

Prescribing Cascades and 2023 AGS Beers Criteria® Cardiovascular Pearls

**Rebecca Brynjulson, PharmD, BCACP, BCGP
IPPE Director and Assistant Professor of Practice
North Dakota State University School of Pharmacy**

Presenter Disclosure Statement

- I have no relevant financial interest or other relationship with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services that are discussed in this activity to disclose.

Learning Objectives

- At the conclusion of this presentation, participants should be able to:
 - Identify key cardiovascular recommendations in the 2023 AGS Beers Criteria®
 - Identify common prescribing cascades.
 - Practice recognizing potentially inappropriate medication use and prescribing cascades in older adult patient case scenarios.

AGS 2023 updated Beers Criteria® for potentially inappropriate use in older adults.

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

2023 AGS Beers Criteria® Cardiovascular Pearls

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

HIGHLIGHTS From TABLE 2
2023 American Geriatrics Society (AGS) Beers
Criteria® for potentially inappropriate medication
use in older adults

SELECTED CARDIOVASCULAR AND ANTITHROMBOTICS RECOMMENDATIONS

Aspirin

- Avoid “Aspirin for primary prevention of cardiovascular disease”
 - Avoid starting for this indication; consider deprescribing for this indication

Quality of Evidence	Strength of Recommendation
High	Strong

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

Warfarin

- Avoid “Warfarin for the treatment of nonvalvular atrial fibrillation or venous thromboembolism (VTE)”
 - Avoid starting warfarin for these indications unless there are contraindications or significant barriers to DOAC use.

Quality of Evidence	Strength of Recommendation
High	Strong

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

Rivaroxaban

- Avoid “Rivaroxaban for long-term treatment of nonvalvular atrial fibrillation or venous thromboembolism”
 - Increased risk of major bleeding and GI bleeding when compared to other DOACs

Quality of Evidence	Strength of Recommendation
Moderate	Strong

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

HIGHLIGHTS From TABLE 4
2023 American Geriatrics Society
Beers Criteria® for potentially inappropriate
medication use in older adults: DRUGS TO BE
USED WITH CAUTION IN OLDER ADULTS

SELECTED CARDIOVASCULAR AND ANTITHROMBOTICS RECOMMENDATIONS

Dabigatran

- Use Caution “Dabigatran for long term treatment of nonvalvular atrial fibrillation or venous thromboembolism (VTE)”
 - GI bleeding risk greater with dabigatran than warfarin
 - GI bleeding and major bleeding risk greater with dabigatran than apixaban

Quality of Evidence	Strength of Recommendation
Moderate	Strong

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

Case Scenario One

A 68 year old female with non valvular atrial fibrillation is seeing you in clinic today for an annual wellness exam. Upon review of her medications, you see she is taking dabigatran 150 mg by mouth twice daily. Based upon the updated 2023 AGS® Beers Criteria, what recommendation would you make?

- A. Continue dabigatran 150 mg by mouth twice daily.
- B. Discontinue dabigatran 150 mg by mouth twice daily, begin warfarin 2.5 mg by mouth daily.
- C. Discontinue dabigatran 150 mg by mouth twice daily, begin apixaban 5 mg by mouth twice daily
- D. Discontinue dabigatran 150 mg by mouth twice daily, begin rivaroxaban 20 mg by mouth once daily.

What is a prescribing cascade?



prescribing cascade

DEFINITION

“A prescribing cascade refers to the sequence of events in which an adverse drug event is misinterpreted as a new medical condition, leading to the addition of another, potentially unavoidable medication.”

Sternberg SA, Guy-Alfandary S, Rochon PA. Prescribing cascades in older adults. CMAJ Feb 2021 193(6) E215 DOI: 10.1503/cmaj.201564

Questions to ask as a prescriber...

- Could a previously prescribed medication be causing an adverse event that appears to be a new symptom?
 - If yes:
 - Is the offending medication needed?
 - If yes:
 - How could you best manage adverse effect/symptom without creating a prescribing cascade?

Sternberg SA, Guy-Alfandary S, Rochon PA. Prescribing cascades in older adults. CMAJ Feb 2021 193(6) E215 DOI: 10.1503/cmaj.201564

McCarthy LM, Savage R, Dalton K, et al.
ThinkCascades: A Tool for Identifying Clinically
Important Prescribing Cascades Affecting Older
People. *Drugs Aging*. 2022;39(10):829-840.
doi:10.1007/s40266-022-00964-9

Looking to the literature...

Study Design

- Modified Delphi Process
- Panel of Experts
- Multiple Rounds
- Final consensus reached

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840.
doi:10.1007/s40266-022-00964-9

ThinkCascades Results: Cardiovascular System

First Medication Prescribed	Observed Side Effect	Medication Prescribed to Treat Adverse Effect of First Medication
Calcium Channel Blocker	Peripheral Edema	Diuretic
Diuretic	Urinary incontinence	Overactive bladder medication

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840. doi:10.1007/s40266-022-00964-9; Micromedex, accessed August 2023

What does the 2023 AGS Beers Criteria® say about these medications...

First Medication Prescribed	Observed Side Effect	Medication Prescribed to Treat Adverse Effect of First Medication
Calcium Channel Blocker	Peripheral Edema	Diuretic
Diuretic	Urinary incontinence	Overactive bladder medication

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840. doi:10.1007/s40266-022-00964-9; Micromedex, accessed August 2023

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

ThinkCascades Results: Central Nervous System

First Medication Prescribed	Observed Side Effect	Medication Prescribed to Treat Adverse Effect of First Medication
Antipsychotic	Extrapyramidal symptoms	Antiparkinsonian Agent
Benzodiazepine	Cognitive Impairment	Cholinesterase Inhibitor or memantine
Benzodiazepine	Paradoxical agitation or agitation secondary to withdrawal	Antipsychotic
SSRI/SNRI	Insomnia	Sleep agent (benzodiazepines, benzodiazepine receptor agonists, sedating antidepressant, melatonin)

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840. doi:10.1007/s40266-022-00964-9; Micromedex, accessed August 2023

What does the 2023 AGS Beers Criteria® say about these medications...

First Medication Prescribed	Observed Side Effect	Medication Prescribed to Treat Adverse Effect of First Medication
Antipsychotic	Extrapyramidal symptoms	Antiparkinsonian Agent
Benzodiazepine	Cognitive Impairment	Cholinesterase Inhibitor or memantine
Benzodiazepine	Paradoxical agitation or agitation secondary to withdrawal	Antipsychotic
SSRI/SNRI	Insomnia	Sleep agent (benzodiazepines, benzodiazepine receptor agonists, sedating antidepressant, melatonin)

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840. doi:10.1007/s40266-022-00964-9; Micromedex, accessed August 2023

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

ThinkCascades Results: Musculoskeletal System

First Medication Prescribed	Observed Side Effect	Medication Prescribed to Treat Adverse Effect of First Medication
NSAID	Hypertension	Antihypertensive

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840. doi:10.1007/s40266-022-00964-9; Micromedex, accessed August 2023

What does the 2023 AGS Beers Criteria® say about these medications...

First Medication Prescribed	Observed Side Effect	Medication Prescribed to Treat Adverse Effect of First Medication
NSAID	Hypertension	Antihypertensive

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840. doi:10.1007/s40266-022-00964-9; Micromedex, accessed August 2023

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

ThinkCascades Results: Urogenital System

First Medication Prescribed	Observed Side Effect	Medication Prescribed to Treat Adverse Effect of First Medication
Urinary Anticholinergics	Cognitive impairment	Cholinesterase inhibitor or memantine
Alpha-1 Receptor Blocker	Orthostatic Hypotension, dizziness	Vestibular sedative (e.g. betahistine, antihistamines, benzodiazepines)

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840. doi:10.1007/s40266-022-00964-9; Micromedex, accessed August 2023

What does the 2023 AGS Beers Criteria® say about these medications...

First Medication Prescribed	Observed Side Effect	Medication Prescribed to Treat Adverse Effect of First Medication
Urinary Anticholinergics	Cognitive impairment	Cholinesterase inhibitor or memantine
Alpha-1 Receptor Blocker	Orthostatic Hypotension, dizziness	Vestibular sedative (e.g. betahistine, antihistamines, benzodiazepines)

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840. doi:10.1007/s40266-022-00964-9; Micromedex, accessed August 2023

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

Prescribing Cascade Clinical Scenario One

- A 72 year old female presents to your clinic to establish care. She currently lives independently in the community in her home and is an active volunteer and substitute high school English teacher. As part of her visit today, her medications are reviewed for appropriateness. Today she reports her knees are bothering her quite a bit and she's been having difficulty sleeping which is limiting her ability to be as active as she'd like.
- PMH
 - HTN, diagnosed May 2013
 - Dyslipidemia, diagnosed May 2008
 - Osteoarthritis in both knees

Prescribing Cascade Clinical Scenario One

Vital Signs and Lab Values

BP 132/82 mmHg (sitting, L arm) BP 128/76 (standing, L arm), P 81 bpm, RR 15, T 98.2°F,
Wt. 72.7 kg, Ht 5'6"

BMP (today)	Na	138 mEq/L
	K	4.1 mEq/L
	Cl	104 mEq/L
	CO2	27 mEq/L
	Glu	96 mg/dL
	Calcium, serum	9.1 mg/dL
	BUN	16 g/dL
	SCr	1.0 mg/dL

TSH (today): 2.1 mU/L

Fasting Lipid Panel (today) TC: 202 mg/dL, HDL 35 mg/dL, LDL 102 mg/dL, TG 160 mg/dL

Current Medications

- Hydrochlorothiazide 25 mg by mouth daily
- Lisinopril 20 mg by mouth daily
- Atorvastatin 40 mg by mouth daily
- APAP 500 mg po as needed for knee pain

Prescriber Recommends

- Ibuprofen 400 mg by mouth three times daily for osteoarthritis of knee
- Temazepam 7.5 mg by mouth once daily for sleep

Do you agree with these recommendations?

Prescribing Cascade Clinical Scenario Two

- A 73 year old female presents to your clinic for follow-up. It's been 6 months since she last saw her provider, who is currently out of the office on personal leave. She currently lives independently in the community in her home and is an active volunteer and substitute high school English teacher, although she's not sure she'll keep substituting. She states "my memory isn't what it used to be." Today she reports her knees have been feeling better and she's sleeping better. She had her blood pressure checked at the Senior Center Screening event last week and it was 152/90 mmHg. She checked it at home yesterday and it was 150/88 mmHg.
- PMH
 - HTN, diagnosed May 2003, inadequately treated until 2013
 - Dyslipidemia, diagnosed May 2008
 - Osteoarthritis in both knees
 - Insomnia

Prescribing Cascade Clinical Scenario Two

Vital Signs and Lab Values

BP 154/82 mmHg (sitting, L arm) BP 148/78 (standing, L arm), P 82 bpm, RR 15, T 98.2°F,
Wt. 71 kg, Ht 5'6"

BMP (today)	Na	138 mEq/L
	K	4.2 mEq/L
	Cl	104 mEq/L
	CO2	27 mEq/L
	Glu	98 mg/dL
	Calcium, serum	9.1 mg/dL
	BUN	17 g/dL
	SCr	1.0 mg/dL

Current Medications

- Hydrochlorothiazide 25 mg by mouth daily
- Lisinopril 20 mg by mouth daily
- Atorvastatin 40 mg by mouth daily
- APAP 500 mg po as needed
- Ibuprofen 400 mg by mouth three times daily
- Temazepam 7.5 mg by mouth once daily

Prescriber Recommends

- Amlodipine 5 mg by mouth once daily for high blood pressure

Do you recognize the potential prescribing cascades?

Prescribing Cascade Clinical Scenario Three

- A 73 year old female presents to your clinic for follow-up. It's been 6 months since she was last seen. Today, her daughter is with her. She currently lives independently in the community in her home but her children have become increasingly concerned. She seems to have gotten more forgetful in the past year and they wonder if she might be developing early stages of Alzheimer's. Her daughter also reports that both of her mom's ankles have been slightly swollen as well. Her blood pressure checks at the Senior Center have all been "good" according to the patient's daughter.
- PMH
 - HTN, diagnosed May 2003, inadequately treated until 2013
 - Dyslipidemia, diagnosed May 2008
 - Osteoarthritis in both knees
 - Insomnia

Prescribing Cascade Clinical Scenario Three

Vital Signs and Lab Values

BP 134/82 mmHg (sitting, L arm) BP 130/78 (standing, L arm), P 82 bpm, RR 15, T 98.2°F, Wt. 71 kg, Ht 5'6", 1+ bilateral pitting edema on ankles noted on physical exam.

BMP (today)	Na	138 mEq/L
	K	4.1 mEq/L
	Cl	103 mEq/L
	CO2	27 mEq/L
	Glu	97 mg/dL
	Calcium, serum	9.1 mg/dL
	BUN	17 g/dL
	SCr	1.1 mg/dL

Current Medications

- Hydrochlorothiazide 25 mg by mouth daily
- Lisinopril 20 mg by mouth daily
- Amlodipine 5 mg by mouth once daily
- Atorvastatin 40 mg by mouth daily
- APAP 500 mg po as needed
- Ibuprofen 400 mg by mouth three times daily
- Temazepam 7.5 mg by mouth once daily

Prescriber Recommends

- Elevate feet and limit salt in diet. Consider compression stocking and diuretic use in future.
- Recommend referral for evaluation of memory concerns

Do you recognize the potential prescribing cascades?

References

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2023; 71(7): 2052-2081. doi:[10.1111/jgs.18372](https://doi.org/10.1111/jgs.18372)

Chen A, Stecker E, Warden BA. Direct Oral Anticoagulant Use: A Practical Guide to Common Clinical Challenges. *JAHA* Jul 2020 9(13): 1-18. DOI: [10.1161/JAHA.120.017559](https://doi.org/10.1161/JAHA.120.017559)

Micromedex, accessed September 2023.

Sternberg SA, Guy-Alfandary S, Rochon PA. Prescribing cascades in older adults. *CMAJ* Feb 2021 193(6) E215 DOI: [10.1503/cmaj.201564](https://doi.org/10.1503/cmaj.201564)

McCarthy LM, Savage R, Dalton K, et al. ThinkCascades: A Tool for Identifying Clinically Important Prescribing Cascades Affecting Older People. *Drugs Aging*. 2022;39(10):829-840. doi:[10.1007/s40266-022-00964-9](https://doi.org/10.1007/s40266-022-00964-9)