A ten year review of child injury hospitalisations, health outcomes, and costs in Australia

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Childhood injury

- Injury – a leading cause of death and hospitalisation for children
- Also a leading cause of long-term disability – ongoing limitations to physical abilities, chronic pain, psychological issues
- No comprehensive examination of injury characteristics, treatment cost or survival post-discharge
- Inform child injury prevention policy in Australia
Objective and Aims

• **Objective:**
  - Describe the burden of hospitalised childhood injury in Australia during 1 July 2002 to 30 June 2012

• **Aims:**
  - Determine the number, incidence and temporal trends of hospitalised injury involving children;
  - Describe the type and characteristics of hospitalised injury involving children;
  - Describe the health outcomes of children hospitalised following an injury, including hospital treatment costs; &
  - Examine factors associated with survival at 30-days post-admission
Method

- Paediatrics ≤ 16 years
- Linked hospital admission and mortality data, 2002-03 to 2011-12
- Principal diagnosis of injury (ICD-10-AM:S00-T78)
- 22 chronic health conditions – prior research & hospitalisation data e.g. diabetes; epilepsy; cancer; autism; asthma
- Urban and regional/remote using Australian Standard Geographical Standard
- International Classification of Injury Severity Score i.e. minor (ICISS >0.99), moderate (0.941-0.99), serious (<0.941)
- Hospital treatment costs using AR-DRGs, episode of care type, episode of care LOS and the National Hospital Costing Data Collection
Method: analysis

- Descriptive statistics
- Age-standardised hospital incidence rates using ABS population projections and 2001 standard population
- Negative binomial regression to examine temporal trends
- Hospital LOS included transfers
- 30-day mortality calculated from date of admission
- Cox proportional hazard regression to examine factors associated with 30-day mortality
- Hazard ratios and 95% confidence intervals calculated
Results

• 686,409 injury hospitalisations over 10 years
• Total hospital treatment cost $2.1 billion; $212 million annually; $3,119 mean cost per child
• Males (63.6%) and females (36.4%)
• NSW (32.6%) and Queensland (25.8%) accounted for over half
• Urban Australia (70.0%)
• Hospital LOS:
  • 0-5 years: 1.41 days (SD: 1.54)
  • 6-10 years: 1.42 days (SD: 1.38)
  • 11-16 years: 1.64 days (SD: 1.72)
Injury hospitalisation rate for children ≤16 years, Australia¹

¹Hospitalisation rate excludes ACT.
Injury hospitalisation rate for children ≤16 years by age group, Australia

Hospitalisation rate excludes ACT.
Injury hospitalisation rate for children ≤16 years by jurisdiction, Australia¹

¹Data only available from ACT from 1 July 2004.
Injury hospitalisations of children ≤16 years by injury severity, Australia

Data only available from ACT from 1 July 2004.
Injury mechanism by age group, injury hospitalisations of children ≤16 years, Australia

Data only available from ACT from 1 July 2004.

1Data only available from ACT from 1 July 2004.
Principal body location of injury by age group, injury hospitalisations of children ≤16 years, Australia¹

1Data only available from ACT from 1 July 2004.
Adjusted hazard ratios for 30-day mortality after injury hospitalisation of children ≤16 years, Australia\(^1\)

- Adjusted 30-day mortality no significant difference across the 10 years

1Data only available from ACT from 1 July 2004. Adjusted for age group, sex, chronic health conditions, injury mechanism, principal injury type, injury severity, urban-regional/remote & financial year. Reference year: 2002-03.
Higher risk of 30-day mortality for injured children ≤16 years, Australia\textsuperscript{1}

<table>
<thead>
<tr>
<th>Higher risk of 30-day mortality</th>
<th>Hazard ratio</th>
<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
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</tr>
<tr>
<td>Female</td>
<td>1.16</td>
<td>1.00-1.34***</td>
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<tr>
<td><strong>Age group</strong></td>
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<td></td>
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<tr>
<td>0-5</td>
<td>2.02</td>
<td>1.66-2.46*</td>
</tr>
<tr>
<td>6-10</td>
<td>1.28</td>
<td>1.01-1.64***</td>
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<td>11-16</td>
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<td></td>
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<tr>
<td><strong>Injury severity</strong></td>
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<tr>
<td>Minor (ICISS ≤ 0.99)</td>
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<tr>
<td>Moderate (ICISS between 0.942-0.99)</td>
<td>2.61</td>
<td>1.58-4.32*</td>
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<tr>
<td>Serious (ICISS &lt;0.942)</td>
<td>57.51</td>
<td>36.60-90.36*</td>
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<tr>
<td><strong>Injury mechanism</strong></td>
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<td>Transport incidents</td>
<td>2.42</td>
<td>1.74-3.37*</td>
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<td>Drowning and submersion or other threats to breathing</td>
<td>3.06</td>
<td>2.30-4.06*</td>
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<td>Intentional self-harm</td>
<td>5.00</td>
<td>3.41-7.33*</td>
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<td>Other and unspecified injury mechanism</td>
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<td><strong>Location of residence</strong></td>
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<td>Urban</td>
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<td>Regional/remote</td>
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<td>1.00-1.35***</td>
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<td><strong>Principal injury type</strong></td>
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<td>Head</td>
<td>1.54</td>
<td>1.14-2.08**</td>
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<tr>
<td>Thorax</td>
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<td>1.03-2.64***</td>
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<tr>
<td>Other injuries</td>
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</table>

\textsuperscript{1}Data only available from ACT from 1 July 2004.
Limitations

• No information on injury hospitalisations in ACT prior to 2004
• 20.4% of Victorian injury hospitalisation records could not be linked (i.e. up to 3,975 hospitalisations per year)
• Chronic health conditions relevant to episode of care recorded
• Did not have AR-DRGs to estimate costs in ACT and TAS prior to 2004 – underestimate hospital costs
• Did not include personal, non-hospital or societal costs
• Logistics of obtaining access to the linked hospitalisation and mortality data for all Australian jurisdictions – took 4 years
Conclusions and where to next?

- Child injury hospitalisations have not decreased in last 10 years: Limited effect of prevention measures
- Development of a national, multi-sectorial child injury prevention strategy in Australia is overdue
- Child injury surveillance capabilities
- Advocacy:
  - Position statement
  - National, State and Territory Health Ministers - meetings
  - CHIPA: Child Injury Prevention Alliance formed
Acknowledgments

- Australian Data Linkage Centres & data custodians
- Day of Difference Foundation
- Paediatric Critical Injury Research Program - www.paediatricinjuryoutcomes.org.au

References:


- Paediatric Critical Injury Research Program - www.paediatricinjuryoutcomes.org.au