Outcomes of Intensive care patients following prolonged mechanical ventilation

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Background

Prolonged mechanical ventilation (PMV), defined as 21 days or more of invasive or non-invasive mechanical ventilation, has an international average hospital mortality rate of 29% and 58% within 12 months of discharge1. International data cannot be appropriately interpreted to predict outcomes locally. This is the first Australian Capital Territory (ACT) report on patient outcomes following PMV.

Methods

Adult (16 years or older) ICU patients admitted to the Canberra Hospital and Calvary Public Hospital Bruce between 2008-2019 who met the criteria for PMV were included in this retrospective cohort study. Baseline characteristics, severity of illness scores and discharge disposition were compared to mortality at 12 months (including in-hospital mortality) to identify predictors of outcome in this cohort.

Outcomes

Primary outcome: Mortality (hospital and at 12 months following discharge).

Secondary outcomes: Hospital discharge disposition and readmissions to hospital within 12 months.

Results

Main findings

> 117 patients met criteria for PMV in the ACT public hospital ICUs between 2008-2019.
> 98 patients were analysed as 19 (16%) patients were lost to 12 month follow-up.
> In-hospital mortality was 37% (36/98) with a further 8% (S/62) survivors dying within 12 months following discharge.
> Of those who survived until hospital discharge, 63% (39) were discharged home and 37% (23) required some form of ongoing care.
> Of the 62 survivors, 27% (17) required hospital readmissions within 12 months.
> Predictors of mortality following PMV included: age >50 years (OR 1.004 (0.995-1.012), 0.42), APACHE-III risk of death (OR 2.138 (0.794-5.757), 0.13), APACHE III score (OR 1.743 (0.711-4.275), 0.23), age, median (IQR) (OR 4.398 (1.733-11.163), 0.002) (Table 2).

> On multivariate analysis, males were significantly more likely to die following PMV (OR 4.398, 95% CI 1.733-11.163, P = 0.002) (Table 2).

Table 1. Baseline characteristics, severity of illness scores and proxies, and discharge disposition of PMV patients in the ACT compared to outcome at 12 months.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Sex</th>
<th>P *=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alive (n=57)</td>
<td>Alive (n=57)</td>
<td>P = 0.091</td>
</tr>
<tr>
<td>Dead (n=41)</td>
<td>Dead (n=41)</td>
<td>P = 0.002</td>
</tr>
</tbody>
</table>

*Values are mean (STDEV) unless otherwise indicated
†Values are mean (SDT) unless otherwise indicated
‡Values are median (IQR) unless otherwise indicated
¶Values are mean (IQR) unless otherwise indicated

Table 2. Univariate and multivariate logistic regression analysis comparing clinical variables and mortality at 12 months in patients undergoing PMV.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate analysis OR (95% CI), P †</th>
<th>Multivariate analysis OR (95% CI), P ‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (male)</td>
<td>4.102 (1.708-9.708), 0.001</td>
<td>4.308 (1.733-11.162), 0.002</td>
</tr>
<tr>
<td>Age (over 50)</td>
<td>3.071 (0.851-7.769), 0.09</td>
<td>2.462 (0.770-7.979), 0.13</td>
</tr>
<tr>
<td>Socioeconomic status (ref: advantaged)</td>
<td>1.000 (0.409-3.987), 1.75</td>
<td>1.000 (0.409-3.987), 1.75</td>
</tr>
<tr>
<td>Neither disadvantaged nor advantaged</td>
<td>1.192 (0.727-1.520), 0.19</td>
<td>1.192 (0.727-1.520), 0.19</td>
</tr>
<tr>
<td>Neither disadvantaged nor advantaged</td>
<td>1.993 (0.943-4.665), 0.079</td>
<td>1.993 (0.943-4.665), 0.079</td>
</tr>
<tr>
<td>APACHE-III score</td>
<td>1.185 (0.570-2.479), 0.995</td>
<td>1.185 (0.570-2.479), 0.995</td>
</tr>
<tr>
<td>APACHE-III score</td>
<td>1.005 (0.409-3.987), 0.44</td>
<td>1.005 (0.409-3.987), 0.44</td>
</tr>
<tr>
<td>APACHE-III score</td>
<td>2.775 (0.404-15.641), 0.32</td>
<td>2.775 (0.404-15.641), 0.32</td>
</tr>
<tr>
<td>APACHE-III score</td>
<td>4.050 (0.520-32.920), 0.16</td>
<td>4.050 (0.520-32.920), 0.16</td>
</tr>
</tbody>
</table>

Conclusions

This cohort had a high in-hospital mortality compared to international reports. In keeping with the literature, we demonstrated that severity of illness scores are inaccurate predictors of mortality in persistently critically ill patients. Baseline characteristics and discharge disposition may be more accurate in predicting outcomes in this cohort. Our findings support recommendations that local outcome data be used to inform evidence-based guideline development in Australia.

References

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