Polypharmacy and Older Adults

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Hilton San Gabriel, CA

Financial Disclosures

The following CME planners have no relevant financial relationships with ineligible companies in the past 24 months:

- Leilanie Mercurio, Provider Continuing Education (PCE) Program Manager, L.A. Care Health Plan, CME Planner.
- Jennifer Schlesinger, MPH, CHES, Vice President, Healthcare Services & Professional Training, Alzheimer's Los Angeles, CME Planner.

The CME Presenter, Michelle S. Keller, PHD, MPH, Assistant Professor, USC Leonard Davis School of Gerontology, has relevant financial relationships with the following ineligible companies in the past 24 months:

- Scientific Advisor for Evidium, an AI knowledge engineering platform.
- Received funding from NIH/NIA.

All relevant financial relationships of Dr. Michelle S. Keller with ineligible companies have been mitigated.

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Commercial support was not received for this CME/CE activity.

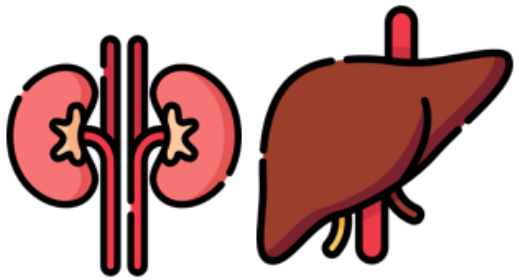
Learning Objectives

- **Specify and mitigate** potentially inappropriate medications.
- **Describe at least two (2) consequences** of anticholinergic burden in older adults.
- **Identify at least two (2)** common over-the-counter medications that have high anticholinergic burden.
- **Assess readiness to deliver** informed decision-making regarding medications in dementia management.

About Me

- Health services researcher at the USC Leonard School of Gerontology.
- U.S. Deprescribing Network.
- Research focuses on how to promote and disseminate interventions to reduce potentially inappropriate medications in older adults.

Polypharmacy in Older Adults



Aging leads to changes in pharmacokinetics, affecting medication absorption, distribution, metabolism, and excretion

Risks of unsafe medication use include:

- Increased falls and fractures
- Cognitive impairment, delirium, dementia, altered mental status
- Anticholinergic effects
- Increased hospitalizations
- Increased mortality

- 42% of older adults take 5 or more prescription medications
- Nearly 20% take 10 or more medications
- Reducing unnecessary medications could save up to $62 billion in hospitalizations over 10 years

Medication Overload and Older Americans. Lown Institute. https://lowninstitute.org/projects/medication-overload-how-the-drive-to-prescribe-is-harming-older-americans

Why is polypharmacy so harmful?

- Greater mortality, falls, fractures, motor vehicle accidents, functional and cognitive decline.
- Higher healthcare costs (average of $500 per year due to more hospitalizations, outpatient visits, etc.).
- Lower medication adherence.

Clark CM, Shaver AL, Aurelio LA, et al. Potentially Inappropriate Medications Are Associated with Increased Healthcare Utilization and Costs. *Journal of the American Geriatrics Society*. 2020/11/01 2020;68(11):2542-2550. doi:https://doi.org/10.1111/jgs.16743

How does polypharmacy affect medication adherence?

- For every additional medication in a patient's regimen, the odds of non-adherence increase by 16%.
- Medication adherence is an important concern in populations with lower levels of health literacy or Limited English Proficiency.

Gray SL, Mahoney JE, Blough DK. Medication adherence in elderly patients receiving home health services following hospital discharge. Annals of Pharmacotherapy. 2001 May;35(5):539-45.

Medication adherence in populations with low health literacy and language barriers

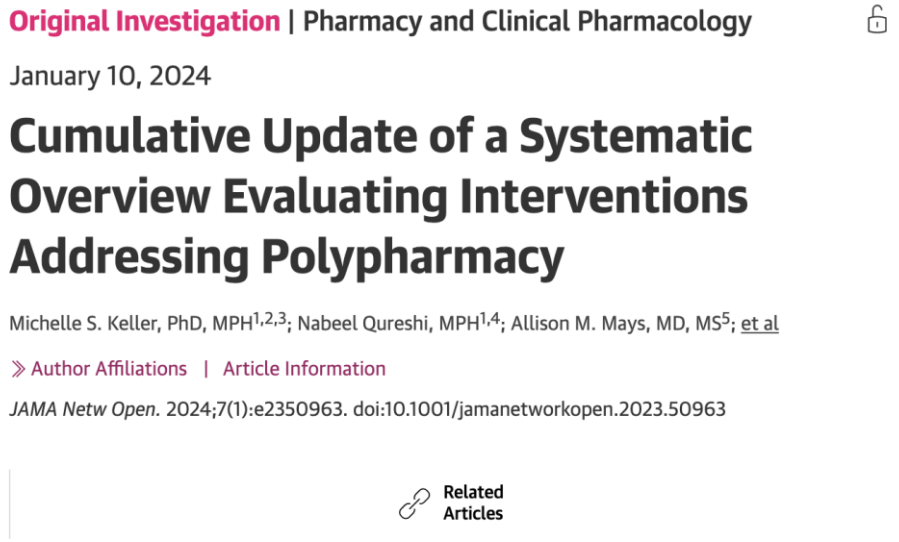
- Due to issues of cost, access, pharmacy deserts, health literacy, etc., rates of medication adherence are 5-8% lower in Black and Latino patients compared to other groups.
- In a study examining newly prescribed diabetes medications, non-adherence was higher for non-English speaking Latino patients (60%) compared to English-speaking Latino patients (52%) or English-speaking non-Latino White patients (37%).

Xie Z, St. Clair P, Goldman DP, Joyce G. Racial and ethnic disparities in medication adherence among privately insured patients in the United States. PloS one. 2019 Feb 14;14(2):e0212117.

Fernández A, Quan J, Moffet H, Parker MM, Schillinger D, Karter AJ. Adherence to newly prescribed diabetes medications among insured Latino and white patients with diabetes. JAMA internal medicine. 2017 Mar 1;177(3):371-9.

Improved medication adherence with management of polypharmacy

- Managing polypharmacy has been found to improve medication adherence in numerous studies.
- Managing polypharmacy has also been shown to reduce prescribing omissions and potentially inappropriate medications.



Original Investigation | Pharmacy and Clinical Pharmacology

January 10, 2024

Cumulative Update of a Systematic Overview Evaluating Interventions Addressing Polypharmacy

Michelle S. Keller, PhD, MPH[1,2,3]; Nabeel Qureshi, MPH[1,4]; Allison M. Mays, MD, MS[5]; et al

» Author Affiliations | Article Information

JAMA Netw Open. 2024;7(1):e2350963. doi:10.1001/jamanetworkopen.2023.50963

Related Articles

Key Points

Question What is the current evidence base for interventions focused on addressing polypharmacy on process, clinical, and health care use outcomes?

Findings This systematic overview of 14 systematic reviews noted that interventions to address polypharmacy appeared to reduce potentially inappropriate prescribing omissions and commissions (low to very low evidence quality). However, these interventions did not appear to meaningfully reduce mortality and health care (moderate to very low evidence quality), falls (moderate to very low evidence quality), or quality of life (very low evidence quality).

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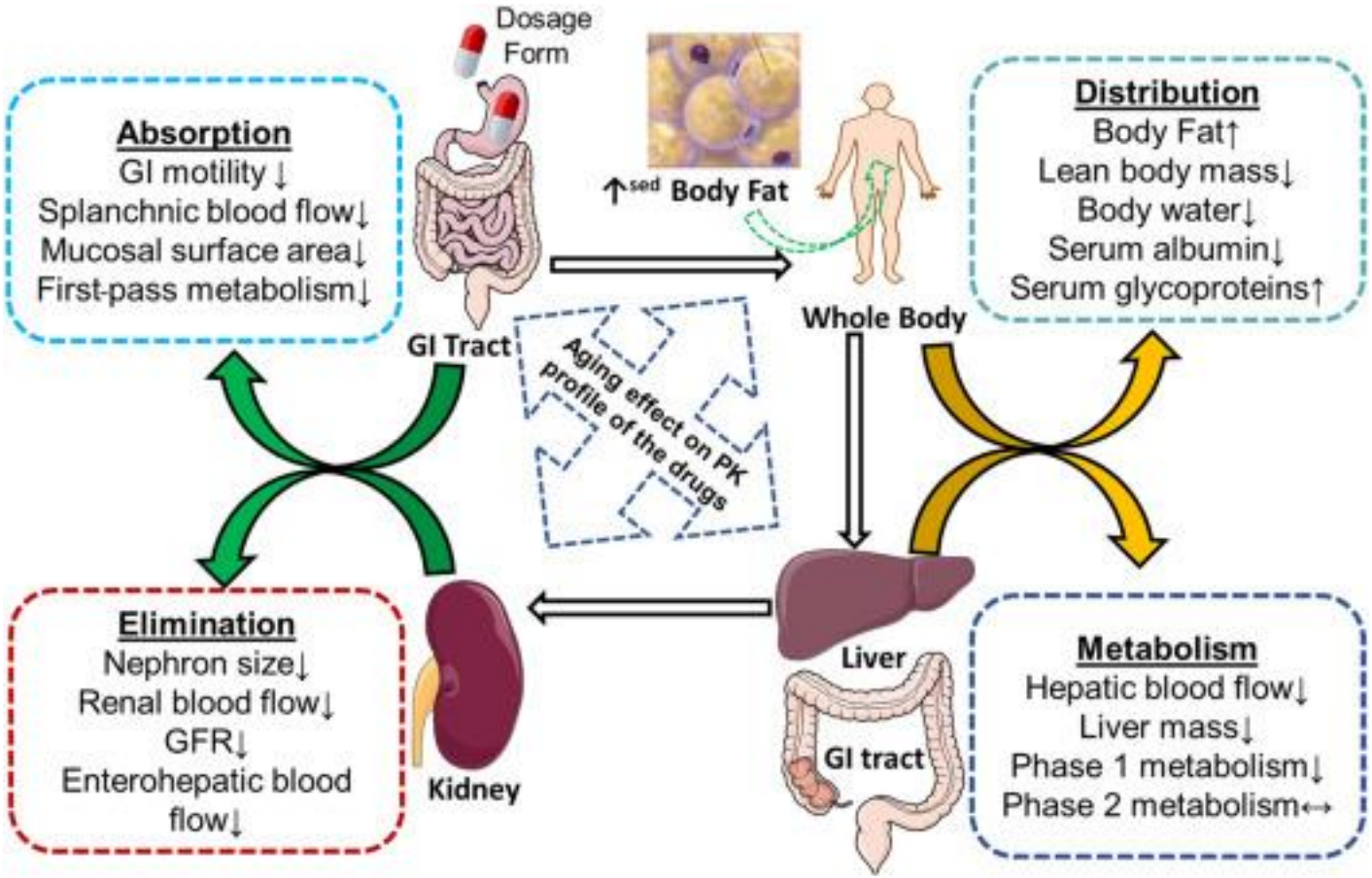
Keller MS, Qureshi N, Mays AM, Sarkisian CA, Pevnick JM. Cumulative update of a systematic overview evaluating interventions addressing polypharmacy. JAMA Network Open. 2024 Jan 2;7(1):e2350963-.

What causes polypharmacy?

- Chronic disease burden
- Automatic refills from pharmacies
- Fragmented care (multiple prescribers)
- Poor medical record-keeping
- Self-medication

What do we mean when we say a medication is "potentially inappropriate?"

- Inappropriate medication for older adults can include drugs that may pose a **higher risk of side effects** or **adverse reactions.**
- These risks are due to factors such as age-related changes in metabolism, potential interactions with other medications commonly taken by older individuals, and the presence of multiple chronic conditions.



Practice Gap: Overprescribing of potentially inappropriate medications

- 1 in 3 older adults in the U.S. is taking a medication that is potentially inappropriate.
- Use of potentially inappropriate medications increases by 17% after a dementia diagnosis.

Danijela Gnjidic, George O Agogo, Christine M Ramsey, Daniela C Moga, Heather Allore, The Impact of Dementia Diagnosis on Patterns of Potentially Inappropriate Medication Use Among Older Adults, *The Journals of Gerontology: Series A*, Volume 73, Issue 10, October 2018, Pages 1410–1417, https://doi.org/10.1093/gerona/gly078

Clark, C.M., Shaver, A.L., Aurelio, L.A., Feuerstein, S., Wahler, R.G., Jr., Daly, C.J. and Jacobs, D.M. (2020), Potentially Inappropriate Medications Are Associated with Increased Healthcare Utilization and Costs. J Am Geriatr Soc, 68: 2542-2550. https://doi.org/10.1111/jgs.16743

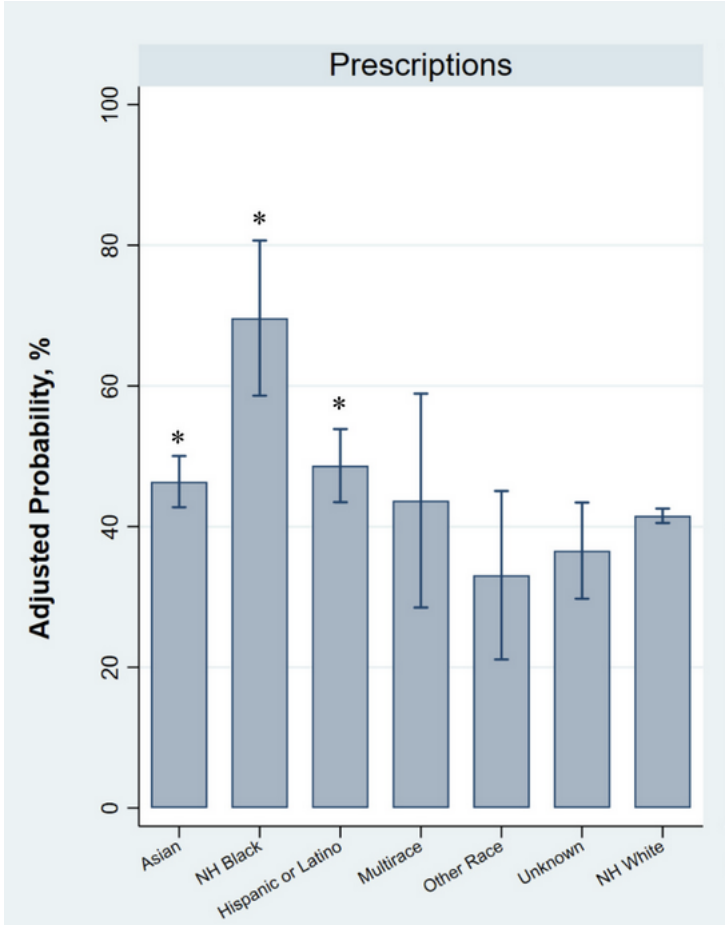
Practice Gap: Overprescribing of potentially inappropriate medications

- Older adults with dementia have significantly greater odds of being prescribed 5+ medications (OR: 3.0) or 10+ medications (OR: 2.8).
- The largest sources of medications among older adults with dementia: cardiovascular and central nervous system medications.
- Older adults with dementia have higher odds of receiving at least one highly sedating or anticholinergic medication (AOR 2.5; 95% CI: 1.6–3.9).

Growdon ME, Gan S, Yaffe K, Steinman MA. Polypharmacy among older adults with dementia compared with those without dementia in the United States. *J Am Geriatr Soc*. 2021; 69(9): 2464–2475. https://doi.org/10.1111/jgs.17291

Practice Gap: Overprescribing of potentially inappropriate medications

- In one study, Asian, Black, and Latino older adults, were **more likely** to receive potentially inappropriate medications compared to non-Latino white older adults.



Oronce, C.I.A., Pablo, R., Shapiro, S.R., Willis, P., Ponce, N., Mafi, J.N. and Sarkisian, C. (2025), Racial and Ethnic Differences in Low-Value Care Among Older Adults in a Large Statewide Health System. J Am Geriatr Soc. https://doi.org/10.1111/jgs.19369

Over-the-counter (OTC) medications can be potentially inappropriate!

- NSAIDs, proton pump inhibitors, and first-generation antihistamines are commonly used by older adults.
- NSAIDs are **by far** the most commonly used potentially inappropriate medications.
- Most older adults are not aware of the risks of OTC medications, particularly their long-term adverse effects.

Prevalence of Potentially Inappropriate Medication Use in Older Adults Using the 2012 Beers CriteriaAmy J. Davidoff PhD, G. Edward Miller PhD, Eric M. Sarpong PhD, Eunice Yang MA, Nicole Brandt PharmD, MBA, Donna M. Fick PhD, RN

Holden RJ, Srinivas P, Campbell NL, Clark DO, Bodke KS, Hong Y, Boustani MA, Ferguson D, Callahan CM; IU Brain Health Patient Safety Laboratory. Understanding older adults' medication decision making and behavior: A study on over-the-counter (OTC) anticholinergic medications. Res Social Adm Pharm. 2019 Jan;15(1):53-60. doi: 10.1016/j.sapharm.2018.03.002. Epub 2018 Mar 6. PMID: 29559218; PMCID: PMC6690198.

Received: 7 March 2023 | Accepted: 29 March 2023
DOI: 10.1111/jgs.18372

SPECIAL ARTICLES

Journal of the
American Geriatrics Society

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

By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel

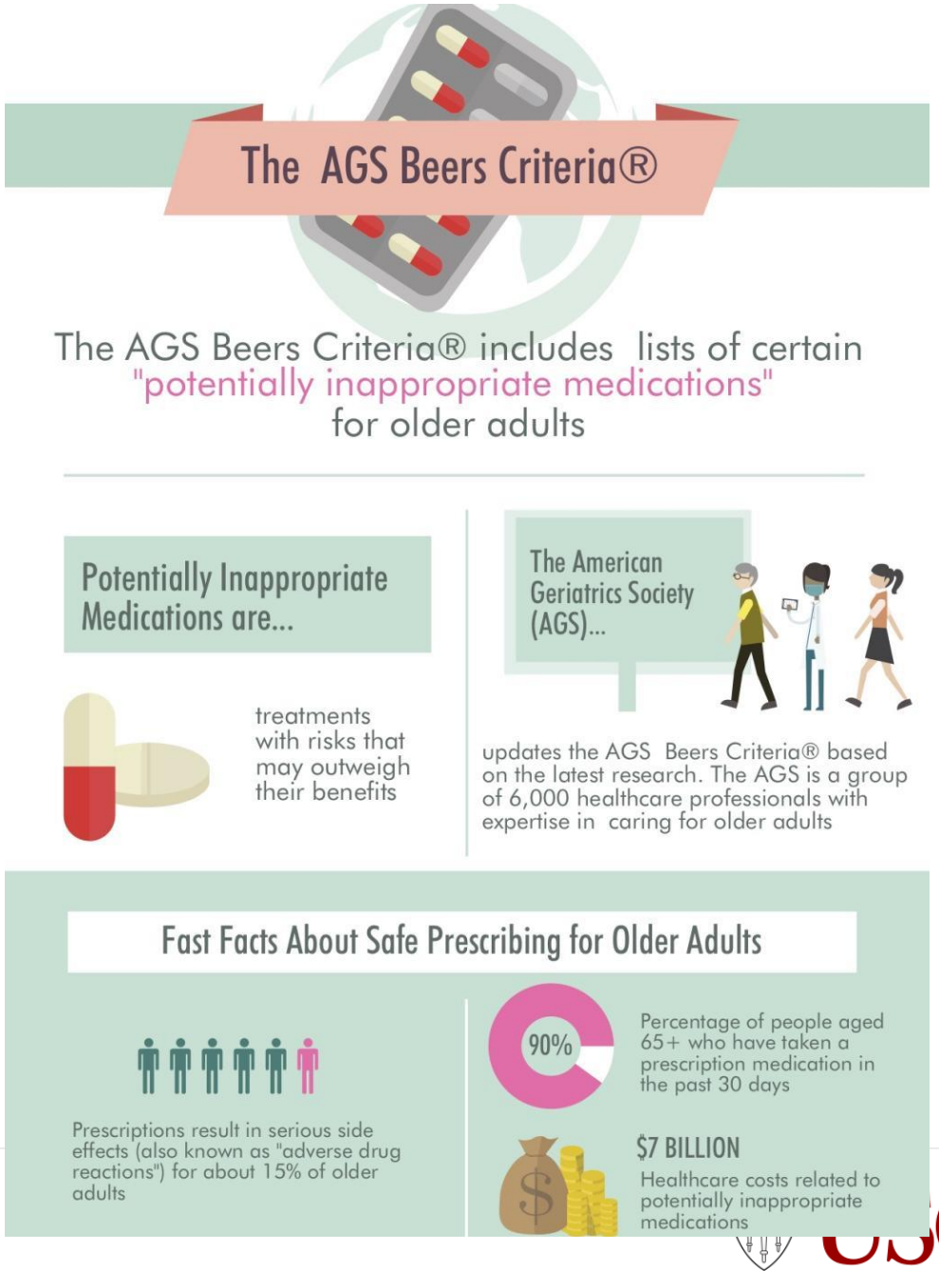
Correspondence
Mary Jordan Samuel, American Geriatrics Society, 40 Fulton Street, Suite 809, New York, NY 10038, USA.
Email: msamuel@americangeriatrics.org

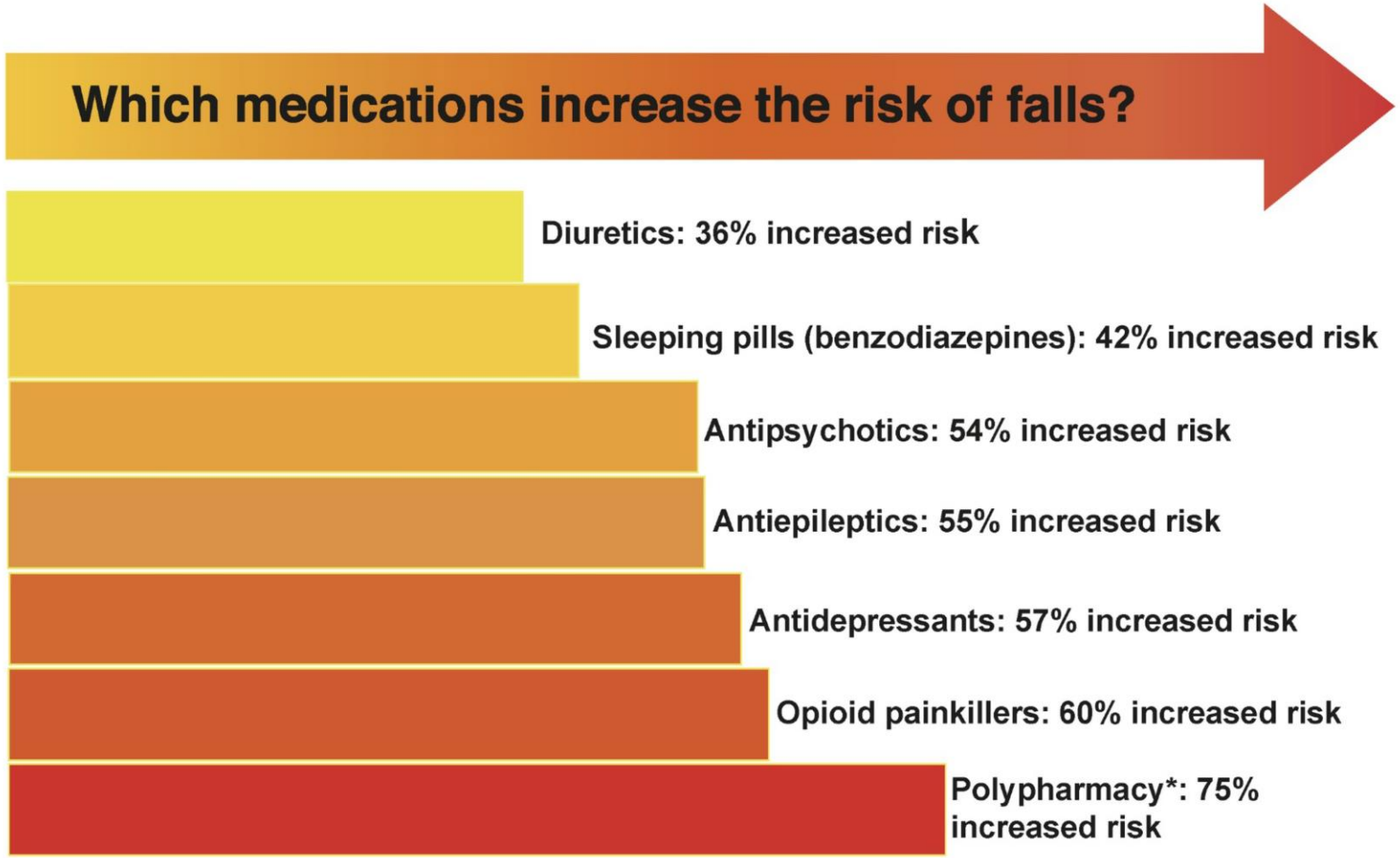
Abstract

The American Geriatrics Society (AGS) Beers Criteria® (AGS Beers Criteria®) for Potentially Inappropriate Medication (PIM) Use in Older Adults is widely used by clinicians, educators, researchers, healthcare administrators, and regulators. Since 2011, the AGS has been the steward of the criteria and has produced updates on a regular cycle. The AGS Beers Criteria® is an explicit list of PIMs that are typically best avoided by older adults in most circumstances or under specific situations, such as in certain diseases or conditions. For the 2023 update, an interprofessional expert panel reviewed the evidence published since the last update (2019) and based on a structured assessment process approved a number of important changes including the addition of new criteria, modification of existing criteria, and formatting changes to enhance usability. The criteria are intended to be applied to adults 65 years old and older in all ambulatory, acute, and institutionalized settings of care, except hospice and end-of-life care settings. Although the AGS Beers Criteria® may be used internationally, it is specifically designed for use in the United States and there may be additional considerations for certain drugs in specific countries. Whenever and wherever used, the AGS Beers Criteria® should be applied thoughtfully and in a manner that supports, rather than replaces, shared clinical decision-making.

KEYWORDS

Beers criteria, Beers list, inappropriate prescribing, medications and drugs, older adults





In this analysis, the most commonly used definition for polypharmacy was 4 or more medications.
Sources: de Vries M *et al.* 2018, Seppala LJ *et al.* 2018, Seppala LJ *et al.* 2018

How do medications cause falls?

1. Sedation
2. Impaired postural stability (inability to maintain posture)
3. Hypotension (low blood pressure)
4. Drug-induced parkinsonism (Parkinson-like symptoms)
5. Visual impairment (blurred vision, dry eyes)
6. Hypoglycemia (low blood sugar)
7. Vestibular damage (tinnitus, deafness)
8. Hypothermia (low body temperature)
9. Confusion
10. Dehydration

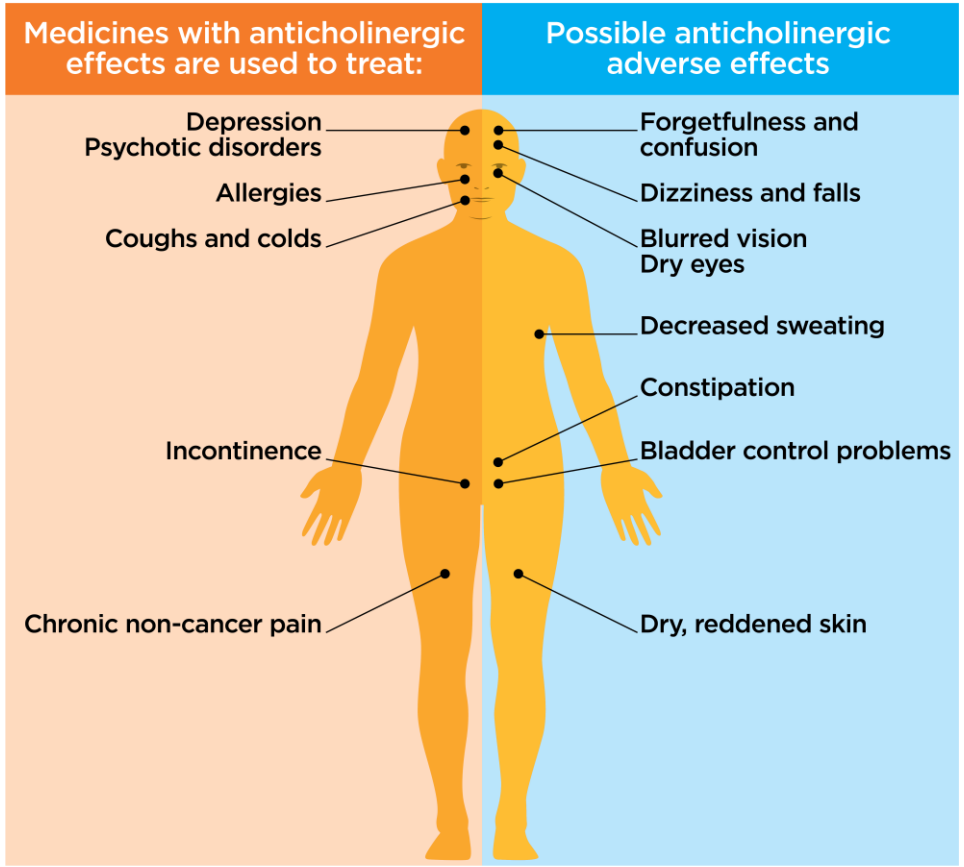
Intrinsic factors that can influence falls

1. Balance, gait or mobility problems including those due to degenerative joint disease and motor disorders such as stroke and Parkinson's disease.
2. Visual impairment.
3. Impaired cognition or depression.
4. Postural hypotension.

What is anticholinergic burden?

- Anticholinergic drugs are a class of medications that block the action of acetylcholine, a neurotransmitter in the nervous system.
- Acetylcholine is involved in the transmission of nerve impulses, and blocking its action can lead to various side effects.
- 20-50% of older adults are prescribed medications with anticholinergic burden.

Figure 1: Indications for medicines with anticholinergic effects and their possible adverse effects[a,*] [3–5]



[a] List is not exhaustive

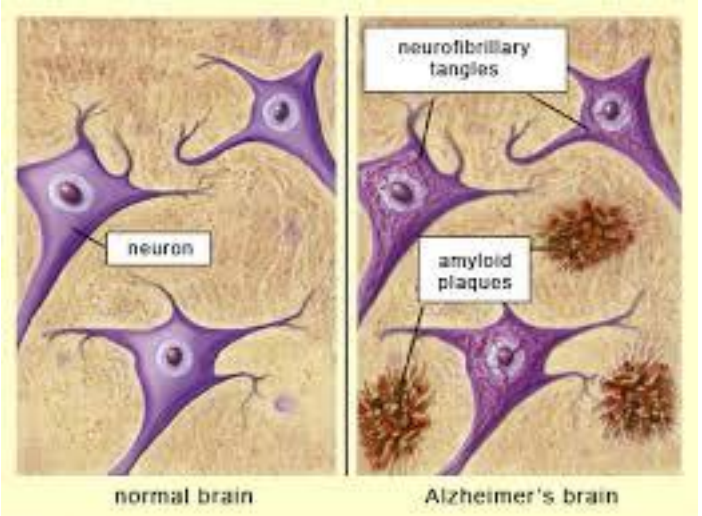
* Courtesy of the Australian Department of Veterans' Affairs, adapted from Figure 1 of the Veterans' Medicines Advice and Therapeutics Education Services Veteran Brochure for *Thinking clearly about your medicines: managing side effects*

What is anticholinergic burden?

- Anticholinergic drugs can result in acute impairment of memory function in **all** adults.
- In older adults, they can result in an acute impairment of:
  - Working memory
  - Attention
  - Psychomotor speed
- Initial view, these effects were acute and reversible…

Long-term use of anticholinergic medications

- Recent studies have suggested that long-term use of anticholinergic drugs:
  - May result in brain atrophy
  - May impair glucose metabolism
  - More neurofibrillary tangles and amyloid plaques
  - May disturb neural networks involved in memory and learning
  - May drive neuroinflammation



Zheng YB, Shi L, Zhu XM, Bao YP, Bai LJ, Li JQ, Liu JJ, Han Y, Shi J, Lu L. Anticholinergic drugs and the risk of dementia: A systematic review and meta-analysis. Neurosci Biobehav Rev. 2021 Aug;127:296-306. doi: 10.1016/j.neubiorev.2021.04.031. Epub 2021 Apr 29. PMID: 33933505.

Long-term use of anticholinergic medications

Original Investigation

FREE

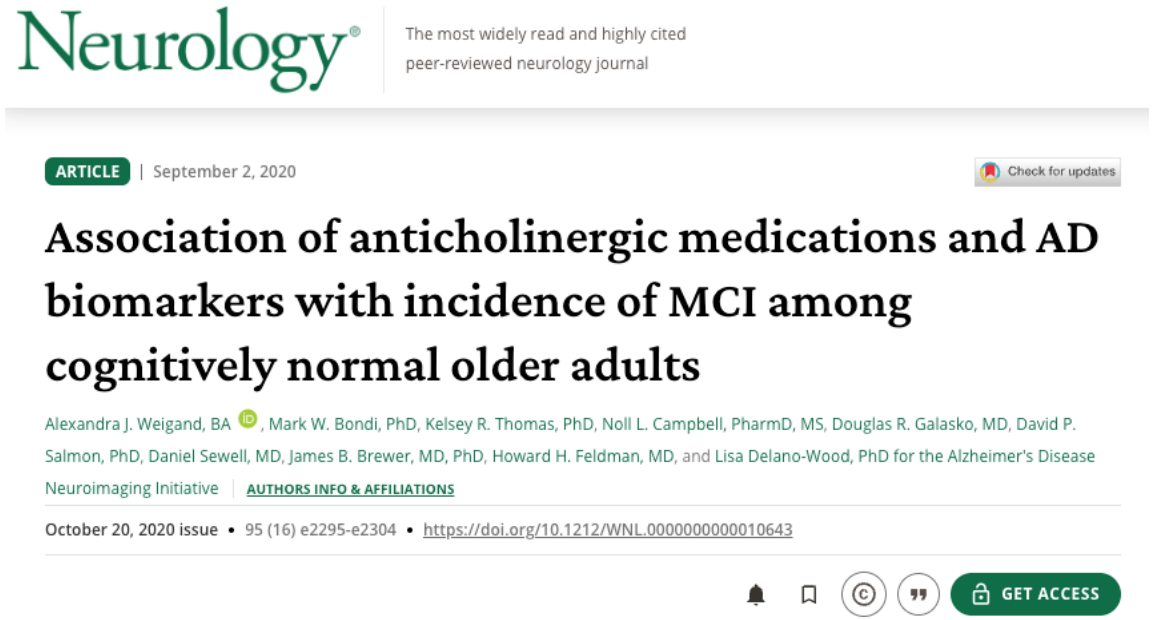
June 2016

Association Between Anticholinergic Medication Use and Cognition, Brain Metabolism, and Brain Atrophy in Cognitively Normal Older Adults

Risacher SL, McDonald BC, Tallman EF, et al. Association Between Anticholinergic Medication Use and Cognition, Brain Metabolism, and Brain Atrophy in Cognitively Normal Older Adults. *JAMA Neurol.* 2016;73(6):721–732. doi:10.1001/jamaneurol.2016.0580

- Use of medications with medium or high anticholinergic effects was associated with:
  - poorer cognition (particularly in immediate memory recall and executive function).
  - reduced glucose metabolism.
  - whole-brain and temporal lobe atrophy.
  - clinical decline.
- The effect appeared additive because an increased burden of anticholinergic medications was associated with poorer executive function and increased brain atrophy.

Long-term use of anticholinergic medications



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ARTICLE | September 2, 2020

Check for updates

Association of anticholinergic medications and AD biomarkers with incidence of MCI among cognitively normal older adults

Alexandra J. Weigand, BA, Mark W. Bondi, PhD, Kelsey R. Thomas, PhD, Noll L. Campbell, PharmD, MS, Douglas R. Galasko, MD, David P. Salmon, PhD, Daniel Sewell, MD, James B. Brewer, MD, PhD, Howard H. Feldman, MD, and Lisa Delano-Wood, PhD for the Alzheimer's Disease Neuroimaging Initiative | AUTHORS INFO & AFFILIATIONS

October 20, 2020 issue • 95 (16) e2295-e2304 • https://doi.org/10.1212/WNL.0000000000010643

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- A prospective study of persons with normal cognition followed participants for 10 years.
- Participants taking anticholinergic medications had increased risk of progression to MCI (HR 1.47),
- There was a significant risk interaction between patients with APEO4 and anticholinergic medications, who had 2.69x risk for incident MCI.

Weigand AJ, Bondi MW, Thomas KR, Campbell NL, Galasko DR, Salmon DP, Sewell D, Brewer JB, Feldman HH, Delano-Wood L, Alzheimer's Disease Neuroimaging Initiative. Association of anticholinergic medications and AD biomarkers with incidence of MCI among cognitively normal older adults. Neurology. 2020 Oct 20;95(16):e2295-304.

Anticholinergic drugs and dementia risk

- One large (3,500) prospective cohort study examined prescription and non-prescription drug use over 10 years.
  - Dementia risk increased along with the cumulative dose.
  - Taking an anticholinergic for the equivalent of three years or more was associated with a **54% higher dementia risk** than taking the same dose for three months or less.

JAMA Internal Medicine | Search All

Original Investigation | FREE

March 2015

Cumulative Use of Strong Anticholinergics and Incident Dementia

A Prospective Cohort Study

Shelly L. Gray, PharmD, MS[1]; Melissa L. Anderson, MS[2]; Sascha Dublin, MD, PhD[2,3]; et al

» Author Affiliations | Article Information

JAMA Intern Med. 2015;175(3):401-407.
doi:10.1001/jamainternmed.2014.7663

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Gray SL, Anderson ML, Dublin S, Hanlon JT, Hubbard R, Walker R, Yu O, Crane PK, Larson EB. Cumulative use of strong anticholinergics and incident dementia: a prospective cohort study. JAMA Intern Med. 2015 Mar;175(3):401-7. doi: 10.1001/jamainternmed.2014.7663. PMID: 25621434; PMCID: PMC4358759.

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Long-term use of anticholinergic medications

ELSEVIER

Neurobiology of Disease

Volume 45, Issue 1, January 2012, Pages 329-336

Anticholinergics boost the pathological process of neurodegeneration with increased inflammation in a tauopathy mouse model

Yasumasa Yoshiyama [a b], Ayako Kojima [a], Kimiko Itoh [b], Tomoyuki Uchiyama [c], Kimihito Arai [b]

Show more

Yoshiyama Y, Kojima A, Itoh K, Uchiyama T, Arai K. Anticholinergics boost the pathological process of neurodegeneration with increased inflammation in a tauopathy mouse model. Neurobiology of Disease. 2012 Jan 1;45(1):329-36.

- A study in mice found that anticholinergics, especially those with stronger effects on the brain, worsened tau-related brain damage, increased inflammation, and led to greater cognitive decline.
- Anticholinergic drugs not only impair cognitive function by decreased acetylcholine neurotransmission but also accelerate neurodegeneration by suppressing an acetylcholine-dependent anti-inflammatory system.

Anticholinergic drugs and falls

- Anticholinergic burden is associated with recurrent and injurious falls in older individuals.
  - 1.8x higher risk of falls among patients taking 1 or more highly anticholinergic medications.
  - Thought to be associated with gait and balance impairment.

Zia A, Kamaruzzaman S, Myint PK, Tan MP. Anticholinergic burden is associated with recurrent and injurious falls in older individuals. Maturitas. 2016 Feb 1;84:32-7.

Anticholinergic drugs and oral health

Participants with a high-anticholinergic burden were:

- 3x more likely to have xerostomia (dry mouth)
- 2.3x more likely to have low-unstimulated salivary flow
- 1.5x more likely to have low-stimulated salivary flow

compared to reference group (ADS 0)

Tiisanoja A, Syrjälä A-M, Komulainen K, et al. Anticholinergic burden and dry mouth among Finnish, community-dwelling older adults. *Gerodontology*. 2018; 35: 3–10. https://doi.org/10.1111/ger.12304

Anticholinergic load and oral health

High anticholinergic load has also been found to be associated with:

- Periodontal disease
- Dental caries
- Tooth mineralization defects
- Tooth sensitivity
- Dysphagia

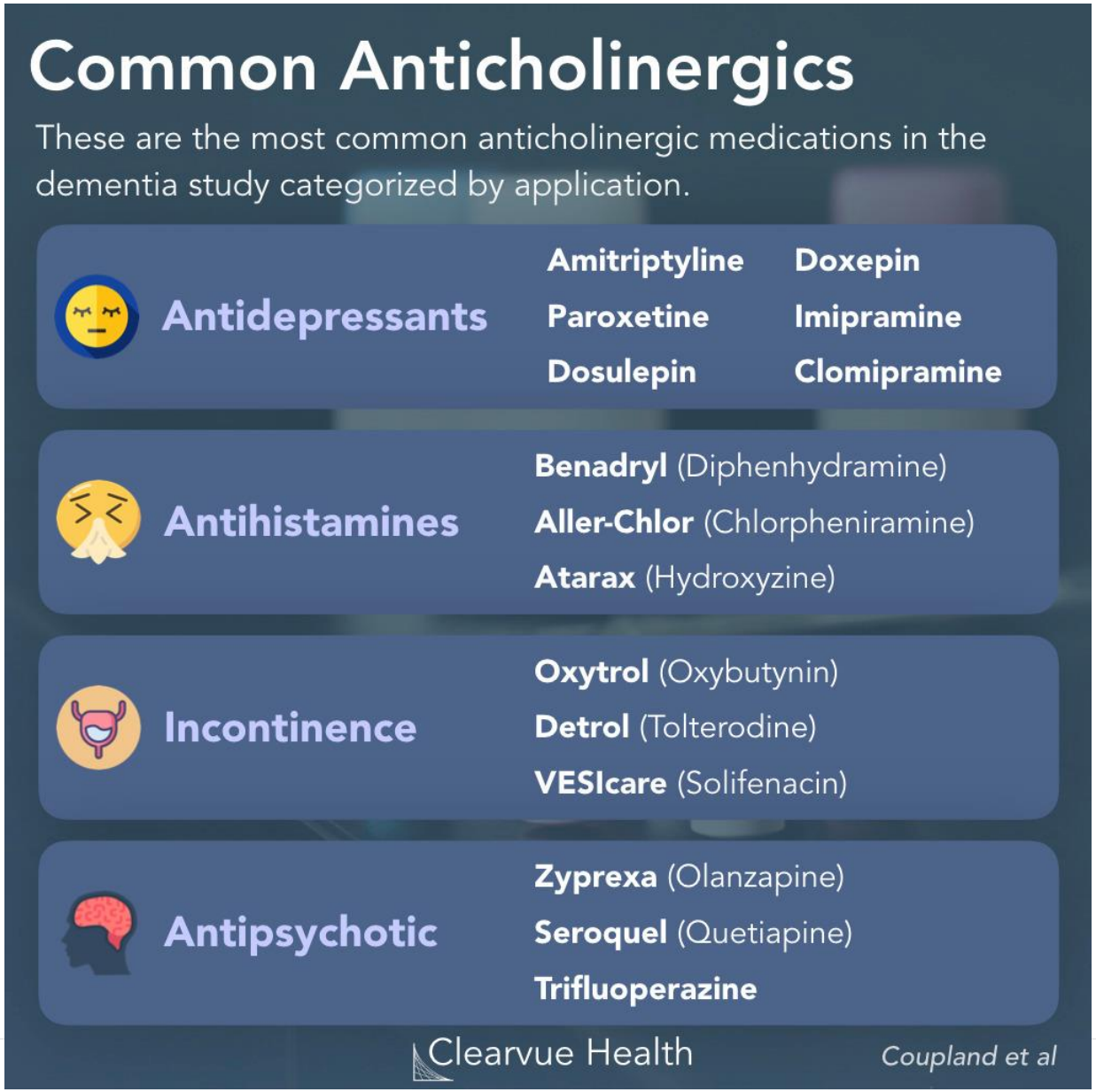
Tiisanoja A, Anttonen V, Syrjälä AM, Ylöstalo P. High Anticholinergic Burden and Dental Caries: Findings from Northern Finland Birth Cohort 1966. JDR Clinical & Translational Research. 2024 Jun 13:23800844241253250.

Stenbäck J, Tiisanoja A, Syrjälä AM, Komulainen K, Hartikainen S, Ylöstalo P. High anticholinergic burden and hyposalivation and xerostomia in the elderly. Acta Odontologica Scandinavica. 2023 Aug 18;81(6):436-42.

TABLE 7 Drugs with strong anticholinergic properties.

Antidepressants
Amitriptyline
Amoxapine
Clomipramine
Desipramine
Doxepin (>6 mg/day)
Imipramine
Nortriptyline
Paroxetine
Antiemetics
Prochlorperazine
Promethazine
Antihistamines (first-generation)
Brompheniramine
Chlorpheniramine
Cyproheptadine
Dimenhydrinate
Diphenhydramine
Doxylamine
Hydroxyzine
Meclizine
Promethazine
Triprolidine
Antimuscarinics (urinary incontinence)[a]
Darifenacin
Fesoterodine
Flavoxate
Oxybutynin
Solifenacin
Tolterodine
Trospium
Antiparkinsonian agents
Benztropine
Trihexyphenidyl
Antipsychotics
Chlorpromazine
Clozapine
Olanzapine
Perphenazine
Antispasmodics
Atropine
Clidinium-chlordiazepoxide
Dicyclomine
Homatropine
Hyoscyamine
Scopolamine
Skeletal muscle relaxants
Cyclobenzaprine
Orphenadrine

Note: This table is not a comprehensive list of all medications with anticholinergic properties.



Anticholinergics:

A class of harmful drugs that includes some types of sleeping pills, allergy medicines, and more. They can be over the counter or prescription drugs.

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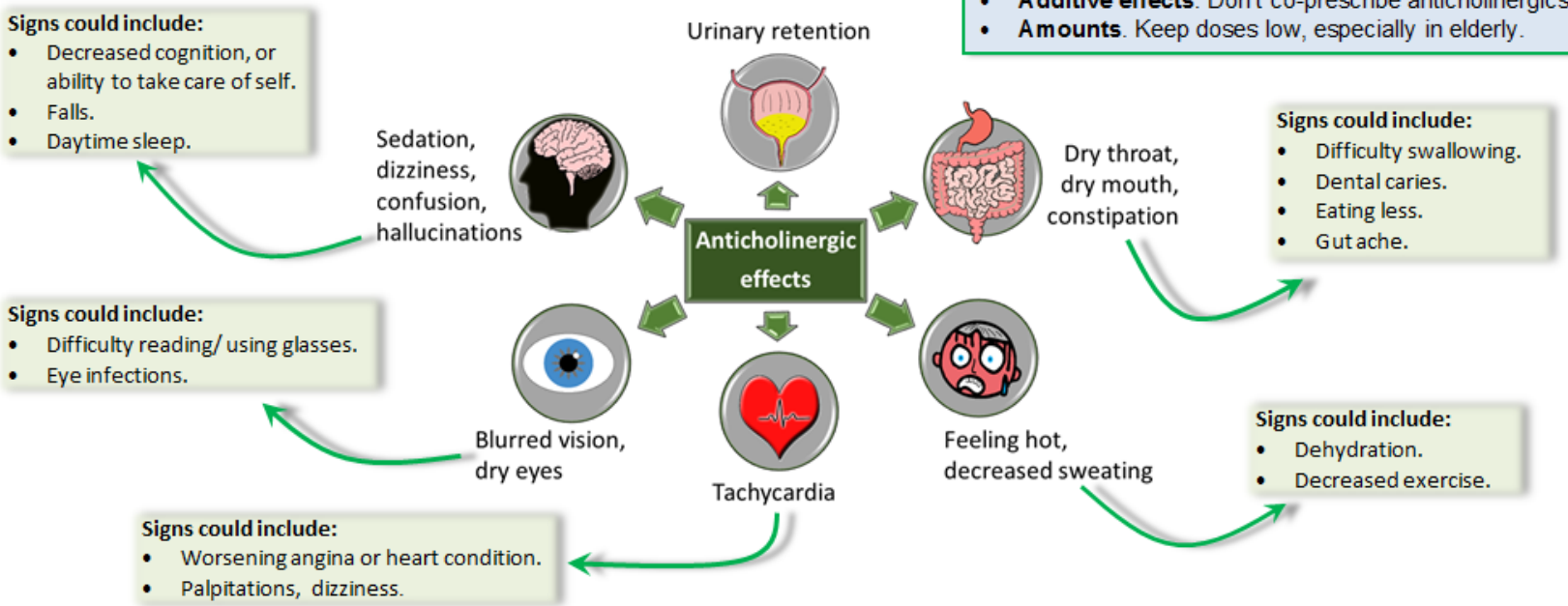
Managing Anticholinergic Side Effects

from **www.medicinesafety.co.uk**

General approach is to review patients regularly and:

- **Awareness**. Know your anticholinergic effects.
- **Alternatives**. Use lower risk medicines or non-drugs.
- **Additive effects**. Don't co-prescribe anticholinergics.
- **Amounts**. Keep doses low, especially in elderly.



Indication	Higher anticholinergic potential	Example LOWER anticholinergic choices
Analgesia for neuropathic pain	Amitriptyline, imipramine, nortriptyline carbamazepine	Gabapentin, pregabalin, capsaicin cream, non-pharmacological options
Antidepressant	Amitriptyline, imipramine, nortriptyline paroxetine,	Venlafaxine, trazodone, duloxetine, mirtazapine, citalopram, sertraline, psychotherapy
Antiemetics and vertigo	Prochlorperazine, cyclizine, promethazine, hyoscine	Ondansetron, domperidone, treat the cause of these symptoms (*e.g.* betahistine for Ménière's)
Antihistamine	Chlorphenamine, hydroxyzine, promethazine, diphenyhdramine	Cetirizine, desloratadine, fexofenadine, topical options (for e.g. hay fever, skin)
Antipsychotic	Chlorpromazine, clozapine, olanzapine	Aripiprazole, ziprasidone, quetiapine, risperidone
Gastrointestinal spasm	Dicycloverine, hyoscine, propantheline	Mebeverine, peppermint oil, diet changes
Urology: incontinence, overactive bladder	Oxybutynin, solifenacin, tolterodine, trospium, propiverine	Mirabegron, alpha blockers (for selected men), non-pharmacological options

Exposure to anticholinergic and sedative burden[b] is associated with a

60% ↑

increase in fall-related hospitalisations

Use of medicines with anticholinergic effects for ≥ 3 months has a

50% ↑

increased risk of dementia compared to non-use

Exposure to anticholinergic and sedative burden[b] is associated with a

30% ↑

increase in mortality for older people

[b] Based on the Drug Burden Index (DBI), which measures cumulative exposure to medicines with anticholinergic and sedative effects

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Various tools to calculate anticholinergic burden

Drugs with ACB Score of 1

Generic Name	Brand Name
Alimemazine	Theralen™
Alverine	Spasmonal™
Alprazolam	Xanax™
Aripiprazole	Abilify™
Asenapine	Saphris™
Atenolol	Tenormin™
Bupropion	Wellbutrin™, Zyban™
Captopril	Capoten™
Cetirizine	Zyrtec™
Chlorthalidone	Diuril™, Hygroton™
Cimetidine	Tagamet™
Clidinium	Librax™
Clorazepate	Tranxene™
Codeine	Contin™
Colchicine	Colcrys™
Desloratadine	Clarinex™
Diazepam	Valium™
Digoxin	Lanoxin™
Dipyridamole	Persantine™
Disopyramide	Norpace™
Fentanyl	Duragesic™, Actiq™
Furosemide	Lasix™
Fluvoxamine	Luvox™
Haloperidol	Haldol™
Hydralazine	Apresoline™
Hydrocortisone	Cortef™, Cortaid™
Iloperidone	Fanapt™
Isosorbide	Isordil™, Ismo™
Levocetirizine	Xyzal™
Loperamide	Immodium™, others
Loratadine	Claritin™
Metoprolol	Lopressor™, Toprol™
Morphine	MS Contin™, Avinza™
Nifedipine	Procardia™, Adalat™
Paliperidone	Invega™
Prednisone	Deltasone™, Sterapred™
Quinidine	Quinaglute™
Ranitidine	Zantac™
Risperidone	Risperdal™
Theophylline	Theodur™, Uniphyl™
Trazodone	Desyrel™
Triamterene	Dyrenium™
Venlafaxine	Effexor™
Warfarin	Coumadin™

Drugs with ACB Score of 2

Generic Name	Brand Name
Amantadine	Symmetrel™
Belladonna	Multiple
Carbamazepine	Tegretol™
Cyclobenzaprine	Flexeril™
Cyproheptadine	Periactin™
Loxapine	Loxitane™
Meperidine	Demerol™
Methotrimeprazine	Levoprome™
Molindone	Moban™
Nefopam	Nefogesic™
Oxcarbazepine	Trileptal™
Pimozide	Orap™

Categorical Scoring:

- Possible anticholinergics include those listed with a score of 1; Definite anticholinergics include those listed with a score of 2 or 3

Numerical Scoring:

- Add the score contributed to each selected medication in each scoring category
- Add the number of possible or definite Anticholinergic medications

Notes:

- Each definite anticholinergic may increase the risk of cognitive impairment by 46% over 6 years. [3]
- For each on point increase in the ACB total score, a decline in MMSE score of 0.33 points over 2 years has been suggested. [4]
- Additionally, each one point increase in the ACB total score has been correlated with a 26% increase in the risk of death. [4]

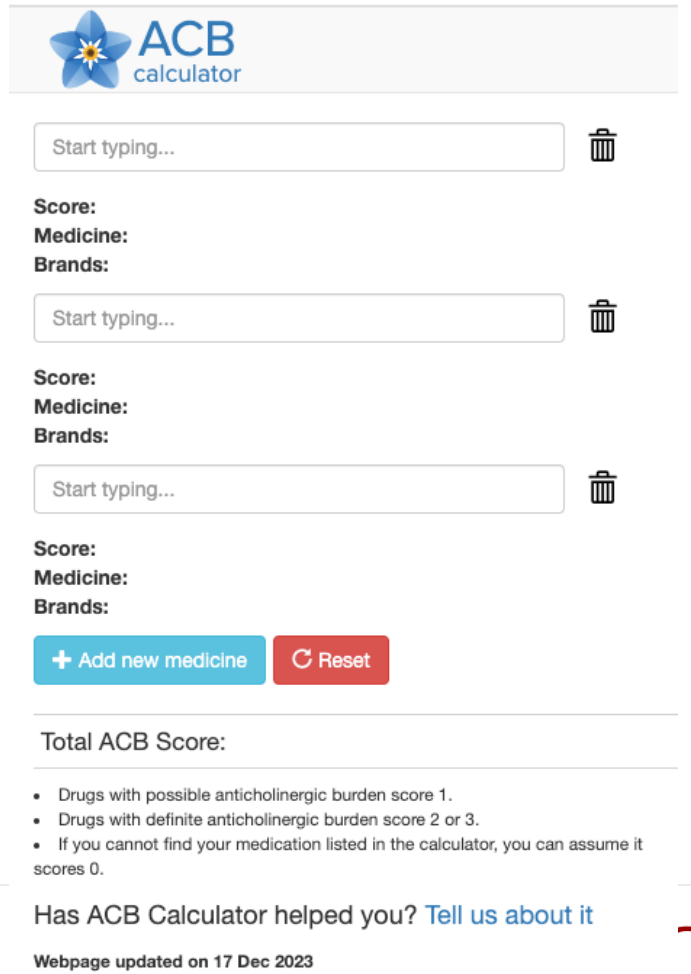
Aging Brain Care

www.agingbraincare.org

Drugs with ACB Score of 3

Generic Name	Brand Name
Amitriptyline	Elavil™
Amoxapine	Asendin™
Atropine	Sal-Tropine™
Benztropine	Cogentin™
Brompheniramine	Dimetapp™
Carbinoxamine	Histex™, Carbihist™
Chlorpheniramine	Chlor-Trimeton™
Chlorpromazine	Thorazine™
Clemastine	Tavist™
Clomipramine	Anafranil™
Clozapine	Clozaril™
Darifenacin	Enablex™
Desipramine	Norpramin™
Dicyclomine	Bentyl™
Dimenhydrinate	Dramamine™, others
Diphenhydramine	Benadryl™, others
Doxepin	Sinequan™
Doxylamine	Unisom™, others
Fesoterodine	Toviaz™
Flavoxate	Urispas™
Hydroxyzine	Atarax™, Vistaril™
Hyoscyamine	Anaspaz™, Levsin™
Imipramine	Tofranil™
Meclizine	Antivert™
Methocarbamol	Robaxin™
Nortriptyline	Pamelor™
Olanzapine	Zyprexa™
Orphenadrine	Norflex™
Oxybutynin	Ditropan™
Paroxetine	Paxil™
Perphenazine	Trilafon™
Promethazine	Phenergan™
Propantheline	Pro-Banthine™
Propiverine	Detrunorm™
Quetiapine	Seroquel™
Scopolamine	Transderm Scop™
Solifenacin	Vesicare™
Thioridazine	Mellaril™
Tolterodine	Detrol™
Trifluoperazine	Stelazine™
Trihexyphenidyl	Artane™
Trimipramine	Surmontil™
Trospium	Sanctura™

acbcalc.com

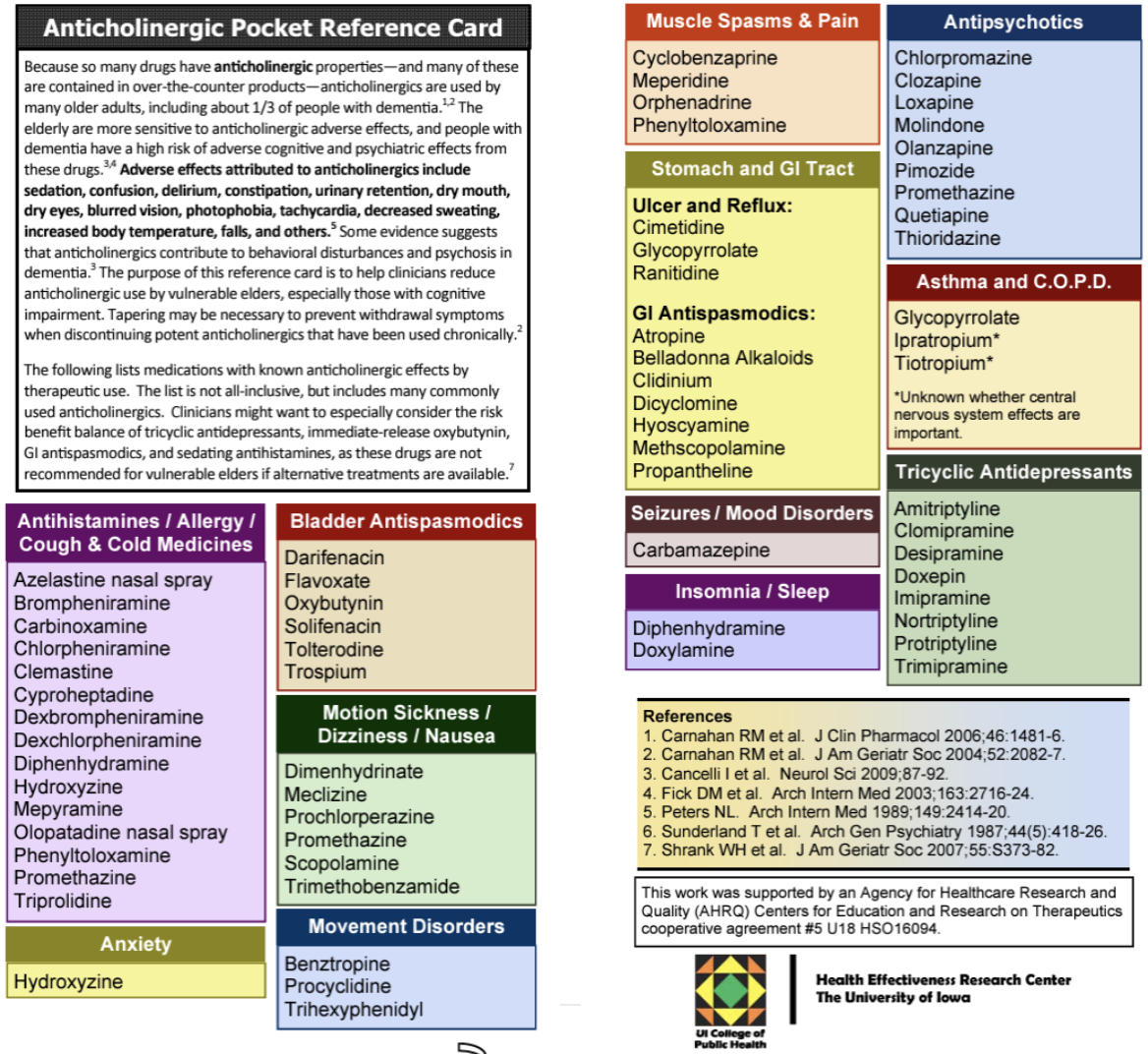


Various tools to calculate anticholinergic burden

- **Anticholinergic Risk Scale (ARS)**
  - The ARS tool is used to assess the risk of adverse effects due to anticholinergic drugs. Within the tool the medications are broken down into categories and each category is assigned points.
  - To use ARS you must determine the point values of the anticholinergic drugs that the individual is taking, add up the points, and the higher the total points the greater the risk.
  - J.L. Rudolph, MD, M.J. Salow, PharmD, M.C. Angelini, MA, PharmD, and R.E. McGlinchey, PhD.

- **Anticholinergic Pocket Reference Card** [PDF]
  - This reference card provides lists of commonly used anticholinergic drugs, which are categorized by their therapeutic use.
  - It also includes some background information and a definition of common anticholinergic adverse effects.
  - University of Iowa Health Effectiveness Research Center.

Various tools to calculate anticholinergic burden



Anticholinergic Pocket Reference Card

Because so many drugs have **anticholinergic** properties—and many of these are contained in over-the-counter products—anticholinergics are used by many older adults, including about 1/3 of people with dementia.[1,2] The elderly are more sensitive to anticholinergic adverse effects, and people with dementia have a high risk of adverse cognitive and psychiatric effects from these drugs.[3,4] **Adverse effects attributed to anticholinergics include sedation, confusion, delirium, constipation, urinary retention, dry mouth, dry eyes, blurred vision, photophobia, tachycardia, decreased sweating, increased body temperature, falls, and others.**[5] Some evidence suggests that anticholinergics contribute to behavioral disturbances and psychosis in dementia.[3] The purpose of this reference card is to help clinicians reduce anticholinergic use by vulnerable elders, especially those with cognitive impairment. Tapering may be necessary to prevent withdrawal symptoms when discontinuing potent anticholinergics that have been used chronically.[2]

The following lists medications with known anticholinergic effects by therapeutic use. The list is not all-inclusive, but includes many commonly used anticholinergics. Clinicians might want to especially consider the risk benefit balance of tricyclic antidepressants, immediate-release oxybutynin, GI antispasmodics, and sedating antihistamines, as these drugs are not recommended for vulnerable elders if alternative treatments are available.[7]

Antihistamines / Allergy / Cough & Cold Medicines

Azelastine nasal spray
Brompheniramine
Carbinoxamine
Chlorpheniramine
Clemastine
Cyproheptadine
Dexbrompheniramine
Dexchlorpheniramine
Diphenhydramine
Hydroxyzine
Mepyramine
Olopatadine nasal spray
Phenyltoloxamine
Promethazine
Triprolidine

Anxiety

Hydroxyzine

Bladder Antispasmodics

Darifenacin
Flavoxate
Oxybutynin
Solifenacin
Tolterodine
Trospium

Motion Sickness / Dizziness / Nausea

Dimenhydrinate
Meclizine
Prochlorperazine
Promethazine
Scopolamine
Trimethobenzamide

Movement Disorders

Benztropine
Procyclidine
Trihexyphenidyl

Muscle Spasms & Pain

Cyclobenzaprine
Meperidine
Orphenadrine
Phenyltoloxamine

Stomach and GI Tract

Ulcer and Reflux:
Cimetidine
Glycopyrrolate
Ranitidine

GI Antispasmodics:
Atropine
Belladonna Alkaloids
Clidinium
Dicyclomine
Hyoscyamine
Methscopolamine
Propantheline

Seizures / Mood Disorders

Carbamazepine

Insomnia / Sleep

Diphenhydramine
Doxylamine

Antipsychotics

Chlorpromazine
Clozapine
Loxapine
Molindone
Olanzapine
Pimozide
Promethazine
Quetiapine
Thioridazine

Asthma and C.O.P.D.

Glycopyrrolate
Ipratropium*
Tiotropium*

*Unknown whether central nervous system effects are important.

Tricyclic Antidepressants

Amitriptyline
Clomipramine
Desipramine
Doxepin
Imipramine
Nortriptyline
Protriptyline
Trimipramine

References
1. Carnahan RM et al. J Clin Pharmacol 2006;46:1481-6.
2. Carnahan RM et al. J Am Geriatr Soc 2004;52:2082-7.
3. Cancelli I et al. Neurol Sci 2009;87-92.
4. Fick DM et al. Arch Intern Med 2003;163:2716-24.
5. Peters NL. Arch Intern Med 1989;149:2414-20.
6. Sunderland T et al. Arch Gen Psychiatry 1987;44(5):418-26.
7. Shrank WH et al. J Am Geriatr Soc 2007;55:S373-82.

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UI College of Public Health
Health Effectiveness Research Center
The University of Iowa

CONTINUED ON BACK

Age and Ageing 2017; **46:** 600–607
doi: 10.1093/ageing/afx005
Published electronically 24 January 2017

STOPPFrail (Screening Tool of Older Persons Prescriptions in Frail adults with limited life expectancy): consensus validation

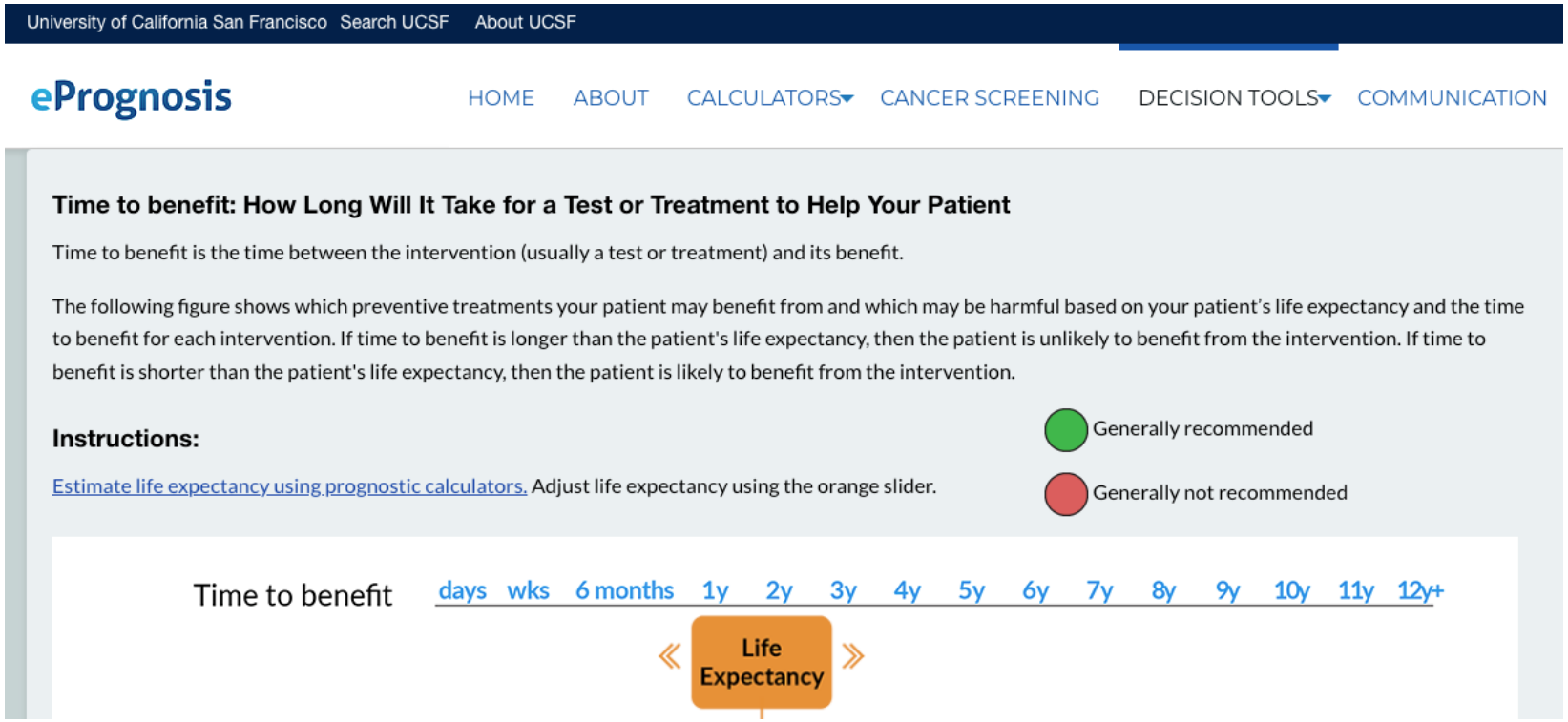
Amanda Hanora Lavan[1,2], Paul Gallagher[1,2], Carole Parsons[3], Denis O'Mahony[1,2]

STOPPFrail recommendations specific for people with dementia

- D1. Neuroleptic antipsychotics Aim to reduce dose and gradually discontinue these drugs in patients taking them for longer than 12 weeks if there are no current clinical features of behavioral and psychiatric symptoms of dementia (BPSD) [48–52].

- D2: Memantine Discontinue and monitor in patients with moderate to severe dementia, unless memantine has clearly improved BPSD (specifically in frail patients who meet the criteria above) [53–56].

Other tools to consider for deprescribing in persons living with dementia

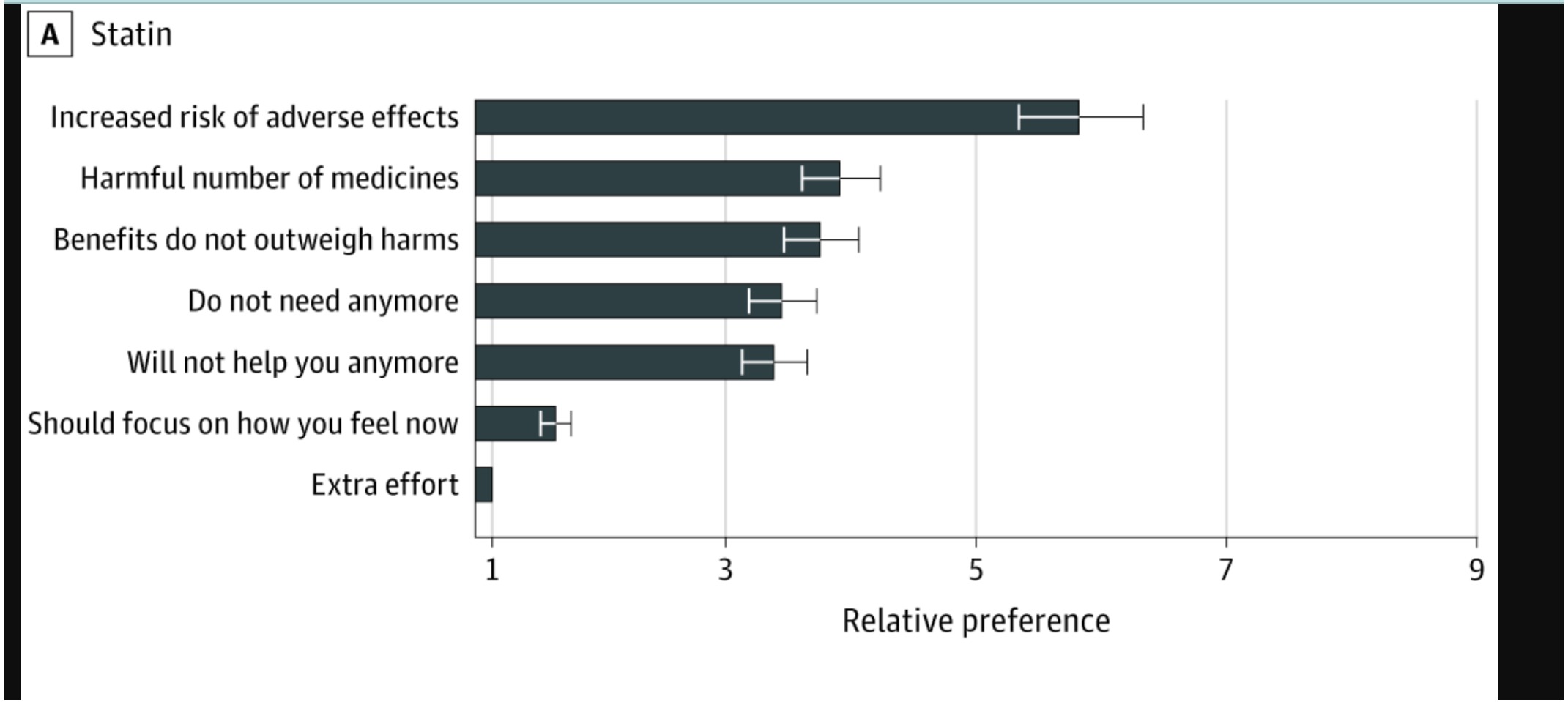


Now what? How to deprescribe?

- Older adults and their families prefer a focus on **quality of life** and **reduction of side effects.**
- The most preferred phrases to explain reducing or stopping a medication were:
  - "Given your age and other health problems, I'm worried that you are at increased risk of **side effects** from this medicine."
  - "This medicine has been linked to **side effects** such as problems with memory, concentration, balance and falls, hospitalizations and death in older adults."
  - "This medicine is **not good for you** in the long run; let's work together to slowly reduce the dose and get you off it over time."

Green AR, Aschmann H, Boyd CM, Schoenborn N. Assessment of Patient-Preferred Language to Achieve Goal-Aligned Deprescribing in Older Adults. *JAMA Netw Open.* 2021;4(4):e212633. doi:10.1001/jamanetworkopen.2021.2633

Now what? How to deprescribe?



Green AR, Aschmann H, Boyd CM, Schoenborn N. Assessment of Patient-Preferred Language to Achieve Goal-Aligned Deprescribing in Older Adults. *JAMA Netw Open.* 2021;4(4):e212633. doi:10.1001/jamanetworkopen.2021.2633

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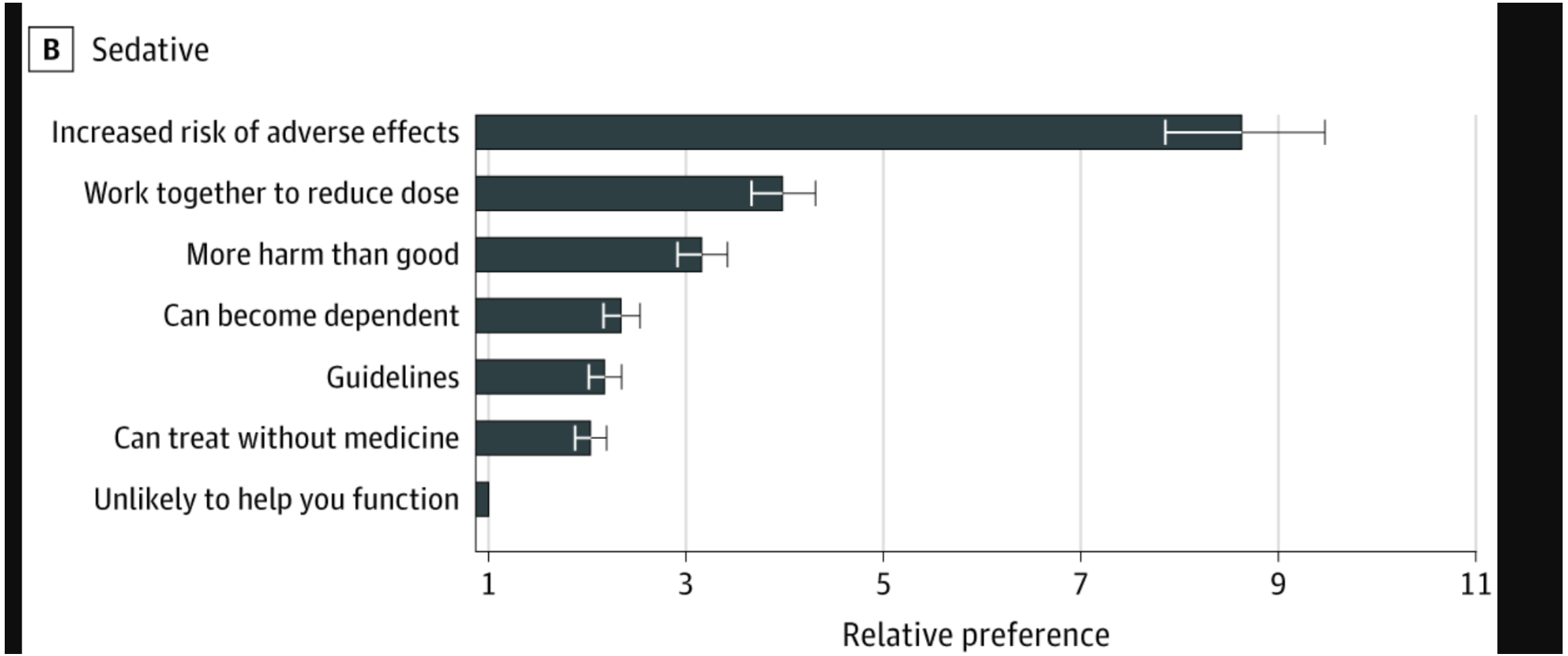


Green AR, Aschmann H, Boyd CM, Schoenborn N. Assessment of Patient-Preferred Language to Achieve Goal-Aligned Deprescribing in Older Adults. *JAMA Netw Open.* 2021;4(4):e212633. doi:10.1001/jamanetworkopen.2021.2633

Now what? How to deprescribe?

- Simple interventions, such as the use of patient educational materials from **deprescribing.org**, can have significant effects.
- EMPOWER: Eliminating Medications through Patient OWnership of End Results.
  - We mailed 308 patients taking benzodiazepines on a regular basis a brochure about the harms of benzodiazepines and a letter from their primary care physician asking them to set up a clinic visit to discuss their medications.
  - We found that this letter resulted in a 9% greater probability of complete benzodiazepine discontinuation compared to usual care.
  - By 9 months, 26% of intervention patients (81/308) discontinued benzodiazepines, compared to 17% (49/291) of control patients.

Le TM, Campbell S, Andraos A, Ahlmark P, Hoang H, Isserman S, Goldzweig CL, Mays AM, Bradley K, Keller MS. Implementation of an intervention aimed at deprescribing benzodiazepines in a large US healthcare system using patient education materials: a pre/post-observational study with a control group. BMJ open. 2024 Apr 1;14(4):e080109.

Now what? How to deprescribe?

ORIGINAL RESEARCH | MAY 01 2018

Effectiveness of a direct-to-consumer written health education program in the reduction of benzodiazepine and sedative-hypnotic use in an elderly population at a single Veterans Affairs medical center

William J. Erwin, MS, EdS, PharmD, BCPP; Courtney Goodman, PharmD, BCPP; Tammy Smith, PharmD, BCPS, BCPP

Mental Health Clinician (2018) 8 (3): 100–104.

https://doi.org/10.9740/mhc.2018.05.100

Split-Screen Views

Fed Pract. 2018 Sep; 35(9): 36–43.

PMCID: PMC6366792

PMID: 30766385

Reducing Benzodiazepine Prescribing in Older Veterans: A Direct-to-Consumer Educational Brochure

Margaret A. Mendes, PharmD, Jason P. Smith, PharmD, Jennifer Kryskalla Marin, PharmD, Mark Bounthavong, PharmD, MPH, Marcos K. Lau, PharmD, Juan I. Miranda, MHS, David Gray, PharmD, Maria Brown, PharmD, and Peter Hauser, MD

[Sleeping pills and anti-anxiety medication] such as lorazepam (Ativan®), oxazepam (Serax®), zopiclone (Imovane®) or zolpidem (Sublinox®).

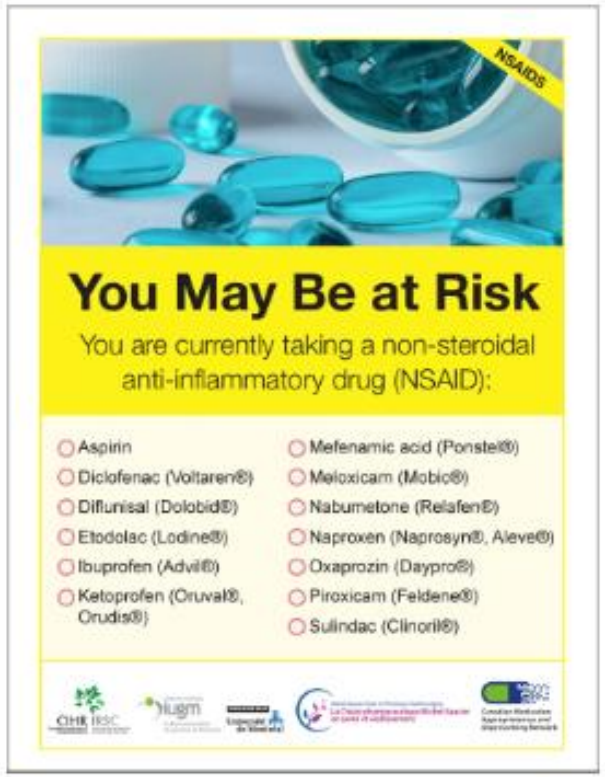
[Stomach pills for acid reflux] such as pantoprazole (Pantoloc®), lansoprazole (Prevacid®), omeprazole (Losec®) or dexlansoprazole (Dexilant®)

[Opioids for chronic non-cancer pain] such as morphine (Statex®, M-Eslon®) or oxycodone (Oxyneo®, Percocet®)

[Medications for allergies and itchiness] (First-generation antihistamines) such as diphenhydramine (Benadryl®)

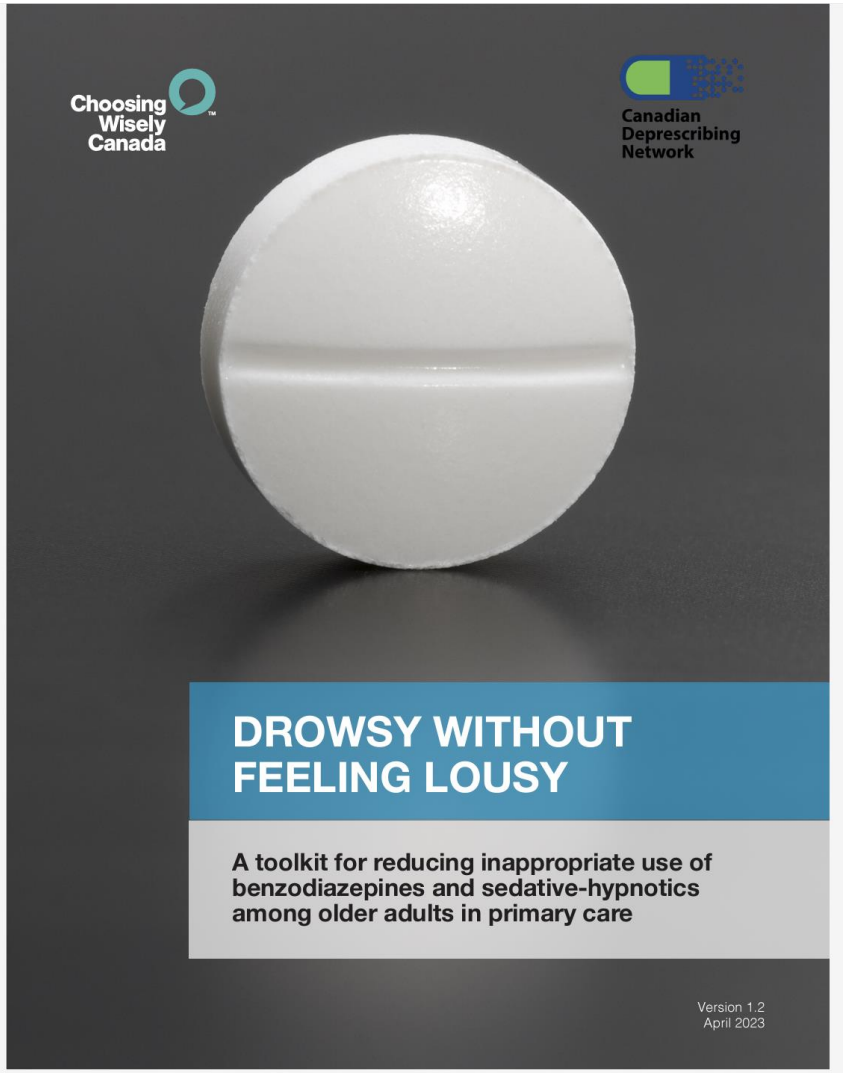
[Antipsychotic medication] for sleep or for symptoms of dementia (e.g. quetiapine (Seroquel®) or risperidone (Risperdal®))

[Gabapentinoids medications] for chronic pain, such as pregabalin (Lyrica®) or gabapentin (Neurontin®)



Anti-inflammatory medications such as ibuprofen (Advil®) or naproxen (Aleve®)

Medications for diabetes such as glyburide (DiaBeta®)



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An initiative of the ABIM Foundation

ConsumerReportsHealth
ASN LEADING THE FIGHT AGAINST KIDNEY DISEASE
ABIM FOUNDATION

Choosing a pain reliever

What to do if you have kidney disease or heart problems

If you need a painkiller but suffer from high blood pressure, heart failure, or kidney disease, it's best to steer clear of some commonly used pain relievers. Those include:

• Ibuprofen, which is sold under the brand names Advil and Motrin, and also as a generic or store brand. You can buy it without a prescription at the drug store. It's sometimes combined with other drugs in other over-the-counter products, such as certain cold remedies.

• Naproxen, sold under the brand name Aleve and as a generic or store brand. It doesn't need a prescription, either.

• Celecoxib, a prescription drug sold as Celebrex.

All three of those drugs, which are called non-steroidal anti-inflammatory drugs, or NSAIDs, can ease pain and inflammation. But they are too risky if you have any of those health problems. Here's why.

They're bad for high blood pressure.
All NSAIDs can cause or worsen high blood pressure. That increases your chance of having a heart attack or stroke. The drugs can also make some blood pressure drugs less effective. That includes diuretics such as hydrochlorothiazide (Hydrodiuril and generic), ACE inhibitors such as lisinopril (Prinivil, Zestril, and generic) and ARBs such as losartan (Cozaar and generic).

They're bad for the heart and kidneys.
Long-term use of NSAIDs can make your body hold onto fluid, which can worsen heart failure

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ConsumerReportsHealth
AMERICAN ACADEMY OF NEUROLOGY®
ABIM FOUNDATION

Treating migraine headaches

Some drugs should rarely be used

Migraine attacks can last for hours—or even days. They can cause intense pain, nausea, and vomiting. They can make you sensitive to light or noise, and they can affect your life and work.

To treat migraines, you may get a prescription for an opioid (narcotic) or a barbiturate (sedative) called butalbital. These are pain medicines. But you should think twice about using these drugs. Here's why:

These drugs can make headaches worse.
Using too much pain medicine can lead to a condition called MOH, or medication overuse headache. Two kinds of pain medicine are more likely to cause MOH:

- Drugs containing **opioids**—such as hydrocodone (Norco, Vicodin, and generics) or oxycodone (Percocet and generics).
- Drugs containing **butalbital** (Fioricet, Fiorinal, and generics).

They are not as effective as other migraine drugs.
There are other drugs that can reduce the number of migraines you have and how severe they are—better than opioids and butalbital. Even in the emergency room—where people with severe migraines often ask for opioids—better drugs are available.

They have risks.
Opioids and butalbital can cause serious withdrawal symptoms if you stop taking them suddenly. People who use high doses for a long time may need to be in the hospital in order to stop using them.

Opioids, even at low doses, can make you feel sleepy or dizzy. Other side effects include constipation and nausea. Using them for a long time can lower your sex drive and cause depression and sleep problems.

https://www.olympiadocs.com/patient-resources/medical-home-program-

Figure 1

Antipsychotic (AP) Deprescribing Algorithm

October 2016

Why is patient taking an antipsychotic?

- Psychosis, aggression, agitation (behavioural and psychological symptoms of dementia - BPSD) treated ≥ 3 months (symptoms controlled, or no response to therapy).
- Primary insomnia treated for any duration or secondary insomnia where underlying comorbidities are managed
- Schizophrenia
- Schizo-affective disorder
- Bipolar disorder
- Acute delirium
- Tourette's syndrome
- Tic disorders
- Autism
- Less than 3 months duration of psychosis in dementia
- Mental retardation
- Developmental delay
- Obsessive-compulsive disorder
- Alcoholism
- Cocaine abuse
- Parkinson's disease psychosis
- Adjunct for treatment of Major Depressive Disorder

Recommend Deprescribing

Strong Recommendation (from Systematic Review and GRADE approach)

Taper and stop AP (slowly in collaboration with patient and/or caregiver; e.g. 25%-50% dose reduction every 1–2 weeks)

Stop AP
Good practice recommendation

Continue AP
or consult psychiatrist if considering deprescribing

Monitor every 1-2 weeks for duration of tapering

Expected benefits:

- May improve alertness, gait, reduce falls, or extrapyramidal symptoms

Adverse drug withdrawal events (closer monitoring for those with more severe baseline symptoms):

- Psychosis, aggression, agitation, delusions, hallucinations

If BPSD relapses:

Consider:

- Non-drug approaches (e.g. music therapy, behavioural management strategies)

Restart AP drug:

- Restart AP at lowest dose possible if resurgence of BPSD with re-trial of deprescribing in 3 months
- At least 2 attempts to stop should be made

Alternate drugs:

- Consider change to risperidone, olanzapine, or aripiprazole

If insomnia relapses:

Consider

- Minimize use of substances that worsen insomnia (e.g. caffeine, alcohol)
- Non-drug behavioural approaches (see reverse)

Alternate drugs

- Other medications have been used to manage insomnia. Assessment of their safety and effectiveness is beyond the scope of this deprescribing algorithm. See AP deprescribing guideline for details.

Bjerre LM, Farrell B, Hogel M, Graham L, Lemay G, McCarthy L, et al. Deprescribing antipsychotics for behavioural and psychological symptoms of dementia and insomnia. Evidence-based clinical practice guideline. *Can Fam Physician* 2018;64:17-27 (Eng), e1-12 (Fr).

deprescribing.org

Bruyère Research Institute

USC Leo School of C

USC

What about supplements?

https://www.aafp.org/pubs/afp/issues/2002/1115/p1917.html

Common Herbs Taken by Older Adults and Drug Interactions

Herb (uses)	*Drug*	*Adverse events*
Ginkgo biloba (Alzheimer's and vascular dementia; peripheral vascular disease, erectile dysfunction, and tinnitus)	Aspirin Warfarin (Coumadin) Thiazide diuretic Acetaminophen and ergotamine/caffeine	Spontaneous hyphema Intracerebral hemorrhage Hypertension Subdural hematoma
St. John's wort (mild depression)	Protease inhibitors, cyclosporine (Sandimmune), theophylline, warfarin Digoxin (Lanoxin) Selective serotonin-reuptake inhibitors	Induction of CYP450 3A4 system with decreased levels of drugs available Decreased drug absorption from the gut Lethargy/incoherence/mild serotonin syndrome
Saw palmetto (benign prostatic hypertrophy)	No specific drug interactions	Headaches, GI upset
Ginseng (cure-all herb)	Warfarin	Decreased INR
	Alcohol	Increased alcohol clearance
	Phenelzine (Nardil); MAOI)	Headache, tremor, mania
Yohimbine (sexual dysfunction)	Tricyclic antidepressants	Hypertension
Senna, cascara (laxative)	Possible interference with any intestinally absorbed drug	Decreased drug availability

CYP450 = cytochrome P-450; GI = gastrointestinal; INR = International Normalized Ratio; MAOI = monoamine oxidase inhibitor.

Choosing Wisely
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Communicating About Overuse with Vulnerable Populations

More than anything, low-income focus group participants wanted to be heard by the health care system.

Nearly every participant said being ‘heard’ by physicians was the most important aspect of the clinical encounter. Many said they value their clinician listening to them more than anything else.

Virtually all said that the quality of the relationship mattered as much as the quality of care – and they judged that relationship by whether they felt listened to and respected.

Choosing Wisely
An initiative of the ABIM Foundation

Communicating About Overuse with Vulnerable Populations

When having conversations about potential overuse and what care is right for the patient, the patients want a clear rationale for recommendations – including explaining potential harm – and recognition that there was a **comprehensive plan in place, with clear alternatives**.

Patients want to understand that their request is not being denied but that the clinician is trying to guide them to a better, safer option and that, if appropriate, their request might be fulfilled in the future.

Working with care partners to deprescribe

- Acknowledge the hard work the care partner is doing to care for the person.
- Emphasize *lack of benefit, side effects,* and *quality of life.*
- Patients and caregivers would stop taking a medication if the side effect burden outweighed its perceived benefits.
  - One caregiver stated, “I think if it's debilitating in any form like nausea, vomiting … diarrhea … [and the side effects] are going to impact your life … and your ability to do even basic things like leaving the house … that's when it's not worth it anymore.”

Pickering, A.N., Hamm, M.E., Dawdani, A., Hanlon, J.T., Thorpe, C.T., Gellad, W.F. and Radomski, T.R. (2020), Older Patient and Caregiver Perspectives on Medication Value and Deprescribing: A Qualitative Study. J Am Geriatr Soc, 68: 746-753. https://doi.org/10.1111/jgs.16370

Working with care partners to deprescribe

- Set the stage over time, contrasting long-term benefits of medications with immediate risks:
  - "We're going to stop some of these medications because... the benefit you get is down the road and the harm is right now."
  - From a care partner: "I think it's invaluable to re-evaluate every so often the effectiveness of the medications and whether or not they're causing side effects that may not have occurred in the beginning."

Green, A.R., Boyd, C.M., Gleason, K.S. *et al.* Designing a Primary Care–Based Deprescribing Intervention for Patients with Dementia and Multiple Chronic Conditions: a Qualitative Study. *J GEN INTERN MED* **35**, 3556–3563 (2020). https://doi.org/10.1007/s11606-020-06063-y

Progress not perfection

- Deprescribing can take a long time, patients and their families may need time and support.
- Presenting the discontinuation as a patient-led trial.
- Dose reductions, even if not complete discontinuation, are a win.
- Most older adults and their family members are willing to consider a dose reduction or a reduction in the frequency of their medications – even if they are not willing to completely deprescribing (at first).
- Clinical pharmacists can be amazing assets in the journey to deprescribe.
- Patients and their families may not be aware of the harms of medications, don't assume they've heard it before.

Choi J, Vordenberg SE. Older adults' perceptions of deprescribing chronic benzodiazepines. Journal of the American Pharmacists Association. 2021 Sep 1;61(5):533-8.

Clinicians need support, too

- Negative experiences (a patient / family member getting upset) can lead to pessimism about deprescribing.
  - It can take several conversations before someone makes a change, analogous to smoking cessation.
- Physicians are often very hesitant to change medications prescribed by another physician.
  - The key to overcoming this barrier is to get the patient and family engaged.
- When is a good time to discuss medication changes?
  - Annual visits, seminal events (e.g., falls, hospitalizations) can be a good time to review medications with the patient and their family/care partners.
- How quickly to taper?
  - Deprescribing guidelines and algorithms are available at deprescribing.org under the “Resources” tab.

Strategies to limit the potential harms of polypharmacy

Strategies to limit the potential harms due to polypharmacy

1. Assess polypharmacy risk
2. Annual review of medications in all older adults
3. Inform caregivers of medication changes to increase the chance of detecting problems as soon as possible
4. Chose medications with the fewest side effects
5. Stop unnecessary medications
6. Consider the impact of medications on quality of life
7. Consider the person's ability to take medications and remember to take them

Resources

- Deprescribing.org - Contains deprescribing algorithms, guidelines, patient education tools.
- Anticholinergic Calculator - https://www.acbcalc.com/
- Anticholinergic Pocket Reference card - https://www.pharmacy.umaryland.edu/media/SOP/medmanagementumaryllandedu/AnticholPocketCard.pdf
- ePrognosis - https://eprognosis.ucsf.edu/
- STOPP/START - Screening Tool Of Older People's Prescriptions (STOPP) Screening Tool to Alert to Right Treatment (START) - https://www.cgakit.com/m-2-stopp-start

FAQs

1. What does it mean for a medication to be potentially inappropriate for an older adult?

Answer: Inappropriate medication for older adults can include drugs that may pose a higher risk of side effects or adverse reactions due to factors such as age-related changes in metabolism, potential interactions with other medications commonly taken by older individuals, and the presence of multiple chronic conditions.

2. What is one way to calculate Anticholinergic Burden?

Answer: The Anticholinergic Burden Calculator or the Anticholinergic Risk Scale are both ways to calculate a patient's anticholinergic burden.

FAQs

3. What is the most resonant message for patients and their families when discussing deprescribing?

Answer: Increased risk of adverse effects when taking medications is the message that most resonates with patients and their families when considering deprescribing.

4. What is one way in which the body changes in older age that affects medication absorption, metabolism, or elimination?

Answer: Decreased liver size and function, decreased kidney function, higher body fat percentage, and lower gastrointestinal motility are all ways in which the body changes over time, which affects medication absorption, metabolism, or elimination.

Thank you!

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