Where are the Zzzzzs in ICU?
Creating a Culture of Sleep Promotion in the Intensive Care Unit

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Sleep and Delirium?

What is Delirium?

- an acute but reversible disorder of attention & cognition
- Incidence rate of 60-85% in critically ill patients
- Associated with both significant and profound short term and long term consequences
- Mortality rates
- Financial Burden

(Vanderbuilt University Medical Center for Health Services Research, 2013)
Delirium: Common Causes

Multifactorial in nature
2 main mechanisms
– Anatomic deficits (injury/insult) in the brain
– Neurotransmitter imbalance

Due to this, prevention and management requires a multidisciplinary and multifaceted approach.

(Justic, 2000)

Calgary Zone & RGH Initiatives

• Delirium Screening Using the ICDSC

• 3 Main Delirium Management Guidelines
  1. Non-Pharmacological Prevention & Management
     – Bed Mobility
     – Mobilization
     – Exercise
     – Environment
     – Cognitive/Sensory Stimulation, Orientation
     – Activities of Daily Living

(VUMC for Health Services Research, 2013)
2. **Analgesia/Sedation Guidelines for Mechanically Ventilated Patients**
   - based on PAD guidelines

3. **Wake up and Breathe**
   - SAT & SBT
     - Bullet Rounds
     - Night Routine

### Physiology of Sleep

<table>
<thead>
<tr>
<th>Stages of Sleep</th>
<th>Non-REM Sleep</th>
<th>REM Sleep</th>
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</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Occurs @ sleep onset</td>
<td>20% of sleep time</td>
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<tr>
<td></td>
<td>10-20% of sleep time is spent here</td>
<td>Episodic Bursts of Eye Movement</td>
</tr>
<tr>
<td>Stage 2</td>
<td>50% of sleeping time is normally spent here</td>
<td>Irregular RR and HR</td>
</tr>
<tr>
<td></td>
<td>EEG: Spindles &amp; K Complexes, slowing with increase in amplitude complexes</td>
<td>Paralysis of major muscle groups (exceptions -- diaphragm &amp; upper</td>
</tr>
<tr>
<td></td>
<td></td>
<td>respiratory muscles)</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Known as deep sleep or slow wave sleep</td>
<td></td>
</tr>
<tr>
<td></td>
<td>~10-20% of normal sleep time</td>
<td></td>
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<tr>
<td></td>
<td>Stable respiratory control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balanced sympathetic-parasympathetic stimulus</td>
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<tr>
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<td>EEG: slow wave exceeds 20% of time, low frequency high altitude delta waves.</td>
<td></td>
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(Parthasarathy & Tobin, 2004; Kirsch et al., 2014)
Characteristics of Sleep in the Critically Ill

- Sleep is severely fragmented
- Total Sleep Time/24 hours may be normal – But distributed between day & night
- ↑ time in Stage 1
- ↓ time in Stages 2, 3 & REM
- Leads to increased arousal and awakening

<table>
<thead>
<tr>
<th>Sleep Alterations in the Critically Ill</th>
<th>Non-REM Sleep</th>
<th>REM Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Usually occurs @ sleep onset</td>
<td>~10% of sleep time</td>
</tr>
<tr>
<td></td>
<td>Critically ill population: 40-60% of time spent here</td>
<td></td>
</tr>
<tr>
<td>Stage 2</td>
<td>~40-60% of sleep time spent here</td>
<td></td>
</tr>
<tr>
<td>Stage 3</td>
<td>~10% of sleep time</td>
<td></td>
</tr>
</tbody>
</table>

(Bourne et al., 2007; Parthasarathy & Tobin, 2004)

Sleep in the Critically Ill

Physiological Alterations:

- Environmental Factors
- Analgesia/Sedation/Hypnotic Use
- Acute Illness
- General Patient Comfort/Pain level

(Nicolas et al., 2008; Parthasarathy & Tobin, 2004)
Sleep and Delirium

So does a “lack of sleep” cause delirium?
• Early research findings

The relationship between sleep deprivation and delirium:
• A well cited 2008 study found: “sleep deprivation is a common phenomena in critically ill patients and in those same patients the incidence of delirium is up to 85%” (Mistraletti, et al, 2008)
• Patients with severe REM deprivation (0-6% of TST) had an incidence of delirium of 73% (Trompeo, et al, 2011)
• Both have similar characteristics

Clinical and physiologic similarities shared by delirium and sleep disruption

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inattention</td>
<td>Intensive care unit admission</td>
</tr>
<tr>
<td>Fluctuating mental status</td>
<td>Mechanical ventilation</td>
</tr>
<tr>
<td>Impaired cognition, specifically those relating to executive function</td>
<td>Pain</td>
</tr>
<tr>
<td>(memory, planning, creative thinking, judgment)</td>
<td>Stress</td>
</tr>
<tr>
<td>Delayed recovery after the insult is removed</td>
<td>Pre-existing cognitive impairment</td>
</tr>
</tbody>
</table>

(Weinhouse, et al, 2009)
Clinical and physiologic similarities shared by delirium and sleep disruption

**Medications**
- Sedatives, especially γ-aminobutyric acid agonists such as:
  - Benzodiazepines
  - Anticholinergics
  - Sympathomimetics
  - Corticosteroids
  - Anticonvulsants

**Pathophysiology**
- Cholinergic deficiency
- Dopaminergic excess
- Altered metabolism at specific regions of the CNS
  - Prefrontal cortex
  - Posterior parietal cortex

(Weinhouse, et al, 2009)

Sleep and Delirium

Most recent studies strongly indicate the sleep deprivation is a risk factor for or a contributing factor in the development of delirium.

- “sleep deprivation may play an important role in the pathogenesis of delirium by affecting those areas of the CNS associated with delirium. Prevention or treatment of sleep deprivation may be instrumental in preventing or improving ICU delirium.”

(Weinhouse, et al, 2009)
Our Night Routine

2 parts:
1. Sleep promotion strategies
2. Formal Night Routine Orders

How did we get here?

- Google group post
- Literature search
  - Identified common themes
    - poor quality sleep
    - frequent disturbances
  - suggestions for promoting and protecting sleep
  - Still no formal pre-fabricated night routine found
Sleep Promotion Strategies

4 main themes found in the literature

- Patient Comfort Measures
- Coordination of Care
- Noise Reduction
- Light Reduction

Create as comfortable and ‘home-like’ an environment as you can for your patient

Room temperature set to patient preference
- Calm environment and reduce anxiety and discomfort prior to sleep
- Provide pain control as needed and ordered
- As able, use the patient’s preferred sleep position and preferred pillow placements
- Use pillows, blankets and comforters from home
- Consider use of a rotation therapy bed to lengthen intervals between repositions (if no skin integrity concerns)
Coordination of Care

- Coordinate overnight care with multidisciplinary team members and visitors to minimize the number of interruptions overnight.
- Observe as many physiologic parameters you can without disturbing the patient.
- Ensure medication infusion volumes are adequate to cover as much of the night time period as possible.
- Perform non-essential tasks/interventions before or after the night time period (2200-0600).

Noise Reduction

- Provide earplugs for patients to block noxious sounds.
- Keep conversations at low volume outside patient rooms.
- Partially or fully close patient doors (always ensure alarms are audible outside the room).
- Reduce ring volume on call bell and phone systems overnight.
- White noise machines for patient rooms.

Create as calm and quiet a sleep environment as possible for the patient.
Light Reduction

- Use eye masks for patients to wear
- Face backlit equipment away from the patient and place displays in ‘night mode’ (always ensure display screens remain visible from outside the room)
- Use curtains and blinds to shield the patient from lights outside the room (ensure the patient is visible from outside the room)
- Dim hallway lighting

Similar to noise reduction - create as calm and comfortable a sleep environment as possible

Night Routine Orders

For patients that fit the criteria below, physicians can enter orders into SCM for a more formal night routine.

In future...electronic order set for night routine

Factors to consider in determining a patient’s appropriateness for a structured Night Routine:
- Hemodynamic stability and meeting goals, resolution of their disease process, airway protection and secretion management, readiness for transfer from critical care, bed mobility, skin condition, patient’s ability to use a call bell.

Night Routine Orders (2200-0600)

- The orders below deviate from standard critical care monitoring and documentation guidelines.
- Orders must be entered into SCM. If patient condition deteriorates, perform more frequent assessments and interventions as required with subsequent reassessment of Night Routine orders.
- Vital Signs (HR, BP, Resp rate, O2 sat, temp) q12h q8h q4h Other
- Physical Assessment (including RASS and GCS) q12h q8h q4h Other
- Intake and Output q12h q8h q4h Other
- 
- HS sedation ordered
- Active weaning from ventilator completed by 2200 hrs
- Administer respiratory mode only if awake
- Patient awaiting transfer from critical care (cardiac monitor off, VS qid, physical assessment q shift)
Changing Unit Practices

- Viewing our unit practices and routines through a new lens. Areas for improvement:
  - Equipment needs
    - Work station lighting
    - White noise machines
    - O2 tank exchange – time changed
  - Encouraging dialogue on rounds
    - Appropriateness for formal night routine orders
    - Challenging the status quo – recognizing sleep as a priority
- What the other ICU’s have found:
  - Housekeeping cleaning rooms at 0400

Implementation

- Baseline data collection tool
- Staff education
- Bedside references
- Contest

Summer of Sleep!
Next Steps

- Re-audit

- Electronic Delirium order set
  - Incorporate all delirium strategies in one place
  - in the queue!

- We see this as the beginning of a culture change – small steps!

Acknowledgements

Many individuals have contributed time to developing, implementing and supporting our Delirium prevention and management strategies.

RGH and Calgary Zone Delirium QI committee members
RN champions: Rachel Lessoway, Danielle Obbema, Christy Demeter,
Nurse Clinicians
Physiotherapy and Occupational Therapy
Respiratory Therapists

icudelirium.org

Thank you!!
Additional Information

We would be happy to share electronic versions of any or all of our delirium strategies

Contact any one of us to arrange
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Reference list available upon request as well

References


References continued


Questions?