>100% (1,664/1,664)</strong></td>
<td><strong>100% (5,226/5,226)</strong></td>
</tr>
</tbody>
</table>
VASM 2015-2016 Report

Risk factors
- 90.9 (3,588/3,948) with ≥1 comorbidities
- 86.3% (3,078/3,567) moderate to high risk of death prior surgery
Top 3 comorbidities of 10,575 identified;
- 23.3% (2,462/10,575) cardiovascular
- 19.8% (2,091/10,575) age
- 12.1% (1,288/10,575) respiratory
## Common Diagnoses for Surgical Deaths (319)

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Surgical diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiothoracic Surgery</td>
<td>Coronary atherosclerosis</td>
</tr>
<tr>
<td></td>
<td>Heart failure</td>
</tr>
<tr>
<td></td>
<td>Mitral valve diseases</td>
</tr>
<tr>
<td>General Surgery</td>
<td>Carcinoma in situ of rectum</td>
</tr>
<tr>
<td></td>
<td>Intestinal obstruction NOS</td>
</tr>
<tr>
<td></td>
<td>Vascular insufficiency of the intestine</td>
</tr>
<tr>
<td></td>
<td>[M]Carcinoma, metastatic, NOS</td>
</tr>
<tr>
<td></td>
<td>[M]Neoplasm, metastatic</td>
</tr>
<tr>
<td>Orthopaedic Surgery</td>
<td>Fracture of femur, NOS</td>
</tr>
<tr>
<td></td>
<td>Fracture of neck of femur</td>
</tr>
<tr>
<td></td>
<td>Other fracture of femur</td>
</tr>
<tr>
<td>Otolaryngology Head and Neck Surgery</td>
<td>O/E - epistaxis</td>
</tr>
<tr>
<td>Urology</td>
<td>[M]Carcinoma, metastatic, NOS</td>
</tr>
<tr>
<td>Vascular Surgery</td>
<td>Abdominal aortic aneurysm which has ruptured</td>
</tr>
<tr>
<td></td>
<td>Carotid artery stenosis</td>
</tr>
<tr>
<td></td>
<td>Peripheral vascular disease NOS</td>
</tr>
<tr>
<td></td>
<td>Ruptured aortic aneurysm NOS</td>
</tr>
</tbody>
</table>
Most frequent cause of death: cardiac, respiratory & organ failure

2012-2015

Most frequent cause of death: cardiac, organ failure & respiratory

2015-2016

Cause of death:
- Acute pancreatitis
- Fracture of neck of femur
- GI haemorrhage
- Peritonitis
- Coagulopathy
- Non-GI haemorrhage
- Intestinal obstruction
- Ruptured aortic aneurysm
- Hepatic failure
- Malignancy
- Cause unknown
- Pulmonary embolism
- Gut ischaemia
- Neurotrauma
- Renal failure
- Cardiac failure
- Cerebrovascular accident
- Pneumonia
- Septicaemia
- Respiratory failure
- Multiple organ failure
- Cardiac event

Frequency during the audit period (n)

Note: n=4,099 conditions were perceived to be responsible for death in 3,948 cases.
Audit period 1 July 2012 to 30 June 2016.
# Common Causes of Surgical Deaths

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Cause of death</th>
</tr>
</thead>
</table>
| Cardiothoracic Surgery                        | Heart failure  
Multiple organ failure  
Pulmonary embolism  
Respiratory failure  
Stroke and cerebrovascular accident unspecified  
Vascular insufficiency of the intestine |
| General Surgery                                | Heart failure  
Multiple organ failure  
Septicaemia  
Vascular insufficiency of the intestine |
| Orthopaedic Surgery                            | Acute myocardial infarction  
Heart failure  
[D]Sudden death, cause unknown |
| Otolaryngology Head and Neck Surgery           | Cardiac arrest  
Multiple organ failure |
| Urology                                        | Acute renal failure  
Septicaemia  
[M]Carcinoma, metastatic, NOS |
| Vascular Surgery                               | Acute myocardial infarction  
Multiple organ failure  
Ruptured aortic aneurysm NOS |

NOS = Not otherwise specified  
D = Diagnosis  
M = Morphology
Emergency Laparotomy Mortality Rates

23,115 emergency laparotomies
In-patient mortality was 2036/23,115 (8.8%).
Fractured NOF Mortality

M3 In-hospital mortality of patients admitted for fractured neck of femur
Comparison with peers (2016 Jul - 2017 Jun)

Formula: SMR = [deaths] / [expected deaths]
Source: CHBOI v2.0

Denominator: Expected number of deaths for acute care type admissions with a principal diagnosis of fractured neck of femur (ICD-10 codes S72.0x, S72.10 or S72.11) for patients aged 50-120 years and having LOS 1-30 days. Must have an additional code for a fall (ICD10 codes W00-W19 OR R29.6) and one of the following major comorbidities: valvular heart disease, cerebrovascular disease, chronic obstructive pulmonary disease, or diabetes mellitus.
Outcomes

- 31.6% (1,251/3,948) clinical management issues
- 68.1% (2,688/3,948) no clinical management issues

Areas of outcome
- 17.4% (687/3,948) consideration
- 9.2% (365/3,948) concern
- 5.0% (199/3,948) adverse events
Most common areas of concern & adverse event

- 21.3% (89/418) delay issues
- 17.9% (75/418) operative management issues
- 16.7% (70/418) postoperative care issues
- 12.7% (53/418) preoperative care issues
Delay in Diagnosis

Average: 6.3 % Nationally

Barwon Health range 1.6 – 10.7% of audited deaths = 6.3%
Delay in Transfer to UGH

6.2 DELAY IN TRANSFER TO YOUR HOSPITAL

FIGURE 2: AUDITED DEATHS WITH TRANSFER TO YOUR HOSPITAL WITH DELAY.

5/53 cases transferred 2012-2016 (9.4%)
Using ICU/HDU when appropriate

We use ICU/HDU sparingly, much less than elsewhere. 11/177 (6.2%) would have benefited.

Do we have adequate ICU capacity?
Appropriate DVT Prophylaxis

6 patients
Good consultant supervision

6.6 CONSULTANT SURGEON IN THEATRE: OPERATING, ASSISTING OR SUPERVISING

FIGURE 6: OPERATIONS WITH THE CONSULTANT SURGEON PRESENT IN THEATRE
Postoperative Complications

37% versus national average of 33%

Delay in recognising postoperative complications (7/88 - 8.0%)
Unplanned return to theatre

6.8 UNPLANNED RETURN TO THEATRE

36/261 (13.7%) of deaths had an unplanned return
25% of CT and Gen Surg but only 4.6% of orthopaedic cases
Unplanned ICU admission

Barwon Health is 13.7% overall versus 17% national average
Unplanned readmission after surgery

Barwon Health 4.2% - 11/261
Fluid Balance Issues (8%)

6.11 ISSUES WITH FLUID BALANCE

FIGURE 11: AUDITED DEATHS WITH FLUID BALANCE ISSUES

- Hospital
- Like state hospitals
- Like national hospitals
Deaths with significant infections (30%)

6.12 CLINICALLY SIGNIFICANT INFECTION

FIGURE 12: AUDITED OPERATIVE DEATHS WITH A CLINICALLY SIGNIFICANT INFECTION

Infections
- 31.8% (1,256/3,948) clinical significant infections
- 14.9% (692/3,948) pneumonia
- 8.1% (319/3,948) septicemia
- 4.6% (184/3,948) intra-abdominal sepsis
Conclusions

• Barwon Health surgical mortality is similar to the rest of the State and Nationally
• Focus on high mortality procedures
• We use ICU less than other hospitals
• About 10% case record forms have not been returned
• In addition to participating in VASM we review every mortality in surgical audit meetings and in a hospital-wide mortality review committee
• Local audit and peer review provides incentives for improvement
• The opinions of second line assessors are usually reassuring (my experience) but the hospital has no direct knowledge of these due to qualified priviledge.