

# Delirium in the Hospitalized Patient

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# Goals & Objectives

- Review the diagnosis of delirium and medical assessment of the delirious patient
- Understand delirium risk factors and precipitants
- Examine the associated costs and consequences of delirium
- Learn evidence-based methods for delirium prevention & treatment
- Looking forward at new directions for delirium research

# Delirium: So What?

- Delirium is COMMON – affecting up to 50% of hospitalized elders
- Delirium is COSTLY – \$150+ billion in the USA annually
- Delirium is DANGEROUS – can lead to lasting cognitive impairment and dementia, and is an independent marker for increased mortality
- Delirium is PREVENTABLE – in up to a third of cases based on studies of delirium prevention tools

# Delirium: A Common Complication

Population	Prevalence (%)	Incidence (%)	Occurrence (%)
General medical	18-35	11-14	29-49
Geriatric	25	20-29	45-54
ICU	7-50	19-82	26-100
Stroke	---	10-27	---
Palliative Care	---	47	---

Adapted from Table 1. Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. Lancet 2014;383:911–922.

# Delirium: Costs & Consequences

- Increased hospital LOS and direct hospital costs during admission
- Increased nursing care/staff burden
- Increased rates of nursing home placement at hospital discharge
- Persistent cognitive impairment 6-12 months after discharge
- Independent marker for 90-day mortality
- Strong association with falls, decubitus ulceration, aspiration, dehydration, malnutrition

Inouye SK, Rushing JT, Foreman MD, Palmer RM, Pompei P. Does delirium contribute to poor hospital outcomes? *J Gen Intern Med* 1998; 13(4): 204

Cole MG, Primeau FJ. Prognosis of delirium in elderly hospital patients. *CMAJ*. 1993;149:41–46.

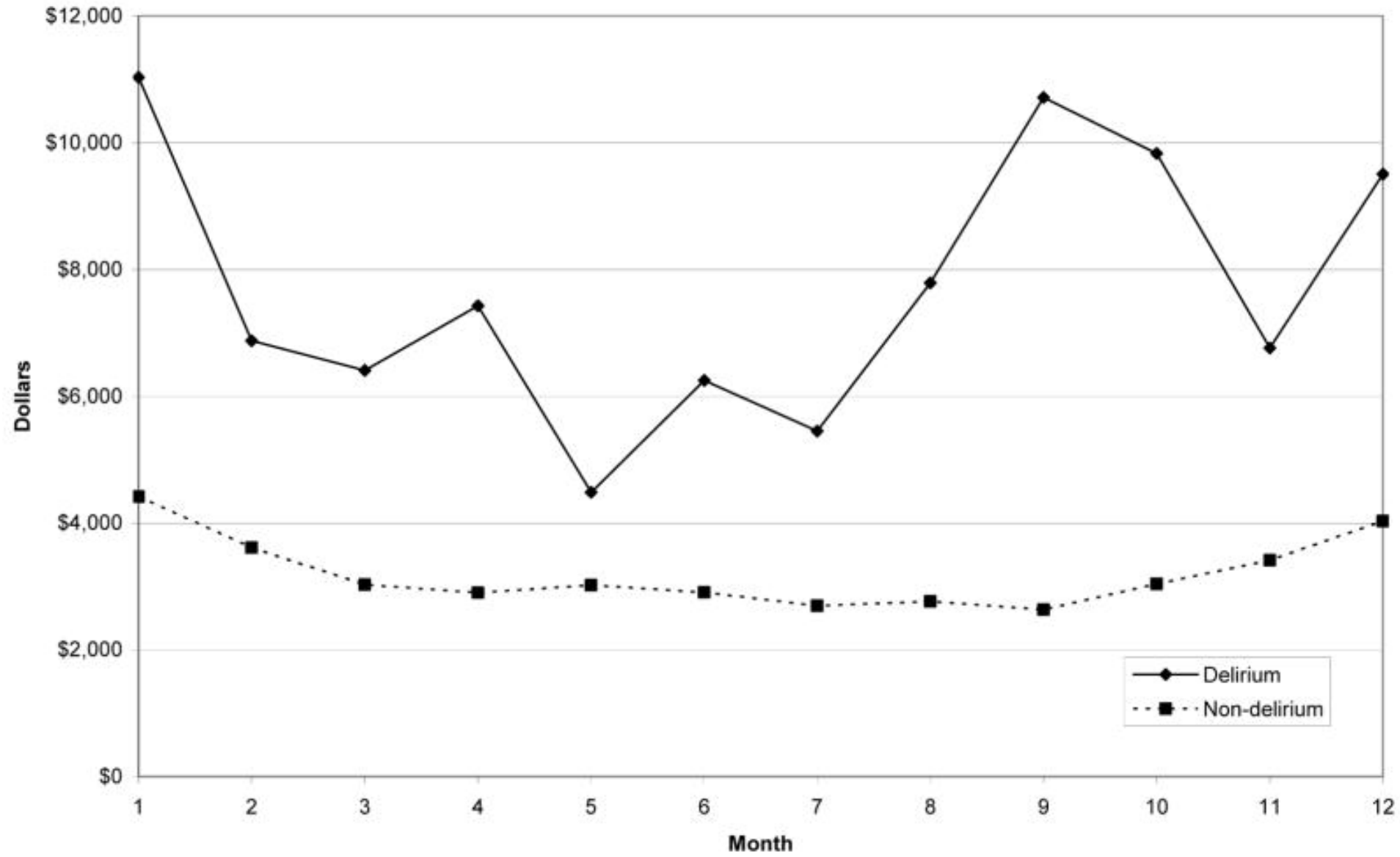
Dharmarajan K, Swami S, Gou R, Jones R, Inouye SK. Pathway from delirium to death: potential in-hospital mediators of excess mortality. *J Am Geriatr Soc*. 2016 Dec 30. [Epub ahead of print]

# Delirium: Financial Burden

- What about long term costs beyond hospitalization?
  - Study of 841 hospitalized patients age 70+ admitted for > 48h
  - Followed for 1 year after discharge
  - Reviewed health care costs (Yale New Haven hospital records and Medicare parts A + B)
  - 13% developed delirium
  - Delirious patients were more likely to have underlying dementia, dwell in a nursing home, have ADL impairment(s)

# Delirium: Financial Burden

Measure	Total cohort (N = 841)	+ Delirium (N = 109)	No delirium (N = 732)	p-value
Died w/in 1 year, N (%)	208 (25)	47 (43)	161 (22)	<.001
Days of follow-up (mean)	313	256	322	0.89
Total costs (mean)	\$50,745	\$69,498	\$47,958	<.001
Total costs per survival day (mean)	\$256	\$563	\$211	<.001



Adjusted total mean health care costs by month

Leslie DL, Marcantonio ER, Zhang Y, Leo-Summers L, Inouye SK. One-year health care costs associated with delirium in the elderly population. Arch Intern Med. 2008 Jan 14; 168(1): 27-32.



# Delirium: Financial Burden

→ \$60,000/year adjusted cost for one patient

→ 11.8 million patients aged 65+ are hospitalized annually

Assuming delirium complicates 20% of elder hospitalizations – direct annual costs of **\$140 – 152 billion!**

Hip fracture: \$7 billion

Falls: \$19 billion

Diabetes: \$91.8 billion

Cardiovascular disease: \$257.6 billion

# Delirium: Definition

- Disturbance in attention and awareness
- Acute onset; change from baseline; fluctuating over time
- Disturbance in cognition (memory, attention, language, perception)
- Not otherwise explained by acute or chronic medical condition
- Evidence of a precipitant

# Delirium: Other Features

- Sleep disturbance
- Hypo- or hyperactivity
- Emotional disturbances
  - Depressed mood, anxiety or aggression are common
- Visual hallucinations or persecutory delusions

# Delirium: An Elusive Diagnosis

- Delirium is often unrecognized and underdiagnosed...why?
  - Difficult to establish a patient's baseline mental status
  - Early or mild delirium can be subtle
  - Patients' high education levels can mask impairment
  - No lab or imaging data can diagnose delirium
  - Requires time and interaction at the bedside

# Delirium: 3 Steps to the Diagnosis

1. Determine baseline mental status
2. Perform cognitive assessment
  - a) Montreal Cognitive Assessment (MOCA) (if time permits)
  - b) Mini-cog: 3 word recall + clock draw
  - c) Assessment of orientation + attention task
3. Apply Confusion Assessment Method (CAM) tool

# The Confusion Assessment Method (CAM)

Acute MS change with  
fluctuating course

+

Inattention

+

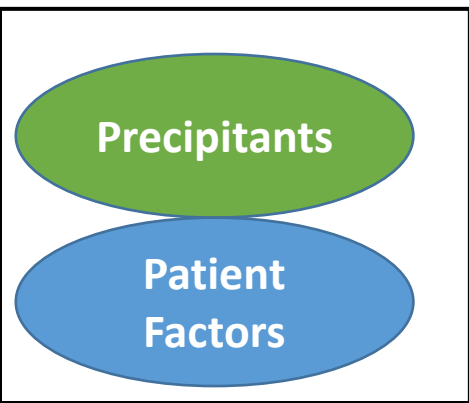
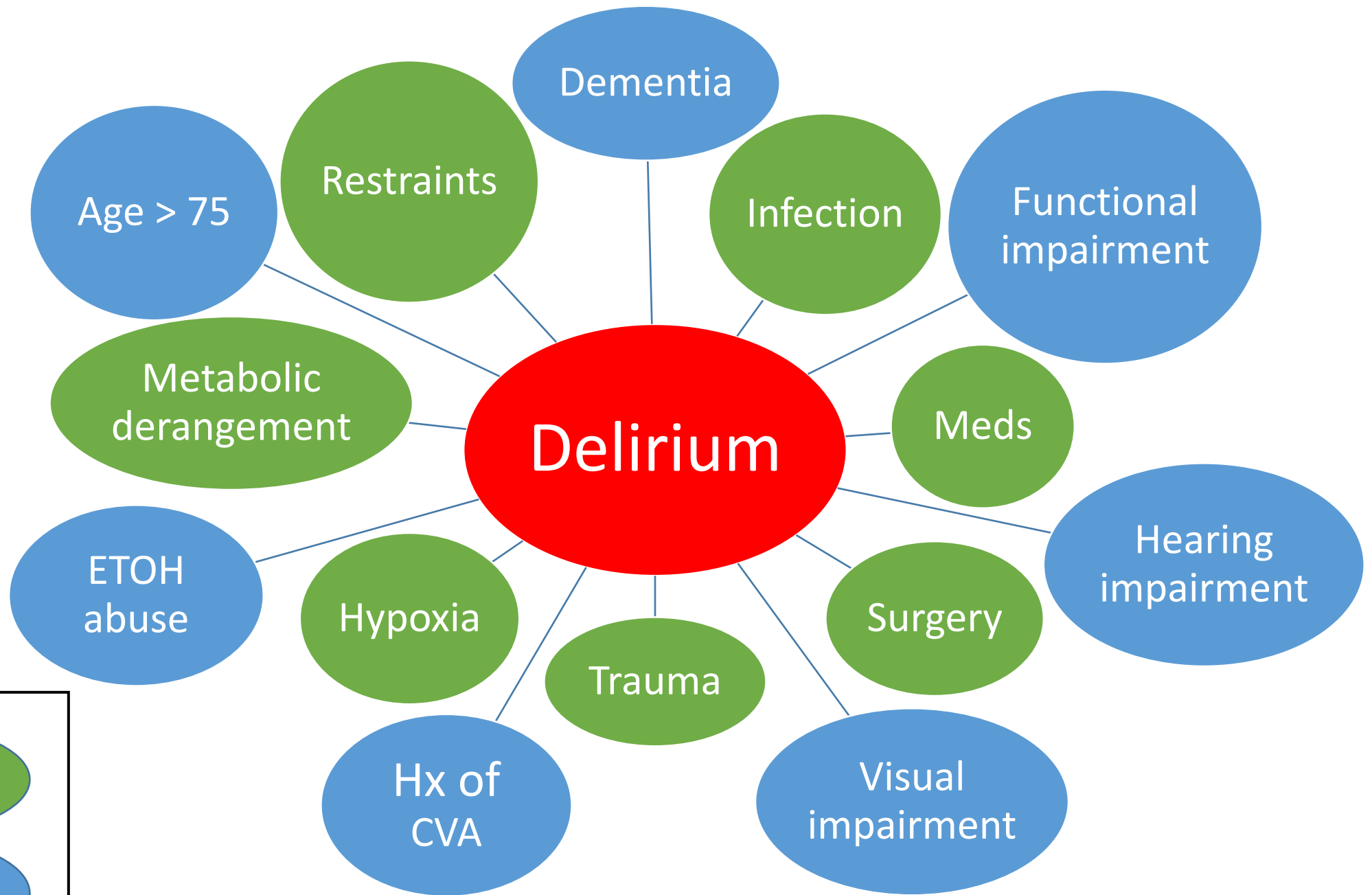
Disorganized thinking OR change in level of consciousness

=

Delirium

# Delirium: Diagnosis

- Confusion Assessment Method (CAM)
  - Complete at bedside in < 5 minutes
  - Sensitivity – 94%
  - Specificity – 89%
  - Versions available for nursing home or ICU use
  - [www.hospitalelderlifeprogram.org](http://www.hospitalelderlifeprogram.org) for free download and online training on use





# Delirium: Identify a Precipitant

Risk Factor	Relative Risk
AAA repair	8.3
Elevated BUN	5.1
Psychoactive drugs	4.5
Neurosurgery	4.5
Physical restraints	4.4
Noncardiac thoracic surgery	3.5
Trauma admission	3.4
Abnormal glucose, Na, K	3.4
Infection	3.1
Polypharmacy	2.9
Bladder catheter	2.4

Adapted from Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. *Lancet* 2014;383:911–922.

# Identify Underlying Cause(s)

- Delirium is a symptom, not a diagnosis
  - A thorough evaluation for precipitating conditions is crucial
1. Medication review
  2. Physical exam including neurological assessment
  3. Selected labs & imaging

# Focused History: Meds, Toxins, Symptoms

- Review recent changes in outpatient prescription medications
- Review inpatient MAR for new meds, missed doses, PRN doses
- Don't forget OTC meds – diphenhydramine (Benadryl), ranitidine, loratadine (Claritin)
- Obtain substance use/abuse history
- Screen for & treat pain, nausea, urinary retention, constipation

# Physical Exam

- Vital signs + POC glucose
- Signs of dehydration: skin turgor, dry mucous membranes
- Signs of infection: rhonchi, suprapubic pain, cellulitis, shingles, septic joint (or gout), decubitus ulcers
- Neurological exam
- Abdominal pain, distension, tympany
- Presence/absence of sensory impairments and corrective devices
- Presence/absence of restraints, bladder catheter

# Laboratory Studies to Consider

- **UA & culture**
- **CBC**
- **Chemistries including transaminases and calcium**
- Blood cultures
- Drug/tox screen TSH
- Arterial or venous blood gas sampling
- ammonia level

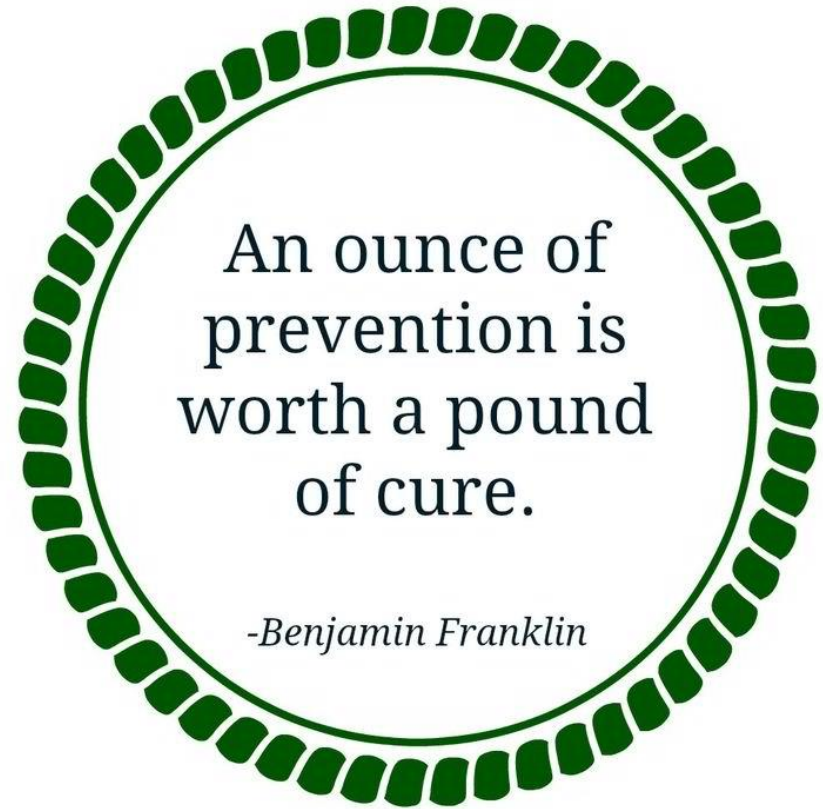


# Imaging Studies

- Consider EKG if pt with risk factors or hx of CAD
- EEG can rule out seizure, but generally low yield otherwise
- Neuroimaging if focal neurological signs on exam or in setting of head trauma or unwitnessed fall
- Lumbar puncture should be used rarely – to rule out meningitis or encephalitis, or if conservative measures fail to correct suspected delirium

# Delirium Management

1. PREVENTION!
2. Supportive care
3. Identify and treat underlying cause
4. Limited role for neuroleptic meds



# The Best Treatment is Prevention

- Avoid benzodiazepines, anticholinergics, tricyclics
- Encourage frequent visits from family/friends
- Limit interruptions of night-time sleep
- Lights on, shades up during daylight hours
- Noise reduction / earplugs
- Continue use of corrective devices (hearing aids, glasses)
- Early mobilization and PT/OT if patient able → DC BEDREST
- Cognitive stimulation may help
- Adequate pain treatment



# Supportive Care

- Continue all preventative measures
- Assess mental status at least twice a day (use CAM tool)
- Frequent re-orientation and reassurance
- Assess and treat dehydration and malnutrition
- Streamline med list and discontinue any potential offenders
- Remove bladder catheters and any other devices if able
- Bedside sitter/attendant if family cannot be present
  - Redirection, prevent falls, calm agitated behaviors

# Case

A 79 year old woman with a history of insulin-dependent diabetes and HTN is admitted with a hip fracture. She is medically optimized for surgery and awaiting operative repair.

Which of the following could help prevent delirium?

A. Trazodone 25mg PO QHS

B. Melatonin 2mg PO QHS

C. Ambien 10mg PO QHS

D. Have her husband spend the night in the recliner next to her bed

# Delirium: Pharmacologic Treatment

- Pharmacotherapy should be reserved for extreme cases (aggressive delirium = harmful to patient or staff)
  - Haloperidol 0.5-1mg PO, IM or IV (risk of QT prolongation with IV)
  - Short term use only; increased mortality in patients with dementia
- Physical restraints worsen delirium and increase risk of patient injury, and should not be used if at all possible
- Studies have shown promise with ramelteon (Rozerem) and melatonin in prevention of delirium in elderly patients

# Preventive Effects of Ramelteon on Delirium

## A Randomized Placebo-Controlled Trial

Kotaro Hatta, MD, PhD; Yasuhiro Kishi, MD, PhD; Ken Wada, MD, PhD; Takashi Takeuchi, MD, PhD;  
Toshinari Odawara, MD, PhD; Chie Usui, MD, PhD; Hiroyuki Nakamura, MD, PhD; for the DELIRIA-J Group

Aim: Assess efficacy of ramelteon in preventing delirium in hospitalized elders

Methods: RCT in ICUs and medical wards; medical patients aged 65-89y; ramelteon 8mg QHS vs placebo for 7 days

Outcomes: Incidence of delirium as defined by DSM-IV

Results: Ramelteon associated with lower risk of delirium (3% vs 33%)

# Assessment of role of perioperative melatonin in prevention and treatment of postoperative delirium after hip arthroplasty under spinal anesthesia in the elderly



Aim: Evaluate relationship between preop sedatives and postop delirium

Methods: RCT; 300 pts >65yo; hip arthroplasty under spinal  
Control vs melatonin 2mg vs midazolam 7.5 mg vs clonidine 100 mcg;  
Meds given at bedtime night before surgery and 90 min before incision

Outcomes: incidence of postoperative delirium

Results: delirium developed in 9.4% of patients in melatonin group vs 32.6 % of patients in the control group

# Physical Restraints

- Include mitts, wrist or ankle restraints, vests
- Siderails on the bed are considered a restraint if they prevent patient from getting out of bed on his/her own
- Associated with increased risk of injuries (skin breakdown, soft tissue trauma, asphyxiation)
- Prolonged duration of delirium
- Have not been shown to reduce pulling of lines, drains, or tubes

# New Approaches

- Family-administered protocols for reorientation
- Rehab-based curricula
- “Delirium rooms”
  - No restraints
  - Staff with special training in delirium prevention & treatment
  - Emphasis on behavioral interventions
- There are 23 different codes for delirium in ICD-10...  
...but < 5% of delirium cases are coded in the medical record!

# Take-Home Points

- Delirium is common, costly, and under-recognized
- Long term harms from delirium include NH placement, increased risk of death, lingering cognitive impairment
- Use the CAM tool to diagnose delirium
- Search for and treat the underlying cause(s)
- Prevention is key!



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