Epidemiology of out-of-hospital cardiac arrest in Australia and New Zealand: results from the Aus-ROC Epistry

Ben Beck

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Background to Aus-ROC

- The Australian Resuscitation Outcomes Consortium (Aus-ROC)
  - Centre of Research Excellence (CRE) funded by the National Health and Medical Research Council (NHMRC)
  
  - Mission: to provide infrastructure and project support for clinical trials and outcome-oriented research in the area of out-of-hospital cardiac arrests

- Major objective
  - Develop an Australian and New Zealand cardiac arrest registry, or Epidemiological-registry (i.e. Epistry)
“To measure is to know; if you can’t measure it you cannot improve it”

- Lord Kevin
Background

- Regional cardiac arrest registries
  - Established with the aim of understanding and improving OHCA outcomes
  - Examples:
    - North American Resuscitation Outcomes Consortium (ROC)
    - Cardiac Arrest Registry to Enhance Survival (CARES)
    - European Cardiac Arrest Registry (EuReCa)
    - Pan-Asian Resuscitation Outcomes Study (PAROS)
Importance of national/international registries
- Variations in incidence and outcomes across regions
- To improve outcomes, we need to understand what is driving this variation
- Need an established framework with consistent definitions to evaluate differences across ambulance services
- Enhanced coordination of clinical trials and improve collaboration between ambulance services
Capture population: 19.5 million
# Aus-ROC Australian and New Zealand Epistry

## TABLE 1. Summary data related to ambulance service characteristics

<table>
<thead>
<tr>
<th>Service area population</th>
<th>SAAS</th>
<th>AV</th>
<th>SJAWA</th>
<th>QAS</th>
<th>SJANT†</th>
<th>New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 685 714(^{10})</td>
<td>5 841 667(^{10})</td>
<td>2 573 389(^{10})</td>
<td>4 722 447(^{10})</td>
<td>210 000</td>
<td>4 018 370(^{11})</td>
</tr>
<tr>
<td>Geographical area (km(^2))</td>
<td>984 179.8(^{12})</td>
<td>227 495.5(^{13})</td>
<td>2 526 417.9(^{14})</td>
<td>1 725 825.9(^{15})</td>
<td>1 353 163.9(^{16})</td>
<td>261 521.9(^{17})</td>
</tr>
<tr>
<td>Population density (persons per km(^2))</td>
<td>1.71</td>
<td>25.68</td>
<td>1.02</td>
<td>2.74</td>
<td>0.18</td>
<td>15.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment type</th>
<th>Australia</th>
<th>New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full time</td>
<td>784 (33%)</td>
<td>1168 (52%)</td>
</tr>
<tr>
<td>(full time)</td>
<td>2578 (63%)</td>
<td>226 (55%)</td>
</tr>
<tr>
<td>Part time</td>
<td>211 (9%)</td>
<td>97 (4%)</td>
</tr>
<tr>
<td>(part time)</td>
<td>240 (6%)</td>
<td>64 (16%)</td>
</tr>
<tr>
<td>Casual</td>
<td>70 (3%)</td>
<td>455 (20%)</td>
</tr>
<tr>
<td>(casual)</td>
<td>172 (4%)</td>
<td>30 (7%)</td>
</tr>
<tr>
<td>Volunteer</td>
<td>1286 (55%)</td>
<td>536 (24%)</td>
</tr>
<tr>
<td>(volunteer)</td>
<td>1103 (27%)</td>
<td>92 (22%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total of number of paramedics with:</th>
<th>Australia</th>
<th>New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLS-only(^{‡})</td>
<td>1469 (64%)</td>
<td>1288 (59%)</td>
</tr>
<tr>
<td>(BLS-only)</td>
<td>30 (1%)</td>
<td>47 (37%)</td>
</tr>
<tr>
<td>ALS</td>
<td>657 (29%)</td>
<td>633 (29%)</td>
</tr>
<tr>
<td>(ALS)</td>
<td>2473 (83%)</td>
<td>56.5 (44%)</td>
</tr>
<tr>
<td>Intensive care training</td>
<td>173 (7%)</td>
<td>262 (12%)</td>
</tr>
<tr>
<td>(intensive care training)</td>
<td>488 (16%)</td>
<td>25 (19%)</td>
</tr>
</tbody>
</table>

Aus-ROC Australian and New Zealand Epistry

- **Approach**
  - Developed list of mandatory variables by consensus
    - Demographics
    - Arrest features
    - Times
    - Treatment
    - Outcomes
  - Agreed definitions
    - E.g. differences in the way in which ‘attempted resuscitation’ was defined

- **Merging of data**
  - Internal quality control
Aim and Methods

- **Aim**
  - Describe and compare the epidemiology of out-of-hospital cardiac arrest in Australia and New Zealand

- **Methods**
  - Retrospective review of the Aus-ROC Epistry in 2015
    - Attempted resuscitation
      - Any chest compressions or defibrillation by EMS
    - Primary outcome
      - Survived the event (ROSC on arrival at hospital)
Results: Aus-ROC Australian and New Zealand Epistry - 2015

19,761 out-of-hospital cardiac arrests

67% male

Median age: 66 years (IQR: 50-80 years)

75% occurred in the home
### Results: Aus-ROC Australian and New Zealand Epistry - 2015

<table>
<thead>
<tr>
<th>Category</th>
<th>Australia (OHCA: 15,158 (77%))</th>
<th>New Zealand (OHCA: 4,603 (23%))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of OHCA:</td>
<td>15,158</td>
<td>4,603</td>
</tr>
<tr>
<td>Incidence</td>
<td>99.7 per 100,000 population</td>
<td>100.2 per 100,000 population</td>
</tr>
<tr>
<td>Medical aetiology</td>
<td>71%</td>
<td>73%</td>
</tr>
</tbody>
</table>
## Results: Aus-ROC Australian and New Zealand Epistry - 2015

<table>
<thead>
<tr>
<th>Witnessed:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS</td>
<td>9%</td>
<td>12%</td>
</tr>
<tr>
<td>Bystander</td>
<td>23%</td>
<td>38%</td>
</tr>
<tr>
<td>Unwitnessed</td>
<td>68%</td>
<td>50%</td>
</tr>
</tbody>
</table>

**Bystander CPR**
(for bystander-witnessed cases)

- **60%**
  - **71%**

**Shockable rhythm**
(for non-EMS witnessed cases)

- **13%**
  - **25%**
Results: Aus-ROC Australian and New Zealand Epistry - 2015

48% of cases received attempted resuscitation

34% had ROSC in the prehospital setting

28% had ROSC on arrival at hospital
Results: Aus-ROC Australian and New Zealand Epistry - 2015

Cases with attempted resuscitation:

Response time: 8 mins (IQR: 6 – 11) 9 mins (IQR: 7 – 13)

ROSC – prehospital: 33% 35%

ROSC – hospital: 28% 29%
Discussion and conclusion

- Similarities between Australia and New Zealand
  - Incidence
  - Patient characteristics
  - Outcomes

- Differences
  - Bystander CPR rates
  - Witnessed status

- Important baseline data
Moving forward

- **Where to next**
  - Comparisons between ambulance services
  - Risk-adjusted outcomes

- **Aims**
  - Impact of variation in the provision of treatment for OHCA between ambulance services
  - Temporal changes in incidence and outcome
  - Impact of changes in clinical guidelines and clinical trials

- **Overall**
  - Improve survival from OHCA
Acknowledgements

- The authors would like to acknowledge the late Prof Ian Jacobs. It was Prof Jacob’s vision to establish the Aus-ROC Epistry and it is through his hard work and dedication that the Epistry is now operational. The Aus-ROC Epistry will act as one of Prof Jacob’s many legacies.
Acknowledgements

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