

# Geriatric Acute Care Surgery Update 2022: From Evidence to Standards

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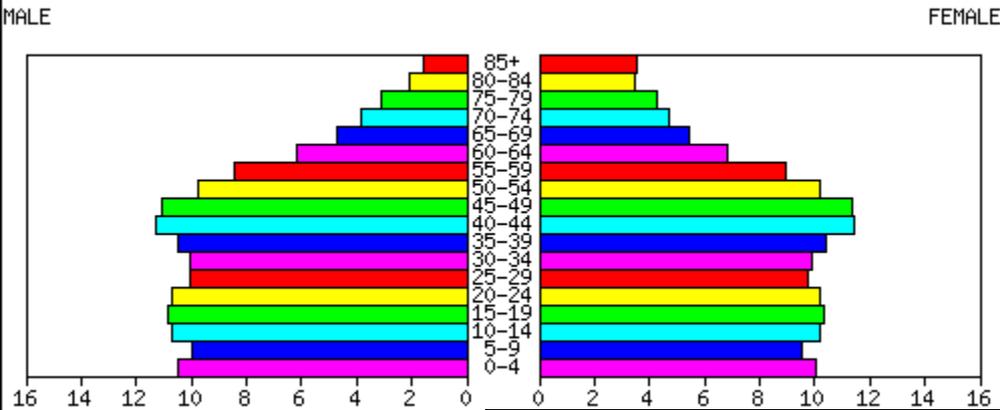
# Objectives

- Describe the epidemiology of geriatric trauma
- Discuss relevant physiologic changes with aging
- Discuss recent practice management guidelines in geriatric trauma and surgery.

# Committee Update

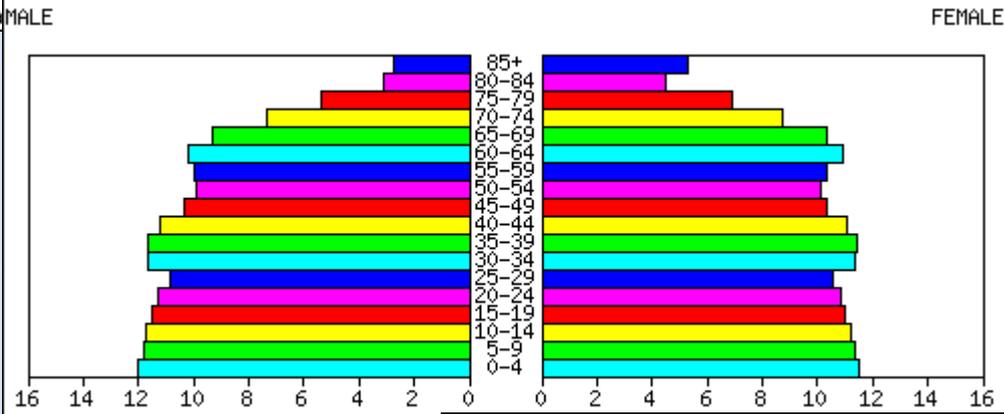
**NO ONE  
WATCHING TODAY  
IS GETTING YOUNGER**

United States: 2005



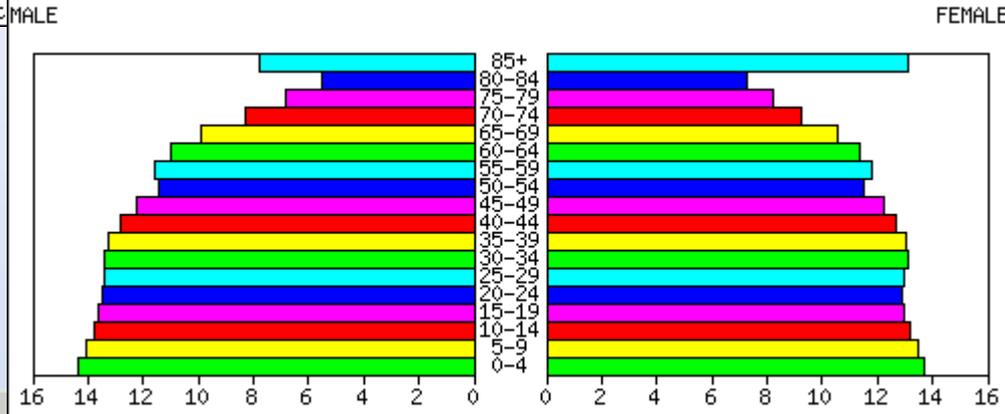
Source: U.S. Census Bureau, International

United States: 2025



Source: U.S. Census Bureau, International

United States: 2050



Source: U.S. Census Bureau, International Data Base.

# **Bodily Changes: Sunset or Sunrise?**

- Changes in all body systems
- Less reserve
- Relatively unable to compensate
- Physical exam findings unreliable

**Please Remember:**  
**These are general trends.**  
**Individual results may vary...**

# Mechanism of Injury

## ■ Falls

- Most common method of injury in the elderly
- Most responsible for cause of death
- \$50 billion dollars spent on the treatment of geriatric falls

# Factors that increase your risk of falling...

## Disease Processes

- Osteoporosis
- Arthritis
- Dementia or Confusion
- Parkinson's Disease
- Vision Problems
- Hearing Problems
- Diabetes
- Depression
- Heart Disease
- Blood Pressure Problems
- Bowel & Bladder Incontinence
- Foot Disorders

# Mechanism of Injury

- Motor Vehicle Crash
  - Drivers aged 70+ have higher crash death rates per mile driven than middle-aged drivers
    - Primarily due to increased vulnerability to injury in a crash.
  - In accidents involving elderly patients
    - 80% were found to be at fault
    - 18% syncopal episode was the inciting event



# Mecahnism of Injury

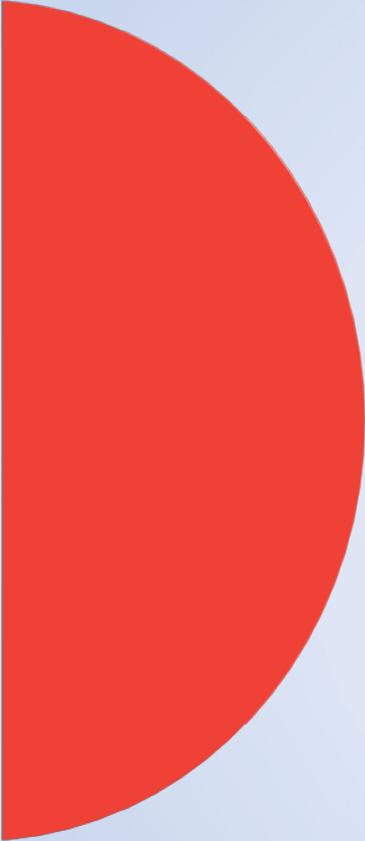
- Pedestrian struck by MV
  - 65 and older accounted for 20% of all pedestrian deaths and an estimated 10% of all pedestrian injuries in 2017.
  - Causes
    - Confusion
    - Vision or hearing deficiency
    - Poor gait
    - Timing of traffic lights/crossing
    - Lack of audible traffic signal

# Elder Abuse

- In Pennsylvania in the 2004-2005 fiscal year, there were 13,006 suspected situations of elder abuse.
- Of these reports, 21% were so severe that they required state protective services.

# Problems

- Triage Criteria
  - Activation
- Prognostication/Risk Assessment
  - Frailty
- Inpatient Care
  - Medications/Delirium

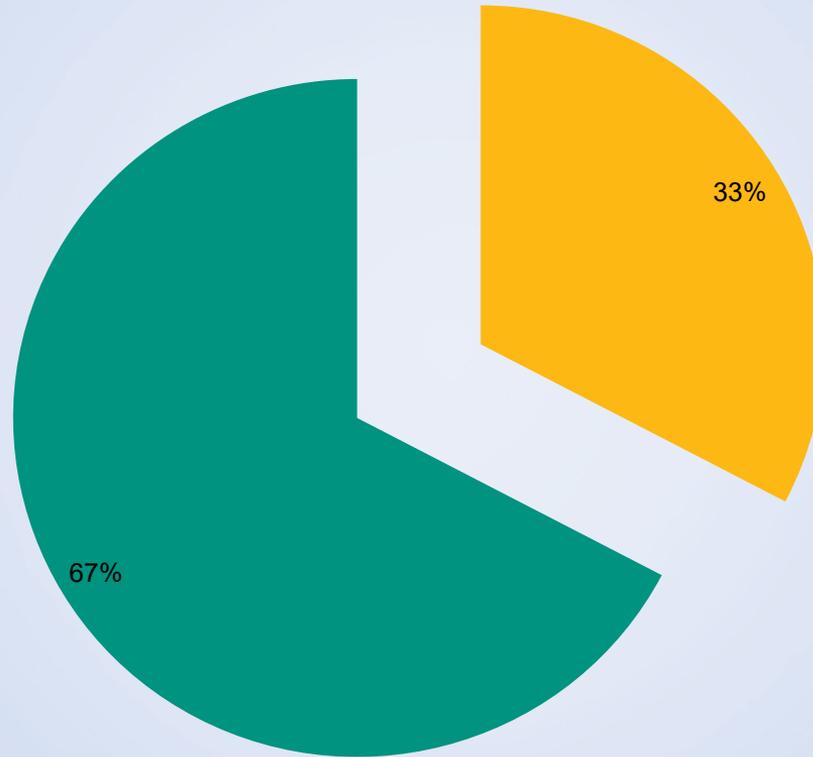


ACS TQIP  
GERIATRIC TRAUMA  
MANAGEMENT  
GUIDELINES



# Patient Destination

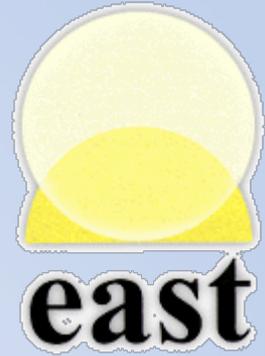
■ Trauma Center   ■ Non Trauma Center



# Trauma Team Activation

- Ensure trauma team activation for all elderly injured patients meeting trauma criteria (first or second tier)
- Age?
  - 60: J Trauma 69(1), July 2010, pp 88-92
  - 65: NSQIP, EAST and PTSF definition
  - 70: J Trauma 2001 Oct; 51(4): 754-6

# Prehospital Triage and Activation



## Level II

- *Injured patients with advanced age (>65) and pre-existing medical conditions (PEC's) should lower the threshold for field triage directly to a designated/verified trauma center.*

## Level III

- *A lower threshold for trauma activation should be used for injured patients aged 65 years or older who are evaluated at trauma centers.*

# Defining Geriatric Trauma: when does age make a difference?

- Pennsylvania 2001-2005 ISS<9
- Significant increase in mortality at 57
- Trauma center care associated with decreased mortality vs. Non-TC care
- If 70 used as triage age, one additional admission per day

# Triage and Activation Criteria

- Hemodynamics in the elderly are different and need alternate criteria.\*
- Triage criteria involving medications, comorbidities, mechanisms and injuries are different from standard adult criteria in states that have implemented such.\*\*

# Initial Evaluation

- Determine medications that affect initial evaluation and care.
- Consider common, acute, non-traumatic events that could complicate the patient's presentation.
- Labs
- Imaging
- **Anticoagulation assessment and reversal**

# Anticoagulation Tests

- **INR -**
  - *should* exclude the presence of significant levels of dabigatran or others *in most* patients.
  - might be only minimally elevated with therapeutic doses of dabigatran.
  - Rivaroxaban increases the INR at therapeutic levels, but not the same as warfarin
- **Partial thromboplastin time (PTT)**
  - might be slightly prolonged with dabigatran,
  - Rivaroxaban might cause mild PTT prolongations in most patients with therapeutic levels.

# Other tests

- Thrombin time –
  - Dabigatran
- Thromboelastography (TEG) -
  - Dabigatran, rivaroxaban and clopidogrel
  - Guides therapy
  - Recent literature

# Use of anticoagulants

- Patients on anti-coagulant therapy will experience major bleed despite minor trauma
- Emergent anti-coagulant reversal is indicated for head trauma
  - IF there is an antidote
  - Ionized ration (INR)  $> 1.5$  has mortality of 23% vs 8% for patients with INR  $< 1.5$

# Anticoagulation Reversal

- It is suggested that a rapid anticoagulation reversal protocol be developed in each center based on the availability of products, local costs, and preferences.
  - Warfarin – Vit K/FFP old, 4 factor PCC new
  - Dabigatran - (Thrombin inhib) Praxbind
  - Rivaroxaban – (Xa inhib) PCCs
  - Clopidogrel/ASA – no reversal, DDAVP/plt transfusion

# Inpatient Care

- Multidisciplinary
  - Some with and without Geriatrics/Medicine
- Early warning
- Protocols
- Medication Reconciliation
- Common issues

## **Improved outcomes in elderly trauma patients with the implementation of two innovative geriatric-specific protocols**

- High-Risk Geriatric Protocol (HRGP) and AntiCoagulation and Trauma (ACT) alert
- A significantly reduced OR of mortality with the combination of both the HRGP and ACT

# Geriatric Consultation Screen

Two or more indicate consult recommended

- Before you were injured, did you need someone to help you on a regular basis?
- Since the injury, have you needed more help than usual to take care of yourself?
- Have you been hospitalized for one or more nights during the past six months?
- In general, do you have problems seeing well?
- In general, do you have serious problems with your memory?
- Do you take more than three different medications every day?

# Inappropriate Medications in the Elderly

- 30 % of hospital admissions
- 177,000 emergency department visits
- 7 times more likely to be hospitalized
- 33% involve warfarin



# Beers Criteria

- American Geriatrics Society updated Beers Criteria for potentially inappropriate medication use in older adults.

## FRAILTY SCORE: OPERATIONAL DEFINITION<sup>89</sup>

Criteria	Definition
Shrinkage	Unintentional weight loss $\geq 10$ pounds in past year
Weakness	Decreased grip strength
Exhaustion	Self-reported poor energy and endurance
Low physical activity	Low weekly energy expenditure
Slowness	Slow walking

### Interpretation of the Frailty Score

The patient receives 1 point for each criterion met.

0–1 = Not Frail

2–3 = Intermediate Frail (Pre-frail)

4–5 = Frail

**Frail patients are at much higher risk of adverse health outcomes.**

**Intermediate frail patients are at elevated risk (less than frail ones) but are also at more than double the risk of becoming frail over three years.**

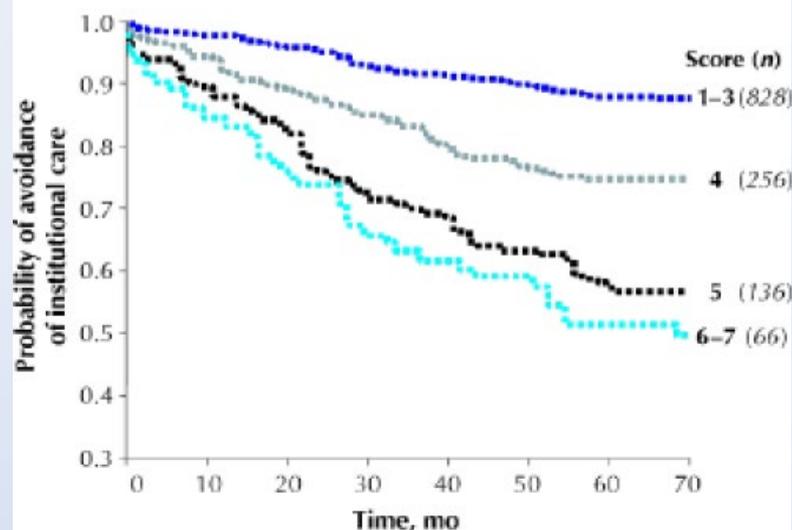
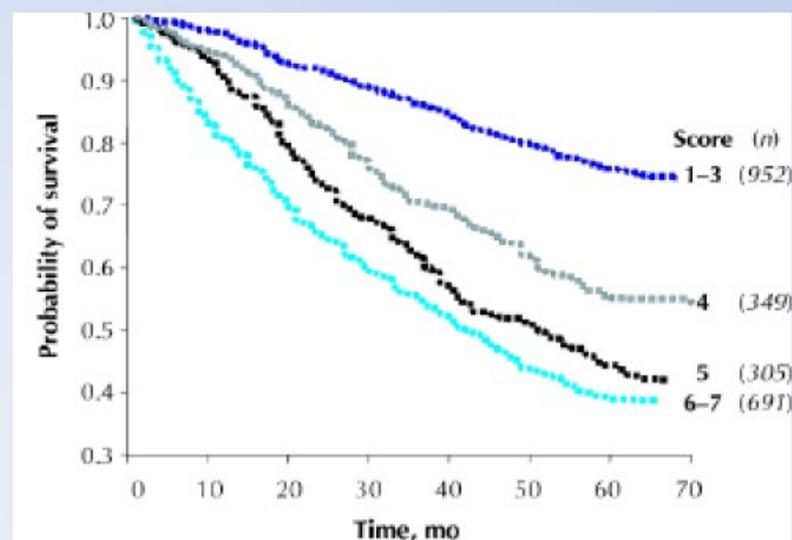
# VES-13

- The VES-13 (Vulnerable Elders Survey) relies on patient self-report.
- VES-13 is function-based.
- In the national sample of elders, a score of 3+ identified 32% of individuals as vulnerable.
- This vulnerable group had four times the risk of death or functional decline when compared to elders scoring 3 or less.

### Box 1: The CSHA Clinical Frailty Scale

- 1 *Very fit*—robust, active, energetic, well motivated and fit; these people commonly exercise regularly and are in the most fit group for their age
- 2 *Well*—without active disease, but less fit than people in category 1
- 3 *Well, with treated comorbid disease*—disease symptoms are well controlled compared with those in category 4
- 4 *Apparently vulnerable*—although not frankly dependent, these people commonly complain of being “slowed up” or have disease symptoms
- 5 *Mildly frail*—with limited dependence on others for instrumental activities of daily living
- 6 *Moderately frail*—help is needed with both instrumental and non-instrumental activities of daily living
- 7 *Severely frail*—completely dependent on others for the activities of daily living, or terminally ill

Note: CSHA = Canadian Study of Health and Aging.



# Trauma-Specific Frailty Index

<b>Comorbidities</b>	
<b>Cancer history</b>	
Yes	1
No	0
<b>Coronary heart disease</b>	
Myocardial infarction	1
Coronary artery bypass grafting	0.75
Percutaneous coronary intervention	0.5
<b>Medication</b>	0.25
No medication	0
<b>Dementia</b>	
Severe	1
Moderate	0.5
Mild	0.25
None	0
<b>Daily activities</b>	
<b>Help with grooming</b>	
Yes	1
No	0
<b>Help managing money</b>	
Yes	1
No	0
<b>Help doing household work</b>	
Yes	1
No	0
<b>Help toileting</b>	
Yes	1
No	0
<b>Help walking</b>	
Wheelchair	1
Walker	0.75
Cane	0.25
None	0

<b>Health attitude</b>	
<b>Feel less useful</b>	
Most time	1
Sometimes	0.5
Never	0
<b>Feel sad</b>	
Most time	1
Sometimes	0.5
Never	0
<b>Feel effort to do everything</b>	
Most time	1
Sometimes	0.5
Never	0
<b>Falls</b>	
Most time	1
Sometimes	0.5
Never	0
<b>Feel lonely</b>	
Most time	1
Sometimes	0.5
Never	0
<b>Function, sexually active</b>	
Yes	1
No	0
<b>Nutrition, albumin</b>	
<3	1
>3	0

# Frailty Predicts Surgical Outcomes

- Pre-operative assessment of Frailty can predict surgical outcomes
  - 594 pre-op patients (> 65 years old) assessed
    - Frail (4-5) Mean age 76 years (10.4%)
    - Intermediate (2-3) Mean age 74 years (31.3%)
    - Nonfrail (1) Mean age 71 years (58.3%)
  - 30 day complications
  - Hospital length of stay (LOS)
  - Discharge disposition

# Frailty Predicts Surgical Outcomes

- Frailty was an independent predictor of post-operative complications within 30 days

Procedure:	Minor	Major
Nonfrail	3.9%	19.5%
Intermediate	7.3%	33.7%
Frail	11.4%	43.5%

- Also predicts increased LOS and discharge to skilled or assisted living facility
- Enhanced predictive power of conventional risk models (ASA, cardiac risk)

# Delirium

- Delirium is underdiagnosed in the ICU
- Delirium is present as a preexisting condition in 37% of patients in the ICU, with doctors unaware of this condition in 53% of cases
- Delirium is a predictor of
  - 3 fold higher mortality over 6 months
  - Higher cost of care
  - Significant cognitive impairment long after discharge

# Prevalence and Risk Factors for Delirium in the SICU

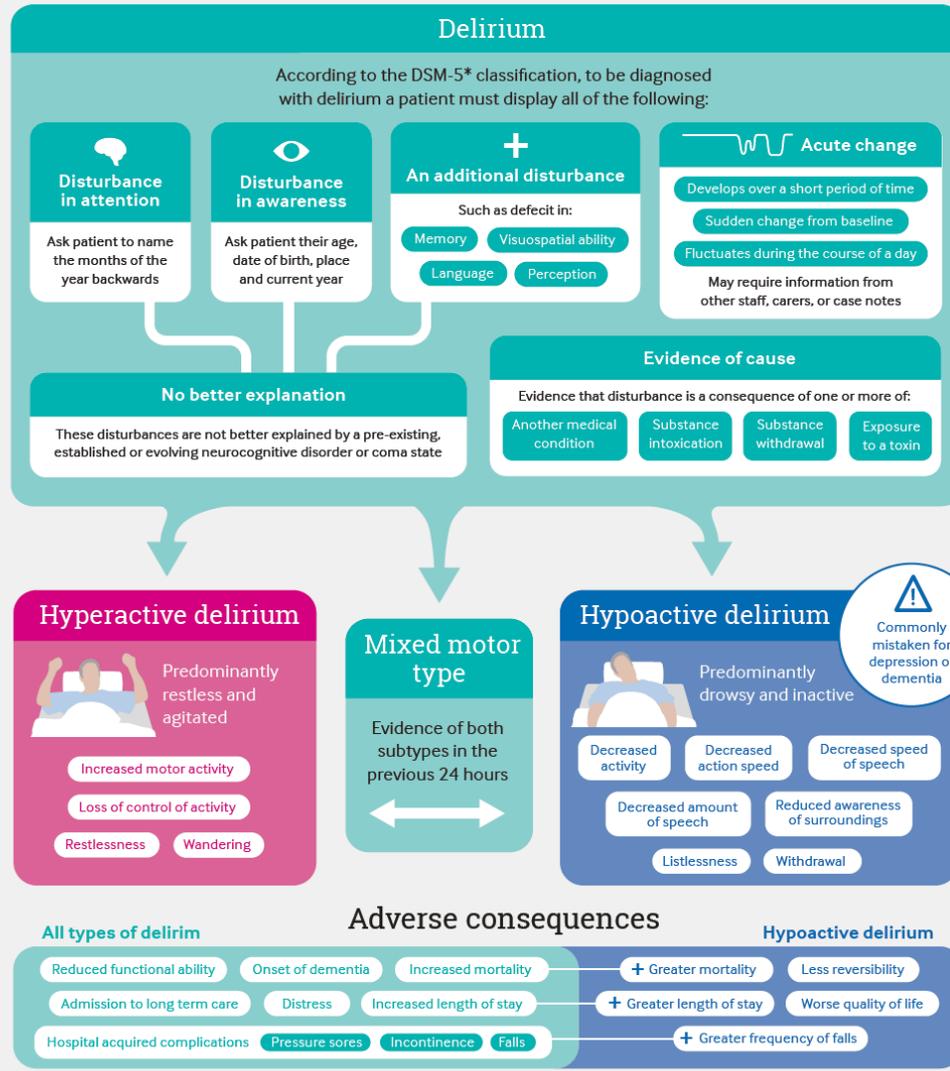
- Screening of 100 non-geriatric patients in a surgical ICU
  - Head trauma excluded
  - Median age = 48 years old
  - Used the Confusion Assessment Method for the ICU (CAM-ICU) and Richmond Agitation Sedation Scale (RASS) to screen for delirium
  - Screened once daily for up to 10 days
- Delirium prevalence of 70%
  - Surgical ICU: 73%; Trauma ICU: 67%
  - Multivariable analysis found strongest predictor was midazolam exposure
  - Opiate use inconsistent risk factor

# Delirium

- Hypoactive delirium is the most common (68%) and is associated with higher mortality at 6 months than mixed delirium (32% v 9%)
- Hypoactive delirium is characterized by inattention, fluctuating mental status and disorganized thinking
- Daily screening with RASS and CAM-ICU will improve diagnosis

# Quietly delirious

Hypoactive delirium can be more difficult to recognise than hyperactive delirium, and is associated with worse outcomes. This infographic summarises the main differences between the two forms of delirium.



\* DSM-5 = Diagnostic and Statistical Manual of Mental Disorders (fifth edition)

# Diagnosing Delirium

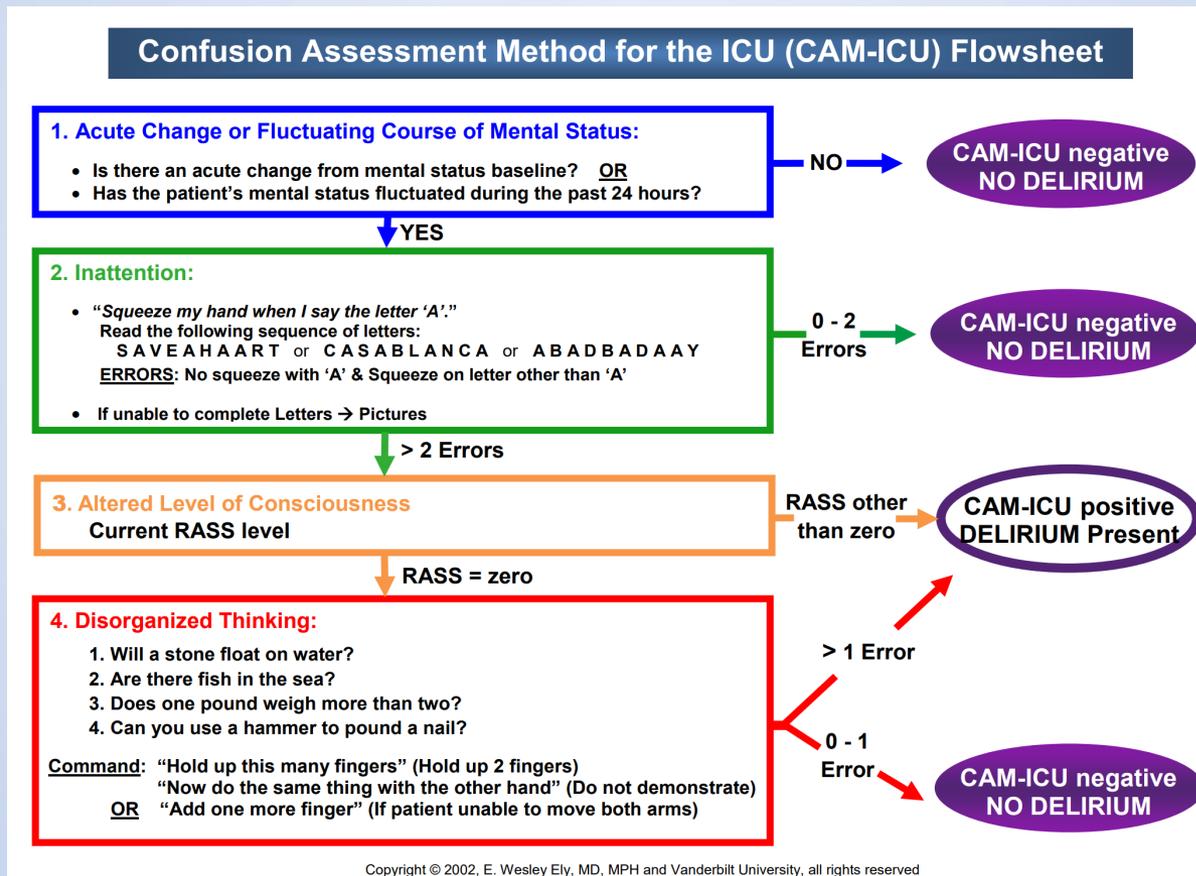
Comparison of conditions			
	<i>Dementia</i>	<i>Delirium</i>	<i>Depression</i>
<i>Central feature</i>	Memory loss	Confusion	Sadness
<i>Onset</i>	Masked	Acute	Slow
<i>Course</i>	Chronic	Fluctuating	Episodic, possibly chronic
<i>Consciousness</i>	Normal	Altered	Normal
<i>Attention</i>	Normal	Diminished	Possibly diminished
<i>Hallucinations</i>	Rare	Common	Not Common
<i>Psychomotor</i>	No	Yes	No

# Diagnosis in ICU

- The 2013 clinical practice guidelines for Pain, Agitation, and Delirium (PAD) recommend that all ADULT ICU patients be regularly (i.e. once per shift) assessed for delirium using either:
  - The Confusion Assessment method for the ICU (CAM-ICU) or
  - The Intensive Care Delirium Screening Checklist (ICDSC).

# CAM-ICU

■ Website: [icudelirium.org](http://icudelirium.org)





- |   |  |
|---|--|
| <p><b>5. Psychomotor agitation or retardation</b><br/>         Either: a) Hyperactivity requiring the use of sedative drugs or restraints in order to control potentially dangerous behavior (e.g. pulling IV lines out or hitting staff)<br/>         OR b) Hypoactive or clinically noticeable psychomotor slowing or retardation</p> | <p><b>NO</b>    <b>0</b>    <b>1 Yes</b></p> |
| <p><b>6. Inappropriate speech or mood</b><br/>         Patient displays: inappropriate emotion; disorganized or incoherent speech; sexual or inappropriate interactions; is either apathetic or overly demanding</p>  | <p><b>NO</b>    <b>0</b>    <b>1 Yes</b></p> |
| <p><b>7. Sleep-wake cycle disturbance</b><br/>         Either: frequent awakening/&lt; 4 hours sleep at night OR sleeping during much of the day</p>  | <p><b>NO</b>    <b>0</b>    <b>1 Yes</b></p> |
| <p><b>8. Symptom Fluctuation</b><br/>         Fluctuation of any of the above symptoms over a 24 hr period.</p>   | <p><b>NO</b>    <b>0</b>    <b>1 Yes</b></p> |

**TOTAL SHIFT SCORE:**                  
 (0 – 8)

<u>Score</u>	<u>Classification</u>
0	Normal
1-3	Subsyndromal Delirium
4-8	Delirium

**Adapted from: Bergeron et al. Intens Care Med 2001;27:859-64; Ouimet et al. Intens Care Med 2007;33:1007-13.**

# Pain Control

- Over medication can lead to delirium
- So can under treated pain
  - Up to 45% of elderly patients say pain is undertreated in the hospital
- Comparison of 43 patients and incidence of delirium looking at delivery of “as needed” (PRN) analgesic medications
  - 26% vs 48% of “allowed” analgesia given in delirious vs non-delirious patients.

# Pain medication Recommendations

- Elderly-appropriate medications/dose.
- Avoid benzodiazepines.
- Monitor narcotics; consider early PCA.
- Consider NSAIDs, adjuncts, tramadol.
- Epidural analgesia may be preferable with multiple rib fractures
- “Start low, go slow...but go”

# Sleep Disruption

- Sleep disorder affects 50% of elderly patients at baseline
- Hospitalization increases the morbidity of sleep deprivation
  - Poor wound healing
  - Decreased resistance to infection
  - Immune suppression
  - Disrupted nitrogen balance
- Multiple disruptors
  - Lights, noise, patient care

# Sleep Basics

- Normal sleep has both Rapid Eye Movement (REM) and non-REM stages
  - Non-REM sleep in 4 stages
  - Arousal threshold is lowest in stage 1
  - Stage 4 has highest threshold (delta wave sleep)
- REM sleep
  - Dreaming, increased CNS activity
  - Occurs about every 90min, lasts 10-30 min, and is 20-25% of total sleep time.

# Sleep Quality in the ICU

- ICU patients spend less time in REM and stage 4 (delta wave) sleep
- Repeated arousals disrupt sleep continuity about every 20 min
- Less than 6% of sleep time in the ICU is in REM (vs 25% normally)
- Daytime sleep is about 50% of total ICU sleep, but lacks REM and delta sleep
  - Circadian rhythm severely disrupted

# Delirium Prevention Measures

- Optimize light/dark & sleep/wake cycle and decrease disruptions at night
- Re-orient regularly, minimize restraints
- Caregivers should use clear instructions and make frequent eye contact with patients.
- Minimize sedatives, especially benzodiazepines and benadryl
- Treat pain appropriately
- “Sedation holiday” daily
- Screen daily

# Delirium: Prevention

In a controlled trial that evaluated HELP, delirium developed in 9.9% of the intervention group, compared with 15.0% of the usual-care group

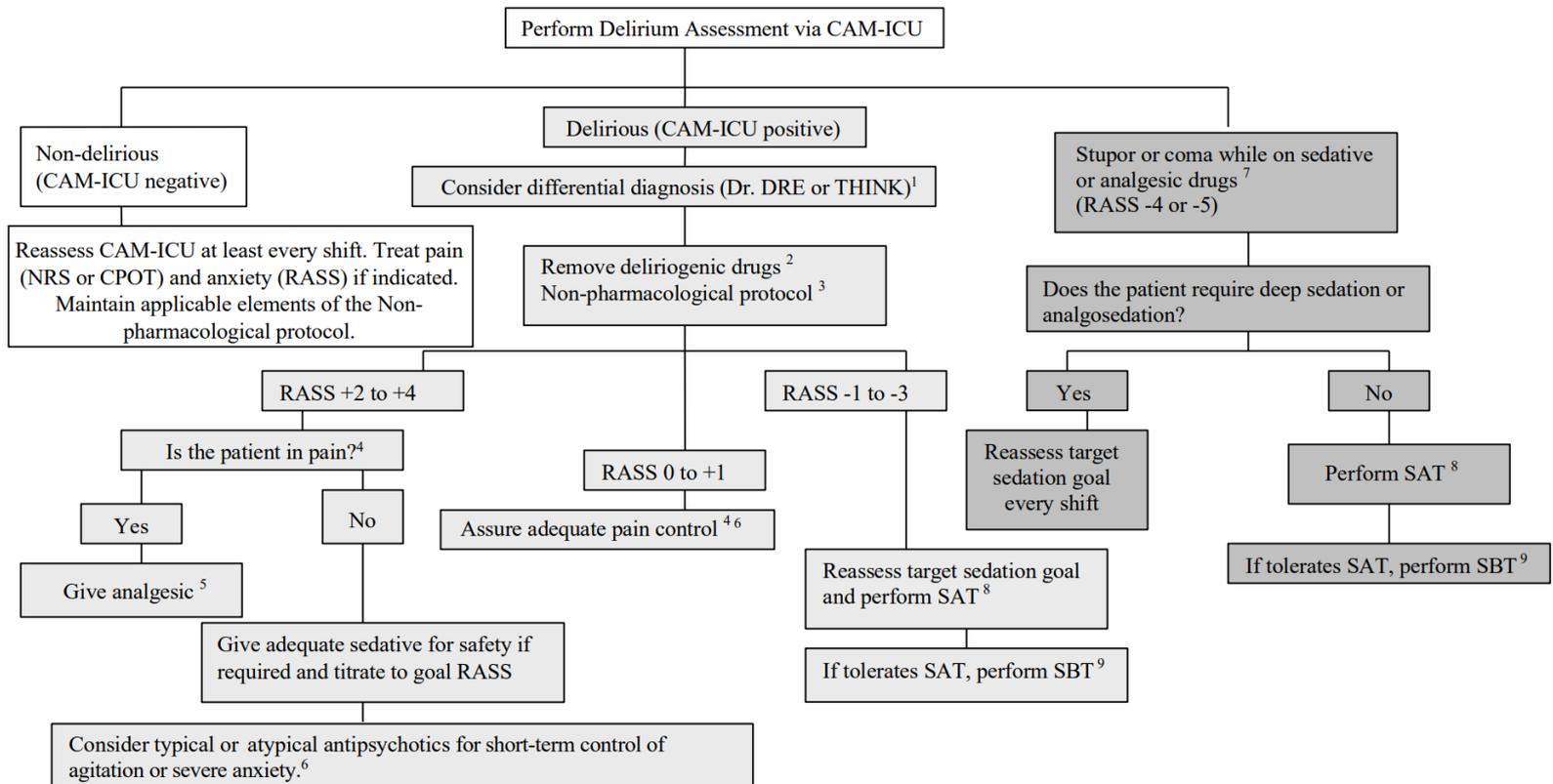
The HELP interventions can also effectively reduce the total number of episodes and days of delirium

Proactive geriatric consultation reduces risk of delirium after acute hip fracture by 40%

# Delirium: Treatment

- An environment with minimal noise at night
- Nonpharmacological sleep protocol
  - First, a glass of warm milk or herbal tea
  - Second, relaxation tapes or relaxing music
  - Third, back massage
- Reduced the use of sleeping medications from 54% to 31%

# DELIRIUM PROTOCOL



1. Dr. DRE:  
Diseases: Sepsis, CHF, COPD  
Drug Removal: SATs and stopping benzodiazepines/narcotics  
Environment: Immobilization, sleep and day/night orientation, hearing aids, eye glasses, noise
- THINK:  
Toxic Situations – CHF, shock, dehydration – Deliriogenic meds (tight titration) – New organ failure (liver, kidney, etc)  
Hypoxemia;  
Infection/sepsis (nosocomial), Immobilization  
Nonpharmacological interventions<sup>3</sup>  
K<sup>+</sup> or Electrolyte problems
2. Consider stopping or substituting deliriogenic medications such as benzodiazepines, anticholinergic medications (metoclopramide, H2 blockers, promethazine, diphenhydramine), steroids, etc.
3. See non pharmacological protocol – see below
4. If patient is non-verbal assess via CPOT or if patient is verbal assess via visual analog scale
5. Analgesia – Adequate pain control may decrease delirium. Consider opiates, non-steroidals, acetaminophen or gabapentin (neuropathic pain)
6. Typical or atypical antipsychotics. Short-term control of agitation (alcohol or drug withdrawal) or severe anxiety to avoid respiratory depression (CHF, COPD, asthma). Discontinue if high fever, QTc prolongation, or drug-induced rigidity.
7. Consider non-benzodiazepine sedation strategies (propofol or dexmedetomidine)
8. Spontaneous Awakening Trial (SAT) – If meets safety criteria (No active seizures, no alcohol withdrawal, no agitation, no paralytics, no myocardial ischemia, normal intracranial pressure, FiO<sub>2</sub> ≤ 70%)
9. Spontaneous Breathing Trial (SBT) – If meets safety criteria (No agitation, No myocardial ischemia, FiO<sub>2</sub> ≤ 50%, adequate inspiratory efforts, O<sub>2</sub> saturation ≥ 88%, no vasopressor use, PEEP ≤ 7.5 cm)

Non-pharmacological protocol<sup>3</sup>

#### Orientation

Provide visual and hearing aids  
Encourage communication and reorient patient repetitively Have familiar objects from patient's home in the room  
Attempt consistency in nursing staff  
Family engagement and empowerment

#### Environment

Sleep hygiene: Lights off at night, on during day.  
Control excess noise (staff, equipment), earplugs  
Early Mobilization/Rehabilitation and exercise  
Music  
Maintain O<sub>2</sub> saturations >90%

Treat underlying metabolic derangements and infections

ABCDEF Bundle

<http://www.icudelirium.org/medicalprofessionals.html>

# Guidelines

- Pain, Agitation/Sedation, Delirium, Immobility and Sleep Disruption Guidelines 2018

*“We are a culture that denies death...therefore we are all walking towards death backwards! It is better to turn around.”*

**Michael Meade**

# Decision Making and Care Preferences

- Discuss and document (72 hours):
  - Patient's priorities and preferences
  - Post-injury risks of complications, mortality, and *temporary/permanent functional decline*
  - Advance directives or living will
  - Identify surrogate decision maker
  - In appropriate setting, present hospice as a positive active treatment

# Decision Making

**C - Choose & Communicate**

**U - Understand**

**R - Reason**

**V - Values**

**E - EMERGENCY**

**S - Surrogate**

**ACS NSQIP<sup>®</sup>/AGS  
BEST PRACTICE GUIDELINES:**

**Optimal Preoperative Assessment  
of the Geriatric Surgical Patient**

# Surgery in the Elderly

- More than 50% of persons  $\geq$  age 65 years will have some surgical procedure in the remainder of his or her lifetime
- Currently, the 15% of the population  $\geq$  65, accounts for  $\sim$  40 % of procedures, or 19.2 million/ year
- Overall traditional surgical outcomes are worse in older adults
- Surgical decision making is often more complex

# Surgery in the Elderly

- Overall risk of M&M steadily declining
  - Heart disease mortality 3-5%
  - Heart attack 1-4%
  - CHF 4-10%
  - Lungs most common: 15-45%

# Preoperative Risk Assessment

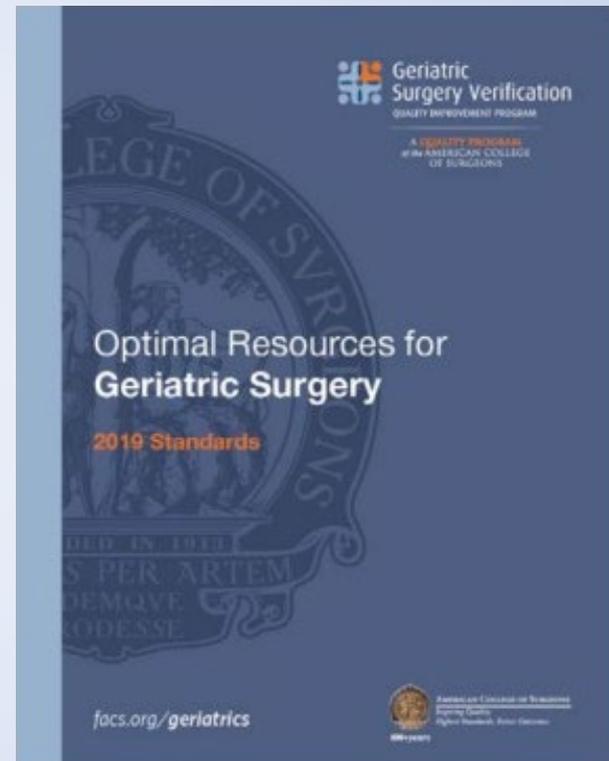
- What is missing?
  - Medications
  - Frailty evaluation
  - Optimization beyond Cardiac
- VES-13 preop screen
- Comprehensive Geriatric Assessment (CGA)
- Improved prognostication and optimization

# Preoperative Discussion

- Should include
  - Patient expectations and preferences
  - Expected postop course and complications including possible functional decline and rehab/SNF
  - Family and social support system, preop social work if necessary

# GSV Standards

1. Institutional Administrative Commitment
  2. Scope & Governance
  3. Facilities & Equipment Resources
  4. Personnel & Services Resources
  5. Patient Care: Expectations & Protocols
  6. Data Surveillance & Systems
  7. Quality Improvement
  8. Professional & Community Outreach
  9. Basic & Clinical Trials
- 32 Total Standards (2 of which are optional)



# Specific Standards: Goals of Care

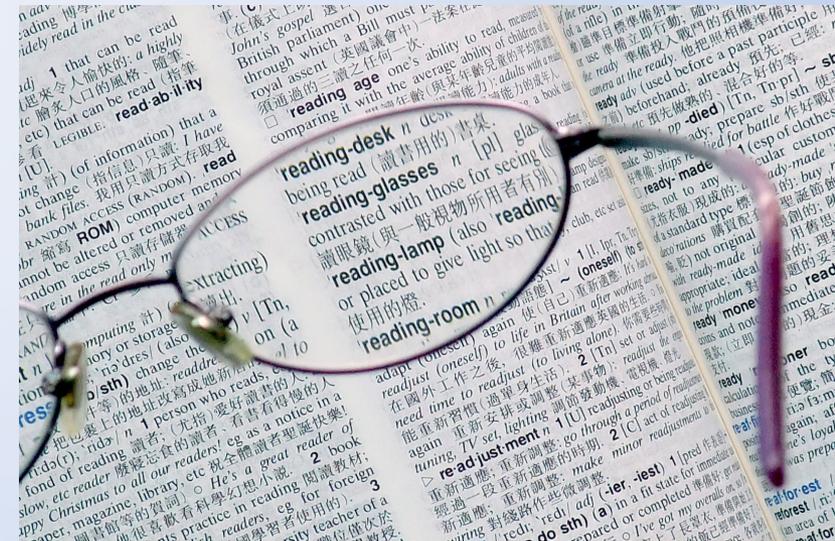
- Code status
- Advance directive
- Medical proxy
- Documentation of above
- Preoperative palliative care discussion if appropriate

# Specific Standards: Vulnerability Screens

- Age  $\geq$  85 years
- Impaired cognition
- Delirium risk
- Impaired functional status
- Impaired mobility
- Malnutrition
- Difficulty swallowing
- Need for preoperative palliative care assessment

# Specific Standards: Hearing, Vision

- Return of personal sensory equipment



# Specific Standards: Pharmacy

- Pharmacy review of medications
- Order sets
- Beers criteria compliance
- Opioid sparing
- Multimodality pain management

# Specific Standards: Postoperative Care

- Delirium screening, education, protocol
- Ambulation, fall prevention, pressure ulcer
- Nutrition, hydration
- Interdisciplinary care for high-risk

# Specific Standards: Transitions of care

- Goals of care documentation
- Medicine reconciliation
- Communication, two-way
- Track quality of post acute care facilities

# General Standards

- Administrative support
- Director, coordinator
- Quality committee
- Geriatric friendly rooms
- Nurse champions
- Data collection/feedback
- Quality improvement project
- Community outreach
- Provider and nurse education
- (NSQIP Collaborative participation)
- (Research)

# Questions?

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# Thank you