Mechanical ventilation protocols in intensive care units: a survey of Ontario hospitals

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Protocols in the ICU

Protocols have been shown to improve the adoption of several ICU interventions and improve patient outcomes when used for

• Nutritional management (1)
• Glycemic control (2,3)
• Early mobilization (4)
• Sedation control (5,6,7,8)
Mechanical Ventilation Protocols

Have been shown to

- ↓ duration of mechanical ventilation
- ↓ ICU and hospital LOS
- ↓ incidence of VAP
- ↓ cost per case
- Improve implementation of low tidal volume ventilation

(9, 10, 11, 12)

(13)
Our study questions

1. What proportion of Ontario ICU’s have protocols for mechanical ventilation?

2. Do these protocols support best practices in mechanical ventilation by utilizing lung protective strategies and early spontaneous breathing trials?

3. What hospital and ICU characteristics are associated with the presence of mechanical ventilation protocols?
How we defined a “protocol”

- A standardized plan which gives step by step instructions
- Specific rules to follow in a given clinical situation
- Must be specific enough that given a particular set of circumstances, multiple clinicians would generally make the same decision or act in the same way.
- In some situations, non-physician health professionals may follow the protocol’s rules without specific orders
Method

• Postal survey of 97 Ontario hospitals with Level 2 and 3 ICUs
• Questionnaire content devised from literature on subject and in consultation with RTs and Critical Care physicians
• Structured tool used to assess face and content validity, ease of use, and feasibility
• Final questionnaire consisted of 37 questions (forced choice and open)
• Telephone inquiry to each hospital to identify Respiratory Therapy leader
• If no RT identified, survey sent to ICU Patient Care Manager (RN)
Results

Received responses from clinicians at 70 hospitals (72.2%)

Hospital and ICU Characteristics

• University - 16% / Community - 60% / Community with University affiliation - 24%

• ICU management model – closed (intensivist led) 42%

• RT coverage – none 4 %, 24/7 coverage 68%

• One ventilated patient (maximum) per RN - 79%

• Maximum ICU patients per staff physician varied widely as did Maximum ventilated patient to RT

• ICU daily multidisciplinary rounds – 68%
### MV Protocol characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Mechanical ventilation protocol</td>
<td>48 (70.6%)</td>
</tr>
<tr>
<td>Initial mode of ventilation specified</td>
<td>9 (19.9%)</td>
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<tr>
<td>ABG and/or EtCO2 limits specified</td>
<td>38 (84.4%)</td>
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<tr>
<td>Tidal volume limited (6-8mL/kg)</td>
<td>24 (54.6%)</td>
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<tr>
<td>Predicted body weight used for Vt</td>
<td>22 (52.4%)</td>
</tr>
<tr>
<td>Permissive hypercapnia allowed</td>
<td>37 (72.7%)</td>
</tr>
<tr>
<td>$P_{\text{plat}}$ limited to $\leq 30$ cmH20</td>
<td>21 (47.7%)</td>
</tr>
<tr>
<td>FiO2 titration governed by protocol</td>
<td>42 (95.4%)</td>
</tr>
<tr>
<td>PEEP changes governed by protocol</td>
<td>34 (77.3%)</td>
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<tr>
<td>SBT included in protocol</td>
<td>37 (80.4%)</td>
</tr>
<tr>
<td>SBT linked to sedation cessation</td>
<td>32 (82.5%)</td>
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<tr>
<td>NIPPV included in protocol</td>
<td>28 (59.6%)</td>
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Proportion of hospitals with MV protocols

- **Closed ICU**
  - Yes: 90
  - No: 60

- **Daily MDR**
  - Yes: 80
  - No: 40

- **24 hr RT coverage**
  - Yes: 90
  - No: 20

*Sunnybrook Health Sciences Centre*
## Protocol Development and Support

<table>
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<tr>
<th>Feature</th>
<th>Percentage</th>
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<tr>
<td>Multidisciplinary development</td>
<td>69.6%</td>
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<tr>
<td>Ongoing staff education</td>
<td>71.1%</td>
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<tr>
<td>Protocol revised since inception</td>
<td>63.0%</td>
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<tr>
<td>Protocol adherence monitored</td>
<td>45.7%</td>
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Possible Next Steps

• Content analysis of mechanical ventilation protocols by expert panel

• Larger (multi-province or national) study to increase sample size and determine if regional variations in ventilation practices exist

• Assess protocol effect on system and patient outcomes by linking to separate data source
Conclusions

- Majority of hospitals in Ontario report the presence of a protocol for mechanical ventilation
- Despite the evidence, low tidal volume ventilation does not appear to be widely supported by these protocols
- Spontaneous breathing trials much more widely incorporated
References


