Delirium

Robert McIntyre, Jr., MD
ICU Delirium = Canary in the Coal Mine

- Underrecognized form of organ dysfunction
- 40-60% nonventilated patients
- 60-80% of ventilated patients
- 3-fold increase in mortality at 6 months
- Each day of delirium = 10% increase in mortality
Patient Perspective

Lack of sleep

Pain

Confusion

Difficulty breathing

Anxiety

Remembered: 83% - not able to speak, 68% - pain, 68% - anxiety, 45% - choking, 34% - difficulty sleeping, 32% - difficulty breathing

Delirium: Snapshot (1)

- 40-60% nonvent & 60-80% of ventilated patients
- MODS = ALI + AKI +...ABI
- ABI = Acute Brain Injury = Organ Dysfunction
- Hypoactive Delirium 95%, Hyperactive 5%
- Hypoactive Delirium invisible and missed in 75%
- Most common organ dysfunction, > half ICU days

Spronk P, ICM 2009
Schweickert W, Lancet 2009
Vasilevskis E, Chest 2010
Devlin J, CCM 2010
Delirium: Snapshot (2)

• Predicts 3-fold increase death; 10% per day rise
• Predicts longer ICU and hospital LOS, higher cost of care, disposition other than home
• Acquired dementia-like long-term disability
• CIBI (Critical Illness-associated Brain Injury)
• Not TBI but CIBI

Pisani M, CCM 2010
Shehabi Y, CCM 2010
Salluh J, Crit Care 2010
Girard T, CCM 2010
Vasilevskis E, CCM 2010
ICU Delirium Leads to Long Term Functional Decline

1. N=2,929 patients >65 followed 6 years without dementia at baseline
2. Never hospitalized Dementia defined as risk=1
3. Hospitalization independently associated with HR 1.4 and ICU with HR of 2.3 for Dementia

Ehlenbach W JAMA 2010
Sepsis Triples Rate of Cognitive Impairment at 3 Years

Iwashyna T, JAMA 2010;304:1787-1794
Length of Delirium Increases Risk of Cognitive Impairment

Delirium and Long-Term Cognitive Outcomes

Cognitive Function at 12 months (predicted mean T-score)

Days of ICU Delirium

Girard T, CCM 2010; 38:1513–1520
Delirium as a Predictor of Mortality in Mechanically Ventilated Patients in the Intensive Care Unit

Ely EW, JAMA 2004;291:1753-62
10% per Day

- After adjusting for covariates, each day spent in delirium was associated with **10% increased risk of death** at 6 mo (HR, 1.10) and at 1 yr (HR, 1.10).
- Delirium was independently associated with a longer hospital stay (HR 20.), fewer median days alive and without mechanical ventilation (19 vs 24), and higher incidence of cognitive impairment at hospital discharge (HR, 9.1).

2. Pisani M, AJRCCM 2009;180:1092-7
Dose-Response Delirium and Mortality

Delirium Duration & Mortality

$p < .001$

Shehabi Y, et al. CCM 2010; 38:2311–2318
Wake up and Breath Literature


SBT
SAT
Remove (A+B)
Remove Sedation
Sedation choice
Sedation choice
Early Mobility

Changing Intensive Care to Improve Life Afterward

By Laura Landro

Hospitals are changing how they care for their sickest patients. Intensive-care units have long kept critically ill patients immobilized, heavily sedated and on a breathing machine. The aim is to keep them free of pain, anxiety and agitation as they heal and undergo invasive procedures and monitoring.

But there is growing evidence that such care can increase patients’ risk for other problems after they leave the hospital and in years to come.

Studies show that prolonged heavy sedation, for example, can trigger or exacerbate delirium, a temporary state of acute brain injury that has been linked to higher rates of death and dementia. Patients immobilized in the ICU quickly lose muscle and bone strength and become frail, which can significantly slow the pace and degree of recovery. A year after being discharged, as many as half of ICU patients are unable to return to work.

**ABCDE’s for the ICU**

Some long-standing practices in intensive-care units can raise the risk of mental and physical impairment down the road. Here are some steps to ask medical staff if they are taking when a loved one is in intensive care.

**ACTION**

**Consequence**

**Awakening**

Patients should be woken from sedation at regular intervals.

**Breathing**

Patients should be assessed daily for their ability to breathe without a mechanical ventilator.

**Choice of Sedation**

Use milder sedative drugs if feasible.

**Delirium Monitoring and Management**

Hospital staff should evaluate patients for delirium routinely, such as by asking them to identify objects in photographs, and should modify treatment accordingly.

**Early Mobility**

Conscious patients should be gotten up and moving and started on physical therapy.

**Consequence**

Awakening

Prolonged sedation can result in delirium, or severe confusion, which in turn is associated with long-term cognitive impairment.

Breathing

The use of a ventilator for long periods can boost the risk of pneumonia and lead to longer hospital stays.

**Choice of Sedation**

Commonly used drugs, like benzodiazepines, may contribute to brain injury.

Delirium Monitoring and Management

Patients with delirium run a greater risk of infections, adverse effects of medications and excessive sedation.

Early Mobility

Lack of movement contributes to muscle atrophy, bone loss, blood clots and skin ulcers.

is reviewing the protocols as part of the professional organization’s ongoing development of guidelines for patient care in ICUs.

Since ICU patients generally can’t monitor their treatment, it’s important for friends and family to make sure the critically ill are getting the most attentive care. Vanderbilt provides information on the new protocols and assessment tools used to diagnose delirium and test for pain and sedation at www.ICUdelirium.org.

“The whole purpose of an ICU visit is to get well enough to get back to your life,” says Barbara Kambolz, a psychiatrist with Duke University and the Veterans Administration Medical Center in Durham, N.C. “If we are disabling people in the process it isn’t consistent with the goal of recovery,” she says.

About five million U.S. adults spend at least a day in an ICU each year. They are admitted for heart failure, recovery from major surgery, severe infections such as sepsis and pneumonia and a host of other reasons. Between 80% and 90% of patients are treated outside of ICU settings.
The **ABCD**E Bundle

- Awakening
- Breathing
- Coordination, Choice
- Delirium monitoring/management
- Early mobility and Exercise

**Wake up and Breaths has become**

**Wake up and Walk**

Vasilevskis E, Chest 2010;138;1224-33
Vasilevskis E, CCM 2010;38:S683-91
Efficacy and safety of a paired sedation and ventilator weaning protocol for mechanically ventilated patients in intensive care (Awakening and Breathing Controlled trial): a randomised controlled trial

SAT = Spontaneous Awakening Trial: Benzos cut in half
Opiates only cut if pain was controlled
ICU Length of Stay

reduced ICU stay by = 4 days

SAT+SBT (n=167)

SBT (n=168)

\[ p = 0.01 \]

One-Year Survival

ARR 14%
NNT=7

Patients Alive (%)

SAT+SBT (n=167)
Usual Care+SBT (n=168)

$\ p=0.01$

Days

SATs (Daily Interruption) Used in Minority Around World

- **Canada** – 40% get SATs (273 physicians in 2005)
- **U.S.** – 40% get SATs (2004-05)
- **Germany** – 34% get SATs (214 ICUs in 2006)
- **Brazil** – 32% get SATs (1,015 MDs in 2008)
- **UK** – 28% get SATs, 82% use midazolam
- **France** – 10% get sedation intermittently (44 ICUs in 2005)

Mehta S, CCM 2006;34:374-80.
Devlin J, CCM 2006;34:556-57.
Payen JF, Anesthes 2007;106:687-95.
Ramaswamy S, Intens Care Med (ESICM 2009)
Salluh J, Brazil, J Crit Care 2009
The **ABCD Bundle**

- Awakening
- Breathing
- Coordination, **Choice**
- Delirium monitoring/management
- Early mobility and Exercise

Vasilevskis E, Chest 2010;138;1224-33
Vasilevskis E, CCM 2010;38:S683-91
PAD Guidelines

- Pain
- Agitation/Sedation
- Delirium
Drug Choice

• 25 RCT
  – Benzodiazepine vs any other
  – Benzodiazepine was never better than other when used for > 24 hours
Worldwide Sedation Practices

- GABA-ergics have been most widely used sedative agents for 20 years
  - Propofol #1 sedative infusion in U.S.
  - Benzodiazepines most common sedatives worldwide
- “Less is more” data support trends in use of algo-sedation or dexmedetomidine

Wunsch H, CCM 2010;37:3031-37
Patel R, CCM 2009;37:825-32
Salluh J, Crit Care 2010;14:R210
Kress JP, NEJM 2000
Girard T, Lancet 2007
Strom T, Lancet 2010
Treggiari M, CCM 2009
Benzodiazepines and Delirium: Medical ICU

Delirium Risk

OR 1.2 (1.1-1.4), P=0.003

Lorazepam Dose (mg)

Benzodiazepines and Delirium: Surg/Trauma ICU

Pandharipande et al., J Trauma. 2008:65;34-41
Benzodiazepine and Delirium: Burn ICU

Benzodiazepines

Odds of delirium

Benzodiazepines in previous 24 hours (midazolam equivalents)

Opiates

Odds of delirium

Opiates in previous 24 hours (fentanyl equivalents)

Pandharipande et al., J Burn Research 2010
Two Step Approach to Assessing Consciousness

• **Step 1: Arousal (Sedation Assessment)**
  – Ramsay
  – SAS
  – RASS

• **Step 2: Content (Delirium Assessment)**
  – Intensive Care Delirium Checklist
  – CAM-ICU
Richmond Agitation-Sedation Scale (RASS)

+4  Combative
+3  Very agitated
+2  Agitated
+1  Restless

0  Alert /calm
-1  Drowsy: eye contact >10 sec
-2  Light sedation: eye contact <10 sec
-3  Moderate: no eye contact
-4  Deep: physical stimulation required
-5  Unarousable: no response to physical

Verbal Stimulus
Physical Stimulus

Sessler CN, et al. AJRCCM 2002; 166:1338-1344
Ely et al, AJRCCM 2001;163:A954
Confusion Assessment Method for the ICU (CAM-ICU) Flowsheet

1. Acute Change or Fluctuating Course of Mental Status:
   - Is there an acute change from mental status baseline?  OR
   - Has the patient’s mental status fluctuated during the past 24 hours?
   - YES

2. Inattention:
   - “Squeeze my hand when I say the letter ‘A’.”
     Read the following sequence of letters: S A V E A H A R T
     ERRORS: No squeeze with ‘A’ & Squeeze on letter other than ‘A’
   - If unable to complete Letters → Pictures
   - 0 - 2 Errors

3. Altered Level of Consciousness
   Current RASS level
   - RASS = zero
   -ль

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?
   Command: “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)

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The Brain Road Map
Screening/Presenting on Rounds - 4 items in 10 seconds

1. Target RASS  (where going?)
2. Actual RASS   (where now?)
3. CAM-ICU      (where now?)
4. Drugs        (how got here?)
## Mobilization = Less Delirium

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention (n=49)</th>
<th>Control (n=55)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU/Hosp Delirium Days</td>
<td>2 days</td>
<td>4 days</td>
<td>0.03</td>
</tr>
<tr>
<td>Time in ICU with Delirium</td>
<td>33%</td>
<td>57%</td>
<td>0.02</td>
</tr>
<tr>
<td>Time in Hosp. with Delirium</td>
<td>28%</td>
<td>41%</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*Schweickert et al, Lancet 2009;373:1874-82*
Milestones Achieved Safely ~3 days earlier (p<0.001)

1. Standing
2. Marching
3. Walking
4. Transferring
What to do about Delirium?

- Nonpharmacologic management
- Pharmacological management
- Remove things (restraints, sleep deprivation, and drugs)
- THINK mnemonic
THINK

- Toxic situations
  - Shock, CHF, new organ failure,
- Hypoxemia
- Haloperidol / atypical antipsychotics
- Infection / sepsis
- Immobilization
- Nonpharmacologic interventions
- K⁺ or electrolyte problems
Dr. DRE

- Disease
- Drug Removal
- And Environment
Randomized ICU Trials Do Not Demonstrate an Association Between Interventions That Reduce Delirium Duration and Short-Term Mortality

- 17 studies
  - pharmacologic intervention \([n=13]\)
    - dexmedetomidine \([n = 6]\),
    - an antipsychotic \([n = 4]\),
    - rivastigmine \([n = 2]\),
    - clonidine \([n = 1]\)),
  - a multimodal intervention \((n = 2)\)
    - (spontaneous awakening \([n = 2]\)),
  - a nonpharmacologic intervention \((n = 2)\)
    - early mobilization \([n = 1]\]
    - increased perfusion \([n = 1]\))

Crit Care Med 2014
Randomized ICU Trials Do Not Demonstrate an Association Between Interventions That Reduce Delirium Duration and Short-Term Mortality

• 17 studies
  – pharmacologic intervention (n=13)
    • dexmedetomidine [n = 6],
    • an antipsychotic [n = 4],
    • rivastigmine [n = 2],
    • clonidine [n = 1]),
  – a multimodal intervention (n = 2)
    • spontaneous awakening [n = 2]
  – a nonpharmacologic intervention (n = 2)
    • early mobilization [n = 1]
    • increased perfusion [n = 1])

Crit Care Med 2014
Delirium duration was reduced in the intervention groups
Short-term mortality rate was similar. Mortality: intervention 15.6% and control 16.5%.