

Foundations of Emergency Medicine

Foundations III: Guided Small Group Experience

Session 18: Geriatric Care in the ED

Unit: Special Populations

❖ **Agenda and Learning Objectives**

- Case Part I – Introduction to Geriatric Care (5 min)
 - Discuss the subtle and complex nature of older adult ED visits
 - Determining which underlying issue requires emergent/urgent attention
- Case Part II – Dementia in the ED (5 minutes)
 - Outline the existing cognitive screens for ED patients
 - Discuss screening for independence and safety among persons with dementia
- Case Part III – Disposition of Geriatric Patients (15 min)
 - Discuss the factors for safe ED disposition for persons with dementia
 - Identify the short-term social and clinical support required to ensure safety
 - Understand the risks of hospital admissions among older adults and particularly those with any cognitive impairment
- Case Part IV – High Risk Medications and Falls (15 min)
 - Review high risk medications in the elderly
 - Review fall risk evaluation in the ED
- Case Conclusion and Teaching Points (10 min)

❖ **Note to Facilitators**

This session is split into two cases. The first highlights teaching points surrounding general care of the geriatric patient in the ED, dementia identification and safe discharge planning while the second case highlights falls in the elderly and potentially dangerous medications in this population. It is a large group discussion. The only additional materials that you may consider is making copies of the Blessed Cognitive Screening Tool and high-risk medication tables attached at the end of this guide.

❖ **Case Part I - Introduction to Geriatric Care (5 min)**

- *GN is a 72 year-old woman who walks into the ED complaining of a cough for two weeks. She denies any fever, chills, difficulty breathing or any other complaints. She states, "I think I just need some antibiotics and I'll be fine". Subsequently, under ROS she also acknowledges occasional chest pain but it is not exertional, pleuritic or clearly musculoskeletal. She had a previous PMD affiliated with the ED's hospital but had no recorded visits for the past 19 months. She has a PMHx of HTN managed by HCTZ and metoprolol that were last renewed at a satellite clinic 5 months ago. Her EMR also notes arthritis and a fall w/o injury. She is overall well-appearing and pleasant. Her vital signs are unremarkable: T98, BP 108/72, HR 58, RR 16, O2 98% RA, Ht 5'2", Wt 90lbs. Her ED workup for her cough included CXR (unremarkable) and labs (mild hypokalemia K=2.9 and dehydration UA Spec Grav 1.045, +ketones; troponins were 0.001 x2). She was ultimately diagnosed with bronchitis.*
- *During her stay she was noted to be mildly obsessive/compulsive and forgetful of things. She asked for a Tylenol for her arthritis and was given a 650mg tablet, which she was observed to swallow. Thereafter, she kept asking the nurse on three other occasions over her ED stay for "Tylenol" and kept obsessing about her "aches and pain from arthritis" and repeated explaining why she needed a Tylenol. Each time reminded she received the medication. Her total ED stay was 6h (1.5hr waiting room, 1h preliminary assessment in room, 3-hr stay for trop x2 and result) and in that time her nurse observed that she did not drink and refused repeated offers of drink or food. The medical student also discovered a loss of 30 lbs (120lb to 90lb) since the last PMD visit 19 months ago, which suggests suboptimal nutrition. An attempt to contact her PMD revealed that her former PMD had since left the institution. When asked, the patient tells the nurse, "Oh, I don't like to see doctors, I only came because this cough bothers me" and when asked about hydration at home, replies "I try not to drink too much because I get up to pee all the time and it interrupts my sleep." She is widowed for 7 years, lives alone, her son lives and works overseas and her best friends have both moved out of state.*

❖ **Discussion Questions with Teaching Points**

- **Why did she come to the ED?**
 - Frankly, her reason for visit is likely the cough, although this is not the most important clinical finding
 - In any case, regardless of the provided chief complaint, there are often unmet care needs or other progressive health declines that are subtle or ignored by the patients themselves and a diligent ROS approach and keen observation are often invaluable to the emergency physician when caring for elderly patients
- **What are the significant findings from her workup at this visit?**
 - Her poor nutritional status, as suggested by the objective weight loss and her abnormally low BMI of 16.5
 - Her hypokalemia is likely from her HCTZ

- Her elevated specific gravity and ketones on her urinalysis indicate a dehydrated state
- **What are the concerning observations during this ED visit?**
 - Her repeated request for Tylenol and forgetting that she had received and taken the medication within the past hour raises concern for her memory impairment and should raise concern for how she is taking her prescribed medications at home → that she may not be taking her home medications correctly, even possibly doubling up on doses or she could forget her medication regimen and not take any of her medications
 - Her forgetfulness, in combination with her poor judgment and overall behavior, indicate a strong possibility of undiagnosed cognitive impairment

❖ **Case Part II: Cognitive Impairment in the ED (5 min)**

- *Following the observation by the ED care team that this patient may have some degree of cognitive impairment, the ED physician attempts to screen for cognitive impairment using two ED-based screening tests.*

❖ **Discussion Questions with Teaching Points**

- **How would you diagnose cognitive impairment?**
 - The accepted criterion standard (“gold standard”) is the Mini Mental State Exam (MMSE) where a cut-off score ≤ 23 out of 30 has been widely accepted as an indication of cognitive dysfunction
 - However, the MMSE takes time and is not practical as an ED cognitive screen, with studies suggesting its implementation would miss 70% of patients (Carpenter 2012)
- **What are the available cognitive screening tests for the ED?**
 - The Short Blessed Test (SBT) is a 6-item screening test developed by Katzman R, et al (1983) that takes <10 minutes to administer and graded from 0-12 (Normal 0-4; questionable 5-9; impaired 10-12) and has a sensitivity of 95% and ROC AUC of 0.930 (see attached to this guide)
 - The Ottawa 3DY (O3DY) is a 4-item screen developed by Molnar et al (2008) where one or more errors indicates impairment, and has a sensitivity of 95% (ROC not calculated as it is a dichotomous test)
 - Other cognitive screens such as the Brief Alzheimer’s Screen and the Montreal Cognitive Assessment (MoCA) have both been suggested as potential ED cognitive screens, but neither have been validated in large ED patient populations

❖ **Case Part III - ED disposition of Geriatric Patients (15 min)**

- *This patient’s cognitive impairment screen yielded an SBT score of 9 and O3DY of 1, indicating early cognitive impairment*

❖ **Discussion Questions with Teaching Points**

- **What are the potential benefits and hazards of admitting this patient to hospital? What are the risks of discharging this patient?**
 - This patient has no current PMD which complicates the ability of the ED physician to create a medically safe discharge plan
 - The ED may help her identify a new PMD but it is unclear how soon she will be seen and what her access to care will be in the interim
 - Admitting her to hospital will not only allow for a comprehensive medical assessment of her cognitive impairment, nutritional status, chronic disease (HTN) medical management regimen, medication reconciliation, PT/OT assessment and safety for independent living
 - Her inpatient team should also ideally develop a coordinated outpatient care plan to include home follow-up (e.g. visiting nurse services, nutritional support (e.g. meals on wheels)) and establish or coordinate her post-discharge outpatient clinic follow-up with both a PMD and the necessary specialists
 - Hospital admissions for all older adults, however, have been associated with serious adverse outcomes including falls, nosocomial infections, delirium, mobility decline, functional impairment, and (further) cognitive decline; therefore, the decision to admit any older adult – particularly one with cognitive impairment – to the hospital must be made judiciously
- **What are the potential benefits hazards of discharging this patient home?**
 - Discharging the patient home would avoid the above adverse outcomes related to hospitalization; however, in this case there is a real and imminent danger of (i) potential medication mismanagement and the sequelae from antihypertensive medication overdose; (ii) further progression of her poor nutritional status; and (iii) further delays in the establishment of a robust outpatient care structure
- **Are there any viable alternatives to ED discharge and hospital admission?**
 - Promising outcomes have been reported from the use of both ED-based observation units and ED-based geriatric nurse specialists in performing the tasks noted above within the ED to achieve similar goals optimizing a safe discharge home and coordinating outpatient follow-up
 - However, these innovative care plans are very few in numbers and not ready for national implementation in the near future
- **What would you do with this patient? Would you admit her or discharge her? Why? What systems are available in your hospital that you might access to help this patient?**

❖ **Case Part IV – High Risk Medications and Falls (15 min)**

- *JB is an 80 year-old woman with history of atrial fibrillation, hypertension, and type 2 diabetes. She is brought to the emergency department at 2am by her daughter for back pain. JB states that she was attempting to get out of bed 2 days ago when she felt lightheaded and then fell to the ground. She denies loss of consciousness, but thinks she tripped over the leg of her nightstand when she was feeling lightheaded. She adamantly denies hitting her head. She states that she fell on her back and ever since then she has been having significant pain not relieved by acetaminophen. She has been unable to sleep because of the pain. She is able to walk short distances within her house but is significantly limited by pain. She denies numbness or weakness. No bowel or bladder incontinence. Her medications are: metoprolol, metformin, glyburide, and rivaroxaban. JB's husband died 6 months ago and her daughter has been living with her since then. She has low energy and a sedentary lifestyle which she attributes to her a-fib and age.*
- *She appears to be in pain and slightly anxious, but pleasant. She is joined by her daughter at the bedside. Her vitals are unremarkable: T98, BP 104/76, HR 78, RR 16, O2 98% RA, Ht 5'6", Wt 180 lbs. She has no external signs of trauma on her head. She has full range of motion of her neck. Her cardiac exam is notable for irregularly irregular rhythm, but normal rate. Her lungs are clear. Her back has R paraspinal tenderness with overlying ecchymosis. Her strength is 5/5 with normal sensation and coordination in all 4 extremities. Her gait is antalgic favoring her right side.*
- *Because she was uncomfortable and anxious she was given 650 mg of acetaminophen and 5mg diazepam PO as a muscle relaxant. The physician was concerned about giving her an opioid because of her recent fall.*
- *Her labs were notable for a hemoglobin of 10.6, a creatinine of 1.7mg/dL, and a glucose of 190 mg/dL, all of which appear to be at baseline per her outpatient records. Because of her anticoagulation and recent trauma, a CT of her brain without contrast and CT abdomen with IV contrast was performed to evaluate for possible intracranial hemorrhage, retroperitoneal hemorrhage or spinal fracture. The CTs were normal, the only finding was a small superficial hematoma over her R paraspinal muscles without any evidence of extravasation.*
- *JB is sleeping comfortably after the medications. She is aroused by her daughter. When her daughter asks if she is ready to go home and get some sleep, she responds yes. Her daughter thanks you for helping JB to finally get some sleep so hopefully everyone can rest.*

❖ **Discussion Questions with Teaching Points**

- **What high risk medications is JB taking as an outpatient?**
 - The Beers Criteria of potentially inappropriate medications was developed to identify high risk medications and provide guidance on alternatives. The list is updated frequently, most recently in 2015, with an update pending in 2018. A printable pocket

card to the 2015 list is available here:

<https://geriatricscareonline.org/ProductAbstract/beers-criteria-pocketcard/PC001#>

- Glyburide – oral hypoglycemics are common causes of adverse drug events (ADEs) for older adults. Glyburide is particularly problematic because it is renally cleared. Using the Cockcroft-Gault Formula <https://www.mdcalc.com/creatinine-clearance-cockcroft-gault-equation>, we see that JB has stage 3 (moderate) kidney disease. The ED clinician should discuss this medication choice with a pharmacist, the prescribing clinician (such as her primary care doctor) or both → it is possible that JB's lightheadedness could have been caused or exacerbated by transient hypoglycemia that went unrecognized
 - Rivaroxaban – given that JB just had a fall, it is concerning that she is on rivaroxaban. Her risk of future falls should be weighed against the benefits of stroke prevention given her atrial fibrillation
 - When available, taking the few extra minutes to contact a patient's PMD to discuss high risk medications can be invaluable in protecting patients from further ADEs, ED visits and even potentially significant morbidity and mortality
- **What are appropriate choices for pain control in older adults? Is diazepam an appropriate medication choice “muscle relaxation?”**
- No. The use of medications with central nervous system effects has been associated with a 50% increase in the risk of falls in older adults.^{1,2} The 2015 Beers Criteria recommends avoiding barbiturates, benzodiazepines, and other hypnotics like zolpidem.³ Additionally, non-benzodiazepine muscle relaxants such as cyclobenzaprine should be avoided in older adults.
 - Given JB's chronic kidney disease and her age, she is more susceptible to gastrointestinal bleeding and additional kidney damage from non-steroidal anti-inflammatory drugs (NSAIDs). The Beers Criteria recommends against chronic use of NSAIDs in older adults. Indomethacin and ketorolac are not recommended even in short durations given their increased risk profile compared to other NSAIDs.
 - Though measures are being taken to reduce opioid use in EDs currently, for JB the most appropriate medication is likely a low dose opioid. The Beers Criteria recommends using caution in patients who are at risk of falling (like JB), however persistent pain can lead to delirium and other complications, therefore it is important to control her pain. In this situation, low doses of opioids such as hydrocodone (5mg) or oxycodone (2.5mg) are likely the best option in combination with acetaminophen (taking care not to exceed 3g of acetaminophen daily) as acetaminophen alone had not been controlling her pain well
- **Is JB safe to be discharged? Are there any ED assessments or interventions which could help clinicians to better assess her risks upon discharge?**
- The CDC offers an algorithm for fall risk screening, assessment, and intervention as part of the initiative Stopping Elderly Accidents, Deaths, and Injuries (STEADI) <https://www.cdc.gov/steadi/pdf/STEADI-Algorithm-508.pdf>¹ → the algorithm begins

with screening questions and identifying the number of falls within the past year and then focuses on identifying issues with gait, strength, and balance¹ → it recommends various interventions based on risk stratification and recommends physical therapy for patients in moderate and high-risk groups¹

- **STEADI Stay Independent Screen:**^{4,5}
 - I have fallen in the past year (2 points)
 - I use or have been advised to use a cane or walker to get around safely (2 points)
 - Sometimes I feel unsteady when I am walking (1 point)
 - I steady myself by holding onto furniture when walking at home (1 point)
 - I am worried about falling (1 point)
 - I need to push with my hands to stand up from a chair (1 point)
 - I have trouble stepping up onto a curb (1 point)
 - I often have to rush to the toilet (1 point)
 - I have lost some feeling in my feet (1 point)
 - I take medicine that sometimes makes me feel light-headed or more tired than usual (1 point)
 - I often feel sad or depressed (1 point)
 - **Interpretation:** ≥4 points indicates increased risk for falls

- Functional testing - Many patients who had a fall as their reason for visit will have a positive STEADI screen → a reasonable option would be to skip the STEADI screen for all patients who had a fall prior to the ED and move to functional testing. There are many options for functional testing.
 - The Timed Up and Go (TUG) test <https://www.cdc.gov/steady/pdf/STEADI-Assessment-TUG-508.pdf>. This simple test involves sitting in a chair, standing, walking 3 feet, turning around, and sitting back down. If it takes >12 seconds to complete this task, the patient is at risk for falls. The patient should be able to use any assist devices (such as a cane or walker) that they usually use.
 - The 30 second Chair Stand Test: <https://www.cdc.gov/steady/pdf/STEADI-Assessment-30Sec-508.pdf>. This test involves having the patient stand from a chair and sit back down as many times as possible in 30 seconds. Their result should be compared to age-group averages.
 - The 4 Stage Balance Test: <https://www.cdc.gov/steady/pdf/STEADI-Assessment-4Stage-508.pdf>. This test involves 4 sequential tests of balance. The patient is asked to hold each stage for 10 seconds. If they are unable to hold the tandem stand stage (Stage 3) for 10 seconds, they are at risk for falling.

- Intervention – If a patient is high risk for falling, they will likely benefit from a physical therapy evaluation, either in the ED, as an outpatient, or inpatient depending on the clinical scenario → additionally, they may benefit from a review of their medications by

a pharmacist to evaluate for high risk medications or medications that could be contributing to dizziness

❖ Case Part IV Continues

- *2 days later, JB is brought back to the ED by ambulance. She became confused in the middle of the night and went the wrong way out of her bedroom, falling down the stairs. She is brought in on a backboard with a cervical collar in place. A trauma activation is called. Her airway is intact, breath sounds are clear bilaterally, and she has pulses in all 4 extremities. She is awake, and responding to questions, and can follow commands with her upper extremities, but is disoriented to place and time. She is unable to lift her left leg, but is able to move her toes, her motor exam is intact in her other extremities.*
- *Her vitals are: T98, BP 96/68, HR 118, RR 20, O2 98% RA. Her secondary survey is notable for a L parietal hematoma with slow external bleeding. She has tenderness to her L chest wall and her L hip. Her L lower extremity is shortened and externally rotated.*
- *In the trauma bay a chest X ray shows 3 displaced rib fractures laterally at ribs 6-8. A pelvis X-ray shows a L femoral neck fracture. She is taken to CT for a CT brain, CT c-spine, and "pan scan." Her CTs demonstrate the injuries seen on plain films and also show an 8mm L sided subdural hematoma without midline shift.*
- *She is given 50IU/kg of Prothrombin Complex Concentrate (PCC) for the hemorrhage. Neurosurgery is consulted and given her large hematoma size and anticoagulation they feel she is at high risk for progression and clinical deterioration. However, given her brain atrophy and lack of midline shift, imminent surgery is not necessary. They recommend monitoring in the Intensive Care Unit and consideration of hematoma evacuation and ICP monitoring if her clinical status deteriorates. Given JB's confusion, her daughter is asked to consent to the procedure, should it be necessary. She is concerned about her mother's long-term prognosis with the hematoma and hip fracture. She states that her mother would not want aggressive interventions if she was unlikely to recover. A DNR/DNI order is placed for the night and it is agreed that given her poor prognosis, she would not undergo surgery if her hematoma progresses.*
- *Orthopaedic surgery is consulted and recommend operative repair in the morning if she is stable. Given, the intracranial hemorrhage, they defer to neurosurgery's assessment of her stability for operative repair of her hip fracture. She is transferred to the ICU under the care of the trauma team with neurosurgery and orthopaedics consulting.*

❖ Discussion Questions with Teaching Points

- **Could this outcome have been prevented? Should she have been admitted on her last presentation?**

- It is difficult to say for sure if this could have been prevented or if hospitalization would have done anything to prevent it. There are significant risks of hospitalizations for older adults including delirium, falls, and infections, so when possible, it is prudent to discharge patients with appropriate follow up and support. The major issues in JB's case are:
 - 1) inadequate assessment of fall risk on previous visit
 - 2) failure to review medications in a patient who is on 2 high risk medications as an outpatient.
 - 3) inappropriate use of benzodiazepines in older adults
 - These evaluations can be time consuming → dedicated geriatrics programs can help ameliorate this but the ED clinician still needs to be aware of the risks of increasing falls and inappropriate medications in the elderly
- **How time sensitive is the hip fracture?**
- The American Orthopaedic Association recommends operative management of hip fractures within 48 hours of injury to decrease hospital length of stay, minimize complications such as deep venous thrombosis (DVT), pneumonia, and functional status decline. This time frame is often delayed by many factors such as operating room availability and "medical clearance" for anesthesia. Establishing protocols for geriatric hip fractures can help to streamline the care to meet this time goal and improve patient outcomes.

❖ Case Teaching Points Summary

- **Distinguishing chief complaints with underlying reasons for visits among older ED patients**
 - The chief complaint still needs to be addressed as an emergency complaint
 - Key features in this case indicating cognitive impairment include memory impairment (repetitive questioning), an obsessive-compulsive preoccupation with apparent ordinary items or tasks
 - In this case the memory impairment manifests itself in the patient's failing to remember that she had taken the acetaminophen resulting in the repeated request for medication → this should trigger a concern for potential overdosing of home medication
 - Her obsessive-compulsive repeated tidying up of her ED bed is often seen in persons with dementia
 - If family or caregivers were present, further inquiry into her home environment and safeguards against these concerns should be pursued → even if she had family, caregivers or a PMD, implicit safety against these potential hazards should not be assumed and needs to be addressed
 - Review the fundamental differences between delirium and dementia⁶ → briefly, delirium is usually acute, highly fluctuating in course and with very prominent confusion and disorientation while dementia is slow and progressive, marked by forgetfulness and is less fluctuating
- **Screening for dementia in the ED**
 - Older adults with dementia have higher ED utilization for various complaints compared to those without cognitive impairment⁷
 - The Mini Mental Status Exam (MMSE) is accepted to be the criterion standard for the assessment of cognitive impairment, however this is time-consuming and not ideal for the ED setting
 - Three brief performance-based cognitive screens, the Short Blessed Test (SBT), Brief Alzheimer's Screen (BAS), Ottawa 3DY (O3DY) have been demonstrated high (95%) sensitivity with identifying older patients more rapidly than the MMSE. Among these, both the O3DY and SBT provide the best accuracy^{8,9}
 - In this case, the cognitive impairment is arguably mild and the patient is evidently sufficiently independent to be living alone and travel to the ED to seek care
 - However, her memory impairment is worrisome as it impacts her ability to safely comply with her medications, in particular, her potential overdose of antihypertensive medication increases her risk of falls
- **ED dispositions for patients with dementia**
 - Are there potential harms to simply admitting older adults in general to the hospital for care coordination? Yes → the risks of delirium, functional decline, mobility decline and worsening cognitive impairment have all been well-documented

- Will she be safe at home if discharged from the ED at the end of this visit? Not likely → her potential overdosing of her antihypertensive medication is a valid concern, as is her slow decline in nutrition
 - If she had either family support or other established caregivers, a home discharge is a safe disposition; however, without those and the fact that a new PMD must now be established and even if done soon, there is no guarantee this patient will comply and follow-up with that care provider
 - The safer course of action in this particular case is to admit her to hospital, for the determination of her home safety status, establishment of care coordination, medication review, and a well-coordinated outpatient follow-up plan
- **High Risk Medications and Falls in the Elderly**
- The Beers Criteria provides a list of medications which may be inappropriate for older adults¹⁰ → the risks and benefits of these medications should be considered when prescribing them
 - Additionally, older adults should have their medication list screened for potentially inappropriate medications in the ED, particularly if they are having dizziness, falls, or other adverse drug events
 - Pain control for older adults can often be difficult, benzodiazepines and skeletal muscle relaxants should **not** be used in older adults for muscle spasm
 - Chronic NSAIDs should be avoided and Indomethacin & ketorolac should not be used even in short courses
 - Acetaminophen is often the safest option for older adults, however in the ED, patients frequently will benefit from a short course of a low dose opioid such as hydrocodone (5mg) or oxycodone (2.5mg) → remember a bowel regimen for these patients if you prescribe narcotics!
 - Older adults should be screened for fall risk and those who are high risk or who had a fall related complaint should have additional functional testing such as the TUG or the 4 Stage Balance Test → patients who are high risk for falls on functional testing should be referred to physical therapy for additional assessment and treatment which can be done in an inpatient or outpatient setting depending on the clinical scenario
 - Operative repair of hip fractures should occur within 48 hours to minimize risk of complications → effective ED care, communication and hospital based protocols can help to ensure that surgery happens promptly

❖ Facilitator Background Information

There are an estimated 5.5 million U.S. adults 65 years and older (“older adults”) living with dementia (www.alz.org). Of the 20 million ED visits each year by older adults, between 20-40% of those were by persons with dementia, who use the ED at a higher rate than persons of similar age without dementia.¹¹ Older adults, even those without dementia, often present to the ED with chief complaints that belie their true unmet (and complex) care needs. These are often challenging for the traditional ED model of care to determine and adequately address.¹² The frequent response of “social admissions” have proven to be harmful to these patients in both the short and longer term. In select EDs, specialized observation unit protocols or geriatric nurse specialists offer a viable alternative, but such programs are very few in number.

The first step is the recognition of these complex issues that frequently represent an overall downward health trajectory and can result in an irreversible loss of independence (i.e. nursing home admission) for that patient. Many ED-based cognitive impairment and general adverse outcome screening tools have been developed.^{8,9,13} Cognitive impairment screens have demonstrated good efficacy in multiple patient populations and at this time are generally recommended for wider ED implementation. One important caution is that the generalizability of these screens in racial minorities is less clear and need more validation.

The patient in this case represents an older adult with mild cognitive impairment and moderately intact independence. Her ED visit represents an excellent opportunity for ameliorating her overall health trajectory. Although the burden of this intervention was never intended to be the responsibility of emergency physicians, the unfortunate reality of today’s fragmented care coordination often makes the emergency physician the only care provider an older adult may see for a substantial time interval. While outpatient care providers can be easily identified and outpatient referrals arranged, factors such as cognitive impairment, poor mobility, transportation difficulty and social isolation may limit the ability to be compliant with those care events. If sufficient concern for a safe discharge home arises, then the potential benefits of admitting the patient to the hospital for a home safety assessment, establishment of care coordination, polypharmacy medication review and an initiation of a well-coordinated outpatient follow-up plan will outweigh the potential harms associated with hospitalization.

High Risk Medications and Falls in the Elderly

The second case is a complex case which combines many principles of geriatric emergency medicine. While it is not imperative that the learners remember all of the details, the key is that they are able to identify and address major issues that may lead to harm in older adults.

The precipitating cause for both visits is an adverse drug event. First, JB likely had undetected hypoglycemia related to glyburide, a sulfonylurea medication with renal clearance which can lead to hypoglycemia in patients with impaired creatinine clearance. Anticoagulants, insulin,

oral antiplatelet agents, and oral hypoglycemics account for two thirds of Adverse Drug Events (ADEs) leading to ED visits, therefore the presence of these medications on a patient's drug list should prompt additional evaluation for possible ADEs.¹⁴ When high risk medications are identified, it is important to consult with a pharmacist, the prescribing clinician or both, to weigh the risks and benefits of discontinuing the medication, or prescribing an alternative.

While high risk medications may be difficult to remember in the ED, and it often seems that medication choices are severely limited in this population, there are some resources which can help identify high risk medications. The Beers Criteria, developed and maintained by the American Geriatrics Society, include medications that should be avoided in the elderly along with medications that could exacerbate falls, delirium, dementia and chronic kidney disease. The Beers Criteria present a set list of medications that can be easily and rapidly applied when making clinical decisions. The 2015 Beers Criteria are divided into several sections, which include lists of: 1) potential inappropriate medications to avoid for many or most older adults, 2) medications for older adults with specific diseases or syndromes to avoid and 3) medications to be used with caution. Published data have found an association between the use of medications on the Beers List and adverse outcomes including higher costs, increased ED visits, hospitalizations, and death.^{15,16} In addition to outpatient medications which lead to ED visits for ADEs mentioned above, medications of particular mention in the ED include anticoagulants, sedatives, analgesics (most notably NSAIDs), and anticholinergic medications (including antihistamines such as diphenhydramine).^{17,18}

The second and most consequential ADE in this case is related to the choice of diazepam for "muscle relaxation". Benzodiazepines carry significant risks for older adults and should not be used for older adults except for seizures and alcohol or benzodiazepine withdrawal. The use of medications with central nervous system effects has been associated with a 50% increase in the risk of falls in older adults.^{1,2} The 2015 Beers Criteria recommends avoiding barbiturates, benzodiazepines, and other hypnotics like zolpidem.³ Benzodiazepines should be avoided for older adults because of increased sensitivity to the drug class, decreased metabolism of long-acting benzodiazepines and active metabolites. Benzodiazepines also increase risk of cognitive impairment, delirium, falls, fractures, and motor vehicle collisions for older adults.³ Importantly in the ED, short courses of benzodiazepines have similar risk profiles to chronic benzodiazepine use.¹⁹ The highest risk for falls is within the first seven days of starting benzodiazepines. Studies have demonstrated the rates of hip fractures and falls as high in the first two weeks of therapy with the highest risk being within the first seven days.^{19,20} Alternative to benzodiazepines include acetaminophen or hydrocodone for pain control (rather than using a skeletal muscle relaxant)

This case also presents the opportunity to discuss fall risk assessments and interventions in the ED. Accidental falls are the leading cause of unintentional injury deaths in older adults (age 65+).²¹ The Centers for Disease Control and Prevention (CDC) has put together an algorithm for identifying fall risk called STEADI. The algorithm begins with screening questions and identifying

the number of falls within the past year, and includes functional testing and interventions.¹ This program was developed for outpatient clinics but much of it is applicable to the ED. Screening can be performed for all older adults in the ED but for patients with a particular concern regarding fall risk, it is reasonable to move directly to functional testing. In our department we use the TUG test to identify patients at risk for falls, and then refer high risk patients to physical therapy. In many EDs PT is not readily available so outpatient or inpatient PT can be consulted as appropriate. In addition to the TUG, the CDC recommends use of the 30 second chair stand test or the 4-stage balance test.

On JB's second presentation to the ED, she has 2 severe injuries. Her hip fracture, which is time sensitive, but not emergent, and her subdural hematoma which is complicated by her anticoagulation use. Certain types of fall-related extremity fractures are highly associated with increased morbidity and mortality.²² Hip fracture is associated with excess mortality (over and above mortality rates in nonhip fracture/community control populations) during the first year after fracture ranging from 8.4% to 36%.²³ The American Academy of Orthopaedic Surgeons recommends operative management within 48 hours of hip fracture (https://www.aaos.org/cc_files/aaosorg/research/guidelines/hipfxsummaryofrecommendations.pdf). Early intervention is associated with decreased mortality, complications, pain and improves functional outcomes. Though much of the delay in hip fracture management occurs after the patient is admitted, waiting for "medical clearance" to go to the operating room, care in the ED can help to facilitate timely operative management and discharge to rehabilitation. This timely treatment can reduce the risk of complications such as delirium, DVT and infections such as urinary tract infection or pneumonia. Additionally, care processes which establish hip fracture protocols and order sets, including regional anesthesia using tensor fascia lata blocks or femoral nerve blocks, can effectively control pain and help to minimize risk of delirium.

❖ References

- **Authors:** Alexander Lo, MD, PhD and Scott Dresden, MD, MS (GEDI-WISE Program)
 - **Editor:** Natasha Wheaton, MD
 - **References:**
1. Leipzig RM, Cumming RG, Tinetti ME. Drugs and falls in older people: a systematic review and meta-analysis: I. Psychotropic drugs. *J Am Geriatr Soc.* 1999;47(1):30-39.
 2. Ensrud KE, Blackwell TL, Mangione CM, et al. Central nervous system-active medications and risk for falls in older women. *J Am Geriatr Soc.* 2002;50(10):1629-1637.
 3. By the American Geriatrics Society Beers Criteria Update Expert P. American Geriatrics Society 2015 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. *J Am Geriatr Soc.* 2015;63(11):2227-2246.
 4. Rubenstein LZ, Vivrette R, Harker JO, Stevens JA, Kramer BJ. Validating an evidence-based, self-rated fall risk questionnaire (FRQ) for older adults. *J Safety Res.* 2011;42(6):493-499.
 5. Stay Independent: Learn more about fall prevention. 2017; https://www.cdc.gov/steady/pdf/Stay_Independent_brochure-print.pdf. Accessed June 15, 2018.
 6. Lippmann S, Perugula ML. Delirium or Dementia? *Innov Clin Neurosci.* 2016;13(9-10):56-57.
 7. LaMantia MA, Stump TE, Messina FC, Miller DK, Callahan CM. Emergency Department Use Among Older Adults With Dementia. *Alzheimer disease and associated disorders.* 2016;30(1):35-40.

8. Barbic D, Kim B, Salehmohamed Q, Kemplin K, Carpenter CR, Barbic SP. Diagnostic accuracy of the Ottawa 3DY and Short Blessed Test to detect cognitive dysfunction in geriatric patients presenting to the emergency department. *BMJ open*. 2018;8(3):e019652.
9. Carpenter CR, Bassett ER, Fischer GM, Shirshekan J, Galvin JE, Morris JC. Four sensitive screening tools to detect cognitive dysfunction in geriatric emergency department patients: brief Alzheimer's Screen, Short Blessed Test, Ottawa 3DY, and the caregiver-completed AD8. *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine*. 2011;18(4):374-384.
10. American Geriatrics Society Beers Criteria Update Expert P. American Geriatrics Society updated Beers Criteria for potentially inappropriate medication use in older adults. *Journal of the American Geriatrics Society*. 2012;60(4):616-631.
11. Pines JM, Mullins PM, Cooper JK, Feng LB, Roth KE. National trends in emergency department use, care patterns, and quality of care of older adults in the United States. *Journal of the American Geriatrics Society*. 2013;61(1):12-17.
12. Lo AX, Biese K. Disseminating and Sustaining Emergency Department Innovations for Older Adults: Good Ideas Deserve Better Policies. *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine*. 2018;25(1):83-84.
13. Gerson LW, Counsell SR, Fontanarosa PB, Smucker WD. Case finding for cognitive impairment in elderly emergency department patients. *Annals of emergency medicine*. 1994;23(4):813-817.
14. Budnitz DS, Lovegrove MC, Shehab N, Richards CL. Emergency hospitalizations for adverse drug events in older Americans. *The New England journal of medicine*. 2011;365(21):2002-2012.
15. Perri M, 3rd, Menon AM, Deshpande AD, et al. Adverse outcomes associated with inappropriate drug use in nursing homes. *Ann Pharmacother*. 2005;39(3):405-411.
16. Lau DT, Kasper JD, Potter DE, Lyles A, Bennett RG. Hospitalization and death associated with potentially inappropriate medication prescriptions among elderly nursing home residents. *Arch Intern Med*. 2005;165(1):68-74.
17. Naja M, Zmudka J, Hannat S, Liabeuf S, Serot JM, Jouanny P. In geriatric patients, delirium symptoms are related to the anticholinergic burden. *Geriatr Gerontol Int*. 2016;16(4):424-431.
18. Vetrano DL, La Carpia D, Grande G, et al. Anticholinergic Medication Burden and 5-Year Risk of Hospitalization and Death in Nursing Home Elderly Residents With Coronary Artery Disease. *J Am Med Dir Assoc*. 2016;17(11):1056-1059.
19. Neutel CI, Hirdes JP, Maxwell CJ, Patten SB. New evidence on benzodiazepine use and falls: the time factor. *Age Ageing*. 1996;25(4):273-278.
20. Ray WA, Thapa PB, Gideon P. Benzodiazepines and the risk of falls in nursing home residents. *J Am Geriatr Soc*. 2000;48(6):682-685.
21. Stevens JA, Ryan G, Kresnow M. Fatalities and injuries from falls among older adults United States, 1993-2003 and 2001-2005 (Reprinted from MMWR, vol 55, pg 1221-1224, 2006). *Jama-J Am Med Assoc*. 2007;297(1):32-33.
22. Jacobsen SJ, Goldberg J, Miles TP, Brody JA, Stiers W, Rimm AA. Race and sex differences in mortality following fracture of the hip. *American journal of public health*. 1992;82(8):1147-1150.
23. Abrahamsen B, van Staa T, Ariely R, Olson M, Cooper C. Excess mortality following hip fracture: a systematic epidemiological review. *Osteoporos Int*. 2009;20(10):1633-1650.

Appendix: Short Blessed Test

Note: The scoring for this test is based on the number of errors accumulated.

1. What year is it now? _____

Score 1 error if incorrect. Note "18" is acceptable for "2018"

2. What month is it now? _____

Score 1 error if incorrect.

To patient: "Please repeat this name and address after me:"

John Brown, 42 Market Street, Chicago

John Brown, 42 Market Street, Chicago

John Brown, 42 Market Street, Chicago

Patient gets 3 trials to correctly repeat the phrase (underline words repeated correctly in each trial)

Trials to learning _____

(If patient cannot repeat phrase in 3 trials = C)

To patient: "Good, now remember that name and address for a few minutes."

3. Without looking at your watch or clock, tell me about what time it is.

(Prompt for specific response if response is vague, e.g. "about lunchtime")

Correct time accepted may be within +/- one hour; score 1 error if other.

4. Count aloud backwards from 20 to 1

(Mark correctly sequenced numerals)

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

If subject starts counting forward or forgets the task, repeat instructions and score 1 error

Maximum score is 2 errors

5. Say the months of the year in reverse order.

(Mark correctly sequenced months)

D N O S A J L J N M Y A P M R F J

If the tester needs to prompt with the last name of the month of the year, one error should be scored.

0 1 2 Errors

6. Repeat the name and address I asked you to remember.

(John Brown, 42 Market Street, Chicago)

_____, _____, _____, _____, _____

The thoroughfare term (Street) is not required for a response to be correct, and alternates (e.g., "Drive" or "Avenue") may be accepted

Score the number of errors; maximum score is 5 errors

Scoring the Short Blessed Test

Question	Errors (0-5)	Weighting Factor	Total Score
1		x 4	/ 4
2		x 3	/ 3
3		x 3	/ 3
4		x 2	/ 4
5		x 2	/ 4
6		x 2	/ 10
			Range 0-28/ 28

From the original study (Katzman, 1983), a score of 0-6 represents 90% of normal individuals. Scores of 7 or higher are considered a positive screen that indicate a need for further revaluations for cognitive disorders.

An independent analysis from the memory and Aging Project (Morris JC, Heyman A, et al, 1989) utilized the following score ranges: 0-4 (normal cognition); 5-9 (questionable impairment); 10+ (impairment consistent with dementia)

Original reference:

Katzman R, Brown T, Fuld P, Peck A, Schechter R, Schimmel, H. Validation of a short orientation-memory concentration test of cognitive impairment. American Journal of Psychiatry (1983); 140:734-739.

System, Therapeutic Category, Drug	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Anticholinergics First-generation antihistamines Diphenhydramine (oral) Doxylamine Hydroxyzine Meclizine Promethazine	Highly anticholinergic; clearance reduced with advanced age, and tolerance develops when used as hypnotic; risk of confusion, dry mouth, constipation, and other anticholinergic effects or toxicity Use of diphenhydramine in situations such as acute treatment of severe allergic reaction may be appropriate	Avoid	Moderate	Strong
Anti-infective Nitrofurantoin	Potential for pulmonary toxicity, hepatotoxicity, and peripheral neuropathy, especially with long-term use; safer alternatives available	Avoid in individuals with creatinine clearance <30 mL/min or for long-term suppression of bacteria	Low	Strong
Central Nervous System Antipsychotics, first - (conventional) and second - (atypical) generation	Increased risk of cerebrovascular accident (stroke) and greater rate of cognitive decline and mortality in persons with dementia. Avoid antipsychotics for behavior problems of dementia or delirium unless nonpharmacological options (e.g., behavioral interventions) have failed or are not possible and the older adult is threatening substantial harm to self or others	Avoid, except for schizophrenia, bipolar disorder, or short-term use as antiemetic during chemotherapy	Moderate	Strong
Sedative-hypnotics	High rate of physical dependence, tolerance to sleep benefits, greater risk of overdose at low dosages	Avoid	High	Strong
Benzodiazepines Short- and intermediate- acting Alprazolam Clonazepam Lorazepam Oxazepam Temazepam Triazolam Long-acting Chlordiazepoxide (alone or in combination with cimetidine or clidinium) Diazepam Flurazepam	Older adults have increased sensitivity to benzodiazepines and decreased metabolism of long-acting agents; in general, all benzodiazepines increase risk of cognitive impairment, delirium, falls, fractures, and motor vehicle crashes in older adults May be appropriate for seizure disorders, rapid eye movement sleep disorders, benzodiazepine withdrawal, ethanol withdrawal, severe generalized anxiety disorder, and procedural anesthesia	Avoid	Moderate	Strong
Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics Zolpidem Eszopiclone Zaleplon	Benzodiazepine-receptor agonists have adverse events similar to those of benzodiazepines in older adults (e.g., delirium, falls, fractures); increased emergency department visits and hospitalizations; motor vehicle crashes, minimal	Avoid	Moderate	Strong

	improvement in sleep latency and duration			
gastrointestinal metoclopramide	Can cause extrapyramidal effects, including tardive dyskinesia; risk may be greater in frail older adults	Avoid, unless for gastroparesis	Moderate	Strong
proton-pump inhibitors	Risk of <i>Clostridium difficile</i> infection and bone loss and fractures	Avoid scheduled use for >8 weeks unless for high-risk patients (e.g.; oral corticosteroids or chronic NSAID use); erosive esophagitis, Barrett's esophagitis, pathological hypersecretory condition, or demonstrated need for maintenance treatment (e.g.; due to failure of drug discontinuation trial or H ₂ blockers)	High	Strong
opioid medications oxycodone	Not effective oral analgesic in dosages commonly used; may have higher risk of neurotoxicity, including delirium, than other opioids; safer alternatives available	Avoid, especially in individuals with chronic kidney disease	Moderate	Strong
non-cyclooxygenase-selective NSAIDs, oral:				

aspirin >325mg/d	Increased risk of gastrointestinal bleeding or peptic ulcer disease in high-risk groups, including those aged >75 or taking oral or parenteral corticosteroids, anticoagulants, or antiplatelet agents; use of proton-pump inhibitor or misoprostol reduces but does not eliminate risk. Upper gastrointestinal ulcers, gross bleeding, or perforation caused by NSAIDs occur in approximately 1% of patients treated for 3-6 months and in ~2-4% of patients treated for 1 year; these trends continue with longer duration of use	Avoid chronic use, unless other alternatives are not effective and patient can take gastroprotective agent (proton-pump inhibitor or misoprostol)	Moderate	Strong
diclofenac ibuprofen Meloxicam etorolac naproxen				
indomethacin	Indomethacin is more likely than other NSAIDs to have adverse CNS effects. Of all the NSAIDs, indomethacin has the most adverse effects. Increased risk of gastrointestinal bleeding, peptic ulcer disease, and acute kidney injury in older adults	Avoid	Moderate	Strong
etorolac, includes parenteral	Increased risk of gastrointestinal bleeding, peptic ulcer disease, and acute kidney injury in older adults			
central muscle relaxants carisoprodol cyclobenzaprine methocarbamol	Most muscle relaxants poorly tolerated by older adults because some have anticholinergic adverse effects, sedation, increased risk of fractures, effectiveness at dosages tolerated by older adults questionable	Avoid	Moderate	Strong

Appendix 2: Highlighted Potentially Inappropriate Medications from 2015 Beers Criteria Adapted from [The American Geriatrics Society Beers Criteria Update Expert Panel. American Geriatrics Society 2015 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. J Am Geriatr Soc. 2015;63(11):2227-2246]