RESPIRATORY THERAPY ATTITUDES TOWARD METHODS OF MONITORING ADEQUACY OF VENTILATION

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Introduction: Multiple clinical organizational standards and recommendations recognize the importance of monitoring quality or ‘adequacy’ of ventilation during procedural sedation and for patients receiving post-operative opioids (e.g., PCA) due to the potential risk of respiratory depression secondary to the medications used. The American Society of Anesthesiologists (ASA) states, “All patients receiving neuraxial opioids should be monitored for adequacy of ventilation (e.g., RR, depth of respiration, oxygenation, and level of consciousness)” and “During moderate or deep sedation the adequacy of ventilation shall be evaluated by continual observation of qualitative clinical signs and monitoring for the presence of exhaled carbon dioxide unless precluded or invalidated by the nature of the patient, procedure, or equipment.” Recently, the Joint Commission released a Sentinel Event Alert For the Safe Use of Opioids in Hospitals recommending “serial assessments of the quality and adequacy of respiration.”

Multiple methods of measuring ventilation have been developed by healthcare manufacturers. The purpose of this work was to survey Respiratory Therapist attitudes toward various methods’ ability to actually measure ‘adequacy of ventilation’ as recommended by clinical organizations.

Methods: A survey of attendees was performed at the 2011 American Association for Respiratory Care (AARC) Congress. Surveys were self-administered using Apple iPads to access SurveyMonkey.com. Attendees responded to the question, “On a 1 - 3 scale (1 is Worst and 3 is Best), rate each of the following on their ability to provide a measure of the adequacy (quality) of ventilation.” and given three choices as outlined below. Results were downloaded and assessed in Microsoft Excel.

Results: In all, 110 people participated in the survey. Participants in the survey included 79% respiratory therapists, 10% Respiratory Therapy Student/Graduate, 2% anesthesiologists, 2% nurses, 2% Respiratory Therapy Educators, 2% Sales Managers, <1% PhD or other doctoral degree, <1% Patient, <1% RT Manager, and <1% Administrator.
## Measure of Adequacy of Ventilation?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>3 - Provides a measure of adequacy of ventilation</th>
<th>2 - Provides an indication of ventilation but not a measure of adequacy</th>
<th>1 - Is not a measure of ventilation</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capnography</td>
<td>86%</td>
<td>14%</td>
<td>0%</td>
<td>2.9</td>
</tr>
<tr>
<td>Bioacoustic Respiratory Rate</td>
<td>30%</td>
<td>50%</td>
<td>19%</td>
<td>2.1</td>
</tr>
<tr>
<td>Impedance Respiratory Rate</td>
<td>30%</td>
<td>50%</td>
<td>20%</td>
<td>2.1</td>
</tr>
<tr>
<td>SpO₂ (Oximetry)</td>
<td>23%</td>
<td>26%</td>
<td>50%</td>
<td>1.7</td>
</tr>
</tbody>
</table>

**Conclusions:** Of the 4 technologies surveyed, AARC attendees chose capnography as ‘provides a measure of adequacy of ventilation’ by a margin of nearly than 3 to 1 over bioacoustic or impedance respiratory rate and nearly 4 to 1 over SpO₂\(^1\). The average score on the 1 – 3 scale (higher is better) was 2.9 for capnography, 2.1 for bioacoustic and impedance RR, and 1.7 for SpO₂. In choosing which methods are not a measure of adequacy of ventilation (i.e., chose ‘not a measure of adequacy’ or ‘not a measure of ventilation’):

- 77% chose that SpO₂ is **not** a measure of adequacy or ventilation,
- 70% chose that impedance RR is **not** a measure of adequacy or ventilation,
- 70% chose that bioacoustic RR is **not** a measure of adequacy or ventilation, and
- 14% chose that capnography is **not** a measure of adequacy or ventilation.

## References:


\(^{ii}\) ASA Standards for Basic Anesthetic Monitoring, Committee of Origin: Standards and Practice Parameters (Approved by the ASA House of Delegates on October 21, 1986, and last amended on October 20, 2010 with an effective date of July 1, 2011) - Viewed 12-21-11 at [www.asahq.org](http://www.asahq.org)


\(^{iv}\) ISMP Medication Safety Alert, February 2007, Volume 12, Issue 3

\(^{v}\) Joint Commission: Provision of Care, Treatment, and Services The Administration of Moderate or Deep Sedation or Anesthesia 2006.


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\(^1\) RR derived from pulse oximetry was not included in this survey.