Potentially Inappropriate Medications in the Elderly*

Medication	Prescribing Concern	Possible Alternatives
Anticholinergics (excludes TCAs)		
First-generation antihistamines (as single agent or as part of combination products) Brompheniramine Carbinoxamine Chlorpheniramine Clemastine Cyproheptadine Dexbrompheniramine Dexchlorpheniramine Diphenhydramine (oral) Doxylamine Hydroxyzine Promethazine Triprolidine	• Clearance reduced with advanced age • Highly anticholinergic; increased risk of confusion, dry mouth, constipation, and other anticholinergic effects/toxicity • Tolerance develops when used as hypnotic • Use of diphenhydramine in special situations such as acute treatment of severe allergic reaction may be appropriate	• Use the smallest dose possible if using first generation antihistamine for acute treatment of severe allergic reaction • Consider second generation antihistamines (e.g., cetirizine, desloratadine, loratadine, fexofenadine) • If using for anxiety, consider buspirone • If using for sleep, consider trazodone • If using for nausea, consider ondansetron, prochlorperazine

*Medications listed are included in *The AGS 2012 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults.* ***J Am Geriatr Soc*** 2012

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Medication	Prescribing Concern	Possible Alternatives
Antiparkinson agents Benztropine (oral) Trihexyphenidyl	• Not recommended for prevention of extrapyramidal symptoms (EPS) with antipsychotics • More effective agents available for treatment of Parkinson's disease	• Consider Amantadine for EPS, but use with caution. Elderly may be more susceptible to CNS effects (using 2 divided daily doses may minimize this effect). Elderly may require dosage reductions based on renal function • Other alternatives include carbidopa-levodopa, pramipexole, selegiline, bromocriptine or ropinirole
Antithrombotics		
Dipyridamole, oral short-acting *(does not apply to the extended-release combination with aspirin)*	• May cause orthostatic hypotension • More effective alternatives available • IV form acceptable for use in cardiac stress testing	• Consider alternative antiplatelet agents (aspirin or clopidogrel)
Ticlopidine	• More toxic than aspirin • Not much better than aspirin in preventing clots • Safer, more effective alternatives available	• Consider alternative antiplatelet agents (aspirin or clopidogrel)
Anti-infective		
Nitrofurantoin ***(avoid cumulative day supply >90 days)***	• Avoid for long-term suppression • Lack of efficacy in patients with CrCl <60 mL/min due to inadequate drug concentration in the urine • Potential for pulmonary toxicity • Safer alternatives available	• Consider other anti-infectives for UTI (trimethoprim-sulfamethoxazole, methenamine)
Cardiovascular		
Alpha agonists Guanabenz Guanfacine Methyldopa Reserpine (>0.1 mg/day)	• High risk of adverse CNS effects • May cause bradycardia and orthostatic hypotension • Not recommended as routine treatment for hypertension	• Consider an alternative treatment for hypertension (a diuretic, calcium channel blocker or ACE/ARB)
Other Disopyramide	• Disopyramide is a potent negative inotrope and therefore may induce heart failure in older adults • Strongly anticholinergic; other antiarrhythmic drugs preferred	• Use other antiarrhythmic drugs, when appropriate, such as diltiazem or verapamil
Digoxin >0.125 mg/day	• In heart failure, higher dosages associated with no additional benefit and may increase risk of toxicity • Decreased renal clearance may increase risk of toxicity	• Avoid doses greater than 0.125 mg/day
Nifedipine, immediate release	• Potential for hypotension • Risk of precipitating myocardial ischemia	• Consider use of extended release nifedipine

Medication	Prescribing Concern	Possible Alternatives
Central nervous system		
Tertiary TCAs, alone or in combination: Amitriptyline Clomipramine Doxepin **>6 mg/day** Imipramine Trimipramine	• Highly anticholinergic, sedating, and cause orthostatic hypotension • The safety profile of low-dose doxepin (≤6 mg/day) is comparable to that of placebo	• Consider an antidepressant agent with less sedation and fewer anticholinergic effects (nortriptyline, desipramine, citalopram, escitalopram, mirtazapine, sertraline, venlafaxine) • For neuropathic pain, consider venlafaxine or duloxetine • For sleep, consider trazodone
Anti-psychotics, first-generation Thioridazine	• Highly anticholinergic and greater risk of QT-interval prolongation	• Consider second generation antipsychotics with less EPS effects (risperidone, quetiapine)
Barbiturates Butalbital Phenobarbital	• High rate of physical dependence • Tolerance to sleep benefits • Greater risk of overdose at low dosages	• Avoid use in older adults, except when used to control seizures • Consider sumatriptan, venlafaxine or topiramate for migraines
Other: Chloral hydrate	• Tolerance occurs within 10 days and risk outweighs the benefits in light of overdose with doses only 3 times the recommended dose	• Use low dose trazodone (25-50 mg), intermittently
Meprobamate	• High rate of physical dependence; very sedating • If used for prolonged periods, the drug may have to be withdrawn slowly	• Consider buspirone for anxiety
Nonbenzodiazepine hypnotics		
Eszopiclone (Lunesta®) Zolpidem (Ambien®, Ambien CR®) Zaleplon (Sonata®) ***(avoid continuous use >90 days)***	• Avoid chronic use (>90 days) • Benzodiazepine-receptor agonists have adverse events similar to those of benzodiazepines in older adults (e.g., delirium, falls, fractures) • Minimal improvement in sleep latency and duration	• Use low dose trazodone (25-50 mg), intermittently. Evidence suggests trazodone does not affect REM sleep cycles
Vasodilators		
Ergot mesylates Isoxsuprine	• Lack of efficacy	• Consider donepezil for Alzheimer's
Endocrine		
Desiccated thyroid	• Concerns about cardiac effects • Safer alternatives available	• Consider levothyroxine as an alternative
Sulfonylureas, long-duration: Chlorpropamide Glyburide	• Higher risk of severe prolonged hypoglycemia in older adults	• Consider shorter-acting sulfonylureas, such as glipizide or glimepiride

Medication	Prescribing Concern	Possible Alternatives
Endocrine *continued*		
Estrogens with or without progestins	• Avoid oral and transdermal dosage forms • 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 • Increases risk of thrombotic events	• Consider venlafaxine, paroxetine or Femring® for vasomotor symptoms • Consider vaginal creams, tablet and rings for vaginal symptoms and lower urinary tract infections: **Tier 3 – Preferred brands:** Premarin® vaginal cream Estring® vaginal ring Vagifem® vaginal tablet Estrace® vaginal cream Femring® vaginal ring
Megestrol	• Minimal effect on weight • Increases risk of thrombotic events and possibly death in older adults	• Consider dronabinol, mirtazapine
Gastrointestinal		
Trimethobenzamide	• One of the least effective antiemetic drugs • Can cause extrapyramidal adverse effects	• Consider safer alternatives: prochlorperazine or ondansetron
Pain medications		
Non-COX-selective NSAIDs Indomethacin Ketorolac, includes parenteral	• Increases risk of GI bleeding/peptic ulcer disease in high-risk groups • Of all the NSAIDs, indomethacin has most adverse effects	• Avoid use in older adults; safer alternatives include naproxen and ibuprofen
Other Meperidine	• The American Pain Society does not recommend use of meperidine • May cause neurotoxicity	• Avoid use in older adults; morphine is the preferred agent
Pentazocine	• Opioid analgesic that causes CNS adverse effects, including confusion and hallucinations, more commonly than other narcotic drugs	• Consider moderate pain relievers: acetaminophen or aspirin, with or without codeine
Skeletal muscle relaxants (as a single agent or as part of a combination product)		
Carisoprodol Chlorzoxazone Cyclobenzaprine Orphenadrine Metaxalone Methocarbamol	• 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	• Alternatives may include tizanidine or baclofen