DELIRIUM IN HOSPITALIZED OLDER ADULTS

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Disclosures

- The presenter and her preceptor have no financial relationships with any commercial interests pertinent to this presentation.
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Pharmacist & Nurse Objectives

- Recognize etiologies and manifestations of delirium in hospitalized older adults.
- Describe strategies for preventing delirium in hospitalized patients.
- Identify pharmacological and non-pharmacological treatments for delirium.

Pharmacy Technician Objectives

- Define delirium older adults.
- Identify medications that treat delirium.
- Recognize strategies for assisting a hospitalized patient with delirium.

WHAT IS DELIRIUM?

Diagnosis

DSM5 Criteria

- Disturbance in attention (i.e., reduced ability to direct, focus, sustain, and shift attention) and awareness (reduced *orientation to the environment*).
- Develops over a short period of time
- Disturbance in cognition
- Not caused by a pre-existing condition
- There is evidence from the history, physical examination or laboratory findings that the disturbance is *a* direct physiological consequence of another medical condition, substance intoxication or withdrawal

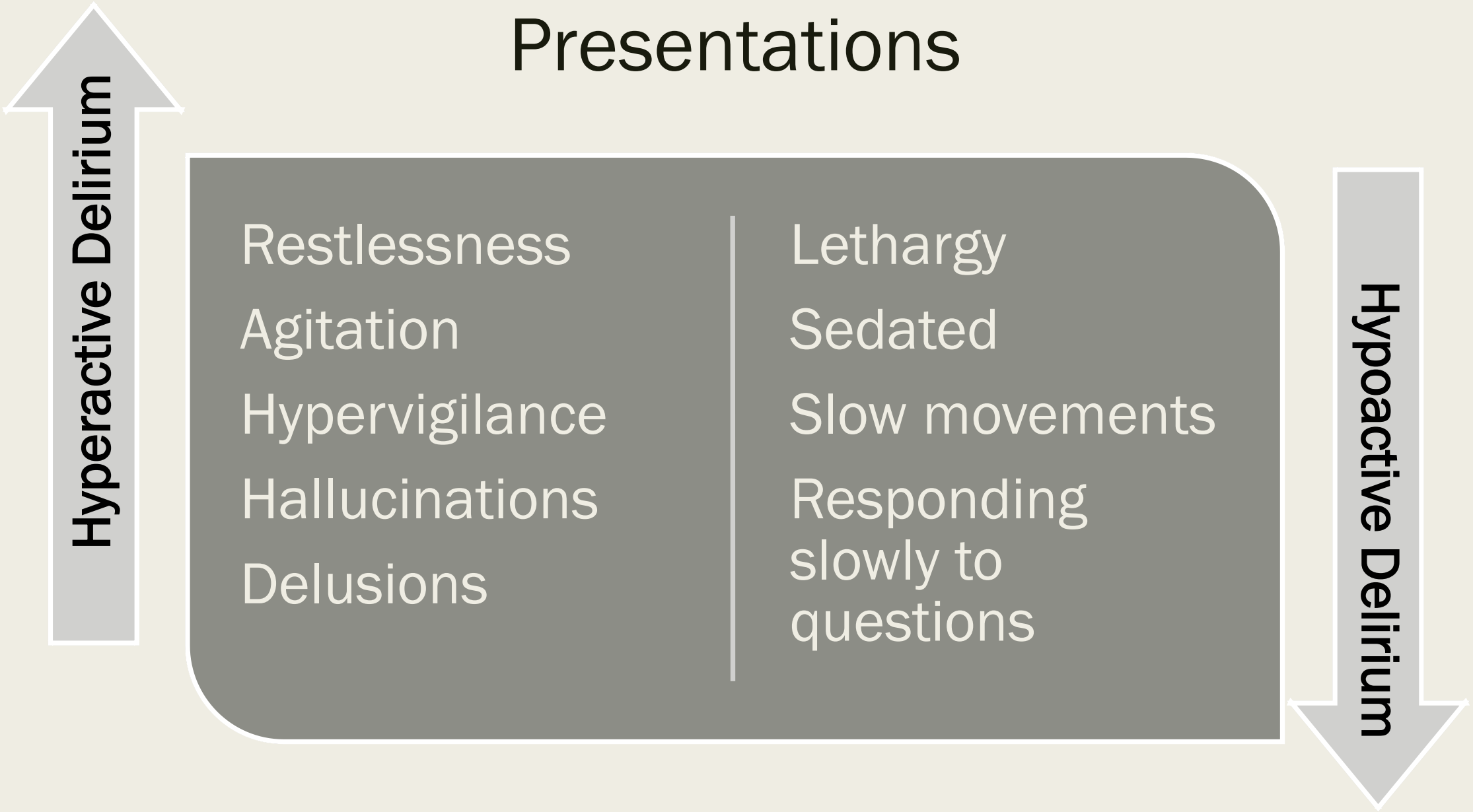
Source: European Delirium Association. *BMC medicine* vol. 12 141. 8 Oct. 2014

Significance of Delirium

- Approximately 11–25% of hospitalized older adults will have delirium upon admission
- Impacts 14-56% of hospitalized older adults
- Long term, patients with delirium tend to have faster cognitive decline over the next year than people who don’t
- One-year mortality of delirium is 39%

Sources: Vasilevskis, E et al. *Clinical anaesthesiology* vol. 26,3 (2012): 277-87
Marcantonio ER. N Engl J Med. 2017 Oct 12;377(15):1456-1466

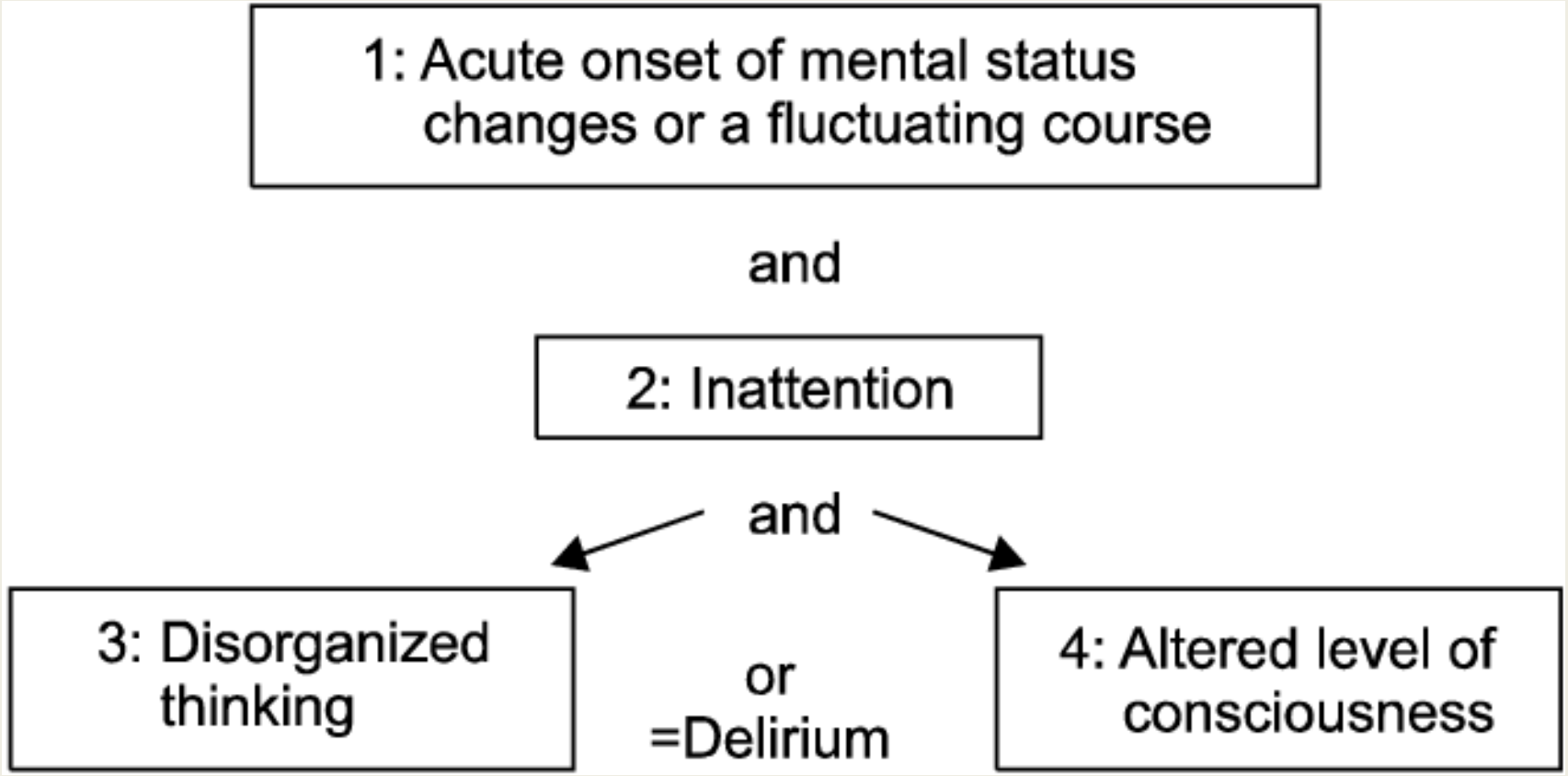
Presentations



Source: Marcantonio ER. N Engl J Med. 2017 Oct 12;377(15):1456-1466

Screening for Delirium

- Confusion Assessment Method (CAM)



Source: https://www.researchgate.net/figure/Diagnosis-of-delirium-by-CAM-ICU-CAM-ICU-confusion-assessment-method-for-the-intensive_fig2_276338681

CAM-SBMC

Box 1

I. ACUTE ONSET AND FLUCTUATING COURSE

A) Is there evidence of an ACUTE change in mental status from the patient's baseline?

○ Yes
◉ No

B) Does the Mental status Fluctuate?

Did the (abnormal) behavior fluctuate during the day, that is tend to come and go or increase and decrease in severity?

○ Yes
◉ No

II. INATTENTION

Difficulty Focusing Attention

Did the patient have difficulty focusing attention, for example, being easily distractible or having difficulty keeping track of what was being said?

○ Yes
◉ No

Box 2

III. DISORGANIZED THINKING

Disorganized & Incoherent Thinking

Was the patient's thinking disorganized or incoherent, such as rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject?

○ Yes
◉ No

IV. ALTERED LEVEL OF CONSCIOUSNESS

Rate LOC

◉ Alert (Normal)
○ Vigilant (Hyperalert)
○ Lethargic (drowsy, easily aroused)
○ Stupor (difficult to arouse)
○ Coma (unarousable)

Do any checks appear? (other than "normal")

○ Yes
◉ No

IF ALL ITEMS IN BOX 1 ARE CHECKED YES, AND AT LEAST 1 ITEM IN BOX 2 IS CHECKED YES, THE PATIENT SCORES POSITIVE ON THE CAM, AND THE DIAGNOSIS OF DELIRIUM IS SUGGESTED

CAM Results

○ Positive
◉ Negative

Delirium Work-up

- **Medication review is necessary**

Laboratory Workup	
CBC	Elevated WBC (>12,000 WBC/μL)
Sodium, potassium, bicarbonate	Sodium<135 mg/dL or >145 mg/dL Potassium<3.5 mg/dL or >5 mg/dL Bicarbonate<24 or >30
Serum creatinine	Acute kidney injury (increase in SCr>30% or >1.3 mg/dL)
Liver function tests	Elevated ammonia (>45)
Urinalysis	Urinary tract infections
Thyroid panel	Elevated TSH (>4)
Thiamine/Cyanocobalamin	Checking for malnutrition Thiamine<2.5 Cyanocobalamin<160
Toxicology screen	Positive for any drug in a toxicology screen

Source: Kalish VB, et al: Am Fam Physician. 2015 Sep 15;92 (6):430.

Knowledge Check: Pharmacist & Nurse

Patient DM is a 70-year-old patient who is admitted for a UTI. Her daughter states that her mother is acting strange. She is awake, but she speaks softly and slowly. When asked if she felt certain stimuli, she was slow to respond. She also kept asking her son to come closer to her, but he was not in the room. The patient was then diagnosed with delirium. What type of delirium does the patient have?

A. Hyperactive delirium
B. Hypoactive delirium
C. Mix of both
D. Patient doesn't have delirium

Knowledge Check: Correct Response

Patient DM is a 70-year-old patient who is admitted for a UTI. Her daughter states that her mother is acting strange. She is awake, but she speaks softly and slowly. When asked if she felt certain stimuli, she was slow to respond. She also kept asking her son to come closer to her, but he was not in the room. The patient was then diagnosed with delirium. What type of delirium does the patient have?

A. Hyperactive delirium

B. Hypoactive delirium

C. Mix of both

D. Patient doesn't have delirium

Knowledge Check: Technician

How is delirium defined?

A. Disturbance in attention
B. Acute mental status change
C. Short-term memory loss
D. A and B
E. All of the above

Knowledge Check: Correct Response

How is delirium defined?

A. Disturbance in attention
B. Acute mental status change
C. Short-term memory loss
D. A and B
E. All of the above

PATHOPHYSIOLOGY OF DELIRIUM

Predisposing Risk Factors

- Most common:
  - *Dementia diagnosis*
  - *Age above 65*
  - *Multiple comorbidities*
  - *Visual/functional impairment*
- Other risk factors:
  - *Depression*
  - *History of alcohol abuse*
  - *Poor nutritional status*
  - *Opioid or benzodiazepine use*
  - *Low education*
  - *Male sex*

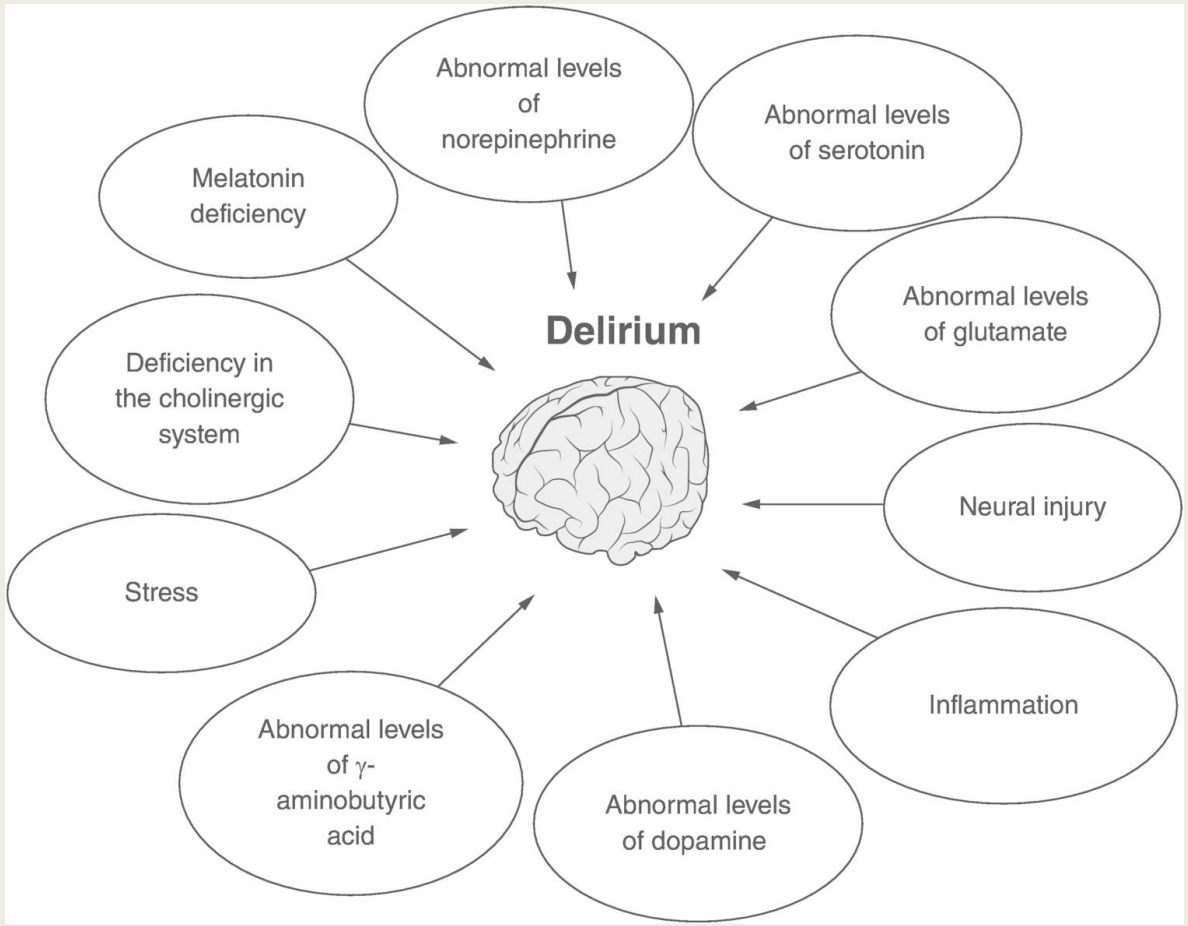
Source: Marcantonio, Edward R. *New Eng Jour of Med* vol. 377,15 (2017): 1456-1466.

Precipitating Risk Factors

- Most common:
  - *Ingestion of sedative hypnotic agents and anticholinergic agents*
  - *Surgery*
  - *Anesthesia*
  - *High pain levels*
  - *Anemia*
  - *Infection*
- Other risk factors:
  - *Myocardial infarction*
  - *Congestive heart failure*
  - *Anxiety*

Source: Marcantonio, Edward R. *New Eng Jour of Med* vol. 377,15 (2017): 1456-1466.

CAUSES OF DELIRIUM



Source: Marcantonio, Edward R. *New Eng Jour of Med* vol. 377,15 (2017): 1456-1466.

Medications that Increase Risk of Delirium

Opioids

Benzodiazepines

Centrally acting anti-hypertensives

Anticholinergics

Source: Ahmed, Suman et al. *Age and ageing* vol. 43,3 (2014): 326-33.

Opioids

- Increased sedation can cause cognitive impairment
- Increased sensitivity to these medications in older adults
  - *Cross the blood brain barrier*
- Beer's criteria recommendations:
  - *Only use for pain management during hospitalization for* ***severe, breakthrough*** *pain*
  - *Start with the lowest dose of opioids recommended and titrate slowly*
  - *Avoid concomitant use with benzodiazepines or gabapentin*
  - *Appropriate opioids:*
    - Oxycodone 5 mg PO every 6 hours as needed
    - Hydromorphone 1 mg PO every 6 hours as needed
    - Morphine 7.5 mg PO every 6 hours as needed
    - Morphine 1-2 mg IV every 4 hours as needed
    - Avoid morphine in renal impairment

Sources: Gazelka HM, et al.. Mayo Clin Proc. 2020 Apr;95(4):793-800
J Am Geriatr Soc. 2019 Apr;67(4):674-694

Benzodiazepines

- Increased risk of delirium, cognitive dysfunction, and falls with use
- Older adults may not metabolize medication as quickly due to depletion of phase 1 enzymes in the liver
- Beer's criteria recommendations:
  - *All benzodiazepines increase risk of cognitive impairment*
  - *Avoid use with opioids and gabapentin/pregabalin*
  - *Appropriate benzodiazepines*
    - Lorazepam 0.5 mg PO every 6 hours as needed for anxiety
    - Oxazepam 10 mg PO every 6 hours as needed for anxiety
    - Temazepam 7.5 mg PO at bedtime as needed for insomnia

Source: J Am Geriatr Soc. 2019 Apr;67(4):674-694

Anticholinergic Medications

- Older adults have increased blood brain barrier permeability, which allows for these medications to penetrate more easily
  - *Causes increased sedation and confusion due to drug exposure*
- Histamine-2 receptor antagonists were removed from Beer's criteria due to lack of evidence
- Beer's criteria recommendations:
  - *Avoid first generation antihistamines such as diphenhydramine, chlorpheniramine, doxylamine*
  - *Avoid oxybutynin for urinary incontinence*
    - Use more selective agent such as tolterodine or mirabegron
  - *Avoid tricyclic antidepressants such as amitriptyline, nortriptyline, imipramine*
  - *Recommend intranasal corticosteroids as first line for allergies:*
    - Fluticasone intranasal 2 sprays (100 mcg) nasal every day
    - Budesonide 32 mcg nasal every day

Source: J Am Geriatr Soc. 2019 Apr;67(4):674-694

Centrally acting antihypertensives

- Clonidine, methyldopa, guanfacine
- Crosses blood brain barrier
  - *Cause increased sedation and confusion*
  - *Causes orthostatic hypotension, which can lead to falls*
- Beer's Criteria recommendations:
  - *Avoid use in older adults*
  - *Preferred antihypertensive medications:*
    - Losartan 25 PO mg daily
    - Lisinopril 5 PO mg daily
    - Amlodipine PO 2.5-5 mg daily
    - Nifedipine ER PO 30 mg daily

Source: J Am Geriatr Soc. 2019 Apr;67(4):674-694

“RISK FACTORS FOR INCIDENT DELIRIUM AMONG OLDER PEOPLE IN ACUTE HOSPITAL MEDICAL UNITS: A SYSTEMATIC REVIEW AND META-ANALYSIS”

Background

- Delirium is associated with poor outcomes in hospitalized older adults
- Purpose was to identify risk factors of delirium in hospitalized older adults

Methods

- Included trials with patients age 55 and older, validated tool used to diagnose delirium, and acute medical/geriatric settings
- ICU trials were excluded from analysis
- 11 articles were included in the meta-analysis

Results/ Conclusion

- Mean age ranged from 73-84.5 years
- Dementia, critical illness, poor ADL function, polypharmacy, and use of benzodiazepines and opioids were found to increase risk of delirium

Source: Ahmed, Suman et al. *Age and ageing* vol. 43,3 (2014): 326-33.

Laboratory findings		
Malnutrition/low albumin	4.0** (2.2–7.4)	Inouye *et al.* [5]
	0.50* (0.26–0.95)	Villalpando-Berumen *et al.* [20]
	10.7* (1.5–74.5)	Wakefield [21]
Azotemia/Urea Abnormal	2.02** (0.89–4.60)	Inouye *et al.* [24]
Leucocyte abnormal	0.44* (0.21–0.90)	Villalpando-Berumen *et al.* [20]
Low haematocrit	2.16* (1.01–4.60)	Villalpando-Berumen *et al.* [20]
IGF-1	0.82* (0.69–0.97)	Wilson *et al.* [19]
Miscellaneous		
Iatrogenic events	1.9** (1.1–3.2)	Inouye *et al.* [5]
Stressful event	3.36** (2.86–5.44)	Bo *et al.* [17]
Heavy Alcohol use	6.1* (1.8–19.6)	Ranhoff *et al.* [28]
Prolonged hospital stay	1.07* (1.02–1.11)	Villalpando-Berumen *et al.* [20]
Smoking	0.2* (0.03–1.1)	Wakefield [21]

Source: Ahmed, Suman et al. *Age and ageing* vol. 43,3 (2014): 326-33.

Mental status		
Dementia	2.06** (1.62–2.64)	Bo *et al.* [17]
	2.82** (1.19–6.65)	Inouye *et al.* [24]
	3.26* (1.18–9.04)	Wilson *et al.* [19]
Depression	8.99* (1.59–50.76)	Wilson *et al.* [19]
Physical illness		
Illness severity	1.29** (1.11–1.51)	Bo *et al.* [17]
	3.49** (1.48–8.23)	Inouye *et al.* [24]
Co-morbidity	1.16* (1.04–1.30)	Villalpando-Berumen *et al.* [20]
Medication		
Polypharmacy	2.9** (1.6–5.4)	Inouye *et al.* [5]
	1.9* (1.1–3.2)	Ranhoff *et al.* [18]
Physical status		
Diminished ADL	8.4* (1.1–62.1)	Wakefield [21]
Urinary catheter	2.4** (1.2–4.7)	Inouye *et al.* [5]
	2.7* (1.4–4.9)	Ranhoff *et al.* [18]
Physical restraints	4.4** (2.5–7.9)	Inouye *et al.* [5]

Source: Ahmed, Suman et al. *Age and ageing* vol. 43,3 (2014): 326-33.

Knowledge Check: Pharmacist & Nurse

Which medication should be **avoided** to decrease risk of delirium?

A. Fluticasone nasal spray
B. Losartan
C. Amitriptyline
D. All of the above

Knowledge Check: Correct Response

Which medication should be **avoided** to decrease risk of delirium?

A. Fluticasone nasal spray

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C. Amitriptyline

D. All of the above

PREVENTION OF DELIRIUM

First Line Prevention of Delirium

- Ensure patient stays mobile
- Avoid restraints
- Adequate oxygenation
- Glasses/hearing aids
- Ensure adequate nutrition
- Orient to surroundings
  - *Ensure blinds are raised*
  - *Turn on lights*
  - *Clock in the room*
- Medication prophylaxis
  - *No medication recommended to prevent delirium*

Source: Oh, Esther S et al. *JAMA* vol. 318,12 (2017): 1161-1174

Knowledge Check: Technician

When delivering medications to the floor, you pass by an older adult patient's room. He is screaming in the room, saying he is in the twilight zone since the world is now dark. What is one way you can help this patient?

A. Open up the blinds in his room

B. Check with the nurse to see if the patient has glasses or hearing aids with him

C. Both

D. Neither

Knowledge Check: Correct Response

When delivering medications to the floor, you pass by an older adult patient's room. He is screaming in the room, saying he is in the twilight zone since the world is now dark. What is one way you can help this patient?

A. Open up the blinds in his room

B. Check with the nurse to see if the patient has glasses or hearing aids with him

C. Both

D. Neither

MANAGEMENT OF DELIRIUM

Treatment-Pharmacologic

- Should be used short term until delirium symptoms have subsided
- Lowest doses should be initiated
- Oral agents preferred over IV/IM
- Pharmacological Management for Underlying Causes
  - *Pain*
  - *Constipation*
  - *Sleep*
  - *Agitation*

Source: Kalish VB, et al. Am Fam Physician. 2014 Aug 1;90(3):150-8.

Pain

Types of Pain	Drug	Dose	Route
Neuropathic	Lidocaine	4% patch applied every 12 hours, up to 4 patches can be applied to 4 different spots in 24 hours	Topical patch 4%
Nociceptive	Diclofenac	Lower extremities: Apply 4 g of 1% gel to affected area 4 times daily (maximum: 16 g per joint per day). Upper extremities: Apply 2 g of 1% gel to affected area 4 times daily (maximum: 8 g per joint per day).	Topical gel 1%
	Acetaminophen	500-1000 mg every 6 hours as needed for pain, maximum dose 3000 mg for older adults	Oral tablet, liquid 325 mg, 500 mg, 650 mg IV 1000 mg Suppository 650 mg

Sources: Kalish VB, et al. Am Fam Physician. 2014 Aug 1;90(3):150-8.
Hudson (OH): Lexicomp, Inc.; 2007 [cited 2021 Mar 10]

Constipation

Type of medication	Drug	Dose	Route
Osmotic Laxative	Polyethylene glycol	17 g daily, can increase to 34 g if needed	Oral powder to be mixed with 8 ounces of water or juice
	Lactulose	10-20 g daily, maximum dose 40 g daily	Oral liquid Rectal enema
Stool softener	Docusate	100 mg up to 3 times a day as needed	Oral capsule, liquid, can be co-formulated with senna
Stimulant laxative	Senna	Two tablets (8.6 mg each) once daily, maximum daily dose 4 tablets/day	Oral tablet liquid,
	Bisacodyl	5-15 mg tablet once daily 10 mg suppository or enema daily	Oral tablet Rectal suppository or enema

Source: Hudson (OH): Lexicomp, Inc.; 2007 [cited 2021 Mar 10]

Sleep

- Hospitalized older adults sleep an average of 2.5 hours per night
- 1st Line: Non-pharmacologic treatment: improve sleep hygiene, relaxing environment, avoid medications given during the night

Mechanism of Action	Drug	Dose	Route
Binds to melatonin receptor, induces sleep	Melatonin	1-2 mg one hour prior to bedtime	Oral tablet
Inhibits serotonin reuptake	Trazodone	12.5-50 mg at bedtime	Oral tablet
Melatonin receptor agonist, induces sleep	Ramelteon	8 mg 30 minutes before bedtime	Oral tablet

Source: Farasat, Sadaf et al. *Current sleep medicine reports*, 1-13. 27 Jul. 2020

Agitation

- Etiology: confusion, disorientation, restraints, medication induced
- Medication duration is short term, until agitation is resolved
- Medications are titrated to the lowest effective dose needed for the patients
- Medications
  - *Risperidone*
  - *Quetiapine*
  - *Olanzapine*
  - *Aripiprazole*
  - *Haloperidol*
  - *Lorazepam*

Source: Stern, Theodore A et al. *Primary care companion to the Journal of clinical psychiatry* vol. 12,1 (2010)

Pharmacologic Treatment of Delirium Warning

- **Antipsychotics have a black box warning in older adults with dementia for increased mortality**
- All antipsychotic use in delirium is **off-label**

RISK OF DEATH WITH ATYPICAL ANTIPSYCHOTIC DRUG TREATMENT FOR DEMENTIA

Meta-analysis of Randomized Placebo-Controlled Trials

Background

- The purpose of this meta-analysis was to assess the evidence for increased mortality associated with atypical antipsychotic use in dementia patients

Methods

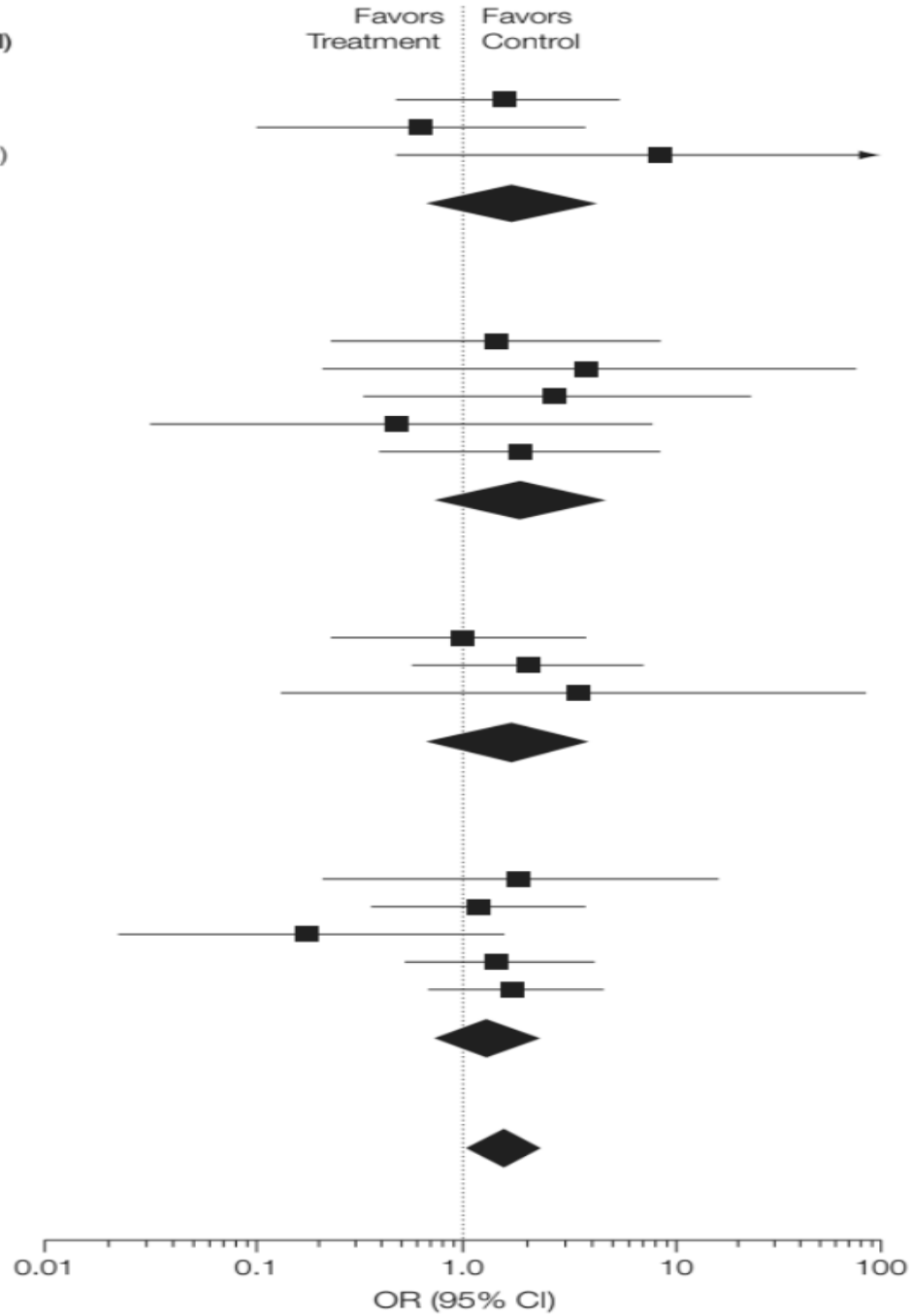
- Fifteen trials were included that looked at aripiprazole, olanzapine, quetiapine, and risperidone use in dementia patients
- 3353 patients were included
- Average age was 81

Results/ Conclusion

- Overall odds ratio for death for patients on antipsychotics vs not on antipsychotics was 1.54 (p=0.02)
- This concluded that there is a small risk of death associated with antipsychotic use in older adults with dementia
- Clinical significance is lacking

Source: Schneider LS, Dagerman KS, Insel P. *JAMA.* 2005;294(15):1934–1943

Source*	Deaths: Treatment, No. of Events/ Total No.	Deaths: Placebo, No. of Events/ Total No.	OR (95% CI) (Fixed-Effects Model)
Aripiprazole			
CN 138-004[38]	15/366	3/121	1.68 (0.48-5.91)
CN 138-005[39-41]	2/131	3/125	0.63 (0.10-3.84)
CN 138-006[40-42]	4/106	0/102	9.00 (0.48-169.32)
Subtotal	21/603	6/348	1.73 (0.70-4.30)
Test for Heterogeneity $\chi^2_2 = 2.42$, $I^2 = 17.2\%$ ($P = .30$)			
Test for Overall Effect $z = 1.18$ ($P = .24$)			
Olanzapine			
HGAO[37,43-45]	3/120	2/118	1.49 (0.24-9.06)
HGEU[6,45]	6/159	0/47	4.02 (0.22-72.73)
HGGU[45-47]	6/204	1/94	2.82 (0.33-23.75)
HGIC[45,48]	1/178	1/90	0.50 (0.03-8.13)
HGIV[8,45]	15/523	2/129	1.88 (0.42-8.30)
Subtotal	31/1184	6/478	1.91 (0.79-4.59)
Test for Heterogeneity $\chi^2_4 = 1.34$, $I^2 = 0\%$ ($P = .85$)			
Test for Overall Effect $z = 1.44$ ($P = .15$)			
Quetiapine			
5077 US-039[11,12]	4/124	4/125	1.01 (0.25-4.12)
5077 US-046[49]	16/241	3/92	2.11 (0.60-7.42)
Ballard[33]	1/26	0/29	3.47 (0.14-88.99)
Subtotal	21/391	7/246	1.67 (0.70-4.03)
Test for Heterogeneity $\chi^2_2 = 0.82$, $I^2 = 0\%$ ($P = .66$)			
Test for Overall Effect $z = 1.15$ ($P = .25$)			
Risperidone			
HGGU[45-47]	4/196	1/94	1.94 (0.21-17.58)
RIS-AUS-05[7]	6/167	5/170	1.23 (0.37-4.11)
RIS-INT-24[5,50]	1/115	5/114	0.19 (0.02-1.66)
RIS-USA-232[51]	9/235	6/238	1.54 (0.54-4.40)
RIS-USA-63[4]	25/462	5/163	1.81 (0.68-4.80)
Subtotal	45/1175	22/779	1.30 (0.76-2.23)
Test for Heterogeneity $\chi^2_4 = 3.69$, $I^2 = 0\%$ ($P = .45$)			
Test for Overall Effect $z = 0.94$ ($P = .35$)			
Overall	118/3353	41/1851	1.54 (1.06-2.23)
Test for Heterogeneity $\chi^2_{15} = 8.45$, $I^2 = 0\%$ ($P = .90$)			
Test for Overall Effect $z = 2.28$ ($P = .02$)			



Risperidone (Risperdal)

Medication class	Dose	Formulations	Onset	Adverse reactions	Population
Second generation antipsychotic	0.5-1 mg divided in 2 doses	Solution Oral tablets	60 minutes	Tremor, extrapyramidal symptoms, prolonged Qtc	Preferred: Overweight and obese, sedated
		Orally disintegrating tablets (ODT) **(preferred for agitation)**	45 minutes		Not preferred: Parkinson's disease

Source: Hudson (OH): Lexicomp, Inc.; 2016 [updated 17 Sept 2020 cited 30 Sept 2020].

Olanzapine (Zyprexa)

Medication class	Dose	Formulations	Onset	Adverse reactions	Population
Second generation antipsychotic	Oral 1.25-5 mg once daily, titrate daily as needed up to 20 mg/day IM: 2.5-5mg daily, titrate as needed up to 20 mg/day	Oral tablet Orally disintegrating tablet	60 minutes	Akathisia, extrapyramidal symptoms prolonged Qtc	Preferred: Parkinson's disease
		Intramuscular solution	15 minutes		Not preferred: Patients older than 70

Source: Hudson (OH): Lexicomp, Inc.; 2016 [updated 17 Sept 2020 cited 30 Sept 2020].

Quetiapine (Seroquel)

Medication class	Dose	Formulations	Onset	Adverse reactions	Population
Second generation antipsychotic	Oral: 12.5-25 mg 1-4 times daily as needed for symptoms	Oral tablet	90 minutes	Qtc prolongation, drowsiness, increased appetite	Preferred: Parkinson's disease, hyperactive delirium, insomnia
					Not preferred: prolonged QTc

Source: Hudson (OH): Lexicomp, Inc.; 2016 [updated 17 Sept 2020 cited 30 Sept 2020

Aripiprazole (Abilify)

Medication class	Dose	Formulations	Onset	Adverse reactions	Population
Second generation antipsychotic	2-5 mg once daily May increase dose based on response to a maximum of 15 mg/day	Solution Oral tablets Orally disintegrating tablets (ODT)	3 hours	Orthostasis, constipation, back pain	Preferred: Prolonged QTc, hypoactive delirium

Source: Hudson (OH): Lexicomp, Inc.; 2016 [updated 17 Sept 2020 cited 3 Feb 2021

Haloperidol (Haldol)

Medication class	Dose	Formulations	Onset	Adverse reactions	Population
First generation antipsychotic	Oral: 2-10 mg, may repeat dose every 6 hours as needed, max 30 mg/day IM or IV 0.5-1 mg, can repeat every 30 minutes until calm. Maximum 5 mg/day	Intramuscular/ intravenous	3-28 minutes	Extrapyramidal symptoms, dystonia, drowsiness, prolonged Qtc	Preferred: Hypoactive and hyperactive delirium
		Oral tablet	120 minutes		Not preferred: Parkinson's disease, history of akathisias or tardive dyskinesia

Source: Hudson (OH): Lexicomp, Inc.; 2016 [updated 17 Sept 2020 cited 30 Sept 2020]

Antipsychotic Comparison-Adverse Reactions

	Extrapyramidal Symptoms	Sedation	Qtc Prolongation	Orthostasis	Anticholinergic Effects
Risperidone	+++	-	++	+	+/-
Olanzapine	+/-	++	++	+	++
Quetiapine	+/-	+++	++	++	++
Aripiprazole	+	-	+/-	+	+
Haloperidol	++/+++	+	+++	+	+/-

Source: Muench J et. al. Am Fam Physician. 2010 Mar 1;81(5):617-22. PMID: 20187598.

Lorazepam

Medication class	Dose	Formulation	Onset	Adverse reactions	Preferred populations
Benzodiazepine	Oral/IM/IV: 0.5-2 mg every 2-6 hours as needed	Oral tablet	Oral: 20-30 minutes	Respiratory depression, sedation, dizziness	Parkinson's disease or have parkinsonisms with antipsychotics
		IV/IM solution	IM/IV: 10 minutes		

Source: Hudson (OH): Lexicomp, Inc.; 2016 [updated 17 Sept 2020 cited 30 Sept 2020].

Knowledge Check: Technician

Which of the following medications can treat delirium?

A. Quetiapine
B. Clonidine
C. Omeprazole
D. A and B
E. All of the above

Knowledge Check: Correct Response

Which of the following medications can treat delirium?

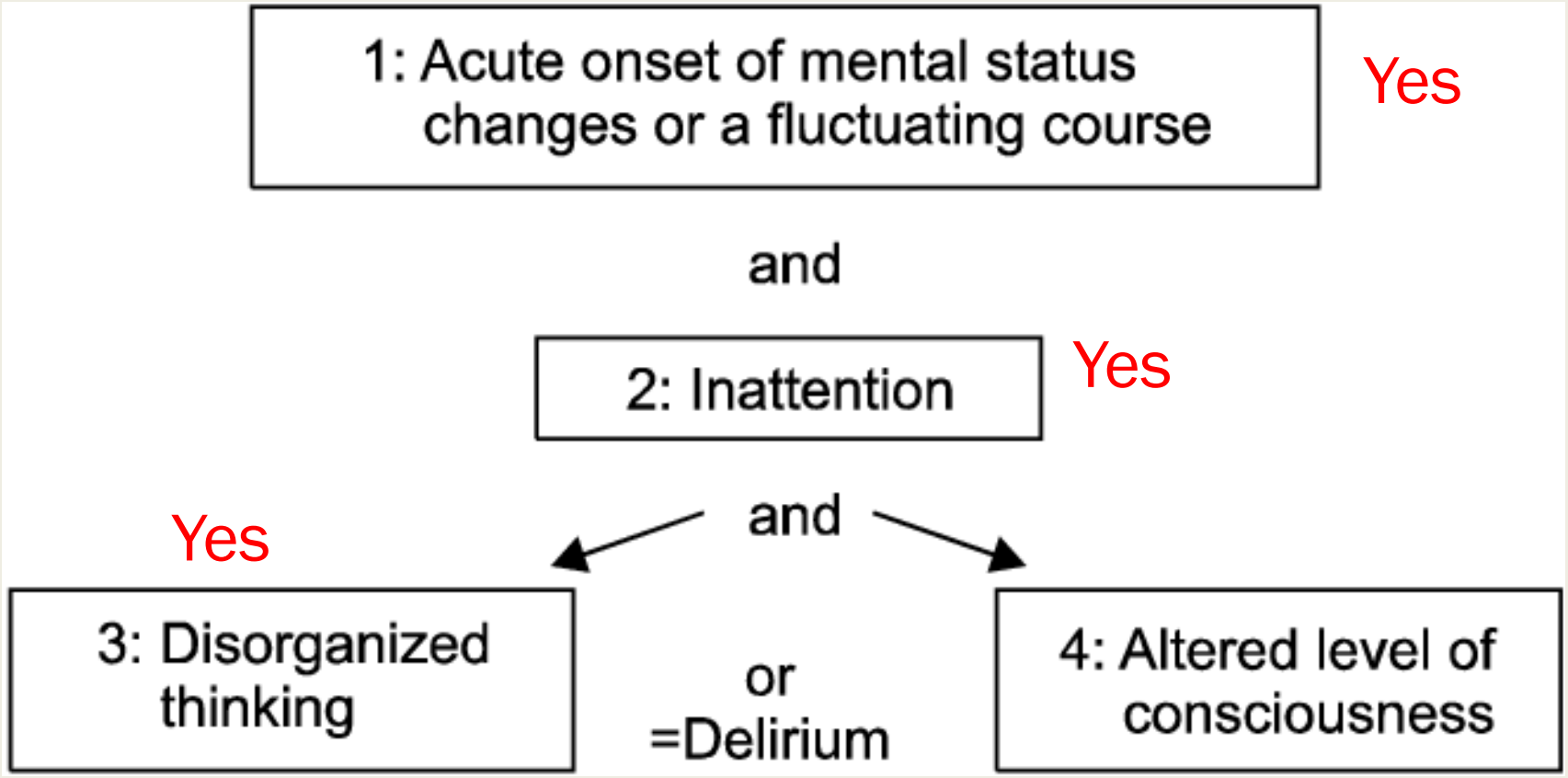
A. **Quetiapine**
B. Clonidine
C. Omeprazole
D. A and B
E. All of the above

DEVELOPING A CARE PLAN

Patient Case

- Patient TD is an 81 year old man who presents to the emergency department with increasing agitation and confusion. He has a past medical history of hypertension, diabetes, and Parkinson's disease. His wife stated that TD was acting normally up until the afternoon, when TD wanted to take their dog out for a walk. His wife told him they do not have a dog. This made TD very angry since he said the dog was sitting by the door waiting for his walk, even though there was no dog there. This prompted his wife to call 911. In the ED, TD is screaming since he did not get to take out his dog, but is able to be calmed by nurses.

Diagnosis-CAM tool



Patient Case

- Patient TD is diagnosed with delirium based on his CAM score

- How should we approach treatment of TD?

ED AGITATION PATHWAY

TREATMENT OPTIONS

Scale	Non-pharmacologic Therapies for All Ages	Age < 70 yrs	Age ≥ 70 yrs	Parkinsonian-like Symptoms
		VAT SCORING	SCORING: (CAM +)	
GREEN **Behavior:** Cooperative without being disruptive **Goals:** Verbal de-escalation Non-pharmacologic therapies for reorientation PO meds as needed	Orient to time/place/person Initiate diet/fluid orders Initiate bowel regimen Appropriate noise/light Restart home medications	**VAT 0-3** **Order PRN medication for agitation** Risperidone 1 mg PO PRN Quetiapine 50 mg PO PRN Haloperidol 2 mg PO PRN Lorazepam 1 mg PO PRN	Quetiapine 25 mg PO PRN Lorazepam 0.5 mg PO PRN Haloperidol 0.25 mg PO PRN	Quetiapine 25 mg PO PRN Lorazepam 0.5 mg PO PRN
YELLOW **Behavior:** Signs of overt activity but calms with instruction **Goals:** Alleviate agitation and prevent escalation to harm	Orient to time/place/person Initiate diet/fluid orders Initiate bowel regimen Appropriate noise/light Restart home medications Consider underlying medical disorders when selecting agent **Order PRN medication for agitation AND consider STAT once treatments**	**VAT 4-6** PO Options: Risperidone 2 mg PO x 1 Quetiapine 50 mg PO x 1 Haloperidol 2 mg PO x 1 Lorazepam 1 mg PO x 1 IV/IM Options: Haloperidol 5 mg IM x 1 Lorazepam 1 mg IV/IM x 1 OR Olanzapine 5 mg IM x 1€€	PO Options: Quetiapine 25 mg PO x 1 Haloperidol 0.25 mg PO x 1 Lorazepam 0.5 mg PO x 1 IV/IM Options: Lorazepam 0.5 mg IV x 1 Haloperidol 1 mg IM x 1	PO Options: Quetiapine 25 mg PO x 1 Lorazepam 0.5 mg PO x 1 IV/IM Options: Lorazepam 0.5 mg IV x 1
RED* **Behavior:** Continuously disruptive and may require restraint **Goal:** Alleviate agitation and prevent escalation to harm	+/- Physical restraints Consider underlying medical disorders when selecting agent **Order PRN medication for agitation AND STAT once treatments**	**VAT 7-9** Haloperidol 5 mg IM x 1 Lorazepam 2 mg IV x 1 OR Olanzapine 10 mg IM x 1€€	Lorazepam 0.5 mg IV x 1 Haloperidol 1 mg IM x 1	Lorazepam 0.5 mg IV x 1
GRAY* **Behavior:** Violent and imminently dangerous to all **Goal:** Rapid tranquilization	+/- Physical restraints **Order PRN medication for agitation AND STAT once treatments**	**VAT 10+** Ketamine 4 mg/kg IM x 1€€ AVOID IN SCHIZOPHRENIA ****to be administered in presence of provider****		

Preferred PRN Regimen (x 4 doses): Risperidone 0.25-1 mg PO Q12H, Quetiapine 25-50 mg daily-Q12H, Lorazepam 0.5-1 mg PO/IV Q8H

IV Haloperidol requires EKG prior to administration > 2 mg OR if patient has concomitant risk factors for QTc prolongation

*Standing orders should be placed on all patients requiring 1:1 sitter

€€ Respiratory Monitoring required, administer as solo agent in lieu of other agents

Green

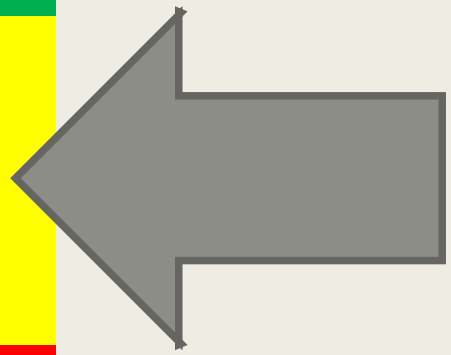
Behavior:
Cooperative without being disruptive

Goals:
Verbal de-escalation
Non-pharmacologic therapies for reorientation
PO meds as needed

Yellow:

Behavior:
Signs of overt activity but calms with instruction

Goals:
Alleviate agitation and prevent escalation to harm



Red

Behavior:
Continually disruptive and may require restraints

Goals:
Alleviate agitation and prevent escalation to harm

Gray

Behavior: Violent and imminent danger to all

Goal: Rapid tranquilization

Orient to time/place/person
Initiate diet/fluid orders
Initiate bowel regimen
Appropriate noise/light
Restart home medications
Consider underlying medical disorders when selecting agents

Order PRN medications for agitation AND consider STAT once treatments

Patient Case

- Patient’s wife denies history of constipation, pain conditions or recent insomnia
- Patient’s wife stated the patient has hearing aides and the batteries were changed last week
- Patient is well hydrated
- Denies history of noncompliance with medication
- Patient had his glasses on in the emergency room

Treatment of Delirium

Age<70	Age≥70
PO Options: Risperidone 2 mg PO x 1 Quetiapine 50 mg PO x 1 Haloperidol 2 mg PO x 1 Lorazepam 1 mg PO x 1 IV/IM Options: Haloperidol 5 mg IM x 1 Lorazepam 1 mg IM/IV x 1 OR Olanzapine 5 mg IM x 1	PO Options: Quetiapine 25 mg PO x 1 Haloperidol 0.25 mg PO x 1 Lorazepam 0.5 mg PO x 1 IM/IV Options: Lorazepam 0.5 mg IV x 1 Haloperidol 1 mg IM x 1

Knowledge Check: Pharmacist & Nurse

What would be the best treatment for the patient?

A. Haloperidol IM 1 mg

B. Risperidone 1 mg ODT

C. Melatonin 2 mg

D. Quetiapine 25 mg

Knowledge Check: Correct Response

What would be the best treatment for the patient?

A. Haloperidol IM 1 mg

B. Risperidone 1 mg ODT

C. Melatonin 2 mg

D. **Quetiapine 25 mg**

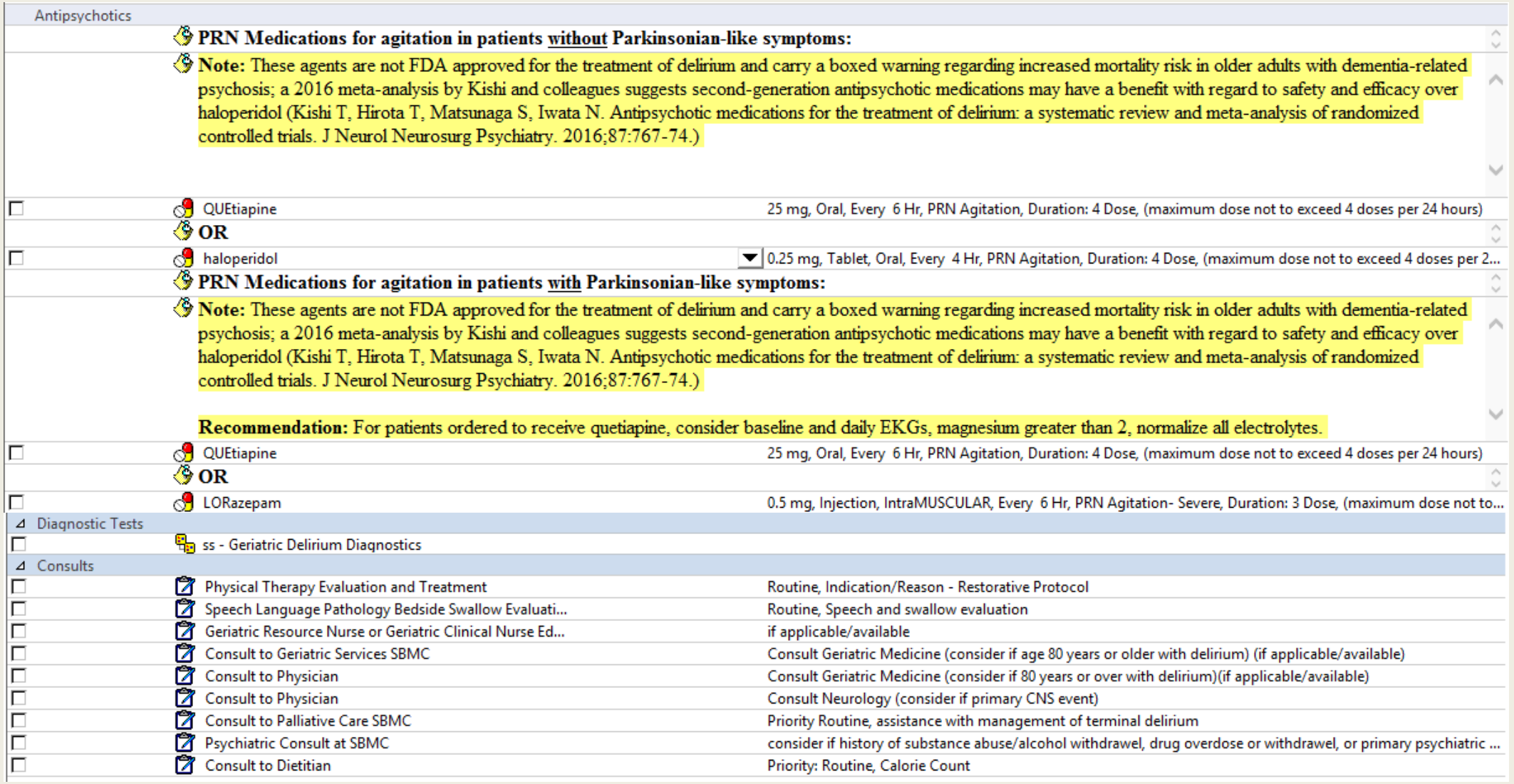
Patient Case

- TD was treated with quetiapine 25 mg in the ED
- Transferred to the floor for inpatient management of delirium

SBMC Geriatric Inpatient Delirium Algorithm

Vital Signs		
☐	Vital Signs (BP, Heart Rate, Resp, Temp)	No vital signs between 10 pm and 6 am, unless clincally contraindicated
Patient Care		
	Persistent Note: ***A GERIATRIC IPOC ACCOMPANIES THIS ORDER SET AND MUST BE INITIATED*	
☐	Eating Protocol (Monitor Meals)	Monitor and document food intake each meal - Notify physician if food intake less than or equal to 50% fluid i...
☐	Head of Bed (HOB)	Elevate HOB greater than 30 degrees
☐	Bladder Scan	Use bladder scan if patient has not voided in 4 hours
Communication		
☑	Nurse to Initiate	Complete Geriatric Delirium IPOC
Intake and Output		
☐	Intake and Output	every 8 hours. Notify physician if fluid intake is less than or equal to 1500 mL/day
Medications		
Gastrointestinal Agents		
	Bowel management, patients taking PO (select all that apply, may be used in combination if necessary):	
☐	docusate	100 mg, Capsule, Oral, 2 times a Day, (Hold for >2 BM/day)
☐	senna	17.2 mg, Tablet, Oral, Bedtime, (Hold for >2 BM/day)
☐	polyethylene glycol 3350	17 g, Powder, Oral, Daily, (Hold for >2 BM/day)
☐	bisacodyl	10 mg, Suppository, Rectal, Daily, PRN Constipation, (if no bowel movement in past 2 days)
☐	lactulose	10 g, Syrup, Oral, Once, (Hold for >2 BM/day); 10 gram = 15 mL
	Bowel management, patients on feeding tube (select all that apply, may be used in combination if necessary):	
☐	docusate	100 mg, Liquid, NG-Tube, 2 times a Day, (Hold for >2 BM/day)
☐	senna	17.6 mg, Syrup, NG-Tube, 2 times a Day, (Hold for >2 BM/day); 17.6 gram = 10 mL
☐	polyethylene glycol 3350	17 g, Powder, NG-Tube, Daily, (Hold for >2 BM/day)
☐	bisacodyl	10 mg, Suppository, Rectal, Daily, PRN Constipation, (if no bowel movement in past 2 days)
Ancillary Medications		
	Sleep management:	
☐	melatonin (Melatonin)	1 mg, Tablet, Oral, With Dinner
	OR	
☐	traZODone	25 mg, Tablet, Oral, Bedtime, PRN Insomnia
Analgesics		
	Pain management (suggested starting doses for older adults):	
☐	acetaminophen	650 mg, Tablet, Oral, Every 4 Hr, Pain-Mild 1-3, Do not exceed 4 gm/day acetaminophen from all sources

SBMC Geriatric Inpatient Delirium Algorithm



Antipsychotics		
	PRN Medications for agitation in patients without Parkinsonian-like symptoms:	
	Note: These agents are not FDA approved for the treatment of delirium and carry a boxed warning regarding increased mortality risk in older adults with dementia-related psychosis; a 2016 meta-analysis by Kishi and colleagues suggests second-generation antipsychotic medications may have a benefit with regard to safety and efficacy over haloperidol (Kishi T, Hirota T, Matsunaga S, Iwata N. Antipsychotic medications for the treatment of delirium: a systematic review and meta-analysis of randomized controlled trials. J Neurol Neurosurg Psychiatry. 2016;87:767-74.)	
☐	QUEtiapine	25 mg, Oral, Every 6 Hr, PRN Agitation, Duration: 4 Dose, (maximum dose not to exceed 4 doses per 24 hours)
	OR	
☐	haloperidol	0.25 mg, Tablet, Oral, Every 4 Hr, PRN Agitation, Duration: 4 Dose, (maximum dose not to exceed 4 doses per 2...
	PRN Medications for agitation in patients with Parkinsonian-like symptoms:	
	Note: These agents are not FDA approved for the treatment of delirium and carry a boxed warning regarding increased mortality risk in older adults with dementia-related psychosis; a 2016 meta-analysis by Kishi and colleagues suggests second-generation antipsychotic medications may have a benefit with regard to safety and efficacy over haloperidol (Kishi T, Hirota T, Matsunaga S, Iwata N. Antipsychotic medications for the treatment of delirium: a systematic review and meta-analysis of randomized controlled trials. J Neurol Neurosurg Psychiatry. 2016;87:767-74.) **Recommendation:** For patients ordered to receive quetiapine, consider baseline and daily EKGs, magnesium greater than 2, normalize all electrolytes.	
☐	QUEtiapine	25 mg, Oral, Every 6 Hr, PRN Agitation, Duration: 4 Dose, (maximum dose not to exceed 4 doses per 24 hours)
	OR	
☐	LORazepam	0.5 mg, Injection, IntraMUSCULAR, Every 6 Hr, PRN Agitation- Severe, Duration: 3 Dose, (maximum dose not to...
⊿ Diagnostic Tests		
☐	ss - Geriatric Delirium Diagnostics	
⊿ Consults		
☐	Physical Therapy Evaluation and Treatment	Routine, Indication/Reason - Restorative Protocol
☐	Speech Language Pathology Bedside Swallow Evaluati...	Routine, Speech and swallow evaluation
☐	Geriatric Resource Nurse or Geriatric Clinical Nurse Ed...	if applicable/available
☐	Consult to Geriatric Services SBMC	Consult Geriatric Medicine (consider if age 80 years or older with delirium) (if applicable/available)
☐	Consult to Physician	Consult Geriatric Medicine (consider if 80 years or over with delirium)(if applicable/available)
☐	Consult to Physician	Consult Neurology (consider if primary CNS event)
☐	Consult to Palliative Care SBMC	Priority Routine, assistance with management of terminal delirium
☐	Psychiatric Consult at SBMC	consider if history of substance abuse/alcohol withdrawel, drug overdose or withdrawel, or primary psychiatric ...
☐	Consult to Dietitian	Priority: Routine, Calorie Count

Conclusion

- Delirium is a complex disease states that often occurs in hospitalized older adults
- Increased mortality is associated with delirium
- First line therapy is non-pharmacologic therapy
- Pharmacologic treatment consists of correcting underlying cause, which includes pain, constipation, sleep, and agitation
- Pharmacologic selection is based on age, comorbid conditions, and patient's mental status

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THANK YOU FOR YOUR TIME

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