 Disclaimer

Slides contained herein represent general concepts of trauma care as defined by the members of the Education Subcommittee of the Geriatric Trauma Committee of the American Association for the Surgery of Trauma (AAST) and do not represent directives of the AAST itself. This educational program is not intended to dictate or establish the standard of care nor does it outline practice guidelines except where specified. This program is intended for educational use.
Objectives

To Recognize What Constitutes the Cognitive Spectrum

To Identify the Scope of Cognitive Spectrum Disorders

To Differentiate Delirium from Other Cognitive Changes

To Recommend An Approach
To Decrease the Incidence of Delirium in Elderly Trauma Patients
WHAT IS DELIRIUM?

Disturbance of Attention
Develops over a Short Period of Time
Represents an Acute Change from Baseline
Fluctuates in Severity over the Course of the Day
With an Additional Disturbance in Cognition

*Memory Deficit; Disorientation; Language; Visuo-spatial; Perception*

Not Explained by Pre-Existing Condition

*DSM-5 Defines in terms of Cognitive Features, Not Consciousness*
WHAT IS DELIRIUM?

May Affect Up To:

50% of Geriatric Patients Admitted to General Medical/Surgical Wards

80% of Geriatric Patients Admitted to ICUs
WHAT IS DELIRIUM?

Part of a Spectrum of Cognitive Dysfunction
Post-Operative Cognitive Dysfunction
Subsyndromal Delirium
Delirium
(Hypo-Active; Hyper-Active)
Dementia
WHAT IS DELIRIUM?

Associated with Poor Outcomes

- Increased Ventilator-dependent day
- Increased ICU and Hospital Length of Stay
- Increased Likelihood of Discharge to a Nursing Home
- Less Likely to be Discharged to Home or Rehabilitation
- Poorer Functional Outcomes at Rehabilitation
- Increased Rates of Re-Admission
- Long Term Cognitive Impairment
WHAT IS DELIRIUM?

Delirium is Associated with Increased Mortality Rates

- 30% Increase at 3 Months
- 45% Increase at 6 Months
- 44% Increase at 1 Year and 2 Years
Pre-Disposing Risk Factors

Age 65 years and Older

Male

Pre-Morbid States

Inactivity; Poor Functional Status; Social Isolation

Co-Morbidities

Baseline Brain, Heart, Kidney, Liver, or Lung Disease

Alcoholism

Chronic pain

Terminal Illness
Pre-Disposing Risk Factors

Medications and Polypharmacy

Benzodiazepines
Opioids
Metoclopramide
Histamine-1 Blockers
Promethazine; Diphenhydramine
Antinauseants
Scopolamine; Dimenhydrinate
Skeletal Muscle Relaxants
Psychotropic Medications
Tricyclic Antidepressants; Lithium
Steroids
Precipitating Factors

- Dehydration
- Acute Injury
- Hypoxia/Ischemia
- Infection/Severe Illness
- Medications
- Metabolic Derangements
- Surgery
- Pain
- Urinary Retention
- Constipation/Fecal Impaction
- ICU Setting
- Restraints
- Sleep Deprivation
Beers Criteria

An Explicit List of Potentially Inappropriate Medications That Are Typically Best Avoided in Older Adults

Updated Every 3 Years by the American Geriatric Society

American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults.
## Beers Criteria

### Table 3. 2019 American Geriatrics Society Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults Due to Drug-Disease or Drug-Syndrome Interactions That May Exacerbate the Disease or Syndrome

<table>
<thead>
<tr>
<th>Disease or Syndrome</th>
<th>Drug(s)</th>
<th>Rational</th>
<th>Recommendation</th>
<th>Quality of Evidence</th>
<th>Strength of Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiovascular</strong></td>
<td></td>
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</tr>
<tr>
<td>Heart failure</td>
<td>Avoid: Citalopram</td>
<td>Potential to promote fluid retention and/or exacerbate heart failure (NSAIDs and COX-2 inhibitors, nonsteroidal anti-inflammatory drugs, thiazide diuretics); potential to increase mortality in older adults with heart failure (diuretics and loop diuretics)</td>
<td>As noted, avoid or use with caution</td>
<td>Clinotiazol: low</td>
<td>Clinotiazol: strong</td>
</tr>
<tr>
<td></td>
<td>Avoid in heart failure with reduced ejection fraction: Non-diuretic CCBs (diltiazem, verapamil)</td>
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<tr>
<td></td>
<td>Use with caution in patients with heart failure who are symptomatic; avoid in patients with asymptomatic heart failure; NSAIDs and COX-2 inhibitors</td>
<td></td>
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<tr>
<td></td>
<td>Thiazide diuretics (piprazine, metoprolol)</td>
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<tr>
<td><strong>Syncope</strong></td>
<td>Diuretics</td>
<td>ACEIs</td>
<td>ADP-1 inhibitors might be avoided in older adults whose syncope may be due to bradyarrhythmia. Nonselective nonsteroidal anti-inflammatory drugs may cause orthostatic blood pressure changes and should be avoided in older adults whose syncope may be due to orthostatic hypotension.</td>
<td>Avoid</td>
<td>ADEIs, TCAAs, and antipsychotics: high</td>
</tr>
<tr>
<td></td>
<td>Antidepressants:</td>
<td>Chlorpromazine,</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Tertiary TCAAs</td>
<td>Thioridazine</td>
<td></td>
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<tr>
<td></td>
<td>Chlorpromazine</td>
<td></td>
<td></td>
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<tr>
<td><strong>Central nervous system</strong></td>
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<tr>
<td><strong>Depression</strong></td>
<td>Anticholinergics</td>
<td>Avoid in older adults with or at high risk of delirium because of potential of including or worsening delirium</td>
<td>Avoid</td>
<td>H2-receptor antagonists: low</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>Antiparkinsonian/Benzodiazepines</td>
<td>Avoid antipsychotics for behavioral problems of dementia and delirium unless nonpharmacological options (eg, behavioral interventions) have failed or are not possible and the older adult is threatening substantial harm to self or others. Antipsychotics are associated with greater risk of cerebrovascular accident (stroke) and mortality in persons with dementia.</td>
<td>Avoid</td>
<td>All others: moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Dementia or cognitive impairment</strong></td>
<td>Anticholinergics</td>
<td>Avoid because of adverse CNS effects</td>
<td>Avoid</td>
<td>Moderate</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>Benzodiazepines</td>
<td></td>
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<tr>
<td></td>
<td>Nonbenzodiazepine, benzodiazepine receptor agonist hypotensives:</td>
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</tbody>
</table>

(Continued)
## Beers Criteria

<table>
<thead>
<tr>
<th>Central nervous system</th>
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<tbody>
<tr>
<td>Delirium</td>
<td></td>
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<tr>
<td>Anticholinergics (see Table 7 and full criteria available on <a href="http://www">www</a>. geriatriccareonline.org)</td>
<td></td>
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</tr>
<tr>
<td>Antipsychotics&lt;sup&gt;2&lt;/sup&gt; Benzodiazepines</td>
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<td></td>
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<tr>
<td>Corticosteroids (oral and parenteral)&lt;sup&gt;3&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H&lt;sub&gt;2&lt;/sub&gt;-receptor antagonists</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cimetidine</td>
<td></td>
<td></td>
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<tr>
<td>Famotidine</td>
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<td></td>
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<tr>
<td>Nizatidine</td>
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<td></td>
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<tr>
<td>Ranitidine</td>
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<td></td>
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<tr>
<td>Meperidine</td>
<td></td>
<td></td>
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<tr>
<td>Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics: eszopiclone, zaleplon, zolpidem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoid in older adults with or at high risk of delirium because of potential of inducing or worsening delirium</td>
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<td>H&lt;sub&gt;2&lt;/sub&gt;-receptor antagonists: low</td>
<td></td>
<td>Strong</td>
</tr>
<tr>
<td>All others: moderate</td>
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</table>
Signs and Symptoms

Subsyndromal Delirium

One or More Symptoms of Delirium that Does Not Meet Criteria of Delirium and Does Not Progress to Delirium

Cognition

Poor Concentration, Mild confusion
Mild Other Disturbances of Memory, Orientation, Perception

Physical Function

May Be Unchanged from Baseline

Social

Communication May or May Not be Altered
Signs and Symptoms

Hyper-Active Delirium

Cognition

Poor Concentration, Confusion, Agitation
Altered Perception of Sensory Inputs
Visual or Auditory Hallucinations, Paranoia

Physical Function

Restlessness, Agitation, Insomnia

Social

Uncooperative, Combative
Altered Communication, Garbled Speech
Signs and Symptoms

Hypo-Active Delirium

Cognition

Poor Concentration, Confusion, Slowed Response
Altered Perception of Sensory Inputs
Visual or Auditory Hallucinations

Physical Function

Reduced Mobility and Movement, Somnolence

Social

Poorly Reactive, Withdrawn
Decreased Communication
Depressed Mood, Flattened Affect
Confusion Assessment and Diagnosis

Richmond Agitation Sedation Scale (RASS)

Assesses Level of Sedation

Describes Level of Alertness or Agitation

Mostly Used for Mechanically Ventilated Patients

+4 = Combative
0 = Normal
-5 = Unarousable

Non-Zero Score Prompts CAM-ICU
Confusion Assessment and Diagnosis

Richmond Agitation Sedation Scale (RASS)

**STEP 1: Sedation Assessment**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+4</td>
<td>COMBATIVE</td>
<td>Combative, violent, immediate danger to staff</td>
</tr>
<tr>
<td>+3</td>
<td>VERY AGITATED</td>
<td>Pulls to remove tubes or catheters; aggressive</td>
</tr>
<tr>
<td>+2</td>
<td>AGITATED</td>
<td>Frequent non-purposeful movement, fights ventilator</td>
</tr>
<tr>
<td>+1</td>
<td>RESTLESS</td>
<td>Anxious, apprehensive, movements not aggressive</td>
</tr>
<tr>
<td>0</td>
<td>ALERT &amp; CALM</td>
<td>Spontaneously pays attention to caregiver</td>
</tr>
<tr>
<td>-1</td>
<td>DROWSY</td>
<td>Not fully alert, but has sustained awakening to voice (eye opening &amp; contact &gt;10 sec)</td>
</tr>
<tr>
<td>-2</td>
<td>LIGHT SEDATION</td>
<td>Briefly awakens to voice (eyes open &amp; contact &lt;10 sec)</td>
</tr>
<tr>
<td>-3</td>
<td>MODERATE SEDATION</td>
<td>Movement or eye opening to voice (no eye contact)</td>
</tr>
<tr>
<td>-4</td>
<td>DEEP SEDATION</td>
<td>No response to voice, but movement or eye opening to physical stimulation</td>
</tr>
<tr>
<td>-5</td>
<td>UNAROUSABLE</td>
<td>No response to voice or physical stimulation</td>
</tr>
</tbody>
</table>

If RASS is ≥ -3 proceed to CAM-ICU (Is patient CAM-ICU positive or negative?)

If RASS is -4 or -5 → STOP (patient unconscious), RECHECK later

Sessler et al., Am J Respir Crit Care Med 2002, 166: 1338-1344
Ely et al., JAMA 2003; 289: 2983-2991
Confusion Assessment and Diagnosis

Confusion Assessment Method for ICU (CAM-ICU)

Feature 1: Acute Onset or Fluctuating Course?

Feature 2: Inattention?

Feature 3: Altered Level of Consciousness?

Feature 4: Disorganized Thinking?
Confusion Assessment Method for ICU (CAM-ICU)

**STEP 2: DELIRIUM ASSESSMENT**

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** → 0 - 2 Errors → CAM-ICU negative
   → NO DELIRIUM

   **NO** → > 2 Errors → CAM-ICU negative
   → NO DELIRIUM

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

   **> 2 Errors** → CAM-ICU positive
   → DELIRIUM Present

3. **Altered Level of Consciousness:**
   - Current RASS level (think back to sedation assessment in Step 1)
   - RASS = zero

4. **Disorganized Thinking:**
   - Will a stone float on water?
   - Are there fish in the sea?
   - Does one pound weigh more than two?
   - 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)

   **> 1 Error** → CAM-ICU negative
   → NO DELIRIUM

**> 0 - 1 Error** → CAM-ICU negative
→ NO DELIRIUM

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Differential Diagnosis of Etiology

**D**
- Drugs, Dehydration, Detox, Deficiencies *(Vitamin or Hormone)*, Discomfort *(Pain)*

**E**
- Electrolytes, Elimination Problems *(Constipation, Urinary Retention)*, Environmental Issues *(Noise, Lighting)*

**L**
- Lungs *(Hypoxia)*, Liver, Lack of Sleep, Long Stay *(In ED or ICUs)*

**I**
- Infection, iatrogenic *(Drugs, Surgery)*, Infarction *(Heart or Brain)*, Ischemia *(Hypoxia)*

**R**
- Restricted Movement/Mobility, Renal Failure

**I**
- Injury, Impaired Sensory Input, Intoxication

**U**
- Urinary Tract Infection, Unfamiliar Environment

**M**
- Metabolic Abnormalities *(Glucose, Na, Thyroid)*, Metastasis *(Brain)*, Medications/Anesthesia
Prevention of Delirium

Medications Which Prevent or Decrease the Incidence of Delirium

None!!
Prevention of Delirium

General

Attempt to Maintain Consistency of Care Team

Avoid Moving Patient Between Rooms or Wards

Make Care Assignments as Consistent as Possible

Assess Patients at Risk Every Shift

Minimize Medications and Dosages
Prevention of Delirium

Cognitive Engagement

Adequate Lighting and Clear Signage
24 hour Clock and Calendar Clearly Visible
Re-Orient Patient Often

Address Them by Name
Where They Are
Who YOU Are
What YOU Do
Why YOU Are There

Every Person, Every Time!

Ask about Their Family and Past
Facilitate Visits by Family and Friends
Prevention of Delirium

Cognitive Engagement

Physical Activity Stimulates Cognitive Function

Out of Bed to Chair
Physical Therapy
Occupational Therapy
X-rays in the Department
Prevention of Delirium
Cognitive Engagement

Address Sensory Impairments

Resolve Reversible Causes of Impairments
*Ear Wax; Hearing Aid Batteries; Clean Glasses*
*Make Sure Glasses and Hearing Aids Are Used*

Dementia
Developmental Delays
Learning Disabilities
Communication Impairments
Prevention of Delirium

Nutrition

Assess Dentition

Assure Appropriate Fit of Dentures

Dietary, Nutrition, Speech and Swallow to Assure Appropriate Diet

Assist with All Meals

Daily Calorie Count and Monitor Intake

Ensure Adequate Fluid Intake
Prevention of Delirium

Elimination

Assure Daily Bowel Movements

Ensure Adequate Urinary Output

*Both Men and Women Develop Urinary Retention*

Bladder Scan If No Urine Output for 6 Hours
Prevention of Delirium

Respiration

Out of Bed to Chair If Possible

Deep Breathe and Cough Every Hour While Awake

Incentive Spirometry 10 Breaths Every Hour While Awake

Suction Secretions If Patient Cannot Clear

Check Pulse Oximetry
Prevention of Delirium

Infection Control

Avoid Urinary Catheters

Avoid Central Lines, PICC Lines

Favor Midline Catheters, Peripheral IVs

Assess Perineum and Intertriginous Areas

Healthcare Worker Hand Hygiene!!
Prevention of Delirium

Mobilization

Out of Bed to Chair

Physical Therapy

Occupational Therapy

Ambulation

Active Range of Motion When in Bed
Prevention of Delirium

Pain Management

Assess and Appropriately Treat Acute Pain

Address Pre-Existing and Chronic Pain

Is It Appropriate to Resume Home Pain Regimen?

Look for Non-Verbal Signs of Pain or Distress

Avoid Benzodiazepines and Opioids
Prevention of Delirium

Tiered Pain Management

Tier 1: Acetaminophen po or IV

Tier 2: Non-Steroidal Anti-Inflammatory Agent (With Ulcer Prophylaxis)

Tier 3: Non-Opioid Alternatives
   * Tramadol; Gabapentin; Pregabalin

Tier 4: Low Dose Opioids
   * Codeine; Morphine; Fentanyl
Prevention of Delirium

Promote Sleep

Let Them Sleep At Night!

Schedule Medications For When Patient is Awake

Avoid Medical/Nursing Interventions During Rest Hours

Minimize Ambient Light and Noise During Rest Hours
Treatment of Delirium

Determine the Cause and Fix It

**DELIRIUM**

**Beers Criteria**

Benzodiazepines Cause Worsen Outcomes

Diphenhydramine Can Cause Anti-Cholinergic Toxidrome
Treatment of Delirium

Anti-Cholinergic Toxidrome

Mad as a Hatter

Blind as a Bat

Red as Beet

Dry as a Bone

Full as a Flask

Delirium

Dilated Pupils

Flushed Skin

Dry Mouth

Urinary Retention
Treatment of Delirium

Haloperidol

Helps with Symptoms of Agitation, Hallucination, Disruptive or Dangerous Behavior

Can Prolong QTc

Low Dose to Treat Symptoms, Not Sedate

0.25 mg IV q15 min prn

*Can Be Repeated Up to 4 Doses Every 6 Hours*

1 mg po q6h prn
Treatment of Delirium

Quetiapine

Helps with Symptoms of Agitation, Hallucination, Disruptive or Dangerous Behavior

Can Prolong QTc

More Sedating than Haloperidol

12.5 mg po q12h prn

Can Be Increased Up to 200mg/day
Summary

Delirium Is:

Disturbance of Attention
Develops over a Short Period of Time
Represents an Acute Change from Baseline
Fluctuates in Severity over the Course of the Day
With an Additional Disturbance in Cognition

Memory Deficit; Disorientation; Language;
Visuospatial; Perception

Not Explained by Pre-Existing Condition
Summary

Delirium May Affect Up To:

50% of Geriatric Patients Admitted to General Medical/Surgical Wards

80% of Geriatric Patients Admitted to ICUs
Summary

Delirium Is Associated with Poor Outcomes

- Increased Ventilator-Dependent Days
- Increased ICU and Hospital Length of Stay
- Increased Likelihood of Discharge to a Nursing Home
- Less Likely to be Discharged to Home or Rehabilitation
- Poorer Functional Outcomes at Rehabilitation
- Increased Rates of Re-Admission
- Long Term Cognitive Impairment
Summary

Delirium is Associated with Increased Mortality Rates

30% Increase at 3 Months

45% Increase at 6 Months

44% Increase at 1 Year and 2 Years
Summary

Pre-Disposing Factors for Delirium

Age 65 years and Older
Male
Pre-Morbid States
Co-Morbidities
Medications and Polypharmacy
Summary

Precipitating Factors for Delirium

**D**
Drugs, Dehydration, Detox, Deficiencies *(Vitamin or Hormone)*, Discomfort *(Pain)*

**E**
Electrolytes, Elimination Problems *(Constipation, Urinary Retention)*, Environmental Issues *(Noise, Lighting)*

**L**
Lungs *(Hypoxia)*, Liver, Lack of Sleep, Long Stay *(In ED or ICUs)*

**I**
Infection, Iatrogenic *(Drugs, Surgery)*, Infarction *(Heart or Brain)*, Ischemia *(Hypoxia)*

**R**
Restricted Movement/Mobility, Renal Failure

**I**
Injury, Impaired Sensory Input, Intoxication

**U**
Urinary Tract Infection, Unfamiliar Environment

**M**
Metabolic Abnormalities *(Glucose, Na, Thyroid)*, Metastasis *(Brain)*, Medications/Anesthesia
Summary

Prevention of Delirium

No Medication Prevents Delirium

Consistency of Care Team and Location

Minimize Medications and Dosages
Summary

Prevention of Delirium

Cognitive Engagement and Re-Orient Patient Often

- Lighting, Signage, Clock, Calendar
- Out of Bed to Chair; PT; OT

Resolve Reversible Causes of Impairments

- Ear Wax; Hearing Aid Batteries; Clean Glasses
- Make Sure Glasses and Hearing Aids Are Used

Let Them Sleep!
Summary

Prevention of Delirium

Nutrition

Elimination

Respiration

Infection Control

Mobilization

Pain Management
Summary

Treatment of Delirium

Identify and Resolve the Cause

Haloperidol

Quetiapine
This Presentation was Developed by
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on Behalf of
The Geriatric and Acute Care Surgery Committee
of
The American Association for the Surgery of Trauma
2019