Table 3. 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[a]

Disease or Syndrome	Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Cardiovascular					
Heart failure	Avoid: Cilostazol Avoid in heart failure with reduced ejection fraction: Nondihydropyridine 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	Potential to promote fluid retention and/or exacerbate heart failure (NSAIDs and COX-2 inhibitors, nondihydropyridine CCBs, thiazolidinediones); potential to increase mortality in older adults with heart failure (cilostazol and dronedarone)	As noted, avoid or use with caution	Cilostazol: low Nondihydropyridine CCBs: moderate NSAIDs: moderate COX-2 inhibitors: low Thiazolidinediones: high Dronedarone: high	Cilostazol: strong Nondihydropyridine CCBs: strong NSAIDs: strong COX-2 inhibitors: strong Thiazolidinediones: strong Dronedarone: strong
Syncope	AChEIs Nonselective peripheral alpha-1 blockers (ie, doxazosin, prazosin, terazosin) Tertiary TCAs Antipsychotics: Chlorpromazine Thioridazine Olanzapine	AChEIs cause bradycardia and should be avoided in older adults whose syncope may be due to bradycardia. Nonselective 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.	Avoid	AChEIs, TCAs, and antipsychotics: high Nonselective peripheral alpha-1 blockers: high	AChEIs and TCAs: strong Nonselective peripheral alpha-1 blockers and antipsychotics: weak
Central nervous system					
Delirium	Anticholinergics (see Table 7 and full criteria available on www.geriatricscareonline.org.) Antipsychotics[b] Benzodiazepines Corticosteroids (oral and parenteral)[c] H2-receptor antagonists Cimetidine Famotidine Nizatidine Ranitidine Meperidine Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics: eszopiclone, zaleplon, zolpidem	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 (eg, 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.	Avoid	H2-receptor antagonists: low All others: moderate	Strong
Dementia or cognitive impairment	Anticholinergics (see Table 7 and full criteria available on www.geriatricscareonline.org) Benzodiazepines Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics	Avoid because of adverse CNS effects Avoid antipsychotics for behavioral problems of dementia and/or delirium unless nonpharmacological options (eg, behavioral interventions) have failed or are not possible *and* the older adult is	Avoid	Moderate	Strong

(Continued)

Table 3 (Contd.)

Disease or Syndrome	Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
	Eszopiclone Zaleplon Zolpidem Antipsychotics, chronic and as-needed use[b]	threatening substantial harm to self or others. Antipsychotics are associated with greater risk of cerebrovascular accident (stroke) and mortality in persons with dementia.			
History of falls or fractures	Antiepileptics Antipsychotics[b] Benzodiazepines Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics Eszopiclone Zaleplon Zolpidem Antidepressants TCAs SSRIs SNRIs Opioids	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 agonist hypnotics, 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.	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)	Opioids: moderate All others: high	Strong
Parkinson disease	Antiemetics Metoclopramide Prochlorperazine Promethazine All antipsychotics (except quetiapine, clozapine, pimavanserin)	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 five trials and to that of clozapine in two others.	Avoid	Moderate	Strong
Gastrointestinal					
History of gastric or duodenal ulcers	Aspirin >325 mg/day Non–COX-2–selective NSAIDs	May exacerbate existing ulcers or cause new/additional ulcers	Avoid unless other alternatives are not effective and patient can take gastroprotective agent (ie, proton-pump inhibitor or misoprostol)	Moderate	Strong
Kidney/urinary tract					
Chronic kidney disease stage 4 or higher (creatinine clearance <30 mL/min)	NSAIDs (non-COX and COX selective, oral and parenteral, nonacetylated salicylates)	May increase risk of acute kidney injury and further decline of renal function	Avoid	Moderate	Strong

Table 3 (Contd.)

Disease or Syndrome	Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Urinary incontinence (all types) in women	Estrogen oral and transdermal (excludes intravaginal estrogen) Peripheral alpha-1 blockers Doxazosin Prazosin Terazosin	Lack of efficacy (oral estrogen) and aggravation of incontinence (alpha-1 blockers)	Avoid in women	Estrogen: high Peripheral alpha-1 blockers: moderate	Estrogen: strong Peripheral alpha-1 blockers: strong
Lower urinary tract symptoms, benign prostatic hyperplasia	Strongly anticholinergic drugs, except antimuscarinics for urinary incontinence (see Table 7 and full criteria available on www.geriatricscareonline.org)	May decrease urinary flow and cause urinary retention	Avoid in men	Moderate	Strong

Abbreviations: AChEI, acetylcholinesterase inhibitor; CCB, calcium channel blocker; CNS, central nervous system; COX, cyclooxygenase; NSAID, nonsteroidal anti-inflammatory drug; SNRI, serotonin-norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor; TCA, tricyclic antidepressant.

[a]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.

[b]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.

[c]Excludes inhaled and topical forms. Oral and parenteral corticosteroids may be required for conditions such as exacerbation of chronic obstructive pulmonary disease but should be prescribed in the lowest effective dose and for the shortest possible duration.

was lowered to 70 years or older from 80 years or older. This criterion was also expanded to cover use of aspirin as primary prevention of colorectal cancer. Note that this criterion does not apply to use of aspirin for secondary prevention of either disease.

- In addition to the existing caution about dabigatran, the updated criteria highlight caution about use of rivaroxaban for treatment of venous thromboembolism or atrial fibrillation in adults 75 years or older.
- Tramadol was added to the list of drugs associated with hyponatremia or syndrome of inappropriate antidiuretic hormone secretion. The chemotherapeutic agents carboplatin, cyclophosphamide, cisplatin, and vincristine were removed from this list because the panel thought the prescribing of these highly specialized drugs fell outside the scope of the criteria.
- Vasodilators were removed, because syncope is not unique to older adults.
- The combination dextromethorphan/quinidine was added to the "use with caution" table on the basis of limited efficacy in patients with behavioral symptoms of dementia without pseudobulbar affect while potentially increasing the risk of falls and drug-drug interactions.
- The combination trimethoprim-sulfamethoxazole (TMP-SMX) should be used with caution by patients with reduced kidney function and taking an angiotensin-converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) because of an increased risk of hyperkalemia.

Drug-Drug Interactions

Table 5 contains potentially clinically important drug-drug interactions to be avoided in older adults. New recommendations include avoiding use of opioids concurrently with benzodiazepines and avoiding use of opioids concurrently with gabapentinoids (except when transitioning from the former to the latter). Other additions to the table are interactions involving TMP-SMX, macrolide antibiotics, and ciprofloxacin. TMP-SMX in combination with phenytoin or warfarin increases the risk of phenytoin toxicity and bleeding, respectively. Macrolides, excluding azithromycin, or ciprofloxacin in combination with warfarin increases bleeding risk. Ciprofloxacin in combination with theophylline increases risk of theophylline toxicity. The concurrent use of a combination of three or more central nervous system (CNS) agents (antidepressants, antipsychotics, benzodiazepines, nonbenzodiazepine benzodiazepine receptor agonist hypnotics, antiepileptics, and opioids) and increased fall risk have been collapsed into one recommendation instead of separate recommendations for each drug class. The recommendation on avoiding concurrent use of medications that increase serum potassium has been expanded to encompass a broader range of these medications.

PIMs Based on Kidney Function

Table 6 contains a list of medications that should be avoided or have their dosage reduced based on kidney function. Two antibiotics have been added, ciprofloxacin and TMP-SMX, over concerns of increased CNS effects and tendon rupture, and worsening renal function and hyperkalemia, respectively. Dofetilide was also added because of concerns of corrected QT interval prolongation and torsade de pointes. The creatinine clearance lower limit at which to avoid edoxaban has been reduced to less than 15 mL/min.