### Hemodynamic Effects of Dexmedetomidine Compared to Propofol in Critically Ill Adults

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### Introduction
- Sedation is used in the intensive care unit (ICU) to facilitate mechanical ventilation and is associated with decrease in:
  - Delirium
  - Ventilator dependent days
  - Mortality and morbidity
- The Society of Critical Care Medicine’s (SCCM) 2013 Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium recommend maintaining light levels of sedation for improved clinical outcomes!
- SCCM recommends using the Richmond Agitation-Sedation Scale (RASS) to monitor sedation levels
- Target RASS of 0 to -2 (Table 1)

### Objectives
- **Primary**
  - Compare the hemodynamic effects associated with dexmedetomidine versus propofol during the first 24 hours of infusion
- **Secondary**
  - Evaluate the efficacy of first line sedative agents for sedation in critically ill patients
  - Characterize interventions utilized in treatment of sedative-induced hypotension and bradycardia

### Methods
**STUDY DESIGN**
- Single center, retrospective, observational chart review
- This study was approved by the Institutional Review Board at Beaumont Health
- A convenience sample of patients administered propofol or dexmedetomidine between July 1, 2013 and July 1, 2015 will be reviewed for eligibility (Figure 1)
- Data will be collected from the electronic medical record

**Eligibility Criteria**
- Age ≥ 18 years old
- Mechanically ventilated, critically ill patients
- Target RASS of 0 to -2
- Hemodynamics (averaged ≥4 hours prior to sedative administration)
  - Mean arterial pressure (MAP)
  - Diastolic blood pressure (DBP)
  - Systolic blood pressure (SBP)
  - Heart rate (HR)

**Exclusion Criteria**
- Severe hypotension or bradycardia
  - Decreased cardiac output
  - Increased organ perfusion

### Table 1. Richmond Agitation-Sedation Scale

<table>
<thead>
<tr>
<th>Degree of Sedation</th>
<th>RASS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agitated</td>
<td>+3 to +4</td>
</tr>
<tr>
<td>Quiet and Calm</td>
<td>0</td>
</tr>
<tr>
<td>Lightly Sedated</td>
<td>-1 to -2</td>
</tr>
<tr>
<td>Deeply Sedated</td>
<td>-3 to -5</td>
</tr>
</tbody>
</table>

*Modified from SCCM guidelines*

### Table 2. Propofol and Dexmedetomidine Pharmacokinetics

<table>
<thead>
<tr>
<th>Propofol</th>
<th>Dexmedetomidine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism</td>
<td>Sedative hypnotic, GABA agonist</td>
</tr>
<tr>
<td>Dosage</td>
<td>Centrally acting α-2 adrenergic receptor agonist</td>
</tr>
<tr>
<td>Duration</td>
<td>1 – 2 minutes</td>
</tr>
<tr>
<td>Duration</td>
<td>5 – 10 minutes</td>
</tr>
</tbody>
</table>

*Table 2 - Modified from SCCM guidelines*

### Table 3. Data Collection

<table>
<thead>
<tr>
<th>Baseline Data</th>
<th>Demographic information</th>
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<td>ICU type and admission diagnosis</td>
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</tr>
<tr>
<td>Acute Physiologic and Chronic Health Evaluation (APACHE) II Score</td>
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</tbody>
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**Primary Endpoints**
- Frequency of severe hypotension and bradycardia events
  - Severe hypotension
  - MAP < 60 or a decrease in SBP of ≥40 mmHg or more from baseline
  - Severe bradycardia
  - HR < 50 bpm

**Secondary Endpoints**
- Time to target RASS
- Treatment of hemodynamic events
  - Sedative dosing
  - Vasopressor or inotrope use
  - Blood product transfusion or paralytics

**Table 3 - Data Collection**

**References**

### Methods (Cont.)
**DATA COLLECTION ENDPOINTS**
- Data collection will conclude at the 24 hour time point or earlier if:
  - The patient is extubated, undergoes cardiac pulmonary resuscitation (CPR), or expires
  - Renal replacement therapy is initiated
  - Sedatives are discontinued

**Statistical Analysis**
- Data analysis will be performed with Statistical Analysis Software® (SAS) for Windows® version 9.3 and R for Windows® version 2.15.1
- Descriptive statistics
- Parametric variables:
  - Student’s t-test, Pearson chi-square test, and Fisher’s exact test
- Non-parametric variables:
  - Wilcoxon signed-rank test, Wilcoxon two-sample rank-sum test
- P-value ≤ 0.05 will be considered statistically significant

### Rationale
- Studies have shown conflicting data on the rates of hemodynamic instability between the recommended agents
- Wide ranges of hypotension (23-98%) and bradycardia (3-42%) have been reported
- Recent studies in specific ICU populations (medical and neurocritical) report similar rates of hypotension and bradycardia between agents

**Table 3 - Data Collection**

### Table 4. Data Collection

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**References**

### Disclosures
- Authors of this presentation have the following to disclose concerning potential financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:
  - All authors have nothing to disclose.