



A PHARMACY CONTINUING EDUCATION PROGRAM

W-F Professional Associates, Inc. 400 Lake Cook Rd., Suite 207 Deerfield, IL 60015 847-945-8050

Mar 2010 "Geriatric Drug Considerations" 707-000-10-003-H01-P



This Month:
"GERIATRIC DRUG
CONSIDERATIONS"

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Caution is the word to utilize when it comes to drugs & the elderly. This is a topic that we periodically address because of the therapeutic complications & considerations. In this lesson we discuss & review a number of areas that have been suggested by participants: from common drugs used by the elderly, to common conditions & diseases that are treated, to adverse effects & reactions that must be anticipated. Additionally, we look at why these situations develop in elderly patients. The goal, as always, is to present information that may be shared with patients. This lesson provides 1.25 hours (0.125 CEUs) of credit, and is intended for pharmacists in all practice settings. **The program ID # for this lesson is 707-000-10-003-H01-P. Pharmacists completing this lesson by March 31, 2013 may receive full credit.**

To obtain continuing education credit for this lesson, you must answer the questions on the quiz (70% correct required), and return the quiz. Should you score less than 70%, you will be asked to repeat the quiz. Computerized records are maintained for each participant.

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The objectives of this lesson are such that upon completion the participant will be able to:

1. Comprehend epidemiological data regarding aging.
2. List symptoms associated with dementia.
3. Describe urological disorders that are common in the elderly.
4. Discuss common drugs that are used by the elderly.
5. Recognize common adverse effects that may arise from drugs used by the elderly.

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INTRODUCTION

The word geriatrics is derived from the Greek word *gere*, meaning to grow old, and *iatros*, meaning healer. It is considered a branch of medicine that deals with healthcare and diseases that affect elderly individuals. A geriatrician is a physician who concentrates on treating these patients. Gerontology is the study of the aging process and the related problems. The term was coined a century ago by Ignatz L. Nascher in an article in the *New York Medical Journal*. Like pediatrics, this area of healthcare has been separated from conventional internal medicine and family practice.

Many physiological changes take place as a patient gets older. The process taking place in the body of an elderly person differs from that of a child or of a young adult. This aging process is accompanied by a functional decline in the various organ systems. Factors influencing the process may include: genetics, the environment and one's occupation. Smoking, for example, can significantly impact the respiratory system. One must differentiate between conditions triggered by aging or by a regular disease state. For example, hepatic impairment may be a part of normal aging. Hepatic failure, on the other hand, is not and can occur by a pathological condition at any age. Elderly persons often experience complications from mild conditions that younger adults can easily cope with. For example, elderly patients may become dehydrated after a mild case of gastroenteritis, or they may become confused as a result of an insignificant fever.

It has been estimated that the elderly constitute about 14% of the population in the U.S. This percentage is on the rise. Among the reasons for the increase are: a decline in mortality rate, improved healthcare (i.e., immunization, continuously improved medical and diagnostic procedures, discovery of new and more effective drugs, and healthy lifestyle awareness).

STATISTICS OF DRUG USE BY THE ELDERLY

The elderly are often subjected to polypharmacy. The consumption of drugs is much higher than the general population, and this is mainly due to the probable coexistence of multiple medical diseases. Additionally, use of OTC products and natural supplements (often without the knowledge of the physician or consideration of other medications) is common. Because elderly patients often take multiple drugs, the risk for drug interactions is high. In the U.S. this group consumes 40% of all prescription drugs used. Upto 90% of patients over 60 take at least one prescription drug. The ambulatory patient fills 9-13 prescriptions. It has been estimated that the average elderly is on 5.7 prescription medications. Additionally, the average person in this group may take as many as 2-4 OTC drugs daily. About 30%-50% of this group uses laxatives, even when they are not needed. Other popular OTCs include: NSAIDs, sedating antihistamines, sedatives and H₂ blockers. These may all cause serious adverse effects. It has been estimated that over 10 million adverse drug reactions occur annually in elderly patients in the U.S. These reactions are seven times more common than in younger adults.

COMMON CLINICAL CONDITIONS SEEN IN GERIATRIC PATIENTS

Geriatric Dementia

Dementia is a progressive cognitive condition associated with a loss of intellectual ability. It ultimately leads to a deterioration of the ability to perform routine daily functions. It is the leading condition associated with patients in nursing homes. The reduction of cognitive processes associated with aging is normal and does not necessarily indicate the presence of dementia. In general, dementia occurs following a period of mild cognitive decline. It usually appears after age 60. Its incidence doubles every 5 years, thereafter, until the age of 90. At least 5 million people in the U.S. are affected by dementia.

One of the most common causes of dementia is Alzheimer's disease (AD) (also known as primary degenerative dementia). As many as 50% of patients with dementia suffer from AD. The remaining cases are associated with vascular dementia, Parkinson's disease dementia, pseudodementia and other forms. Alzheimer's disease is an incurable, degenerative and terminal disease characterized by short-term and long-term memory disturbances, deficient language, inability to learn, solve problems or perform mathematical calculations, poor judgment, as well as functional impairment such as activ-

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ities of daily living (ADL) (i.e. feeding, dressing, ambulating, toileting, bathing and grooming), and instrumental activities of daily living (IADL) (i.e. cooking, cleaning, shopping, telephone use, managing money or medications). It usually occurs after the age of 65, but may appear earlier. Even though there is no accurate universally accepted diagnosis, it is estimated that about 100,000 deaths annually in the U.S. are associated with AD.

Causes and progression of AD are unknown. However, immunological factors, genetics, viral infections and brain atrophy are believed to contribute. It is known that the disease is associated with plaques in the brain. Diagnosis is made by clinically observing the patient history, and presence of neurological abnormalities. A wide variety of drugs have been utilized to treat AD. None provide a totally effective treatment. Goals of treatment are:

1) Control undesirable behavior and to maintain ADL and IADL. Such therapy does not stop progression of the disease. 2) Either slow advancement of the disease or reverse the process that causes the symptoms.

Urological Disorders

Sexual Dysfunction: Aging plays a role in a decrease in sexual arousal and desire. In men this may translate as erectile dysfunction (ED). In women it is manifested as lack of sexual excitement or pleasure. Frequency of intercourse varies from one individual to another depending on general health and life pattern. Physiological changes, disability, presence of disease, as well as the intake of medications can cause interference. Poor health is considered the main reason for the decline in women, while men cited impotence. The decline in estrogen production in postmenopausal females is associated with physiologic changes that result in loss of activity. Whereas, men experience a gradual decline in testosterone at age 50, but the clinical outcomes are not clear. Cardiovascular disease, hypertension, diabetes mellitus, excessive alcohol consumption, brain and spinal cord damage, Parkinsonism, arteriosclerosis, alcohol abuse, and cigarette smoking are examples of factors that may negatively impact males.

Benign Prostatic Hypertrophy (BPH): This condition refers to an increase in the size of the prostate. It occurs as a result of proliferation of the stromal and epithelial cells and manifests in the formation of nodules. These compress the urethral canal. The result is difficulty in urination. BPH develops around the age of 40, and it becomes more prominent with advancing age. Practically all men will experience BPH, if they reach the age of 80. Prostate cancer may occur concurrently with BPH. However, there is no indication that BPH will trigger the development of prostate cancer. Aging and hormonal influence (testosterone and related components) play an important role in causing BPH.

Urinary Incontinence (UI): This can be defined as involuntary urination or leakage of urine while awake or asleep. It is commonly encountered in elderly patients. It may impact as many as 50% of hospitalized patients and about 20% of those who live at home. It is more prevalent in females. The risk factors include: neurological impairment, immobility, atrophic vaginitis and cystitis. Incontinence may be an inevitable result of advancing age. Consequences may include pressure sores, perineal irritation, embarrassment, isolation and depression. This condition is classified as acute (or transient) and chronic (or persistent). The acute variety may occur as a result of cystitis, atrophic vaginitis, delirium, congestive heart failure, restricted mobility, polyuria from diabetes, depression, stool impaction and the side effects of medications such as diuretics, narcotic opiates or calcium channel blockers. The chronic type is the more common. It is due to involuntary voiding preceded by urge for urination. The urge may include urine leakage. The most common factors that precipitate chronic urinary incontinence include: dementia, strokes, involuntary bladder contraction, stress incontinence (common in women and characterized by instantaneous leakage of urine), urethral obstruction (common in men and occurs as a result of cancer or enlargement of the prostate gland, and urethral stricture characterized by dribbling incontinence after voiding), and, finally, urge incontinence. Acute urinary incontinence is relieved by elimination of the cause. Chronic incontinence may be treated by surgery or pharmacologically. Drugs such as anticholinergics, oxybutynin, dicyclomine, doxepin, tolterodine, darifenacin, and trospium may commonly be used. Stress incontinence is sometimes treated by using alpha adrenergic agonists. Urethral obstruction may be alleviated by surgical decompression or by using alpha adrenergic agonists or finasteride.

Accidental Falls & Hypothermia

Musculoskeletal changes that occur due to aging can contribute to restricted mobility. Add this to visual and auditory impairment, and the elderly are at increased risk of accidents, falls, and a decline in physical activity. Nearly 50% of accidental deaths in patients over 65 are from falls (and their complications such as hip fractures). About half of the falls occur at home.

Hypothermia is encountered when body temperature unexpectedly falls more than 4 degrees below normal (98.6). The main causes of hypothermia are: inadequate environmental heating in winter and diminished perception of cold. Even though it develops slowly and insidiously (from several hours to a few days), the result can be death. Symptoms include: fatigue, drowsiness, mental confusion, pallor, shallow respiration, low pulse rate and blood pressure, and cardiac arrhythmias. Treatment includes gentle and gradual re-warming to prevent sudden enlargement of blood vessels.

Age-Related Physiological Changes

As we age, changes occur in all organs system. Patients with no heart disease, experience little, if any, changes in resting cardiac output. Generally, however, the elderly exhibit diminished cardiac output; blood pressure elevates, and there may be development of arteriosclerosis. The lungs experience diminished gas exchange, as well as reduction in expiratory flow rate. Changes in the kidneys contribute to a decrease in renal blood flow, glomerular filtration rate and reduced creatinine clearance. Serum creatinine levels remain the same due to reduced creatinine production. Therefore, serum creatinine may not be a predictor of excretion of a drug from the kidneys. This must be taken into consideration when determining the dose of drugs eliminated from the kidneys. A significant decrease in hepatic flow accompanies aging, and may worsen in the presence of congestive heart failure. A decline in the activity of certain hepatic enzymes and hepatic albumin synthesis may occur. The tissue sensitivity to drugs may diminish with aging. Responsiveness of the myocardial, beta adrenergic receptors and baroreceptors reflect sensitivity decline with advancing age. It has been shown that elderly patients would require higher doses of calcium channel blocker drugs such as verapamil and diltiazem. Altered motility occurs in the GI tract along with atrophic gastritis. Gradual rise in blood sugar is common. Linear decrease in muscle mass and increase in total body fat may cause a decrease in total body water, thereby affecting volume of distribution. Due to progressive changes with aging, the epidermis of the skin atrophies as a result of a decline in collagen and elastin. Inhibition of patient's locomotion results due to degenerative changes in joints and decrease in muscle mass. The aforementioned physiological changes may necessitate dosage adjustment of drugs.

Other Age-Related Changes

The aging process causes changes in the pharmacokinetic parameters of absorption, distribution, metabolism and excretion.

Absorption: Although physiologic factors such as gastric pH, gastric emptying time, and intestinal absorption mechanisms may appear to influence the absorption rate from the GI tract, recent reports have not confirmed this. Any impact on absorption would be insignificant. For example, absorption of vitamin B₁₂, iron and calcium through active transport is reduced, whereas that of levodopa is increased. Due to atrophic changes in the gastric mucosa of the elderly, the secretory capacity of gastric parietal cells diminishes. This results in a decrease in gastric acidity of the stomach. The disintegration, dissolution and subsequent absorption of drugs that require certain acidic environment, might be affected. The dissolution rate of poorly water-soluble drugs is increased in an acidic environment mainly due to enhanced ionization and solubility. Thus, the efficiency of absorption of such drugs in the geriatric patient, who lacks the proper gastric pH, is diminished. Gastric emptying rate appears to decline with age, primarily due to weakening of both muscle tone and motor activity.

Since the small intestine is the main absorption site of orally administered drugs, any delay in gastric emptying of a drug into the intestine will result in the retardation of the absorption process and increased risk of degradation of acid-sensitive drugs.

The GI tract receives about one-third of the heart's output. The decrease in cardiac output, that is usually associated with aging, will result in diminished blood flow to the GI tract, also resulting in reduced absorption.

Distribution: Serum albumin levels tend to decrease with age, especially in malnutrition and acute illness. Therefore, concentration of the free form of highly albumin-bound drugs, which determines drug effect, will rise because these drugs will have fewer sites for binding. However, its clinical importance is insignificant. Increased levels of unbound drugs will result in an increase in adverse reactions. Reduced albumin protein may also occur due to the presence of renal and hepatic dysfunction. The simultaneous intake of several medications by the elderly may lead to competition for the limited albumin binding sites, resulting in a rise in the serum concentrations of the displaced drug(s).

Changes in body composition due to aging can affect drug distribution. Water constitutes the largest single component

of body weight. The proportions of lean body mass and water content to total body weight decreases with age, whereas that of body fat content increases. About 82% of the ideal body weight of younger adults is composed of lean body mass, while in an elderly person, it is 64%. The percentage of fat tissues increases from 18% to 36% in men, and from 36% to 48% in women.

Metabolism: The rate of metabolism depends on hepatic blood flow, the extent of liver impairment, and the magnitude of cytochrome P-450 activity. Age-related reduction in hepatic blood flow falls to a rate of 40 to 50% of that of healthy younger individuals. Consequently, the rate of metabolism in the elderly may be reduced. Acetylation and conjugation do not significantly change with age. However, oxidative metabolism through the cytochrome P-450 system does decrease with age, and results in a decrease in metabolism of the drug.

Renal excretion: Some medications are minimally metabolized and are eliminated practically unchanged. A significant decline in the glomerular filtration rate and renal blood flow occurs with advancing age. It has been estimated that by age 70, a person may experience a 40 to 50% reduction in renal function. Such declines result in many adverse reactions in elderly patients due to inadequate elimination of drugs. Reduction in renal function in the elderly may affect clearance of drugs such as water-soluble antibiotics (aminoglycosides), lithium, diuretics, digoxin, and nonsteroidal anti-inflammatory drugs. Half-life of the following drugs is increased due to increase in body fat: diazepam, thiopental, and trazadone. All of the factors make it necessary to consider adjusting drug doses in elderly patients.

Age-Related Adverse Drug Reactions

The elderly experience adverse drug reactions due to aged-related increase in the frequency of drug use, increased sensitivity to drug effects due to physiological and pharmacokinetic changes that take place, and prevalence of disorders that require an increase in frequency of intake of medications. The most commonly encountered adverse effects in the elderly include: confusion, drowsiness, memory loss, dizziness, nausea, constipation, incontinence and extra pyramidal syndromes. It is essential that the patient be counseled properly regarding drug dosing and administration. Most adverse drug reactions occur as a result of the simultaneous intake of several medications by the patient. As the number of diseases that affect the older patient increases, so does drug utilization. While the use of drugs has improved the quality of life and functional capacity of patients, it results in an increase in drug interactions, noncompliance and costs.

Unintentional misuse of medications is an important factor in causing adverse drug reactions. Compliance errors occur more frequently in elderly patients who suffer from vision, hearing or physical impairment, or from forgetfulness. In some instances, misuse may result from lack of information regarding the proper use of the medications. Some patients may place multiple medications in the same vial, making it difficult to select the right one. Noncompliance also can contribute to adverse drug reactions. It appears that there is no definitive evidence to indicate that the elderly are more noncompliant than other population groups. However, because the elderly require more drugs than younger adults, there are greater risks.

Frequently Used Drugs in Geriatric Patients

Lipid-Lowering Drugs: Occurrence of hyperlipoproteinemia is higher among the elderly than in younger adults. While diet can help in reducing fat-carrying protein, drugs are often used. These include: statins, fibrates, niacin, bile acid sequestrants, ezetimibe and orlistat.

Oral hypoglycemics: Incidences of diabetes mellitus are approximately 1.6 per 1000 for individuals under 25 years of age, and about 65 per 1000 for patients between the ages of 65 and 74. It has been postulated that the higher incidence of diabetes among the elderly may be due to decreased peripheral responsiveness to insulin, decreased utilization of glucose due to a decline in physical activity, and increased percentage of fatty tissue. Elderly patients, who have renal dysfunction, should use short-acting oral hypoglycemics, if needed. The dose of these agents should be based on clinical response and the degree of physiological changes in the liver and kidney.

NSAIDs: The presence of degenerative diseases is a major cause of pain in the elderly. Most degenerative diseases are accompanied or caused by an inflammatory process. NSAIDs act by inhibiting the synthesis of prostaglandin, a chemical responsible for initiating pain. These medications have an inhibitory effect on both the peripheral and central levels, whereas acetaminophen acts on central prostaglandin. The inflammatory process causes pain by releasing chemicals at the site of inflammation and by irritating the nerve endings due to swelling. Caution should be exercised when using NSAIDs in geriatric patients. The side effects usually depend on the dose, frequency and duration of treatment.

Gastrointestinal disturbances are the main side effects. GI bleeding may occur following their administration. Such side effects may take place less with enteric-coated aspirin, naproxen, sulindac or ibuprofen. To minimize GI disturbances, these medications should be taken with food.

Diuretics: Edema occurs as a result of abnormal retention of salt and water. In congestive heart failure (CHF), edema is precipitated by compensatory reactions to insufficient cardiac output. Diuretics are used as an adjunct to digoxin and vasodilators in the treatment of CHF and hypertension. Thiazide diuretics are used frequently for CHF. Additional popular diuretics are furosemide and bumetanide. Potassium-sparing diuretics may be used, but such agents may lead to hyperkalemia, especially if ACE inhibitors and potassium supplements are taken concurrently. The frequent use of diuretics in the elderly is due mainly to the high incidence of CHF and hypertension. The most common adverse reactions include: hypokalemia, hyponatremia, hyperglycemia, dehydration, and elevation of BUN and creatinine. Hypokalemia must be prevented, since it may cause cardiac toxicity. Potassium supplements and potassium-sparing diuretics are recommended. Dosage of oral hypoglycemics and insulin probably need to be adjusted for diabetics who are also taking diuretics.

Beta-blockers: Beta-blockers should be used with caution in patients with CHF and chronic obstructive pulmonary diseases due to the likelihood of triggering bronchospasm. These agents may precipitate a hypoglycemic episode in diabetic patients. Studies have shown that elderly patients experienced a two to three fold increase in average peak blood concentrations when given propranolol, metoprolol, and labetalol. This increase occurred due to changes in first-pass metabolism. Because of this discrepancy, patients in their sixth decade may be more prone to experiencing side effects than younger patients. To minimize the rise of such reactions, a reduced starting dose may be initiated. Since the beta receptor's sensitivity and responsiveness decreases with increasing age, the beta-blockers are generally less effective in elderly hypertensive patients. The use of long-acting beta blockers such as nadolol or atenolol may reduce the risk of side effects and enhance compliance. Therapy with beta-blockers should not be discontinued abruptly, especially when used in treating coronary artery diseases due to increased sympathetic sensitivity.

Calcium channel blockers: This group of medications is used in the elderly mainly for treating hypertension and coronary artery diseases like angina pectoris. These drugs have a direct effect on coronary smooth muscle, producing vasodilatation and prevention of vasospasm. Side effects include headache and dizziness due to vasodilatation. Because of impaired renal elimination in the elderly, clearance of verapamil is delayed. Likewise, metabolism of this drug is reduced in the presence of liver disease. Verapamil produces greater changes in myocardial contractility than diltiazem and nifedipine. Thus, care must be exercised when using beta-adrenergic blockers concurrently with verapamil, since this combination may reduce cardiac output in patients with CHF. However, calcium channel blockers, especially nifedipine, can improve cardiac output by reducing after load.

ACE Inhibitors: Captopril, enalapril, fosinopril, ramipril and other ACE inhibitors are increasingly used in the treatment of severe CHF. They are more effective than digoxin, with fewer side effects. However, in preserving the renal function in patients with diminished renal perfusion pressure, compensating mechanisms are mediated by prostacyclin and angiotensin II to change the vascular tone of the glomerular afferent and efferent arterioles. Consequently, caution must be exercised when using ACE inhibitors in such patients to avoid the risk of inducing renal failure.

Sedatives and Benzodiazepines: There are a number of medical and nonmedical problems common in the elderly that may interfere with normal sleep patterns. Bronchial asthma may cause nocturnal dyspnea; pain caused by arthritis appears to be more intense at night; diabetes may cause glucosuria and nocturia; urological problems can lead to nocturia; hyperthyroidism can cause insomnia and nervousness; intake of sympathomimetics, such as pseudoephedrine or phenylpropanolamine, may cause insomnia; lack of physical activity in the elderly and daytime naps can contribute to insomnia. As many as half of the patients in nursing homes receive sedative-hypnotics in order to manage insomnia. Benzodiazepines such as oxazepam, lorazepam and temazepam are commonly used in the elderly. Long-acting benzodiazepines may have residual cognitive effect in elderly patients and may increase the risk of falls and bone fracture. It should be kept in mind that the regular use of benzodiazepines in the elderly is not recommended. Abrupt cessation of use of these medications may result in withdrawal symptoms such as tremor, rebound insomnia and agitation. Nonbarbiturates and nonbenzodiazepines, such as the antihistamine diphenhydramine or chloral hydrate, are often used in the elderly. Most OTC sleep products utilize diphenhydramine as the active ingredient. When taking sedatives-hypnotics, the elderly may reduce

the usual dose by as much as one-half or more.

Psychotropic Agents: Drugs like the phenothiazines, haloperidol and loxapine are commonly used in nursing homes and in geriatric patients with psychosis, behavioral manifestations of dementia such as impaired cognitive functioning, anxiety, agitation and hallucinations. The phenothiazines produce adverse drug reactions such as orthostatic hypotension and extra pyramidal symptoms, probably due to a decline in the capacity of liver enzymes to metabolize the drugs. A lower dosage should be used at the start of therapy, which may be increased in accordance with response to safety of the patient. The concurrent intake of some antiparkinson drugs may cause an increase in the anticholinergic activity of the phenothiazines.

Tricyclic Antidepressants: This group includes agents such as desipramine, nortriptyline, imipramine and amitriptyline. They have varying amounts of anticholinergic, cardiovascular and sedating adverse reactions. The initial doses should be lower than those of younger adults due to slow metabolism and excretion. The therapeutic plasma level and patient response should be monitored.

Warfarin: Warfarin is an oral anticoagulant that is highly bound to plasma albumin. Due to the decline in the plasma protein level in the elderly, a larger than normal portion of the administered dose will be present in the unbound (free) form, increasing the risk for hemorrhage. Elderly patients who take warfarin often have their dose reduced by 30 to 40%. Furthermore, hematuria, prothrombin and partial prothrombin times should be monitored.

Digoxin: CHF is a condition that is often encountered in patients over 60. Because of age-related renal dysfunction, renal clearance of digoxin is decreased significantly. Additionally, changes in body composition in the elderly and the reduction in lean body weight must be taken into consideration while calculating digitalization dose. Most geriatric patients may require a daily maintenance dose instead of a loading dose, which may trigger digoxin toxic manifestations such as nausea, anorexia and vision disturbances.

Narcotic Analgesics: Elderly patients are more sensitive to the analgesic effect of narcotic drugs. Consequently, they may require reduced doses. Furthermore, geriatric patients are more prone to experiencing narcotic side effects such as constipation, mental confusion and respiratory depression. When administering narcotics, the patient should be given a minimal effective dose that can be gradually increased until pain is reduced for a few hours. A reduction in narcotic dose may be achieved if given concomitantly with non-narcotic analgesics such as aspirin or NSAIDs.

SUMMARY

The aging process is inevitable and is accompanied by physiological and pharmacokinetic changes. A decline in functions of the various organ systems of the body may change the absorption, distribution, metabolism and excretion of drugs. There is a difference between disease and aging effects. Elderly patients have specific issues regarding the use of medications due to the large number of drugs taken, presence of multiple diseases, concurrent use of OTC drugs and decline in function of body organs. Dosing modifications are a major consideration, and it is often the pharmacist's responsibility to be involved in this.

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Additional Topics for 2010

Geriatric Drug Use Considerations	HIV Update
H1N1	Medication Errors Update
Geriatric Skin Issues	RPh Role in Pharmacogenetics
Drugs Approved in 2009	Barriers to Medication Compliance

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LESSON EVALUATION

Please fill out this section as a means of evaluating this lesson. The information will aid us in improving future efforts. Either circle the appropriate evaluation answer, or rate the item from 1 to 7 (1 is the lowest rating; 7 is the highest).

1. Does the program meet the learning objectives?

Comprehend epidemiological data regarding aging Yes No

List symptoms associated with dementia Yes No

Describe urological disorders that are common in the elderly Yes No

Discuss common drugs that are used by the elderly Yes No

Recognize common adverse effects that may arise from drugs used by the elderly Yes No

2. Was the program independent & non-commercial Yes No

	Poor		Average			Excellent
3. Relevance of topic	1	2	3	4	5	6 7

4. What did you like most about this lesson? _____

5. What did you like least about this lesson? _____

Please Select the Most Correct Answer

1. Immunological factors, genetics, viral infection & brain atrophy are believed to contribute to dementia.
 A. True B. False

2. Which of these is NOT a goal of dementia treatment?
 A. Control undesirable behavior
 B. Maintain ADL
 C. Keep CNS stimulated
 D. Provide medications that slow or reverse the disease

3. BPH refers to:
 A. Increase in size of the prostate
 B. A pre-cancer condition
 C. A condition that results in presence of blood in the urine
 D. A condition that seldom occurs after age 45

4. Which statement(s) is (are) TRUE regarding urinary incontinence?
 A. Most prevalent in females
 B. Most common after age 25
 C. Chronic condition is self-limiting & disappears with time
 D. Chronic condition occurs as result of polyuria from diabetes & depression

5. Which does not effect the aging process?
 A. Genetics
 B. Temperature
 C. Environment
 D. Occupation

6. Hypolipidemia is higher in the elderly than in younger adults.
 A. True
 B. False

7. Acetylation & conjugation of drugs:
 A. Increase in intensity with age
 B. Decrease more than 50%
 C. Do not occur in the liver
 D. Do not significantly change with age

8. Which statement is false concerning pharmacokinetic changes in the elderly?
 A. Efficiency of drug absorption may be diminished
 B. Serum albumin level tends to increase with age
 C. About 82% of the ideal body weight of adults is composed of lean body mass
 D. Hepatic blood flow can fall to a rate of 40 to 50% of younger adults

9. An elderly person in the U.S. takes an average of:
 A. 2-4 OTC drugs per day
 B. 2-4 OTC drugs per week
 C. 5 OTC drugs per day
 D. 7 OTC drugs per day

10. Elderly patients:
 A. Are not sensitive to narcotic analgesics
 B. Should never take narcotic analgesics
 C. Experience a decline in their health only after age 75
 D. Are more sensitive to narcotic analgesics

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