Solid Organ Injury

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Department of Trauma Surgery
The Alfred
SOLID ORGAN INJURY
The ALFRED Experience
Overview

- Quick look at AIS & ISS
- Review Alfred & Auckland Data
- Non-compliant patient
- Lessons learned
Trauma Registry

- Comprehensive trauma database
- Collects and codes trauma information
- Enables:
  - comparisons
  - monitoring of trauma care
  - describes the work you do
Injury Coding
Abbreviated Injury Score (AIS)

- Describe injury anatomically
- Standardize terminology
- Rank by severity
  - Based on probability of survival
  - Single specific injury
• Ordinal Scale

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Serious</td>
</tr>
<tr>
<td>4</td>
<td>Severe</td>
</tr>
<tr>
<td>5</td>
<td>Critical</td>
</tr>
<tr>
<td>6</td>
<td>Maximum</td>
</tr>
</tbody>
</table>
Injury Severity Score

- **AIS**
  - single injury mortality

- **ISS**
  - multiple injuries mortality
  - Square of the MAIS in 3 body regions
  - Range 1 - 75
ISS

$\text{AIS}^2 + \text{AIS}^2 = \text{Injury Severity Code}$
<table>
<thead>
<tr>
<th>ISS Group</th>
<th>Severity of Injury Description</th>
<th>Group Mortality</th>
<th>All Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9</td>
<td>Minor or single system</td>
<td>1.02%</td>
<td>14.03%</td>
</tr>
<tr>
<td>10-15</td>
<td>Moderate</td>
<td>1.9%</td>
<td>4.28%</td>
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<tr>
<td>16-24</td>
<td>Severe</td>
<td>7.23%</td>
<td>15.77%</td>
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<tr>
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<td>Very severe</td>
<td>35.47%</td>
<td>65.92%</td>
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</table>
Traumatic Death
Top 3 Causes of Traumatic Death

• Head Trauma
• Chest Trauma
• Abdominal Trauma
Abdominal Trauma
13-15% of trauma deaths

Haemorrhage

Sepsis & complications (>48 hours)
Serious abdominal injuries in ~15% of all trauma cases
### How common is SOI?

<table>
<thead>
<tr>
<th>Site</th>
<th>Episode</th>
<th>Pts</th>
<th>SOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Alfred</td>
<td>2002</td>
<td>130</td>
<td>170</td>
</tr>
<tr>
<td>Auckland</td>
<td>2001</td>
<td>54</td>
<td>60</td>
</tr>
<tr>
<td>SWAHS*</td>
<td>95-99</td>
<td>x</td>
<td>65.2</td>
</tr>
</tbody>
</table>

*5 yr report divided to give annual total
OZ & NZ data 12 months

1-2.5 pts/week
Trauma Registry Data

- Alfred 2002
  - ISS > 15 = 622

- Auckland 2001
  - ISS > 15 =
The Alfred

2002
130 patients
170 SOI injuries

Auckland

2001
46 patients
52 SOI injuries
<table>
<thead>
<tr>
<th></th>
<th>The Alfred</th>
<th>Auckland</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male</strong></td>
<td>67%</td>
<td>78%</td>
</tr>
<tr>
<td><strong>Av Age</strong></td>
<td>38</td>
<td>31</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>33%</td>
<td>22%</td>
</tr>
<tr>
<td><strong>Av Age</strong></td>
<td>38</td>
<td>30</td>
</tr>
</tbody>
</table>
Mechanism of Injury

![Bar chart showing the mechanism of injury with categories 'Blunt' and 'Penetrating'. The chart compares Alfred and Auckland with Alfred having significantly higher percentages in the 'Blunt' category.](chart.png)
Frequency of Organ Injured

<table>
<thead>
<tr>
<th>Organs</th>
<th>Alfred</th>
<th>Auckland</th>
<th>SWAHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>70</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Spleen</td>
<td>40</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Kidney</td>
<td>30</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Adrenals</td>
<td>20</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Pancreas</td>
<td>10</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
How badly injured?
Pancreas

- Alfred
  - AIS 2 (moderate) 7
  - AIS 5 (critical) 1

- Auckland = 0
Adrenal

- Alfred
  - AIS 2 (moderate) 3

- Auckland = 1
ISS bands Solid Organ Injury

50% Severe to Very Severe
Frequency of other injuries
Alfred data

- Abdomen: 120
- Thorax: 80
- Lower Extremity: 60
- Head: 50
- Spine: 40
- Upper Extremity: 30
- Face: 20
- Neck: 10
- External: 0
Isolated defined as MAIS > 2
Alfred 8 / 130 pts

- kidney contusions 2
- Liver lacerations 3
- Splenic lacerations 3
# Trauma Laparatomies

~6% of patients with SOI need laparotomy (DSTC, 2000, Knudson)

<table>
<thead>
<tr>
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<th>The Alfred</th>
<th>Auckland</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>130 pts</td>
<td>46 pts</td>
</tr>
<tr>
<td>57 Laparatomies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Liver</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>- Spleen</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>- Kidney</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>- Pancreas</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>- Generic</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>- Other</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Negative Lap</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Outcome

Alfred  Auckland

- Dead  18/130  5/46
- Home  42
- Rehab  62
- Other Hospital  4
- Other  2
- Absconded / DOR  2
When did they die?

Alfred n=18

- < 24 hrs: 31%
- > 24 hours: 69%
So what do all these numbers mean ....

- High ISS
- Rarely isolated injury
- Infrequent
- Mostly treated conservatively
What does this mean for us?

- Interventional competence
  - doctors
  - nurses
- decision making
- clinical management.
Post Splenectomy care...
Overwhelming Post Splenectomy Sepsis (OPSI)

- In trauma
  - 58 times > than general population
- Long term sequelae
“Guidelines for the prevention and treatment of infection in patients with absent or dysfunctional spleen.”


BMJ 1996 312 430-4
Recommendations:

- Immunisations
- Antibiotic prophylaxis
- Travel Advice
- Education
  *Including Medi alert disc/card
- The Alfred ID Department
Non-adherence to Guidelines Waghorn, 2001

• Not given correct advice
• Forgotten correct advice
Recommendation (Waghorn, 2001)
Asplenic Registry

- Implement policies
- Audit/Compliance
- Regular reminders/updates
The Alfred

“Asplenic Patient Registry for the Prevention of Sepsis”

• QI and Best Practice Submission to DHS

• Joint submission with Southern Health

• Unsuccessful → successful
Develop Tools

- Laminated cards
- Information sheets
- Medical alert
- Annual reminders / updates
This card belongs to a patient of Alfred Hospital who has a non-functioning or absent spleen. This puts them at risk of potentially life-threatening infections. In order to reduce that risk the recommendations on the opposite side of this card should be followed.

Alfred Splenectomy Registry No. ____________________________

Telephone contact: ____________________________
1. Immunisation with pneumococcal, meningococcal, haemophilus influenzae type B and influenza vaccines
2. Oral antibiotics for life
3. Carry bracelets/wallet cards that alert medical and paramedical personnel
4. Consult LMO for any episode of infection and for vaccine updates
5. Keep a dose of antibiotics at home and take if medical review is not readily available
6. Should consult with doctor prior to visiting or working in malarial areas.
The non-compliant patient
The non-compliant pt

- Spoken to by consultant
- Address the issues
  - substance abuse
  - social issues
  - fear
  - personality disorders
- If they want to go we let them...
- Discharge education
- Early Consultant Psyche liaison
Cases
Case 22 yo Male

M • Driver Morris Minor V telephone pole. Significant intrusion driver’s side. Trapped 15 minutes

I • CHI, # ribs & pelvis

S • GCS 11, HR 168, RR 24, SBP 80/, SpO2 92%

T • ETT, fluids, drugs
Arrival Alfred

- + 95 minutes
- HR 155, SBP 200, CMV, GCS 3 SpO2 85%; Temp 35.4
- Urgent laparotomy
  - Grade 4 splenic lac, involving hilum
  - splenectomy
  - epigastric hernia repair
- # ribs with HPtx, Rx ICC
- # L2,3 transverse process
- L knee ligamentous injury
Day 5

- Discharged at own risk against medical advice

- Represents day 10
  - fever
  - empyema
  - VATS
  - DOR

- Represents day 28
  - thoracotomy wound infection
  - Home
Summary

• SOI
  1 - 2 per week

• Clinical Practice & decision making

• Rarely isolated
  - careful with non-compliant patients
Thank you....
A 15 minute powernap could save your life. TAC

Belt up, or suffer the pain. TAC

Make sure you're right to drive. TAC

If you drink, then drive, you're a bloody idiot. TAC

Take a break, fatigue kills. TAC

A Case Study: "Wipe Off 5"
Additional slides
Major Trauma
Frequency of Injury Body Region

- Head or neck
- Extremities or Pelvis
- Thorax
- External
- Abdominal Cavity
- Face

No of Injuries

1800
1600
1400
1200
1000
800
600
400
200
0
The ALFRED Trauma Registry

- Collect data concurrently with inpatient episode
- Data collected by Trauma Registry Nurses
- Real time reporting
- Trauma data is used by clinical faculty
  - clinical care
  - clinical audit
# National Trauma Data Bank™ 2002, American College of Surgeons

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Abdominal Trauma

- 13-15% of trauma deaths
  - haemorrhage
  - sepsis & complications (>48 hours)
- In Australia serious abdominal injuries in ~ 15% of all trauma cases
Isolated v non-isolated SOI
isolated defined as MAIS ≥2

• 130 patients had 1163 coded injuries
  - ratio 8.9 injuries per patient
• 130 had 247 abdominal injuries
  - 91 had 201 a thoracic injuries
  - 70 had 151 a head injuries
  - 35 had 65 face injuries
  - 2 had 2 neck injuries
  - 43 had 121 spinal injuries
  - 53 had 103 upper extremity
  - 77 had 240 lower extremity injuries
  - 33 had unspecified minor external injuries
Trauma Registry Data
1/1/02 - 31/12/02

- Total number of patients with abdominal injuries = 272 (ISS 23.5, range 1-75); (27 deaths in this group; SMR 9.9%)
- Total number of patients with solid organ injury = 130
- Total number of abdominal injuries in this group = 234
- Total SOI in this group = 170
- 57 had Laparotomies
  - 92 abdominal procedures at Laparotomy
Mechanism of Injury

- Blunt
  - 91% (90%)
- Penetrating
  - 9% (5.5%)
Type of Injury

- Spleen
- Liver
- Kidney
- Pancreas
- Adrenal

Legend:
- NFS
- Rupture
- Lacerations
- Contusion
Spleen

- AIS 2: Moderate - 25
- AIS 3: Serious - 5
- AIS 4: Severe - 10
- AIS 5: Critical - 15

Injuries
Frequency of body regions injured
# Trauma Laparatomies on pts with SOI

~6% of patients with SOI need laparotomy (DSTC, 2000, Knudson)

<table>
<thead>
<tr>
<th>Organ</th>
<th>Code</th>
<th>Count</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>50140</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Spleen</td>
<td>50120</td>
<td>22</td>
<td>(2 spleenorrhaphies)</td>
</tr>
<tr>
<td>Kidney</td>
<td>50130</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td>50170</td>
<td>1</td>
<td>(Whipples)</td>
</tr>
<tr>
<td>Generic Lap</td>
<td>50100</td>
<td>27</td>
<td></td>
</tr>
</tbody>
</table>

- Other laps were for Hollow viscus
- vessel / diaphragm repair
- 2 -ve laparotomies done in this time
  - free gas/stacked
  - +ve FAST, suspicious CT
Patient Education
In hospital
Patient Education Discharge
Breakdown n=130
All av Age 38 (14-84)

87 Male
43 Female
Follow-up