



Administering Medications to Elderly Patients Part 2: Administering and Monitoring Medication Therapy

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Medications and the Elderly, A 3-Part Series

Administering Medications to Elderly Patients, Part 2: Administering and Monitoring Medication Therapy builds on part 1 and addresses concerns related to administering and monitoring response to medications which elderly persons commonly receive.

Administering Medications to Elderly Patients, Part 1: The Physiology of Aging educates healthcare professionals about the implications of medication therapy in the elderly, focusing specifically on the physiology of aging and disease conditions common among this population.

Administering Medications to Elderly Patients, Part 3: Discharge Planning builds on parts 1-2 and explores issues related to patient teaching, polypharmacy, compliance, adherence and social issues that often affect elderly persons and adherence to therapy.

Each course presents case studies for practice in critical thinking.

Each course includes the same five appendices:

- Beers Criteria 1 Potentially Inappropriate Medication Use in Older Adults – High-Severity
- Beers Criteria 1 Potentially Inappropriate Medication Use in Older Adults – Low-Severity
- Beers Criteria 2 Drug-Disease Interactions – High-Severity Concerns
- Beers Criteria 2 Drug-Disease Interactions – Less-Severe Concerns
- Resources for Further Information

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Purpose

Administering Medications to Elderly Patients, Part 2: Administering and Monitoring Medication Therapy educates healthcare professionals about special considerations in administering medications to elderly patients and monitoring the safety and effectiveness of therapy.

Objectives

After successful completion of this course, you will be able to:

1. Identify risks and sources of errors in administering medications to elderly patients.
2. Explain the use of Beers Criteria in medication safety and effectiveness for elderly patients.
3. Identify implications of routes and dosage forms in administering medications to the elderly.
4. Relate specific medications and patient characteristics to the following aspects of assessing the medication profile and monitoring the elderly patient's response to medications:
 - Adverse effects
 - Disease processes
 - Drug interactions
 - Fall prevention
 - Laboratory tests
 - Medication-related cognitive impairment
 - Nursing assessment
 - Pain management
 - Questions to ask
5. Explain how collaborating with patients and healthcare professionals can assist nurses in assuring safety and effectiveness of medication therapy for elderly patients.
6. Name resources for further information about medication therapy for elderly patients.

Introduction

The census of acute care facilities reflects the graying of America. Nurses in most clinical specialties need to gain competence in caring for elderly patients.

Persons aged 65 and older are more likely than younger individuals to suffer from exacerbations of disease processes that require hospitalization. Elderly persons often become candidates for orthopedic and cardiac surgeries requiring extended hospital stays. These factors, plus the availability of Medicare health insurance for persons aged 65 and older, swell the ranks of the elderly in the inpatient census. Literature suggests that as many as one in ten older adult patients may experience an adverse drug reaction (ADR) either leading to or during their hospital admission (Alhawassi, Krass, Jajorek & Pont, 2014).

According to the Centers for Disease Control (CDC), 2012, there are nearly 177,000 emergency annual hospitalizations for adverse drug events in U.S. adults aged 65 years or older. Over 40% of emergency visits which require hospitalization are caused by just a handful of medications which require regular monitoring with blood tests. In 2004, over 7,500 Americans died of unintentional overdoses of opioid analgesics. This data suggests that healthcare professionals need to focus on safety initiatives on medications commonly prescribed to the elderly.

Medication Errors and Elderly Patients

One-third of medication errors that reach a patient involve a patient aged 65 years or older (Lucado, Piez, & Elixhauser, 2011; Picone, Titler, Dochterman, Shever, Kim,...& Rui, 2008).

- 55% of reported errors involved seniors
 - This includes errors that did not reach the patient.
- The most common types of medication errors among seniors were:
 - Omission – 43%
 - Improper dose/quantity – 18%
 - Unauthorized drug (drug not prescribed for the patient, not a drug prescribed for another patient and given to the wrong patient) – 11%
- Among medication errors that caused harm to seniors:
 - 9.6% resulted from prescribing errors.
 - 7% resulted from use of the wrong route, such as tube feeding given IV.
 - 6.5% resulted from wrong administration technique, such as failing to dilute concentrated solution, crushing sustained-release medications, or administering eye or ear drops incorrectly.

Knowledge Check 1

In USP 2003 data, the most common type of medication error among seniors was:

- a. Omission
- b. Wrong Patient
- c. Wrong Dose
- d. Wrong Route

Medication Errors and Elderly Patients: Proceed with Caution

An almost endless combinations of factors can create problems for elderly persons who are taking medications:

- The physiologic effects of aging can cause increased sensitivity to medications. Older persons metabolize medications more slowly and therefore experience more prolonged action of medications. In addition, diminished functioning of organs and the circulatory system makes the elderly person more vulnerable.
- Elderly persons often take a number of medications concurrently.
- Chronic conditions common in the elderly indicate the need for medications and also may alter the action of specific medications.
- Functional, cognitive, and social limitations that often accompany aging can interfere with compliance and adherence to medication regimes.
- Seniors are under-represented in drug trials and therefore, information about therapeutic and toxic drug serum levels and effects of drugs in the elderly is incomplete.
- The age group 65 and older is the fastest growing segment of our population (CDC, 2012).

Research findings cited in this course consider persons aged 65 years and older to be elderly. The U.S. General Accounting Office recognizes categories within the elderly classification:

- 65 – 75 years, "Young old"
- 75 – 85 years, "Older old"
- 85 years and older, "Oldest old"

Medication Errors and Elderly Patients: Research Findings

Researchers examined medication errors in more than 10,000 admissions of elderly persons over a 41-month period (Picone et al., 2008). They found:

- At least one error in 861 admissions.
 - 81% had only one error
 - 19% had 2 or more errors
- 96% of the errors may have been preventable.
- Most errors occurred during the first 2 days of hospitalization.
- Most common errors were: Omissions (48.8%) and Wrong dose (16.3%).
- Most frequent sources of error were: Administration (54%) and Transcription (38%).

Medication Errors and Elderly Patients: Contributions to the Problem

- Odds of error increased 5% for each additional medication received
- Greater odds of error for female patients
- Greater odds of error for Caucasian as compared with all other races
- Patients with an admission diagnosis of diseases of digestive system were 64% more likely to experience an error
- Odds of error were higher when nurse staffing was 20% below the lowest average of hourly RN time
- Medications most commonly involved in errors:
 - Furosemide 4.8%
 - Potassium Chloride 4.5%
 - Heparin 4.4%
 - IV fluids 3.7%
 - Insulin 3.3%
 - Morphine Sulfate 2.9%
 - Warfarin 2.7%
 - Metoprolol 2.4%
 - Phenytoin 2.3%

(Picone et al., 2008)

Adverse Drug Events

Elderly persons are highly susceptible to adverse drug events because their risk of toxicity is increased by:

- Impaired function of many body systems, especially kidney function
- Impaired function or cognitive ability that may lead to errors in self-administration
- Interactions of the many medications they take with drugs and other substances
- Disease conditions which cause drug-disease interactions

Appendix C and Appendix D contain lists of potential drug-disease interactions for elderly persons. These two lists combined are sometimes referred to as Beers Criteria, List 2 or Beers II which identifies potential interaction of specific medications with disease conditions common among elderly persons.

Assess carefully when your patient is at risk for a drug-disease interaction. Consult and collaborate with your clinical nurse specialist (CNS), nurse practitioner (NP), pharmacist and/or the patient's provider to validate and interpret your findings.

Remember that elderly persons often go home from the hospital with a changed medication profile including new medications started during the inpatient stay. Your observations and actions while the patient is hospitalized can help avoid adverse drug reactions after discharge.

Case #1: Mr. Smythe - Adverse Effects of Medications

Read Mr. Smythe's situation and the questions suggested below.

- Are you asking similar questions to those suggested?
- Are there other, more thought-provoking questions that should be asked?
- In addition to the questions, what orders do you think might be indicated?

Mr. Smythe, age 74, was admitted to treat osteomyelitis in his left ankle. He is receiving gentamicin (Garamycin®) 2 mg/kg every 12 hours IV. His renal function was normal at admission. He has never had his hearing tested, but he now complains that his ears "are ringing off the hook."

Case #1: Mr. Smythe – Questions

What effects of aging have implications for the drugs this patient is receiving?

In general, the elderly are less able to eliminate drugs through their kidneys. The rate of glomerular filtration gradually declines by about 40% from age 20 to 80 years. Gentamicin (Garamycin®) is eliminated almost entirely as an unchanged drug by glomerular filtration. The drug may have a longer half-life and higher steady state in the elderly. Gentamicin (Garamycin®) is usually administered no more frequently than every 12 hours in the elderly (Olsen, Tindall, & Clasen, 2007).

What side effects and adverse effects is this patient most likely to experience?

- The most common signs of nephrotoxicity include thirst, nausea, vomiting, loss of appetite, and greatly increased or decreased frequency or amount of urination.
- Signs of neurotoxicity include seizures, numbness, tingling, or muscle twitching.
- Signs of auditory ototoxicity include loss of hearing, ringing or buzzing, or a sensation of fullness in the ears.
- Signs of vestibular ototoxicity include nausea, vomiting, clumsiness, dizziness, or unsteadiness.

What laboratory tests or other means of monitoring response to drug therapy will the patient need now and after discharge?

- The elderly need baseline and periodic measurements of renal function.
- The elderly need periodic peak and trough gentamicin levels.

Adverse Drug Reactions After Discharge

Researchers (Hanlon, Pieper, Hajjar, Sloane, Lindblad, Ruby, & Schmader, 2006) found that after discharge from the hospital, 33% of frail elderly patients experienced one or more adverse drug reactions (ADRs).

The rate of preventable ADRs was 0.71 per 1,000 person-days.

Risk factors for ADRs included:

- Number of medications
- Use of warfarin
- Use of benzodiazepines

Thorough patient and family teaching, including monitoring recommendations, is essential to assure safe medication therapy for patients after discharge.

Other studies identified medications associated with ADRs, including antiplatelets (including aspirin), diuretics, NSAIDs, and anticoagulants (Alhawassi et al., 2014).

The third course in this series, Administering Medications to Elderly Patients, Part 3: Discharge Planning, addresses discharge teaching.

Knowledge Check 2

According to research findings presented in this course, which medication was found to be involved in BOTH medication errors and adverse drug reactions with elderly patients?

- a) Aspirin
- b) Digoxin
- c) Warfarin**
- d) MAO inhibitors

The correct answer is c

Risk for Patient Falls

Falls, hip fractures, delirium, and urticaria lead the list of adverse medication effects which elderly persons experience (Davies & O'Mahony, 2015). Medications that cause confusion, hypotension, or weakness can prove hazardous.

Injuries from falls cause significant morbidity and mortality among the elderly. Even the elder who has not fallen, or falls without injury, often becomes obsessed with the fear of falling. Most elderly people know of at least one contemporary who fell and never regained independence.

Many of those considered as potentially inappropriate medications for elderly persons earned their places on the list because of adverse effects that could lead to falling. This includes anticholinergics and long-acting benzodiazepines such as diazepam (Valium®). Appendices A-D list these medications.

Individuals who take five or more prescription medications are at increased risk for falling, especially if the medications include psychotropics, antiarrhythmics, diuretics or digoxin (Farrell, Szeto, & Shamii, 2011).

Assess your patient carefully for hypotension, confusion, and weakness. Initiate precautions and use assistive devices to prevent falls. Report these symptoms so that orders may be adjusted.

Drug-Induced Delirium

Nearly every drug class can cause either drug-induced delirium (an acute state of confusion) or dementia (a more chronic alteration in mental function) in older people.

- Drug-induced *delirium* reverses with the cessation of the offending drug
- However, drug-induced *dementia* persists after the drug is withdrawn

In general, the elderly are at risk for medication toxicity. The elderly often have reduced central nervous system reserves and changes in cerebral perfusion, making them susceptible to drug-induced cognitive impairment and changes in mental status.

Drug-related cognitive impairment may be related to dose, or may be an idiosyncratic reaction to a drug. It is the most common reversible cause of confusion (Olsen, Tindall, & Clasen, 2007).

Knowledge Check 3

Drug-induced delirium reverses with the cessation of the offending drug.

True

False

The correct answer is true

Risk Factors for Drug-Induced Delirium

The odds of drug-induced dementia are more than nine times greater for a patient who takes four to five medicines as compared with the patient who takes only one medicine.

Administer the least possible number of drugs to elderly patients to reduce the risks associated with polypharmacy.

Certain medications create high risk for drug-induced delirium. To avoid toxicity, dosages for these medications must be adjusted based on age, renal function, and hepatic function:

- Anticholinergics
 - Antihypertensives
 - Benzodiazepines
 - Narcotics
 - Sedative-hypnotics
 - Abrupt cessation of psychoactive medications after long-term use
-
- Major risk factors also include
 - A diagnosis of dementia or other neuropsychological disorders,
 - Advanced age
 - Sepsis
 - Myocardial infarction
 - Hypoalbuminemia
 - Hospitalization
 - Congestive heart failure
 - Stroke
 - Post-operative status
 - Severe chronic illnesses
 - Isolation

(Olsen et al., 2007; Ryan, O'Mahony, Kennedy, Weedle, Gallagher, & Byrne, 2009; Petrone & Katz, 2005).

Knowledge Check 4

Elderly patients are susceptible to drug-induced delirium only if they have a diagnosis of dementia or neuropsychological disorder.

True

False

The correct answer is False

Acute Changes in Mental Status Mnemonic

Lisi (2000) used the following mnemonic as a tool to remember drugs commonly associated with acute changes in mental status (MS). This mnemonic is still useful today (Caplan & Stern, 2008).

MNEMONICS FOR DIAGNOSING MEDICATION ADVERSE EFFECTS		
FEVER (Neuroleptic Malignant Syndrome) Fever Encephalopathy Vital Sign Instability Elevated WBC/CPK Rigidity	FINISH (Antidepressant Discontinuation Syndrome) Flu-like symptoms Insomnia Nausea Imbalance Sensory Disturbances Hyperarousal (anxiety/agitation)	HARMED (Serotonin Syndrome) Hyperthermia Autonomic Instability Rigidity Myoclonus Encephalopathy Diaphoresis

Preventing Drug-Induced Delirium

- Encourage elderly patients to discuss all over-the-counter (OTC) medication purchases with the pharmacist or physician. Many OTC medications have anticholinergic properties, which are linked to drug-induced delirium.
- Help patients maintain adequate fluid and nutritional status.
- Monitor carefully when a patient who has dementia begins therapy with a new drug.
- Obtain a baseline mental status examination in order to detect subtle changes.
 - The Mini Mental Status Examination (MMSE) (discussed in detail later in this course) is a research-based tool, widely used to detect impairments in mental status.
 - Your facility may use this tool or another to assess mental status. It is important to obtain a baseline for later comparison.

Case #2: Mr. Hart - Sedatives and Hypnotics

Read Mr. Hart's situation and the questions suggested on the next screen.

- Are you asking similar questions to those suggested?
- Are there other, more thought-provoking questions that should be asked?
- In addition to the questions, what orders do you think might be indicated?

Mr. Hart, a 75-year-old man admitted for chest pain, complained that he couldn't sleep and asked for his sleeping pill.

At home, he took a red capsule every night, but he couldn't remember the name of the medication.

His doctor ordered secobarbital (Seconal®) 100 mg. orally at bedtime.

Case #2: Mr. Hart – Questions

Is this patient receiving a potentially inappropriate medication

Secobarbital (Seconal®), as a barbiturate, is generally considered inappropriate for the elder because other safe and effective sedatives and hypnotics are available.

What effects of aging have implications for the drug this patient is receiving?

Although the precise reasons are unknown, the elderly generally metabolize and eliminate barbiturates slower than do younger people, resulting in a long half-life for these drugs.

Are certain adverse effects particularly hazardous because of this patient's disease processes?

- Elderly people taking barbiturates have an increased risk of falling.
- Elderly people taking barbiturates are more likely to become confused, depressed, or show paradoxical excitation than are younger people.
- The elderly are at greater risk for barbiturate-related hypothermia, especially at high doses or following an acute overdose.

Does this patient's medication profile comply with recommended guidelines and standards?

Generally, barbiturates used as hypnotics are recommended only for short-term use, less than two weeks.

How will this patient's medication profile change upon discharge? Any new drugs, dosage changes or discontinuations?

If a new hypnotic medication is prescribed at discharge, ensure that the patient knows to discontinue the secobarbital (Seconal®).

What are your resources for further information about the drugs your patient is receiving?

- The patient or family members may provide a history of the patient's sleep patterns and history of using hypnotic medication.
- The Pharmacy or Drug Information Center may suggest safer alternative medications for the elderly.

With whom will you collaborate to assure safety and effectiveness of this patient's drug therapy?

Uninterrupted use of secobarbital (Seconal®) may result in physical or psychological dependence. The drug may need to be reduced gradually to prevent withdrawal symptoms. Long-term users may need referral to drug detoxification and rehabilitation services (Olsen, Tindall, & Clasen, 2007).

The Mini Mental State Evaluation (MMSE)

The Mini Mental State Evaluation, or Mini Mental Status Exam (MMSE), or Folstein test, is a short test for neurocognitive processes that depends largely on a patient's verbal response, reading, and ability to write, to assess for cognitive impairment (Caple & Walsh, 2011). The MMSE asks the patient to:

1. Respond to specific questions about orientation to time and place.
2. Repeat 3 words spoken by the person who is assessing.
3. Demonstrate attention and calculation by subtracting 7 from 100 and continuing to subtract 7 from each result until told to stop.
4. Recall the 3 words previously spoken by the person who is assessing.
5. Name specific common objects, such as a pencil.
6. Repeat a simple phrase spoken by the person who is assessing.
7. Follow a simple spoken instruction that includes 3 steps, such as "Take the paper in your left hand, fold it and hand it to me."
8. Read and follow a simple written instruction without stating the instruction out loud. For example, the written instruction, Close your eyes.
9. Write a simple sentence.
10. Copy a simple design.

If your facility is using the MMSE, a scoring system is provided with the tool.

Did you Know

Assess Mental Status

Obtain a baseline assessment and ongoing reassessment of your elderly patient's mental status. Use standard questions so that you can make meaningful comparisons from one time to the next. For further information about the MMSE, go to

<http://www.nlm.nih.gov/medlineplus/ency/article/003326.htm>

Beers Criteria: Gray List, Potentially Inappropriate Medications, and Potentially Inappropriate Prescribing for Elders

Beers Criteria list medications considered potentially inappropriate for use with elderly patients, based upon research findings (Beers, Ouslander, Rollinger, Reuben, Brooks, & Beck, 1991; Kaplan & Porter, 2011). Researchers use Beers Criteria to study the use of Potentially Inappropriate Medications (also known as Potentially Inappropriate Prescribing for Elders , or the Gray List.

Beers first published his recommendations in the 1990s, but prescribing practice has not yet caught up with his widely endorsed recommendations.

View the complete listing of medications presenting high-severity risks ([Appendix A](#)) and those presenting low-severity risks ([Appendix B](#)).

Note that medications listed are potentially inappropriate for elders. In the case of a given individual patient, it is possible that benefits may outweigh risks.

Before you read the list, make your own, based on your own experiences. Then compare your list with the lists in Appendix A and Appendix B. These two lists combined are sometimes referred to as Beers Criteria, List 1 or Beers I which identifies medications that elderly persons should avoid.

The Beers Criteria are used to study the use of Potentially Inappropriate Medications (, also known as Potentially Inappropriate Prescribing for Elders , or the Gray List.

Case Study #3: Mrs. Thecla - Potentially inappropriate medications

Read Mrs. Thecla's situation and the questions suggested. Click on the button next to each question to view answers.

- Are you asking similar questions to those suggested?
- Are there other, more thought-provoking questions that should be asked?
- In addition to the questions, what orders do you think might be indicated?

Mrs. Thecla is an alert and cheerful 82-year-old admitted after she fractured her hip. She fell at home when her three dogs pushed past her on their way to the door.

She remembered the incident in detail and denied having felt dizzy or lightheaded at the time of the accident. Her last set of vital signs was within normal limits.

For the past five years she has taken amitriptyline (Elavil®) 10 mg po daily to relieve pain and tingling in her hands from what she describes as a "pinched nerve."

Case Study #3: Mrs. Thecla – Questions

Is this patient receiving a potentially inappropriate medication?

- When used at high doses as an antidepressant, amitriptyline (Elavil®) is generally considered inappropriate for the elderly because of its high degree of anticholinergic effects including confusion and sedation.
- It also causes hypotension.
- These effects are likely to cause falls among the elderly.

Does this patient's medication profile comply with recommended guidelines and standards?

Low doses of amitriptyline (Elavil®) are generally considered an acceptable treatment for neuropathic pain, even in the elderly (Olsen et al., 2007).

Initial Medication Profile:

Step 1. Medications upon Admission

The importance of thorough medication reconciliation upon entry into the hospital cannot be stressed enough. In a recent study, Bahrani, Eriksson, Hogulund, & Midlov,(2014) followed a total of 149 hospitalized patients over a 10-month period. In 68 (46%) patients, at least one medication error transpired, with an average of 0.95 errors per patient. Overall, 8.0% of all medications transferred were found to be incorrect. Below are steps you can take to ensure proper medication reconciliation is completed:

- List all medications, herbal preparations and nutritional supplements the patient takes routinely or when needed. A comprehensive list is very important.
- Ask the patient, or caregiver to bring in all medications, topical preparations, eye drops, herbal preparations and nutritional supplements that the patient uses.
- Emphasize that it is important to obtain a complete listing of what the patient has been taking recently. Even medications that are outdated or prescribed for someone else should be included if the patient has been using them.
- Find out how the patient uses the medication – dose, schedule, variations.
- For PRN medications, ask why the patient takes the medication, how often and if he or she experiences relief. Ask if other remedies are used for treating occasional symptoms.
- Include questions about:
 - Pertinent monitoring, such as PT and INR for patients taking warfarin, or blood glucose for patients taking insulin or other diabetic medications.
 - Relevant precautions, such as not driving while taking a medication, or taking a medication with an ample amount of water.
 - Social factors, such as reducing dose or discontinuing due to cost.
 - Functional factors, such as difficulty seeing or opening containers (Murphy, Oxencis, Klauck, Meyer, & Zimmerman et al., 2009).

Assess Mental Status

Obtain a baseline assessment and ongoing reassessment of your elderly patient's mental status. Use standard questions so that you can make meaningful comparisons from one time to the next. For further information about the MMSE, go to <http://www.nlm.nih.gov/medlineplus/ency/article/003326.htm>

Initial Medication Profile:

Step 2. Identify Potential Problems

As you review your patient's list of medications, consider the following:

- Which medications are included on Beers I or Beers II (Appendices A-D)?
- Which medications may be appropriate for the elderly or for this patient, but require frequent monitoring? Include:
 - Angiotensin-converting enzyme inhibitors
 - Antiepileptics
 - Antiplatelet agents
 - Antipsychotics
 - Benzodiazepines
 - Digoxin
 - Hypoglycemic agents
 - Loop diuretics
 - Opioids
 - Theophylline
 - Warfarin
- Which medications have an unclear indication for use for this patient?
- Note that some medications on the list are considered safe at low dose for particular indications.
- Identify contents of over the counter (OTC) combination drugs, such as Tylenol PM® which contain acetaminophen and diphenhydramine (Benadryl®). Diphenhydramine is a potentially inappropriate medications due to anticholinergic and sedating properties (Murphy et al., 2009; Thomen, Winterstein, Sondergaard, Haugbolle, & Melander, 2007).

Initial Medication Profile: Step 3. Collaborate

Review your findings with the pharmacist, the primary care provider, and other prescribers, if appropriate, and other resource persons such as a CNS specialized in geriatrics or NP.

- Could one of the identified medications be causing the patient's symptoms?
- For any potentially inappropriate medications you identify, does the reason this medication is a potentially inappropriate medication create a risk for this patient?
- Is there a clear and present indication for each medication?
- Is the medication having the desired effect?
- Is the dose high enough to be effective and low enough to avoid adverse effects?
- Are there safer alternatives for any identified medications, including non-pharmaceutical approaches?
- Is the medication profile consistent with therapeutic goals? For example, is the priority symptom management or aggressive treatment of a disease?

Consult with the patient, caregiver and/or significant other for input and feedback on the team's recommendations (Murphy et al., 2009).

Potentially Inappropriate Medications May Be Safe at Low Dosage

Some potentially inappropriate medications are prescribed at low dosages for reasons other than the primary indication Amitriptyline (Elavil®), a tricyclic antidepressant (TCA) is considered a potentially inappropriate medication at the usual antidepressant dose. However, it may be prescribed at lower doses to treat migraines or neuropathic pain.

At lower doses, side effects are reduced. TCA side effects of sedation and anti-cholinergic effects create safety risks at the usual dose prescribed for depression, but not at lower doses (Olsen et al., 2007).

Attention ED RNs!

Indicators of possible misuse of prescription or OTC medications in older patients:

- Dizziness
- Vomiting
- Headache
- Abdominal pain

Ask patients:

- “How long have you taken each of your medications?”
- “Which medications have you taken today?”
- “Have you had these symptoms before?”

When possible, encourage patients to bring their medications with them to the ED.

Involve pharmacists in determining whether a patient's complaint is due to an adverse drug event.
(Budnitz et al., 2011)

The Hamdy Questions

The following questions, developed by Hamdy, Moore, Whalen, Donnelly, Compton, Testerman, ...& Hughes, (1995) are a helpful tool that can be used to assess the need for medications for a patient.

Consider them as you evaluate your patient's medications. You may see them incorporated into pharmacy and physician practices (Molony, 2009; Pham & Dickman, 2007).

1. Is the indication for which the medication was originally prescribed still present?
2. Are there duplications in drug therapy (i.e., same class)? Are simplifications possible?
3. Does the regimen include drugs prescribed for an adverse reaction?
4. If so, can the original drug be withdrawn?
5. Is the present dosage likely to be sub-therapeutic or toxic because of the patient's age and renal status?
6. Are any significant drug-drug or drug-illness interactions present?

As adapted by Molony (2009), and Pham & Dickman (2007) with permission from Hamdy et al., (1995).

Initial Plan

Set up an initial plan for your patient.

Ensure laboratory monitoring appropriate for specific medications.

Explore non-pharmacologic approaches, such as sleep hygiene, physical therapy, or other approaches to relieving symptoms for which the patient is receiving medication.

Monitor the effects of changes in the medication.

Educate the patient and family members on medication self-care. Preventable adverse drug events in older adults are often the result of misuse, overuse or underuse of medications (Molony, 2009).

Include:

- Any anticipated effects of changes
- Necessary monitoring
- Medication-specific precautions related to interactions with other substances or administering the medication
- When to call the primary care provider (Molony, 2009)

The third course in this series, Administering Medications to Elderly Patients, Part 3: Discharge Planning addresses medication self-care and other aspects of discharge teaching.

We Use a SIMPLE DOSE

(Condensed from Molony, 2009)

W(e)	Whole person	Consider the whole patient and his or her goals. Collaborate with others in assessment and planning.
U(se)	Under treatment	Identify any preventable conditions which are not addressed in the treatment plan.
A	Adherence	Assess barriers to adherence to the regime.
S	Safety	Examine safer alternatives. Determine whether benefits of medication outweigh the risks.
I	Interactions	Consider drugs, diseases, alcohol, and food.
M	Monitoring	Assure that monitoring needed for each medication is in place and planned for at discharge.
P	Purpose	Determine whether the medication is effective in achieving treatment goals.
L	List	Encourage the patient to maintain a comprehensive, updated list of all medications of all types, herbal preparations, and nutritional supplements.
E	Educate	Include: Brand and generic names of each medication. Why the patient is taking it? When to call the clinician? Potential interactions? Safety precautions (for example, avoid suddenly discontinuing the drug, avoid driving while taking it).
D	Dose	Determine whether the dose is high enough to be effective, yet low enough to avoid adverse effects.
O	Optimize nondrug treatment	Explore non-pharmaceutical measures for treatment and symptom relief.
S	Simplify regimen	If possible, reduce the number of medications and the number of dosages.
E	Efficacy	Plan for periodic reassessment of safety and effectiveness.

Make a Plan to Monitor Response to Medications

After many years of experience with their bodies, your elderly patients are great historians of their personal health. Ask about their previous experiences with medications, especially the drugs similar to those ordered for them.

What effects of aging are most apparent in this patient?

- Are his or her digestive processes very slow?
- Does the patient tell you "Food just lays in my stomach?"
- Does the patient tell you that he or she has trouble moving his or her bowels and takes a variety of laxatives and an occasional enema?
- Does the patient tell you that he or she has trouble urinating?

These symptoms all have implications for medications that they may be receiving. Are any of the patient's symptoms caused by medications? Target your observations toward those signs and symptoms that you identify as particularly likely with each individual patient (Olson et al., 2007).

Hospitalization: A Chance to Improve Overall Health

Your elderly patient is admitted to the hospital for treatment of a particular condition. However, chances are that your patient suffers from at least one chronic illness in addition and may have a host of “aches and pains,” and symptoms unrelated to the primary diagnosis.

Ask questions about symptoms that interfere with activities of daily living, ambulation, sleep and activities that are important to the patient. The patient may be tolerating unnecessary pain, shortness of breath, dizziness or some other symptom for which he can gain relief. Symptoms may indicate a previously undiagnosed condition, including depression, or may be side effects of medications that the patient is receiving for conditions other than the primary diagnosis.

Advocate for full, reasonable treatment for your elderly patients. When you identify deviations from standards of care and practice, discuss your observations with the patient’s provider, a CNS, NP, your nurse manager or other resource person.

At the very least, the process that you begin with initial medication reconciliation and initial medication profile will facilitate a thorough review of your patient’s medication regime (Bahrani, et al., 2014).

Guidelines and Standards

Elderly patients often do not receive the full benefits of aggressive management of their disease conditions and symptoms. Some providers under-treat their elderly patients because they expect and accept deterioration with age.

Providers may fail to prescribe preventative drugs, such as:

- **Statins and beta-blockers**, following myocardial infarction.
- **Osteoporosis medications**. Osteoporosis increases the risk for fractures which contribute significantly to morbidity and mortality in the elderly.
- **Anti-hypertensive medications** such as low dose diuretics and either a calcium channel blocker, a beta-blocker, or an angiotensin-converting enzyme (ACE) inhibitor. Fewer than 10% of elderly hypertensive patients receive therapy. Yet, the studies show that a reduction of as little as 15 mm Hg in systolic blood pressure reduces heart failure by almost 50% and reduces stroke by 25% to 30%. Findings show benefit of treatment within one to one-and-a-half years (Schall & Wehling, 2011).

Guidelines and Standards in Your Specialty

Consult the practice standards and guidelines that are relevant to your specialty area. Are any recommendations modified for elderly patients?

Your patient may receive **a particular drug for a reason other than its most common usage**. For example, neuropathic pain does not respond well to conventional analgesic therapy, but does respond to treatment with tricyclic antidepressants (TCAs) such as amitriptyline (Elavil®), anticonvulsants such as carbamazepine (Tegretol®) and anti-arrhythmic drugs such as mexiletine (Mexitil®).

Raise questions when the treatment your elderly patient is receiving lies outside of recommendations. The prescriber may or may not have therapeutically sound reasons for deviating from guidelines in the case of a particular patient.

Recognize variations from the usual treatment approach on your unit. For example, if patients admitted for exacerbation of congestive heart failure (CHF) usually receive furosemide (Lasix®) intravenously, but your patient has an order for oral Lasix®, ask for clarification (Olsen et al., 2007).

Fulfill Your Responsibilities As a Nursing Professional

Standards of care are the legal standard against which your practice is judged. When you identify deviations from standards of practice you have a legal and professional responsibility to clarify the situation.

Pain Management

“Pain in the elderly is often unrecognized and undertreated. Ineffective pain management can have a significant impact on the quality of life of older adults, leading to depression, social isolation and a loss of function” (Cavalieri, 2002, p. 481).

Assess thoroughly and aggressively to obtain an accurate description of the elderly person’s pain, causative and precipitating factors and response to pain-relief interventions. Use a variety of synonyms for pain to obtain a clear description from your patient. Ask about burning, discomfort, aching, soreness, heaviness and tightness.

Include OTC drugs in the medication profile. Acetaminophen and NSAIDs have ceiling doses that, when exceeded, create risk for complications. The patient may unwittingly exceed ceiling doses by taking OTC acetaminophen or NSAIDs in addition to prescribed drugs.

Is the patient receiving treatment for the condition that is causing the pain (McLiesh, Mungall, & Wiechula, 2009)?

Elders May Fail To Report Pain or Deny Pain

Elders may fail to report or deny pain because of:

- Fear of diagnostic tests
- Fear of medications
- Fear of the meaning of pain
- Perception that physicians and nurses are too busy
- Fear that complaining may affect quality of care
- Belief nothing can or will be done

Most Frequent Causes of Pain in the Elderly

Most frequent causes of pain in the elderly include:

- Osteoarthritis: back, knee, hip
- Night-time leg cramps
- Claudication
- Neuropathies: idiopathic, traumatic, diabetic, herpetic
- Cancer

(McLiesh et al., 2009; UCLA, n.d.)

Myths About Chronic Pain

Which of These Commonly Accepted MYTHS About Chronic Pain Do You Believe?

Myth	Truth
Daily opioid administration always leads to addiction.	Patients may become physically dependent, but rarely do they become addicted. Providers can screen patients who are experiencing chronic, non-cancer pain for substance abuse problems, and past use of illicit opioids before prescribing for pain relief.
Chronic pain is part of growing old.	The elderly are more likely to experience certain conditions that cause pain. However, pain can be managed successfully at any age.
Patients will mention pain if it is a problem.	Elders may resist admitting that they have pain.
Pain treatment centers have little to offer.	Most pain centers address pain with a holistic approach and teach patients how to modify attitudes and behaviors that increase their pain. Some elders may be skeptical of alternative therapies while others are open to non-pharmaceutical approaches.
Adapted from Wagner, 2009	

Pain Management Techniques

Comply with facility policy and protocols including use of the pain management team.

Elderly patients may resist analgesic medications because they fear addiction, have an aversion to drug use or the feeling analgesics give them, a stoicism or acceptance of pain as a part of aging. These attitudes are common in the older generation.

Teach patients and their family members and significant others about pain management.

Administer pain medication at regular intervals, rather than on a PRN basis. The exception to regular administration is NSAIDs, which should be used with caution in the elderly, if at all.

Prevent complications caused by side effects to which the elderly are particularly susceptible. Initiate a bowel program when a patient receives an opioid such as morphine sulfate (Roxonal®) or oxycodone (Oxycontin®).

Treat breakthrough pain. Obtain orders for relief of breakthrough pain.

Reassess regularly for improvement, deterioration, or complications attributable to treatment (McLiesh et al., 2009; UCLA, n.d.).

Non-Pharmacologic Pain Relief Measures

Set a goal of pain-free patients!

Investigate use and effectiveness of non-pharmacologic pain relief measures for each individual patient. Non-pharmacologic pain relief measures include:

- Relaxation techniques
- Cognitive-behavioral therapy
- Hypnosis
- Distraction therapy
- Guided imagery
- Biofeedback
- Exercise, such as walking and mild resistance training
- Hydrotherapy: alternate 20 minutes of heat, followed by 20 minutes of cold
- Massage therapy
- Acupuncture or acupressure
- Chiropractic manipulation
- Transcutaneous electrical nerve stimulation

(TENS) (McLiesh et al., 2009)

Analgesics to Avoid in the Elderly

- butorphanol (Stadol®)
- fentanyl Transdermal (Duragesic®)
- meperidine (Demerol®)
- methadone (Dolophine®)
- pentazocine (Talwin®)
- propoxiphene (Darvon®)

(McLiesh et al., 2009; UCLA, n.d.)

Clinical Curiosity: A Safety Feature

When you observe your elderly patient, ask yourself, “What’s wrong with this picture?”

- Could any of your assessment findings indicate inadequate dose or toxicity? Investigate clinical signs and symptoms, including lab results.
- What physical effects of aging have implications for the drugs this patient is receiving?
- What disease processes affect metabolism and action of drugs for this patient?
- What side effects and adverse effects is this patient most likely to experience?
- Which adverse effects are most problematic because of disease processes?
- Does this patient exhibit cognitive impairment that could be drug-related?

Voice questions to your elderly patients, their families and caretakers, providers, pharmacists, CNSs and NPs.

What precautions are in place to alert you, the prescriber, or the pharmacist of adverse effects or risks? In some facilities, a clinical pharmacist receives an automatic page when a lab value indicates a potential medication-related problem, such as a high INR for a patient receiving warfarin.

Plan the assessments, including lab results that will help you identify toxic or subtherapeutic response.

Laboratory Results: Serum Concentration

Serum levels of drugs are the most accurate of determining the amount of drug in the patient's blood. However, scientific accuracy may not translate directly into clinical significance.

The changes of aging, renal disease or malnutrition decrease plasma proteins results in less available protein to bind protein-binding medications such as phenytoin. As a result, the patient will have more of the active drug circulating and exerting its effect. Therefore, the total serum level may be misleading.

Serum concentrations are not very informative until a drug has reached its steady state, which usually takes five half-lives. However, serum concentrations may be checked before a steady state is reached for medications that have serious toxic effects, such as:

- Digoxin - Low levels of serum potassium cause greater sensitivity to digoxin. Patients who receive digoxin often receive potassium-depleting diuretics as well. These patients usually receive potassium supplements.
- Hyperkalemia can also produce serious consequences for cardiac patients. If the patient is receiving an ACE inhibitor, hyperkalemia is a potential risk, since ACE inhibitors spare potassium (Lacy, Armstrong, Goldman, & Lance, 2011).

Knowledge Check 5

In elderly patients, rely on serum levels as accurate indicators of both toxicity and therapeutic level.

True

False

Which Labs are Important

Identify targeted values and ranges that indicate the therapeutic effect of the medications your patient is taking. Identify values that may indicate risk for toxicity, such as electrolytes.

Targeted ranges for a given drug may vary widely with their indications for use. For example:

- For the acute myocardial infarction (MI) patient with risk factors for recurrent MI who is receiving warfarin (Coumadin®) the targeted INR range is 2.0 – 3.0.
- For the patient who has a mechanical heart valve and takes aspirin 80 – 100 mg/day, the target INR range is 2.5 – 3.5 (Lacy et al., 2011).

Timing of blood draws in relation to times that medications are administered may be significant – as in peaks and troughs. For drugs with long half-lives, serum concentration varies little with time of day. For other drugs however, concentrations are measured most accurately at the trough (immediately before the next dose).

Assess your elderly patients for indications of the effects of aging. Individuals vary greatly in the degree and age at which they experience the physical changes that affect lab results, such as renal impairment and decreased serum albumin. Dehydration can also cause misleading lab results.

Characteristics of Medications and Lab Values

Highly protein-bound medications, such as warfarin, diazepam, propranolol and phenytoin

Total serum level may be within therapeutic range when a toxic level is actually present because the proportion of unbound, active medication is greater if serum protein is reduced.

If a new protein-bound drug is introduced (such as phenytoin for a patient who takes warfarin), phenytoin which is more highly-protein bound can cause more warfarin to become unbound and active, thereby increasing INR and risk for bleeding.

Water-soluble medications which are excreted by the kidney, such as digoxin diuretics such as furosemide (Lasix®), ACE inhibitors such as ramipril (Altace®), lithium, and penicillin and other antibiotics

Decreased renal function can create toxicity.

Medications metabolized in the liver, such as warfarin, glipizide, statins such atorvastatin (Lipitor®)

Decreased liver function can create toxicity
(Lacy et al., 2011).

Drug Interactions

One drug may interfere with another by causing chemical changes that interfere with the absorption of the other drug. For example, since aspirin requires acidity in the stomach in order to exert its therapeutic effect, administering antacids and aspirin together interferes with the effect of aspirin.

Though many such interactions are chemically possible, not all are clinically significant. For example, antacids containing aluminum interact chemically with digoxin, but research has shown this interaction to be of limited clinical significance.

Most drug-drug, food-drug, and herb-drug interactions arise in the process of drug metabolism. Most drugs are metabolized via the cytochrome P450 (CYP) system in the liver.

The enzymes of the CYP system, which number more than 300, are involved in the metabolism of most drugs. For example, the enzyme CYP3A3/4 is involved in the metabolism of over 200 different drugs. The enzymes not only metabolize drugs, but their activity is also affected by drugs (Lacy et al., 2011).

Knowledge Check 6

What is the implication of impaired renal function when a patient is receiving digoxin?

- a. Serum levels of digoxin will be misleading.
- b. A low dose should be used to avoid toxicity.**
- c. A high dose will be required to achieve a therapeutic effect.
- d. An alternative medication should be used to prevent renal failure.

Interactions and Drug Metabolism: Some Examples

Certain drugs and substances induce the action of each enzyme, which means that they cause the enzyme to metabolize medications more rapidly. This means that the medication exerts its effect over a shorter period of time.

- Carbamazepine (Tegretol®) induces a number of CYP enzymes and therefore decreases the effect of many medications including amiodarone, benzodiazepines, calcium channel blockers, glipizide (Glucotrol®), thyroid hormone, and others.

Certain drugs and substances inhibit the action of each enzyme, which means that they cause the enzyme to metabolize medications more slowly. When medication is metabolized more slowly it remains active for a longer period of time.

- Grapefruit juice inhibits metabolism of a number of medications including anticonvulsants, antidepressants, amiodarone (Cordarone®), calcium channel blockers, statins and others.
- NSAIDs and sulfonamides inhibit metabolism of glipizide, creating a risk for hypoglycemia (Lacy et al., 2011).

Additional Sources of Interactions

Interactions also arise from alterations in absorption of medications. For example, metoclopramide (Reglan®) may reduce absorption of digoxin.

The side effects of some medications and substances add to the intended effect of other medications. For example the herb ginkgo biloba, which may be used for its antioxidant properties or to improve memory, has an anticoagulant effect.

Some medications, such as furosemide (Lasix®) may reduce glucose tolerance and therefore create a need to adjust doses of diabetic medications.

Cardiovascular problems can interfere with absorption and circulation of medication. Glaucoma and urinary retention can be exacerbated by anticholinergic medications.

Benzodiazepines, sedatives and narcotics may cause respiratory depression in COPD patients.

Because elderly patients take so many medications, they are especially likely to experience interactions. Careful monitoring specific to each medication is essential.

Not all drugs and substances which interact with a given medication are contraindicated. For example, a patient who takes warfarin need not eliminate vitamin K from his diet. Instead, he or she should ingest a consistent amount of foods containing vitamin K. With regular monitoring of PT and INR, his or her warfarin dose can be adjusted to his consistent intake of vitamin K (Lacy et al., 2011).

Appendices C and D contain a detailed list of potential drug-disease interactions in the elderly.

Interaction Alert! Warfarin

Nearly 30 drugs inhibit the metabolism of warfarin, including medications which elderly persons might be likely to use such as fluvastatin (Lescol®) and omeprazole (Prilosec®).

Numerous other medications and substances interact with warfarin in other ways.

A number of medications induce the metabolism of warfarin including some anticonvulsants, barbiturates, and antibiotics.

In addition to the interactions caused by warfarin metabolism:

- Some medications decrease absorption of warfarin.
- A number of medications, such as NSAIDs, increase bleeding tendency.
- Vitamin K decreases warfarin effects.
- Vitamin E and cranberry juice may increase its effect.

Warfarin doses are adjusted regularly based on PT and INR. These lab values reflect changes in intake of any of the many medications and substances that affect anticoagulation (Lacy et al., 2011).

Ongoing Nursing Assessment

- Identify and monitor the lab values and other signs and symptoms that indicate therapeutic and toxic effects of medications your patient is receiving.
- Investigate signs and symptoms thoroughly. In the elderly, vague signs and symptoms can signal a host of problems:
 - Adverse drug reactions
 - Inadequate doses
 - Drug interactions
 - Exacerbations of known diseases
- Indications of newly occurring diseases, including depression
- Substance abuse
- Any combination of these possibilities

However, vague signs and symptoms are often attributed solely to the aging process. Even patients themselves may attribute their signs and symptoms to aging when in fact, the problem is drug-related or related to a treatable condition.

Analyze your assessment findings. If you suspect a medication-related problem, consult with a clinical nurse specialist, nurse practitioner, pharmacist, or physician to interpret and validate your findings (Olsen et al., 2007).

Always review your patient's history. Elderly patients often have multiple co-morbidities. This increases the likelihood of multiple prescribers, polypharmacy, and drug-disease interactions.

Monitor Effects of Specific Medications

Monitor your elderly patients closely for symptoms of:

- Digoxin toxicity when taking digoxin.
- Hypoglycemia when taking diabetes medications. Beta blockers may mask hypoglycemic symptoms such as tachycardia.
- Hypo- and hyperthyroidism when taking thyroid medications.
- Toxicities from anticonvulsants.

Moderate or high-dose ferrous sulfate therapy, opioids, and some calcium channel blockers increase the risk of constipation and fecal impaction. Periods of illness, hospitalization, and reduced mobility further increase the risk and the need for implementing a bowel regime (Molony, 2009).

Enlist the help of the patient in monitoring. Advise him of important symptoms related to his medications and encourage him to report these to you promptly. Some elderly persons are reluctant to report symptoms. Encourage them that information about what they are experiencing is highly significant in planning their care and treatment (Olsen et al., 2007; Molony, 2009).

Interpreting Your Findings

Look for the therapeutic effect, high-frequency side effects, adverse effects and toxic effects.

In addition do you notice any otherwise unexplained changes in the patient that might be attributed to medication? Changes such as:

- Gait changes
- Confusion
- Light-headedness
- Agitated, withdrawn behavior

Subtle changes and nonspecific symptoms in the elderly can signal a wide range of problems:

- A previously undiagnosed chronic disease
- Dehydration
- Pneumonia
- A medication-related problem

Support your interpretation with:

- Laboratory data
- Concurrent events, such as a delayed meal or an episode of vomiting after taking oral medication
- Signs and symptoms (Olsen et al., 2007; Molony, 2009)

Case Study #4: Mrs. Peele - Medication Interactions

Read Mrs. Peele's situation and the questions suggested.

- Are you asking similar questions to those suggested?
- Are there other, more thought-provoking questions that should be asked?
- In addition to the questions, what orders do you think might be indicated?

Mrs. Peele, 90 years old, was admitted for treatment of an acute sinus infection.

She complains of pain. She is very demanding, but fails to describe her pain in detail.

When you ask Mrs. Peele if her pain seems to be related to her sinuses, she waves you away with the command, "Just get me my pain pills, and stop asking so many questions."

Besides her antibiotic and warfarin (Coumadin®), she has an order for ketorolac (Toradol®) 10 mg po q 4-6 hourly prn.

Case Study #4: Mrs. Peele - Questions

Is this patient receiving any potentially inappropriate medications ?

Ketorolac (Toradol®) is generally considered inappropriate for the elderly because of GI pathology and symptoms.

What effects of aging have implications for the drugs this patient is receiving?

The elderly generally metabolize and eliminate narcotics slower than do younger people; therefore, a lower or less frequent dose may suffice.

Are certain side effects particularly hazardous because of this patient's disease processes?

Elderly people taking NSAIDS increase their risk of falling.

What creates risks for drug-drug interactions for Mrs. Peele?

- Instruct Mrs. Peele to avoid intermittent use of over-the-counter analgesics because of the potential of drug-drug interactions.
- Ketorolac (Toradol®) should also be avoided in the elderly due to GI concerns.
- The antibiotic can potentially interact with warfarin. Evaluation of this possibility must be done.
- The warfarin (Coumadin ®) dose will be based on Mrs. Peele's INR values. The INR values may indicate a need for a dosage adjustment.
- Instruct Mrs. Peele to avoid herbal products that may interact with warfarin (Coumadin ®) or alter bleeding time, such as garlic, ginseng, dan shen, devil's claw, ginkgo biloba, dong quai, fenugreek, horse chestnut, red clover, sweet clover, and sweet woodruff.

What creates risks for food-drug interactions for this patient?

- Warfarin (Coumadin ®) interacts with food that contains vitamin K. Instruct the patient to maintain a well-balanced diet with a stable amount of foods high in vitamin K.
- Vitamin E may increase bleeding time for patients taking warfarin (Coumadin ®). If she decides to supplement her diet with vitamin E, instruct her to maintain a steady dose of vitamin E.

How will this patient's medication profile change upon discharge? Any new drugs, dosage changes, or discontinuations?

- If a new pain medication is prescribed at discharge, ensure that the patient knows to discontinue ketorolac (Toradol®).

What are your resources for further information about the drugs your patient is receiving?

The patient or family members may provide a history of the patient's pain and history of using pain medication.

The Pharmacy or Drug Information Center may suggest safer alternative medications for the elderly.

Therapeutic Index: The Range Between Toxic and Subtherapeutic

Assess carefully for both therapeutic effects and adverse effects of drugs. A maxim for prescribing drugs for elderly patients is:

Start low, go slow.

The prescriber may introduce the medication at a subtherapeutic dose. The elderly require lower dosages of most medications than do younger adults.

When a low dose does not obtain a therapeutic result, the prescriber can gradually increase the dosage. Studies that establish dosage ranges often do not include elderly patients. Dosage ranges for elders may differ from their younger counterparts.

Elderly persons also differ from one another in their sensitivity to drugs. Finding the therapeutic dose for a particular individual may require some trial and error. Observe for signs and symptoms that indicate the dosage is effective for each drug you administer.

The changes of aging and the effects of specific disease conditions, may cause the elderly to experience toxic effects at doses that fall within recommended dosage ranges.

Your assessments can make an invaluable contribution in establishing the optimal dose for elderly patients. Your assessments are critical and can make an enduring difference in your patients' lives after they leave the hospital (Olsen et al., 2007; Molony, 2009).

Knowledge Check 7

Elderly patients usually require higher doses of medications.

True

False

Case #5 Study: Mr. Topchevsky - Medication Toxicity

Read Mr. Topchevsky's situation and the questions suggested.

- Are you asking similar questions to those suggested?
- Are there other, more thought-provoking questions that should be asked?
- In addition to the questions, what orders do you think might be indicated?

Mr. Topchevsky is a 75-year-old being admitted for a complicated wrist fracture.

His medications include levothyroxine (Synthroid®) 200 mcg po daily. For the last 35 years, he has taken this dose without adverse effects.

In the most recent vital signs, his pulse was 120 bpm and his blood pressure was 140/98 mmHg.

Before you administered his levothyroxine (Synthroid®), he complained of a feeling of pressure in his chest, although it was difficult to understand him because his explanation was confusing. You observed that he was sweating profusely.

Case Study #5: Mr. Topchevsky - Questions

What effects of aging have implications for the drugs this patient is receiving?

In general, people older than 60 years of age are more sensitive to the effect of levothyroxine (Synthroid®) and may need a 25% lower dose compared to younger people. Doses must be individualized in the elderly.

Does this patient exhibit cognitive impairment that could be drug related?

Cognitive changes could indicate a direct effect of chronic overdose of levothyroxine (Synthroid®), or these changes may result from insomnia resulting from chronic overdose.

Are certain side effects particularly hazardous because of this patient's disease process?

Reduced cardiac functioning make many elderly people more vulnerable to cardiac adverse events related to levothyroxine (Synthroid®).

What laboratory tests or other means of monitoring response to drug therapy will the patient need now and after discharge?

TSH and T4 (or unbound T4) may be the most useful laboratory tests to monitor drug dosing. Because of levothyroxine's (Synthroid®) long half-life (3 to 10 days), assessing the patient's clinical condition may be as important as evaluating changes in laboratory values. It may be necessary to withhold levothyroxine (Synthroid®) for several days before a chronic overdose is corrected.

Has this patient been compliant with medications prior to this hospitalization?

To help determine whether the prescribed dose of levothyroxine (Synthroid®) is the therapeutic dose, evaluate the patient's compliance and the other medications he takes.

How will this patient's medication profile change upon discharge? Any new drugs, dosage changes, or discontinuations?

Because of levothyroxine's (Synthroid®) long half-life (3 to 10 days), he may be discharged with the drug still being held, and the dose may be adjusted later.

Implication of Dosage Form

Before your elderly patients can absorb and metabolize medications, you may have to overcome physical and mechanical challenges in delivering medications. To overcome these challenges, think critically about these questions:

- Why is the medication ordered in this form?
- Is an alternative form more desirable for this patient? If so, how will dosage differ in the alternative form?
- Is there a sequence to be followed, or avoided, when administering more than one medication at the same time?
- Is this patient compromised in any way, due to the effects of aging or a disease process that cause problems with delivering medications effectively?
- What can you do to make the medication more palatable or more effective?

If you observe a subtherapeutic or a toxic effect, investigate the possibility that the effect you are observing is related to dosage form. If your data gathering supports this possibility, find out what other dosage forms are available and recommend that an alternative be ordered.

When the prescriber orders a new route for a previously ordered drug, assure that the proper dose equivalent has been chosen (Olsen et al., 2007; Molony, 2009).

Case Study #6: Mrs. Boothroyde - ETOH and Liver Function

Read Mrs. Boothroyde's situation and the questions suggested. Click on the button next to each question to view answers.

- Are you asking similar questions to those suggested?
- Are there other, more thought-provoking questions that should be asked?
- In addition to the questions, what orders do you think might be indicated?

You hear 77-year-old Mrs. Boothroyde moaning as she slowly walks from her bed to the bathroom. Later you question her about pain.

Although she has never been diagnosed with osteoarthritis, she reported that she's usually stiff in her knees and hips when she first gets out of bed in the morning. She denies pain when resting.

You discover from reading her chart that she has a history of alcoholism, but claims to have been sober for the last month.

She tells you: "I guess my little nips used to keep me from feeling the pain. But, I suppose aching knees are a small price to pay for being a teetotaler, when you're an old bird like me. My doctor had me scared about drinking myself to death."

Her doctor orders acetaminophen (Tylenol®) 650 mg po every four hours prn.

Case Study #6: Mrs. Boothroyde - Questions

Does this patient's medication profile comply with recommended guidelines and standards?

The American College of Rheumatology recommends treating mild arthritic pain with acetaminophen (Tylenol®) first (Hochberg, Altman, Toupin, Benkhalti, Guyatt, & Tugwell, 2012).

What social issues affect drug therapy for this patient?

Chronic alcohol use increases the risk of hepatotoxicity with acetaminophen.

What laboratory tests or other means of monitoring response to drug therapy will the patient need now and after discharge?

A baseline measurement of liver enzymes is needed to uncover preexisting liver damage.

How will this patient's education profile change upon discharge? Any new drugs, dosage changes, or discontinuations?

Ensure that the patient knows the deleterious effects of drinking alcohol while taking acetaminophen (Tylenol®).

Look Before You Crush

When presenting your elderly patient with large pills, capsules, or tablets, the most efficient approach often seems to be to crush the pill, open the capsule, or instruct the patient to chew the tablet.

Before you crush, open, or cut, assure that in doing so you will not alter the action of the medication or cause unintentional, but harmful effects:

- **Look before you crush.** You will alter the effect of many pills, tablets, and capsules if you tamper with the coating.
- **Do not crush enteric-coated medications** because the coating may:
 - Disguise a bitter taste.
 - Prevent stomach acid from destroying the drug.
 - Delay the onset of the action of the drug.
 - Prevent irritation of the stomach lining.
 - Prevent irritation of the mouth or staining of the teeth and oral mucosa.
 - Protect against exposure to carcinogens or teratogens.

Some enteric-coated drugs are available as enteric-coated sprinkles. Find out if that option is available for your patient who cannot swallow an enteric-coated tablet (Lacy et al., 2011).

More Do Not Crush Medications

Sublingual and buccal medications are designed to remain intact to slow absorption.

Extended-release preparations: If you crush or cut extended-release medications that are intended to remain intact and administer the altered form, the patient initially receives an overdose. Subsequently, the patient receives an insufficient level to obtain or maintain the desired effect. Extended-release medications are often ordered for elderly patients since the less frequent dosing increases the ease of remembering to take the medications and makes compliance more likely.

Abbreviations that Indicate Extended-release Medications

- CR = controlled release
- XL = extended release
- CRT = controlled-release tablet
- SR = sustained release
- XR = extended release
- DR = delayed release
- TD = time delayed
- LA = long acting
- ER = extended release
- TR = time release

(Lacy et al., 2011)

Knowledge Check 8

If you crush an extended release tablet and administer the crushed form to the patient, the immediate effect will be that the patient will:

- a. Receive an overdose.
- b. Suffer damage to the oral mucosa.
- c. Become nauseated and probably vomit the medication.
- d. Experience the affects of the medication over a prolonged period of time.

Administering Medications Via Enteral Feeding Tubes

Feeding tubes blocked by medications can create serious problems. **Blockages most commonly occur after administering crushed enteric-coated or sustained-released drugs** without consulting the pharmacy.

Do not crush or open a medication without consultation with the pharmacist.

In addition to clogged feeding tubes, the patient can suffer adverse effects as a result of medications improperly administered via enteral feeding catheters.

- The pharmacokinetics of the drug may be altered.
- Diarrhea, dumping syndrome, and gastric distress may also result. Diarrhea may result from failure to dilute a medication adequately, or from sorbitol which is commonly used to sweeten oral medications.
- Also, some drugs must be given on an empty stomach such as bisphosphonates, even the smallest amount of food has a very significant effect.

EFT Guidelines for Medication Administration

1. Check with the pharmacy to ensure that administering the patient's medications via enteral feeding tube is safe and appropriate. For example, drugs such as carbamazepine (Tegretol®) cling to polyvinyl chloride, a major component of many enteral feeding tubes. Not only does this cause the tube to be blocked, it also results in the patient's receipt of subtherapeutic drug dosages.
2. Coordinate medication administration with the feeding schedule. Check the content of enteral feedings for substances that cause food-drug interactions.
3. Dilute medications adequately to clear the tube and facilitate absorption.
4. Give each medication separately, rather than a number of medications together. This helps prevent drug interactions as well as clogged tubes.
5. Before and after administering a medication, flush the tube well (Boullata, 2009).

Additional Implications of Dosage Form and Route of Administration

Medications to be chewed. Some medications such as antacid tablets must be chewed in order to be effective. If a patient cannot chew adequately, obtain an order for an alternative dosage form such as a liquid.

Intramuscular (IM) or subcutaneous medication. Impaired circulation and tissue perfusion can diminish absorption of intramuscular and subcutaneous injections. Massage and if permitted, heat at the injection site will stimulate absorption.

Evaluate the effectiveness of the injected medication if your assessment indicates that your elderly patient is at risk for poor absorption. If you observe a subtherapeutic effect, or if you observe skin breakdown at injection sites, investigate alternate routes and, if available, recommend to the prescriber.

The IM or subcutaneous routes usually afford more rapid absorption than the oral route. However, for a particular patient, the oral route may prove more efficacious.

If the patient has poor circulation, poor tissue perfusion, wasted muscle tissue and diminished mobility, the oral route may be a better choice. Recommended dosages may differ markedly when the same drug is administered through different routes (Olsen et al., 2007; Lacy et al., 2011).

Knowledge Check 9

Changes of aging interfere with absorption of medications that are administered IM or subcutaneously.

True

False

Tips for IV Starts

Fragile skin and veins create challenges for IV insertion. To reduce the risks of venipuncture:

- Avoid bruised areas or skin tears.
- Use the smallest catheter possible.
- Note the depth of the vein to determine insertion angle.
- Apply traction to the vein below the insertion site.
- Avoid side access; insert the catheter directly on top of the vein.

(Moureau, 2008)

Route Matters. When you accept an order for a change in route, check with the pharmacy or with your drug reference to assure that the dose is equivalent. Verify that the prescriber is intentionally changing the dose.

Sequence Matters

Some drugs interfere with absorption of others: For example, cholestyramine (Questran®), colestipol (Colestid®), and kaolin-pectin reduce absorption of a number of drugs including digoxin (Lanoxin®) and are to be administered separately.

Often, several types of eye drops are prescribed for delivery to elderly patients at the same time. If one of the drops is a saline solution for moisturizing, administer the saline first so that the saline does not dilute or wash out the other eye drop medications.

When more than one type of eye drop, ear drop, or inhalant is to be administered at the same time, determine whether the sequence of the medications is significant (Lacy et al., 2011).

Knowledge Check 10

Eye drops containing saline solution may need to be administered last in a sequence of drops.

True

False

Your Collaborative Role

Providers and pharmacists often lack the complete picture of the individual patient's capabilities and limitations you see as the nurse. Your holistic picture of your patients places you in a unique position to advocate for the most effective therapy for them.

You play the role of patient advocate, safety advocate, and informed professional. Many potentially inappropriate medications cause concerns because of anticholinergic properties, extrapyramidal effects and sedative effects that create risk for falling.

Approach your colleagues with an inquiring attitude. "Please explain this to me – I read that Valium® is not recommended for the elderly."

Share your findings confidently. You will expand your own knowledge base, build professional rapport and further empower yourself as a patient advocate (AHRQ, 2008).

Your Partners in Collaboration

When you identify a need or opportunity to improve your patient's medication profile, gather the data and then raise your concerns with other team members. Tap the expertise of your nurse colleagues: your nurse manager, CNS and NP. Present your assessment findings to your colleagues, including your use of Beers Criteria.

Consult with others – Clinical Nurse Specialist, case manager, discharge planner, nurse manager, physician, pharmacist, laboratory professional – to assist in interpreting your findings. Studies have shown that consultation with pharmacists and active involvement of unit-based pharmacists dramatically decrease medication errors and adverse drug reactions.

- Ask the pharmacist to review the patient's medication profile and give the prescriber some recommendations accompanied by supporting evidence.
- The prescriber may have determined that benefits of the use of a potentially inappropriate medications outweigh risks in a particular patient's situation. Ask the prescriber to clarify the rationale.
- The nutritionist can provide information about food-drug interactions, nutrient content of foods (such as vitamin K for the patient who takes warfarin), and food substitutions that the patient might make if necessary.
- The patient, caregiver, and family members provide essential monitoring information during hospitalization and can give feedback on the acceptability of discharge plans. Use every opportunity, particularly when you give the patient medications, to teach and verify the patient understands (AHRQ, 2008).

For further information about patient teaching and discharge planning, access Administering Medications to Elderly Patients, Part 3: Discharge Planning at www.rn.com

Collaborate for Safety

The way you begin collaborating with other team members depends upon the policies, practices and culture of your facility. Your approach also depends upon the rapport and relationship you have established with your colleagues. You may have choices in how to go about it, but for safety's sake you must commit to doing it.

Ask questions and give feedback in a professional manner. It is essential to your ability to exercise your full professional role. When you identify a subtherapeutic effect, a toxic effect, an idiosyncratic reaction or some other **drug-related problem, bring it to the attention of the prescriber.** To increase your comfort level, you might first consult a reference and validate your concerns with a CNS, NP or pharmacist.

Be prepared to suggest alternatives such as an alternative dosage form or medication with fewer side effects.

When you receive an order for a medication to treat a side effect of another medication, **consult with the pharmacist** to find out if an alternative drug with a different side effect profile could be recommended to the prescriber. Drugs to treat side effects of other drugs can lead to disease-drug interactions, drug-drug interactions and noncompliance (Agency for Healthcare Research and Quality [AHRQ], 2008).

Resources for Information

Appendix E contains a lengthy list of specific resources for helpful information about medications and the elderly. General categories include:

- U.S. Government Websites
- Geriatric Care Resources
- Professional Organizations, such as the American Geriatrics Society, the American College of Cardiology, the American Heart Association and Oncology Nurses Society (ONS)

Package inserts and drug references contain drug-specific recommendations for use, dosage and monitoring.

Medical and nursing departments in your facility may have approved practice guidelines related to the use and monitoring of specific medications.

Resources at Your Facility

Know about resources that are available at your facility and how to access them. If you identify a deficit in unit-based resources, make recommendations to your manager or pharmacist.

Some facilities have networked computerized systems for flagging potential hazards, such as potentially inappropriate medications and drug-disease interactions when an order is entered.

Some facilities have safety systems that automatically alert a clinical pharmacist when certain lab values, dosages or other triggers occur.

Many facilities have placed their formularies on their intranet systems. Other facilities may rely on package inserts and reference books such as the Physician's Desk Reference.

Make a commitment to use a comprehensive reference for reviewing information about the medications you administer frequently. For every medication you administer, know dose range, action, side effects and toxic effects.

The facility's pharmacy usually has the most recent annual update of two USP publications:

- Drug Information for the Healthcare Professional
- Advice for the Patient: Drug Information in Lay Language

Learn about resources that are available at your facility and how to access them.

- If you identify a deficit in unit-based resources, make recommendations to your manager or pharmacist.
- Some facilities have networked computerized systems for flagging potential hazards, such as PIMs and drug-disease interactions when an order is entered.
- Some facilities have safety systems that automatically alert a clinical pharmacist when certain lab values, dosages or other triggers occur.
- Many facilities have placed their formularies on their intranet systems. Other facilities may rely on package inserts and reference books such as the Physician's Desk Reference.
- Make a commitment to use a comprehensive reference for reviewing information about the medications you administer frequently. **For every medication you administer, know dose range, action, side effects and toxic effects.**

The facility's pharmacy usually has the most recent annual update of two USP publications:

- Drug Information for the Healthcare Professional.
- Advice for the Patient: Drug Information in Lay Language.

Current References are Crucial

The pharmaceutical industry moves quickly. The FDA approves new medications frequently and with less scrutiny than it has previously used.

Manufacturers also withdraw medications from the market based on research-based safety information. For example, troglitazone (Rezulin®) was withdrawn from the market in March 2000, after safety study results revealed that other medications [rosiglitazone (Avandia®) and pioglitazone (Actos®)] offered the same benefits in the treatment of type 2 diabetes without the risk of liver damage (Lacy et al., 2011).

A medication may be withdrawn from the market and then returned, but with additional warnings as was the case with certain coxib medications.

In addition, pharmacological research produces new pharmaco-dynamic and pharmacokinetic information on an ongoing basis. Emerging information may indicate new safety hazards such as previously unknown drug-disease or drug-drug interactions.

Always use CURRENT drug references.

Put References and Resources to Work

You should have ready access to your clinical pharmacist and the ability to call the drug information number of a pharmaceutical company if necessary.

Find out how to access medication information on your facility's intranet.

Make use of your clinical pharmacist and drug references to learn the less commonly known facts about the medications you are administering:

- Which ones should not be given together?
- What less common side effects should you watch for?
- Are there any new research findings or precautions?

Conclusion

Elderly patients are highly vulnerable to serious and potentially fatal medication-related problems. To advocate for them and protect them from harm:

- Raise questions about medication therapy.
- Question assumptions about the cause of signs and symptoms.
- Assemble evidence to support your conclusions.
- Collaborate with the prescriber. Physicians appreciate assistance in correcting discrepancies, although organizational culture may be a barrier at times.
- Collaborate with the patient, caregivers and significant others, and your professional colleagues (AHRQ, 2008).

The results of your actions can make a crucial, even life-saving difference for your elderly patients.

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At the time this course was constructed all URL's in the reference list were current and [accessible. Rn.com](#). is committed to providing healthcare professionals with the most up to date information available.

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Appendix A: Beers I, High-Severity Concerns

Adapted from The Merck manual of diagnosis and therapy, (Kaplan & Porter, 2011) and Geriatric pharmacotherapy: A guide for the helping professional (Olsen, et al., 2007).

* When a category or class of drugs is named, the precaution applies to the entire category or class and not only the example given.

Drug or Classification*	Usual Indication	Risk for Patients Age 65 and Older
Amiodarone (Cordarone®)	Arrhythmias	Lack of efficacy older adults. Risk of QT interval problems and provoking torsades de pointes.
Amitriptyline (Elavil®) and combinations e.g., with chlordiazepoxide (Limbitrol®), perphenazine-amitriptyline (Triavil®)	Depression; migraine headaches	Strong anticholinergic and sedating properties. Anticholinergic effects include ataxia, urinary retention, constipation, dry mucus membranes, visual disturbances, confusion, increased temperature and heart rate.
Amphetamines Excluding methylphenidate hydrochloride (Concerta®, Metadate®, Ritalin®) and anorexics	Narcolepsy, attention-deficit/hyperactivity disorder (ADHD), CNS depression, respiratory depression	Risk of dependence, hypertension, angina and MI. Adverse CNS stimulation effects.
Antihistamines such as chlorpheniramine in combinations such as with phenylephrine (Histatab Plus®), with acetaminophen (Coricidin®), with pseudoephedrine (Allerest®, ChlorTrimeton®, Triaminic®) with acetaminophen and phenylephrine (Actifed®); diphenhydramine (Benadryl®), hydroxyzine (Vistaril®, Atarax®), cyproheptadine (Periactin®), promethazine (Phenergan®), tripelemnamine (PBZ®), dexchlorpheniramine (Polaramine®)	Nasal and sinus congestion, colds, flu, allergies	Potent anticholinergics. Many cough and cold preparations are available without antihistamines. Anticholinergic effects include ataxia, urinary retention, constipation, dry mucus membranes, visual disturbances, confusion, increased temperature and heart rate.
Anticholinergic: muscle relaxants such as cyclobenzaprine (Flexeril®), methocarbamol (Robaxin®), carisprodol (Soma®), chlorzoxasone (Paraflex®), metaxalone (Skelaxin®)	Muscle spasms	Anticholinergic effects include ataxia, urinary retention, constipation, dry mucus membranes, visual disturbances, confusion, increased temperature and heart rate.
Urinary antispasmodics such as Tolterodine (Detrol®), flavoxate (Urispas®), oxybutynin (Ditropan®),	Urinary spasms, urinary frequency, urgency, urge incontinence	Poorly tolerated by elderly. Weakness and sedation.

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Drug or Classification*	Usual Indication	Risk for Patients Age 65 and Older
not including extended release (Ditropan-XL®)		Questionable effectiveness at doses tolerated by elderly.
GI antispasmodics such as dicyclomine (Bentyl®, Antispas®), hyoscyamine (Anaspaz®), propantheline (ProBanthine®), belladonna alkaloids (Donnatal®), belladonna alkaloids with opium (B&O supprettes®), clidinium with chlordiazepoxide (Librax®)	Disturbances of GI motility such as irritable bowel syndrome	Highly anticholinergic; questionable effectiveness; especially avoid long-term use.
Barbiturates such as pentobarbital (Nembutal®) except phenobarbital and except to control seizures	Seizures; need for sedation	Cause more side effects than most other sedatives and hypnotics. Should be used only to control seizures. Highly addictive.
Chlordiazepoxide (Librium®) and combinations such as chlordiazepoxideamitriptyline (Limbitrol®); also Long-acting benzodiazepines: clidinium-chlordiazepoxide (Librax®), diazepam (Valium®), quazepam (Doral®), halazepam (Paxipam®), chlorazapate (Tranxene®)	Anxiety; chlordiazepoxide for alcohol withdrawal in acute alcoholism	Long half-life in the elderly (often days), produces sedation and increased incidence of falls. Short- or intermediateacting benzodiazepines are preferred if benzodiazepines are required.
Chlorpropamide (Diabinese®)	Type II diabetes	Prolonged half-life; can cause prolonged, serious hypoglycemia. Only hypoglycemic causing inappropriate secretion of antidiuretic hormone.
Diphenhydramine (Benadryl®)	Allergic reaction; sometimes used to produce sedation.	Potent anticholinergic, confusion and sedation. For allergic reaction use lowest dose. Additional anticholinergic effects include ataxia, urinary retention, constipation, dry mucus membranes, visual disturbances, increased temperature and heart rate.
Disopyramide (Norpace®), not including extended release formulation	Arrhythmias	Most potent negative inotrope of all antiarrhythmics, which may induce heart failure in the elderly. Also, strong anticholinergic. Anticholinergic effects include ataxia, urinary retention, constipation, dry mucus membranes, visual disturbances, confusion, increased temperature and heart rate.

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Drug or Classification*	Usual Indication	Risk for Patients Age 65 and Older
Doxepin (Sinequan®)	Anxiety; depression	Strong anticholinergic and sedating properties. Anticholinergic effects include ataxia, urinary retention, constipation, dry mucus membranes, visual disturbances, confusion, increased temperature and heart rate.
Fluoxetine (daily) (Prozac®)	Depression	Long half-life; risk of CNS stimulation, sleep disturbance, increasing agitation.
Flurazepam (Dalmane®)	Need for sedation	Extremely long half-life in the elderly (often days), produces sedation and increased incidence of falls. Short- or intermediate-acting benzodiazepine preferred.
Guanadrel (Hylorel®)	Hypertension	Risk for orthostatic hypotension
Guanethedine (Ismelin®) – no longer available in the USA	Hypertension	Risk for orthostatic hypotension, dizziness, fainting.
Indomethacin (Indocin®)	Inflammatory diseases and rheumatoid disorders, arthritis; pain	Most CNS side effects of any NSAID.
Ketorolac (Toradol®)	Pain	GI effects – many elderly persons have asymptomatic GI pathology
Long-term use of stimulant Laxatives such as bisacodyl (Dulcolax®), cascara sagrada (herbal), castor oil preparations such as Neoloid® - except with opioid therapy	Constipation	May exacerbate bowel dysfunction
Lorazepam (Ativan®) 3 mg, oxazepam (Serax®) 60 mg, alprazolam (Xanax®) 2 mg, temazepam (Restoril®) 15 mg, triazolam (Halcion®) 0.25 mg	Anxiety, need for sedation	Total daily doses should not exceed these recommendations. Smaller doses may be effective as well as safer due to increased sensitivity of the elderly to benzodiazepines.
Meperidine (Demerol®)	Pain	Not effective orally; more disadvantages than other narcotics. Causes confusion.
Meprobamate (Miltown®, Equanil®)	Anxiety	Addictive, sedation.
Mesoridazine (Serentil®)	Schizophrenia, psychosis	CNS and extrapyramidal adverse effects.
Methyldopa (Aldomet®) and combinations [e.g., with hydrochlorothiazide (Aldoril®)]	Hypertension	May cause bradycardia and exacerbate depression in the elderly.
Methyltestosterone (Adroid®, Virilon®, Terstrad®)	Male: Impotence, climacteric symptoms Female: Palliative in metastatic breast cancer	Potential for prostatic hypertrophy and cardiac problems.

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Drug or Classification*	Usual Indication	Risk for Patients Age 65 and Older
Mineral oil	Constipation	Potential for aspiration, may interfere with absorption of drugs and nutrients.
Long-term use of full dose of longer half-life, non-Cox NSAIDS, such as naproxen (Naprosyn®), Avaprox®, Aleve®), oxaprosin (Daypro®), piroxicam (Feldene®)	Inflammatory diseases, arthritis; pain	Risk of GI bleeding, renal failure, hypertension, heart failure.
Short-acting nifedipine (Procardia®, Adalat®)	Angina, hypertension, pulmonary hypertension	Risk for hypotension and constipation.
Nitrofurantoin (Macrochantin®)	Urinary tract infection	Potential for renal impairment.
Orphenadrine (Norflex®)	Muscle spasm, Parkinson’s disease	More anticholinergic effects and sedation than alternatives. Anticholinergic effects include ataxia, urinary retention, constipation, dry mucus membranes, visual disturbances, confusion, increased temperature and heart rate.
Pentazocine (Talwin®)	Pain, need for sedation	Mixed narcotic agonist/antagonist; Causes confusion, hallucinations more commonly than other narcotics.
Thioridazine (Mellaril®)	Schizophrenia, psychosis	Increased risk for adverse CNS and extrapyramidal effects.
Dessicated thyroid (natural thyroid), not the synthetic preparations such as levothyroxine (Synthroid®)	hypothyroidism	Risk for cardiac effects.
Ticlopidine (Ticlid®)	Thrombosis, stroke and stroke prevention	No better than aspirin to reduce clotting, but more toxic.
Trimethobenzamide (Tigan®)	Nausea and vomiting	One of least effective antiemetics, but can cause extrapyramidal side effects such as drowsiness and dizziness.

Appendix B: Beers I, Low-Severity Concerns

Adapted from The Merck manual of diagnosis and therapy, (Kaplan & Porter, 2011) and Geriatric pharmacotherapy: A guide for the helping professional (Olsen, et al., 2007).

* When a category or class of drugs is named, the precaution applies to the entire category or class and not only the example given.

Drug or Classification*	Usual Indication	Risk for Patients Age 65 and Older
Cimetidine (Tagamet®)	Gastric hypersecretory states, including gastric ulcers, gastroesophageal reflux disease	Adverse CNS effects, including confusion.
Clonidine (Catapres®)	Hypertension; migraine headache prophylaxis	Risk for orthostatic hypotension and adverse CNS effects including drowsiness and dizziness.
Digoxin (Lanoxin®)	Congestive heart failure, arrhythmias	Decreased renal clearance of digoxin in the elderly may lead to toxic effects. Doses should rarely exceed 0.125 mg daily, except in treating atrial arrhythmias.
Short-acting dipyridamole (Persantine®), not including long-acting. Exception: patients who have artificial heart valves.	Thrombosis. Used with warfarin post-heart valve replacement.	Causes orthostatic hypotension in the elderly. Proven beneficial only in patients who have artificial heart valves.
Doxazosin (Cardura®)	Hypertension	Risk for hypotension, dry mouth and urinary problems.
Ergoloid mesylates With caffeine (Cafergot®) (Hydergine®) cyclandelate (Cyclospasmol®) not commercially available in the USA	Migraine headache Cerebrovascular insufficiency Peripheral vascular disease	Have not been shown effective in the doses studied for the treatment of dementia or any other condition. Lack of efficacy. Risk for dizziness.
Estrogens, only (that is, not estrogen in combination with progesterone) oral (Cinestin®)	Menopause	Evidence of carcinogenic (breast and endometrial cancer) in women and lack of cardioprotective effect in older women
Ethacrynic acid (Edecrin®)	Edema associated with congestive heart failure, hepatic cirrhosis, renal disease and other conditions	Risk for hypertension, fluid imbalance. Safer alternatives available.
Iron supplements, e.g. ferrous sulfate (Feosol®)	Iron-deficiency anemia	Doses >325 mg rarely needed. At higher doses, absorption not substantially increased, but constipation is more likely.
Isoxsuprine (Vasodilan®)	Peripheral vascular disease	Lack of efficacy.
Reserpine (Serpasil®) at doses greater than 0.25 mg/day and combinations [with chlorothiazide (Diupres®)]	Hypertension	Risk for depression, impotence, sedation, and orthostatic hypotension.

Appendix C: Beers II, High-Severity Concerns in Drug-Disease Interaction and the Elderly

Adapted from The Merck manual of diagnosis and therapy, (Kaplan & Porter, 2011) and Geriatric pharmacotherapy: A guide for the helping professional (Olsen, et al., 2007).

* When a category or class of drugs is named, the precaution applies to the entire category or class and not only the example given.

Disease or Condition	Drug or Classification	Usual Indication	Risk for Patients 65 or Older
Anorexia and malnutrition	CNS stimulants such as dextroamphetamine +Amphetamine (Adderall®), methylphenidate (Ritalin®), methamphetamine (Desoxyn®) Non-amphetamine stimulants, such as pemoline (Cylert®) Selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine (Prozac®)	Narcolepsy, attentiondeficit/hyperactivitydisorder (ADHD), CNS depression, respiratory depression Depression	Further suppression of appetite
Arrhythmias	Tricyclic antidepressants: imipramine hydrochloride (Tofranil®), doxepin hydrochloride (Sinequan®), amitriptyline hydrochloride (Elavil®)	Depression, Migraine headaches	Proarrhythmic effects and may produce QT interval changes
Bladder outflow problems, including benign prostatic hypertrophy (BPH)	Anticholinergic: Muscle relaxants such as cyclobenzaprine (Flexeril®) Urinary antispasmodics such as Tolterodine (Detrol®), oxybutynin (Ditropan®), flavoxate (Urispas®) Antidepressants such as amitriptyline (Elavil®) Antihistamines and decongestants such as pseudoephedrine (Actifed®) Gastrointestinal antispasmodic drugs such as dicyclomine (Bentyl®)	Muscle spasms Urinary frequency, incontinence Depression Nasal, sinus and lung congestion Disturbances of GI motility such as irritable bowel syndrome	Anticholinergic effects include ataxia, urinary retention, constipation, dry mucus membranes, visual disturbances, confusion, increased temperature and heart rate.
Blood-clotting disorders or receive anticoagulant therapy	Anti-platelet agents such as clopidogrel (Plavix®), dipyridamole (Persantine®), ticlopidine (Ticlid®)	Atherosclerosis, thrombosis, and to prevent second thrombotic event (MI, CVA)	May cause bleeding due to anti-platelet activity. May prolong clotting

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Disease or Condition	Drug or Classification	Usual Indication	Risk for Patients 65 or Older
	Nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen (Advil®) and aspirin		time and elevate INR. Increased risk of GI bleeding.
Chronic obstructive pulmonary disease (COPD)	Long-acting benzodiazepines: chlordiazepoxide (Librium®), chlordiazepoxide-amitriptyline (Limbitrol®), clidinium-chlordiazepoxide (Librax®), diazepam (Valium®), quazepam (Doral®), halazepam (Paxipam®), chlorazapate (Tranxene®)	Anxiety, need for sedation	CNS adverse effects; May induce, cause, or exacerbate respiratory depression. May slow respirations and increase CO ₂ retention.
COPD, asthma	Beta blockers such as propranolol (Inderal®)	Hypertension; arrhythmias	May produce bronchospasm, respiratory distress.
Cognitive impairment	Barbiturates such as pentobarbital (Nembutal®) except phenobarbital for seizures Antispasmodics drugs such as dicyclomine (Bentyl®), Tolterodine (Detrol®) Muscle relaxants such as cyclobenzaprine (Flexeril®) CNS stimulants such as dextroamphetamine +Amphetamine (Adderall®), methylphenidate (Ritalin®), methamphetamine (Desoxyn®), pemoline (Cylert®)	Need for sedation GI, urinary spasms Muscle spasms Attention-deficit/hyperactivity disorder; narcolepsy	CNS-altering effects.
Constipation	Calcium channel blockers verapamil (Isoptin®)	Hypertension	May exacerbate constipation.
	Tricyclic antidepressants (TCAs): imipramine hydrochloride (Tofranil®), doxepin hydrochloride (Sinequan®), amitriptyline hydrochloride (Elavil®)	Depression	
Depression	Long-term benzodiazepine use - Long-acting benzodiazepines: chlordiazepoxide (Librium®), chlordiazepoxide-amitriptyline (Limbitrol®), clidinium-chlordiazepoxide (Librax®), diazepam (Valium®), quazepam (Doral®), halazepam (Paxipam®), chlorazapate (Tranxene®) and short-	Anxiety, insomnia	May produce or exacerbate depression. Long-term use interferes with balance, alertness, energy level and

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Disease or Condition	Drug or Classification	Usual Indication	Risk for Patients 65 or Older
	<p>and intermediate-acting such as estazolam (ProSom®), flurazepam (Dalmane®), temazepam (Restoril®), and triazolam (Halcion®)</p> <p>Sympatholytic agents: methyldopa (Aldomet®), reserpine (Serpasil®) at doses greater than 0.25 mg/day, guanethidine (Ismelin®), Guanethidine no longer available in USA</p>	Hypertension	<p>produces tolerance to the drugs.</p> <p>May produce or exacerbate depression.</p>
Heart failure	<p>Disopyramide (Norpace®), not including extended release formulation</p> <p>High sodium-content drugs such as drugs containing sodium salts, including sodium -alginate - bicarbonate, -biphosphate, citrate, - phosphate, -salicylate, and -sulfate</p>	<p>Arrhythmias</p> <p>Variety of uses including electrolyte and metabolic disturbances; selected salts are antidotes for specific overdoses; GI disturbances and constipation</p>	<p>Negative inotropic effect.</p> <p>Potential fluid retention and exacerbation of heart failure.</p>
Hypertension	Phenylpropanolamine HCl (Dexitrim®) and a variety of cold remedies), off the market in 2001; pseudoephedrine, diet pills: amphetamines, dextroamphetamine (Dexedrine®)	Desire to increase metabolism for weight loss or increased alertness	Elevation of blood pressure secondary to increased sympathomimetic activity.
Insomnia	<p>Decongestants</p> <p>Theophylline (Theodur®), Methylphenidate (Ritalin®)</p> <p>Monoamine oxidase inhibitors (MAOIs) such as phenazine (Nardil®)</p> <p>Amphetamines such as dextroamphetamine (Dexedrine®)</p>	<p>Nasal or lung congestion Asthma</p> <p>Attention-deficit/hyperactivity disorder</p> <p>Depression</p> <p>Desire to increase metabolism for weight loss</p>	CNS stimulation will aggravate insomnia.
Parkinson's disease	Metoclopramide (Reglan®)	Gastroesophageal reflux disease, diabetic gastric stasis	<p>Antidopaminergic and anticholinergic effects</p> <p>Anticholinergic effects include ataxia, urinary retention, constipation, dry mucus</p>

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Disease or Condition	Drug or Classification	Usual Indication	Risk for Patients 65 or Older
	<p>Conventional antipsychotics such as fluphenazine (Prolixin®), haloperidol (Haldol®), chlorpromazine (Thorazine®)</p> <p>Tacrine (Cognex®)</p>	<p>Schizophrenia, psychosis Haloperidol – also Tourette’s disorder Chlorpromazine – also nausea and vomiting; mania</p> <p>Mild to moderate dementia of Alzheimer’s type</p>	<p>membranes, visual disturbances, confusion, increased temperature and heart rate. Extrapyramidal effects.</p> <p>May produce ataxia.</p>
Seizures, seizure disorder, epilepsy	Bupropion (Wellbutrin®), clozapine (Clozaril®), chlorpromazine (Thorazine®), thioridazine (Mellaril®), thiothixene (Navane®)	<p>Depression, Schizophrenia, psychosis</p> <p>Thorazine also antiemetic, mania</p>	May lower seizure thresholds.
Stress incontinence	<p>Long-acting benzodiazepines: chlordiazepoxide (Librium®), chlordiazepoxide-amitriptyline (Limbitrol®), clidinium-chlordiazepoxide (Librax®), diazepam (Valium®), quazepam (Doral®), halazepam (Paxipam®), chlorazapate (Tranxene®)</p> <p>Anti-cholinergics (see Bladder outflow listing above)</p> <p>Alpha-blockers, doxazosin (Cardura®), prazosin (Minipress®), terazosin (Hytrin®)</p> <p>Tricyclic antidepressants: imipramine hydrochloride (Tofranil®), doxepin hydrochloride (Sinequan®), amitriptyline hydrochloride (Elavil®)</p>	<p>Anxiety, need for sedation</p> <p>Nasal congestion associated with allergy, cold or prevent respiratory complications of anesthesia; disturbances of GI motility</p> <p>Hypertension</p> <p>Depression; Migraine headache</p>	May produce polyuria and worsening of incontinence
Syncope or falls	Long-acting benzodiazepines: chlordiazepoxide (Librium®), chlordiazepoxide-amitriptyline		May produce ataxia, impaired

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Disease or Condition	Drug or Classification	Usual Indication	Risk for Patients 65 or Older
	<p>(Limbitrol®), clidinium-chlordiazepoxide (Librax®), diazepam (Valium®), quazepam (Doral®), halazepam (Paxipam®), chlorazapate (Tranxene®)</p> <p>Short- to intermediate-acting benzodiazepines: alprazolam (Xanax®), lorazepam (Ativan®), oxazepam (Serax®)</p> <p>Tricyclic antidepressants (TCAs): imipramine hydrochloride (Tofranil®), doxepin hydrochloride (Sinequan®), amitriptyline hydrochloride (Elavil®)</p>		<p>psychomotor function, syncope, and additional falls.</p>
<p>Ulcer disease, gastritis, gastroesophageal reflux disease (GERD)</p>	<p>Nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen (Advil®) and aspirin (ASA) greater than 325 mg/day. Coxibs excluded, such as celecoxib (Celebrex®)</p>	<p>Pain; arthritis</p>	<p>GI irritation can exacerbate GI problems and lead to GI bleeding.</p>

Appendix D: Beers II, Less Severe Concerns in Drug-Disease Interaction and the Elderly

Adapted from The Merck manual of diagnosis and therapy, (Kaplan & Porter, 2011) and Geriatric pharmacotherapy: A guide for the helping professional (Olsen, et al., 2007).

* When a category or class of drugs is named, the precaution applies to the entire category or class and not only the example given.

Disease or Condition	Drug or Classification	Usual Indication	Risk for Patients 65 or Older
Obesity	Olanzapine (Zyprexa®)	Schizophrenia, bipolar mania, psychosis	May stimulate appetite and increase weight gain
Secretion of syndrome of inappropriate antidiuretic hormone secretion (SIADH)/ hyponatremia	Selective serotonin uptake inhibitors (SSRIs): fluoxetine (Prozac®), citalopram (Celexa®), fluvoxamine (Luvox®), paroxetine (Paxil®), sertraline (Zoloft®)	Depression	May cause or exacerbate SIADH

Appendix E: Resources for Further Information

New resources continually become available and Web addresses may change. Search the Internet for new credible resources for care of the elderly and for particular medications and conditions that are pertinent in the care of your patients.

Government Resources

- The Agency for Healthcare Research and Quality (AHRQ), a federal agency, has published many clinical practice guidelines, including disease-specific guidelines and the guideline, Improving Medication Management for Older Adult Clients, which grades the quality of the available evidence supporting use of the Beers criteria and lists strategies to improve medication management. <http://www.guideline.gov/>.
- USFDA (nd) Medicines and older adults. <http://www.fda.gov/opacom/lowlit/medold.html>

Professional Organizations: Clinical Practice Guidelines and Recommendations

- The American Geriatrics Society has published clinical practice guidelines and clinical practice recommendations. <http://www.americangeriatrics.org/>
- The American College of Cardiology and the American Heart Association have established guidelines jointly. <http://www.acc.org/>
- The American Diabetes Association <http://www.diabetes.org/home.jsp>
- The American College of Rheumatology <http://www.rheumatology.org/>

Professional Nursing Societies' Clinical Guidelines such as:

- Wound, Ostomy, and Continence Nurses Society (WOCN) <http://www.wocn.org/>
- American Association of Critical Care Nurses (AACN) <http://www.aacn.org/>
- Oncology Nurses Society (ONS) <http://www.ons.org/>

Geriatric Nursing Resources

- Assessing the Care of Vulnerable Elders (ACOVE) Indicators. 22 indicators of quality of care for the elderly. http://www.rand.org/pubs/research_briefs/2005/RB4545-1.pdf
- Hartford Foundation: <http://www.hartfordign.org/>; <http://www.ConsultGeriRN.org>
- Nurses Improving Care for Healthsystem Elders (NICHE) program. <http://www.nicheprogram.org>
- University of Minnesota <http://www.nursing.umn.edu/CGN/ResearchPractice/>
- University of Iowa <http://www.nursing.uiowa.edu/excellence/gerontology/>

Medication-Related Resources

- Decreasing Anti-cholinergic Drugs in the Elderly (DADE) resources and a clinical tool targeting PIMs are available at no charge. Materials include resources for both clinicians and patients. <http://providers.ipro.org/index/pres-drug-plan-prescribers>

- Medication Management Improvement System, a model which includes software and a pharmacist consultant to manage medications in the home care setting. <http://www.homemedics.org>

Assessment and Research Tools

Medication Appropriateness Index. A valid and reliable tool for assessing drug indication, effectiveness, dosage, correct and practical directions, drug–drug interactions, drug–disease interactions, duplication, duration and cost. See:

Spinewine, A., et al. (2007). Effect of a collaborative approach on the quality of prescribing for geriatric inpatients: A randomized, controlled trial. *Journal of the American Geriatric Society*, 55(5), 658 – 665.

Lata, H., & Alia, L. (2007). Aging: Physiological aspects. *JK Science*, 9(3), 111-115.

Drug Burden Index. Specific to sedating and anticholinergic agents, this index considers frequency and dosage as well as mechanism of action. Useful to predict adverse effects. See:

Hilmer, S.N., et al. (2007). A drug burden index to define the functional burden of medications in older people. *Archives of Internal Medicine*, 167(8), 781 – 787.

Drug Regimen Unassisted Grading Scale (DRUGS). A standardized assessment of medication-related function that predicts the need for focused nursing intervention or increased support. See:

Farris, K.B. & Phillips, B.B. (2008). Instruments assessing capacity to manage medications. *Annals of Pharmacotherapy*, 42(7), 1026 – 1036.

Kripalani, S., et al. (2006). Predictors of medication self-management skill in a low-literacy population. *Journal of General Internal Medicine*, 21(8), 852 – 856.

Ryan, C., O'Mahony, D., Kennedy, J., Weedle, P., Gallagher, P., & Byrne, S. (2009)._ Appropriate prescribing in the elderly: An investigation of two screening tools, Beers criteria considering diagnosis and independent of diagnosis and improved prescribing in the elderly tool to identify inappropriate use of medicines in the elderly in primary care in Ireland. *Journal of Clinical Pharmacy and Therapeutics*, 34, 369–376.

Olsen, C.G., Tindall, W.N., & Clasen, M.E. (2007). *Geriatric pharmacotherapy: A guide for the helping professional*. Washington, DC: American Pharmacists Association.

Expert panels frequently create targeted recommendations, such as:

- The Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults recently updated practice guidelines to expand the indications for intensive therapy with lipid lowering agents. <http://www.nhlbi.nih.gov/files/docs/guidelines/atglance.pdf>

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