



**BAD, GOOD, OR POTENTIALLY  
INAPPROPRIATE  
WHAT'S INSIDE THE PILLBOX?**

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# MEET THE SPEAKER

- Director, HbL PharmaConsulting
- Adjunct instructor at the St. Louis College of Pharmacy at University of Health Sciences and Pharmacy in St. Louis
- Author, “Maybe It’s Your Medications” (2023)
- Past president of the American Society of Consultant Pharmacists (2022)
- Clinical pharmacy residency at Shands Hospital at the University of Florida.
- Doctor of Pharmacy and Bachelor of Arts degrees from the University of Michigan



# OBJECTIVES

1. Define potentially inappropriate medications and the AGS Beers Criteria
2. Recognize common potentially inappropriate medications in older adults
3. Identify resources that empower caregivers and older adults to engage with their health-care team to avoid potentially inappropriate medications

# MEDICATION USE IN OLDER ADULTS

- 41% of older adults take 5 or more medications
  - 3-fold increase since 1988 (13%)
  - 40% use over-the-counter (OTC) products
  - >70% use dietary supplements

“Polypharmacy”

- Hyperpolypharmacy
- Excessive polypharmacy

“Inappropriate Polypharmacy”

“Medication Overload”

# HARMS OF MEDICATION OVERLOAD

Estimated 280,000 hospitalizations in 2018 because of adverse drug events

- \$3.8 billion in health-care costs

Cost concerns

- 54% of adults >50 years old indicated concern about being able to afford their medications (per survey 2024)

Adverse drug events

- Risk increases 7-10% with each added medication

Delirium & cognitive impairment

- Older adults taking 10 drugs are 2.5x more likely to have cognitive impairment compared to those taking <5 drugs

Falls

- Taking 4 or more drugs associated with 18% increased fall risk
- Taking 10 or more...50% increased risk

Mortality

- Polypharmacy associated with increased risk of death in a “dose-dependent” manner
- 1 to 4 meds: relative risk 1.24; 6 to 9 meds, RR 1.59; >9 meds, RR 1.96

Lown Institute 2019

U. Michigan Poll on Health Aging May/ June 2024

# CLIENT SCENARIO

Mr. G is an 87 y.o. male

He questions if his medications are helping him. He recently has ~~medicated~~ with additional pain and sleep medications due to increased pain following a fall (a folding chair he was sitting on collapsed)

Social history: Lives with spouse in senior apartment building (independent living); retired owner of insurance agency; maintains active lifestyle. Two daughters, one lives in town. He and his wife come to the senior center usually 2 days per week.

Height: 5 ft. 7 in.; Weight: 140

## CLIENT SCENARIO MEDICATION LIST

Drug name	Reason patient is taking it	Drug category (if applicable)
Diltiazem ER 120 mg once daily	High blood pressure	Calcium channel blocker
Metformin XL 1000 mg once daily	Diabetes type 2	Biguanide
Glipizide XL 5 mg once daily	Diabetes type 2	Sulfonylurea
Xarelto (rivaroxaban) 10 mg once daily	Atrial fibrillation	Anticoagulant
Lexapro (escitalopram) 20 mg once daily	Depression and anxiety	SSRI
Acetaminophen 500 mg, 4 times a day	Pain	(OTC pain medicine)
Gabapentin 600 mg 3 times a day	Pain (nerve related)	Gabapentinoid, antiepileptic drug
Sonata (zaleplon) 5 mg once daily (bedtime)	Sleep	Non-benzodiazepine hypnotic
Montelukast 10 mg once daily	(patient doesn't know)	Leukotriene antagonist
As needed medications		
Hydrocodone/acetaminophen 5/325 mg, every 6h as needed (takes 3 times a day)	Pain	Opioid pain combination medicine
Doxylamine, dextromethorphan, pseudoephedrine liquid (takes 3 or 4 times a day)	Cough	OTC cough & cold product
Blink OTC lubricating eye drops	Dry eyes	Artificial tears
Tylenol PM (added recently; takes nightly)	"can't sleep"	OTC sleep product

# RISK & BENEFIT OF MEDICATIONS

- Risks & benefits shift with age
- Role of shared decision-making regarding drug therapy



## How benefits are affected

- Unknown efficacy in oldest old (lack of research)
- Effect of other health conditions
- Patient preferences might change

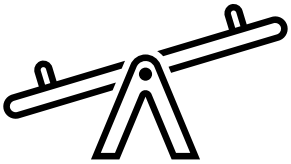


## How risks are affected

- Age-related physiologic changes
- Multiple chronic conditions
- Interactions
- More medications (polypharmacy)



# POTENTIALLY INAPPROPRIATE MEDICATIONS (PIMs)



Definition: medications for which potential adverse effects may exceed the expected benefits in adults age 65 and older

- Identified by geriatrics experts as higher-risk medications that should be avoided when safer options are available (or used with caution)
- In general, benefits of these medicines are diminished and/ or adverse effects are increased

AGS Beers Criteria®: Drug listing of PIMs in the US

- “Explicit Criteria” -- straightforward to interpret
- Includes rationale that explains in what situations criteria apply
- Includes strength of recommendation (strong or weak)

Not a litmus test of good/ bad

- Educational tool that indicates where & when caution should be applied

# AGS BEERS CRITERIA® OVERVIEW

First created in 1991 for nursing home residents

Most recent update in 2023; for all settings except hospice, palliative care

- 36 criteria of drugs to avoid (includes drugs & drug classes)
- 9 criteria of drugs to avoid with certain disease states or syndromes

Target audience practicing clinicians and others, such as health care consumers, pharmacy benefits managers, policymakers...

Purpose: reduce adverse drug event & related problems and improve medication selection and use in older adults; serve as a teaching and research tool

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

Journal of the American Geriatrics Society 2023;71(7):2052-2081

<https://agsjournals.online.library.wiley.com/doi/pdf/10.1111/jgs.18372>

# AGS BEERS, PIMLISTINGS

Table 2 (Contd.)

Organ System, Therapeutic Category, Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Pain medications				
Meperidine	Oral analgesic not effective in dosages commonly used; may have higher risk of neurotoxicity, including delirium, than other opioids; safer alternatives available	Avoid	Moderate	Strong
Non-cyclooxygenase-selective NSAIDs, oral:	Increased risk of gastrointestinal bleeding or peptic ulcer disease in high-risk groups, including those >75 years or taking oral or parenteral corticosteroids, anticoagulants, or antiplatelet agents; use of proton-pump inhibitor or misoprostol reduces but does not eliminate risk. Upper gastrointestinal ulcers, gross bleeding, or perforation caused by NSAIDs occur in ~1% of patients treated for 3-6 months and in ~2%-4% of patients treated for 1 year; these trends continue with longer duration of use. Also can increase blood pressure and induce kidney injury. Risks are dose related.	Avoid chronic use, unless other alternatives are not effective and patient can take gastroprotective agent (proton-pump inhibitor or misoprostol)	Moderate	Strong
Aspirin >325 mg/day Diclofenac Diflunisal Etodolac Fenoprofen Ibuprofen Ketoprofen Meclofenamate Mefenamic acid Meloxicam Nabumetone Naproxen Oxaprozin Piroxicam Sulindac Tolmetin				

# TYPES OF DRUGS CONSIDERED PIMS

## Blood thinners

- Bleeding risk

## Diabetes medications (selected)

- Low blood sugar risk  
(HYPOglycemia)

## Opioid pain medications

- Falls, cognitive impairment, sedation, overdose risk
- Drug interaction concerns

## Anticholinergic drugs

- Risk of confusion, dementia, falls, constipation, blurred vision...

## Miscellaneous Others

- Fall-risk drugs
- Antipsychotic agents
  - Risk of stroke, death in patients with dementia
- Benzodiazepines/ sedative agents

# BEERS CRITERIA: BLOODTHINNERS

Drug Category	Examples of drugs	Comments/Reason Why a PIM
Antiplatelet agents	Aspirin	<ul style="list-style-type: none"> <li>Do not initiate to prevent a <u>first</u> stroke or heart attack (primary prevention); consider stopping</li> <li>Risk of bleeding.</li> </ul>
Anticoagulants*	Warfarin (Coumadin)	<ul style="list-style-type: none"> <li>Avoid starting as initial therapy [for certain uses] unless other options not available; risk of bleeding</li> <li>Reasonable to continue if patient has been stable on it</li> </ul>
	Rivaroxaban (Xarelto)	<ul style="list-style-type: none"> <li>Avoid for long-term use; risk of bleeding higher in older adults compared to other options</li> <li>May be reasonable in certain situations</li> </ul>
	Dabigatran (Pradaxa)	<ul style="list-style-type: none"> <li>Use with caution for long-term use (other options have lower bleeding risk in older adults)</li> </ul>

\*when used long-term in patients with atrial fibrillation to prevent a stroke or a blood clot in the leg or lung

# BEERS CRITERIA: DIABETES MEDICINES

Drug Category	Examples of drugs	Reason Why a PIM
Sulfonylureas	Glyburide Glipizide Glimepiride	<ul style="list-style-type: none"><li>• Risk of low blood sugar</li><li>• Increased risk of heart disease (compared to other diabetes agents)</li></ul>
SGIT-2* inhibitors ("flozin" drugs)	Farxiga® - dapgliflozin Invokana® - canagliflozin Jardiance® - empagliflozin Others	<ul style="list-style-type: none"><li>• Use with caution due to risk of genital infections (e.g., yeast infections) &amp; urinary tract infections</li></ul>
*sodium-glucose co-transporter 2		

# BEERS CRITERIA: OPIOID PAIN MEDICINES

## When certain diseases/syndromes are present

- History of falls or fracture (avoid -- except if severe, acute pain)
- Delirium (“emerging data” show an association with delirium)

## Drug interactions risks:

- Benzodiazepines – increased risk overdose, adverse events
  - drugs for sleep or anxiety like lorazepam (Ativan®), alprazolam (Xanax®), diazepam (Valium®)
- Gabapentin (Neurontin), pregabalin (Lyrica) – risk of severe sedation-related events, diminished breathing
  - seizure meds used for nerve pain
- In combination with other “CNS-active” drugs (use of 3 or more increases risk of falls, fractures
  - Opioids, antidepressants, antipsychotics, anxiety medicines, muscle relaxants, seizure medicines, sleep medicines

# BEERS CRITERIA: ANTICHOLINERGIC DRUGS

These medications work by blocking a chemical in the nervous system called acetylcholine.

- Acetylcholine has effects throughout the body
- For example, heart, gut, bladder, sweat glands, lungs

Anticholinergic medications act on many parts of the body at the same time

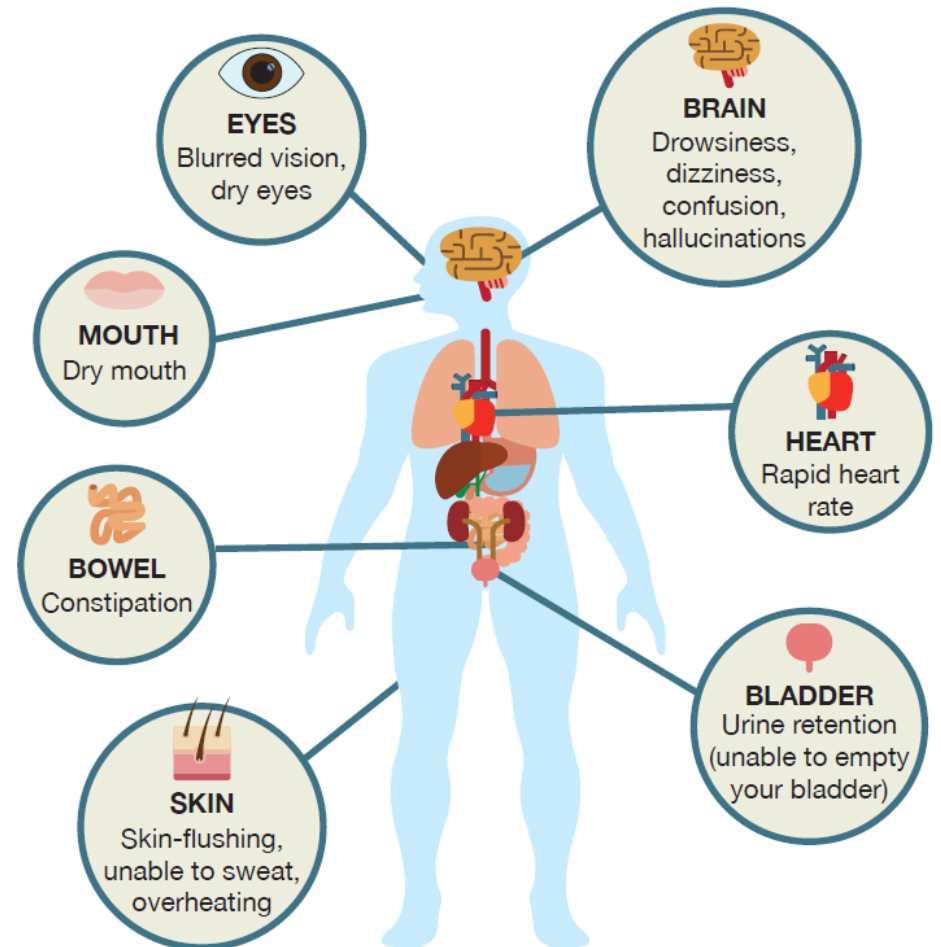
- Therapeutic effects, but also side effects

Dry mouth, dry eyes, blurred vision, constipation, urinary retention

Risk of confusion, cognitive impairment, and possibly dementia in older adults

CUMULATIVE exposure associated with falls, delirium, and dementia

Some common side effects from anticholinergic medications:



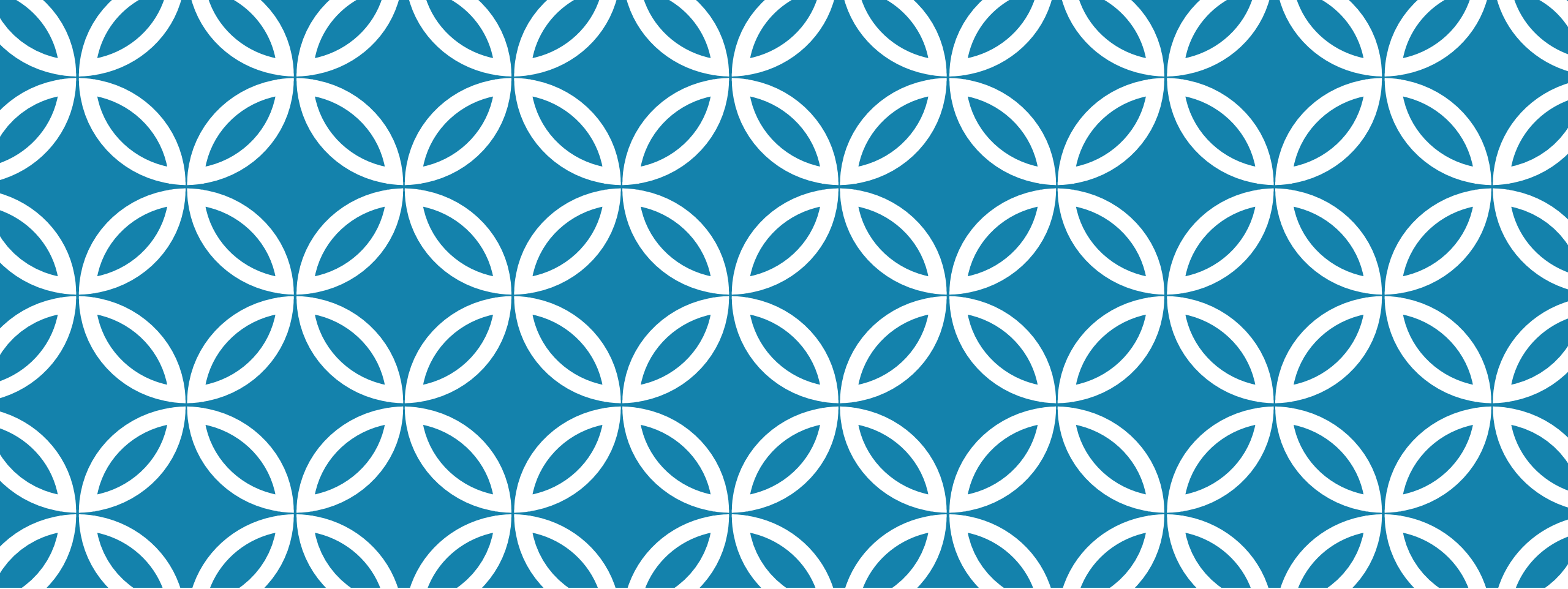


# EXAMPLES OF ANTICHOLINERGIC MEDICATIONS

Type of drug/drug class	Examples
Allergy medications – older antihistamines*	Benadryl® - diphenhydramine; ChlorTrimeton® - chlorpheniramine
Antidepressants	Paxil® - paroxetine; Elavil® - amitriptyline; Pamelor® - nortriptyline
Antipsychotics	Zyprexa® - olanzapine; Seroquel® - quetiapine
Bladder control medications	Detrol® - tolterodine; Ditropan® - oxybutynin
Sleeping pills	trazodone; *OTC antihistamines like Unisom® - doxylamine; Tylenol® PM – diphenhydramine
Muscle relaxants	Robaxin® - methocarbamol; Flexeril® - cyclobenzaprine

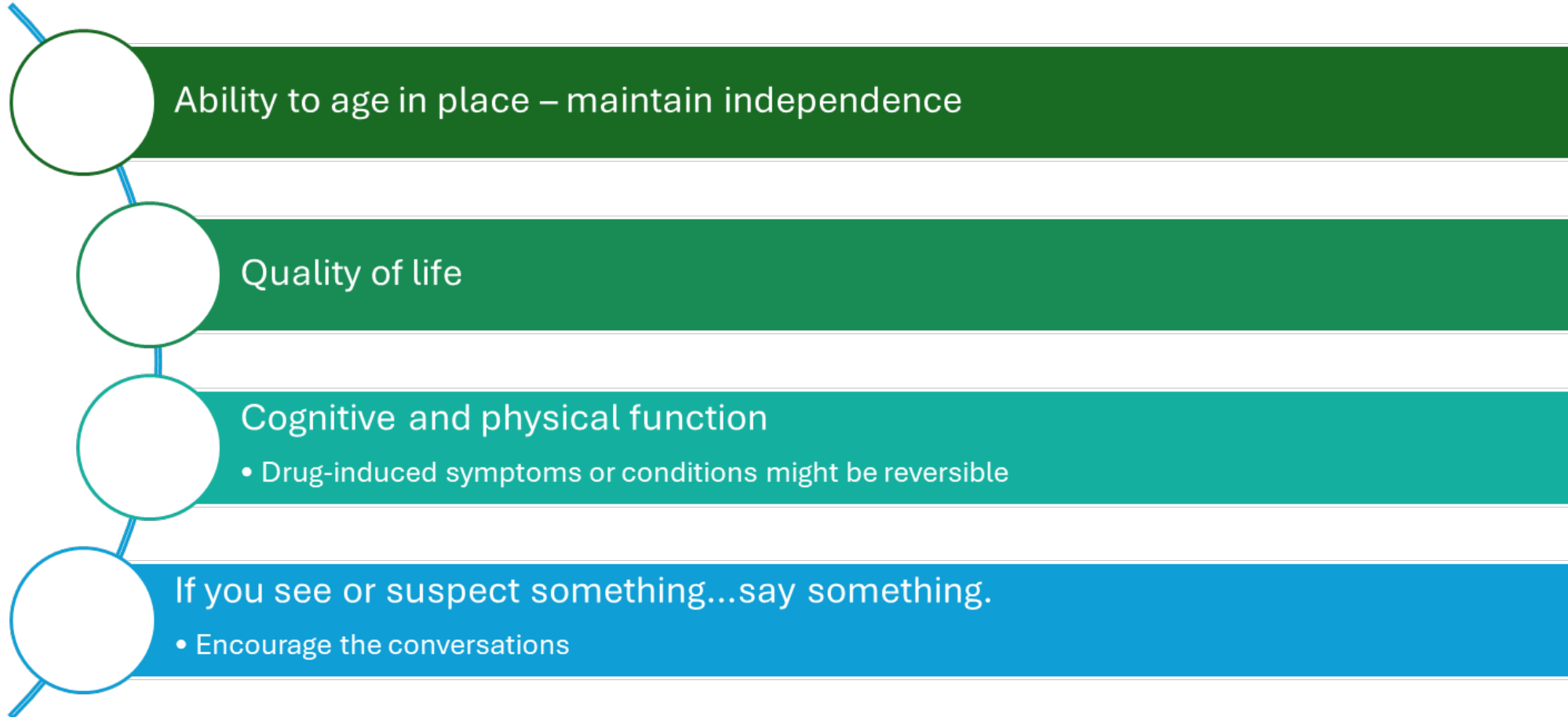
# BEERS CRITERIA: MISCELLANEOUS OTHERS

Drug Category	Examples of drugs	Reason Why a PIM
Fall risk drugs	Anticholinergic drugs, anti-depressant drugs, antiepileptic drugs, antipsychotic agents, benzodiazepines & nonbenzodiazepine hypnotics, opioid pain medicines	<ul style="list-style-type: none"> <li>• Gait imbalance, impaired concentration &amp; coordination; additive fall risk in persons with history of a fall.</li> </ul>
Antipsychotic agents	Seroquel®, Zyprexa®, Risperdal®, Haldol®, others	<ul style="list-style-type: none"> <li>• Avoid unless for FDA-approved reasons.</li> <li>• Increased risk of stroke, death in patients with dementia</li> <li>• Cognitive impairment, stroke risk, falls</li> </ul>
Benzodiazepines & Nonbenzodiazepines (Z-drugs)	Alprazolam (Xanax), lorazepam (Ativan), diazepam (Valium), zolpidem (Ambien), zaleplon (Sonata), others	<ul style="list-style-type: none"> <li>• Physical dependence; risk of cognitive impairment, delirium, falls, fractures, motor vehicle accidents</li> </ul>
Drugs needing adjusted with kidney impairment	[too numerous to list]	<ul style="list-style-type: none"> <li>• Increased risk adverse effects, toxicity</li> <li>• Age-related kidney function decline</li> <li>• Chronic kidney disease</li> </ul>



HOW CAN WE APPLY THIS  
INFORMATION TO HELP OUR CLIENTS

# IMPORTANCE OF THE BEERS CRITERIA



# BE AMBASSADORS FOR SAFER MEDICATION USE



## Be aware of PIMs

- Risk-benefit balance for medications can shift as we get older

## Patients/clients need to talk about medications with their health care team

- It's OK to have conversations with health care providers about AGS Beers Criteria
- Ask questions, be informed

## Limit exposure to unnecessary and potentially harmful medications

- Explore non-drug treatments with health-care team
- ...And other ways to reduce the number of medications a person takes

# BACK TO OUR CLIENT

Mr. G is an 87y.o. male

He questions if his medications are helping him. He recently has ~~been~~ ~~with~~ ~~additional~~ ~~pain~~ and sleep medications due to increased pain following a fall (a folding chair he was sitting on collapsed)

Social history: Lives with spouse in senior apartment building (independent living); retired owner of insurance agency; maintains active lifestyle. Two daughters, one lives in town. He and his wife come the senior center usually 2 days per week.

UPDATE: His wife expresses concern because of recent changes in Mr. G's behavior and cognitive function. He has fallen twice in the past week; he seems more forgetful. A recent blood glucose reading at home was 70 mg/dL

# CLIENT SCENARIO, MEDICATION LIST

Drug name	Reason patient is taking it	Drug category (if applicable)
Diltiazem ER 120 mg once daily	High blood pressure	Calcium channel blocker
Metformin XL 1000 mg once daily	Diabetes type 2	Biguanide
→ Glipizide XL 5 mg once daily	Diabetes type 2	Sulfonylurea
→ Xarelto (rivaroxaban) 10 mg once daily	Atrial fibrillation	Anticoagulant
Lexapro (escitalopram) 20 mg once daily	Depression and anxiety	SSRI
Acetaminophen 500 mg, 4 times a day	Pain	(OTC pain medicine)
Gabapentin 600 mg 3 times a day	Pain (nerve related)	Gabapentinoid, antiepileptic drug
→ Sonata (zaleplon) 5 mg once daily (bedtime)	Sleep	Non-benzodiazepine hypnotic
Montelukast 10 mg once daily	(patient doesn't know)	Leukotriene antagonist
As needed medications		
→ Hydrocodone/acetaminophen 5/325 mg, every 6h as needed (takes 3 times a day)	Pain	Opioid pain combination medicine
→ Doxylamine, dextromethorphan, pseudoephedrine liquid (takes 3 or 4 times a day)	Cough	OTC cough & cold product
Blink OTC lubricating eye drops	Dry eyes	Artificial tears
→ Tylenol PM (added recently; takes nightly) (diphenhydramine in it)	"can't sleep"	OTC sleep product

# ASSESSING AGS BEERS MEDICATIONS

Medications that could contribute to fall risk?

Medications that could contribute to cognitive changes?

Medication that could cause low blood sugar

Other medicines on AGS Beers list:



# ASSESSING AGS BEERS MEDICATIONS

## Medications that could contribute to fall risk?

“CNS-active” meds

- Gabapentin
- Lexapro
- Sonata
- Hydrocodone/  
acetaminophen

Doxylamine cough liquid  
& Tylenol PM are  
anticholinergic drugs

## Medications that could contribute to cognitive changes?

Tylenol PM recently  
added to  
doxylamine (in the  
cough product) –  
anticholinergic  
medications

## Medication that could cause low blood sugar

Glipizide is a  
“sulfonylurea”  
diabetes  
medication;  
patient needs to  
have sufficient food  
intake when taking  
this medication

## Other medicines on AGS Beers list:

Xarelto – need to  
balance bleeding  
risks with convenient  
once-daily dosing,  
for example

# STRATEGIES & RESOURCES





# IF SOMEONE IS TAKING A MEDICATION ON THE BEERS LIST

It's OK to remind the physician (prescriber) that the drug is on the AGS Beers Criteria®, and to ask whether another treatment might be safer and more effective.

Value in having the conversation, regardless

- “Are any of my medications on the Beers List?”
- “I’ve heard about the Beers Criteria; could you review my medicines to see if I am taking any of these drugs?”

# PIMSPILUS – RESOURCE FOR CONSUMERS & HEALTHCARE PROFESSIONALS

Collaborative effort with Department of Family Medicine at McMaster University, American Society of Consultant Pharmacists (ASCP), and Taper MD

<https://www.pimspilus.org/>

## PIMsPlus Drug Search

- Can search by drug name
- Links to MedlinePlus.gov drug information page
- PIMsPlus Notes – provides information if it is considered a “PIM”
- Links to TaperMD website (for healthcare professionals though)

# IF YOU LOOK UP GLYBURIDE, FOR EXAMPLE

## PIMsPlus Notes

### *glyburide (glibenclamide)*

May increase risk of severe or prolonged hypoglycemia.


At eGFR < 30 avoid use; eGFR between 30 - 44 adjust dose (Must Be Considered).

# HEALTHINAGING WEBSITE (AMERICAN GERIATRICS SOCIETY FOUNDATION)

HealthinAging.org

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About Us

Aging & Health A-Z

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Medications & Older Adults

Vaccinations For Older Adults



ASK THE EXPERT

HealthinAging.org

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Ask The Expert: What To Do If A Medication You Take Is Listed In The AGS Beers Criteria® For Potentially Inappropriate Medication Use In Older Adults

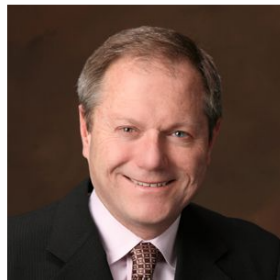
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AGS foundation website:

<https://www.healthinaging.org/>



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The AGS Beers Criteria® includes lists of certain medications that may not be the safest or most appropriate options for older

# HEALTHIN AGING WEBSITE (AGS FOUNDATION)

- AGS foundation web site: [https:// www.he a lthina ging.org/](https://www.healthinaging.org/)

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LEARN MORE

HealthinAging.org

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## Learn More: Ten Medications Older Adults Should Avoid Or Use With Caution

PRINT SHARE     

Because older adults often experience chronic health conditions that require treatment with multiple medications, there is a greater likelihood of experiencing unwanted drug side effects. Older people can also be more sensitive to certain medications.

To help you make better informed decisions about your medications, and to lower your chances of overmedication and serious drug reactions, the American Geriatrics Society Health in Aging Foundation recommends that older people be cautious about using the following types of medications, including some that can be purchased without a prescription (over-the-counter).

If you are taking any of these medications, talk to your healthcare provider or pharmacist. Do not stop taking any medication without first talking to your healthcare provider.

Need a PDF?  
**Ten Medications Older Adults Should Avoid or Use with Caution** (184.79 KB)

Medication	Reason
<b>USE WITH CAUTION</b> NonSteroidal Anti-Inflammatory Drugs (NSAIDs) NSAIDs are used to reduce pain and inflammation.	

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- Age-Friendly Healthcare & You
- Medications & Older Adults
- Vaccinations For Older Adults

## Medications & Older Adults

PRINT SHARE     

People 65 years old and older take prescribed medications more frequently than any other age group in the United States. Most older adults take several medicines to treat chronic illnesses. Healthcare providers may also prescribe medications to older adults to help prevent certain illnesses. This section provides important information on medication safety for us all as we age.



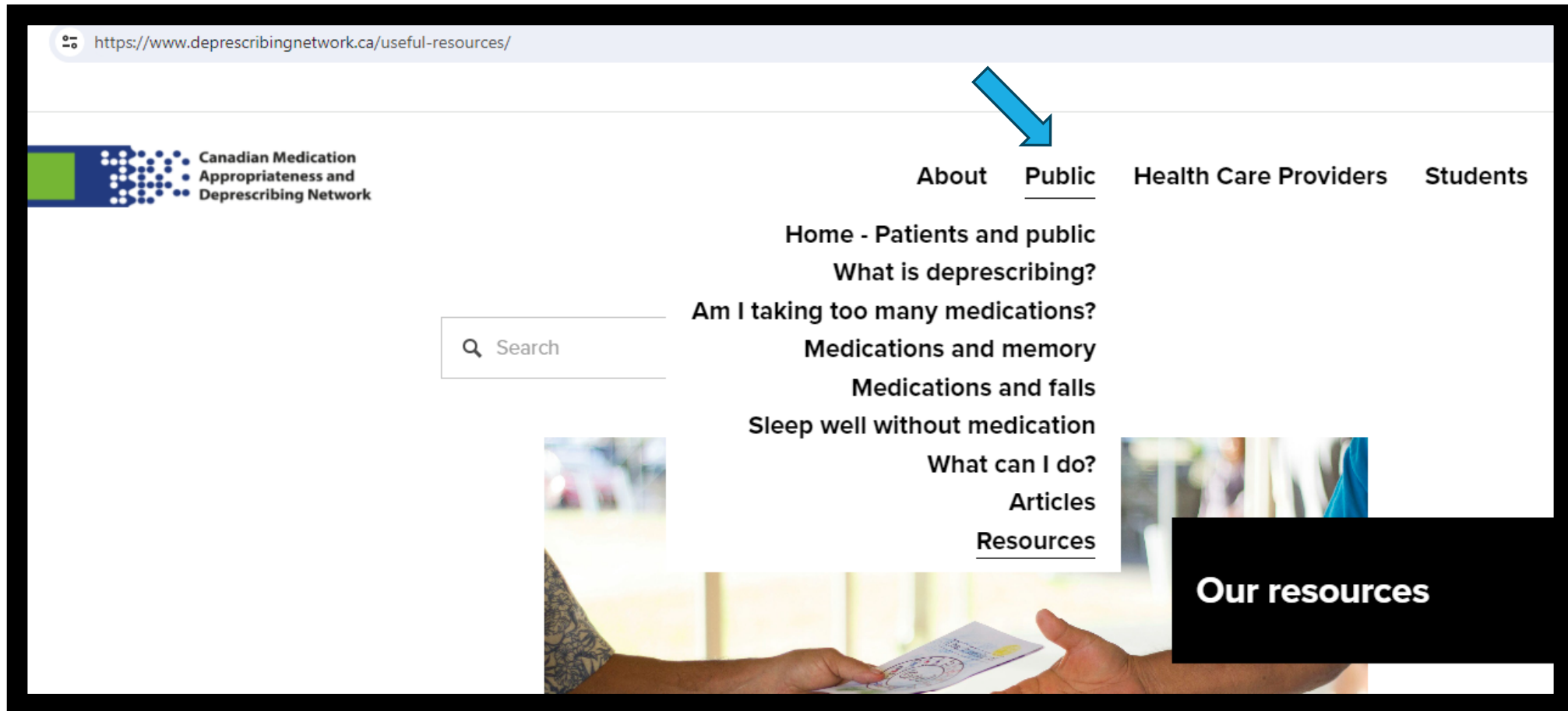
What Older Adults Can Do >



# RESOURCES FOR CONSUMERS FROM CANADA

Canadian Medication Appropriateness and Deprescribing Network: <https://www.deprescribingnetwork.ca/patients-and-public>

- “Patient and Public Resources” page
- <https://www.deprescribingnetwork.ca/useful-resources/>



Resources from Canada (deprescribingnetwork.ca)

# 2-SIDED HANDOUT ABOUT MEDICATIONS & AGING (DEPRESCRIBING NETWORK CA):

## What can you do?

**Book a special appointment with your health care professional to review your medications.**

What was good for you then may not be good for you now. That's why it's important to regularly review your medications with your doctor, pharmacist or nurse, especially if you take five or more medications.

Together, you may decide to **deprescribe** a medication. Deprescribing means reducing the dose or stopping a medication that may be causing harm.

### Questions to ask your doctor, pharmacist or nurse

1. Why am I taking this medication?
2. What are the potential benefits and harms of this medication?
3. Can it affect my memory or cause me to fall?
4. Can I stop or reduce the dose of this medication?
5. Who do I follow up with and when?

For more information on medications and aging, visit the Canadian Deprescribing Network at [deprescribingnetwork.ca](http://deprescribingnetwork.ca)

## As we get older, we should be careful with our medications

### Did you know?

Older adults are hospitalized five times more often than younger adults.

## As we age, our body becomes less efficient at processing medications

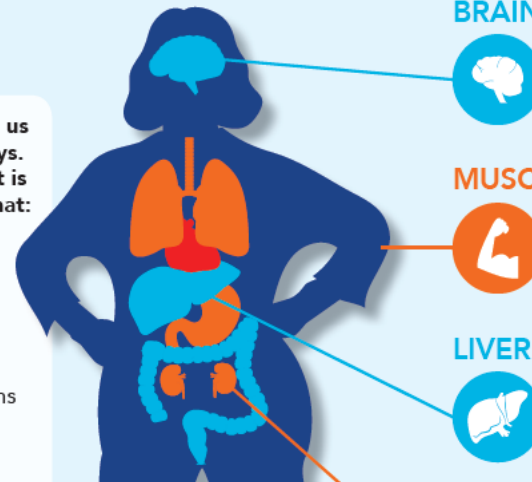
### How medications are processed in the body

#### Medications are:

1. **Absorbed** into the body
2. **Distributed** throughout the body via the bloodstream

Medications can help us in many different ways. However, with age, it is important to know that:

- We become more sensitive to the effects of medications.
- Our bodies do not process medications as efficiently.
- We are more likely to experience side effects.



#### BRAIN

The brain becomes more sensitive to drug effects. The effects of medications on the brain may also last longer.

#### MUSCLE & FAT

Some medications stay longer in our body because we have **less muscle and more body fat**.

#### LIVER

The liver becomes less efficient at eliminating some medications. This may lead to interactions when taking multiple medications.

# NATIONAL INSTITUTE ON AGING (NIA)

<b>Medicines &amp; medication management</b>	<ul style="list-style-type: none"><li>Managing medicines for person with Alzheimer's</li><li>Taking Medicines Safely as You Age</li></ul>	<a href="https://www.nia.nih.gov/health/medicines-and-medication-management">https://www.nia.nih.gov/health/medicines-and-medication-management</a>
<b>Medical care &amp; appointments</b>	<ul style="list-style-type: none"><li>What Should I Ask My Doctor During a Checkup? Understand your medications</li></ul>	<a href="https://www.nia.nih.gov/health/medical-care-and-appointments/what-should-i-ask-my-doctor-during-checkup#medications">https://www.nia.nih.gov/health/medical-care-and-appointments/what-should-i-ask-my-doctor-during-checkup#medications</a>
<p><a href="https://www.nia.nih.gov/">https://www.nia.nih.gov/</a> → Health Information tab → “Health Topics A-Z” → M (by alpha listing)</p>		

# SUMMARY AND TAKE-HOME POINTS

AGS Beers Criteria® = potentially inappropriate medications in adults  $\geq 65$  years old

- An educational tool to guide prescribing
- Medication risks outweigh benefits in many or certain situations

Grow awareness of PIMs and the need to always consider medicines as cause of a new symptom

- Ask about AGS Beers Criteria medications as part of regular medication review

Best to avoid prescribing PIMs unless safer options are not available

- Be aware of risks and how to reduce them (if a PIM is prescribed)

We need to talk about our medications!

- Shared decision making between patient and clinician

# THANK YOU



Sign up to receive my monthly newsletter on medication safety topics (scroll down on this link)

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[HBLpharm.com](http://HBLpharm.com)

Consumer resource: Maybe It's Your Medications ([MaybeItsYourMeds.com](http://MaybeItsYourMeds.com))

