Delirium: Recognition and Management

CCCF 2017 - October 3rd, 2017
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Disclosures

• I have received unrestricted educational grants related to quality improvement activities in delirium screening
  – Hospira
  – Snell Medical
Objectives

• **What** ICU Delirium actually is
• **Why** and **How** we should look for it
• Some ideas on management

... at the completion of this presentation you will **not** have a ‘magic bullet’ for preventing or treating delirium...
Consciousness

• Arousal
  – *Level* of consciousness
  – Requires reticular activating system / thalamic projections

• Awareness
  – *Content* of consciousness
  – Requires functional integrity of cerebral cortex and subcortical connections
**Delirium**

- DSM-IV lists four domains of delirium:
  - disturbance of consciousness
  - change in cognition
  - development over a short period
  - fluctuation

- **Inattention** is the cardinal sign
ICU Delirium: Epidemiology

- 20 - 80% of ICU patients develop delirium at any point
- Subtypes: Hyperactive 1%
  Hypoactive 44%
  Mixed 55%
- Onset: ICU Day 2 (+/- 2)
- Duration: 4 (+/- 2) days
- 50% & 10% delirious at ICU & hospital discharge

Peterson et al., JAGS 2006;54:479-484.
ICU Delirium: Worse Outcomes

• Independently associated with 2-3 fold increased risk of death

• Also associated with
  – Increased MV duration (9 vs. 4 days)
  – Increased ICU length of stay (8 vs. 5 days)
  – Increased hospital length of stay (21 vs. 11 days)
  – Higher ICU costs ($22,000 vs. $13,000)

• Estimated national cost $4-$16 billion

Ely EW et al., JAMA 2004;291:1753-1762.
Lin SM et al., Crit Care Med 2004;32:2254-2259.
Milbrandt E et al., Crit Care Med 2004;32:955-962.
ICU Delirium: Mortality

Survival (%)

- Persistently Comatose (n=51)
- Never Delirious (n=41)
- Ever Delirious (n=183)

ICU Delirium: Long-Term Impact

• Duration of delirium was an independent predictor of cognitive impairment.
  – e.g. An increase from 1 day of delirium to 5 days was associated with nearly a 5-point decline in cognitive battery scores

• Duration of delirium associated with disability in ADLs and worse motor-sensory function in the following year

Misak CJ. Am J Respir Crit Care Med 2004.
Brummel N. Crit Care Med. 2014.
Long Term Cognition

- Longer duration of delirium associated with worse cognitive function

Delirium: Structural Correlates

• Structural associations:
  – Loss of brain volume
  – Neuronal atrophy
  – Loss of white matter integrity

• Role of inflammation and neuronal loss

Findings common to Medical, Surgical and Trauma patients
Brain Volume and Delirium

- Association between decrease brain volume and delirium

Brain Volumes and Delirium

• Every 3 days increase in duration of delirium

\[2.4 \text{ cm}^3\] difference in superior frontal lobe

\[1 \text{ cm}^3 = \text{sugar cube}\]
White Matter in ICU Delirium

- Loss of white matter tracts
  - At discharge
  - At 3 months
  - Worse cognitive scores at 12 months

Similar to White Matter Injury in Stroke & TBI

- Loss of white matter tracts associated with cognitive deficits

Gottesman RF. *Lancet Neurology*. 2010
Levin HS et al. *J Neurotrauma*. 2010
Rutgers DR. *AJNR*. 2008
How Do We Diagnose Delirium?

• You must screen:
  – Content of consciousness not easily assessed indirectly
  – Hypoactive delirium is the majority

• You must use a Validated Instrument
  – CAM-ICU
  – Intensive Care Delirium Screening Checklist
CAM-ICU

1. Mental Status Change:
   - acute onset OR fluctuating course over time

and

2. Inattention

and

3. Disorganized Thinking

or

4. Altered Level of Consciousness

DSM-IV
Ely EW et al., Crit Care Med 2001.
1. Does patient have adequate arousal for CAM-ICU?
   - SAS other than 1 or 2
   - SAS 1-2 or NMJ Blockade
   - Unable to Assess (UTA)

2. Acute Change or Fluctuating Mental Status:
   - Acute change from mental status baseline? OR
   - Has the patient’s mental status fluctuated during the past 24 hours?

3. Inattention:
   - Ask: Squeeze my hand when I say the letter ‘A’
   - Read the following sequence of letters:
     S A V E A H A A R T
   - ERRORS: No squeeze with ‘A’ & Squeeze on other letter other than ‘A’
   - If unable to complete —> Letters or Pictures
   - MORE THAN 2 ERRORS

4. Altered Level of Consciousness
   - SAS other than 4

5. Disorganized Thinking:
   1. Will a stone float on water?
   2. Are there fish in the sea?
   3. Does one pound weigh more than two?
   4. Can you use a hammer to pound a nail?
   Or COMMANDS:
      “Hold up this many fingers” (Hold up 2 fingers)
      “Now do the same thing with the other hand” (Do NOT demonstrate)
      OR
      “Add one more finger” (If patient unable to move both arms)
   - >1 Error
   - 0-1 Error
   - CAM-ICU Positive DELIRIUM PRESENT
   - CAM-ICU Negative NO DELIRIUM

Jim Singh 2011. Adapted from E. Weeley, EY, MD, MPH and Vanderbilt University, © 2002
# Intensive Care Delirium Screening Checklist

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Score Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Altered level of consciousness</strong></td>
<td></td>
<td><strong>Arousal</strong></td>
</tr>
<tr>
<td>A: No response, score: none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B: Response to intense and repeated stimulation, score: none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C: Response to mild or moderate stimulation, score: 1</td>
<td></td>
<td></td>
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<tr>
<td>D: Normal wakefulness, score: 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E: Exaggerated response to normal stimulation; score 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inattention</strong></td>
<td>0-1</td>
<td></td>
</tr>
<tr>
<td><strong>Disorientation</strong></td>
<td>0-1</td>
<td></td>
</tr>
<tr>
<td><strong>Hallucination-delusion-psychosis</strong></td>
<td>0-1</td>
<td></td>
</tr>
<tr>
<td><strong>Psychomotor agitation or retardation</strong></td>
<td>0-1</td>
<td></td>
</tr>
<tr>
<td><strong>Inappropriate speech or mood</strong></td>
<td>0-1</td>
<td></td>
</tr>
<tr>
<td><strong>Sleep/wake cycle disturbance</strong></td>
<td>0-1</td>
<td></td>
</tr>
<tr>
<td><strong>Symptom fluctuation</strong></td>
<td>0-1</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td>0-8</td>
<td></td>
</tr>
</tbody>
</table>
What Should I Do When I Find It?

• Trigger for a review / conversation of:
  – Medical Problems / Medications:
    • New diseases (e.g. sepsis)
    • Pain
    • Pharmacology
    • Environment
    • Metabolic derangement
  – Mobility
  – Management Plan
Delirium: Risk Factors

**Acutely Modifiable**
- Depth of sedation
- Pain management
- Environment / Stimulation
- Dehydration
- Infections

**Not Acutely Modifiable**
- Age
- Sensory deprivation
- Sleep deprivation
- Social isolation
- Physical restraint
- Bladder catheter
- Polypharmacy
- Severe illness
- Cognitive impairment
- Malnutrition
- Hypoalbuminemia
Management of Agitation

• Addition of Dexmedetomidine to usual care:
  – Increased VFD
  – Resolution of delirium 1 day sooner
  – Extubated 1 day sooner

Reade et al. JAMA 2016.
Impact of a clinical pharmacist-enforced intensive care unit sedation protocol on duration of mechanical ventilation and hospital stay*

John Marshall, PharmD; Christine A. Finn, PharmD; Arthur C. Theodore, MD

CASE STUDY

Impact of pharmacist management of pain, agitation, and delirium in the intensive care unit through participation in multidisciplinary bundle rounds

↓ ICU LOS
↓ Deliriogenic drugs
↓ Drug administration
↓ Drug costs
Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial

William D Schweickert, Mark C Pohlman, Anne S Pohlman, Celerina Nigos, Amy J Pawlik, Cheryl L Esbrook, Linda Spears, Megan Miller, Mietka Franczyk, Deanna Deprizio, Gregory A Schmidt, Amy Bowman, Rhonda Barr, Kathryn E McCallister, Jesse B Hall, John P Kress

- 104 patients randomized to early exercise and mobilization or mobility as ordered by the care team

- Intervention group
  - Dramatic improvement in functional status at discharge
  - Shorter delirium

One Last Reason Why We Should Care About Delirium...
Take Home Messages

• Delirium in the ICU is important, and may impact our patients long after discharge
• There are many risk factors that might mitigate/reduce delirium
• If you don’t screen for delirium, you will surely miss it!
• Improving the cognitive outcomes of our patients is a team sport
Questions?

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