Evaluation of pharmacist intervention on spontaneous awakening trials (SAT) in ventilated patients

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Evaluation of pharmacist intervention on spontaneous awakening trials in ventilated patients

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Disclosure Statement

The authors of this study have no financial interest or personal relationships with commercial entities (or their competitors) that may be referenced in this presentation.
Presentation Objective

Review the impact of pharmacist involvement on adherence to spontaneous awakening trials (SATs) in mechanically ventilated patients.
Background

- Intensive care unit (ICU) patients regularly require use of continuous sedation to decrease stress associated with mechanical ventilation, agitation, overall discomfort, etc.\(^1\)

- SATs have been implemented into standard of care to prevent oversedation & improve patient outcomes\(^2-4\)

- Interruptions of continuously infused sedatives are recommended daily in qualifying patients to:
  
  - Reassess continued needs for sedation
  - Perform adequate neurologic examinations
  - Allow patients to wake up & breathe\(^3-7\)
Spontaneous Awakening Trials

• Nonbenzodiazepine sedatives preferred over benzodiazepines in certain populations to improve short-term outcomes
  – Short durations of benzodiazepines are recommended due to unpredictable awakening & time to extubation
  – Highlights the importance of performing SATs properly

• Often not performed when indicated and may not be appropriately conducted

• Literature has shown pharmacist involvement may lead to shorter weaning times & reduced rates of medication-related adverse events\(^7,8\)
Study Purpose

To determine the impact of pharmacist involvement on adherence to a nursing-driven protocol for performance of SATs and on total days of mechanical ventilation.
Study Design

• Bi-phasic IRB-reviewed study
  – Retrospective: April – September 2022
    • Random sample of patients on continuous IV sedation
  – Prospective: October – March 2023
    • Pharmacist intervention on qualifying patients

• Setting: Baptist Health South Florida
  – 5 ICUs

• Statistical analysis
  – Nominal variables: Chi-square and Fisher’s exact test
  – Continuous variables: Student’s t-test, Mann-Whitney U test
Eligibility Criteria

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Patients ≥ 18 years old</td>
<td>• Receiving continuous IV paralytic agents</td>
</tr>
<tr>
<td>• ICU admission during study period</td>
<td>• Indication for continuous infusion other than sedation</td>
</tr>
<tr>
<td>• Mechanically ventilated &gt; 48 hours</td>
<td>• Anticipated tracheostomy placement after 48 hours</td>
</tr>
<tr>
<td>• Receiving sedation &amp;/or analgesia with continuous IV midazolam, propofol, or fentanyl</td>
<td></td>
</tr>
</tbody>
</table>
Indications for SAT

• Patients on continuous sedatives and/or analgesic drips with:
  – $\text{FiO}_2$ less than 70%
  – $\text{SpO}_2$ greater than 88%
  – Respiratory rate (RR) ≤ 30 breaths per minute
  – PEEP ≤ 10 cm $\text{H}_2\text{O}$
  – Hemodynamically stable

• Do not meet criteria if:
  – Ventilator settings are not in range with parameters listed above
  – Patient is receiving paralytics
  – Provider specifies NOT to do a SAT
  – Receiving sedatives for a reason other than sedation (i.e., seizures, alcohol withdrawal, ICP management)
Spontaneous Awakening Trial Process

1. Assess for SAT eligibility
2. Perform SAT
3. If SAT passed, proceed to SBT
4. Perform SBT
5. If SBT passed, proceed to extubation
Spontaneous Awakening Trial Process

**Pass**
- Continue to hold sedation
- Attempt spontaneous breathing trial (SBT)

**Fail**
- **Propofol or dexmedetomidine:** Restart at half the pre-SAT drip rate
- **Midazolam:** BOLUS midazolam 2 mg IV q 15 min x 2, then restart at half the pre-SAT drip rate
- **Fentanyl:** BOLUS fentanyl 50 mcg IV x1, then restart at half the pre-SAT drip rate

**Agitation or anxiety:**
- Start PRN doses
- Initiate same sedative/analgesic agent on at initiation rate
Outcomes

Primary Outcomes

- SAT compliance
- Number and type of pharmacist interventions

Secondary Outcomes

- Days of mechanical ventilation
- ICU length of stay
# Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Retrospective N=37</th>
<th>Prospective N=59</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean age, years (± SD)</strong></td>
<td>56 (±19)</td>
<td>66 (±14)</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Sex – male, n (%)</strong></td>
<td>15 (41)</td>
<td>36 (61)</td>
<td>0.05</td>
</tr>
<tr>
<td>*<em>APACHE II Score</em>, median (IQR)**</td>
<td>15 (0-24)</td>
<td>16 (7-28)</td>
<td>0.08</td>
</tr>
<tr>
<td><strong>Diagnosis, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute respiratory failure</td>
<td>12 (32)</td>
<td>16 (27)</td>
<td>0.58</td>
</tr>
<tr>
<td>Altered mental status</td>
<td>11 (30)</td>
<td>15 (25)</td>
<td>0.65</td>
</tr>
<tr>
<td>Sepsis</td>
<td>6 (16)</td>
<td>3 (5)</td>
<td>0.08</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>1 (3)</td>
<td>7 (12)</td>
<td>0.15</td>
</tr>
<tr>
<td>COPD or asthma exacerbation</td>
<td>0</td>
<td>9 (15)</td>
<td>0.03</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0</td>
<td>4 (7)</td>
<td>0.16</td>
</tr>
<tr>
<td>Other</td>
<td>8 (22)</td>
<td>5 (8)</td>
<td>0.12</td>
</tr>
<tr>
<td><strong>Sedative &amp;/or analgesic agent utilized when criteria met for SAT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fentanyl + midazolam</td>
<td>24 (65)</td>
<td>22 (37)</td>
<td>0.01</td>
</tr>
<tr>
<td>Fentanyl + propofol</td>
<td>4 (11)</td>
<td>16 (27)</td>
<td>0.07</td>
</tr>
<tr>
<td>Midazolam</td>
<td>0</td>
<td>2 (3)</td>
<td>0.52</td>
</tr>
<tr>
<td>Propofol</td>
<td>2 (5)</td>
<td>14 (24)</td>
<td>0.02</td>
</tr>
<tr>
<td>Other</td>
<td>7 (19)</td>
<td>5 (8)</td>
<td>0.2</td>
</tr>
</tbody>
</table>

*Acute Physiology and Chronic Health Evaluation
Primary Outcome

Criteria Met for SAT (N=37)
Retrospective Phase

- SAT Conducted*: 21, 57%
- SAT Not Conducted: 16, 43%

Criteria Met for SAT (N=59)
Prospective Phase

- SAT Conducted*: 41, 69%
- SAT Not Conducted: 18, 31%

*P=0.2
Primary Outcome

Criteria Met for SAT (N=37)
Retrospective Phase

- SAT Conducted*: 21, 57%
- SAT Not Conducted: 16, 43%

Criteria Met for SAT (N=59)
Prospective Phase

- SAT Conducted*: 41, 69%
- SAT Not Conducted: 18, 31%

*P=0.2

Satellite Not Conducted 16, 43%
Satellite Conducted 21, 57%
Criteria Met for SAT (N=37)
Retrospective Phase

Satellite Conducted* 41, 69%
Satellite Not Conducted 18, 31%
Criteria Met for SAT (N=59)
Prospective Phase

12%
# Reason SAT Not Conducted

<table>
<thead>
<tr>
<th>Documented Reasons Against SAT, n (%)</th>
<th>Retrospective (n=16)</th>
<th>Prospective (n=18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not documented</td>
<td>15 (94)</td>
<td>5 (28)</td>
</tr>
<tr>
<td>No plans for extubation</td>
<td>1 (6)</td>
<td>4 (22)</td>
</tr>
<tr>
<td>Pending procedure</td>
<td>0</td>
<td>6 (33)</td>
</tr>
<tr>
<td>Hemodynamic instability documented</td>
<td>0</td>
<td>3 (17)</td>
</tr>
</tbody>
</table>

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## Pharmacist Interventions

<table>
<thead>
<tr>
<th>Type of Intervention</th>
<th>Total Number of Interventions</th>
<th>Interventions Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAT Recommended</td>
<td>59</td>
<td>41</td>
</tr>
<tr>
<td>Other</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>86</strong></td>
<td><strong>68</strong></td>
</tr>
</tbody>
</table>

*79% Acceptance Rate*
## Secondary Outcomes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Retrospective (n=37)</th>
<th>Prospective (n=59)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU length of stay (days), median</td>
<td>11.42</td>
<td>11.1</td>
<td>0.17</td>
</tr>
<tr>
<td>Mechanical ventilation duration (days), median</td>
<td>8</td>
<td>9</td>
<td>0.53</td>
</tr>
</tbody>
</table>

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Limitations

• Unable to evaluate total daily dose of continuous sedatives & analgesics
• Convenience sample
• Inconsistent documentation in retrospective phase
• Pharmacist interventions in retrospective phase not assessed
Conclusions

79% of pharmacists’ recommendations were accepted

Pharmacist intervention resulted in an increase from 57% to 69% SATs performed

Differences in sedatives used may have impacted duration of mechanical ventilation
Future Directions

Nursing re-education on SAT indications and how to appropriately conduct SATs

Streamlining documentation of pharmacists’ SAT interventions
Self Assessment

• What are known benefits of performing daily spontaneous awakening trials?
  a) Decrease ICU length of stay
  b) Prevent oversedation
  c) Decrease duration of mechanical ventilation
  d) All of the above
Acknowledgments

Thank you to the following individuals for their continuous support and contributions to this project

– Delany Santos Ferrer, Pharm.D., BCCCP
– Heidi Clarke, Pharm.D., BCCCP


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