From THE AMERICAN GERIATRICS SOCIETY

A POCKET GUIDE TO THE 2019 AGS 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 2019 AGS 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 older adults due to the physiologic changes of aging. In 2011, the AGS sponsored its first update of the criteria, assembling a team of experts and using an enhanced, evidence-based methodology. Since 2011, the AGS has been the steward of the criteria and has produced updates 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 found in its entirety online at geriatricscareonline.org.

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.
- A companion piece that addresses the best way for patients, providers, and health systems to use (and not use) the AGS Beers Criteria® was also developed. The document can be found on geriatricscareonline.org.

The criteria are not applicable in all circumstances (i.e. patients 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. 2019 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 ■ Pyrilamine ■ 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 ■ Homatropine (excludes ophthalmic) ■ Hyoscyamine ■ Methscopolamine ■ 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*** Rationale: May cause orthostatic hypotension; more effective alternatives available; IV form acceptable for use in cardiac stress testing *QE = Moderate; SR = Strong*

*See also criterion on highly anticholinergic antidepressants

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*** 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 for treatment of hypertension ■ Doxazosin ■ Prazosin ■ Terazosin	***Avoid use as an antihypertensive*** High risk of orthostatic hypotension and associated harms, especially in older adults; not recommended as routine treatment for hypertension; alternative agents have superior risk/benefit profile *QE = Moderate; SR = Strong*
Central-alpha agonists Clonidine for first-line treatment of hypertension Other CNS alpha-agonists ■ Guanabenz ■ Guanfacine ■ Methyldopa ■ Reserpine (>0.1 mg/d)	***Avoid clonidine as first-line antihypertensive. Avoid other CNS alpha-agonists 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*** May induce heart failure in older adults because of potent negative inotropic action; 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*

Table 1 *(continued on page 4)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Digoxin for first-line treatment of atrial fibrillation or of heart failure	***Avoid this rate control agent 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 there are safer and more effective alternatives for rate control supported by high-quality evidence. Use in heart failure: evidence for benefits and harms of digoxin is conflicting and of lower quality; most but not all of the evidence concerns use in heart failure with reduced ejection fraction (HFrEF). There is strong evidence for other agents as first-line therapy to reduce hospitalizations and mortality in adults wiht HFrEF. In heart failure, higher dosages are not associated with additional benefit and may increase 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: Low. Heart failure: Low. Dosage >0.125 mg/d: Moderate; SR = Atrial fibrillation: Strong. Heart failure: Strong. Dosage >0.125 mg/d: Strong*
Nifedipine, immediate release	***Avoid*** Potential for hypotension; risk of precipitating myocardial ischemia *QE = High; SR = Strong*
Amiodarone	***Avoid as first-line therapy for atrial fibrillation unless the patient has heart failure or substantial left ventricular hypertrophy*** Effective for maintaining sinus rhythm but has greater toxicities than other antiarrhythmics used in atrial fibrillation; 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 to that of placebo *QE = High; SR = Strong*

Table 1 *(continued on page 5)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Antipsychotics, first- (conventional) and second- (atypical) generation	***Avoid, except in schizophrenia, bipolar disorder, or for 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 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*
Benzodiazepines *Short- and intermediate-acting:* ■Alprazolam ■Estazolam ■Lorazepam ■Oxazepam ■Temazepam ■Triazolam *Long-acting:* ■Chlordiazepoxide (alone or in combination with amitriptyline or clidinium) ■Clonazepam ■Clorazepate ■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 behavior disorder, benzodiazepine withdrawal, ethanol withdrawal, severe generalized anxiety disorder, and periprocedural anesthesia *QE = Moderate; SR = Strong*
Meprobamate	***Avoid*** High rate of physical dependence; sedating *QE = Moderate; SR = Strong*
Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics (ie, "Z-drugs") ■Eszopiclone ■Zaleplon ■Zolpidem	***Avoid*** Nonbenzodiazepine benzodiazepine-receptor agonist hypnotics (ie, "Z drugs") 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*

Table 1 *(continued on page 6)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
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*
Estrogens with or without progestins	***Avoid systemic estrogen (eg, oral and topical patch). Vaginal cream or vaginal tablets: acceptable to use low-dose intravaginal estrogen for management of dyspareunia, recurrent 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 healthcare 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 for patients rigorously diagnosed by evidence-based criteria with growth hormone deficiency due to an established etiology*** 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 (insulin regimens containing only short- or rapid-acting insulin dosed according to current blood gluclose levels without concurrent use of basal or long-acting insulin)	***Avoid*** Higher risk of hypoglycemia without improvement in hyperglycemia management regardless of care setting; Avoid insulin regimens that include only short- or rapid-acting insulin dosed according to current blood glucose levels without concurrent use of basal or long-acting insulin. This recommendation does not apply to regimens that contain basal insulin or long-acting 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*

Table 1 *(continued on page 7)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Sulfonylureas, long-acting ■ Chlorpropamide ■ Glimeperide ■ Glyburide (also known as glibenclamide)	***Avoid*** Chlorpropamide: prolonged half-life in older adults; can cause prolonged hypoglycemia; causes SIADH Glimepiride and Glyburide: higher risk of severe prolonged hypoglycemia in older adults *QE = High; SR = Strong*
Gastrointestinal	
Metoclopramide	***Avoid, unless for gastroparesis with duration of use not to exceed 12 weeks except in rare cases*** Can cause extrapyramidal effects, including tardive dyskinesia; risk may be greater in frail older adults and with prolonged exposure *QE = Moderate; SR = Strong*
Mineral oil, given orally	***Avoid*** Potential for aspiration and adverse effects; safer alternatives available *QE = Moderate; SR = Strong*
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., because of failure of drug discontinuation trial or H2-receptor antagonists*** Risk of *C difficile* infection and bone loss and fractures *QE = High; SR = Strong*
Pain medications	
Meperidine	***Avoid*** Oral analgesic not effective 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 ~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. Also can increase blood pressure and induce kidney injury. Risks are dose-related. *QE = Moderate; SR = Strong*

Table 1 *(continued on page 8)*

Table 1 Continued

Organ System, Therapeutic Category, Drug(s)	***Recommendation,*** Rationale, *QE, SR*
■ Indomethacin ■ Ketorolac, includes parenteral	***Avoid*** Increased risk of gastrointestinal bleeding/peptic ulcer disease, and acute kidney injury in older adults Indomethacin is more likely than other NSAIDs to have adverse CNS effects. Of all the NSAIDs, indomethacin has the most adverse effects. *QE = Moderate; 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. 2019 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	Avoid: Cilostazol Avoid in heart failure with reduced ejection fraction: Non-dihydropyridine CCBs (diltiazem, verapamil) Use with caution in patients with heart failure who are asymptomatic; avoid in patients with symptomatic heart failure: NSAIDs and COX-2 inhibitors Thiazolidinediones (pioglitazone, rosiglitazone) Dronedarone	***As noted, avoid or use with caution*** Potential to promote fluid retention and/or exacerbate heart failure (NSAIDs and COX-2 inhibitors, non-dihydropyridine CCBs, thiazoildinediones); potential to increase mortality in older adults with heart failure (cilostazol and dronedarone) *QE = Cilostazol: Low Non-dihydropyridine CCBs: Moderate NSAIDs: Moderate COX-2 inhibitors: Low. Thiazolidinediones: High. Dronedarone: High; SR = Strong*

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

[a]May be required to treat concurrent schizophrenia, bipolar disorder, and other selected mental health conditions but should be prescribed in the lowest effective dose and shortest possible duration.

[b]Excludes inhaled and topical forms. Oral and parenteral corticosteroids may be required for conditions such as exacerbation 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; SNRI=serotoninnorepinephrine reuptake inhibitor; SSRI=selective serotonin reuptake inhibitor; TCAs=tricyclic antidepressant.

Table 2 *(continued on page 9)*

Table 2 Continued

Disease or Syndrome	Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Syncope	Acetylcholinesterase inhibitors (AChEIs) Non-selective peripheral alpha-1 blockers (ie, doxazosin, prazosin, terazosin) Tertiary TCAs Antipsychotics ■ Chlorpromazine ■ Thioridazine ■ Olanzapine	***Avoid*** AChEIs cause bradycardia and should be avoided in older adults whose syncope may be due to bradycardia. Non-selective peripheral alpha-1 blockers cause orthostatic blood pressure changes and should be avoided in older adults whose syncope may be due to orthostatic hypotension. Tertiary TCAs and the antipsychotics listed increase the risk of orthostatic hypotension or bradycardia. *QE = AChEIs, TCAs and antipsychotics: High. Non-selective peripheral alpha-1 blockers: High; SR = AChEIs, TCAs: Strong. Non-selective peripheral alpha-1 blockers, antipsychotics: Weak*
Central nervous system		
Delirium	Anticholinergics* Antipsychotics[a] Benzodiazepines Corticosteroids (oral and parenteral)[b] H2-receptor antagonists ■ Cimetidine ■ Famotidine ■ Nizatidine ■ Ranitidine Meperidine Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics: eszopiclone, zaleplon, zolpidem	***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 = H2-receptor antagonists: Low. All others: Moderate; SR = Strong*
Dementia or cognitive impairment	Anticholinergics* Benzodiazepines Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics ■ Eszopiclone ■ Zaleplon ■ Zolpidem Antipsychotics, chronic and as-needed use[a]	***Avoid*** Avoid because of 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*

Table 2 *(continued on page 10)*

Table 2 Continued

Disease or Syndrome	Drug(s)	***Recommendation,*** Rationale, *QE, SR*
History of falls or fractures	Antiepileptics Antipsychotics[a] Benzodiazepines Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics ■ Eszopiclone ■ Zaleplon ■ Zolpidem Antidepressants ■ TCAs ■ SSRIs ■ SNRIs Opioids	***Avoid unless safer alternatives are not available; avoid antiepileptics except for seizure and mood disorders. Opioids: avoid except for pain management in the setting of severe acute pain, eg, 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, antiepileptics, opioid-receptor agonists, antipsychotics, antidepressants, nonbenzodiazepine and benzodiazepine-receptor agonists, other sedatives/hypnotics) and implement other strategies to reduce fall risk. Data for antidepressants are mixed but no compelling evidence that certain antidepressants confer less fall risk than others. *QE = Opioids: Moderate. All others: High; SR = Strong*
Parkinson disease	Antiemetics ■ Metoclopramide ■ Prochlorperazine ■ Promethazine All antipsychotics (except quetiapine, clozapine, pimavanserin)	***Avoid*** Dopamine-receptor antagonists with potential to worsen parkinsonian symptoms Exceptions: Pimavanserin and clozapine appear to be less likely to precipitate worsening of Parkinson disease. Quetiapine has only been studied in low quality clinical trials with efficacy comparable to that of placebo in 5 trials and to that of clozapine in 2 others. *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*

Table 2 *(continued on page 11)*

Table 2 Continued

Disease or Syndrome	Drug(s)	***Recommendation,*** Rationale, *QE, SR*
Kidney/Urinary tract		
Chronic kidney disease Stage IV or higher (creatinine clearance <30 mL/min)	NSAIDs (non-COX and COX-selective, oral and parenteral, nonacetylated salicylates)	***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*** Lack of efficacy (oral estrogen) and aggravation of incontinence (alpha-1 blockers) *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*

TABLE 3. 2019 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 cardiovascular disease and colorectal cancer	**Use with caution in adults ≥70 years old** Risk of major bleeding from aspirin increases markedly in older age. Several studies suggest lack of net benefit when used for primary prevention in older adult with cardiovascular risk factors, but evidence is not conclusive. Aspirin is generally indicated for secondary prevention in older adults with established cardiovascular disease. *QE = Moderate; SR = Strong*
Dabigatran Rivaroxaban	**Use with caution for treatment of VTE or atrial fibrillation in adults ≥75 years old** Increased risk of gastrointestinal bleeding compared with warfarin and reported rates with other direct oral anticoagulants when used for long-term treatment of venous thromboembolism (VTE) or atrial fibrillation in adults ≥75 years old. *QE = Moderate; SR = Strong*

Table 3 *(continued on page 12)*

Table 3 Continued

Prasugrel	**Use with caution in adults ≥75 years old** 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 when used for its approved indication of acute coronary syndrome to be managed with percutaneous coronary intervention *QE = Moderate; SR = Weak*
Antipsychotics Carbamazepine Diuretics Mirtazapine Oxcarbazepine SNRIs SSRIs TCAs Tramadol	**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*
Dextromethorphan/ quinidine	**Use with caution** Limited efficacy in patients with behavioral symptoms of dementia (does not apply to treatment of PBA). May increase risk of falls and concerns with clinically significant drug interactions. Does not apply to treatment of pseudobulbar affect. *QE = Moderate; SR = Strong*
Trimethoprim-sulfamethoxazole	**Use with caution in patients on ACEI or ARB and decreased creatinine clearance.** Increased risk of hyperkalemia when used concurrently with an ACEI or ARB in presence of decreased creatinine clearance. *QE = Low; SR = Strong*

ACEI= angiotensin-converting enzyme inhibitor; ARB=angiotensin receptor blocker; CrCl= creatinine clearance; SIADH= syndrome of inappropriate antidiuretic hormone secretion; SNRIs = Serotonin-nonrepinephrine reuptake inhibitors; SSRIs = Selective serotonin reuptake inhibitors; TCA=tricyclic antidepressant; VTE=venous thromboembolism

TABLE 4. 2019 American Geriatrics Society Beers Criteria® for Potentially Clinically Important 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)*
RAS inhibitor (ACEIs, ARBs, aliskiren) or potassium-sparing diuretics (amiloride, triamterene)	Another RAS inhibitor (ACEIs, ARBs, aliskiren)	***Avoid routine use in those with chronic kidney disease Stage 3a or higher*** Increased risk of hyperkalemia *QE = Moderate; SR = Strong*
Opioids	Benzo-diazepines	***Avoid*** Increased risk of overdose *QE = Moderate; SR = Strong*

Table 4 *(continued on page 13)*

Table 4 Continued

Opioids	Gabapentin, pregabalin	***Avoid; exceptions are when transitioning from opioid therapy to gabapentin or pregabalin, or when using gabapentinoids to reduce opioid dose, although caution should be used in all circumstances.*** Increased risk of severe sedation-related adverse events, including respiratory depression and death *QE = Moderate; SR = Strong*
Anticholinergic	Anticholinergic	***Avoid, minimize number of anticholinergic drugs*** Increased risk of cognitive decline *QE = Moderate; SR = Strong*
Antidepressants (TCAs, SSRIs, and SNRIs) Antipsychotics Antiepileptics Benzodiazepines and nonbenzodiazepine, benzodiazepine receptor agonist hypnotics (ie, "Z-drugs") Opioids	Any combination of ≥3 of these CNS-active drugs[a]	***Avoid total of ≥3 CNS-active drugs[a]; minimize number of CNS-active drugs*** Increased risk of falls (all) and of fracture (benzodiazepines and nonbenzodiazepine, benzodiazepine receptor agonist hypnotics) QE: Combinations including benzodiazepines and nonbenzodiazepine, benzodiazepine receptor agonist hypnotics or opioids: High. All other combinations: Moderate; 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*
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*
Phenytoin	Trimethoprim-sulfamethoxazole	***Avoid*** Increased risk of phenytoin toxicity *QE = Moderate; SR = Strong*
Theophylline	Cimetidine	***Avoid*** Increased risk of theophylline toxicity *QE = Moderate; SR = Strong*
Theophylline	Ciprofloxacin	***Avoid*** Increased risk of theophylline toxicity *QE = Moderate; SR = Strong*
Warfarin	Amiodarone	***Avoid when possible; if used together, monitor INR closely*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Warfarin	Ciprofloxacin	***Avoid when possible; if used together, monitor INR closely*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Warfarin	Macrolides (excluding azithromycin)	***Avoid when possible; if used together, monitor INR closely*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Warfarin	Trimethoprim-sulfamethoxazole	***Avoid when possible; if used together, monitor INR closely*** Increased risk of bleeding *QE = Moderate; SR = Strong*
Warfarin	NSAIDs	***Avoid when possible; if used together, monitor closely for bleeding*** Increased risk of bleeding *QE = High; SR = Strong*

TABLE 5. 2019 American Geriatrics Society Beers Criteria® for 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*)
Anti-infective		
Ciprofloxacin	<30	***Doses used to treat common infections typically require reduction when CrCl <30 mL/min*** Increased risk of CNS effects (eg, seizures, confusion) and tendon rupture *QE = Moderate; SR = Strong*
Trimethoprim-sulfamethoxazole	<30	***CrCl 15-29 mL/min:Reduce Dose*** ***<15 mL/min: Avoid*** Increased risk of worsening of renal function and hyperkalemia *QE = Moderate; SR = Strong*

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

ACEIs=angiotensin-converting enzyme inhibitors; ARBs=angiotensin receptor blockers; INR=international normalized ratio; NSAIDs=nonsteroidal anti-inflammatory drugs; RAS=renin-angiotensin system

Table 4 *(continued on page 14)*

Table 5 *(continued on page 15)*

Table 5 Continued

Medication Class and Medication	Creatinine Clearance, mL/min, at Which Action Required	***Recommendation,*** Rationale, *QE, SR*
Cardiovascular or hemostasis		
Amiloride	<30	***Avoid*** Increased potassium and decreased sodium *QE = Moderate; SR = Strong*
Apixaban	<25	***Avoid*** Lack of evidence for efficacy and safety in patients with a CrCl <25 mL/min *QE = Moderate; SR = Strong*
Dabigatran	<30	***Avoid; dose adjustment advised when CrCl >30 mL/min in the presence of drug-drug interactions*** Lack of evidence for efficacy and safety in individuals with a CrCl <30 mL/min. Label dose for patients with a CrCl 15-30 mL/min based on pharmacokinetic data. *QE = Moderate; SR = Strong*
Dofetilide	<60	***CrCl 20-59 mL/min: Reduce dose*** ***CrCl <20 mL/min: Avoid*** QTc prolongation and torsades de pointes *QE = Moderate; SR = Strong*
Edoxaban	15–50 <15 or >95	***CrCl 15-50: Reduce dose*** ***CrCl <15 or >95: Avoid*** Lack of evidence of efficacy or safety in patients with a CrCl <30 mL/min *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	<50	***Nonvalvular atrial fibrillation: reduce dose if CrCl 15-50 mL/min; avoid if CrCl <15 mL/min*** ***Venous thromboembolism treatment and for VTE prophylaxis with hip or knee replacement: avoid if CrCl <30 mL/min*** Lack of efficacy or safety evidence in patients with a CrCl <30 mL/min *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*

Table 5 *(continued on page 16)*

Table 5 Continued

Medication Class and Medication	Creatinine Clearance, mL/min, at Which Action Required	***Recommendation,*** Rationale, *QE, SR*
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*
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; QTc=corrected QT interval; CrCl=creatinine clearance

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.