Polypharmacy: An Age-Friendly Approach to Describing

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Objectives

- Discuss Age Friendly Initiative and the CMS age-friendly inpatient hospital measure
- Examine the causes of polypharmacy and the importance of medication reconciliation
- Describe the influence of age on pharmacodynamics and pharmacokinetics
- Identify potentially inappropriate medications (PIMs) in older adults
- Utilize strategies to reduce polypharmacy

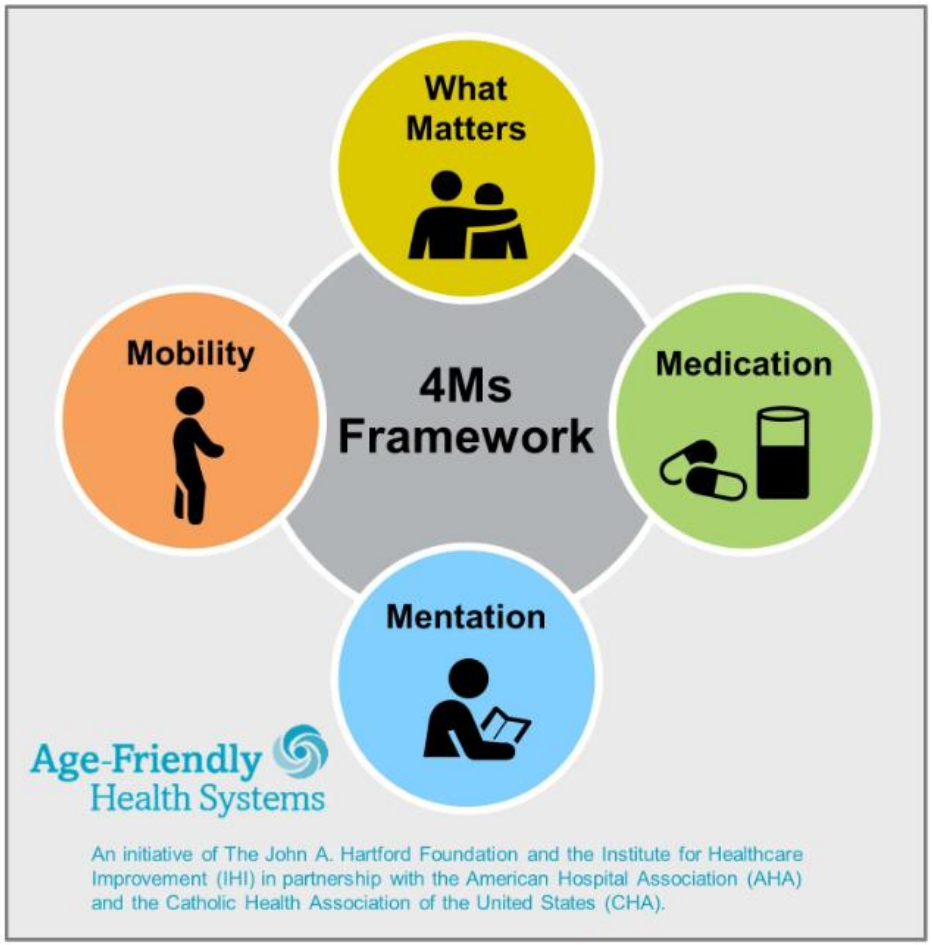
Age-Friendly Health System

- Initiative funded by John A Hartford Foundation and Institute for Healthcare Improvement
- Reliably provide a set of evidence-based practices, known as “4Ms” to all older patients

Goals of an Age-Friendly System

- Older adults get the best care possible
- Health care–related harms to older adults are dramatically reduced and approaching zero
- Older adults are satisfied with their care
- Value is optimized for patients, families, caregivers, health care providers and health systems

4 M's Framework



What Matters

Know and align care with each older adult's specific health outcome goals and care preferences including, but not limited to, end-of-life care, and across settings of care.

Medication

If medication is necessary, use Age-Friendly medication that does not interfere with What Matters to the older adult, Mobility, or Mentation across settings of care.

Mentation

Prevent, identify, treat, and manage dementia, depression, and delirium across settings of care.

Mobility

Ensure that older adults move safely every day in order to maintain function and do What Matters.

Levels of Participation

Level I Participant

- Successfully developed plans and committed to implement the 4Ms

Level II (Committed to Care Excellence)

- Evidence of 3 months or more data of older adults who receive 4Ms care.

Age Friendly Hospital Measure

- CMS mandate as of January 2025
- For Inpatient Quality Reporting Program
- Must comply with & report on 5 domains:
  1. Elicit patient health care goals
  2. **Responsibly manage medications**
  3. Implement Frailty screening and intervention (including cognition and mobility screens)
  4. Assess vulnerability (social isolation, caregiver stress, elder abuse)
  5. Designate age-friendly leadership

Domain 2: Responsible Medication Management

- Medications are reviewed for purpose of identifying potentially inappropriate medications (PIMS) for older adults
- Upon admission, before major procedures, and/or upon significant changes in clinical status
- Once identified, PIMS should be discontinued or dose adjusted

Polypharmacy

Multiple definitions:

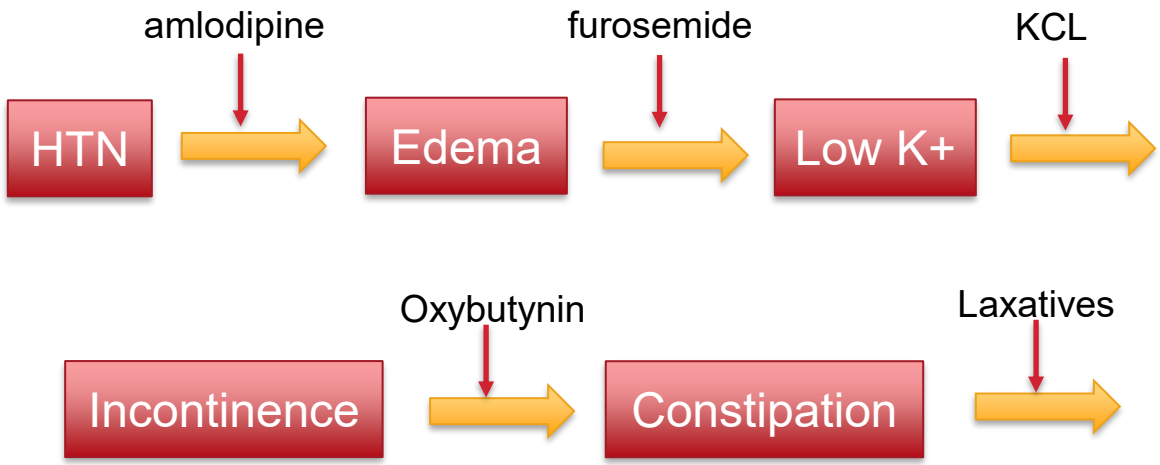
- 5 or more medicines (including OTC)
- 2 or more meds of same class
- Meds of different classes for same indication
- Taking at least 1 med not indicated

Hovstadius B. *Clin Ger. Med* 2012

Why Does It Happen?

- Multi-morbidities
- Prescribing cascade
  - Treating side effects of a medicine with a new medicine
- Multiple providers, health systems
- Inaccurate medication lists
- Hesitancy to change meds prescribed by others

Example Cascade



Drug Use in Older Adults

Adults ≥ 65 yo in United States

- ~ 60 million in 2023
- 86% on at least 1 med, 54% on 4+
- Use 1/3 of all prescriptions
- 40% of non-prescription medications

Consequences

- Adverse drug event
- Drug interactions
- Non-adherence
- Geriatric syndromes
- Delirium
- Health care utilization
- Cost

Adverse Drug Reactions (ADR)

- 5 categories
  - Side effects
  - Hypersensitivity
  - Idiosyncratic response
  - Toxic reactions
  - Adverse drug interactions

Adverse Drug Events (ADE)

- Injury resulting from use of a medication
- ~1.5 million ED visits per year
- ~ 500,000 hospitalizations per year
- 3rd leading cause of death
- Many ADEs are preventable
- Risks
  - Age, low BMI, CrCl, # meds, med type

Preventable ADEs

- Most common offenders
  - Cardiovascular drugs
  - Antibiotics
  - NSAIDs, opiates
  - Antidiabetics
  - Antipsychotics and sedatives
  - Anticoagulants/antiplatelets
  - Alcohol

Shehab N, *JAMA*, 2016

Drug Interactions

Interaction Type	Examples
Drug - Drug	Esomeprazole & citalopram
Drug - Disease	Donepezil,diltiazem → bradycardia
Drug - Nutrient	Warfarin & Vit. K rich foods
Drug - Herb	Sertraline & St. John's wort

Ulrich. K *Drug Metab*. Rev. 2009

Drug-Drug Interactions (DDI)

- Causes
  - Impaired absorption
  - Similar or opposite effects
  - Altered metabolism
    - Inhibited or induced
- Risk increases with number of medicines
- Most common effect → neuropsychological
- Cardiovascular and psychotropic drugs

Shehab N, *JAMA*, 2016

Pharmacokinetics

How the body handles a drug

- Absorption
- Volume of distribution (Vd)
- Metabolism
- Excretion

Absorption: Age-related Changes

Mode	Change	Comment
Oral	↓	Delayed gastric emptying, slowed GI motility, altered stomach pH
IV	↔	100% bioavailability
IM	↓	Erratic absorption
Inhalation	↓	Decreased chest wall compliance alveolar surface area
Topical	↓	Atrophy of epidermis and dermis

Turnheim, *Clinics in Geriatrics*, 1998
Trautinger, *Clinics in Geriatrics*, 2001

Vd: Age-related Changes

Content	Vd	Drug Class	Examples
Total body water	↓	Hydrophilic	Ethanol Morphine
Muscle mass	↓	Hydrophilic	Digoxin
Fat	↑	Lipophilic	Lorazepam Trazodone
Plasma albumin	↓	Free drug (↑)	Phenytoin, VPA Lorazepam

Ulrich. K *Drug Metab*. Rev. 2009

Metabolism: Changes with Age

- Liver mass decreases by 20 to 30%
- Hepatic blood flow decreases up to 50%
- Cytochrome P- 450 metabolism reduced 30%
  - ↓ medication inactivation and clearance
  - Greater risk for side effects

Ulrich. K *Drug Metab*. Rev. 2009

Renal Excretion- Aging Changes

- Reduction in nephrons (renal mass)
- Decreased blood flow in cortex
- Creatinine clearance decreases
- However, decreased muscle mass and inactivity can lead to “normal” Cr levels

Ulrich. K *Drug Metab*. Rev. 2009

Pharmacodynamics

- How a drug effects the body
- Changes in receptor affinity or numbers
- Post-receptor alterations
- Impairment of homeostasis
- Examples
  - Benzodiazepines, anticholinergics
  - Opioids – changes in μ sensitivity
  - Cardiac medicines – altered α, β function

Ulrich. K *Drug Metab*. Rev. 2009

Pearls of Geriatric Pharmacology

- **M** Minimize
- **A** Alternatives
- **S** Start low and go slow
- **T** Titrate
- **E** Educate
- **R** Review

Consult Pharm 2008: 23;538-47 [25]

Deprescribing

- Tapering, withdrawing, or discontinuing medicines
- Potential benefits
  - ↓ polypharmacy, ADRs
  - ↓ inappropriate, ineffective med use
  - ↓ ER visits/hospitalizations
  - Potentially ↓ LOS, readmissions, mortality

Consult Pharm 2008: 23;538-47

Reduction Strategies

- Multiple tools
- Aim to reduce Potentially Inappropriate Medicines (PIMs)
- Most commonly used
  - STOPP-START
  - Beers criteria
- Others: anticholingeric burden calculator, medstopper, deprescribing.org, Improved Prescribing in Elderly Tool (IPET)

Gokula M, *Clin Geriatr Med,* 2012

STOPP-START

- Developed in 2008 in Ireland, updated 2014
- Validated in the inpatient setting
- Based on physiological systems
- Includes medications in widespread use
- Emphasis on drug interactions, duplicates
- 80 STOPP and 34 START Criteria

O'Mahoney D, *Age Ageing*, 2014

Beers Criteria

- Supported by American Geriatrics Society
- Developed in 1991 for nursing homes
- Now applied to all older adults
- Last updated in 2023
- Evidence based recommendations

Beers Update Panel, *J Am Geriatr Soc*, 2023

Beers Criteria 2023

- 53 medications or drug classes
- 5 Categories
  - PIMs to avoid in older adults
  - PIMs to avoid in syndromes/diseases
  - PIMs to be used with caution
  - Specific drug-drug interactions
  - Meds to avoid/dose adjust for kidney function

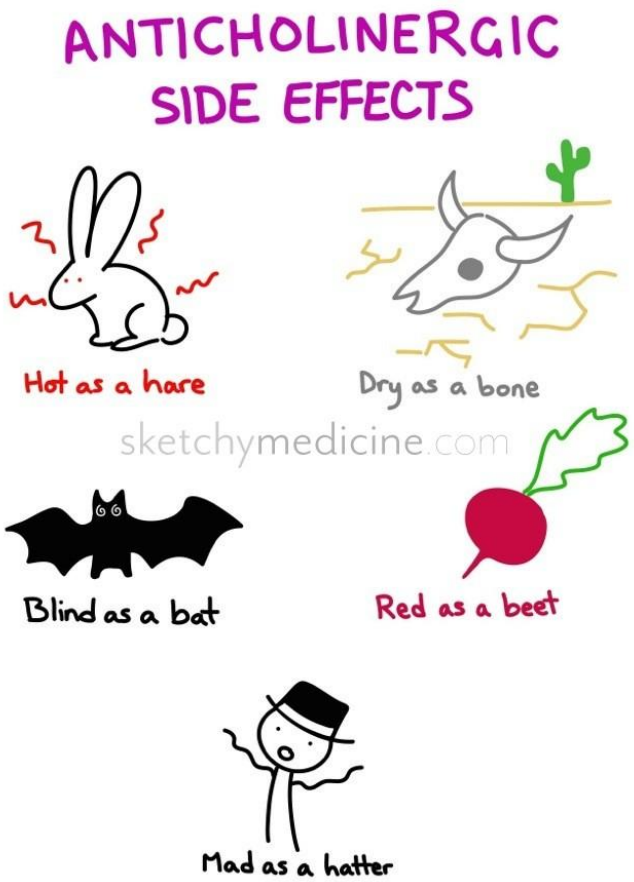
Beers Update Panel, *J Am Geriatr Soc*, 2019

Beers Medication Examples

- PIMs in older adults
  - Megesterol
  - Nitrofurantoin – avoid in CrCl <30ml/min
  - Warfarin, rivaroxaban
  - Sliding scales
  - Digoxin
  - Antipsychotics
  - Sulfonylureas
  - Metaclopramide

Anticholinergics

- Most common toxicity
- 32% NH and 13% outpatients on 2+
- Central and peripheral effects



Hayes B. Clin. Geri. Medicine 2012

Anticholinergic Side Effects

Central	Peripheral
Confusion Disorientation Agitation Memory problems Orthostasis	Dry mouth Decreased perspiration Double vision Loss of coordination Tachycardia Ileus, constipation Urinary retention

Anti-Cholinergic Burden

Drugs Class	Examples
Antidepressants	Tricyclic antidepressants, paroxetine
Anti-arrhythmic	Quinidine, disopyramide, digoxin
Anti-emetics/vertigo/motion	Meclizine, promethazine
Antihistamines	Diphenhydramine, H2 blockers
Antipsychotics	Quetiapine, olanzapine
Bronchodilators	Ipratropium
Antispasmodics	Hyoscyamine
Mydriatics	Atropine
Overactive bladder	Oxybutynin, tolterodine
Parkinson's disease	Benztropine

Sedating Drugs

- Increase risk for:
  - Cognitive impairment
  - Falls
  - Sedation
- Avoid long-acting benzodiazepines

Hayes, *Clinics in Geriatric medicine, 2007*

Sedating Drugs

- Increase risk for sedation, falls, cognitive impairment, MVCs

Drugs class	Examples
Anticonvulsants	gabapentin, valproic acid
Atypical antipsychotics	aripiprazole, olanzapine, quetiapine, risperidone
Benzodiazepines	diazepam, lorazepam, alprazolam, clonazepam
Muscle relaxants	baclofen, metaxalone, tizanidine, cyclobenzaprine
Opioids	oxycodone, hydrocodone, hydromorphone
SSRI	fluoxetine, trazodone
TCA	amitriptyline, doxepin, imipramine
Central alpha agonists	clonidine, dexmedetomidine, guanfacine

Medications and Falls

- Sedatives
- Benzodiazepines
- Anticholinergics
- Pain medicines- opiates, tramadol
- Heart medicines- BP, arrhythmia, digoxin
- Anti-epileptics
- Antipsychotics

Other Medications and Falls

- SSRI/SNRIs
  - Increases risk for falls
  - Can lower bone density
- Proton pump inhibitors
  - Increases risk for fractures
- Dementia medications
  - Acetyl cholinesterase (donepezil, rivastigmine)
  - NMDA inhibitor (memantine)

Medications and Delirium

- Meds can precipitate delirium
- Usually with other factors
- Older adults more vulnerable
- Antipsychotics do not improve delirium outcomes
  - May help with severe agitation
  - Use lower doses

Sedatives
Anticholinergics
Antipsychotics
Benzos
Opiates
Steroids
Antibiotics
Antidepressants
Cardiac meds
Withdrawal

Medication Management and Cognitive Impairment

- Lack of insight about noncompliance
- Requires detective work
- Lack of change in conditions is a clue
- Look at pill bottles
- Cut back and keep it simple
- Advocate for assistance with taking meds

Medication Reconciliation: WHAT

- Determination of accurate list of meds
  - Including Rxs, OTCs, PRNs
- Verification of doses and frequency
- Identification of PIMs and polypharmacy
- Assessment of benefits vs harm

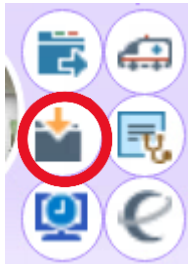
Medication Reconciliation WHY

- Medication errors → patient injury
  - common and preventable
- ~6.5 per 100 hospital admissions
- Poor med rec on transitions → patient harm, hospitalizations/readmissions

Kreckman J, *BMJ Open Quality*, 2018

Medication Reconciliation HOW

- Assume system med list is INACCURATE
- Talk to patients/caregivers
- Call pharmacy
- Look at pill bottles
- Check refill patterns
- Obtain facility med lists
- Edit/update med list



Inpatient MedRec Tips

- Assume initial system list is INACCURATE
- Determine accurate home med list
- If patient is from assisted living or nursing home
  - Have facility fax current med list
- CMC pharmacy list collection
- Identify PIMs
- Anticholinergic meds: stop or make PRN
- Don’t abruptly stop SSRIs/SNRIs, benzos

Inpatient Discharge MedRec

- Carefully review med selection
- If home medicines were not given during hospital stay
  - Decide whether they should be resumed or stopped
  - If stopped or changed, why
- Discharge summary paragraph should reflect the discharge med list

Outpatient MedRec Tips

- Assume system med list is INACCURATE
- MAs/RNs can't remove or change meds
- Providers: review and edit list at every visit
- If patient is from assisted living or nursing home
  - Have facility fax current med list
- New symptom/complaint
  - First think meds as culprit
- Think before prescribing. Try deprescribing

Take Home Points

- Mindfulness in prescribing
  - Start low, go slow
  - Know how the medicine works
- Reconcile medication lists
- New symptom- think medicine ADR
- Look at the pill bottles
- Question medication history
- Weigh risks and benefits of each medicine
- Stepwise med removal and close follow up

Thank you

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