From THE AMERICAN GERIATRICS SOCIETY

AGS 2015 BEERS CRITERIA

This guide has been developed as a tool to assist healthcare providers in improving medication safety in older adults. The role of this guide is to *inform* clinical decision-making, research, training, quality measures and regulations concerning the prescribing of medications for older adults to improve safety and quality of care. It is based on *The AGS 2015 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults.*

Originally conceived of in 1991 by the late Mark Beers, MD, a geriatrician, the Beers Criteria catalogues medications that cause side effects in the elderly due to the physiologic changes of aging. In 2011, the AGS sponsored its firstupdateofthecriteria,assemblingateamofexperts and using an enhanced, evidence-based methodology. In 2015, the AGS again funded the development of the Updated Criteria using an evidence-based methodology and rating each Criterion (quality of evidence and strength of evidence) using the American College of Physicians' Guideline Grading System, which is based on the GRADE scheme developed by Guyatt et al. The full document, along with accompanying resources can be viewed in their entirety online at geriatricscareonline.org.

The Beers Criteria for Potentially Inappropriate Medication Use in Older Adults, commonly called the Beers List, are guidelines for healthcare professionals to help improve the safety of prescribing medications for older adults.

INTENDED USE

The goal of this guide is to improve care of older adults by reducing their exposure to Potentially Inappropriate Medications (PIMS).

- This should be viewed as a guideline for identifying medications for which the risks of their use in older adults outweigh the benefits.
- These criteria are not meant to be applied in a punitive manner.
- This list is not meant to supersede clinical judgment or an individual patient's values and needs. Prescribing and managing disease conditions should be individualized and involve shared decision-making.
- These criteria also underscore the importance of using a team approach to prescribing and the use of non-pharmacological approaches and of having economic and organizational incentives for this type of model.
- Two companion pieces were developed for the 2015 update. The first addresses the best way for patients, providers, and health systems to use (and not use) the 2015 AGS Beers Criteria. The second is a list of alternative medications included in the current use of High-Risk Medications in the Elderly and Potentially Harmful Drug-Disease Interactions in the Elderly quality measures. Both pieces can be found on geriatricscareonline.org.

The criteria are not applicable in all circumstances (i.e. patient's receiving palliative and hospice care). If a provider is not able to find an alternative and chooses to continue to use a drug on this list in an individual patient, designation of the medication as potentially inappropriate can serve as a reminder for close monitoring so that adverse drug effects can be incorporated into the electronic health record and prevented or detected early.

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TABLE 1. 2015 American Geriatrics Society Beers Criteria for Potentially Inappropriate Medication Use in Older Adults

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *Quality of Evidence (QE), Strength of Recommendation (SR)*
Anticholinergics	
First-generation antihistamines: ■ Brompheniramine ■ Carbinoxamine ■ Chlorpheniramine ■ Clemastine ■ Cyproheptadine ■ Dexbrompheniramine ■ Dexchlorpheniramine ■ Dimenhydrinate ■ Diphenhydramine (oral) ■ Doxylamine ■ Hydroxyzine ■ Meclizine ■ Promethazine ■ Triprolidine	***Avoid*** Highly anticholinergic; clearance reduced with advanced age, and tolerance develops when used as hypnotic; risk of confusion, dry mouth, constipation, and other anticholinergic effects or toxicity Use of diphenhydramine in situations such as acute treatment of severe allergic reaction may be appropriate *QE = Moderate; SR = Strong*
Antiparkinsonian agents ■ Benztropine (oral) ■ Trihexyphenidyl	***Avoid*** Not recommended for prevention of extrapyramidal symptoms with antipsychotics; more-effective agents available for treatment of Parkinson disease *QE = Moderate; SR = Strong*
Antispasmodics: ■ Atropine (excludes ophthalmic) ■ Belladonna alkaloids ■ Clidinium-Chlordiazepoxide ■ Dicyclomine ■ Hyoscyamine ■ Propantheline ■ Scopolamine	***Avoid*** Highly anticholinergic, uncertain effectiveness *QE = Moderate; SR = Strong*
Antithrombotics	
■ Dipyridamole, oral short-acting (does not apply to the extended-release combination with aspirin)	***Avoid*** May cause orthostatic hypotension; more effective alternatives available; IV form acceptable for use in cardiac stress testing *QE = Moderate; SR = Strong*
■ Ticlopidine	***Avoid*** Safer, effective alternatives available *QE = Moderate; SR = Strong*

CNS=central nervous system; NSAIDs=nonsteroidal anti-inflammatory drugs; SIADH, syndrome of inappropriate antidiuretic hormone.

Table 1 *(continued on page 3)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Anti-infective	
■ Nitrofurantoin	***Avoid in individuals with creatinine clearance <30 mL/min or for long-term suppression of bacteria*** Potential for pulmonary toxicity, hepatoxicity, and peripheral neuropathy, especially with long-term use; safer alternatives available *QE = Low; SR = Strong*
Cardiovascular	
Peripheral alpha-1 blockers ■ Doxazosin ■ Prazosin ■ Terazosin	*Avoid use as an antihypertensive* High risk of orthostatic hypotension; not recommended as routine treatment for hypertension; alternative agents have superior risk/benefit profile *QE = Moderate; SR = Strong*
Central alpha agonists ■ Clonidine ■ Guanabenz ■ Guanfacine ■ Methyldopa ■ Reserpine (>0.1 mg/d)	***Avoid clonidine as first-line antihypertensive. Avoid others as listed*** High risk of adverse CNS effects; may cause bradycardia and orthostatic hypotension; not recommended as routine treatment for hypertension *QE = Low; SR = Strong*
Disopyramide	***Avoid*** Disopyramide is a potent negative inotrope and therefore may induce heart failure in older adults; strongly anticholinergic; other antiarrhythmic drugs preferred *QE = Low; SR = Strong*
Dronedarone	***Avoid in individuals with permanent atrial fibrillation or severe or recently decompensated heart failure*** Worse outcomes have been reported in patients taking dronedarone who have permanent atrial fibrillation or severe or recently decompensated heart failure *QE = High; SR = Strong*
Digoxin	***Avoid as first-line therapy for atrial fibrillation. Avoid as first-line therapy for heart failure. If used for atrial fibrillation or heart failure, avoid dosages >0.125 mg/d*** Use in atrial fibrillation: should not be used as a first-line agent in atrial fibrillation, because more-effective alternatives exist and it may be associated with increased mortality Use in heart failure: questionable effects on risk of hospitalization and may be associated with increased mortality in older adults with heart failure; in heart failure, higher dosages not associated with additional benefit and may increase risk of toxicity Decreased renal clearance of digoxin may lead to increased risk of toxic effects; further dose reduction may be necessary in those with Stage 4 or 5 chronic kidney disease. *QE = Atrial fibrillation: moderate. Heart failure: low. Dosage >0.125 mg/d: moderate; SR = Atrial fibrillation: strong. Heart failure: strong. Dosage >0.125 mg/d: strong*

Table 1 *(continued on page 4)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Nifedipine, immediate release	***Avoid*** Potential for hypotension; risk of precipitating myocardial ischemia *QE = High; SR = Strong*
Amiodarone	***Avoid amiodarone as first-line therapy for atrial fibrillation unless the patient has heart failure or substantial left ventricular hypertrophy*** Amiodarone is effective for maintaining sinus rhythm but has greater toxicities than other antiarrhythmics used in atrial fibrillation; it may be reasonable first-line therapy in patients with concomitant heart failure or substantial left ventricular hypertrophy if rhythm control is preferred over rate control *QE = High; SR = Strong*
Central nervous system	
Antidepressants, alone or in combination ■ Amitriptyline ■ Amoxapine ■ Clomipramine ■ Desipramine ■ Doxepin >6 mg/d ■ Imipramine ■ Nortriptyline ■ Paroxetine ■ Protriptyline ■ Trimipramine	***Avoid*** Highly anticholinergic, sedating, and cause orthostatic hypotension; safety profile of low-dose doxepin (≤6 mg/d) comparable with that of placebo *QE = High; SR = Strong*
Antipsychotics, first- (conventional) and second- (atypical) generation	***Avoid, except for schizophrenia, bipolar disorder, or short-term use as antiemetic during chemotherapy*** Increased risk of cerebrovascular accident (stroke) and greater rate of cognitive decline and mortality in persons with dementia Avoid antipsychotics for behavioral problems of dementia and/or delirium unless nonpharmacological options (e.g., behavioral interventions) have failed or are not possible ***and*** the older adult is threatening substantial harm to self or others *QE = Moderate; SR = Strong*
Barbiturates ■ Amobarbital ■ Butabarbital ■ Butalbital ■ Mephobarbital ■ Pentobarbital ■ Phenobarbital ■ Secobarbital	***Avoid*** High rate of physical dependence, tolerance to sleep benefits, greater risk of overdose at low dosages *QE = High; SR = Strong*

Table 1 *(continued on page 5)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Benzodiazepines *Short- and intermediate-acting:* ■ Alprazolam ■ Estazolam ■ Lorazepam ■ Oxazepam ■ Temazepam ■ Triazolam *Long-acting:* ■ Clorazepate ■ Chlordiazepoxide (alone or in combination with amitriptyline or clidinium) ■ Clonazepam ■ Diazepam ■ Flurazepam ■ Quazepam	***Avoid*** Older adults have increased sensitivity to benzodiazepines and decreased metabolism of long-acting agents; in general, all benzodiazepines increase risk of cognitive impairment, delirium, falls, fractures, and motor vehicle crashes in older adults May be appropriate for seizure disorders, rapid eye movement sleep disorders, benzodiazepine withdrawal, ethanol withdrawal, severe generalized anxiety disorder, and periprocedural anesthesia *QE = Moderate; SR = Strong*
Meprobamate	***Avoid*** High rate of physical dependence; very sedating *QE = Moderate; SR = Strong*
Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics ■ Eszopiclone ■ Zolpidem ■ Zaleplon	***Avoid*** Benzodiazepine-receptor agonists have adverse events similar to those of benzodiazepines in older adults (e.g., delirium, falls, fractures); increased emergency room visits/hospitalizations; motor vehicle crashes; minimal improvement in sleep latency and duration *QE = Moderate; SR = Strong*
Ergoloid mesylates (dehydrogenated ergot alkaloids) Isoxsuprine	***Avoid*** Lack of efficacy *QE = High; SR = Strong*
Endocrine	
Androgens ■ Methyltestosterone ■ Testosterone	***Avoid unless indicated for confirmed hypogonadism with clinical symptoms*** Potential for cardiac problems; contraindicated in men with prostate cancer *QE = Moderate; SR = Weak*
Desiccated thyroid	***Avoid*** Concerns about cardiac effects; safer alternatives available *QE = Low; SR = Strong*

Table 1 *(continued on page 6)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Estrogens with or without progestins	***Avoid oral and topical patch. Vaginal cream or tablets: acceptable to use low-dose intravaginal estrogen for management of dyspareunia, lower urinary tract infections, and other vaginal symptoms*** Evidence of carcinogenic potential (breast and endometrium); lack of cardioprotective effect and cognitive protection in older women. Evidence indicates that vaginal estrogens for the treatment of vaginal dryness are safe and effective; women with a history of breast cancer who do not respond to nonhormonal therapies are advised to discuss the risk and benefits of low-dose vaginal estrogen (dosages of estradiol <25 mcg twice weekly) with their health care provider *QE = Oral and patch: high. Vaginal cream or tablets: moderate.; SR = Oral and patch: strong. Topical vaginal cream or tablets: weak*
Growth hormone	***Avoid, except as hormone replacement following pituitary gland removal*** Impact on body composition is small and associated with edema, arthralgia, carpal tunnel syndrome, gynecomastia, impaired fasting glucose *QE = High; SR = Strong*
Insulin, sliding scale	***Avoid*** Higher risk of hypoglycemia without improvement in hyperglycemia management regardless of care setting; refers to sole use of short- or rapid-acting insulins to manage or avoid hyperglycemia in absence of basal or long-acting insulin; does not apply to titration of basal insulin or use of additional short- or rapid-acting insulin in conjunction with scheduled insulin (ie, correction insulin) *QE = Moderate; SR = Strong*
Megestrol	***Avoid*** Minimal effect on weight; increases risk of thrombotic events and possibly death in older adults *QE = Moderate; SR = Strong*
Sulfonylureas, long-duration ■ Chlorpropamide ■ Glyburide	***Avoid*** Chlorpropamide: prolonged half-life in older adults; can cause prolonged hypoglycemia; causes SIADH Glyburide: higher risk of severe prolonged hypoglycemia in older adults *QE = High; SR = Strong*
Gastrointestinal	
Metoclopramide	***Avoid, unless for gastroparesis*** Can cause extrapyramidal effects, including tardive dyskinesia; risk may be greater in frail older adults *QE = Moderate; SR = Strong*
Mineral oil, given orally	***Avoid*** Potential for aspiration and adverse effects; safer alternatives available *QE = Moderate; SR = Strong*

Table 1 *(continued on page 7)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Proton-pump inhibitors	***Avoid scheduled use for >8 weeks unless for high-risk patients (e.g., oral corticosteroids or chronic NSAID use), erosive esophagitis, Barrett's esophagitis, pathological hypersecretory condition, or demonstrated need for maintenance treatment (e.g., due to failure of drug discontinuation trial or H_2 blockers)*** Risk of *C difficile* infection and bone loss and fractures *QE = High; SR = Strong*
Pain medications	
Meperidine	***Avoid, especially in those with chronic kidney disease*** Not effective oral analgesic in dosages commonly used; may have higher risk of neurotoxicity, including delirium, than other opioids; safer alternatives available *QE = Moderate; SR = Strong*
Non-cyclooxygenase-selective NSAIDs, oral: ■ Aspirin >325 mg/d ■ Diclofenac ■ Diflunisal ■ Etodolac ■ Fenoprofen ■ Ibuprofen ■ Ketoprofen ■ Meclofenamate ■ Mefenamic acid ■ Meloxicam ■ Nabumetone ■ Naproxen ■ Oxaprozin ■ Piroxicam ■ Sulindac ■ Tolmetin	***Avoid chronic use, unless other alternatives are not effective and patient can take gastroprotective agent (proton-pump inhibitor or misoprostol)*** Increased risk of gastrointestinal bleeding or peptic ulcer disease in high-risk groups, including those aged >75 or taking oral or parenteral corticosteroids, anticoagulants, or antiplatelet agents; use of proton-pump inhibitor or misoprostol reduces but does not eliminate risk. Upper gastrointestinal ulcers, gross bleeding, or perforation caused by NSAIDs occur in approximately 1% of patients treated for 3–6 months and in ~2–4% of patients treated for 1 year; these trends continue with longer duration of use *QE = Moderate; SR = Strong*
■ Indomethacin ■ Ketorolac, includes parenteral	***Avoid*** Indomethacin is more likely than other NSAIDs to have adverse CNS effects. Of all the NSAIDs, indomethacin has the most adverse effects. Increased risk of gastrointestinal bleeding/peptic ulcer disease, and acute kidney injury in older adults *QE = Moderate; SR = Strong*
Pentazocine	***Avoid*** Opioid analgesic that causes CNS adverse effects, including confusion and hallucinations, more commonly than other opioid analgesic drugs; is also a mixed agonist and antagonist; safer alternatives available *QE = Low; SR = Strong*
Skeletal muscle relaxants ■ Carisoprodol ■ Chlorzoxazone ■ Cyclobenzaprine ■ Metaxalone ■ Methocarbamol ■ Orphenadrine	***Avoid*** Most muscle relaxants poorly tolerated by older adults because some have anticholinergic adverse effects, sedation, increased risk of fractures; effectiveness at dosages tolerated by older adults questionable *QE = Moderate; SR = Strong*
Genitourinary	
Desmopressin	***Avoid for treatment of nocturia or nocturnal polyuria*** High risk of hyponatremia; safer alternative treatments *QE = Moderate; SR = Strong*

TABLE 2. 2015 American Geriatrics Society Beers Criteria for Potentially Inappropriate Medication Use in Older Adults Due to Drug–Disease or Drug–Syndrome Interactions That May Exacerbate the Disease or Syndrome

Disease or Syndrome	Drug(s)	***Recommendation,*** Rationale, *Quality of Evidence (QE), Strength of Recommendation (SR)*
Cardiovascular		
Heart failure	NSAIDs and COX-2 inhibitors Nondihydropyridine CCBs (diltiazem, verapamil)—avoid only for heart failure with reduced ejection fraction Thiazolidinediones (pioglitazone, rosiglitazone) Cilostazol Dronedarone (severe or recently decompensated heart failure)	***Avoid*** Potential to promote fluid retention and exacerbate heart failure *QE = NSAIDs: moderate. CCBs: moderate. Thiazolidinediones: high. Cilostazol: low. Dronedarone: high; SR = Strong*
Syncope	Acetylcholinesterase inhibitors (AChEIs) Peripheral alpha-1 blockers ■ Doxazosin ■ Prazosin ■ Terazosin Tertiary TCAs ■ Chlorpromazine ■ Thioridazine ■ Olanzapine	***Avoid*** Increases risk of orthostatic hypotension or bradycardia *QE = Peripheral alpha-1 blockers: high. TCAs, AChEIs, antipsychotics: moderate; SR = AChEIs, TCAs: strong. Peripheral alpha-1 blockers, antipsychotics: weak*
Central nervous system		
Chronic seizures or epilepsy	Bupropion Chlorpromazine Clozapine Maprotiline Olanzapine Thioridazine Thiothixene Tramadol	***Avoid*** Lowers seizure threshold; may be acceptable in individuals with well-controlled seizures in whom alternative agents have not been effective *QE = Low; SR = Strong*
Delirium	Anticholinergics* Antipsychotics Benzodiazepines Chlorpromazine Corticosteroids[a] H_2-receptor antagonists ■ Cimetidine ■ Famotidine ■ Nizatidine ■ Ranitidine Meperidine Sedative hypnotics	***Avoid*** Avoid in older adults with or at high risk of delirium because of potential of inducing or worsening delirium Avoid antipsychotics for behavioral problems of dementia and/or delirium unless nonpharmacological options (e.g., behavioral interventions) have failed or are not possible ***and*** the older adult is threatening substantial harm to self or others. Antipsychotics are associated with greater risk of cerebrovascular accident (stroke) and mortality in persons with dementia *QE = Moderate; SR = Strong*

Table 2 *(continued on page 9)*

Table 2 Continued

Disease or Syndrome	Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Dementia or cognitive impairment	Anticholinergics* Benzodiazepines H_2-receptor antagonists Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics ■ Eszopiclone ■ Zolpidem ■ Zaleplon Antipsychotics, chronic and as-needed use	***Avoid*** Avoid due to adverse CNS effects Avoid antipsychotics for behavioral problems of dementia and/or delirium unless nonpharmacological options (e.g., behavioral interventions) have failed or are not possible ***and*** the older adult is threatening substantial harm to self or others. Antipsychotics are associated with greater risk of cerebrovascular accident (stroke) and mortality in persons with dementia *QE = Moderate; SR = Strong*
History of falls or fractures	Anticonvulsants Antipsychotics Benzodiazepines Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics ■ Eszopiclone ■ Zaleplon ■ Zolpidem TCAs SSRIs Opioids	***Avoid unless safer alternatives are not available; avoid anticonvulsants except for seizure and mood disorders. Opioids: avoid, excludes pain management due to recent fractures or joint replacement*** May cause ataxia, impaired psychomotor function, syncope, additional falls; shorter-acting benzodiazepines are not safer than long-acting ones If one of the drugs must be used, consider reducing use of other CNS-active medications that increase risk of falls and fractures (ie, anticonvulsants, opioid-receptor agonists, antipsychotics, antidepressants, benzodiazepine-receptor agonists, other sedatives/hypnotics) and implement other strategies to reduce fall risk *QE = High. Opioids: Moderate; SR = Strong. Opioids: Strong*
Insomnia	Oral decongestants ■ Pseudoephedrine ■ Phenylephrine Stimulants ■ Amphetamine ■ Armodafinil ■ Methylphenidate ■ Modafinil ■ Theobromines ■ Theophylline ■ Caffeine	***Avoid*** CNS stimulant effects *QE = Moderate; SR = Strong*

*See Table 7 in full criteria available on www.geriatricscareonline.org.

Table 2 *(continued on page 10)*

Table 2 Continued

Disease or Syndrome	Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Parkinson disease	All antipsychotics (except aripiprazole, quetiapine, clozapine) Antiemetics ■ Metoclopramide ■ Prochlorperazine ■ Promethazine	***Avoid*** Dopamine-receptor antagonists with potential to worsen parkinsonian symptoms Quetiapine, aripiprazole, clozapine appear to be less likely to precipitate worsening of Parkinson disease *QE = Moderate; SR = Strong*
Gastrointestinal		
History of gastric or duodenal ulcers	Aspirin (>325 mg/d) Non-COX-2 selective NSAIDs	***Avoid unless other alternatives are not effective and patient can take gastroprotective agent (ie, proton-pump inhibitor or misoprostol)*** May exacerbate existing ulcers or cause new/additional ulcers *QE = Moderate; SR = Strong*
Kidney/Urinary tract		
Chronic kidney disease Stages IV or less (creatinine clearance <30 mL/min)	NSAIDs (non-COX and COX-selective, oral and parenteral)	***Avoid*** May increase risk of acute kidney injury and further decline of renal function *QE = Moderate; SR = Strong*
Urinary incontinence (all types) in women	Estrogen oral and transdermal (excludes intravaginal estrogen) Peripheral Alpha-1 blockers ■ Doxazosin ■ Prazosin ■ Terazosin	***Avoid in women*** Aggravation of incontinence *QE = Estrogen: High. Peripheral alpha-1 blockers: Moderate; SR = Estrogen: Strong. Peripheral alpha-1 blockers: Strong*
Lower urinary tract symptoms, benign prostatic hyperplasia	Strongly anticholinergic drugs, except antimuscarinics for urinary incontinence.*	***Avoid in men*** May decrease urinary flow and cause urinary retention *QE = Moderate; SR = Strong*

[a]excludes inhaled and topical forms. Oral and parenteral corticosteroids may be required for conditions such as exacerbations of COPD but should be prescribed in the lowest effective dose and for the shortest possible duration.

CCB=calcium channel blocker; AChEI=acetylcholinesterase inhibitor; CNS=central nervous system; COX=cyclooxygenase; NSAIDs=nonsteroidal antiinflammatory drug; TCAs=tricyclic antidepressant.

Table 2 *(continued on page 11)*

TABLE 3. 2015 American Geriatrics Society Beers Criteria for Potentially Inappropriate Medications to Be Used with Caution in Older Adults

Drug(s)	***Recommendation,*** Rationale, *Quality of Evidence* (*QE*), *Strength of Recommendation* (*SR*)
Aspirin for primary prevention of cardiac events	**Use with caution in adults ≥80 years old** Lack of evidence of benefit versus risk in adults ≥80 years old *QE = Low; SR = Strong*
Dabigatran	**Use with caution in adults ≥75 years old and in patients with CrCl <30 mL/min** Increased risk of gastrointestinal bleeding compared with warfarin and reported rates with other target-specific oral anticoagulants in adults ≥75 years old; lack of evidence of efficacy and safety in individuals with CrCl <30 mL/min *QE = Moderate; SR = Strong*
Prasugrel	**Use with caution in adults aged ≥75** Increased risk of bleeding in older adults; benefit in highest-risk older adults (e.g., those with prior myocardial infarction or diabetes mellitus) may offset risk *QE = Moderate; SR = Weak*
Antipsychotics Diuretics Carbamazepine Carboplatin Cyclophosphamide Cisplatin Mirtazapine Oxcarbazepine SNRIs SSRIs TCAs Vincristine	**Use with caution** May exacerbate or cause SIADH or hyponatremia; monitor sodium level closely when starting or changing dosages in older adults *QE = Moderate; SR = Strong*
Vasodilators	**Use with caution.** May exacerbate episodes of syncope in individuals with history of syncope *QE = Moderate; SR = Weak*

CrCl= creatinine clearance; SNRIs = Serotonin-nonrepinephrine reuptake inhitibors; SSRIs = Selective serotonin reuptake inhitibors; TCA=tricyclic antidepressant.

TABLE 4. 2015 American Geriatrics Society Beers Criteria for Potentially Clinically Important Non-anti-infective Drug–Drug Interactions That Should Be Avoided in Older Adults

Object Drug and Class	Interacting Drug and Class	***Recommendation,*** Risk Rationale, *Quality of Evidence* (*QE*), *Strength of Recommendation* (*SR*)
ACEIs	Amiloride or triamterene	***Avoid routine use; reserve for patients with demonstrated hypokalemia while taking an ACEI*** Increased risk of hyperkalemia *QE = Moderate; SR = Strong*
Anticholinergic	Anticholinergic	***Avoid, minimize number of anticholinergic drugs*** Increased risk of cognitive decline *QE = Moderate; SR = Strong*
Antidepressants (ie, TCAs and SSRIs)	≥2 other CNS-active drugs[a]	***Avoid total of ≥3 CNS-active drugs[a]; minimize number of CNS-active drugs*** Increased risk of falls *QE = Moderate; SR = Strong*
Antipsychotics	≥2 other CNS-active drugs[a]	***Avoid total of ≥3 CNS-active drugs[a]; minimize number of CNS active drugs*** Increased risk of falls *QE = Moderate; SR = Strong*
Benzodiazepines and nonbenzodiazepine, benzodiazepine receptor agonist hypnotics	≥2 other CNS-active drugs[a]	***Avoid total of ≥3 CNS-active drugs[a]; minimize number of CNS active drugs*** Increased risk of falls and fractures *QE = High; SR = Strong*
Corticosteroids, oral or parenteral	NSAIDs	***Avoid; if not possible, provide gastrointestinal protection*** Increased risk of peptic ulcer disease or gastrointestinal bleeding *QE = Moderate; SR = Strong*
Lithium	ACEIs	***Avoid, monitor lithium concentrations*** Increased risk of lithium toxicity *QE = Moderate; SR = Strong*
Lithium	Loop diuretics	***Avoid, monitor lithium concentrations*** Increased risk of lithium toxicity *QE = Moderate; SR = Strong*
Opioid receptor agonist analgesics	≥2 other CNS-active drugs[a]	***Avoid total of ≥3 CNS-active drugs[a]; minimize number of CNS drugs*** Increased risk of falls *QE = High; SR = Strong*
Peripheral Alpha-1 blockers	Loop diuretics	***Avoid in older women, unless conditions warrant both drugs*** Increased risk of urinary incontinence in older women *QE = Moderate; SR = Strong*
Theophylline	Cimetidine	***Avoid*** Increased risk of theophylline toxicity *QE = Moderate; SR = Strong*
Warfarin	Amiodarone	***Avoid when possible; monitor INR closely*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Warfarin	NSAIDs	***Avoid when possible; if used together, monitor for bleeding closely*** Increased risk of bleeding *QE = High; SR = Strong*

[a]Central nervous system (CNS)-active drugs: antipsychotics; benzodiazepines; nonbenzodiazepine, benzodiazepine receptor agonist hypnotics; tricyclic antidepressants (TCAs); selective serotonin reuptake inhibitors (SSRIs); and opioids.

ACEI = angiotensin-converting enzyme inhibitor; NSAID=nonsteroidal antiinflammatory drug.

TABLE 5. 2015 American Geriatrics Society Beers Criteria for Non-Anti-Infective Medications That Should Be Avoided or Have Their Dosage Reduced with Varying Levels of Kidney Function in Older Adults

Medication Class and Medication	Creatinine Clearance, mL/min, at Which Action Required	***Recommendation,*** Rationale, *Quality of Evidence* (*QE*), *Strength of Recommendation* (*SR*)
Cardiovascular or hemostasis		
Amiloride	<30	***Avoid*** Increased potassium and decreased sodium *QE = Moderate; SR = Strong*
Apixaban	<25	***Avoid*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Dabigatran	<30	***Avoid*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Edoxaban	30–50 <30 or >95	***CrCl 30-50: Reduce dose*** ***CrCl <30 or >95: Avoid*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Enoxaparin	<30	***Reduce dose*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Fondaparinux	<30	***Avoid*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Rivaroxaban	30–50 <30	***CrCl 30-50: Reduce dose*** ***CrCl <30: Avoid*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Spironolactone	<30	***Avoid*** Increased potassium *QE = Moderate; SR = Strong*
Triamterene	<30	***Avoid*** Increased potassium and decreased sodium *QE = Moderate; SR = Strong*
Central nervous system and analgesics		
Duloxetine	<30	***Avoid*** Increased gastrointestinal adverse effects (nausea, diarrhea) *QE = Moderate; SR = Weak*
Gabapentin	<60	***Reduce dose*** CNS adverse effects *QE = Moderate; SR = Strong*

Table 5 *(continued on page 14)*

Table 5 Continued

Medication Class and Medication	Creatinine Clearance, mL/min, at Which Action Required	***Recommendation,*** Rationale, *QE, SR*
Levetiracetam	≤80	***Reduce dose*** CNS adverse effects *QE = Moderate; SR = Strong*
Pregabalin	<60	***Reduce dose*** CNS adverse effects *QE = Moderate; SR = Strong*
Tramadol	<30	***Immediate release: Reduce dose*** ***Extended release: avoid*** CNS adverse effects *QE = Low; SR = Weak*
Gastrointestinal		
Cimetidine	<50	***Reduce dose*** Mental status changes *QE = Moderate; SR = Strong*
Famotidine	<50	***Reduce dose*** Mental status changes *QE = Moderate; SR = Strong*
Nizatidine	<50	***Reduce dose*** Mental status changes *QE = Moderate; SR = Strong*
Ranitidine	<50	***Reduce dose*** Mental status changes *QE = Moderate; SR = Strong*
Hyperuricemia		
Colchicine	<30	***Reduce dose; monitor for adverse effects*** Gastrointestinal, neuromuscular, bone marrow toxicity *QE = Moderate; SR = Strong*
Probenecid	<30	***Avoid*** Loss of effectiveness *QE = Moderate; SR = Strong*

CNS=central nervous system.

The primary target audience is the practicing clinician. The intentions of the criteria include 1) improving the selection of prescription drugs by clinicians and patients; 2) evaluating patterns of drug use within populations; 3) educating clinicians and patients on proper drug usage; and 4) evaluating health-outcome, quality-of-care, cost, and utilization data.