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Monitoring Medication Use in Older Adults

The Beers criteria can be used in identifying medication-related risk.



Ed Eckstein

Overview: The Beers Criteria for Potentially Inappropriate Medication Use in Older Adults assessment instrument highlights specific medications whose risks to older adults may outweigh their benefits. Nurses can use the criteria to evaluate medications for risks that warrant follow-up with older adults in various settings, including hospitals, nursing homes, and private homes. Watch a video demonstrating the use of the Beers criteria at <http://links.lww.com/A266>.



Web Video

Watch a free online video demonstrating the use of the Beers Criteria for Potentially Inappropriate Medication Use in Older Adults at <http://links.lww.com/A266>.



A Closer Look

Get more information on why it's important for nurses to monitor medication use in older adults.



Try This: Beers Criteria for Potentially Inappropriate Medication Use in Older Adults, Part I.

This shows the instrument in its original form. See page 73.



Online Only

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Clemente Flores, 81 years old, was admitted to the hospital for treatment of acute pneumonia. His history includes hypertension, congestive heart failure, benign prostatic hypertrophy, chronic renal failure, osteoarthritis, falling, depression, chronic constipation, and mild cognitive impairment. (This case is a composite based on my clinical experience.) His medications include digoxin (Lanoxin and others) 0.125 mg by mouth once daily, furosemide (Lasix) 40 mg by mouth once daily, desipramine (Norpramin) 50 mg by mouth twice daily, verapamil (Calan SR) 120 mg by mouth once daily, docusate sodium (Colace and others) 100 mg by mouth twice daily, meclizine (Antivert and others) 25 mg three times daily when necessary, and bisacodyl (Dulcolax and others) one rectal suppository when necessary. Moxifloxacin (Avelox) 400 mg IV every 24 hours was ordered to treat his newly diagnosed pneumonia. His wife, Inéz Flores, told his nurse that he had “cut back” on some of his medications at home because he thought they were “too much.” As a result of several falls before admission, he complained of low-back pain. After an X-ray ruled out a fracture, an order was written for cyclobenzaprine (Flexeril, a muscle relaxant) 5 mg by mouth

three times daily for five days and ibuprofen (Advil and others) 400 mg every six hours when necessary for five days.

Now, two days later, Mr. Flores is confused and agitated. He's found wandering off the unit, disrobing and yelling. Alprazolam (Xanax) 0.25 mg every four to six hours when necessary is ordered for agitation. Mr. Flores falls again, becoming unable to walk without assistance or to urinate. His blood urea nitrogen, serum creatinine, and digoxin levels are elevated, and he is diagnosed with acute urinary retention and acute renal failure. His nurse, recognizing that he is at risk for poor outcomes because of medication overuse, decides to assess him using the Beers criteria.

THE 2002 BEERS CRITERIA

The Beers Criteria for Potentially Inappropriate Medication Use in Older Adults assessment instrument, also known as the 2002 Beers criteria, is useful to nurses in identifying medication-related risks in older adults who have several chronic illnesses.¹ The criteria include two components: Part I: 2002 Criteria Independent of Diagnoses or Conditions (referred to in this article as Beers I; see page 74), which lists drug types and medications of concern, and Part II:



Why Assess Older Adults for Inappropriate Medication Use?

Several factors related to medication use put older adults at high risk for negative health outcomes.

Polypharmacy. Older adults use more prescription and over-the-counter drugs than do younger adults and are at higher risk for drug–drug and drug–disease interactions.³ A 1998–1999 national survey of medication use among U.S. ambulatory older adults found that 71% of men and 81% of women ages 65 and older had taken at least one prescription medication in the prior week, and 19% of men and 23% of women had taken five or more.³ When over-the-counter medications were included, 12% each of men and women took 10 or more medications. A more recent study of older adults in California eligible for Medicare and Medicaid found that they took a mean of nine drugs per day.⁴ Several studies have shown that the greater the number of medications prescribed, the greater the risk of adverse effects and the lower the level of adherence,^{5,6} and that large discrepancies can exist between prescribed medication regimens and the medications the patient actually takes.^{7,8}

Physiologic changes related to aging can affect the body's response to some drugs, so careful consideration is required in prescribing and dosing medications. For instance, older adults have decreased lean body mass, less total body fluid, decreased serum albumin levels (and therefore less protein-binding capacity), decreased activity of some liver enzymes, and less blood flow to the kidneys (which could prolong the time

to drug elimination). (See the four-part series on pharmacokinetics in *Drug Watch*, May through August 2008.) Frailty, the presence of multiple diseases, and changes in physiologic function affect medication-related risk to a greater degree than does age alone.^{9,10} A study that examined data collected over two years by the National Electronic Injury Surveillance System found that adults ages 65 and older had adverse drug reactions requiring hospitalization at seven times the rate of those younger than 65.¹¹ Aging magnifies interindividual variability in drug bioavailability, drug activity, and potential for toxicity.¹⁰

Older adults are more likely than younger people to have multiple prescribers, multiple health care transitions (such as admissions and discharges and changes in pharmacies and formularies), and self-care deficits related to medication use (such as vision and memory impairment) that may increase the risk of adverse reactions.^{9,10,12-14}

Nurses in all settings need clinical tools to help them identify high-risk situations. The use of potentially inappropriate medications is prevalent in ambulatory care,¹⁵⁻¹⁷ home care,¹⁸ hospital care,^{19,20} and long-term care.²¹⁻²³ Using the Beers criteria to screen for medication risks that might outweigh benefits will allow nurses to help reduce the possibility of adverse events. To watch the portion of the online video in which a nurse uses the Beers criteria to evaluate medications in older adult patients, go to <http://links.lww.com/A267>.

2002 Criteria Considering Diagnoses or Conditions (referred to in this article as Beers II; see http://consultgerirn.org/uploads/File/trythis/issue16_2.pdf), which groups these medications by the disease or condition they are used to treat. Both parts are the latest versions of criteria originally published in 1991 (and first updated in 1997) and were developed by an interdisciplinary panel of experts. The criteria highlight specific medications whose associated risks to older adults may outweigh their benefits or for which safer alternatives exist. Nurses may use the criteria to evaluate medications for risk warranting follow-up in older adults in various settings, including hospitals, nursing homes, and private homes.¹

It's important to note that the Beers instrument was not intended to discern causal relationships between medications and outcomes; rather, the cri-

teria specify drugs and classes of drugs whose associated risks *might* outweigh their benefits. As with any assessment instrument, clinicians must exercise their judgment in light of an individual patient's needs. The American Medical Directors Association and the American Society of Consultant Pharmacists have issued a joint position statement cautioning against using a drug's inclusion in the Beers criteria as an absolute prohibition against prescribing it. They stress that in providing patient-centered care, prescribing decisions should be made in consideration of the larger clinical picture, including comorbidities, medication history, and prognosis.² Nurses can use the Beers criteria tool to begin medication assessment. (For more information, see *Why Assess Older Adults for Inappropriate Medication Use?*³⁻²³ above.)



The Cockcroft–Gault Formula

ADMINISTERING THE BEERS CRITERIA

Medication assessment should be done at least every six months, and more often during an acute illness or exacerbation of a chronic illness.²⁴ To reduce medication-related risks using the Beers criteria, the nurse should

- obtain a list of all medications taken on a regular or as-needed basis, including over-the-counter medications. Ask the patient to bring in *all* medications (including herbal and nutritional supplements and topical preparations, as well as any “old” or “borrowed” medications).
- assess whether the patient changes the medication dosage or schedule (such as by skipping, raising, or reducing a dose) for any reason.
- highlight any medications that are listed in Beers I or Beers II.
- highlight medications that are not listed in Beers I or Beers II but which require frequent monitoring to avoid adverse drug effects (see Table 1, page 74).
- highlight any medications whose indication for use is unclear.
- consult the patient, caregiver, pharmacist, primary care provider, and other prescribers, if appropriate, to determine whether
 - the patient’s symptoms could be caused by one of the highlighted medications.
 - the indication for using the medication is clear (and still exists).
 - the medication is serving its purpose.
 - the medication has been titrated appropriately (that is, the dose is high enough to be therapeutic without causing undue adverse effects).
 - the dose is correct (this is particularly important for renally excreted drugs, which may need to be given in reduced doses if creatinine clearance is low, as measured or as estimated by the Cockcroft–Gault Formula (at right).
 - there are safer alternatives for high-risk medications.
 - therapeutic goals should be reevaluated according to stage of illness and prognosis (for example, at the end of life, managing symptoms may be more appropriate than treating the disease).
- ensure laboratory monitoring of appropriate medications is being performed (see *Centers for Medicare and Medicaid Services Guidelines for Drug Monitoring in Elderly Residents of Long-Term Care Facilities*, <http://links.lww.com/A636>).
- make use of nonpharmacologic approaches.
- monitor the effects of changes in the medication regimen made in response to the assessment and educate the patient and family members on medication self-care (including any anticipated effects

of changes and when to call the primary care provider).

low creatinine clearance may indicate renal dysfunction, which affects a renally excreted drug’s metabolism and appropriate dosage. For men, calculate creatinine clearance using the following formula. For women, use the following formula and multiply the answer by 0.85.

$$\frac{(140 - \text{age in years}) \times \text{lean body weight in kg}}{\text{serum creatinine in mg/dL} \times 72}$$

In the case of Mr. Flores, the nurse begins this process by saying, “I’d like to make a list of all of the medications that Mr. Flores takes at home. Did you bring the medications with you to the hospital?” Ms. Flores replies, “No, we left in such a hurry, and I’m not sure I can remember them all. I’m going home to pick up a few things, and I’ll bring the medicines when I come back.”

The nurse says, “That would be very helpful. Please include *all* medications, including eyedrops, lotions and creams, vitamins, herbs, and other over-the-counter medications that Mr. Flores takes on a regular basis. Any old or borrowed prescriptions that he uses should also be included.”

After Ms. Flores agrees, the nurse adds, “In addition to the medications you take every day, I want to ask you about those you use just once in a while. Mr. Flores, do you use medications to treat headaches? Indigestion or heartburn? Cough or cold symptoms? Difficulty sleeping? Arthritis or other aches and pains? Constipation or diarrhea? Allergies? Can you tell me how often you take these?” Mr. Flores mentions that he has been taking Tylenol PM (acetaminophen and diphenhydramine) for difficulty sleeping and Dimetapp Elixir (brompheniramine and pseudoephedrine) for a persistent cough. He also reports occasional use of Alka-Seltzer (aspirin) for indigestion but has not used it recently. The nurse asks, “When did you last use the Alka-Seltzer? How many times per day or per week do you use it?”

The nurse records this information. Asking about specific symptoms may result in a more accurate list of medications taken on an as-needed basis. Maintaining an accurate, up-to-date medication list that includes all medications actually used by the older adult is one of the most important medication risk reduction strategies. When obtaining this list, the nurse can assess the patient’s and family’s knowledge about each medication, respond to their questions and concerns, and provide education (for example, on old, expired,



Other Medications Associated with Potentially Preventable Adverse Effects

Their use may be appropriate in older adults; nevertheless, they warrant increased monitoring.

- Angiotensin-converting enzyme inhibitors
- Antiepileptics
- Antiplatelet agents
- Antipsychotics
- Benzodiazepines
- Digoxin
- Hypoglycemic agents
- Loop diuretics
- Opioids
- Theophylline
- Warfarin

Gurwitz JH, et al. *Am J Med* 2005;118(3):251-8; Thomsen LA, et al. *Ann Pharmacother* 2007;41(9):1411-26.

or borrowed medications). A comprehensive medication list establishes an effective baseline and facilitates comparison between home and hospital therapy (for more, see “Medication Reconciliation,” November 2005). This will also help to identify undertreatment, drug interactions, and medication duplication, such as two drugs in the same therapeutic category or the same drug prescribed under two different names (one brand name and one generic). Nonjudgmental questioning may also elicit important information about medication adherence.

When Ms. Flores returns, she shares the written list. The nurse notices that meclizine, which was prescribed in the hospital, isn’t on the list. “Oh, yes,” Ms. Flores replies, “I forgot to add that. It’s new. We got it last week, after we went to the walk-in center when he was dizzy.”

The nurse also notices that the list includes tamsulosin (Flomax), which wasn’t part of the admission orders. Mr. Flores says, “I stopped taking that a few weeks ago because I read it could cause dizziness and falls.” The nurse replies, “Have you made any other changes, such as taking more or less of a medication, or sometimes missing a dose?” Mr. Flores says that he “forgot to fill the water pill prescription for a few days last month” and that he

skips the medication when he goes out in public, “maybe two or three times a week.”

The nurse reviews the lists of prescribed medications, diagnoses, and conditions in Mr. Flores’s current and past medical records. She checks these lists and the medication list his wife compiled against both Beers criteria tables and highlights on the medication list all of the medications included in the Beers criteria. She also notes the medications on the list that have no known indication for use, based on the patient’s documented medical history. She notes that anticholinergic agents are listed in the Beers criteria and may cause confusion, urinary retention, and other adverse effects in older adults. Medications with high anticholinergic activity include tricyclic antidepressants and antihistamines.²⁵ Medication assessment tools are also available online (for several of these sites, see *Other Resources for Medication Monitoring* at <http://links.lww.com/A634>). The nurse consults drug reference resources to review potential medication adverse effects and toxicities, special dosing instructions (such as for patients with reduced creatinine clearance), and clinically important drug interactions. She contacts the clinical pharmacist to review the results of her assessment and asks for consultation on pharmacologic recommendations as well as drug–drug and drug–disease interactions. Since Mr. Flores’s acute urinary retention is an urgent concern, the nurse contacts the admitting physician immediately to share these concerns and recommendations. (If nothing urgent were at issue, she could wait until rounds to discuss her assessment.) Mr. Flores’s physician may need to consult other prescribers to add information about patient-specific risks, benefits, and responses to medication. The health care team and Mr. and Ms. Flores will then use this information to reduce the medication-related risks.

INTERPRETING AND COMMUNICATING RESULTS

Using the updated Beers criteria instrument allows the nurse to identify several potential drug–disease interactions and monitoring needs. She assesses Mr. Flores for drug-related problems and reviews recent laboratory values in his chart. After consulting the pharmacist, she contacts the physician to determine whether any medication-related risks might be reduced.

The nurse explains to the physician that she’s taken a comprehensive medication history from the Flores family and reviewed the medication record with the pharmacist. She notes that Mr. Flores has been taking several medications with anticholinergic or antihistaminic properties, including desipramine, a tricyclic antidepressant; meclizine, used to treat ver-



try this: Best Practices in Nursing Care to Older Adults

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Beers Criteria for Potentially Inappropriate Medication Use in Older Adults Part I: 2002 Criteria Independent of Diagnoses or Conditions

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WHY: Recently published studies confirm that inappropriate medication use remains a serious problem for the elderly (Bonk, et al, 2006; Lau, et al, 2005). Nursing knowledge of potentially inappropriate medications will enable attentive monitoring for adverse effects, and increase awareness of disease and condition-specific medication concerns in older adults.

BEST TOOL: The 2002 *Criteria for Potentially Inappropriate Medication Use in Older Adults* (Fick, et al, 2003) update the 1997 Beers Criteria, and identify medications noted by an expert consensus panel to have potential risks that outweigh potential benefits. The criteria provide an outcome severity rating (high vs. low) and a brief summary of the prescribing concerns. A total of 15 medications/classes were dropped or modified from the 1997 list, and 44 new medications were added.

Try This: Part I focuses on Table 1: 2002 Criteria Independent of Diagnoses and Conditions. It contains 48 individual medications or classes of medications to avoid in older adults and their potential concerns. Try This: Part II presents the criteria considering diagnosis or medical condition.

TARGET POPULATION: The criteria apply to the general population of adults older than 65 years of age. There may be additional medications that are inappropriate for a significantly older or frailer population.

VALIDITY AND RELIABILITY: The criteria were developed using a modified Delphi method to achieve consensus among 12 experts in geriatrics and/or pharmacology. The criteria have been used to screen populations for possible medication-related problems. Use of inappropriate medications has been associated with negative outcomes (Fu, et al, 2004; Lau, et al, 2005; Perri, et al, 2005). Additional studies are needed to support predictive validity and address potential confounding variables such as severity of underlying illness (Lau, et al, 2005; Zuckerman, et al, 2006).

STRENGTHS AND LIMITATIONS: The criteria will assist nurses to identify patients who may benefit from monitoring or medication review. The criteria do not identify all cases of potentially inappropriate prescribing or medication-associated adverse events, and do not address polypharmacy or underuse of helpful medications. The criteria are designed for population-based screening and are not intended to substitute for professional judgment regarding the individualized needs of particular older adults.

FOLLOW-UP: Nurses may use the criteria to increase awareness of medications that may increase risk for adverse drug reactions. Nurses, primary care providers and pharmacists may collaborate to optimize individualized medication regimes and provide appropriate clinical monitoring and education. The suggested references provide further information on medication risk and older adults.

MORE ON THE TOPIC:

Best practice information on care of older adults: www.ConsultGeriRN.org.

Beers, M.H. (1997). Explicit criteria for determining potentially inappropriate medication use by the elderly.

Archives of Internal Medicine, 157, 1531-1536.

Bonk, M.E., Krown, H., Matuszewski, K., & Oinonen, M. (2006). Potentially inappropriate medications in hospitalized senior patients. *American Journal of Health-System Pharmacy*, 63(12), 1161-1165.

Fick, D.M., Cooper, J.W., Wade, W.E., Waller, J.L., Maclean, J.R., & Beers, M.H. (2003). Updating the Beers Criteria for potentially inappropriate medication use in older adults: Results of a US consensus panel of experts. *Archives of Internal Medicine*, 163(22), 2716-2724.

Fu, A.Z., Liu, G.G., & Christensen, D.B. (2004). Inappropriate medication use and health outcomes in the elderly. *JAGS*, 52(11), 1934-1939.

Lau, D.T., Kasper, J.D., Potter, D.E., Lyles, A., & Bennett, R.G. (2005). Hospitalization and death associated with potentially inappropriate medication prescriptions among elderly nursing home residents. *Archives of Internal Medicine*, 165(1), 68-74.

Perri, M. III, Menon, A.M., Deshpande, A.D., Shinde, S.B., Jiang, R., & Cooper, J.W., Cook, C.L., Griffin, S.C., & Lorys, R.A. (2005). Adverse outcomes associated with inappropriate drug use in nursing homes. *Annals of Pharmacotherapy*, 39(3), 405-411.

Zuckerman, I.H., Langenberg, P., Baumgarten, M., Orwig, D., Byrns, P.J., & Simoni-Wastila, L., & Magaziner, J. (2006). Inappropriate drug use and risk of transition to nursing homes among community-dwelling older adults. *Medical care*, 44(8), 722-730.

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Table 1: 2002 Criteria for Potentially Inappropriate Medication Use in Older Adults: Independent of Diagnoses or Conditions

Drug	Concern	Severity Rating (High or Low)
Propoxyphene (Darvon) and combination products (Darvon with ASA, Darvon-N, and Darvocet-N)	Offers few analgesic advantages over acetaminophen, yet has the adverse effects of other narcotic drugs.	Low
Indomethacin (Indocin and Indocin SR)	Of all available nonsteroidal anti-inflammatory drugs, this drug produces the most CNS adverse effects.	High
Pentazocine (Talwin)	Narcotic analgesic that causes more CNS adverse effects, including confusion and hallucinations, more commonly than other narcotic drugs. Additionally, it is a mixed agonist and antagonist.	High
Trimethobenzamide (Tigan)	One of the least effective antiemetic drugs, yet it can cause extrapyramidal adverse effects.	High
Muscle relaxants and antispasmodics: methocarbamol (Robaxin), carisoprodol (Soma), chlorzoxazone (Paraflex), metaxalone (Skelaxin), cyclobenzaprine (Flexeril), and oxybutynin (Ditropan). Do not consider the extended-release Ditropan XL.	Most muscle relaxants and antispasmodic drugs are poorly tolerated by elderly patients, since these cause anticholinergic adverse effects, sedation, and weakness. Additionally, their effectiveness at doses tolerated by elderly patients is questionable.	High
Flurazepam (Dalmane)	This benzodiazepine hypnotic has an extremely long half-life in elderly patients (often days), producing prolonged sedation and increasing the incidence of falls and fracture. Medium- or short-acting benzodiazepines are preferable.	High
Amitriptyline (Elavil), chlorthalidopoxide-amitriptyline (Limbitrol), and perphenazine-amitriptyline (Triavil)	Because of its strong anticholinergic and sedation properties, amitriptyline is rarely the antidepressant of choice for elderly patients.	High
Doxepin (Sinequan)	Because of its strong anticholinergic and sedating properties, doxepin is rarely the antidepressant of choice for elderly patients.	High
Meprobamate (Miltown and Equanil)	This is a highly addictive and sedating anxiolytic. Those using meprobamate for prolonged periods may become addicted and may need to be withdrawn slowly.	High
Doses of short-acting benzodiazepines: doses greater than lorazepam (Ativan), 3 mg; oxazepam (Serax), 60 mg; alprazolam (Xanax), 2 mg; temazepam (Restoril), 15 mg; and triazolam (Halcion), 0.25 mg	Because of increased sensitivity to benzodiazepines in elderly patients, smaller doses may be effective as well as safer. Total daily doses should rarely exceed the suggested maximums.	High
Long-acting benzodiazepines: chlorthalidopoxide (Librium), chlorthalidopoxide-amitriptyline (Limbitrol) clidinium-chlorthalidopoxide (Librax), diazepam (Valium), quazepam (Doral), halazepam (Paxipam), and chlorzatepate (Tranxene)	These drugs have a long half-life in elderly patients (often several days), producing prolonged sedation and increasing the risk of falls and fractures. Short- and intermediate-acting benzodiazepines are preferred if a benzodiazepine is required.	High
Disopyramide (Norpace and Norpace CR)	Of all antiarrhythmic drugs, this is the most potent negative inotrope and therefore may induce heart failure in elderly patients. It is also strongly anticholinergic. Other antiarrhythmic drugs should be used.	High
Digoxin (Lanoxin) (should not exceed >0.125 mg/d except when treating atrial arrhythmias)	Decreased renal clearance may lead to increased risk of toxic effects.	Low
Short-acting dipyrindamole (Persantine). Do not consider the long-acting dipyrindamole (which has better properties than the short-acting in older adults) except with patients with artificial heart valves	May cause orthostatic hypotension.	Low
Methyldopa (Aldomet) and methyldopa-hydrochlorothiazide (Aldonil)	May cause bradycardia and exacerbate depression in elderly patients.	High
Reserpine at doses >0.25 mg	May induce depression, impotence, sedation, and orthostatic hypotension.	Low
Chlorpropamide (Diabinese)	It has a prolonged half-life in elderly patients and could cause prolonged hypoglycemia. Additionally, it is the only oral hypoglycemic agent that causes SIADH.	High
Gastrointestinal antispasmodic drugs: dicyclomine (Bentyl), hyoscyamine (Levsin and Levsinex), propantheline (Pro-Banthine), belladonna alkaloids (Donnatal and others), and clidinium-chlorthalidopoxide (Librax)	GI antispasmodic drugs are highly anticholinergic and have uncertain effectiveness. These drugs should be avoided (especially for long-term use).	High
Anticholinergics and antihistamines: chlorpheniramine (Chlor-Trimeton), diphenhydramine (Benadryl), hydroxyzine (Vistaril and Atarax), cyproheptadine (Periactin), promethazine (Phenergan), triproleamine, dexchlorpheniramine (Polaramine)	All nonprescription and many prescription antihistamines may have potent anticholinergic properties. Nonanticholinergic antihistamines are preferred in elderly patients when treating allergic reactions.	High
Diphenhydramine (Benadryl)	May cause confusion and sedation. Should not be used as a hypnotic, and when used to treat emergency allergic reactions, it should be used in the smallest possible dose.	High
Ergot mesylates (Hydergine) and cyclandelate (Cyclospasmol)	Have not been shown to be effective in the doses studied.	Low
Ferrous sulfate >325 mg/d	Doses >325 mg/d do not dramatically increase the amount absorbed but greatly increase the incidence of constipation.	Low
All barbiturates (except phenobarbital) except when used to control seizures	Are highly addictive and cause more adverse effects than most sedative or hypnotic drugs in elderly patients.	High
Meperidine (Demerol)	Not an effective oral analgesic in doses commonly used. May cause confusion and has many disadvantages to other narcotic drugs.	High
Ticlopidine (Ticlid)	Has been shown to be no better than aspirin in preventing clotting and may be considerably more toxic. Safer, more effective alternatives exist.	High
Ketorolac (Toradol)	Immediate and long-term use should be avoided in older persons, since a significant number have asymptomatic GI pathologic conditions.	High
Amphetamines and anorexic agents	These drugs have potential for causing dependence, hypertension, angina, and myocardial infarction.	High
Long-term use of full-dosage, longer half-life, non-COX-selective NSAIDs: naproxen (Naprosyn, Avapro, and Aleve), oxaprozin (Daypro), and piroxicam (Feldene)	Have the potential to produce GI bleeding, renal failure, high blood pressure, and heart failure.	High
Daily fluoxetine (Prozac)	Long half-life of drug and risk of producing excessive CNS stimulation, sleep disturbances, and increasing agitation. Safer alternatives exist.	High
Long-term use of stimulant laxatives: bisacodyl (Dulcolax), cascara sagrada, and Neoloid except in the presence of opiate analgesic use	May exacerbate bowel dysfunction.	High
Amiodarone (Cordarone)	Associated with QT interval problems and risk of provoking torsades de pointes. Lack of efficacy in older adults.	High
Orphenadrine (Norflex)	Causes more sedation and anticholinergic adverse effects than safer alternatives.	High
Guanethidine (Ismelin)	May cause orthostatic hypotension. Safer alternatives exist.	High
Guanadrel (Hyloril)	May cause orthostatic hypotension.	High
Cyclandelate (Cyclospasmol)	Lack of efficacy.	Low
Isosurpine (Vasodilan)	Lack of efficacy.	Low
Nitrofurantoin (Macrochantin)	Potential for renal impairment. Safer alternatives available.	High
Doxazosin (Cardura)	Potential for hypotension, dry mouth, and urinary problems.	Low
Methyltestosterone (Android, Virilon, and Testrad)	Potential for prostatic hypertrophy and cardiac problems.	High
Thioridazine (Mellaril)	Greater potential for CNS and extrapyramidal adverse effects.	High
Mesoridazine (Sereniti)	CNS and extrapyramidal adverse effects.	High
Short acting nifedipine (Procardia and Adalat)	Potential for hypotension and constipation.	High
Clonidine (Catapres)	Potential for orthostatic hypotension and CNS adverse effects.	Lo
Mineral oil	Potential for aspiration and adverse effects. Safer alternatives available.	High
Cimetidine (Tagamet)	CNS adverse effects including confusion.	Low
Ethacrynic acid (Edecrin)	Potential for hypertension and fluid imbalances. Safer alternatives available.	Low
Desiccated thyroid	Concerns about cardiac effects. Safer alternatives available.	High
Amphetamines (excluding methylphenidate hydrochloride and anorexics)	CNS stimulant adverse effects.	High
Estrogens only (oral)	Evidence of the carcinogenic (breast and endometrial cancer) potential of these agents and lack of cardioprotective effect in older women.	Low

Abbreviations: CNS, central nervous system; COX, cyclooxygenase; GI, gastrointestinal; NSAIDs, nonsteroidal anti-inflammatory drugs; SIADH, syndrome of inappropriate antidiuretic hormone secretion. Reprinted with permission: Fick, D.M., Cooper, J.W., Wade, W.E., Waller, J.L., Maclean, J.R., & Beers, M.H. (2003). Updating the Beers Criteria for potentially inappropriate medication use in older adults: Results of a US consensus panel of experts. Archives of Internal Medicine, 163(22), 2716-2724. Table 1, p. 2720. Evidence Level VI: Expert Opinion. Copyright © 2003, American Medical Association. All Rights reserved.



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Additional Nursing Considerations

Flagging the use of potentially inappropriate medications—sometimes referred to as PIMs—is just one facet of nursing’s role in medication management. The value of nonpharmacologic nursing intervention is often overlooked in discussions about medication management. Best practices in the care of older adults with delirium, dementia, urinary incontinence, and many other conditions include nonpharmacologic strategies.¹ Nondrug interventions may complement pharmacologic treatment or make possible a reduced dose or duration of pharmacologic treatment for some conditions.

Medication-related risks are not limited to inappropriate medication use. Drugs that require frequent monitoring to prevent toxicity (for example, antidiabetic agents, warfarin, several antiepileptics, digoxin, theophylline, and lithium) are implicated in more than 50% of adverse drug reactions requiring hospitalization in older adults.² Polypharmacy, the administration of many drugs at the same time, is a common finding among older adults. A recent paper found that for a hypothetical 79-year-old woman with hypertension, type 2 diabetes mellitus, osteoarthritis, chronic obstructive pulmonary disease, and osteoporosis, following disease-specific best practice guidelines would result in the prescription of at least 12 different medicines.³ This illustrates the challenges of balancing a medication regimen’s risks and benefits, as well as the necessity of looking at the whole person and providing follow-up monitoring for medication-related problems.^{4,5} A mnemonic tool to systematically assist nurses in this process is provided online at <http://links.lww.com/A637>.

How can nurses reduce the risk of problems related to “appropriate” medications? Nurses must also be aware of the need to monitor for toxicities and adverse effects caused by medicines that are considered “appropriate.” Two of the most common adverse drug reactions are hemorrhage related to anticoagu-

lant therapy and delirium in patients taking antipsychotics. A study of 1,247 long-term care residents also found preventable adverse reactions to loop diuretics (such as dehydration, hypokalemia, hyponatremia, and azotemia), opioids (constipation and oversedation), antiplatelet agents (bleeding), and angiotensin-converting enzyme inhibitors (hypokalemia).⁴ Older adults also require attentive monitoring for symptoms of digoxin toxicity (with digoxin therapy), hypoglycemia (with diabetes medications), hypo- and hyperthyroidism (with thyroid medications), and toxicities from anticonvulsants. Risks of constipation and fecal impaction are increased with moderate- or high-dose ferrous sulfate therapy, opioids, and some calcium channel blockers, especially during periods of illness, hospitalization, and reduced mobility.⁶ Nurses need to monitor dosing of medications excreted primarily by the kidneys (such as digoxin and lithium) because many older adults have reduced creatinine clearance. Other important considerations include assessment of the impact of medications on adherence, financial condition, and function.

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tigo; brompheniramine, an over-the-counter cough medication; and diphenhydramine, an over-the-counter sleep aid. Since he has benign prostatic hypertrophy, she’s concerned that these medications might increase urinary retention. Also, he recently discontinued his tamsulosin. He has not yet voided since being admitted this morning. The physician agrees and says he’s also concerned about the effect these medications might have on Mr. Flores’s cognitive function because of his mild cognitive impairment.

The nurse adds that the pharmacist also has questions about the indication for using melizine and has suggested that Mr. Flores may be using diphenhydramine as a sleep aid to counteract the effects of

pseudoephedrine, a central nervous system stimulant in his over-the-counter cough medication; the cough medication may also be elevating his blood pressure, which was 160/84 mmHg on admission.

The physician notes that the information the nurse gathered about Mr. Flores’s self-care practices, such as occasionally skipping his Lasix and using over-the-counter medications for indigestion, also suggest that Mr. Flores’s heart failure may be exacerbated by fluid retention.

The nurse asks, “How often should we be monitoring his digoxin levels, serum creatinine, and electrolytes?”

The physician replies that the patient’s potassium



Watch It

Go to <http://links.lww.com/A266> to watch a nurse use the Beers criteria to assess medication use in a hospitalized older adult. Then watch the health care team plan interventions.

View this video in its entirety and then apply for CE credit at www.nursingcenter.com/AJNolderadults; click on the *How to Try This* series link. All videos are free and in a downloadable format (not streaming video) that requires Windows Media Player.

and digoxin levels were normal at his office visit last month, but these should be checked again because the serum creatinine is rising and new medications have been added.

After the physician confers with Mr. and Ms. Flores, as well as with Mr. Flores's cardiologist, urologist, and psychiatrist, a plan is put in place to improve medication safety. To reduce the number of anticholinergic medications, meclizine is discontinued, and over-the-counter medications are avoided. The physician orders inhaled bronchodilators and inhaled steroids to treat Mr. Flores's cough and airway reactivity. Although the desipramine may have anticholinergic adverse effects, the physician and the psychiatrist decide to continue its use because it's been effective in treating Mr. Flores's depression. They will consider having Mr. Flores taper off the desipramine or substituting another antidepressant at some point. Tamsulosin is also reordered and gradually reintroduced, and the nurse carefully monitors Mr. Flores for orthostatic hypotension. A plan to taper the verapamil is instituted. If a calcium channel blocker is still needed to manage hypertension after the tamsulosin has reached therapeutic levels, an alternative long-acting agent that is less constipating will be used.

The nurse recommends a stool softener and a fiber-and-prune-juice mixture to be added to the daily regimen and includes a plan to help Mr. Flores increase his physical activity and maintain adequate fluid intake to prevent constipation. She also includes a plan to monitor him for urinary retention and orthostatic hypotension and to notify the physician immediately if these should occur. She shares this information with all shifts and adds a problem to Mr. Flores's interdisciplinary problem list: "high risk for adverse medication events related to renal and cognitive impairment and potential drug-disease interactions." She posts copies of the Beers criteria near the medication administration area.

OUTCOMES

Education is one of the most important components of nursing interventions to reduce medication-related adverse effects. Ensuring that the patient and caregivers know the name of the medication, its purpose, when and how to take it (including the correct dose), and when to call a primary care provider are all essential outcomes in the nursing care process. Immediately after hospital discharge, patients are at especially high risk for medication-related adverse effects; therefore, anticipatory guidance and discharge planning are needed to reduce adverse outcomes.²⁶ Home health nursing visits may be needed to reinforce health education and assess self-care capacity in the actual home environment. To watch the portion of the online video in which experts discuss the importance of understanding age-related medication issues, go to <http://links.lww.com/A268>.

Optimizing nonpharmacologic care may allow dosage or medication reduction and decrease medication-related risks. Mr. Flores's back pain is treated initially with nonpharmacologic measures, including physical therapy, and acetaminophen. These steps prevent the fecal impaction, acute urinary retention, and delirium that could result from medication use. Benzodiazepines (which may increase the risk of falling) are not prescribed. Mr. and Ms. Flores are looking forward to his discharge.

Just before discharge, the nurse speaks again with Mr. and Ms. Flores. "Here's your updated medication list, with both the generic and the brand names listed, as well as the dose, frequency, and reason for use of each medicine, and special instructions. Do you have any questions?"

Ms. Flores says, "Our daughter bought a new medication box to organize the pills and help us remember what to take when. I just wish he didn't have to take so many!"

The nurse replies, "I'll ask the physician to speak with you about that. It's important that you discuss any medication changes with your primary care provider or pharmacist, even when you take over-the-counter medicines. Every six to 12 months, the medication plan should be reviewed to make sure the benefits are outweighing the risks and the medication is doing what it should do. And it may be that you can reduce the number of medications then. Would you like more information about what you can do to prevent constipation, reduce pain, and promote sleep without taking a medication?"

CHALLENGES

As illustrated in the Flores case, the Beers criteria and related assessment tools can help guide nursing assessment and intervention and facilitate collabora-



Online Resources

ration with the primary prescriber, clinical pharmacist, and other prescribers. Using these resources properly requires good communication skills and teamwork. Consultation with geriatricians and geriatric pharmacists, if available, is recommended. The plan of care must be continuously updated as the patient's condition changes.

However, there are important medication-related issues that the Beers criteria instrument doesn't address, such as the cost of medications, medication adherence, and undertreatment. The instrument requires the nurse to be familiar with drug classes such as anticholinergics and benzodiazepines and to be aware of ingredients in over-the-counter medications. The pharmacist can assist by providing reference materials with this information. The nurse may want to work with the pharmacy and therapeutics committee and quality improvement team to advocate the adoption of systemwide medication-safety education, easy-to-use reference materials, and electronic medical records that can alert clinicians to high-risk situations or monitoring needs.

CONSIDER THIS

What's the evidence for using the Beers criteria with older adults? Because this is not an instrument with standardized scoring, the usual reliability testing is not relevant. What confidence should clinicians have in using the criteria to identify patients at risk of medication-related adverse outcomes? The current Beers criteria tables are based on a literature review, consensus process, and on criteria originally created in 1991 and updated in 1997 and 2002. A review of the evidence supported designating most of the medications identified in the 1997 criteria "inappropriate" for use in older adults.²⁷ Research on the 2002 Beers criteria has not included the disease-dependent list (Beers II).²⁸

Beers I has been used in epidemiologic and intervention studies to describe and mitigate medication-related risk. A recent study by Fick and colleagues examined a Medicare managed care population to compare outcomes in community-dwelling older adults receiving one or more potentially inappropriate medications (identified on Beers I) and older adults not receiving any potentially inappropriate medications.¹⁵ The prevalence of drug-related problems within 30 days of starting a new prescription was 14.3% in the first group and 4.7% in the comparison group ($P < 0.01$), suggesting that the criteria can identify people at risk for adverse responses to medications.

But some of the adverse outcomes related to potentially inappropriate medications may be influenced by the underlying condition or reason for the drug prescription. A 2007 analysis of 19 studies

For more information on high-risk medications in the elderly and other geriatric assessment tools and best practices, go to www.ConsultGerRN.org—the clinical Web site of the Hartford Institute for Geriatric Nursing, New York University College of Nursing, and the Nurses Improving Care for Healthsystem Elders (NICHE) program. The site presents authoritative clinical products, resources, and continuing education opportunities that support individual nurses and practice settings.

Visit the Hartford Institute site, www.hartfordign.org, and the NICHE site, www.nicheprogram.org, for additional products and resources.

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using Beers I concluded that there is insufficient evidence to link the tool with outcomes other than hospitalization for community-dwelling older adults.²⁸ Go to <http://links.lww.com/A635>  for more information on the psychometric properties of the Beers criteria. ▼

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