Implementation of Delirium Monitoring in the PACU

Elizabeth Card, MSN, RN, APRN, FNP-BC, CCRP
Vanderbilt University Medical Center
Delirium is defined as a disturbance of consciousness with inattention accompanied by a change in cognition or perceptual disturbance that develops over a short period of time (hours to days) and fluctuates over time.
Emergence Delirium is also Known As

- agitated emergence
- emergence agitation
- emergence excitement
- post-anesthetic excitement
How Do We Detect Emergence Delirium?

If delirium is not screened for by using a validated delirium screening tool, delirium is missed +/- 75% of the time ¹⁻⁵

Adult tools:
• CAM
• CAM-ICU
• ICDSC

Pediatric tools:
• CAPD
• P-CAM
• PS-CAM
Outcomes from ICU Delirium

- Increased morbidity
- Increased mortality
- Increased LOS
- Long term cognitive impairment

Patient testimonial from ICUdelirium.org

“(I) consider myself all well except that I can’t remember to take my medications.”
Recognizing an Opportunity

- Is emergence delirium the same as ICU delirium?
- Dearth of literature on emergence delirium
- Discussions with key stakeholders (nurse managers, charge nurses, anesthesia)
- Delirium detection tool selected
CAM-ICU Two-step Process

**Step 1**
Assess consciousness

**Step 2**
Assess cognition

---

### CAM-ICU Two-step Process

<table>
<thead>
<tr>
<th>Score</th>
<th>Classification</th>
<th>(RASS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Combative</td>
<td>Overly combative or violent, immediate danger to staff</td>
</tr>
<tr>
<td>3</td>
<td>Very agitated</td>
<td>Pulls on or removes tube(s) or catheter(s) or has aggressive behavior toward staff</td>
</tr>
<tr>
<td>2</td>
<td>Agitated</td>
<td>Frequent nonpurposeful movement or patient–ventilator dyssynchrony</td>
</tr>
<tr>
<td>1</td>
<td>Restless</td>
<td>Anxious or apprehensive but movements not aggressive or vigorous</td>
</tr>
<tr>
<td>0</td>
<td>Alert and calm</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td>Drowsy</td>
<td>Not fully alert, but has sustained (more than 10 seconds) awakening, with eye contact, to voice</td>
</tr>
<tr>
<td>-2</td>
<td>Light sedation</td>
<td>Briefly (less than 10 seconds) awakens with eye contact to voice</td>
</tr>
<tr>
<td>-3</td>
<td>Moderate sedation</td>
<td>Any movement (but no eye contact) to voice</td>
</tr>
<tr>
<td>-4</td>
<td>Deep sedation</td>
<td>No response to voice, but any movement to physical stimulation</td>
</tr>
<tr>
<td>-5</td>
<td>Un arousable</td>
<td>No response to voice or physical stimulation</td>
</tr>
</tbody>
</table>

---

### Confusion Assessment Method for the PACU

**Step 2 Delirium Assessment**

1. **Acute Change or Fluctuating Course of Mental Status:**
   - This is always ‘yes’ when patient has had general anesthesia.
   - **YES**

2. **Inattention:**
   - “Squeeze my hand when I say the letter ‘A’.”
   - Read the following sequence of letters: SAVE A H A R T
   - 0 - 2 Errors: Stop
   - CAM-ICU Negative
   - 3+ Errors: CAM-ICU Positive

3. **Altered Level of Consciousness:**
   - Current RASS level
   - **RASS = zero**
   - RASS other than zero: Stop
   - Patient is Delirious CAM-ICU Positive

4. **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?
   - Ask patient to:
     - “Hold up this many fingers” (hold up 2 fingers)
     - “Now do the same thing with the other hand” (do not demonstrate)
   - 0 - 1 Errors: Stop
   - CAM-ICU Negative
   - 2 Errors: Stop
   - Patient is Delirious CAM-ICU Positive
Where was the Baseline Nurses’ Knowledge?

Have you ever taken care of a patient in the PACU with emergence delirium or confusion?

<table>
<thead>
<tr>
<th>Total Count (N)</th>
<th>Missing</th>
<th>Unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>0 (0.0%)</td>
<td>2</td>
</tr>
</tbody>
</table>

Counts/frequency: Yes (44, 95.7%), No (2, 4.3%)
Nurses’ Perception of Presentation

I think most delirious patients are hyperactive.

Counts/frequency: Strongly Agree (6, 13.0%), Agree (20, 43.5%), Disagree (18, 39.1%), Strongly Disagree (2, 4.3%)

I think patients who experience delirium have longer stays in the PACU than those patients who wake up less confused.

Counts/frequency: Strongly Agree (23, 50.0%), Agree (20, 43.5%), Disagree (3, 6.5%), Strongly Disagree (0, 0.0%)
Nurses’ Interest in Delirium Monitoring

**I think having the ability as a bedside caregiver to diagnose delirium would be useful.**

<table>
<thead>
<tr>
<th>Total Count (N)</th>
<th>Missing</th>
<th>Unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>0 (0.0%)</td>
<td>3</td>
</tr>
</tbody>
</table>

Counts/frequency: Strongly Agree (18, 39.1%), Agree (25, 54.3%), Disagree (3, 6.5%), Strongly Disagree (0, 0.0%)

**I think the CAM-ICU provides the patient’s health care team with useful information.**

<table>
<thead>
<tr>
<th>Total Count (N)</th>
<th>Missing</th>
<th>Unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>1 (2.2%)</td>
<td>4</td>
</tr>
</tbody>
</table>

Counts/frequency: Strongly Agree (0, 0.0%), Agree (30, 66.7%), Disagree (5, 11.1%), Strongly Disagree (1, 2.2%)
A HUGE Undertaking

• Research protocol developed
• Recruited staff nurses as nurse research investigators
• CITI training and Good Clinical Practice completed
• Training on CAM-ICU with inter-rater reliability agreement 100%
Interesting Ideas Generate Excitement

• Generated multidisciplinary discussions
• Electronic charting added CAM-ICU
• Nurse champions volunteered; more nurses wanted to assess for delirium!
BIG Question Needed Answering First

IF to d/c home, then what??

Chart 1. The ‘modified’ Aldrete Scale

<table>
<thead>
<tr>
<th>RESPIRATION</th>
<th>O2 SATURATION</th>
<th>CONSCIOUSNESS</th>
<th>CIRCULATION</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to take deep breath and cough</td>
<td>Maintains &gt; 92% on room air</td>
<td>Fully awake</td>
<td>BP ± 20mmHg pre op</td>
<td>Able to move 4 extremities voluntarily or on command</td>
</tr>
<tr>
<td>Dyspnea/Shallow Breathing</td>
<td>Needs O2 inhalation to maintain O2 saturation &gt; 90%</td>
<td>Arousable on calling</td>
<td>BP ± 20-50mmHg pre op</td>
<td>Able to move 2 extremities voluntarily or on command</td>
</tr>
<tr>
<td>Apnea</td>
<td>Saturation &lt; 90% even with supplemental O2</td>
<td>Not responding</td>
<td>BP ± 50mmHg pre op</td>
<td>Able to move 0 extremities voluntarily or on command</td>
</tr>
</tbody>
</table>
What if the Patient has Delirium??

**DELIRIUM (S)** (remember: delirium usually has more than one cause)

- **D** Drugs, Drugs, Drugs
- **E** Eyes, ears *
- **L** Low 02 states (MI, ARDS, PE, CHF, COPD) **
- **I** Infection
- **R** Retention (of urine or stool), Restraints
- **I** Ictal
- **U** Underhydration/Undernutrition
- **M** Metabolic
- **(S)** Subdural, Sleep deprivation

* Poor vision and hearing are considered more risk factors than true causes, but should be "fixed" or improved if possible. Cerumen is common cause of hearing impairment.

**"Low 02 states" does NOT necessarily mean hypoxia, rather it is a reminder that patients with a hypoxic insult (e.g. MI, stroke, PE) may present with mental status changes with or without other typical symptoms/signs of these diagnoses."
Education on Treatments for Delirium

- No FDA-approved therapies YET
- Identify etiologies
- Risk factors you can modify? (decrease benzodiazepine usage, increase O2 if hypoxemia, re-orient)
- Haldol (2-5 mg IV q6h), atypical antipsychotics
- Dexmedetomidine
- Treat pain
- Early mobilization and/or ROM
Roll Out to All Staff Began

- Unit Board presentations
- EMR addition
- Learning Exchange Module
- Training book created with vignettes for nurses to score
- Incorporated into orientation for new staff
- Added to PACU nurses’ competencies
Feedback from Staff

Assessment

Nursing Diagnosis

Nursing Process

Planning

Implementation

Evaluation
Study Completion

- Enrollment and assessment of 400 general anesthesia patient
- 9 months to enroll

## Emergence Delirium Study
### Patient Demographics

<table>
<thead>
<tr>
<th>Variable*</th>
<th>N = 400</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (yr)</strong></td>
<td>57 (44 – 67)</td>
</tr>
<tr>
<td><strong>Preop + Intraop Midazolam (mg)</strong></td>
<td>2 (0 – 2)</td>
</tr>
<tr>
<td>0 mg</td>
<td>31%</td>
</tr>
<tr>
<td>0.5 – 2 mg</td>
<td>65%</td>
</tr>
<tr>
<td>&gt; 2 mg</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Preop + Intraop + Postop Midazolam (mg)</strong></td>
<td>2 (0 – 2)</td>
</tr>
<tr>
<td>0 mg</td>
<td>31%</td>
</tr>
<tr>
<td>0.5 – 2 mg</td>
<td>63%</td>
</tr>
<tr>
<td>&gt; 2 mg</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Preop + Intraop Fentanyl Equivalents (mcg)</strong></td>
<td>250 (150 – 383)</td>
</tr>
<tr>
<td><strong>Preop + Intraop + Postop Fentanyl Equivalents (mcg)</strong></td>
<td>383 (200 – 554)</td>
</tr>
<tr>
<td><strong>Anesthetic Duration (min)</strong></td>
<td>140 (87 – 207)</td>
</tr>
<tr>
<td><strong>Inhalation Agent (N)</strong></td>
<td>398 (97%)</td>
</tr>
<tr>
<td>- Sevoflurane</td>
<td>53%</td>
</tr>
<tr>
<td>- Desflurane</td>
<td>35%</td>
</tr>
<tr>
<td>- Isoflurane</td>
<td>12%</td>
</tr>
<tr>
<td><strong>ASA Classification</strong></td>
<td>3 (2 – 3)</td>
</tr>
<tr>
<td>- 1</td>
<td>4%</td>
</tr>
<tr>
<td>- 2</td>
<td>44%</td>
</tr>
<tr>
<td>- 3</td>
<td>49%</td>
</tr>
<tr>
<td>- 4</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Emergent Delirium n (%)</strong></td>
<td>154 (38%)</td>
</tr>
<tr>
<td>- Agitated emergence per OR staff</td>
<td>75 (19%)</td>
</tr>
<tr>
<td>- Positive CAM-ICU on PACU admission</td>
<td>124 (33%)</td>
</tr>
<tr>
<td><strong>PACU Delirium n (%)</strong></td>
<td>67 (17%)</td>
</tr>
<tr>
<td>- Positive CAM-ICU at 30 min</td>
<td>59 (15%)</td>
</tr>
<tr>
<td>- Positive CAM-ICU at 60 min</td>
<td>32 (8%)</td>
</tr>
<tr>
<td>- Positive CAM-ICU at Discharge</td>
<td>15 (5%)</td>
</tr>
</tbody>
</table>
Risk Factors

Emergence Delirium

<table>
<thead>
<tr>
<th>Variable</th>
<th>N = 154</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>Preop + Intraop Benzo</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Preop + Intraop Opioid</td>
<td>0.32</td>
<td></td>
</tr>
<tr>
<td>Anesthetic Duration</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Inhalation Agent</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>ASA Classification</td>
<td>0.81</td>
<td></td>
</tr>
</tbody>
</table>

Probability of Emergence Delirium by Anesthetic Duration

PACU Delirium

Probability of PACU Delirium by Total Perioperative Opioids

<table>
<thead>
<tr>
<th>Variable</th>
<th>N = 67</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Preop + Intraop + Postop Benzo</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Preop + Intraop + Postop Opioid*</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td>ASA Classification</td>
<td>0.21</td>
<td></td>
</tr>
</tbody>
</table>

*Nonlinear
Without Excitement Difficult to Sustain 100%

• Research study completion

• Nurse investigators promoted and/or transferred to other departments

• Delirium monitoring continues, but not by all the nurses all of the time

“The world hates change, yet it is the only thing that has brought progress.” – Charles Kettering
Lessons

• Continued interest to sustain 100% compliance

• Education and chart audits

“There are no mistakes or failures, only lessons.”

– Denis Waitley
References

Elizabeth Card, MSN, APRN, FNP-BC, CPAN, CCRP
Nursing Research Consultant
Vanderbilt University Medical Center
Department of Nursing Research
1161 Medical Center Drive S-2411 MCN
Nashville, TN 37232-2424 USA
Office: 615-875-4611
elizabeth.b.card@vanderbilt.edu