

# 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

(Vanderbilt 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**

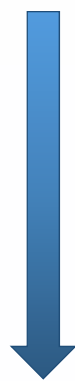
- SAT & SBT

- Bullet Rounds
- Night Routine

# Physiology of Sleep



Stages of Sleep	
Non-REM Sleep	REM Sleep
<b>Stage 1</b> <ul style="list-style-type: none"> <li>• Occurs @ sleep onset</li> <li>• 10-20% of sleep time is spent here</li> </ul>	<ul style="list-style-type: none"> <li>• 20% of sleep time</li> <li>• Episodic Bursts of Eye Movement</li> <li>• Irregular RR and HR</li> <li>• Paralysis of major muscle groups (exceptions -- diaphragm &amp; upper respiratory muscles)</li> </ul>
<b>Stage 2</b> <ul style="list-style-type: none"> <li>• 50% of sleeping time is normally spent here</li> <li>• EEG: Spindles &amp; K Complexes, slowing with increase in amplitude complexes</li> </ul>	
<b>Stage 3</b> <ul style="list-style-type: none"> <li>• Known as deep sleep or slow wave sleep</li> <li>• ~10-20% of normal sleep time</li> <li>• Stable respiratory control</li> <li>• Balanced sympathetic-parasympathetic stimulus</li> <li>• EEG: slow wave exceeds 20% of time, low frequency high altitude delta waves.</li> </ul>	



(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*

Sleep Alterations in the Critically Ill	
Non-REM Sleep	REM Sleep
<b>Stage 1</b> <ul style="list-style-type: none"> <li>• Usually occurs @ sleep onset</li> <li>• Critically ill population: 40-60% of time spent here</li> </ul>	<ul style="list-style-type: none"> <li>• ~10% of sleep time</li> </ul>
<b>Stage 2</b> <ul style="list-style-type: none"> <li>• ~40-60% of sleep time spent here</li> </ul>	
<b>Stage 3</b> <ul style="list-style-type: none"> <li>• ~10% of sleep time</li> </ul>	

(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



### Clinical features

- Inattention
- Fluctuating mental status
- Impaired cognition, specifically those relating to executive function
- (memory, planning, creative thinking, judgment)
- Delayed recovery after the insult is removed

### Risk factors

- Intensive care unit admission
- Mechanical ventilation
- Pain
- Stress
- Pre-existing cognitive impairment
- Advanced age
- Alcoholism
- Depression
- Sepsis
- Head trauma

(Weinhouse, et al, 2009)

## Clinical and physiologic similarities shared by delirium and sleep disruption



### Medications

- Sedatives, especially  $\gamma$ -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)

### Sleep Promotion Strategies

Department of Critical Care Medicine Calgary Zone  
Revised December 3, 2013

**Ultimate Goal**  
 Balance acute needs and safety of the patient while promoting quality sleep and rest overnight

Strategies to support quality sleep

Patient Comfort Measures

Room temperature set to patient preference

Calm environment and reduce activity 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

Light Reduction

Eye masks for patients to wear

Face mask/ equipment away from the patient and pose displays in "night mode" (always ensure display screens remain visible from outside the room)

Use curtains and blinds to shield the patient from light outside the room (ensure the patient is visible from outside the room)

Dim hallway lighting

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 meds only if awake  
 Patient awaiting transfer from critical care (cardiac monitor off, VS qid, physical assessment q shift)


## 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

# Sleep Promotion Strategies



- 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)

Patient Comfort Measures

**Create as comfortable and 'home-like' an environment as you can for your patient**



# 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)

Coordination of Care

**Coordinating and organizing overnight care to minimize interruptions to the patient between 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

Noise Reduction

**Create as calm and quiet a sleep environment as possible for the patient**

# Light Reduction



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

Light Reduction

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

# Night Routine Orders



**For patient's 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 meds only if awake
  - Patient awaiting transfer from critical care (cardiac monitor off, VS qid, physical assessment q shift)

## Changing Unit Practices



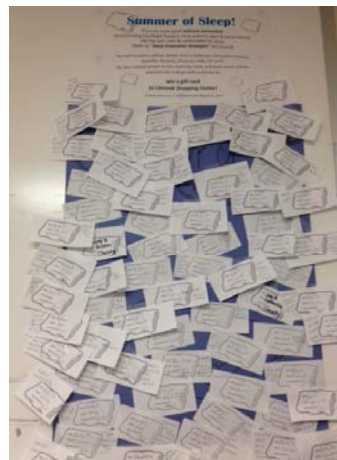
- Viewing our unit practices and routines through a new lens. Areas for improvement:
  - Equipment needs
    - Work station lighting
    - White noise machines
    - O2 tank exchange – time changed
  - Encouraging dialogue on rounds
    - Appropriateness for formal night routine orders
    - Challenging 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](http://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

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## Questions?

