Geriatric Pharmacology: Review Questions

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QUESTIONS

Choose the single best answer for each question.

1. **Which of the following statements regarding medication use by older adults in the United States is INCORRECT?**
   - A) Adverse drug reactions in older adults appear unrelated to the number of medications taken
   - B) Elderly patients regularly take an average of 4.5 prescribed medications
   - C) Institutionalized geriatric residents typically take 3 to 8 medications daily
   - D) Older adults comprise approximately 13% of the US population but consume 25% to 30% of all medications
   - E) Use of over-the-counter medications and nutritional supplements other than those prescribed can contribute to polypharmacy

2. **Which of the following correctly describes an age-related physiologic alteration that affects the pharmacokinetics of medications in geriatric patients?**
   - A) Altered gastrointestinal function leading to decreased drug absorption
   - B) Decrease in the body fat compartment
   - C) Decline in creatinine clearance with an increase in age
   - D) Decrease in serum albumin levels with an increase in age
   - E) Increase in the water compartment

3. **An 85-year-old woman with Alzheimer's disease is brought to the emergency department because of agitation and recent worsening of mentation. She currently takes donepezil 5 mg once daily; a week ago, her family started giving her over-the-counter diphenhydramine for insomnia. She has been constipated for 4 days. Physical examination reveals an uncooperative patient with a distended urinary bladder. Laboratory studies reveal a serum sodium level of 146 mEq/L, serum creatinine level of 1.5 mg/dL, and a blood urea nitrogen level of 30 mg/dL. Each of the following is an appropriate next step EXCEPT:**
   - A) Consider bladder distension as the cause of her agitation
   - B) Consider delirium as a possible diagnosis
   - C) Explore drug-disease interaction as a cause of the findings
   - D) Increase the dose of donepezil
   - E) Review and revise the medications she takes

4. **Which of the following statements regarding renal function and pharmacokinetics in geriatric patients is most accurate?**
   - A) Decreased muscle mass (sarcopenia) is the basis for normal or low creatinine levels in older patients, despite a decrease in renal function
   - B) Gentamicin can be used safely in elderly patients with serum creatinine levels of 1.5 mg/dL
   - C) Glomerular function invariably declines with aging
   - D) Serum creatinine levels of 1.5 mg/dL reflect normal renal function in elderly women
   - E) Tubular secretion is unaltered with aging

5. **Each of the following statements regarding the safety of medications used by geriatric patients is correct EXCEPT:**
   - A) Amantidine excretion depends on renal function and can cause confusion and falls if the dose is not adjusted for renal dysfunction
   - B) Benzodiazepines have a large lipid volume of distribution and are therefore relatively safe to use in geriatric patients
   - C) Chlorpropamide can cause hypoglycemia

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from prolonged action and is not safe to use in elderly patients

D) Meperidine and its metabolite normeperidine can potentially cause seizures in older patients and so should be used sparingly in the elderly

E) Metronidazole generally can be safely administered to older patients without dose alteration

EXPLANATION OF ANSWERS

1. **(A) Adverse drug reactions in older adults appear unrelated to the number of medications taken.** Geriatric patients consume a disproportionate number of medications, compared with the rest of the US population. Polypharmacy, the use of multiple prescribed and over-the-counter medications and nutritional supplements, is a cause of adverse drug reactions. The chronic use of 2 medications simultaneously is associated with a 15% risk for adverse drug reaction, but the use of 5 drugs results in a risk of over 50%. Rather than age, the number of medications taken appears related to adverse effects in older adults. Institutionalized geriatric residents take a large number of medications, with cardiovascular, analgesic, and central nervous system agents being the most frequently prescribed.
2. **(C) Decline in creatinine clearance with an increase in age.** Several changes that occur with age affect pharmacokinetics and pharmacodynamics in elderly patients. A decrease in creatinine clearance (although not invariable) occurs commonly with increasing age at the rate of 7.5 to 10 mL/min per decade of life and necessitates adjustment in the dosage of renally excreted drugs. Aging is associated with an increase in the body fat compartment, resulting in a larger volume of distribution for lipid-soluble drugs; at the same time, the water compartment decreases, resulting in an increased concentration of water-soluble drugs. Gastrointestinal changes are not significant and do not alter drug absorption with normal aging. Albumin levels do not change appreciably with age alone; any decrease usually results from disease.
3. **(D) Increase the dose of donepezil.** The patient has Alzheimer's disease, characterized by a decrease in cholinergic activity in the brain. Addition of diphenhydramine, a drug with anticholinergic properties, was likely responsible for her worsening mentation and agitation (ie, drug-induced delirium and drug-disease interaction). Her urinary retention and constipation were also drug-induced, although fecal impaction is a possible cause of the distended bladder. An increase in the dose of donepezil will not help her worsened mental state and agitation. Rather, a review of the drugs she is taking and discontinuing any offending agents (in this case, diphenhydramine) is the best approach in her care.
4. **(A) Decreased muscle mass (sarcopenia) is the basis for normal or low creatinine levels in older patients, despite a decrease in renal function.** Creatinine is a derivative of muscle; sarcopenia (low muscle mass) is the basis for low serum creatinine levels in elderly patients, despite a decrease in renal function. A creatinine level of 1.5 mg/dL denotes a creatinine clearance of less than 50 mL/min in an older woman, which is abnormally low. Aging is generally associated with a decrease in the glomerular filtration rate (creatinine clearance) at the rate of 1 mL/min per year of life, although this decrease is not invariable. Tubular function also decreases with aging. Gentamicin, an aminoglycoside, should be administered in lower dosages in geriatric patients than in younger patients, because a lower creatinine clearance and a smaller amount of water in the body lead to a higher drug concentration and the risk of toxicity.
5. **(B) Benzodiazepines have a large lipid volume of distribution and are therefore relatively safe to use in geriatric patients.** Although the stores of lipid tend to become relatively larger with age, benzodiazepines accumulate in fat tissues and do not leave the body, resulting in cumulative effects. Chronic use of benzodiazepines in older patients is not safe and is associated with cognitive changes, daytime drowsiness, and increased body sway with falls. Chlorpropamide is best avoided, and meperidine and amantidine should be used with caution and require dose reduction. Use of metronidazole is generally safe in geriatric patients.

SUGGESTED READINGS

Dharmarajan TS, Tota R. Appropriate prescribing of medications in older adults. Fam Pract Recert 2000;22:29–38.

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