Adaptive Support Ventilation Reduces The Number of Ventilator Changes From Initiation To Liberation

Bryn S. Pencil BS, RRT-ACCS
Lehigh Valley Health Network, Bryn_S.Pencil@lvhn.org

Kenneth Miller MEd, RRT-NPS
Lehigh Valley Health Network, Kenneth.Miller@lvhn.org

Courtney Edwards MD
Lehigh Valley Health Network, Courtney_M.Edwards@lvhn.org

Follow this and additional works at: http://scholarlyworks.lvhn.org/patient-care-services-nursing
Part of the Equipment and Supplies Commons, Nursing Commons, and the Surgical Procedures, Operative Commons

Published In/Presented At

This Poster is brought to you for free and open access by LVHN Scholarly Works. It has been accepted for inclusion in LVHN Scholarly Works by an authorized administrator. For more information, please contact LibraryServices@lvhn.org.
Background:

• Goals of Mechanical Ventilation:
  – Optimize gas exchange
  – Decrease work of breathing
  – Minimize ventilator induced trauma
  – Maximize patient-ventilator synchronization
  – Facilitate liberation

Adaptive Support Ventilation (ASV):

• ASV is a closed loop mode of ventilation designed to maintain goal-directed mechanical ventilation using a lung protective strategy.
• ASV streamlines the set-up and weaning of the mechanical ventilation patient.
• Ventilation targets are derived from analysis of the patients pulmonary mechanics and are automatically implemented.
• All time-cycled delivered breaths are pressure regulated volume targeted breaths. (PRVC)
  – Spontaneous breaths are delivered with pressure support targeted at a desired tidal volume.
• Ventilator parameters: tidal volume/respiratory rate are set based on Otis’ least work physiology.

Otis Least Work of Breathing

\[ f_{\text{target}} = \sqrt{\frac{1+2aR\exp^b(V\text{'}a+V\text{'}d)}{Vd-1}} \]

Methods:

• We conducted a retrospective cohort study in our SICU on abdominal/thoracic patient populations who had achieved pulmonary stability.
• We compared one hundred patients ventilated via ASV mode to one hundred similar historical cohorts ventilated via CMV/SIMV modes.
• Cohorts were matched by: age, BMI, ventilator duration, and surgical diagnosis.
• We assessed ventilator interactions over an eighteen month time frame.
• An interaction was defined as: a mode change, rate/tidal volume adjustment, PSV titration, and %minute ventilation adjustment.

Results:

<table>
<thead>
<tr>
<th>Table 1. Title</th>
<th>Interventions</th>
<th>Age</th>
<th>BMI</th>
<th>Abd Surg</th>
<th>VLS</th>
<th>Thoracic</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASV</td>
<td>3.4</td>
<td>62.6</td>
<td>32.1</td>
<td>72%</td>
<td>5.1 days</td>
<td>28%</td>
</tr>
<tr>
<td>Cohort</td>
<td>6.2</td>
<td>63.8</td>
<td>29.9</td>
<td>69.6%</td>
<td>5.6 days</td>
<td>30.4%</td>
</tr>
</tbody>
</table>

Discussion:

• The number of ventilator interactions was less in the ASV group compared to the CMV/SIMV cohort group.
• ASV had 3.4 ventilator interactions compared to 6.2 for the CMV/SIMV cohort group.
• Ventilatory duration was 5.1 days in the ASV group compared to 5.6 days in the CMV/SIMV group.

Conclusion:

• ASV resulted in a reduction in both the number of ventilator interactions and ventilatory duration
• ASV may optimize patient comfort by transitioning from time-cycled to flow-cycled ventilation when workloads prevent timely ventilator adjustments
• Transitioning to flow-cycle ventilation may help facilitate ventilatory liberation
• Larger studies need to be conducted to evaluate the total impact of ASV on morbidity and mortality.

Adaptive Support Ventilation Reduces The Number of Ventilator Changes From Initiation To Liberation

Bryn Pencil, BS, RRT-ACCS; Kenneth Miller, MEd, RRT-ACCS; John Hong, MD; Courtney Edwards, MD
Lehigh Valley Health Network, Allentown, Pennsylvania

Otis AB, Fenn WJ, Rahn H, Mechanics of breathing in man, JAP 1950; 2: 592-607