Are there differences in patient characteristics and risk-adjusted outcomes related to ICU admission source?

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BACKGROUND

• The transfer of critically ill patients between hospitals has been associated with increased risk of mortality, adverse events, and costs. (Parmentier, 2003, Hills et al, 2007, CEC, 2013)
• This often involves moving patients far from their home and social networks (Durairaj, 2003).
• Reasons for transfer are complex, and include the patient’s requirements for higher level, specialised or more invasive care, or lack of local ICU capacity.

AIMS

1. To determine whether there are differences in patient characteristics and outcomes depending on ICU admission source.
2. To determine whether there is an increased risk of hospital mortality for those patients admitted to ICU from another hospital ICU compared with those patients admitted from other sources?

METHOD

• Australian & New Zealand Intensive Care Society (ANZICS) Datathon - Melbourne
• De-identified ANZICS Adult Patient Database records for 1,196,089 cases for patients admitted from one ICU to another using data linkage to other hospital ICU (ANZICS, 2014)
• 603,312 cases: emergency adult public ICU admissions
• SPSS: Descriptive & exploratory analyses, binomial regression

RESULTS

• Characteristics described for 603,312 patients: Mean age was 58.4 years (SD=19.4, range = 16-110), 56.7% patients were male and 41204 (8.4%) patients identified as Indigenous.
• Patients transferred from an ‘other hospital’ (ANZICS, 2014) were predominately admitted to tertiary hospitals (64%), with 26% admitted to metropolitan hospitals and 4.5% admitted to rural/regional hospitals. 83.6% of patients transferred from an ‘other hospital ICU’ were admitted to a tertiary hospital, with 12.1% admitted to metropolitan units and 4.2% to rural/regional hospital.

Australian New Zealand Risk of Death (ANZROD) estimates by ICU Admission source suggests the majority of patients are of low acuity, (See Figure 3). Differences in median in ANZROD estimates were significant across all ICU admission sources ($\chi^2(6)=4598.046, P<.0001$).

DISCUSSION

• Our findings are consistent with previous Australasian studies demonstrating a higher risk adjusted hospital mortality and longer LOS for those patients whose admission source was an other hospital compared with those admitted from the ED.
• The persistence of this problem suggests there is a need to: - address the safety and timeliness of inter-hospital transfers - improve capacity of smaller ICU to reduce the need for transfer of lower acuity patients.
• Next steps: Examine change in patient needs and interventions for those admitted from one ICU to another using data linkage to examine the impact of critical care transfer networks.

Table 1: Results by ICU Admission Source and for whole sample

<table>
<thead>
<tr>
<th>Description</th>
<th>Whole Sample</th>
<th>Within same facility</th>
<th>Outside facility</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers</td>
<td>603,312</td>
<td>100%</td>
<td>10%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Median</td>
<td>(0.1640)</td>
<td>(.0934) (.1277) (.2757)</td>
<td>(.1639) (.9912)</td>
<td></td>
</tr>
<tr>
<td>Ventilated*</td>
<td>43%</td>
<td>53% 39% 34%</td>
<td>60% 72%</td>
<td></td>
</tr>
<tr>
<td>ICU LOS hrs*</td>
<td>52.18</td>
<td>46.42 47.92 64.03</td>
<td>65.93 114.08</td>
<td></td>
</tr>
<tr>
<td>Died in hospital</td>
<td>16.0%</td>
<td>11.3% 14.0% 23.8%</td>
<td>16.0% 19.4%</td>
<td></td>
</tr>
</tbody>
</table>

The regression model (N=98.6%) included In-hospital mortality, ICU admission source, site ID, and ANZROD estimates ($\chi^2(132) = 152803.898, p<.0001$).

Table 2: Risk of mortality for different ICU admission sources

<table>
<thead>
<tr>
<th>ICU Admission Source</th>
<th>Odds ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>OT / recovery</td>
<td>0.877</td>
<td>0.807 0.954</td>
</tr>
<tr>
<td>ED</td>
<td>0.849</td>
<td>0.782 0.923</td>
</tr>
<tr>
<td>Ward</td>
<td>1.004</td>
<td>0.924 1.091</td>
</tr>
<tr>
<td>Other hospital</td>
<td>0.889</td>
<td>0.816 0.968</td>
</tr>
<tr>
<td>Other hospital ICU</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

REFERENCES

• Clinical Excellence Commission (2013). Clinical Focus Report from review of Root Cause Analysis and/or incident information management system (RIMS) data: Retrieval and inter-hospital transfer, CEC, Sydney.

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