Sedation Management

Achieving Balance for Positive Patient Outcomes
Objectives

- Discuss the evidence and standards that can be used to guide sedation management

- Discuss delirium in the pediatric patient
Sedation Management

Outline:

- Sedation Goals
- Sedation Scales
- U of M Sedation Scale
- PICU Agitation Scale
- Delirium
Sedation

To facilitate mechanical ventilation we use sedation and analgesia medications.

We do this, to provide comfort, and minimize pain, suffering, anxiety and other forms of distress, some of which are a direct result of interventions in the ICU.
Management of a patients pain and anxiety requires a delicate balance of analgesia and sedation.

Administration of sedatives and analgesics can contribute to the development of delirium.

Acute brain dysfunction (delirium) is a significant complication of critical illness.
Sedation

**Under Sedation**
- Pain
- Self extubation
- Misery
- Awake
- Aware

**Over Sedation**
- VAP
- Long-term decrease in cognitive function
- Hemodynamic instability
- Increased length of stay
- PTSD

**Titration**
- Pain
- Sedation
- Delirium

**Reduced pain**
- Decreased anxiety
- Managed delerium
- Amnesia
- Recovery

*After San Diego Patient Safety Council 2009*
Pain/ sedation/ Agitation poorly managed

- Escalating dosages and increased exposures to drugs resulting in complications and side effects
- Prolonged ventilation and longer PICU stay
- Unplanned extubation (self-extubation)
- Drug withdrawal
- Conflict and confusion among staff
- Patient discomfort
- Patient/family dissatisfaction
Standardization, communication, goals, protocols

- Pain and sedation should be routinely assessed
- Team work and good communication improve pt outcomes
- Standardization helps to develop protocols
- Sedation goals and protocols decrease unplanned extubations
- Planned drug tapers decrease withdrawal
Sedation Management

- To improve communication, collaboration and develop a common language
- Developed Daily Sedation Goals (Goal directed care)
- Implemented Assessment Tools for pain/sedation/agitation and drug withdrawal (close monitoring)
- Developed algorithms. (medication titration protocols)
Sedation Goals

A – Awake: interactive with environment
B – Light: arouses to light stimulation, consistently breathes above ventilator
C – Moderate: arouses to loud noise and pain, very little movement, breathes above ventilator
D – Deep and Apneic: no respiratory effort, no spontaneous movement
E – Deep and Blocked: asleep with neuromuscular blockade
Sedation Scales

Why?

- Consistently document a patient's status
- Improve communication among ICU caregivers
- Guidance for titration of sedatives
There are many validated scales to quantify and describe patient behavior in relation to sedation. Only validated in adult settings. Underlying assumption: increased agitation = increased need for sedatives.
Sedation Scales

Adult Scale examples:
- Ramsay Sedation scale (30 years ago)
- Sedation Agitation Scale (SAS)
- Motor Activity Assessment Scale
- Vancouver Interactive and Calmness Scale (VICS)
- Richmond Agitation Sedation Scale (RASS)
- Adaptation to the Intensive Care Environment (ATICE)
Sedation Scales

- State Behavior Scale (SBS) - Validated in critically ill intubated children
- Comfort scale
- Identifies 6 behaviors and 2 physiological scores
- Assessment includes pain and sedation
- Determines comfort vs discomfort
- Does not differentiate cause
- Limited value guiding interventions
University of Michigan Sedation Scale

Pros:
- Practical
- Reliable
- Validated for pediatric patients
- Simple to administer
- Easy to document
Sedation is a continuum

Consciousness

0
Awake
Alert

1
Minimal
Sedation

2
Moderate
Sedation

3
Deep
Sedation

4
Unarousable

Unconsciousness

Patient who has received a PRN dose of Lorazepam can score a 0
University of Michigan Sedation Scale

Cons:

- Assesses degree of arousal
- Does not assess content
- Does not address agitated behavior
Sedation Medication Protocols

- Development of Sedation Protocols helps guide practitioner medication choices.
- Ensures understanding of sedation medication activity and dosing.
- Ensures consistent approach to how we go up or down on sedation drips.
- Most commonly used are midazolam lorazepam and valium (benzodiazepines).
- Also use ketamine and dexmedetomidine.
Agitation

- Most sedation scales are based on a continuum of behaviors from deeply sedated to extremely agitated.
- Observations of agitation infer that more sedation is required.
- Most sedation scales guide caregivers to this conclusion.
- Agitation is not captured in U of M sedation scale.
Agitation Defined

- Is a behavioral response to a physical or emotional distress
- Behaviors include, excessive motor activity, which is non purposeful and involves pulling at tubes
- The patient can be kicking and biting, and difficult to redirect or get to follow instructions.
Agitation Assessment

- No validated tools exist to measure agitation in children
- Variable assessment and interpretation of agitated behavior leads to inconsistent treatment choices.
Agitation Assessment

Physiological?
- Pain?
- Air hunger?
- Medication Side effects?
- Under sedated?

Psychological?
- Confusion?
- Anxiety?
- Delirium?
Agitation Behavior

- Need to communicate the observed agitation in a standard way (common language)
- Developed a tool to measure agitation in the pediatric pt.
- Called the ACAT scale
ACAT Scale

- **Four Categories of Assessment:**
  - **Activity:** calm to excessive/pulling at tubes
  - **Consolability:** control to not consoled
  - **Alertness:** follow instruction to confused
  - **Threat to Safety:** calm, tolerates ventilation to high risk of self-extubation
### University of Michigan PICU ACAT Scale

#### Scoring

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity</strong></td>
<td>Calm</td>
<td>Intermittent-squirming</td>
<td>Persistent attempts to move – restless and squirming</td>
<td>Excessive movement and pulling at tubes</td>
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<tr>
<td>Restlessness/squirming</td>
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</tr>
<tr>
<td><strong>Consolability</strong></td>
<td>No intervention needed</td>
<td>Easy to console with voice or touch</td>
<td>Difficult to console (short period &lt; 5 min)</td>
<td>Inconsolable</td>
</tr>
<tr>
<td>Ability to console</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Alertness</strong></td>
<td>Yes - without reinforcement</td>
<td>Yes - with reinforcement</td>
<td>Inconsistent - requiring frequent reinforcement</td>
<td>Does not follow instructions - confused</td>
</tr>
<tr>
<td>Ability to follow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>instructions*</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Threat to safety</strong></td>
<td>Calm and tolerates ventilation</td>
<td>Distressed at times, calms when stimulus removed. Unsafe at times. Tolerates ventilation most of the time.</td>
<td>Intermittently unsafe to be left alone. Recovers after ET suctioning</td>
<td>High threat of safety and risk of self-harm, high risk of self-extubation, fighting ventilation</td>
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<tr>
<td>Risk for harm or self-extubation</td>
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ACAT Scale

- If your patient continues to score 2-3 despite interventions, consider delirium.
Delirium

Acute brain dysfunction, is a common and significant complication of critical illness.

Observed in 60-80% of ventilated adult ICU patients.

There are well validated/reliable tools for diagnosis in adult populations.
Delirium

- More failed and self extubations
- Prolonged mechanical ventilation
- Inadvertent removal of catheters
- Prolonged hospital stay
- Higher health care costs
- Increased mortality
Delirium

- Survivors can develop post traumatic stress disorder (PTSD)
- Survivors can develop long-term cognitive impairment (LTCI)
- The common risk factor for the development of PTSD, and LTCI is delirium
Delirium Defined

- A disturbance of consciousness and cognition that develops acutely with a fluctuating course of inattention and impaired ability to receive, process, store or recall information
Delirium Types

- Hyperactive - hyper vigilance, restlessness, anger, irritability and uncooperativeness. Associated with better outcomes
- Hypoactive - lack of awareness, decreased alertness, sparse or slow speech, lethargy, decreased motor activity and apathy. More common and deleterious.
- Mixed - a bit of both at different times, in adults can occur in up to 54% of patients
Delirium Risk Factors

- Iatrogenic:
  - Sleep deprivation
  - Administration of sedatives and analgesics
  - ICU patients sleep on average 2 hours/day
<table>
<thead>
<tr>
<th>Predisposing Factors Host</th>
<th>Factors of Critical Illness</th>
<th>Iatrogenic Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Acidosis</td>
<td>Few social interactions</td>
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<tr>
<td>Apolipoprotein E4 polymorphism</td>
<td>Anemia</td>
<td>Frequent nursing care</td>
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<tr>
<td>Cognitive impairment</td>
<td>Electrolyte disturbances</td>
<td>Immobilization</td>
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<td>Depression</td>
<td>Endocrine derangement</td>
<td>Medications</td>
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<td>Epilepsy</td>
<td>Fever</td>
<td>Oversedation</td>
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<tr>
<td>Stroke history</td>
<td>Hepatic failure</td>
<td>Poorly controlled pain</td>
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<tr>
<td>Vision/hearing impairment</td>
<td>High severity of illness</td>
<td>Sleep disturbances</td>
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<td></td>
<td>Hypoperfusion</td>
<td>Vascular access lines</td>
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<td></td>
<td>Hypotension</td>
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<td>Hypoxia/anoxia</td>
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<td>Intercranial hemorrhage</td>
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<td>Infection/sepsis</td>
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<td>Malnutrition</td>
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<td>Metabolic disturbances</td>
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<td></td>
<td>Myocardial failure</td>
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<td></td>
<td>Poisoning</td>
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<td></td>
<td>Respiratory failure</td>
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<td></td>
<td>Trauma</td>
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Delirium Treatment

- Prevention through controlling precipitating risk factors
- Management of delirium symptoms
- Treatment through resolution of the underlying cause or modulation of the neurochemical cascade.
Non-Pharmacological Delirium treatment

- Promote effective sleep/awake cycles
- Remove lines, restraints as early as possible
- Minimize noise/stimulation at night
- Minimize benzodiazepines for sedation
- Early mobilization
- Continually reorient the pt to surroundings
Delirium Treatment

- After minimizing risk factors
- After taking care of complications from the disease (hypoxemia etc)
- Then pharmacological therapy can be considered.
Delirium Treatment

- Neurotransmitters are involved in cognitive function
- Haldol, and resperidone are antipsychotic used to help restore neurotransmitter equilibrium
- All antipsychotics have potentially serious side effects that need to be monitored for.
Delirium Treatment

- Benzodiazepines is recognized as a significant risk factor for the development of delirium.
- Dexmedetomidine has not been shown to be associated with the development of delirium.
- Dexmedetomidine would be the better choice for sedation.
Delirium Pediatrics

- In its infancy regarding diagnosis, treatment and associations of risk
- Prevalence unknown, likely underestimated as it was initially in adult literature
- We literally don’t look for it, don’t diagnose it and don’t treat it.
Delirium

- In adults there are several delirium-screening tools
- The Delirium Rating Scale
- Confusion Assessment Method for the ICU (CAM-ICU)
- Intensive Care Delirium Screening Checklist (ICDSC)
Delirium

- Of these the CAM-ICU and the IDSC can be used by non psychiatrically trained medical professionals.

- The CAM-ICU is the most commonly used, and is also validated for mechanically ventilated patients.
Pediatric Delirium Tool

- Vanderbilt Pediatric Delirium Group took the CAM-ICU and modified it for pediatric patients.
- They adapted the tool using age-appropriate cognitive assessment methods.
- The resulting tool is appropriate for 5 years of age and up.
Pediatric Delirium Tool

- The tool uses the RASS to assess sedation level or arousal
- The pCAM-ICU is used to assess content or the delirium assessment
- The validity and reliability of this tool is being tested now
Pediatric Delirium

- The Pediatric Anesthesia Emergence Delirium (PAED) scale
- Can be used on children as young as 2 years
- Used for emergence delirium post anesthesia
**Pediatric Anesthesia**  
**Emergence Delirium Scale**

**Item A:** The child makes eye contact with the caregiver.

**Item B:** The child’s actions are purposeful.

**Item C:** The child is aware of his/her surroundings.

**Item D:** The child is restless.

**Item E:** The child is inconsolable.

Items A, B, and C are scored as follows: 4, not at all; 3, just a little; 2, quite a bit; 1, very much; 0, extremely. Items D and E are scored as follows: 0, not at all; 1, just a little; 2, quite a bit; 3, very much; 4, extremely. The scores of all items are summed to obtain a total PAED scale score. The degree of ED increases directly with the total score.

*Adapted from* Sikich N., Lerman J. Development and psychometric evaluation of the pediatric anesthesia emergence delirium scale. Anesthesiology 2004; 100(5):1138-45.
PAED

- Has limitations
- It really only looks at hyperactive delirium
- Is not validated to diagnose delirium
- Subjective in nature
Delirium Treatment

- There is very little data on use of halol, and resperidone for delirium treatment in children.
- Study reporting the use of these meds for delirium treatment.
Delirium - Summary

- Described as a disturbance of consciousness and cognition that cannot be accounted for by a preexisting condition.
- Delirium is frequently seen in critically ill adults and is associated with poor outcomes.
- Agitation can be a symptom of delirium.
- Data suggest that it can be present in children and contributes to increased mortality.
- The treatment for delirium is not more sedation, but possibly less, with the addition of antipsychotic drugs like haldol and resperidone.
Delirium- Summary

- Valid and reliable tools are in the works for pediatric patients
- For a detailed description of the pCAM-ICU visit www.icudelirium.org
- Tool development in <5 years yet to be addressed
Sedation Under Sedation

- Pain
- Self extubation
- Misery
- Awake
- Aware

Over Sedation

- VAP
- Long-term decrease in cognitive function
- Hemodynamic instability
- Increased length of stay
- PTSD

Titration

Pain
Sedation
Delirium

Reduced pain
Decreased anxiety
Managed delerium
Amnesia
Recovery

After San Diego Patient Safety Council 2009
Sedation

Questions?

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References

References
