QUIZ

Medication management in the Elderly

(Cleveland Clinic Emergency Medicine Programme – Thanks to Dr. Fred Hustey)

1. Mrs. Smith is a 75-year-old woman presenting to the emergency department with complaints of burning on urination and urinary frequency. She has a past medical history of hypertension, atrial fibrillation, and osteoarthritis. Her medications include hydrochlorothiazide, lisinopril, and warfarin. She has no known drug allergies. You perform a urinalysis which is remarkable for nitrites and greater than 25 WBC per high powered field.

Which treatment regimens would be **contraindicated**?

A. *TMP/SMX*
B. *Ciprofloxacin*
C. *Nitrofurantoin*
D. *Cephalexin*
E. *Amoxicillin*

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2. Mr. Roberts is a 66-year-old man with a history of gout who presents with a two-day history of right great toe pain. He also has a past medical history of renal insufficiency but his most recent creatinine level (one week ago) was 1.7mg/dl. On physical exam, his vital signs are stable. His estimated weight is 70kg. Your physical exam findings are consistent with a diagnosis of acute gouty arthritis.

Which treatment regimens would be **contraindicated**?

A. *Indomethacin 50 mg PO t.i.d.*
B. *Colchicine .6 mg PO every hour until symptoms are resolved or gastrointestinal side effects develop*
C. *Prednisone*
D. *Codeine/Acetaminophen (Tylenol 2 or 3) for pain*
E. *Acetaminophen and Oxycodone (Percocet) for pain*

3. You are prescribing a medication for an 80-year-old man with an estimated weight of 65kg and a creatinine of 1.4mg/dl. The medication you have selected is primarily eliminated by the kidneys.

What medication adjustments should be considered?

A. *None. This patient's renal function is within the normal range*
B. *Give 50% of the recommended dose*
C. *Calculate the dose based on the patient's creatinine clearance*

4. A 70 year-old man presents with neck pain and stiffness after a motor vehicle accident sustained the day before. After a thorough evaluation, you diagnose the patient with neck strain. His most recent creatinine level (one week ago) was 80 mmol/L. His only medical history is osteoarthritis. He takes no medications.

Which medications would be appropriate for symptomatic relief?

A. *Acetaminophen (Tylenol)*
B. *Cyclobenzaprine (Flexeril)*
C. *Diazepam (Valium)*
D. *Ibuprofen 200-400 mg*

5. Approximately how many emergency department patients age 65 years and older are routinely taking inappropriate (and potentially harmful) prescription medications based on medication lists recorded during ED visits?

A. *Up to 5%*.
B. *Up to one-third*
C. *Up to one*-half.
D. *Up to three-quarters*.
E. *More than three-quarters*

6. Which of the following combinations have the potential for an adverse drug-drug interaction?

A. *Amiodarone and Erythromycin*
B. *Calcium supplements and ciprofloxacin*
C. *Azithromycin and Lisinopril*
D. *TMP/SMX and Warfarin*
E. *Furosemide and Ibuprofen*

7. Diphenhydramine (Benadryl) is useful in treating which condition in older patients?

A. *Urticaria*
B. *Insomnia*
C. *Anxiety*
D. *Pruritis*

8. A 76-year-old woman with a history of generalized anxiety disorder presents to the emergency department complaining of worsening anxiety. She was prescribed a quantity of 10 pills of diazepam for the first time during an emergency department visit last week. She requests another refill of diazepam for use until her psychiatry appointment in 7 days. On physical examination, she does not appear to be in acute benzodiazepine withdrawal. You determine that the most likely diagnosis is anxiety.

Which of the following discharge medication is most appropriate for the acute management of her symptoms?

A. *Diazepam (Valium)*
B. *Lorazepam*
C. *Amitriptyline*
D. *Buspirone (BuSpar)*

9. Which conditions are highly associated with the risk of receiving a potentially inappropriate prescription based on Beers explicit criteria at emergency department discharge?

A. *Musculoskeletal pain.*
B. *Gout*
C. *Headache*
D. *Acute bronchitis*

10. Gabapentin and amitriptyline are equally appropriate choices for the treatment of post-herpetic neuralgia.

A. *True*
B. *False*

Medication Management Answer Key

Question 1.

A. Correct TMP/SMX would not be appropriate for this patient. TMP/SMX interacts with warfarin through a variety of mechanisms and may lead to elevation in INR and increased risk of bleeding.

B. **Correct.** Ciprofloxacin would not be appropriate for this patient. Ciprofloxacin can interact with warfarin and may lead to elevation in INR and increased risk of bleeding. In circumstances where safer alternatives are not available, ciprofloxacin may be used but INR values must be closely monitored.

C. **Correct.** Nitrofurantoin would not be appropriate for this patient. This medication is included on the Beers list and may induce renal failure in older patients. TMP/SMX and Ciprofloxacin also would not be appropriate for this patient.

D. **Incorrect.** Cephalexin would be an appropriate choice for this patient

E. Incorrect. Amoxicillin would be an appropriate choice for this patient

Question 2.

A. Correct. Indomethacin is included on the Beers list. It induces the most CNS side effects of any NSAID. Indomethacin also can induce renal failure, and this patient's renal function is already impaired.

B. **Correct.** This patient has renal insufficiency and the dose of colchicines should be adjusted based on creatinine clearance

C. Incorrect. Prednisone would be an appropriate treatment for this patient. Steroids can be used to treat acute gouty arthritis and would be preferred over NSAIDs in patients with renal insufficiency

D. Correct. Codeine offers little analgesic benefit over acetaminophen while having a heavy burden of side effects

E. Incorrect. Acetaminophen and oxycodone (Percocet) can be an appropriate choice in older patients.

Question 3.

A. Incorrect. Glomerular filtration rate (GFR) declines significantly with age. However, because there is also a concomitant decrease in muscle mass with decline in GFR is often not reflected by an elevation in serum creatinine. Thus, patients with normal creatinine levels (especially those in the higher range of normal) are still likely to have renal insufficiency and need dose adjustments based on creatinine clearance.

B. Incorrect. Proper doses of medications should be calculated based on creatinine clearance

C. **Correct.** GFR declines significantly with age. However, because there is also a concomitant decrease in muscle mass the declined in GFR is often not reflected by an elevation in serum creatinine. Thus, patients with normal creatinine levels (especially those in the higher range of normal) are still likely to have renal insufficiency and need dose adjustments based on creatinine clearance

Question 4

A. Correct Acetaminophen in appropriate doses has a more favourable safety profile than NSAIDs in older patients. It does not carry the same risk of renal failure or gastrointestinal bleeding. Acetaminophen is a reasonable first choice for pain management in patients with mild to moderate pain.

B. **Incorrect.** Most muscle relaxants are poorly tolerated by older patients due to anti-cholinergic side effects including dizziness and weakness. In addition, therapeutic benefit at tolerated doses in older patients is questionable. These medications also are included on the Beers list.

C. **Incorrect.** Long-acting benzodiazepines are contraindicated in older patients due to long half-lives. These medications can result in prolonged sedation, dizziness, delirium, and subsequent increased risk of falls and injury. Shorter acting agents such as lorazepam are preferred when benzodiazepines are safer if a benzodiazepine is indicated.

D. **Correct.** Ibuprofen may be appropriate based on dose prescribed after review of potential contraindications (i.e., co-morbidities, warfarin use, etc.).

Question 5.

A. Incorrect

B. Correct. In addition, approximately 13% of older patients may be receiving inappropriate medications in the emergency department.

C. **Incorrect**

D. **Incorrect**

E. **Incorrect**

Question 6.

A. Correct. Macrolides can interact with Class III anti-arrhythmic agents to cause QT prolongation and fatal arrhythmias

B. Correct. Calcium supplements can interfere with absorption and fluoroquinolone antibiotics and thus lower their efficacy.

C. **Incorrect.** There are no significant interactions between macrolide antibiotics and ACE inhibitors.

D. **Correct.** Sulfonamide derivatives can interfere with warfarin metabolism leading to high warfarin levels and increased risk of bleeding.

E. **Correct.** NSAIDs can result in decreased therapeutic effect of loop diuretics, such as furosemide. NSAIDs should be used with caution in these patients. NSAIDs can also lower the efficacy of many anti-hypertensive drugs. If NSAIDs are prescribed to patients taking anti-hypertensive agents, blood pressure should be monitored closely.

Question 7.

A. **Correct.** Although, due to side effects of confusion and sedation the lowest possible dose should be used. This is also one situation where a long-acting medication without anti-cholinergic features (such as loratidine) would be preferable

B. **Incorrect.** Diphenhydramine may cause confusion, sedation, and delirium in older

patients. It should be avoided when possible. It is included on the Beers list.
C. **Incorrect.** Diphenhydramine may cause confusion, sedation, and delirium in older patients. It should be avoided when possible. It is included on the Beers list.
D. Incorrect. Non-sedating or low-sedating antihistamines provide better alternatives and are less likely to precipitate delirium.

Question 8.
A. Incorrect Long-acting benzodiazepines are contraindicated in older patients due to long half-lives which can contribute to prolonged sedation, dizziness, and subsequent increased risk of falls and injury.
B. Correct Lorazepam is a shorter acting benzodiazepine and is preferred to longer acting agents such as diazepam. However, daily dosing of lorazepam should never exceed 3 mg per dose.
C**. Incorrect** While anti-depressants are often first-line agents for the treatment of generalized anxiety disorder, amitriptyline is highly anti-cholinergic and may induce dizziness, confusion, and risk of falls in older patients. Its use should be avoided in older patients. Amitriptyline is also included on the Beers list.
D. Incorrect. While buspirone is used for the management of anxiety, it may take up to one month before full effects of treatment are seen. It is not appropriate for emergency use.

Question 9.
A. Correct. Muscle relaxants and long acting NSAIDs (e.g. naproxen) are often prescribed for musculoskeletal pain. These medications should generally be avoided in older patients and are included on the Beers list. High dose NSAIDs (e.g. Ibuprofen 600 mg) may be appropriate in limited circumstances, but carry increased risk of renal failure and gastrointestinal bleeding. NSAIDs can also interfere with the action of many anti-hypertensive drugs, resulting in uncontrolled hypertension
B. Correct. Indomethacin is often prescribed for gout, but is contraindicated in older patients due to CNS side effects and nephrotoxicity. Indomethacin can also precipitate gastrointestinal bleeding. Colchicine is also often prescribed but in inappropriate doses. Colchicine dosing should be determined based on creatinine clearance. Creatinine clearance may be abnormal even in patients with serum creatinine levels in the normal reference range.
C. **Incorrect.** Patients with headaches have not been shown to be associated with increased risk of receiving inappropriate prescription medications at ED discharge. However, high dose NSAIDs or long acting NSAIDs, which are sometimes prescribed for these patients, should generally be avoided. Tryptans (e.g., sumatriptan or Imitrex) should also be avoided due to cardiovascular risk associated with these drugs.
D. **Incorrect.** This condition has not been shown to be associated with an increased risk of receiving inappropriate prescription medications at emergency department discharge.

Question 10.

A. Incorrect. While gabapentin may be appropriate in some circumstances, amitriptyline is highly anti-cholinergic and may induce dizziness, confusion, and risk of falls in older patients.

B. Correct. Amitriptyline is highly anti-cholinergic and may induce dizziness, confusion, and risk of falls in older patients.

Suggested Readings:

1. Fick DM, Cooper JW, Wade WE et al. Updating the Beers criteria for potentially inappropriate medication use in older adults: results of a US consensus panel of experts. Arch Intern Med. 2003 Dec 8-22; 163(22): 2716-24 Link
2. Terrell KM, Heard K, Miller DK. Prescribing to older ED patients. American Journal of Emergency Medicine 2006 Jul; 24(4): 468-78 Link
3. Hustey FM, Wallis N, Miller J. Inappropriate Prescribing in an Older Emergency Department Population. The American Journal of Emergency Medicine. 2007 Sep; 25(7): 804-7. Link
4. Chin MH, Wang LC, Jin L, et al. Appropriateness of medication selection for older persons in an urban academic emergency department. Academic Emergency Medicine 1999 Dec; 6(12): 1232-42. Link
5. Caterino JM, Emond JA, Camargo CA Jr. Inappropriate medication administration to the acutely ill elderly: a nationwide emergency department study, 1992-2000. Journal of the American Geriatrics Society 2004 Nov; 52(11): 1847-55. Link