

**Occupational Therapy in the ICU:  
Complex Populations**

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December 6, 2023



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**Agenda**



1. Review the ABCDEF bundle
2. Discussion on Delirium (prevalence, challenges, and recommendations)
3. The role of OT with Delirium
4. Discussion on Disorders of Consciousness (prevalence, challenges, and recommendations)
5. The role of OT with Disorders of Consciousness

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**Early ICU Rehab: Benefits**



**Benefits:**

- Reduced risk of ICU-acquired weakness, delirium, PICS
- Shorter LOS (\$\$ savings)
- Improved functional outcomes, walking distance at discharge
- Relatively *low frequency* of potential safety events:
  - Fall (0.07%)
  - Endotracheal tube removal (0.01%)
  - Intravascular catheter event (0.2%)
  - Other catheter or tube removal (0.09%)
  - Cardiac arrest (0.03%)
  - Hemodynamic changes (0.7%)
  - Desaturation (0.5%)

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### ABCDEF (A2F) Bundle- Approach to Care

- A well-studied, inter-professional approach to managing the symptoms of critical illness
  - Reduces ventilator days, reduces LOS, improves outcomes, less delirium

ABCDEF multi-intervention approach					
A	B	C	D	E	F
Assessment, prevention, and management of pain	Both spontaneous awakening trials and spontaneous breathing trials	Choice of sedation and analgesia	Delirium assessment, prevention, and management	Early mobility and exercise	Family engagement and empowerment

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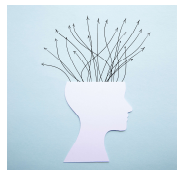
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### Delirium




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### Delirium



#### What is it?

- A change in **attention** and **awareness**
- Develops over a short period of time (hours-days)
- A **direct physiological consequence** of another medical condition, substance intoxication/withdrawal, or due to multiple etiologies (not related to a preexisting condition)

#### Prevalence:

- **80%** of ICU patients (undiagnosed 72% of the time)

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**Have you ever overheard the following?**

- "He/she is crazy"*
- "He/she is just sundowning"*
- "He/she is old, of course he/she is a little confused"*
- "It's probably just a little Dementia"*
- "I think he/she is just depressed"*
- "He/she had a major surgery, wouldn't you be confused?"*

**These should be flags for further assessment!**

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**What delirium feels like for our patients...**

- "It's like rusty gears in my head struggling to work"*
- "My head feels so foggy"*
- "It's like my mind doesn't fit into my brain anymore, it's slightly off, like right before milk is about to go bad"*
- "I thought I just had a lung disease. Why am I crying? Why can't I think straight for more than 5 minutes?"*

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### Delirium



**Current Challenges:**

- Underdiagnosed and easily overlooked (“I wouldn’t know the answer to those questions if you asked me”)
- Increased LOS, healthcare costs (**\$164 billion/year**)
- Increased risk of dementia and cognitive decline, functional decline, anxiety, depression, falls, death...

**Recommendations:**

- Routine, protocolized delirium screening using validated tools
- Delirium can occur at any time during critical illness
  - ICU patients should be monitored **every shift, every day**

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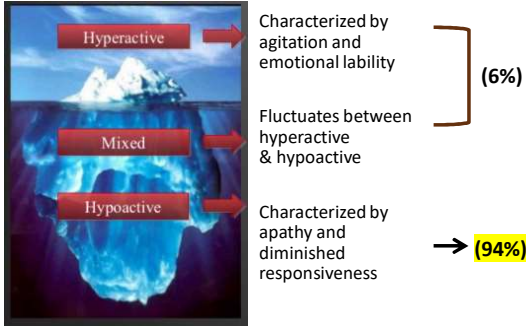
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### Types of Delirium in the ICU



Hyperactive → Characterized by agitation and emotional lability (6%)

Mixed → Fluctuates between hyperactive & hypoactive

Hypoactive → Characterized by apathy and diminished responsiveness (94%)

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### Assessment of Delirium



**Step 1: Know your "at-risk populations"**

- Age ≥ 65 years, ICU admission, hx delirium, hx of dementia, s/p surgical intervention, limited mobility, sleep deprived

**Step 2: SCREEN!**

- Utilize evidence-based, standardized assessment tools during your sessions (e.g., CAM, CAM-ICU, ICDSC)
- Good Practice Statement: *Critically ill adults should be regularly assessed for delirium using a valid tool, every 8-12 hours*

**Step 3: Document**

**Step 4: Communicate**

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### Richmond Agitation and Sedation Scale (RASS)

Richmond Agitation & Sedation Scale		
Score	Description	
+4	Combative	Violent, immediate danger to staff
+3	Very agitated	Pulls at or removes tubes, aggressive
+2	Agitated	Frequent non-purposeful movements, fights ventilator
+1	Restless	Anxious, apprehensive but movements not aggressive or vigorous
0	Alert & calm	
-1	Drowsy	Not fully alert, sustain awakening to voice (eye opening & contact > 10 secs)
-2	Light sedation	Briefly awakens to voice (eye opening & contact < 10 secs)
-3	Moderate sedation	Movement or eye-opening to voice (no eye contact)
-4	Deep sedation	No response to voice, but movement or eye opening to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

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### Confusion Assessment Method (CAM)

Feature		
✓	(1) Acute Onset	(A) Is there evidence of acute change in mental status from patient's baseline? -OR- (B) Did the (abnormal) behavior tend to fluctuate during the day?
✓	(2) Inattention	Did the patient have difficulty focusing attention (e.g., being easily distractible or having difficulty keeping track of what was said)?
✓	(3) Disorganized Thinking	Was the patient's thinking disorganized or incoherent (e.g., rambling, irrelevant, unclear or illogical flow of ideas, or unpredictable switching from subject to subject)?
	(4) Altered Level of Consciousness	Overall, how would you rate this patient's level of consciousness?

Both Features 1 and 2 and either Feature 3 or 4 are present  
**Delirious**

Otherwise  
**Not Delirious**

Download from <https://americandeliriumsociety.org/>

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### Confusion Assessment Method- ICU (CAM-ICU)

Feature		
✓	(1) Acute Onset	(A) Acute change from mental status baseline? OR (B) Has the patient's mental status fluctuated during the last 24 hours?
✓	(2) Inattention	"Squeeze my hand when I say the letter A" S A V E A H A A R T (positive if >2 errors)
✓	(3) Altered Level of Consciousness	Score current RASS level (positive if not 0)
✓	(4) Disorganized Thinking	1. Will a stone float on water? 2. Are there fish in the sea? 3. Does 1 lb. weigh more than 2? 4. Can you use a hammer to pound a nail?  Command: "Hold up this many fingers" (show 2) "Now do the same thing with the other hand" (don't show) OR "Add one more finger"

Download from <https://www.icudelirium.org/>

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Both Features 1 and 2 and either Feature 3 or 4 are present

**Delirious**

Otherwise

**Not Delirious**

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**1** **Acute change or fluctuating course of mental status**  Check box if answer to either question is YES

Is the patient different than his/her baseline mental status?

or

Has the patient had any fluctuation in mental status in the past 24 hours as evidenced by fluctuation on a sedation/level of consciousness scale (i.e., RASS, SAS, or GCS) or previous delirium assessment?

**X** If no to both, stop Patient is not delirious

**Tips:**

- Determine pre-hospital mental status and use clinical reasoning
- Sedation counts! Decreased arousal is a change from usual mental status
- If the patient need eyeglasses or hearing aids, put them on!

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**2** **Inattention**  Check box if >2 errors

**Letters Attention Test** (See training manual for alternate Pictures)

**Directions:** Say to the patient, "I am going to read you a series of 10 letters. Whenever you hear the letter 'A', indicate by squeezing my hand." Read letters from the following letter list in a normal tone 3 seconds apart.

**SAVEHHAART or CASABLANCA or ABADBADAAY**

Errors are counted when patient fails to squeeze on the letter "A" and when the patient squeezes on any letter other than "A."

- If the patient squeezes on all letters, consider all incorrect (i.e. 10 errors)
- If the patient does not squeeze on any letters, consider all incorrect (i.e. 10 errors)

**X** If 0-2 errors, stop Patient is not delirious

**Tips:**

- All attentive patients are alert, but not all alert patients are attentive!
- Patients may require more time to respond, or indicate response with another method (e.g., eye blinks, finger taps)
- If the patient is unable to perform the Letters, you can use Pictures option

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**Pictures**

**Step 1**



**Step 2**




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**3** **Altered level of consciousness**

Present if the actual RASS score is anything other than alert and calm (zero)

Check box if RASS anything other than zero

**Tips:**

- This is to assess current (right now) level of consciousness
- You *cannot* use the CAM-ICU on a patient with a true RASS -4 or -5
- You don't have to use the RASS; you can use any validated sedation-agitation/LOC scale

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**4** **Disorganized thinking**

**Yes/No Questions** (See training manual for alternate set of questions)

1. Will a stone float on water?
2. Are there fish in the sea?
3. Does one pound weigh more than two pounds?
4. Can you use a hammer to pound a nail?

Errors are counted when the patient incorrectly answers a question.

**Command**

Say to patient: "Hold up this many fingers" (Hold 2 fingers in front of patient)

"Now do the same thing with the other hand" (Do not repeat number of fingers) "If the patient is unable to move both arms, for 2nd part of command ask patient to "Add one more finger"

An error is counted if patient is unable to complete the entire command.

Check box if combined number of errors is >1

**Tips:**

- Complete the "Command" section even if perfect score on "Yes/No Questions"
- There is an alternate set of questions in the CAM-ICU manual
- If the patient cannot move his/her arms or is unable to see, score Feature 4 solely on the "Yes/No Questions"

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### The Intensive Care Delirium Screening Checklist (ICDSC)

Feature		
(1) Altered Level of Consciousness	Current RASS level (factoring in sedation)?	
(2) Inattention	Difficulty following instructions, easily distracted, cannot reliably squeeze to letter A on S A V E A H A A R T?	
(3) Disorientation	Knows name, kind of place, date, and recognition of staff?	
(4) Hallucination, delusion, or psychosis	Hallucinations or delusions present?	
(5) Psychomotor agitation or retardation	<i>Hyperactive or Hypoactive?</i>	
(6) Inappropriate speech or mood	Displays inappropriate emotion, disorganized speech?	
(7) Sleep-wake cycle disturbance	Frequent awakening at night or sleeps much of the day?	<b>Score</b> 0: Normal 1-3: Subsyndromal Delirium 4-8: Delirium
(8) Symptom Fluctuation	Symptoms fluctuate over 24 hours?	

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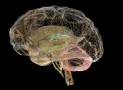
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### Delirium: Neuro Considerations



**Current Challenges:**

- It can be difficult to assess for delirium in patients we know already have an abnormal neurological exam!
- Delirium
  - Worsens neurological quality of life
  - Leads to increased mortality at 12 months
- Occurs in **12-48%** of the neuro critically ill
  - Associated with prohibited self-transfer, frequent nighttime care interruptions, and multiple care modalities (e.g., indwelling catheter, no oral feeding)

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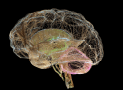
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### Delirium: Neuro Considerations



**Recommendations:**

- Consider delirium a “micro” injury to the brain *superimposed* on the “macro” injury (e.g., SAH, ICH, ischemic stroke)
- Once you’ve established the post “neurological event” baseline, utilize delirium screening tools to assess for changes over time
  - \*You may need to wait until follow-up to be able to accurately assess for delirium
- Both CAM-ICU and ICDSC have been used in literature

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### Delirium: Dementia Considerations



**Current Challenges:**

- It can be difficult to assess for delirium in patients with known cognitive impairments at baseline
- Acute changes in cognition are frequently missed, incorrectly attributed to the underlying dementia or “sundowning”
- DSD:
  - Occurs 4-5x more often in this population
  - May be a sign of treatable issues, like UTI, PNA, or dehydration
  - Accelerates the trajectory of the underlying cognitive decline

\*Delirium that occurs in patients with dementia is referred to as delirium superimposed on dementia (DSD)

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### Delirium: Dementia Considerations



**Recommendations:**

1. Recognize baseline mental status is critical
2. Obtain family/caregiver input... *essential* in helping to delineate an acute change (delirium) versus chronic impairments due to dementia

**At OT Initial Evaluation, ask...**

"Does ___ level of alertness tend to fluctuate at home?"
"Would ___ normally know ___ name?"
"Would ___ normally know where ___ is?"
"Would ___ normally know the date?"
"Does ___ have a regular sleep pattern at home?"

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### Interventions for Delirium



**A multicomponent, nonpharmacologic program:**

- Reduces modifiable risk factors for delirium, improves cognition, and optimizes sleep, mobility, hearing, and vision
- BUNDLES of care improve outcomes
- Multi-component interventions have the highest efficacy

Lange et al. (2022)

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### Interventions for Delirium

**Nonpharmacological, evidence-based strategies can reduce delirium by 33%:**

- Early OT & PT intervention (SLP, too!)
  - Mobility 3x/daily
- Cognitive re-training
  - Current events discussion, word games, orientation
  - Use bedside tables, smartphones, whiteboard, etc.
- Basic ADLs/routines
- Correct sensory deficits (eyeglasses, hearing aids)
- Provide language access services
- Prevent dehydration



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### Interventions for Delirium



**Cognitive Exercises:**

- Can improve mobility, enhance self-confidence, improve psychological status, and enhance their belief in recovery
- Reduces vent time, LOS, and medical costs

OT-Led Cognitive Protocol by Deemer et al. (2023):

- 2, 20-minute sessions, M-F
- 4 components, based on RASS score:
  1. Family or loved-one directed intervention (e.g., memory journal)
  2. Cognitive Stimulation (e.g., discussion of fears/strengths)
  3. Cognitive Training (e.g., memory match card game)
  4. Cognitive Rehab (e.g., medication management)

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### Interventions for Delirium



**Family/caregiver involvement:**

- Family intervention is associated with a 24% lower risk of delirium and fewer delirium days
- Interventions:
  - Orientation-memory clues delivered by family members
  - Family members' voices
  - Family visitation
  - Family/caregiver menu

Qin et al. (2022)

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**Need to Know**  
For  
**Patients and Families**

**NICHE**  
National Institute for Care of the Elderly

**DELIRIUM**

*Need to Know provides older adults and their families with important information to enhance their hospital or nursing home stays. Communication and teamwork are important aspects of high-quality healthcare. The individual, family, and caregivers are vital members of the team.*

Delirium is a new, sudden, and serious confusion episode that may change throughout the day or night. A person with delirium will have difficulty paying attention. Delirium is often caused by reversible conditions such as medication reactions, infections, and dehydration.

**Why is it important?**

Delirium, which can last for hours or weeks, is a problem in any unfamiliar setting such as a hospital or nursing home with different routines and people. Anesthesia and surgery can increase risk of delirium.

**What you and your family can do:**

Tell the healthcare team what is "normal" for you/your family member. Tell them about any changes in mood or behavior.

Ensure the use of devices such as glasses and hearing aids, if needed.

Ensure your loved one gets enough sleep.

Get your loved one moving! Activity can prevent and/or shorten the delirium.

Encourage your loved one to eat and drink regularly.

Be alert for signs of pain such as grimacing, restlessness, or not wanting to move or receive care. Let the healthcare team know right away.

Use a notebook as a "guest book" so your loved one can see that people are coming to visit them and provide cues to support orientation to person, place, and time such as clocks and family photos.

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**Interventions for Delirium**



**Promote Sleep!**

**80%** of ICU patients experience sleep deprivation

- Fragmented sleep, abnormal circadian rhythms, increased light sleep, & decreased REM sleep --> leads to decreased immunity, respiratory muscle endurance, exercise performance, & cognition
- Strategies:**
  - Orient patients during the day
  - Earplugs + eye mask + relaxing music: a statistically significant reduction in delirium incidence
  - Minimize noise disruptions overnight
  - Reduce overhead fluorescent lighting when possible

McKenzie (2022)

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Devlin et al

**TABLE 2. List of Factors That Patients Report as Disruptive to Sleep**

Environmental	Physiologic and Pathophysiologic
Noise (447, 453, 454, 480, 483-488, 490, 491)	Pain (454, 483-486, 488, 490, 491)
Light (241, 453, 454, 480, 482-484, 486-488)	Discomfort (454, 483, 486, 488, 490)
Comfort of bed (483, 486-488)	Feeling too hot or too cold (484, 486, 488)
Activities at other bed/sides (483, 486, 487)	Breathing difficulty (484, 491)
Visitors (clinician or family) (483)	Coughing (484, 491)
Room ventilation system (483)	Thirst (484, 486) and hunger (486, 488)
Hand washing by clinicians (483)	Nausea (484, 488)
Bad odor (486, 488)	Needing to use bedpan/urinal (486, 488)
Care Related	Psychologic
Nursing care (447, 453, 480, 482-484, 486, 488, 491)	Anxiety/nervous/stress (483, 484, 486, 488-491)
Patient procedures (447, 453, 480, 482, 483, 487, 488)	Fear (486, 486, 490)
Vital sign measurement (442, 448, 475, 477, 481, 483)	Unfamiliar environment (485, 488, 491)
Diagnostic tests (447, 453, 480, 483)	Disorientation to time (454, 486)
Medication administration (447, 453, 480, 482)	Loneliness (488, 491)
Restricted mobility from lines/catheters (454, 486, 488)	Lack of privacy (485, 488)
Monitoring equipment (454, 486, 488)	Hospital attire (486, 488)
Oxygen mask (486, 488)	Missing bedtime routine (483)
Endotracheal tube (491)	Not knowing nurses' names (486)
Urinary catheters (486)	Not understanding medical terms (486)

**Top 3 reported sleep disruptors:**

- Noise, lighting, and nursing care (e.g., baths)

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### Interventions for Delirium

**Avoid ElderSpeak!**

- "Babytalk" (exaggerated prosody)
- Inappropriate, simplified speech register commonly used with older adults, especially in health care settings
- Younger caregivers tend to use this, cued by signs of cognitive or functional impairment
- Harmful effects:
  - Reduces comprehension
  - Perceived as patronizing
  - In dementia, elderspeak increases resistiveness to care

Shaw et al. (2020)

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Table 5 | Suggested adaptations to delirium prevention interventions for individuals with dementia

Targeted risk factor	Interventions	Description	Adaptation for dementia
Cognitive impairment	Orientation protocol	Orientation board with names of care team members and daily schedule; orienting communication once a day	Orientation protocol three times a day; education for staff in special approaches to communication with individuals with dementia
	Therapeutic activities	Cognitive stimulation activities three times a day (customized selection according to leisure interests and physical impairments)	Additional customization for the selection of activities according to level of cognitive function
Immobility	Early mobilization	Walking or active range-of-motion exercises three times a day; minimizing use of immobilizing equipment and physical restraints	For all tasks, focus on one-step, as opposed to multistep, instructions
Vision impairment	Vision protocol	Providing visual aids and adaptive equipment, with daily reinforcement	For all tasks, focus on one-step, as opposed to multistep, instructions
Hearing impairment	Hearing protocol	Providing portable amplifying devices; earwax disimpaction; special communication techniques, with daily reinforcement	For all tasks, focus on one-step, as opposed to multistep, instructions
Dehydration	Oral volume repletion	Early recognition of dehydration and oral volume repletion; encouragement during meals	For all tasks, focus on one-step, as opposed to multistep, instructions
Sleep deprivation	Non-pharmacological sleep protocol	At bedtime, warm drink, relaxation music or sounds, and massage; unit-wide noise reduction programmes; rescheduling medications and procedures to allow uninterrupted sleep	Importance of behavioural (for example, avoid caffeine and diuretics after mid-day) and environmental changes to enhance sleep (for example, darkened, quiet room, minimize interruptions)

**Adaptations for Dementia:**

1. Orientation protocol 3x/daily
2. "Focus on one-step as opposed to multi-step, instructions"
3. Avoid caffeine and diuretics after mid-day, promote sleep routines

Inouye (2022)

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### Interventions by RASS Level

RASS -4/-5	RASS -2/-3	RASS -1/0/+1	RASS +2/+3/+4
- Sedated? HOLD - Not receiving sedation? Assess for Disorders of Consciousness (e.g., JFK CRS-R)	- Orientation exercises - Delirium strategies (i.e., use of familiar objects, music) - Sensory stimulation tasks - Adapted communication methods (visual, gestural based on ventilation status) - Smart tablet to engage with family  - Hand over hand facilitation of basic ADLs (wiping face, combing hair, oral care/brushing teeth, upper body, moisturizing) - Sit at EOB with support	Tabletop tasks: - Delirium prevention strategies - Lifestyle/leisure checklist - Reminiscence/recall therapy - Goal planning/day planning - Orientation exercises - Memory games, digit spans - Puzzles, hobbies, Sudoku - Family engagement (make video for family member)  - ADLs (e.g., grooming, bathing in the bathroom) - AROM, therapeutic exercise - Progress sit → stand → ambulate	- DEFER

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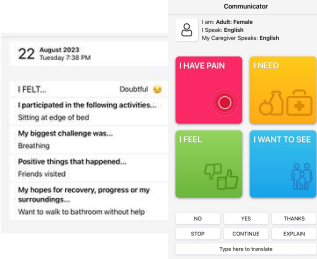
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### General Treatment Ideas

**Communication:**

- Strategies for non-verbal patients:
  - Follow SLP recommendations. If not consulted, consider requesting.
  - Tablet or smartphone apps:
    - ICU Patient Communicator
  - Handwriting
  - Picture board (EZ board)
  - Trached? Check if patient has been assessed for speaking valve




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### General Treatment Ideas

**ICU Diary**



reference: Atlantic Health System

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### General Treatment Ideas

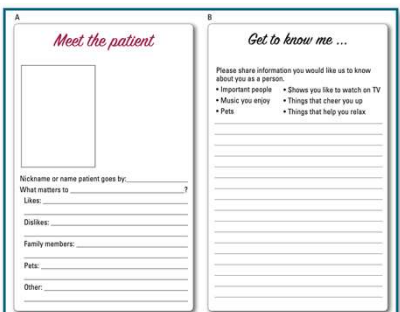


Figure 1. Elements of the intensive care unit diary: the "Meet the Patient" page (A) and the "Get to know Me" page (B).

Rogan et al. (2020)

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## Prevention of Delirium



**Early Mobilization:**

- Exercise has the highest level of evidence
  - Prevents functional decline
  - Establishes a routine within the hospital
  - Assists with general health (e.g., cardiovascular function)
- Clinical Practice Guidelines for Management of Pain, Agitation and Delirium in Adult Patients in the Intensive Care Unit:
  - "Recommend performing early mobilization of adult ICU patients whenever feasible to reduce the incidence and duration of delirium" (Level 1B)

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## Add-on Assessment: Orientation Log (O-Log)

**Function:**

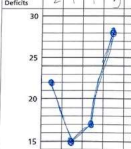
- A measure of orientation to time, place and situation that can be used for serial assessments over time
- Not dependent on vocal responses- can rely on written responses or mouthing, can also modify with yes/no responses
- 3-15 minutes

Download from [www.sralab.org](http://www.sralab.org)

**The Orientation Log (O-Log)**

Patient Name: \_\_\_\_\_

Date	Pl	Pl	Pl	Pl	Pl
Time	10	11	12	1	2
City	3	3	3	3	3
Kind of Place	3	2	3	3	3
Name of Hospital	3	2	2	3	3
Month	3	1	1	3	3
Date	1	0	0	2	2
Year	2	2	2	3	3
Day of Week	1	1	2	3	3
Clock Time	2	2	2	3	3
Etiology/Event	2	1	1	2	2
Pathology/Deficits	2	1	1	3	3



**Key:**  
 3=spontaneous/free recall  
 2=logical cueing  
 1=multiple choice, phonemic cueing  
 0=unable, incorrect, inappropriate

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## Case Study #1 – Delirium



76-year-old with Hx of Parkinson's Disease (PD) presents to ED after a fall, striking back of head. Found to have progression of PD with *superimposed* toxic metabolic encephalopathy from electrolyte derangement.

- **OT Eval on Weds:**
  - Patient alert, following commands, cooperative, **CAM(-)**.
  - Patient is fair historian. Detailed baseline mental status as per daughter: Alert & calm, oriented x 3, decreased STM, hard of hearing.
  - Interests: Music (sings at church), enjoys making spreadsheets, game shows. "Get to Know Me" posted on whiteboard and Delirium handout provided to daughter.
- **Tx on Thurs:** Alert, following commands, some repetition needed, **CAM(-)**.
- **Tx on Mon:** Distractible, visual hallucinations, fluctuating arousal, restless, **CAM(+)**. Medical team notified, music played in session, Music Therapy & Geriatrics consults recommended.
- **Tx on Thurs:** Alert, following commands, **CAM(-)**, discharge to acute rehab.

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## Case Study # 2 – Delirium



87-year-old presents with altered mental status. History of multiple abdominal surgeries and Alzheimer's dementia. Hx of delirium on previous admissions. Found to have UTI.

### Occupational Therapy:

#### Eval on Weds:

- Patient is a poor historian. Detailed baseline mental status as per wife: Alert, calm, oriented to self, with poor STM.
- Patient alert but highly distractible and illogical, **CAM(+)**, 3/30 on O-Log.
- Interests: Listening to music, reading the NY Times. "Get to Know Me" posted on whiteboard and Delirium handout provided to wife.

Tx on Mon: Disoriented, distractible, **CAM(+)**. Recommended patient be moved to window bed. Geriatrics consult placed. 9/30 on O-Log.

Tx on Weds: Tangential, agitated, **CAM(+)**. Neurology consulted. 9/30 on O-Log. Started treatment for UTI and PNA.

Tx on Friday: Alert, calm and cooperative. **CAM(-)**. Discharge home with wife.

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*"In the ideal ICU of the future, all patients are free from delirium, a syndrome of brain dysfunction frequently observed in critical illness and associated with worse ICU-related outcomes and long-term cognitive impairment."*

Kofteris et al. (2022)

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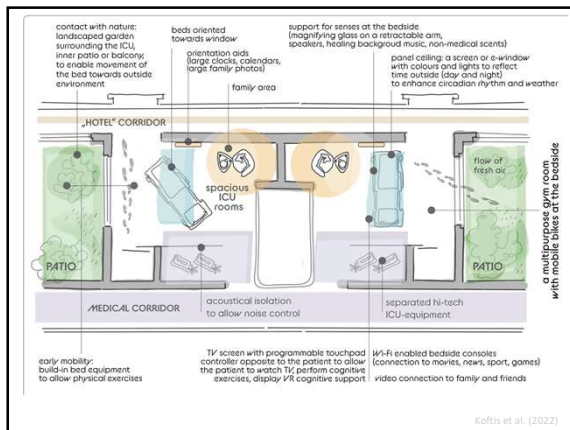
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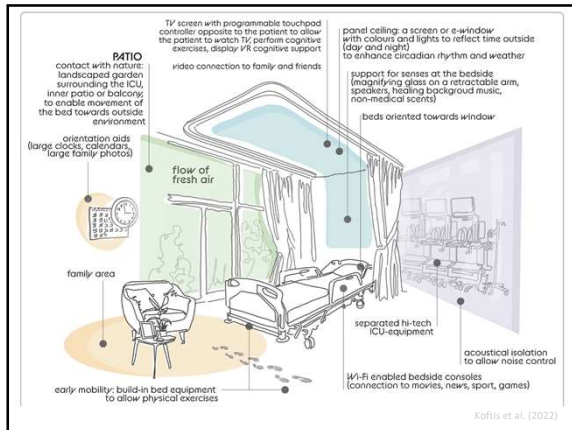
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### Expanding the A2F Bundle...

For a *delirium-free future*, the bundle should be expanded with 3 additional letters:

- **G** - Gaining insight into patient needs
- **H** - delivering **H**olistic care with a 'home-like' environment
- **I** - redefining ICU architectural design

	OT Practice Framework	Examples
<b>G</b>	"Client-centered practice"	Occupational Profile; conversation topics, assistive devices (e.g., hearing aids)
<b>H</b>	"Personal factors"	Establishing prior routines like TV shows, music, books
<b>I</b>	"Environmental Factors"	Make the room feel safe and comfortable, use items from home (e.g., blanket)

Kofitis et al. (2022)

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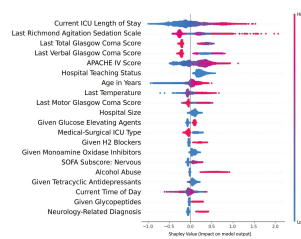
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### The Future of Delirium Screening



- App-directed delirium identification protocols
- Artificial Intelligence
  - Machine learning models trained with routinely collected electronic health record data accurately predict ICU delirium
  - Can identify delirium with a 12-hour lead time!



Gong et al. (2023)

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## Disorders of Consciousness (DoC)




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### Disorders of Consciousness (DoC)

<b>Coma</b>	<ul style="list-style-type: none"> <li>A <i>transitory phase (2-4 weeks)</i></li> <li>No eye opening</li> <li>No command following, reflexive responses</li> <li>No visual pursuit, fixation, or saccades</li> </ul>	*Patient lacks awareness <i>and</i> wakefulness
<b>Unresponsive Wakefulness Syndrome</b>	<ul style="list-style-type: none"> <li>Spontaneous eye opening, may track objects</li> <li>Sleep/wake cycles might resume</li> <li>Cannot follow commands</li> <li>Does not respond to sound, hunger, or pain</li> <li>No language comprehension or expression</li> </ul>	*Characterized by the <i>return of arousal</i> (i.e., patient is awake) but without signs of awareness
<b>Minimally Conscious State</b>	<ul style="list-style-type: none"> <li>Occasionally shows clear signs of self or environment</li> <li>Simple command following</li> <li>Yes/No responses</li> <li>Verbalizations</li> <li>Purposeful behavior</li> <li>Responds to emotional content</li> </ul>	*Partial preservation of consciousness, signs of awareness
<b>Consciousness</b>		

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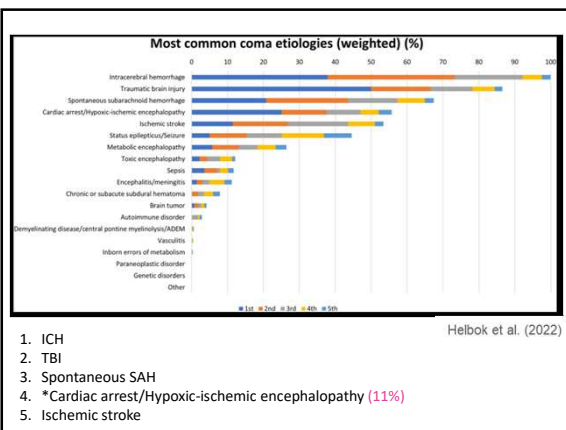
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### Disorders of Consciousness (DoC)

**Current Challenges:**

- These patients are often misdiagnosed
  - Active medical issues take precedence in Acute Care
  - Confounding neurologic deficits
  - Clinician inexperience in examining for subtle signs of consciousness

**Recommendations:**

- Learn how to identify these patients
- Trained clinicians should perform *serial* standardized behavioral evaluations to identify trends in the trajectory of recovery that are important for establishing prognosis

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### AAN's 2020 Practice Guidelines for DoC

**Recommendation 2a:**

- Clinicians should *use standardized neurobehavioral assessment measures* that have been shown to be valid and reliable to improve diagnostic accuracy for the purpose intended (Level B)

**Recommendation 2b:**

- To reduce diagnostic error in individuals with prolonged DoC after brain injury, *serial* standardized neurobehavioral assessments should be performed with the interval of reassessment determined by individual clinical circumstances (Level B)

\*Prolonged DoC defined as  $\geq 28$  days

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### Assessment: JFK Coma Recovery Scale- Revised (CRS-R)

**Function:**

- A standardized neurobehavioral assessment for use with patients with DoC
- Monitors behavioral recovery, predicts outcomes, and assesses tx effectiveness
- The lowest scoring items represent reflexive activity; the highest items reflect cognitively-mediated behavior
- 15- 30 minutes, follow online training guidelines, <\$20
- Download assessment & training materials from [www.sralab.org](http://www.sralab.org)

<b>AUDITORY FUNCTION SCALE</b>
4 – Consistent Movement to Command*
3 – Reproducible Movement to Command*
2 – Localization to Sound
1 – Auditory Startle
0 – None
<b>VISUAL FUNCTION SCALE</b>
5 – Object Recognition*
4 – Object localization: Reaching*
3 – Visual Pursuit*
2 – Fixation*
1 – Visual Startle
0 – None
<b>MOTOR FUNCTION SCALE</b>
6 – Functional Object Use*
5 – Automatic Motor Response*
4 – Object Manipulation*
3 – Localisation to Noxious Stimulation*
2 – Flexion Withdrawal
1 – Abnormal Posturing
0 – None
<b>ORC/MOTOR/VERBAL FUNCTION SCALE</b>
3 – Intelligible Verbalization*
2 – Vocalization/Oral Movement
1 – Oral Reflexive Movement
0 – None
<b>COMMUNICATION SCALE</b>
2 – Functional: Accidental
1 – Non-functional: Intentional*
0 – None
<b>AROUSAL SCALE</b>
3 – Attention
2 – Eye Opening w/o Stimulation
1 – Eye Opening with Stimulation
0 – Unarousable
<b>TOTAL SCORE</b>

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**Auditory Function Scale**

AUDITORY FUNCTION SCALE
4 – Consistent Movement to Command*
3 – Reproducible Movement to Command*
2 – Localization to Sound
1 – Auditory Startle
0 – None



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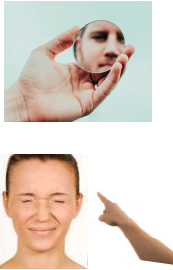
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**Visual Function Scale**

VISUAL FUNCTION SCALE
5 – Object Recognition*
4 – Object localization: Reaching*
3 – Visual Pursuit*
2 – Fixation*
1 – Visual Startle
0 – None



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**Motor Function Scale**

MOTOR FUNCTION SCALE
6 – Functional Object Use†
5 – Automatic Motor Response*
4 – Object Manipulation*
3 – Localisation to Noxious Stimulation*
2 – Flexion Withdrawal
1 – Abnormal Posturing
0 – None



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**Oromotor/Verbal Function Scale**

OROMOTOR/VERBAL FUNCTION SCALE
3 – Intelligible Verbalization*
2 – Vocalization/Oral Movement
1 – Oral Reflexive Movement
0 – None



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**Communication Scale**

COMMUNICATION SCALE
2 – Functional: Accurate†
1 – Non-functional: Intentional*
0 – None



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**Arousal Scale**

AROUSAL SCALE
3 – Attention
2 – Eye Opening w/o Stimulation
1 – Eye Opening with Stimulation
0 – Unarousable



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### Interpretation of Scores

- Total score of  $\geq 10$  provides strong evidence for conscious awareness
- Consistent scores  $\leq 10$ : poorer chance of regaining conscious awareness
- Important of **visual tracking**:
  - "Among patients in the VS group, 73% of those with visual tracking recovered consciousness within the first 12 months post injury, as compared with 45% of those without tracking"

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### When to Discontinue CRS-R

- When all 3 of the following behaviors have been elicited, concurrently, on 3 consecutive examinations conducted over 2 weeks:
- Consistent movement to command
  - Reliable yes-no responses
  - Focused attention

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### Training Guidelines



- Module 1: Review Key material**
1. Read the CRS-R Administration and Scoring Guidelines, FAQs, and Ten Guiding Principles for Administration and Scoring.
  2. Watch the training video found [here](#) (password = CRSR). Please note that there are some discrepancies between the item administration demonstrated in the video and the updated manual. The discrepancies are identified with text boxes that appear throughout the video.



- Module 2: Observe CRS-R administration**
1. Observe 3 administrations of the CRS-R conducted by an experienced examiner. Follow the examination procedures in the manual as the CRS-R is being administered.
  2. Ideally, the observation will include patients diagnosed as VS/UWS, MCS, and eMCS.



- Module 3: Observe and score CRS-R administration**
1. Observe administration of the CRS-R on at least 4 different patients (1 VS/UWS, 2 MCS, 1eMCS) while actively scoring the behavioral responses.
  2. Provide a diagnosis based on the scoring of each assessment.
  3. Review the scoring and diagnosis with the examiner.



- Module 4: Administer and score CRS-R**
1. Administer and score the CRS-R under the supervision of an experienced examiner, including patients across the diagnostic spectrum (VS/UWS, two MCS, and one eMCS patient).

- Module 5: Complete written test**
1. Review and score four CRS-R vignettes. A sample CRS-R vignette is below.
  2. Identify errors in CRSR administration and scoring in a fifth vignette. A sample CRS-R vignette with errors in administration and scoring is below.

Upon successful completion of all 5 modules, CRS-R Administration and Scoring can be conducted independently.

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### Treatment Ideas for DoC- Sensory Stimulation



**Sensory Stimulation:**

- Controlled exposure to sensory-specific stimulation
- Can facilitate recovery
- Prevents sensory deprivation
  - Protocols range from 7 days/week; 2x/day; 30 min; to 6 weeks; 4x/day; 10

**Benefits:**

- Low-invasive, safe, inexpensive, straightforward, and can lead to increased scores on CRS-R

Li et al. (2020)

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### Treatment Ideas for DoC- Sensory Stimulation



**Olfactory/Smell**

- Provide variety of familiar, pleasant (mint, lavender, perfume) and unpleasant smells (vinegar), and other scents (lemon, herbs) close to the patient's nostrils with the mouth closed (try for 10 secs near the patient's nose)

**Oromotor/Taste**

- Oromotor: Oral care using suction mouth swab or attachments
- Verbal: Model familiar words and sounds, mirror for feedback, encourage sequencing (e.g., counting) in unison with therapist

**Vestibular and Proprioceptive Input/Movement**

- Changes in body position, move extremities in horizontal and vertical direction, PROM, hand-over hand, joint compressions and mobilization

Li et al. (2020)

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### Treatment Ideas for DoC- Sensory Stimulation



**Tactile Input/Touch**

- Joint compressions, use different textures (e.g., bristles of soft brush or comb, ice, sandpaper, fur, fabric, feather), and/or noxious stimuli (e.g., nailbed pressure)- tell the patient where/what the stimuli is

**Visual Input**

- Use familiar items/photographs, high-contrast items, mirror (or reverse camera on iPhone), television/videos, familiar faces, brightly colored items, and/or beautiful pictures of interest (try for 10 mins. each item)

**Auditory**

- Conversation with familiar voices, music, radio, television, reading aloud, and/or taped recordings of family member voices sharing stories and memories (try for 10 mins.)

Li et al. (2020)

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### Familiar Auditory Sensory Training (FAST)



#### FAST Protocol:

- Provide patient with at least 8, 5-minute-long stories
- Stories are told by people well-known to the patient, at least 1 year prior to injury
  - 4 stories are happy; 4 involve sad, negative, or neutral emotions
  - Involve a memorable event together (e.g., ski trip, wedding)
- The total duration of the protocol is 1,680 minutes of familiar auditory sensory material, daily over 6 weeks
  - Each treatment day is 40 mins. of stories provided 4x daily, in 10-min. segments, at least 2 hrs. apart

Pattil et al. (2012); Li et al. (2020)

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### Intervention: Family Engagement



#### Families and caregivers are adversely impacted

- **>33%** of family members report psychological distress
- The need for interventions aimed at humanizing the critical care experience is clear!

#### Recommendations:

- OTs are in a distinctive position to support family
- While some hospital professionals might overlook or undervalue the patient experience, OTs are trained to view the patient in a holistic manner, ensuring the patient's needs and goals are addressed

Davidson et al. (2012); Meyfroidt & Smith (2019)

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### Intervention: Family Engagement



#### Tips to Involve the Family:

- Early discussion of the rehab process (e.g., role of OT, frequency)
- Outline a basic plan of care, establishing short- and long-term goals
- Utilize family to help establish an occupational profile and identify meaningful occupations for the patient

#### Engaging effectively...

- Introduce yourself to all visitors in the room
- Establish rapport ("how are you doing?")
- Use simple, plain language (e.g., high blood pressure instead of HTN)
- Involve them! ("tell me a story about Mr. X...", "how'd you meet Mrs. Y...")

Davidson et al. (2012); Meyfroidt & Smith (2019)

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**Family Guide to The Ranchos Levels of Cognitive Functioning**

**COGNITIVE LEVEL III  
LOCALIZED RESPONSE**

**A person at this level will:**

- be awake on and off during the day;
- make more movements than before;
- react more specifically to what he sees, hears, or feels. For example, he may turn towards a sound, withdraw from pain, and attempt to watch a person move around the room;
- react slowly and inconsistently;
- begin to recognize family and friends;
- follow some simple directions such as "Look at me" or "squeeze my hand";
- begin to respond inconsistently to simple questions with "yes" and "no" head nods.

**What family/friends can do at Cognitive Levels I, II, and III**

- Explain to the individual what you are about to do. For example, "I'm going to move your leg."
- Talk in a normal tone of voice.
- Keep comments and questions short and simple. For example, instead of "Can you turn your head

[https://file.lacounty.gov/SDSState/dhs/218115\\_BUDCFDirtnasFamilyGuide-English.pdf](https://file.lacounty.gov/SDSState/dhs/218115_BUDCFDirtnasFamilyGuide-English.pdf)

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**Interdisciplinary Collaboration**



**Consults:**

- Neurology, Neurocritical Care
  - Diagnostic workup, prognosis
- Psychiatry
  - Recommendations for neurostimulants, tone management, discharge planning, etc.
- Palliative Care

**Rehabilitation (OT, SLP, PT)**

- Alternate days for CRS-R assessment
- Family/caregiver training
- Discharge planning
- Advocate for additional consults

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**Neurostimulant Medications**



**Amantadine:**

- Typical Uses: Antiviral agent with mild antiparkinsonian activity
- DoC: Faster rate of recovered consciousness (RCT)
- Mechanism of Action: NMDA receptor antagonist & dopamine agonist
- Onset of Action: Improvements can be seen within 5-10 days
- Dosing: 100-200 mg 2x/day and assess tolerance (i.e., monitor for seizures)
- Strongest evidence, ACRM recommended

**Zolpidem:**

- Typically used for insomnia
- Shown to help improve consciousness in a small # of DOC patients, possibly reversing abnormal cell metabolism following brain damage

**Methylphenidate, Bromocriptine, Levodopa, & Apomorphine:**

- Not well-studied, in theory and anecdotally enhance arousal

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### Case Study #1

67-year-old woman in the medical ICU for ventilator-dependent respiratory failure, with recent anoxic-ischemic brain injury after cardiac arrest (1 month prior to admission). Eyes open, but not following commands, no visual fixation or tracking, no purposeful BUE/BLE movements. No sedation.

CRS-R	Eval (OT)	Tx (PT)	Tx (SLP)	Tx (OT)	Tx (PT)	Tx (OT)
Auditory Function Scale	0	0	0	0	0	0
Visual Function Scale	0	0	0	0	0	0
Motor Function Scale	0	2	2	0	2	2
Oromotor/Verbal Function Scale	0	0	1	0	0	1
Communication Scale	0	0	0	0	0	0
Arousal Scale	2	2	1	2	1	2
<b>Total Score</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>5</b>

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- **OT Goals**
  - Patient's non-stimulated limb will locate/make contact with stimulated body part at point of stimulation on 2/4 trials (50% of the time)
  - Patient will demonstrate <3 episodes of non-responsiveness when provided with verbal prompts to execute actions/responses
- **Serial CRS-R assessment**
  - At least 2x/week, alternating days with PT & SLP
- **Multi-sensory stimulation**
  - Focus on Motor Function and Oromotor/Verbal Function
- **Family/caregiver education** for brother
  - Multi-sensory stimulation (classical music, aftershave, story-telling)
- **Recommendations** to medical team:
  - Multi-podus boots
  - Physiatry consult on day of initial evaluation
    - Amantadine added
    - Consideration for acute rehab/TBI program if weaned off vent

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### DoC Prognosis



#### Predictors of functional outcome:

- Initial CRS-R score *and* changes within the first month
- The cause of brain injury:
  - Non-traumatic injury (e.g., anoxia) have a shorter window for recovery & greater long-term severity of disability compared to traumatic injury
- Most patients who remain in VS/UWS across the first **3 months (after nontraumatic injury)** and **12 months (after traumatic injury)** will remain in this condition, however:
  - 17% will recover consciousness (emerge from VS/UWS) at 6 months
  - 7.5% may recover consciousness after 6 months

2020 AAN Practice Guidelines Update

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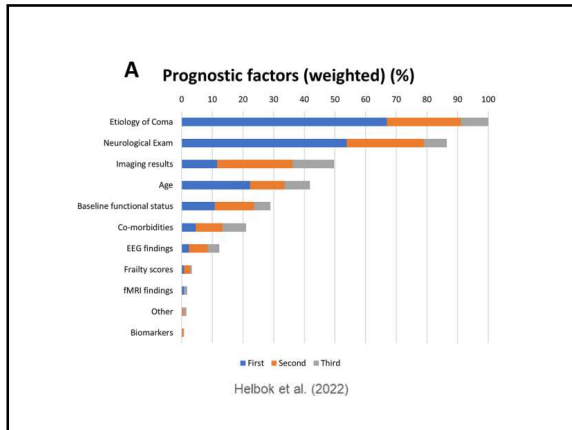
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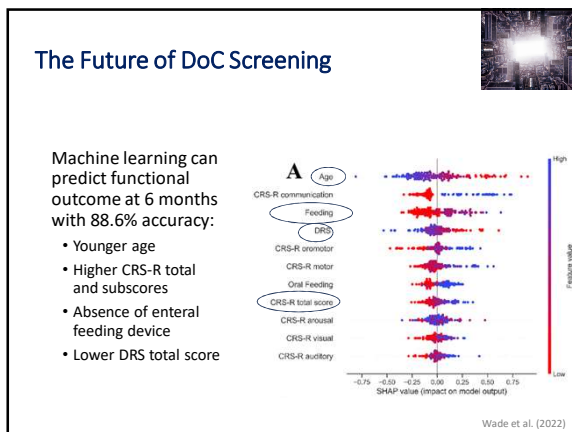
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**Takeaways**

**Delirium** is underrecognized, everywhere!

- Familiarize yourself with delirium screening tools
- If you suspect it, it's probably there
- **YOU** are in the perfect position to detect, treat, and prevent!

**Disorders of Consciousness** are easily overlooked in acute care

- Lookout for these patients
- If your patient has decreased arousal and isn't following commands (and NOT on sedation), this should be a red flag
  - For example, RASS -4/-5 without sedation- time to look closer!!
- Learn the JFK CRS-R, an invaluable tool used across *all* healthcare settings

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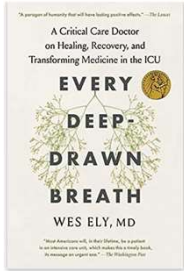
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### Personal Recommendations



**Websites:**

- Critical Illness, Brain Dysfunction, and Survivorship (CIBS) Center <https://www.icudelirium.org/>

 **ICURecovery**  
@RecoveryICU

 **Kali Dayton, DNP**  
@DaytonICUConsulting

**"ICU Monthly Email List"**

- Sign up at <https://www.johnshopkinssolutions.com/oi-n-icu-rehab-monthly-email-list/>

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### Additional Resources

**American Delirium Society**

- Annual conference, educational materials online <https://americandeliriumsociety.org>



**Neurocritical Care Society' Curing Coma® Campaign**

- The first global public health initiative to develop and implement coma treatment strategies that improve human lives
- Coma is a treatable medical entity

<https://www.curingcoma.org/>



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**Thank you**

**Questions?**

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### Appendix: Glasgow Coma Scale(GCS)

BEST EYE OPENING	
4 POINTS	SPONTANEOUS
3	TO VOICE
2	TO PAIN
1	NO RESPONSE

BEST VERBAL	
5 POINTS	ORIENTED
4	CONFUSED
3	INAPPROPRIATE
2	INCOMPREHENSIBLE
1	NO RESPONSE

BEST MOTOR	
6 POINTS	FOLLOWS COMMANDS
5	LOCALIZES PAIN
4	WITHDRAWS TO PAIN
3	DECEBERATE POSTURING
2	DECEBERATE POSTURING
1	NO RESPONSE

● TOTAL SCORE COMPRISES SUM OF BEST EYE OPENING, BEST VERBAL, AND BEST MOTOR SCORES

● TOTAL SCORE RANGES FROM 3 (worst) TO 15 (normal)

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### Appendix: CAM-ICU and RASS pocket cards

[https://assets-global.website-files.com/5b0849dae50243a0a1e5e0c/64494326d62bde72c3ba6c4\\_CAM-ICU-Pocket-Cards.pdf](https://assets-global.website-files.com/5b0849dae50243a0a1e5e0c/64494326d62bde72c3ba6c4_CAM-ICU-Pocket-Cards.pdf)

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