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Originally conceived of in 1991 by the late Mark Beers, MD, a geriatrician, the *Beers Criteria* catalogues medications that cause adverse drug events in older adults due to their pharmacologic properties and/or the physiologic changes of aging. In 2011, the AGS undertook an update of the criteria, assembling a panel of experts to review the literature in the context of the AGS 2012 *Beers Criteria* using an enhanced, evidence-based methodology. Each criterion is rated (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.

INTENDED USE

- This should be viewed as a guide for identifying medications for which the risks of use in older adults outweigh the benefits.

- These criteria are not meant to be applied in a punitive manner.
- The list is not meant to supersede clinical judgment or an individual patient's values and needs. Prescribing and managing difficult 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.
- Implicit criteria such as the STOPP/START criteria and Medication Appropriateness Index should be used in a complementary manner with the 2012 AGS Beers Criteria to guide clinicians in making decisions about safe medication use in older adults.

2012 AGS Beers Criteria for Potentially Inappropriate Medication Use in Older Adults

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2012 AGS 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)
Nifedipine, immediate release ^a	Avoid. Potential for hypotension; risk of precipitating myocardial ischemia. QE = High; SR = Strong
Spironolactone >25 mg/day	Avoid in patients with heart failure or with a CrCl <30 mL/min. In heart failure, the risk of hyperkalemia is higher in older adults if taking >25 mg/day. QE = Moderate; SR = Strong
Central Nervous System	
Tertiary TCAs, alone or in combination: ^a Amitriptyline ^b Chlordiazepoxide-amitriptyline ^c Clomipramine ^d Doxepin >6 mg/day ^e Imipramine ^f Perphenazine-amitriptyline ^g Trimipramine	Avoid. Highly anticholinergic, sedating, and cause of orthostatic hypotension; the safety profile of low-dose doxepin (56 mg/day) is comparable to that of placebo. QE = High; SR = Strong
Antipsychotics, first- (conventional) and second- (atypical) generation (see notes for full list)	Avoid use for behavioral problems of dementia unless non-pharmacologic options have failed and patient is threat to self or others. Increased risk of cerebrovascular accident (stroke) and mortality in persons with dementia. QE = Moderate; SR = Strong
Thioridazine Mesoridazine	Avoid. Highly anticholinergic and greater risk of QT-interval prolongation. QE = Moderate; SR = Strong
Barbiturates ^a Amobarbital ^b ^c Butabarbital ^b ^d Butalbital ^e Mephobarbital ^b ^f Pentobarbital ^b ^g Phenobarbital ^b ^h Secobarbital ^b	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: ^a Alprazolam ^b Estazolam ^c Lorazepam ^d Oxazepam ^e Temazepam ^f Triazolam Long-acting: ^a Chlorazepate ^b Chlordiazepoxide ^c Chlordiazepoxide-amitriptyline ^d Clidinium-chlordiazepoxide ^e Clonazepam ^f Diazepam ^g Flurazepam ^h Quazepam	Avoid benzodiazepines (any type) for treatment of insomnia, agitation, or delirium. 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 accidents in older adults. May be appropriate for seizure disorders, rapid eye movement sleep disorders, benzodiazepine withdrawal, ethanol withdrawal, severe generalized anxiety disorder, preprocedural anesthesia, end-of-life care. QE = High; SR = Strong
Chlortal hydrate ^b	Avoid. Tolerance occurs within 10 days and risk outweighs the benefits in light of overdose with doses only 3 times the recommended dose. QE = Low; SR = Strong
Meprobamate	Avoid. High rate of physical dependence; very sedating. QE = Moderate; SR = Strong

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2012 AGS 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)
Nonbenzodiazepine hypnotics ^a Eszopiclone ^b Zolpidem ^c Zaleplon	Avoid chronic use (>90 days). Benzodiazepine-receptor agonists that have adverse events similar to those of benzodiazepines in older adults (e.g., delirium, falls, fractures); minimal improvement in sleep latency and duration. QE = Moderate; SR = Strong
Ergot mesylates ^a Isosuprine ^b	Avoid. Lack of efficacy. QE = High; SR = Strong
Endocrine	
Androgens ^a Methyltestosterone ^b ^c Testosterone	Avoid unless indicated for moderate to severe hypogonadism. Potential for cardiac problems and 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 oral and topical patch. Topical vaginal cream: Acceptable to use low-dose intravaginal estrogen for the 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 that vaginal estrogens for treatment of vaginal dryness is safe and effective in women with breast cancer, especially at dosages of estradiol <25 mcg twice weekly. QE = High (Oral and Patch), Moderate (Topical), SR = Strong (Oral and Patch), Weak (Topical)
Growth hormone	Avoid, except as hormone replacement following pituitary gland removal. Effect 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. 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 ^a Chlorpropamide ^b 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 further increased 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
Trimethobenzamide	Avoid. One of the least effective antiemetic drugs; can cause extrapyramidal adverse effects. QE = Moderate; SR = Strong

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2012 AGS 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)	
Pain Medications		
Meperidine	Avoid. Not an effective oral analgesic in dosages commonly used; may cause neurotoxicity; safer alternatives available. QE = High; SR = Strong	
Non-COX-selective NSAIDs, oral <ul style="list-style-type: none"> Aspirin >325 mg/day Diclofenac Diflunisal Etoricoxib Fenoprofen Ibuprofen Ketoprofen Meclofenamate Mefenamic acid Meloxicam Nabumetone Naproxen Oxaprozin Proxicam Sulindac Tolmetin 	Avoid chronic use unless other alternatives are not effective and patient can take gastroprotective agent (proton-pump inhibitor or misoprostol). Increases risk of GI bleeding/peptic ulcer disease in high-risk groups, including those ≥75 years old or taking oral or parenteral corticosteroids, anticoagulants, or antiplatelet agents. Use of proton pump inhibitor or misoprostol reduces but does not eliminate risk. Upper GI ulcers, gross bleeding, or perforation caused by NSAIDs occur in approximately 1% of patients treated for 3-6 months, and in about 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. Increases risk of GI bleeding/peptic ulcer disease in high-risk groups (See Non-COX selective NSAIDs). Of all the NSAIDs, indomethacin has most adverse effects. QE = Moderate (Indomethacin), High (Ketorolac); SR = Strong	
Pentazocine*	Avoid. Opioid analgesic that causes CNS adverse effects, including confusion and hallucinations, more commonly than other narcotic drugs; is also a mixed agonist and antagonist; safer alternatives available. QE = Low; SR = Strong	
Skeletal muscle relaxants <ul style="list-style-type: none"> Carisoprodol Chlorzoxazone Cyclobenzaprine Metaxalone Methocarbamol Orphenadrine 	Avoid. Most muscle relaxants poorly tolerated by older adults, because of anticholinergic adverse effects, sedation, increased risk of fractures; effectiveness at dosages tolerated by older adults is questionable. QE = Moderate; SR = Strong	

*Infrequently used drugs. Table 1 Abbreviations: ACEI, angiotensin converting-enzyme inhibitors; ARB, angiotensin receptor blockers; CNS, central nervous system; COX, cyclooxygenase; CrCl, creatinine clearance; GI, gastrointestinal; NSAIDs, nonsteroidal anti-inflammatory drugs; SIADH, syndrome of inappropriate antidiuretic hormone secretion; SR, Strength of Recommendation; TCAs, tricyclic antidepressants; QE, Quality of Evidence

2012 AGS 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	Avoid.
	Non-dihydropyridine CCBs (avoid only for systolic heart failure) <ul style="list-style-type: none"> Diltiazem Verapamil 	Potential to promote fluid retention and/or exacerbate heart failure. QE = Moderate (NSAIDs, CCBs, Dronedarone), High (Thiazolidinediones [glitazones]), Low (Cilostazol); SR = Strong
	Pioglitazone, rosiglitazone Cilostazol Dronedarone	

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2012 AGS 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)
Syncope	Acetylcholinesterase inhibitors (AChEIs) <ul style="list-style-type: none"> Peripheral alpha blockers Doxazosin Prazosin Terazosin Tertiary TCAs Chlorpromazine, thioridazine, and olanzapine	Avoid. Increases risk of orthostatic hypotension or bradycardia. QE = High (Alpha blockers), Moderate (AChEIs, TCAs and antipsychotics); SR = Strong (AChEIs and TCAs), Weak (Alpha blockers and antipsychotics)
Central Nervous System		
Chronic seizures or epilepsy	Bupropion Chlorpromazine Clobazam Maprotiline Olanzapine Thioridazine Thiothixene Tramadol	Avoid. Lowers seizure threshold; may be acceptable in patients with well-controlled seizures in whom alternative agents have not been effective. QE = Moderate; SR = Strong
Delirium	All TCAs Anticholinergics (see online for full list) Benzodiazepines Chlorpromazine Corticosteroids H ₂ -receptor antagonist Meperidine Sedative hypnotics Thioridazine	Avoid. Avoid in older adults with or at high risk of delirium because of inducing or worsening delirium in older adults; if discontinuing drugs used chronically, taper to avoid withdrawal symptoms. QE = Moderate; SR = Strong
Dementia & cognitive impairment	Anticholinergics (see online for full list) Benzodiazepines H ₂ -receptor antagonists Zolpidem Antipsychotics, chronic and as-needed use	Avoid. Avoid due to adverse CNS effects. Avoid antipsychotics for behavioral problems of dementia unless non-pharmacologic options have failed and patient is a threat to themselves or others. Antipsychotics are associated with an increased risk of cerebrovascular accident (stroke) and mortality in persons with dementia. QE = High; SR = Strong
History of falls or fractures	Anticonvulsants Antipsychotics Benzodiazepines Nonbenzodiazepine hypnotics <ul style="list-style-type: none"> Eszopiclone Zaleplon Zolpidem TCAs/SSRIs	Avoid unless safer alternatives are not available; avoid anticonvulsants except for seizure. Ability to produce ataxia, impaired psychomotor function, syncope, and additional falls; shorter-acting benzodiazepines are not safer than long-acting ones. QE = High; SR = Strong
Insomnia	Oral decongestants <ul style="list-style-type: none"> Pseudoephedrine Phenylephrine Stimulants Amphetamine Methylphenidate Pemoline Theobromine Theophylline Caffeine 	Avoid. CNS stimulant effects. QE = Moderate; SR = Strong
Parkinson's disease	All antipsychotics (see online publication for full list, except for quetiapine and clozapine) Antiemetics <ul style="list-style-type: none"> Metoclopramide Prochlorperazine Promethazine 	Avoid. Dopamine receptor antagonists with potential to worsen parkinsonian symptoms. Quetiapine and clozapine appear to be less likely to precipitate worsening of Parkinson disease. QE = Moderate; SR = Strong

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2012 AGS 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)
Gastrointestinal		
Chronic constipation	Oral antimuscarinics for urinary incontinence: Darifenacin Fesoterodine Oxybutynin (oral) Solifenacin Tolterodine Trospium Nondihydropyridine CCB Diltiazem Verapamil First-generation antihistamines as single agent or part of combination products: Brompheniramine (various) Carbinoxamine Chlorpheniramine Clemastine (various) Cyproheptadine Dexbrompheniramine Dexchlorpheniramine (various) Diphenhydramine Doxylamine Hydroxyzine Promethazine Triprolidine Anticholinergics/antispasmodics (see online for full list of drugs with strong anticholinergic properties): Antipsychotics Belladonna alkaloids Clidinium-chloridazepoxide Dicyclomine Hyoscyamine Propantelline Scopolamine Tertiary TCAs (amitriptyline, clomipramine, doxepin, imipramine, and trimipramine)	Avoid unless no other alternatives. Can worsen constipation; agents for urinary incontinence; antimuscarinics overall differ in incidence of constipation; response variable; consider alternative agent if constipation develops. QE = High (For Urinary Incontinence), Moderate/Low (All Others); SR = Strong
History of gastric or duodenal ulcers	Aspirin (>325 mg/day) Non-COX-2 selective NSAIDs	Avoid unless other alternatives are not effective and patient can take gastroprotective agent (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 and V	NSAIDs Triamterene (alone or in combination)	Avoid. May increase risk of kidney injury. May increase risk of acute kidney injury. QE = Moderate (NSAIDs), Low (Triamterene); SR = Strong (NSAIDs), Weak (Triamterene)
Urinary incontinence (all types) in women	Estrogen oral and transdermal (excludes intravaginal estrogen)	Avoid in women. Aggravation of incontinence. QE = High; SR = Strong

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2012 AGS 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)
Lower urinary tract symptoms, benign prostatic hyperplasia	Initiated anticholinergic agents Strongly anticholinergic drugs, except antimuscarinics for urinary incontinence (see Table 9 for complete list).	Avoid in men. May decrease urinary flow and cause urinary retention. QE = Moderate; SR = Strong (labeled agents), Weak (All others)
Stress or mixed urinary incontinence	Alpha-blockers Doxazosin Prazosin Terazosin	Avoid in women. Aggravation of incontinence. QE = Moderate; SR = Strong

Table 2 Abbreviations: CCBs, calcium channel blockers; AChEIs, acetylcholinesterase inhibitors; CNS, central nervous system; COX, cyclooxygenase; NSAIDs, nonsteroidal anti-inflammatory drugs; SR, Strength of Recommendation; SSRIs, selective serotonin reuptake inhibitors; TCAs, tricyclic antidepressants; QE, Quality of Evidence

2012 AGS 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 individuals ≥80 years old. QE = Low; SR = Weak
Dabigatran	Use with caution in adults ≥75 years old or if CrCl <30 mL/min. Increased risk of bleeding compared with warfarin in adults ≥75 years old; lack of evidence for efficacy and safety in patients with CrCl <30 mL/min QE = Moderate; SR = Weak
Prasugrel	Use with caution in adults ≥75 years old. Greater risk of bleeding in older adults; risk may be offset by benefit in highest-risk older patients (eg, those with prior myocardial infarction or diabetes). QE = Moderate; SR = Weak
Antipsychotics Carbamazepine Carboplatin Cisplatin Mirazapine SNRIs SSRIs TCAs Vincristine	Use with caution. May exacerbate or cause SIADH or hyponatremia; need to monitor sodium level closely when starting or changing dosages in older adults due to increased risk. QE = Moderate; SR = Strong
Vasodilators	Use with caution. May exacerbate episodes of syncope in individuals with history of syncope. QE = Moderate; SR = Weak

Table 3 Abbreviations: CrCl, creatinine clearance; SIADH, syndrome of inappropriate antidiuretic hormone secretion; SSRIs, selective serotonin reuptake inhibitors; SNRIs, serotonin-norepinephrine reuptake inhibitors; SR, Strength of Recommendation; TCAs, tricyclic antidepressants; QE, Quality of Evidence

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