Beers Criteria®: American Geriatrics Society updated AGS Beers Criteria® for potentially inappropriate medication use in older adults (2023)

About the Guideline

- This guideline is provided by the American Geriatric Society (AGS) regarding potentially inappropriate medications (not definitively inappropriate medications) for individuals ages 65 and older; these standards are known as the Beers Criteria®.
- This 2023 guideline is an update of the 2019 version.
- This guideline was created to assist healthcare providers in decision-making while also taking into consideration a patient's preferences, needs, and goals, especially when there are numerous medications prescribed for multiple chronic diseases.
- A literature review in PubMed was performed by 10 experts in geriatric care and pharmacotherapy, including doctors, nurses, and pharmacists, from June 1, 2017, to May 31, 2022.

Key Clinical Considerations

Become familiar with the recommendations and best-practice statements provided in this guideline, especially if you care for older adults in acute care or ambulatory care settings.

Potentially Inappropriate Medications

- Antihistamines to be avoided due to their highly anticholinergic effects include the following:
    - Brompheniramine
    - Chlorpheniramine maleate
    - Cyroheptadine
    - Dimenhydrinate
    - DiphenhydrAMINE hydrochloride (use may be appropriate in the treatment of acute, severe allergic reactions)
    - Doxylamine
    - HydrOXYzine hydrochloride
    - Meclizine
    - Promethazine
    - Triprolidine
- Nitrofurantoin macrocrystals should be avoided due to the potential for multisystem organ toxicity and peripheral neuropathy.
- Cardiovascular medications and antithrombotics to be avoided include the following:
    - Aspirin should be avoided for the primary prevention of cardiovascular disease (CVD); the use of aspirin for secondary prevention in older adults with established CVD may be appropriate.
    - Warfarin sodium should be avoided as initial therapy due to higher risk of major bleeding, unless direct oral anticoagulants (DOACs) are contraindicated.
    - Rivaroxaban should be avoided for the long-term treatment of atrial fibrillation or venous thromboembolism (VTE).
    - Dipyridamole should be avoided due to the risk of orthostatic hypotension.

  - Nonselective peripheral alpha-1 blockers, including doxazosin mesylate, prazosin hydrochloride, and terazosin hydrochloride should be avoided.
  - CloNIDine and guanFACINE hydrochloride should be avoided due to the high risk of adverse central nervous system effects.
  - NIFEdipine (immediate release) should be avoided.
  - Amiodarone hydrochloride should be avoided as first-line therapy for atrial fibrillation.
  - Dronedarone should be avoided.
  - Digoxin should be avoided as first-line treatment for atrial fibrillation or heart failure.
- The following CNS medications should be avoided:
  - Antidepressants, including
    - Amitriptyline hydrochloride
    - Amoxapine
    - ClomiPRAMINE hydrochloride
    - Desipramine hydrochloride
    - Doxepin hydrochloride, with a dose of more than 6 mg per day
    - Imipramine hydrochloride
    - Nortriptyline hydrochloride
    - PAroxetine hydrochloride
  - Antiparkinsonian agents, such as benztropine mesylate and trihexyphenidyl
  - Antipsychotics (first and second generation) that should be avoided due to the increased risk of stroke and incidence of cognitive decline and mortality are as follows:
    - ARIPiprazole
    - Haloperidol
    - OLANZapine
    - QUetiapine fumarate
    - RisperiDINE
  - Barbiturates, including
    - Butalbital
    - Phenobarbital
    - Primidone
  - Benzodiazipines, including
    - ALPRAZolam
    - ChlordiazePOXIDE hydrochloride (alone or in combination with amitriptyline or clidinium)
    - CloBAZam
    - ClonazePAM
    - Clorazepate
    - DiazePAM
    - Estazolam
    - LORazepam
    - Midazolam hydrochloride
    - Oxazepam
    - Temazepam
    - Triazolam
  - Nonbenzodiazepines, including eszopiclone, zaleplon, and zolpidem. These medications are associated with delirium, falls, and fractures.
  - Meprobamate
  - Ergoloid mesylates

- Endocrine medications to avoid include the following:
  - Androgens (may be appropriate for symptomatic hypogonadism)
  - Estrogen, with or without progestins (vaginal creams or tablets may be appropriate)
  - Sliding scale insulin
  - Sulfonylureas that should be avoided due to a higher risk of cardiovascular events and hypoglycemia, include
    - Gliclazide
    - Glimepiride
    - GlipiZIDE
    - GlyBURIDE
  - Desiccated thyroid
  - Megestrol acetate should be avoided because it increases the risk of thrombotic events.
  - Growth hormone
- Gastrointestinal (GI) medications to be avoided include the following:
  - Proton-pump inhibitors due to increased risk of *Clostridium difficile* infection, pneumonia, GI malignancies, bone loss, and fractures. But the following may be appropriate for select conditions:
    - Dexlansoprazole
    - Esomeprazole magnesium
    - Lansoprazole
    - Omeprazole
    - Pantoprazole sodium
    - Rabeprazole
  - Metoclopramide should be avoided due to extrapyramidal side effects.
  - GI antispasmodics that should be avoided due to their anticholinergic side effects include the following:
    - Atropine sulfate
    - Clidinium-chlordiazepoxide
    - Dicyclomine
    - Hyoscyamine
    - Scopolamine
  - Mineral oil should be avoided due to its aspiration potential.
- The genitourinary medication desmopressin should be avoided due to the increased risk of hyponatremia.
- Pain medications to be avoided include the following:
  - Non-cyclooxygenase (COX)-2-selective nonsteroidal anti-inflammatory drugs (NSAIDS), due to increased risk of bleeding:
    - Aspirin
    - Diclofenac
    - Diflunisal
    - Etodolac
    - Flurbiprofen
    - Ibuprofen
    - Indomethacin
    - Ketorolac tromethamine (oral, nasal, injection)
    - Meloxicam
    - Nabumetone
    - Naproxen sodium

        - Oxaprozin
        - Piroxicam
        - Sulindac
    - Meperidine, due to an increased risk of neurotoxicity
    - Skeletal muscle relaxants, due to sedation, anticholinergic effects, and increased risk of fractures, including
        - Carisoprodol
        - Chlorzoxazone
        - Cyclobenzaprine
        - Metaxalone
        - Methocarbamol
        - Orphenadrine

Potentially Inappropriate Medications for Patients with Certain Diseases or Syndromes

- Cardiovascular medications
    - For patients with heart failure, the following medications may be inappropriate:
        - NSAIDS, COX-2 inhibitors, non-dihydropyridine calcium channel blockers, and thiazolidinediones should be avoided due to the potential to promote fluid retention and/or exacerbate heart failure.
        - Cilostazol and dronedarone should be avoided due to the potential to increase mortality in older adults.
        - Dextromethorphan-quinidine should be avoided due to concerns regarding QT prolongation.
    - For patients with syncope, the following medications may be inappropriate:
        - Due to the increased risk of orthostatic hypotension, the following antipsychotics and tertiary tricyclic antidepressants should be avoided:
            - Chlorpromazine
            - Olanzapine
            - Amitriptyline
            - Clomipramine
            - Doxepin
            - Imipramine
        - Due to the side effect of bradycardia, the following cholinesterase inhibitors should be avoided:
            - Donepezil
            - Galantamine
            - Rivastigmine
        - Due to causing orthostatic blood pressure changes, the following nonselective peripheral alpha-1 blockers should be avoided:
            - Doxazosin
            - Prazosin
            - Terazosin
- Central nervous system medications
    - For patients with delirium, the following medications should be avoided:
        - Opioids
        - Benzodiazepines
        - Antipsychotics

        - Anticholinergics
        - Corticosteroids
        - H_2-receptor antagonists
        - Nonbenzodiazepines receptor agonists hypnotics
    - For patients with dementia or cognitive impairment, the following medications should be avoided:
        - Antipsychotics
        - Benzodiazepines
        - Anticholinergics
        - Nonbenzodiazepine receptor agonist hypnotics
    - For patients with a history of falls or fractures, the following medications should be avoided:
        - Anticholinergics
        - Antidepressants, including serotonin-norepinephrine reuptake inhibitors (SNRIs), selective serotonin reuptake inhibitors (SSRIs), and tricyclic antidepressants
        - Antiepileptics
        - Antipsychotics
        - Benzodiazepines
        - Opioids
        - Nonbenzodiazepine receptor agonist hypnotics
    - For patients with Parkinson disease, the following medications should be avoided, due to the worsening of parkinsonian symptoms:
        - Antiemetics, including
            - Metoclopramide
            - Prochlorperazine
            - Promethazine
        - Antipsychotics
- GI medications
    - For patients with a history of gastric or duodenal ulcers, aspirin and non-COX-2 selective NSAIDS should be avoided due to the risk of exacerbating existing ulcers or causing new ulcers.
- Kidney/urinary tract medications
    - For female patients with urinary incontinence, the following medications should be avoided:
        - Nonselective peripheral alpha-1 blockers
            - Doxazosin mesylate
            - Prazosin hydrochloride
            - Terazosin hydrochloride
        - Estrogens (conjugated)
    - For male patients with lower urinary tract symptoms and/or benign prostatic hyperplasia, certain anticholinergic drugs should be avoided as they may decrease urinary flow and cause retention.

Medications to be Used with Caution

- Dabigatran may increase the risk of GI bleeding.
- Prasugrel and ticagrelor increase the risk of major bleeding.
- The following medications may exacerbate or cause syndrome of inappropriate antidiuretic hormone or hyponatremia:
    - Mirtazipine
    - SNRIs
    - SSRIs
    - Tricyclic antidepressants
    - CarBAMazepine
    - OXcarbazepine
    - Antipsychotics
    - Diuretics
    - TraMADol hydrochloride
- Dextromethorphan-quinidine may increase the risk of falls, and it shows limited efficacy in select patients with dementia.
- Trimethoprim-sulfamethoxazole may increase the risk of hyperkalemia when used with an angiotensin-converting enzyme (ACE) inhibitor, angiotensin receptor blocker (ARB), or angiotensin receptor-neprilysin inhibitor (ARNI).
- The following medications may increase the risk of urogenital infections and euglycemic diabetic ketoacidosis:
    - Canagliflozin
    - Dapagliflozin
    - Empagliflozin
    - Ertugliflozin

Potentially Inappropriate Drug-Drug Interactions

- Renin-angiotensin system (RAS) inhibitors or potassium-sparing diuretics may increase the risk of hyperkalemia when used concurrently with another RAS inhibitor or potassium-sparing diuretic.
- Opioids used concurrently with benzodiazepines may increase the risk of overdose.
- Opioids used concurrently with gabapentin or pregabalin may increase the risk of severe sedation, including respiratory depression and death.
- Multiple anticholinergic medications used concurrently increase the risk of cognitive decline, delirium, and falls/fractures.
- Any combination of three or more antiepileptics, antidepressants (tricyclic antidepressants, SNRIs, and SSRIs), antipsychotics, benzodiazepines, nonbenzodiazepine benzodiazepine receptor agonist hypnotics, opioids, and skeletal muscle relaxants may increase the risk of falls.
- The use of lithium with ACE inhibitors, ARBs, ARNIs, or loop diuretics may increase the risk of lithium toxicity.
- Concomitant use of nonselective peripheral alpha-1 blockers and loop diuretics may increase the risk of urinary incontinence in older women.
- The use of phenytoin with trimethoprim-sulfamethoxazole may increase the risk of phenytoin toxicity.
- Concomitant use of theophylline with cimetidine or ciprofloxacin may increase the risk of theophylline toxicity.

- Warfarin used concurrently with amiodarone, ciprofloxacin, macrolides (except azithromycin), trimethoprim-sulfamethoxazole, or SSRIs may increase the risk of bleeding.

Medications to be Avoided or Have Their Dosage Reduced

- Ciprofloxacin
- Nitrofurantoin macrocrystals
- Trimethoprim-sulfamethoxazole
- AMILoride hydrochloride
- Dabigatran etexilate mesylate
- Dofetilide
- Edoxaban tosylate
- Enoxaparin sodium
- Fondaparinux sodium
- Rivaroxaban
- Sprionolactone
- Triamterene
- Baclofen
- DULoxetine
- Gabapentin
- Levetiracetam
- NSAIDS
- Pregabalin
- TraMADol
- Cimetadine
- Famotidine
- Nizatidine
- Colchicine
- Probenacid

Reference:

2023 American Geriatrics Society Beers Criteria® Update Expert Panel. (2023). American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *Journal of the American Geriatrics Society, 71*(7), 2052–2081.https://doi.org/10.1111/jgs.18372