Major Trauma Audit in Ireland; Where are we now?

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Clinical Lead, Major Trauma Audit, National Office for Clinical Audit (NOCA)
Deputy Medical Director, National Ambulance Service
Associate Adjunct Professor, School of Primary Care, Monash University
TRAUMA

Radiology
Orthopaedics
General Surgery
Plastic Surgery
Coroner
ICU/Anaesthesia
Health Services Management
Rehab
Neurosurgery
Preventive Medicine/Public Health
Emergency Medicine
EMS
Police

TRAUMA

EMS
Preventive Medicine/Public Health
Police
ICU/Anaesthesia
Orthopaedics
Plastic Surgery
Coroner
Rehab
Neurosurgery
Health Services Management
Radiology
General Surgery

TRAUMA
27 Receiving Trauma Hospitals
• 2 Adult Neurosurgical centres (Beaumont, Cork University Hospital)
• Pelvic Acetabular Centre (Tallaght)
• Spinal Centre (Mater)
• Burns Centre (St. James’s)
• Cardiothoracic centres
• Plastic centres
• Maxillofacial centres
Trauma System

Fundamental Components

- injury prevention
- pre-hospital care
- acute care facilities
- post-hospital care
- performance measurement through registry/audit

Improving the journey from roadside to recovery
‘You can’t manage what you don’t measure’

William Edwards Deming, 1900-1993
Major Trauma Audit is the dash-board for the trauma system.
Roles of Major Trauma Audit

- Monitor Care
  - Benchmark
- Monitor compliance with best practice/evidence based guidelines
- Monitor for equity of access
- Provide feedback
- Stimulate competition
- Risk adjusted outcomes
- High societal and financial cost of poor outcomes

Continuous Quality Improvement Cycle
TARN

The *Trauma Audit & Research Network*

• Associated with University of Manchester
• Largest European trauma registry established in 1990
• Self funded through hospital membership fees
• Clinically led, academic and independent
• Hospitals in England, Wales, Ireland, Denmark & Switzerland
Inclusion Criteria

Admission > 72 hours or

- Admission to an intensive care area or
- Transferred out for continuing care or
- Transferred in for continuing care or
- Died

And whose injuries fulfill the TARN injury criteria

TARN Data Collection

Collected through the patient pathway post injury

- Observations
- Interventions
- Investigations
- Clinician & Grade

Location based

- Incident
- Pre Hospital
- EM Department
- Imaging
- Theatre
- Intensive Care Unit
- Ward
- Discharge
- Rehabilitation
Measures Process and Outcomes
Performance Review Indicators

- Summary of Approved cases for any specified time period.
- Highlights **Key Performance Measures** that underpin TARN reports:

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Arrival date/time</th>
<th>Injury Mechanism</th>
<th>ISS</th>
<th>GCS</th>
<th>Probability of Survival (Ps)</th>
<th>Outcome</th>
<th>Total Los</th>
<th>Critical care Los</th>
<th>Trauma Team presence</th>
<th>ED attendants/grade</th>
<th>NICE criteria met</th>
<th>Shocked patients</th>
<th>No of Operations</th>
<th>Date/time 1st Operation</th>
<th>Time to 1st Operation</th>
<th>Date/Time 1st CT</th>
<th>Time to 1st CT</th>
<th>Transfer from/to Injuries</th>
<th>Glasgow Outcome Score</th>
</tr>
</thead>
</table>

TARN

THE TRAUMA AUDIT & RESEARCH NETWORK
Standards of Care

Head Injuries
CT imaging of the head should be performed within 1 hour of arrival for patients with a head injury and a GCS of less than 13.

NICE Head Injury Guidelines 2007

Addenbrooke's Hospital
Cases submitted and eligible for this standard:

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>70</td>
</tr>
<tr>
<td>2010</td>
<td>71</td>
</tr>
<tr>
<td>2011</td>
<td>83</td>
</tr>
<tr>
<td>2012</td>
<td>79</td>
</tr>
<tr>
<td>2013</td>
<td>1</td>
</tr>
</tbody>
</table>

304 patients were admitted directly from the scene of the injury to this hospital between January 1st 2010 and December 31st 2013 and fulfilled these specific head injury criteria.

206 patients had a CT Scan
278 of the CT Scans had full dates and times recorded.

Time to CT Scan
Median Time to receiving a CT Scan (hrs)
Addenbrooke's Hospital: 0.63 hrs
National Database: 0.77 hrs

6 patients died from their injuries within 2 hours and did not have a CT Scan.
Probability of Survival (Ps12): 4 components

Age: 63

ISS: 45  Gender: Male  GCS: 10

Statistical Model
Ps12

Ps: 62%
PS14 developments
Launched December 2014

1. Pre-Existing Medical Conditions (PMC) added

Charlson comorbidity index (CCI) adds ‘weighting’ PMC
Mechanism of Injury

- RTC: 1061
- Fall < 2m: 2578
- Fall > 2m: 727
- Shooting/Stabbing: 82
- Other: 636
Patient Demographics

- Age Median (IQR)
  - Female 66(48,81) years
  - Male 48(28,64) years
Presentation Times across hours of the day

ISS>15
### Ireland

**Case mix standardised rate of survival (Ws) & Ws Breakdown (Ps14)**

**01 April 2014 to 31 December 2015**

Patients who died at or were discharged from this hospital are eligible for Ws calculations. Patients who were transferred out from this hospital and not re-admitted are excluded.

**Outcome at 30 days or discharge**

<table>
<thead>
<tr>
<th>PS Band</th>
<th>Number in band</th>
<th>Observed Survivors</th>
<th>Expected Survivors</th>
<th>Difference*</th>
<th>TARN fraction</th>
<th>Ws</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 - 100</td>
<td>3282</td>
<td>3262</td>
<td>3236.35</td>
<td>0.78</td>
<td>0.72</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>90 - 95</td>
<td>601</td>
<td>582</td>
<td>558.86</td>
<td>3.85</td>
<td>0.12</td>
<td>0.47</td>
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<tr>
<td>80 - 90</td>
<td>343</td>
<td>326</td>
<td>294.92</td>
<td>9.06</td>
<td>0.07</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>65 - 80</td>
<td>200</td>
<td>166</td>
<td>147.66</td>
<td>9.17</td>
<td>0.04</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>45 - 65</td>
<td>138</td>
<td>76</td>
<td>77.46</td>
<td>-1.06</td>
<td>0.03</td>
<td>-0.03</td>
<td></td>
</tr>
<tr>
<td>25 - 45</td>
<td>71</td>
<td>22</td>
<td>25.28</td>
<td>-4.62</td>
<td>0.02</td>
<td>-0.07</td>
<td></td>
</tr>
<tr>
<td>0 - 25</td>
<td>36</td>
<td>6</td>
<td>4.86</td>
<td>3.16</td>
<td>0.01</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4671</strong></td>
<td><strong>4440</strong></td>
<td><strong>4345.39</strong></td>
<td></td>
<td></td>
<td><strong>1.93</strong></td>
<td><strong>1.34 - 2.52</strong></td>
</tr>
</tbody>
</table>

*Difference* calculated as (Observed - Expected)
Comparative Outcome Analysis for all TARN registered hospitals - 01 April 2013 to 31 December 2014
Outcome at 30 days or discharge

The Ws must be reviewed in conjunction with the Data Completeness and Accreditation figures.

CATERPILLAR PLOT: Ascending Survival rate

95% confidence intervals
All hospitals
Your hospital
Cork University Hospital
Comparative Outcome Analysis for all TARN registered hospitals - 01 April 2014 to 31 December 2015
Outcome at 30 days or discharge
Cork University Hospital is highlighted
The Ws must be reviewed in conjunction with the Data Completeness and Accreditation figures.

The highlighted points at either end of the chart and dashed horizontal lines indicate the combined Ws for the top and bottom 10 hospitals of the dataset.
Greater Precision: More cases (more reliable)

Lower Precision: Fewer cases (not as reliable)

Comparative Outcome Analysis for all TARN registered hospitals - 01 April 2013 to 31 December 2014
Outcome at 30 days or discharge

The Ws must be reviewed in conjunction with the Data Completeness and Accreditation figures.
Comparative Outcome Analysis for all TARN registered hospitals - 01 April 2014 to 31 December 2015
Outcome at 30 days or discharge
Cork University Hospital is highlighted
The Ws must be reviewed in conjunction with the Data Completeness and Accreditation figures.

Hospitals are plotted in order of precision (1 / standard error).
<table>
<thead>
<tr>
<th>Organization</th>
<th>Chair/Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Board for College of Emergency Medicine</td>
<td>Dr Conor Deasy CHAIR</td>
</tr>
<tr>
<td>Royal College of Surgeons, Ireland - General Surgery</td>
<td>Mr Ken Mealy</td>
</tr>
<tr>
<td>Irish Association of Vascular Surgeons</td>
<td>Mr Morgan McMonagle</td>
</tr>
<tr>
<td>Irish Committee for Emergency Medicine Training</td>
<td>Dr Gerry Lane</td>
</tr>
<tr>
<td>Irish Institute of Trauma and Orthopaedic Surgeons</td>
<td>Mr Joe O Bernie/ Mr Brendan Daly</td>
</tr>
<tr>
<td>Irish Association of Plastic Surgeons</td>
<td>Mr Alan Hussey</td>
</tr>
<tr>
<td>Irish Association for Emergency Medicine / Academic Committee</td>
<td>Dr Patricia Houlihan</td>
</tr>
<tr>
<td>Paediatric Emergency Medicine</td>
<td>Dr Turlough O’ Donnell</td>
</tr>
<tr>
<td>National Emergency Medicine Programme for MTA</td>
<td>Dr George Little</td>
</tr>
<tr>
<td>National Emergency Medicine Programme Lead</td>
<td>Dr Una Geary</td>
</tr>
<tr>
<td>HSE Office of Nursing &amp; Midwifery Services</td>
<td>Ms Geraldine Shaw</td>
</tr>
<tr>
<td>Emergency Medicine Nursing Interest Group</td>
<td>Ms. Fiona McDaid</td>
</tr>
<tr>
<td>Royal College of Physicians Ireland - Pathology</td>
<td>Dr Patrick Hayden</td>
</tr>
<tr>
<td>Royal College of Physicians Ireland - Public Health</td>
<td>Dr Orla Healy/Caroline Mohan-Mason</td>
</tr>
<tr>
<td>Royal College of Physicians Ireland - Rehabilitation Medicine</td>
<td>Dr Jacinta Morgan/Jacintha McElligott</td>
</tr>
<tr>
<td>Joint Faculty of Intensive Care Medicine of Ireland - Intensive Care</td>
<td>Dr Rory Dwyer/Jeanne Moriarty</td>
</tr>
<tr>
<td>Pre Hospital Emergency Care Council</td>
<td>Ms Jacqueline Egan</td>
</tr>
<tr>
<td>National Ambulance Emergency Service</td>
<td>Mr Vincent Daly</td>
</tr>
<tr>
<td>Patient Representative</td>
<td>Ms Iryna Pokhilo</td>
</tr>
<tr>
<td>Therapy representative</td>
<td>Ms Rosie Quinn</td>
</tr>
<tr>
<td>Royal College of Surgeons in Ireland - Faculty of Radiologists</td>
<td>Dr Peter MacMahon</td>
</tr>
<tr>
<td>Royal College of Surgeons in Ireland - Neurosurgery Programme</td>
<td>Mr David Allcutt</td>
</tr>
<tr>
<td>Data manager with Trauma Audit experience</td>
<td>Ms Anna Duffy</td>
</tr>
<tr>
<td>Data Manager - HIPE</td>
<td>Mr Des O Toole</td>
</tr>
</tbody>
</table>
Engagement with Hospitals on Audit findings
Odds ratio for survival from Major Trauma in England

\[ n = 65,399 \]  (8.8% mortality)

ISS >8, missing GCS imputed

50% increase in odds of survival
Preferred acute patient pathway

24/7 network coordinator in Ambulance Service

On scene triage

direct transfer (< 45 mins)

enhanced care team

indirect transfer
(geography, time critical intervention)

MAJOR TRAUMA CENTRE

Consultant led trauma team
Immediate operating theatre

All specialties: neurosciences

Immediate CT scan

Interventional radiology

Specialist critical care

Trauma Unit

trauma team

immediate CT

resus, assess and ? transfer

Prof Keith Willett

Prof Chris Moran
Best Practice Tariff Criteria

Level 1  ISS > 8 and the following criteria met:
- the patient is treated in an MTC
- Complete patient data submitted to TARN registry within 40 days of discharge
- MDT Rehabilitation prescription is completed for each patient
- Tranexamic acid administered within 3 hours of injury

Level 2  ISS > 15 Level 1 criteria are met, plus either:
- Patient received by a trauma team led by a Consultant within 30 (5) minutes of arrival
- If the patient is transferred as an ‘urgent’ transfer then the transfer should take place within 2 calendar days of referral from the trauma unit.
Summary

- Fundamental importance of Major Trauma Audit
  - Can help develop strategy and measure the impact of changes
- Vital QA and QI tool
- Making Audit Mandatory
  - Sustainability
  - Data Coordinators
Trauma systems reduce mortality and improve functional and quality of life outcomes. Audit is the dashboard of the Trauma System.