# Hemodynamic Effects of Dexmedetomidine Compared to Propofol in Critically III 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:<sup>1-3</sup>
- Delirium
- Ventilator dependent days
- Morbidity and mortality
- 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<sup>4</sup>
- SCCM recommends using the Richmond Agitation-Sedation Scale (RASS) to monitor sedation levels
- Target RASS of 0 to -2 (*Table 1*)<sup>4</sup>

#### Table 1. Richmond Agitation-Sedation Scale<sup>4</sup>

<b>Depth of Sedation*</b>	RASS Score
Agitated	+1 to +4
Awake and Calm	0
Lightly Sedated	-1 to -2
Deeply Sedated	-3 to -5
*Madified from SCCM anidalinas4	·

\*Modified from SCCM guidelines<sup>•</sup>

• Propofol and dexmedetomidine are the recommended first line agents due to their desirable pharmacokinetic properties (*Table 2*)<sup>4</sup>

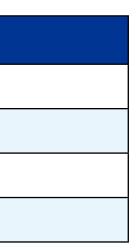
#### *Table 2. Propofol and Dexmedetomidine Pharmacokinetics*<sup>7,8</sup>

	Propofol	Dexmedetomidine
Mechanism	Sedative hypnotic GABA agonist	Centrally acting $\alpha$ -2 adrenergic receptor agonist
Dosing	5 – 50 μg/kg/min	0.2 – 0.7 μg/kg/hr
Onset	1-2 minutes	5 – 10 minutes
Duration	3 – 10 minutes	60 – 120 minutes

- Both agents have been associated with hemodynamic instability including hypotension and bradycardia which may result in:<sup>1,5,6</sup>
- Reduced cardiac output
- Decreased organ perfusion
- Increased mortality

### 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<sup>1,6</sup>
- Recent studies in specific ICU populations (medical and neurocritical) report similar rates of hypotension and bradycardia between agents<sup>1,2</sup>
- This study will compare the rate of hemodynamic effects of propofol and dexmedetomidine in a large mixed ICU population



### 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

### Figure 1. Eligibility Criteria

### **Inclusion Criteria**

- Mechanically ventilated, critically ill patients
- Age  $\geq$  18 years old
- Continuous intravenous sedation with either propofol or dexmedetomidine infusion for  $\geq$  4 hours
- Target RASS of 0 to -2

### Table 3. Data Collection

Baseline Data		
Demographic information		Fr
ICU type and admission diagnosis		hy br
Acute Physiology and Chronic Health		
Evaluation (APACHE) II Score		
Hemodynamics (averaged 6 hours prior		
to sedative administration)		
• Heart rate (HR)		
Systolic blood pressure (SBP)		
• Diastolic blood pressure (DBP)		
• Mean arterial pressure (MAP)		
	1	Ц

Use of analgesics and antihypertensives

Hemodynamics (during sedation period)

### **Exclusion Criteria**

- Procedural sedation
- Use of  $\geq 2$  concurrent continuous infusions of sedatives
- Use of vasopressor or inotrope within 1 hour prior to sedation initiation
- Treatment for active seizures or alcohol withdrawal
- Use of continuous infusion neuromuscular blocking agents
- Blood product transfusion or paracentesis

#### **Primary Endpoints**

requency of severe ypotension and radycardia 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 Percent time spent within target RASS range ICU type and admission diagnosis Treatment of hemodynamic events • Sedative dosing

- Dose titration • Vasopressor or inotrope use
- Dose titration

## Methods (Cont.)

### **DATA COLLECTION ENDPOINTS**

- The patient is extubated, undergoes cardiopulmonary resuscitation (CPR), or expires
- Renal replacement therapy is initiated
- Sedatives are discontinued

## **Statistical Analysis**

- Windows<sup>®</sup> 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  $\leq 0.05$  will be considered statistically significant

### References

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## Disclosures

Authors of this presentation have the following to disclose concerning possible 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.







Data collection will conclude at the 24 hour time point or earlier if:

• Data analysis will be performed with Statistical Analysis Software<sup>®</sup> (SAS) for Windows<sup>®</sup> version 9.3 and R for

