NMAFP Winter Refresher
Medication Issues in the Elderly

Patrick Leung, Pharm.D., BCPS, PhC
Davena Norris, Pharm.D., BCPS, PhC
2/20/2016

Learning Objectives

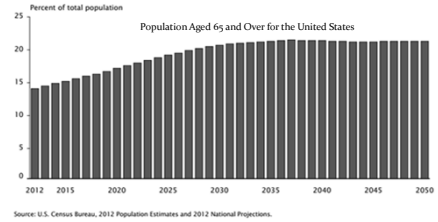
- Identify age-related pharmacokinetic and pharmacodynamic changes in older adults.
- Utilization the START/STOPP and Beer's criteria to recognize appropriate and inappropriate medication prescribing in older adults.
- Explain the importance of and strategies for managing polypharmacy in older adults.

Objective 1
Pharmacokinetic and Pharmacodynamic Changes in Older Adults

Patrick Leung, Pharm.D., BCPS, PhC

Medication issues in Older Adults

- Over 1/3 of the prescription medications are taken by patients over 65 years old, although elderly makes up only 15% of the US population.



Hutchison LC, Sleeper RB. Geriatric Pharmacotherapy. P57-76 http://www.census.gov/prod/2014pubs/p25-1140.pdf

Medication issues in Older Adults

- Up to 35% of elderly outpatients experience ADEs annually
- Up to 30% of hospital admission in elderly are related to ADEs
- Elderly are seven times more likely than young adults to have adverse events that required hospitalizations
  - Age-related physiological changes
  - A larger number of co-existing conditions
  - Polypharmacy

Hutchison LC, Sleeper RB. Geriatric Pharmacotherapy. P57-76 Hamilton et al. BMC Geriatrics 2009;9(5):1-4

Age-related Changes

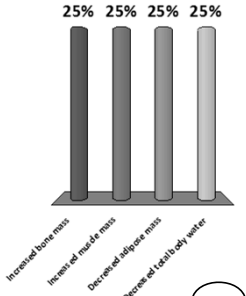
- Older patients respond to medications differently than younger patients because of physiologic changes in aging:
  - Pharmacokinetic changes
  - Pharmacodynamic changes

Drug Response

- **Pharmacokinetics:**
  - Drug concentrations at the site of action
- **Pharmacodynamics:**
  - End-organ responsiveness to a given drug concentration

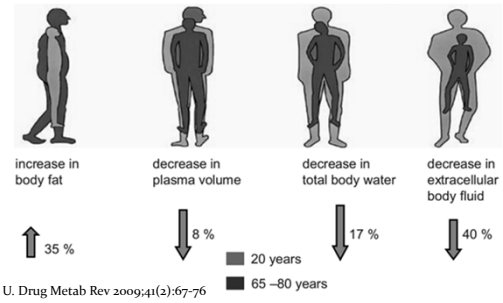
Which one of the following changes in an elderly patient's body composition compared with a younger patient may affect the pharmacokinetics of drugs that he/she is taking?

A. Increased bone mass
B. Increased muscle mass
C. Decreased adipose mass
D. Decreased total body water



30

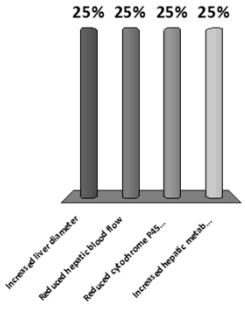
Age-dependent changes in body Composition



Klotz U. Drug Metab Rev 2009;41(2):67-76

Which one of the following changes in liver function would be expected in an older adult?

A. Increased liver diameter
B. Reduced hepatic blood flow
C. Reduced cytochrome P450 enzyme function
D. Increased hepatic metabolism



Physiologic Changes in Aging

Body composition	↓ Total body water ↓ Lean body mass ↑ Body fat
GI system	Delayed gastric emptying ↑ Gastric PH ↓ GI blood flow
Liver	↓ Liver size ↓ Hepatic blood flow
Renal System	↓ Renal mass & blood flow ↓ glomerular filtration rate

ELDesoky ES. Am J Ther 2007(14):488-98 Klotz U. Drug Metab Rev 2009;41(2):67-76

Physiologic Changes in Aging

Cardiovascular system	↓ myocardial β-receptor sensitivity ↓ Baroreceptor activity ↓ Cardiac output ↑ Total peripheral resistance
Central Nervous System	↓ weight and volume of the brain ↓ ACH receptors in the brain ↓ opioid receptor function

ELDesoky ES. Am J Ther 2007(14):488-98 Klotz U. Drug Metab Rev 2009;41(2):67-76

Pharmacokinetic Changes

- Absorption
- Distribution
- Metabolism
- Renal Excretion

Pharmacokinetic Changes

Absorption

Physiologic changes of aging	Clinical Significance
• Delayed gastric emptying • ↑ Gastric PH • ↓ GI blood flow	• No clinical significant change in absorption with age

Klotz U. Drug Metab Rev 2009;41(2):67-76

Pharmacokinetic Changes

Distribution

Physiologic Changes of Aging	Clinical Significance
•↓ Total body water •↓ Lean body mass •↑ Body fat	• ↑ volume of distribution of lipid-soluble drugs (e.g. diazepam) • ↓ volume of distribution of water-soluble drugs (e.g. digoxin, gentamicin)
• ↓ serum albumin	• ↑ free fraction in plasma of highly protein-bound acidic drugs (e.g. warfarin, phenytoin)

ELDesoky ES. Am J Ther 2007(14):488-98 Klotz U. Drug Metab Rev 2009;41(2):67-76

Pharmacokinetic Changes

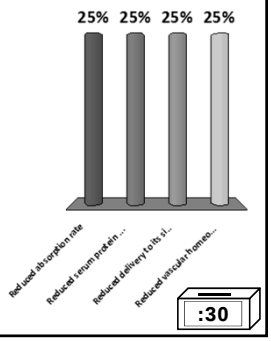
Metabolism

Physiologic Changes of Aging	Clinical Significance
• ↓ Liver size (-20 to 30%) • ↓ Hepatic blood flow (-20 to 50%)	• ↓ First-pass metabolism (e.g. propranolol, MS, statins) • ↓ rate of activation of some prodrugs (e.g. enalapril) • Marked inter-individual variation in the rate of hepatic metabolism • Illness and drug interactions are more important in reducing the activity of CYP enzyme system than aging

Klotz U. Drug Metab Rev 2009;41(2):67-76

Which one of the following is the likely reason that elderly patients may have a decreased diuretic response to a given dose of furosemide?

A. Reduced absorption rate
B. Reduced serum protein binding
C. Reduced delivery to its site of action
D. Reduced vascular homeostatic mechanisms



Pharmacokinetic Changes

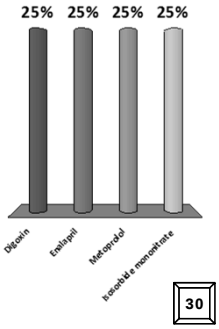
Renal Excretion

Physiologic Changes of Aging	Clinical Significance
• ↓ Renal mass (up to 30%) • ↓ Renal blood flow • ↓ glomerular filtration rate (by 1% every year of age after 20)	• ↓ renal elimination (e.g. gentamicin, enalapril, digoxin, lithium, diuretic) • Marked inter-individual variation • Frail elderly patients with little muscle mass may have normal SrCr despite having experienced a decline in GFR by >50%.

ELDesoky ES. Am J Ther 2007(14):488-98

Which one of the following drugs would have no increased risk of adverse effects as a result of age-related changes in pharmacokinetics or pharmacodynamics?

A. Digoxin
B. Enalapril
C. Metoprolol
D. Isosorbide mononitrate



30

Pharmacodynamic Changes

- Changes in drug pharmacodynamics can result from changes in receptor number, receptor affinity, or post-receptor effects (including second messenger systems).
- Pharmacodynamic changes in
  - Autonomic and central nervous system

Pharmacodynamic Changes

Autonomic Nervous System

Age-related changes in Elderly	Pharmacodynamic Effects
• ↓ β-adrenergic receptors in CV and respiratory tract	• Less responsive to β-agonists and β-antagonists
• Impaired baroreceptor reflex activity	• Elderly are much more likely to have an exaggerated postural hypotension
• ↓ Cholinergic transmission and number of muscarinic ACH receptors	• ↑ sensitivity to antagonism of cholinergic receptors

ELDesoky ES. Am J Ther 2007(14):488-98

Pharmacodynamic Changes

Central Nervous System

Age-related changes in Elderly	Pharmacodynamic Effects
• ↓ Functional reserve in memory and other functions of CNS	• ↑ sensitivity to sedation drugs and drugs with anticholinergic effects in the CNS

ELDesoky ES. Am J Ther 2007(14):488-98

Case 1

AB is a 68-year old man who presents to your clinic with complaints of new onset urinary urgency, frequency, and reduction of stream flow. His wife accompanies him to the clinic visit because she is concerned about his recent onset of disorientation. He has been using an OTC medication for allergy symptoms.

Case (cont.)

His current medications:

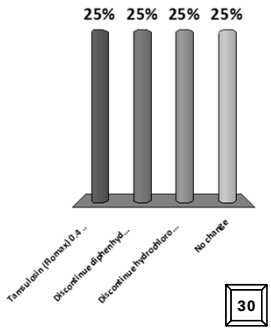
- Hydrochlorothiazide 12.5 mg daily (4 yrs)
- Amlodipine 5 mg daily (6 months)
- Amitriptylline 50 mg at bedtime for back pain (2 years)
- Diphenhydramine 25 mg 3 times/day prn (2 weeks)
- Atorvastatin 10 mg at bedtime (2 yrs)
- Temazepam 15 mg at bedtime (6 months)

Vital sign: BP 159/95, P 75

Lab: Na 143, K 4.9, BUN 22, Cr 1.5

Which of the following is the most appropriate intervention for AB?

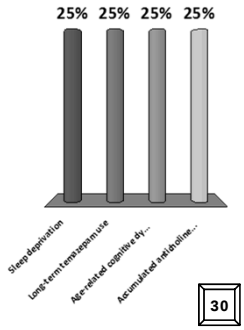
A. Tamsulosin (Flomax) 0.4 mg at bedtime
B. Discontinue diphenhydramine
C. Discontinue hydrochlorothiazide
D. No change



30

Which one of the following is the most likely cause of the change in AB's cognitive function?

A. Sleep deprivation
B. Long-term temazepam use
C. Age-related cognitive dysfunction
D. Accumulated anticholinergic activity



30

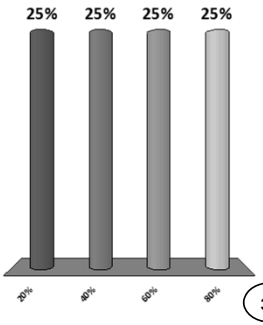
Objective 3 – Part 1

The Importance of Managing Polypharmacy in Older Adults

Patrick Leung, Pharm.D., BCPS, PhC

What percentage of adults 65 or older taking 5-9 medications

A. 20%
B. 40%
C. 60%
D. 80%



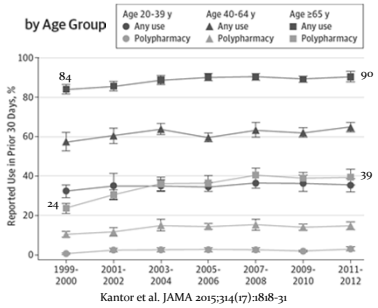
30

Polypharmacy in Older Adults

- Polypharmacy: ≥5 medications
- Adults 65 years of age or older:
  - 40% take 5-9 medications
  - 18% take ≥ 10 medications

http://www.bu.edu/slone/files/2012/11/SloneSurveyReport2006.pdf

Trends in any Rx drug use and Polypharmacy (≥5 Rx drugs) in the US from 1999-2012



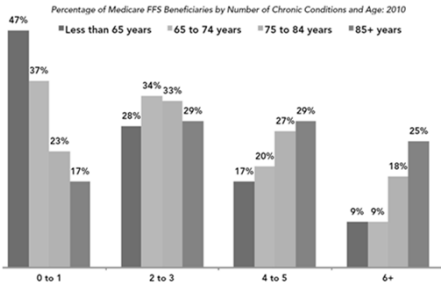
Kantor et al. JAMA 2015;314(17):1818-31

Polypharmacy in Older Adults

- Polypharmacy is more common in elderly because they have more chronic disease conditions and are taking more medications

http://www.bu.edu/slone/files/2012/11/SloneSurveyReport2006.pdf

CMS: Chronic Conditions Among Medicare Beneficiaries, 2000



http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/Downloads/2012Chartbook.pdf

Polypharmacy in Older Adults

- Can be appropriate or inappropriate
- Multiple medications are often required to treat clinically complex older adults.
- Challenge to match the complex needs of older patients with those of disease specific clinical practice guidelines.
- Example: An older patient with a myocardial infarction, history of diabetes mellitus type II, and COPD.

Polypharmacy

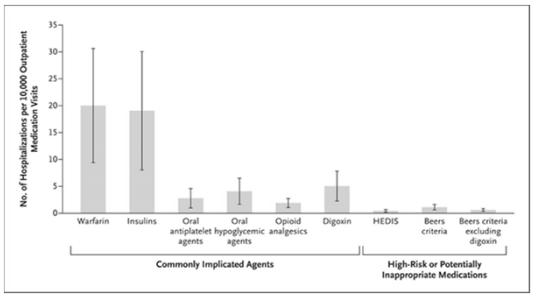
- Increases the risk of adverse drug reactions, drug-drug interactions, drug-disease interactions and drug-food interactions.
- Increases the possibility of "prescribing cascades".
- Increases healthcare costs

Emergency Hospitalizations for Adverse Drug Events in Older Americans

- Adverse drug reactions were responsible for about 100,000 hospitalizations among older Americans each year.
- Almost half of these admissions were elderly 80 years or above
- Nearly two thirds of these hospitalizations were due to unintentional overdose
- The estimated cost of ADEs in 2006 was 3.5 billion US dollars

Budnitz DS et al. N Engl J Med 2011;365(21):2002-12.

Estimated Rates of Emergency Hospitalizations for Adverse Drug Events in Older U.S. Adults, 2007–2009.



Budnitz DS et al. N Engl J Med 2011;365:2002-2012.

Risk Factors for Adverse Drug Effects

- 6 or more concurrent chronic conditions
- 12 or more doses of drug/day
- 9 more medications
- Prior adverse drug reaction
- Low body weight or body mass index
- Age 85 or older
- Estimated CrCl < 50 ml/min
- Inappropriate Prescribing

Inappropriate Prescribing in Elderly

- Medications that pose more harm than benefit
- Inappropriate dose or duration
- Medications with clinically significant drug-drug, and drug-disease interactions
- Underuse of potentially beneficial medications

Hamilton et al. BMC Geriatrics 2009;9(5):1-4

Inappropriate Prescribing in Elderly

- Up to 24% of elderly outpatients and 40% of nursing home residents receiving at least one inappropriate medication according to Beers' criteria
- 58% of elderly do not receive one or more clinically indicated medications according to START criteria
- Inappropriate prescribing is associated with increased morbidity, mortality and healthcare cost, primarily due to an increased prevalence of ADEs

Hamilton et al. BMC Geriatrics 2009;9(5):1-4

References

- Hutchison LC, and Sleeper RB. Fundamental of Geriatric Pharmacotherapy. Bethesda: American Society of Health-System Pharmacists, 2015. Print.
- Jennifer M. Ortman, Victoria A. Velkoff, and Howard Hogan. *An Aging Nation: The Older Population in the United States*, May 2014. http://www.census.gov/prod/2014pubs/p25-1140.pdf. Accessed 1/21/2016.
- Hamilton et al. Inappropriate prescribing and adverse drug events in older people. BMC Geriatrics 2009;9(5):1-4
- Klotz U. Pharmacokinetics and drug metabolish in the elderly. Drug Metab Rev 2009;41(2):67-76
- ELDesoky ES. Pharmacokinetic-Pharmacodynamic Crisis in the Elderly. Am J Ther 2007(14):488-98
- Slone Epidemiology Center. PATTERNS OF MEDICATION USE IN THE UNITED STATES
- **2006.** http://www.bu.edu/slone/files/2012/11/SloneSurveyReport2006.pdf. Accessed 7/12/2015.
- Kantor et al. Trends in Prescription Drug Use Among Adults in the United States From 1999-2012. JAMA 2015;314(17):1818-31
- Budnitz DS et al. Emergency Hospitalizations for Adverse Drug Events in Older Americans. N Engl J Med 2011;365:2002-2012
- Centers for Medicare and Medicaid Services. Chronic Conditions among Medicare Beneficiaries, Chartbook, 2012 Edition. Baltimore, MD. 2012. http://www.cms.gov/Research-Statistics- Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/Downloads/2012ChartBook.pdf. Accessed 7/13/2015.

Objective 2

Screening for Potentially Inappropriate Medications

The Beer's and START/STOPP Criteria

Davena, Pharm.D., BCPS, PhC

American Geriatrics Society (AGS)

2015 Updated Beers Criteria

- Purpose
  - To identify potential inappropriate medications (PIM) that should be avoided in many older adults
  - To reduce ADEs and drug related problems
  - Improve medication selection and use in older adults
  - Designed for use in any clinical setting
- http://geriatricscareonline.org

AGS. 2015. http://geriatricscareonline.org

American Geriatrics Society (AGS)

2015 Updated Beers Criteria

- Key principles
  - *Potentially* inappropriate, not *definitely* inappropriate
  - Understand *why* medications are on the Beers Criteria
  - Optimal application involves offering safer non-pharmacologic and pharmacologic therapies.
  - Access to medications in the Beers Criteria should not be excessively restricted by health plans
- Consider Beers Criteria to be a "Warning Light"

AGS. 2015. http://geriatricscareonline.org

American Geriatrics Society (AGS)

2015 Updated Beers Criteria

Table 2*	PIM use in older adults
Table 3*	PIM due to drug-disease or drug-syndrome interactions
Table 4	PIM to be used with *caution* in older adults
Table 5*	Drug-drug interactions to avoid in older adults
Table 6*	Avoid/dose reduce with renal dysfunction
Table 7	Drugs with strong anticholinergic properties
Table 8	Changes since 2012 Beers Criteria
Table 9	Medications removed since 2012 Beers Criteria

AGS. 2015. http://geriatricscareonline.org

2015 AGS Updated Beers Criteria

Table 2
PIM Use in Older Adults

Table 2: PIM in Older Adults

Patient Case (JP)

- CC: "Altered mental status"
- HPI: 79 y/o man brought to your clinic by his wife after he was found difficult to arouse this morning. He has increased intermittent periods of confusion and is more "sleepy" reporting up to 16 hours of sleep per day. He started a new medication for neuropathy a week ago. Patient also reports dizziness and two falls in the past month.

Table 2: PIM in Older Adults

Patient Case (JP)

- PMH
  - Diabetes, type 2 with neuropathy, no nephropathy
  - Hypertension
  - Depression
  - Osteoarthritis
  - GERD

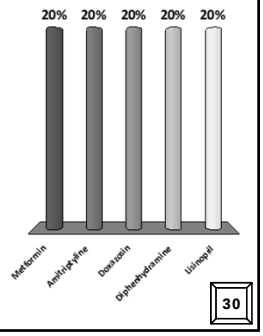
Table 2: PIM in Older Adults

Patient Case (JP)

- Home Medications
  - Metformin 1000 mg BID
  - Glyburide 10 mg daily
  - Lisinopril 20 mg daily
  - Gabapentin 300 mg TID
  - Amitriptyline 50 mg at bedtime
  - Doxazosin 4 mg at bedtime
  - Diphenhydramine 25 mg BID prn allergies
  - Pantoprazole 40 mg daily
  - Acetaminophen 500 mg every 6 hours prn pain

Patient Case (JP): Which *new* medication could explain his worsened confusion and sedation?

A. Metformin
B. Amitriptyline
C. Doxazosin
D. Diphenhydramine
E. Lisinopril



Patient Case (JP): JP is taking how many PIM according to the Beers Criteria?

A. 1
B. 2
C. 3
D. 4
E. 5

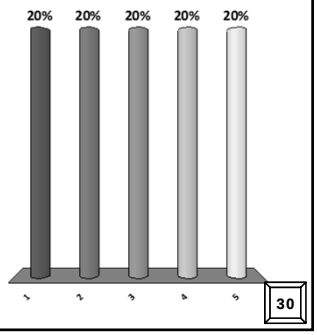


Table 2: PIM in Older Adults

Patient Case (JP)

- Home Medications – 5 PIM
  - Metformin 1000 mg BID
  - Glyburide 10 mg daily
  - Lisinopril 20 mg daily
  - Gabapentin 300 mg TID
  - Amitriptyline 50 mg at bedtime
  - Doxazosin 4 mg at bedtime
  - Diphenhydramine 25 mg BID prn nausea
  - Pantoprazole 40 mg daily
  - Acetaminophen 500 mg every 6 hours prn pain

Table 2: PIM in Older Adults

Diabetes Medications

Drugs	Rationale	Recommendation	Quality of Evidence	Strength of Rec
Sulfonylureas (Long duration) - Chlorpropamide - **Glyburide**	Chlorpropamide: prolonged half-life in older adults; can cause prolonged hypoglycemia; causes SIADH Glyburide: **higher risk of severe prolonged hypoglycemia**	Avoid	High	Strong
Insulin, sliding scale	Higher risk of hypoglycemia without improvement in hyperglycemia management regardless of care setting; refers to sole use of short- or rapid-acting insulins to manage or avoid hyperglycemia in absence of basal or long-acting insulin; does not apply to titration of basal insulin or use of additional short- or rapid-acting insulin in conjunction with scheduled insulin (ie, "correction insulin")	Avoid	Moderate	Strong

Table 2: PIM in Older Adults

CNS – Antidepressants

Drugs	Rationale	Recommendation	Quality of Evidence	Strength of Rec
Antidepressants, alone or in combination → TCAs **Amitriptyline** Amoxapine Clomipramine Desipramine Doxepin >6 mg/d Imipramine Nortriptyline Paroxetine Protriptyline	**Highly anticholinergic**, sedating, and cause orthostatic hypotension; safety profile of low-dose doxepin (≤6 mg/d) comparable with that of placebo	Avoid	High	Strong

AGS. 2015. http://geriatricscareonline.org

Table 2: PIM in Older Adults

CNS – Benzos and Hypnotics

Drugs	Rationale	Recommendation	Quality of Evidence	Strength of Rec
Benzodiazepines *Short- and Intermediate acting:* - Alprazolam - Lorazepam - Temazepam - Triazolam *Long-acting:* - Chlordiazepoxide - Clonazepam - Diazepam	Older adults have increased sensitivity to benzodiazepines and decreased metabolism of long-acting agents; in general, all benzodiazepines increase risk of **cognitive impairment, delirium, falls, fractures, and motor vehicle crashes** in older adults. May be appropriate for seizure disorders, rapid eye movement, sleep disorders, benzo/ethanol withdrawal, severe GAD, and periprocedural anesthesia	Avoid	Moderate	Strong
Nonbenzodiazepine, benzo receptor agonist hypnotics - Eszopiclone - Zolpidem - Zaleplon	Benzodiazepine-receptor agonists have adverse **events similar to those of benzodiazepines in older adults** (e.g., delirium, falls, fractures); increased emergency room visits/hospitalizations; motor vehicle crashes; minimal improvement in sleep latency and duration	Avoid	Moderate	Strong

Table 2: PIM in Older Adults

Anticholinergic Medications

Drugs	Rationale	Recommendation	Quality of Evidence	Strength of Rec
First-generation antihistamines: - Chlorpheniramine - Cyproheptadine - Dimenhydrinate - **Diphenhydramine** - Doxylamine - Hydroxyzine - Meclizine - Promethazine	**Highly anticholinergic**; clearance reduced with advanced age, and tolerance develops when used as hypnotic; risk of confusion, dry mouth, constipation, and other anticholinergic effects or toxicity Use of diphenhydramine in situations such as acute treatment of severe allergic reaction may be appropriate.	Avoid	Moderate	Strong

AGS. 2015. http://geriatricscareonline.org

Table 2: PIM in Older Adults

Cardiovascular/Gastrointestinal

Drugs	Rationale	Recommendation	Quality of Evidence	Strength of Rec
Peripheral alpha-1 blockers - **Doxazosin** - Prazosin - Terazosin	**High risk of orthostatic hypotension**; not recommended as routine treatment for hypertension; alternative agents have superior risk/benefit profile	**Avoid use as an anti-hypertensive**	Moderate	Strong
Proton-pump inhibitors	Risk of C difficile infection and bone loss and fractures **Avoid scheduled use for >8 weeks** unless for high risk patients (e.g., oral corticosteroids or chronic NSAID use), erosive esophagitis, Barrett's esophagitis, pathological hypersecretory condition, or demonstrated need for maintenance treatment (e.g., due to failure of drug discontinuation trial or H_2 blockers)	See rationale	High	Strong

2015 AGS Updated Beers Criteria

Table 3
PIM due to Drug-Disease /Drug-Syndrome Interactions

Table 3: PIM due to Drug-Disease /Drug-Syndrome Interactions

Patient Case (MB)

- 68 y/o woman
- PMH
  - Parkinson's disease
  - Heart failure (LVEF = 30%)
  - Atrial fibrillation
  - Insomnia
  - Seasonal allergies

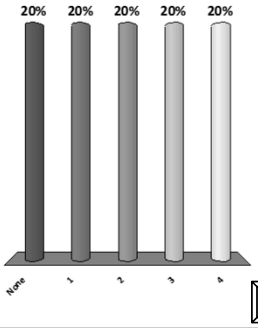
Table 3: PIM due to Drug-Disease /Drug-Syndrome Interactions

Patient Case (MB)

- Medications
  - Carbidopa/levodopa 25/100 mg 1 tablet 4 times daily
  - Diltiazem ER 180 mg daily
  - Apixaban 5 mg BID
  - Metoclopramide 5 mg AC/HS for nausea
  - Claritin D 1 tablet at bedtime for allergies

Patient Case: MB is taking how many PIM according to the Beers Criteria based on her medical history?

A. None
B. 1
C. 2
D. 3
E. 4



30

Table 3: PIM due to Drug-Disease /Drug-Syndrome Interactions

Patient Case (MB)

- Medications
  - Carbidopa/levodopa 25/100 mg 1 tablet 4 times daily
  - Diltiazem ER 180 mg daily
  - Apixaban 5 mg BID
  - Metoclopramide 5 mg AC/HS for nausea
  - Claritin D 1 tablet at bedtime for allergies

Table 3: PIM due to Drug-Disease /Drug-Syndrome Interactions

Heart Failure

Drugs	Rationale	Recommendation	Quality of Evidence	Strength of Rec
NSAIDs and COX-2 inhibitors Nondihydropyridine CCBs (**diltiazem**, verapamil)—avoid only for HFrEF Thiazolidinediones (pioglitazone, rosiglitazone) Cilostazol Dronedarone (severe or recently decompensated heart failure)	Potential to promote fluid retention and/or exacerbate heart failure	Avoid	NSAIDs: moderate CCBs: moderate TZDs: high Cilostazol: low Dronedarone:high	Strong

AGS. 2015. http://geriatricscareonline.org

Table 3: PIM due to Drug-Disease /Drug-Syndrome Interactions

Parkinson Disease

Drugs	Rationale	Recommendation	Quality of Evidence	Strength of Rec
All antipsychotics (except aripiprazole, quetiapine, clozapine) Antiemetics - **Metoclopramide** - Prochlorperazine - Promethazine	Dopamine-receptor antagonists **with potential to worsen parkinsonian symptoms**. Quetiapine, aripiprazole, clozapine appear to be less likely to precipitate worsening of Parkinson disease	Avoid	Moderate	Strong

AGS. 2015. http://geriatricscareonline.org

Table 3: PIM due to Drug-Disease /Drug-Syndrome Interactions

Insomnia

Drugs	Rationale	Recomm-endation	Quality of Evidence	Strength of Rec
Oral decongestants - Pseudoephedrine - Phenylephrine	CNS stimulant effects	Avoid	Moderate	Strong
Stimulants - Amphetamine - Armodafinil - Methylphenidate - Modafinil - Theobromines - Theophylline - Caffeine				

AGS. 2015. http://geriatricscareonline.org

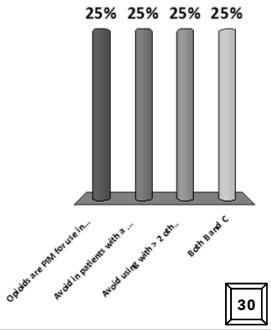
2015 AGS Updated Beers Criteria

Table 5

Drug-Drug Interactions to be Avoided in Older Adults

What does the Beers Criteria say about the use of opioid analgesics as a class?

A. Opioids are PIM for use in all older adults
B. Avoid in patients with a history of falls or fractures (*excludes* pain management due to a recent fracture or joint replacement)
C. Avoid using with ≥ 2 other CNS-active drugs
D. Both B and C



30

2015 AGS Updated Beers Criteria

Table 6
Avoid or Dose Reduce with Varying Levels of Kidney Function in Older Adults

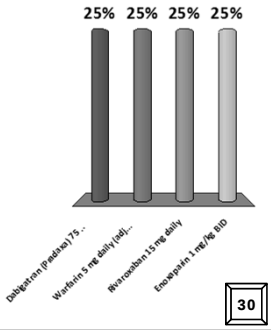
Table 6: Avoid or Dose Reduce with Renal Dysfunction

Patient Case (TH)

- HPI
  - Ms. TH is a 71 y/o woman with a history of DM2, HTN, and CKD stage 4. She comes to your clinic stating she can feel her heart "fluttering" since 1 week ago. An EKG shows Afib. Her vitals are HR 105, BP 143/90. She denies chest pain and her troponins are negative. The decision is made to start a beta blocker for rate control and anticoagulation for stroke prevention.

Patient Case (TH): Using the Beers criteria as a guide, which anticoagulant would be most appropriate for TH?

A. Dabigatran (Pradaxa) 75 mg BID
B. Warfarin 5 mg daily (adjust per INR)
C. Rivaroxaban 15 mg daily
D. Enoxaparin 1 mg/kg BID



30

START and STOPP Criteria

START and STOPP Criteria

- Published 2008
- START
  - (Screening Tool to Alert doctors to Right Treatment)
- STOPP
  - (Screening Tool of Older Persons' potentially inappropriate Prescriptions)
- http://www.ngna.org/_resources/documentation/chapter/carolina_mountain/STARTandSTOPP.pdf

Pharmacists Letter. 2011.

Contents of STOPP

Physiological System	Number of Criteria
Cardiovascular system	17
Central nervous system	13
Gastrointestinal system	5
Musculoskeletal system	8
Respiratory system	3
Urogenital system	6
Endocrine system	4
Drugs that adversely affect fallers	5
Analgesics	3
Duplicate drug classes	1

Pharmacists Letter. 2011.

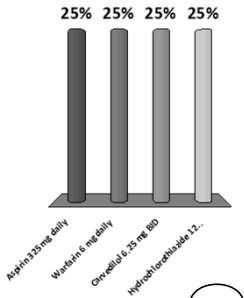
STOPP Criteria

Patient Case (LB)

- LB is a 67 y/o man with CAD, DVT (first uncomplicated 1 year ago), HTN, and gout (last attack 2 months ago)
- CC: Need medication refills
- Medications
  - Aspirin 325 mg daily
  - Warfarin 6 mg daily
  - Carvedilol 6.25 mg BID
  - Hydrochlorothiazide 12.5 mg daily

Patient Case: Which of LB's medications may be potentially inappropriate based on the STOPP criteria?

A. Aspirin 325 mg daily
B. Warfarin 6 mg daily
C. Carvedilol 6.25 mg BID
D. Hydrochlorothiazide 12.5 mg daily



30

STOPP Criteria – CV System

1. Digoxin at a long-term dose > 125µg/day with impaired renal function* *(increased risk of toxicity).*
2. Loop diuretic for dependent ankle oedema only i.e. no clinical signs of heart failure *(no evidence of efficacy, compression hosiery usually more appropriate).*
3. Loop diuretic as first-line monotherapy for hypertension *(safer, more effective alternatives available).*
4. Thiazide diuretic with a history of gout *(may exacerbate gout).*
5. Beta-blocker with Chronic Obstructive Pulmonary Disease (COPD) *(risk of increased bronchospasm).*
6. Beta-blocker in combination with verapamil *(risk of symptomatic heart block).*
7. Use of diltiazem or verapamil with NYHA Class III or IV heart failure *(may worsen heart failure).*
8. Calcium channel blockers with chronic constipation *(may exacerbate constipation).*
9. Use of aspirin and warfarin in combination without histamine H2 receptor antagonist (except cimetidine because of interaction with warfarin) or proton pump inhibitor *(high risk of gastrointestinal bleeding).*
10. Dipyridamole as monotherapy for cardiovascular secondary prevention *(no evidence for efficacy).*
11. Aspirin with a past history of peptic ulcer disease without histamine H2 receptor antagonist or Proton Pump Inhibitor *(risk of bleeding).*
12. Aspirin at dose > 150mg day *(increased bleeding risk, no evidence for increased efficacy).*
13. Aspirin with no history of coronary, cerebral or peripheral vascular symptoms or occlusive event *(not indicated).*
14. Aspirin to treat dizziness not clearly attributable to cerebrovascular disease *(not indicated).*
15. Warfarin for first, uncomplicated deep venous thrombosis for longer than 6 months duration *(no proven added benefit).*
16. Warfarin for first uncomplicated pulmonary embolus for longer than 12 months duration *(no proven benefit).*
17. Aspirin, clopidogrel, dipyridamole or warfarin with concurrent bleeding disorder *(high risk of*

Contents of START

Physiological System	Number of Criteria
Cardiovascular system	8
Central nervous system	2
Gastrointestinal system	2
Musculoskeletal system	3
Respiratory system	3
Endocrine system	4

Pharmacists Letter. 2011.

START Criteria

Cardiovascular System

(i) Warfarin in the presence of chronic atrial fibrillation, where there is no contraindication to warfarin.

(ii) Aspirin in the presence of chronic atrial fibrillation, where warfarin is contraindicated, but not aspirin.

(iii) Aspirin or Clopidigrel with a documented history of coronary, cerebral or peripheral vascular disease in patients in sinus rhythm, where therapy is not contraindicated.

(iv) Antihypertensive therapy where systolic BP consistently >160 mmHg, where antihypertensive therapy is not contraindicated.

(v) Statin therapy in patients with documented history of coronary, cerebral or peripheral vascular disease, where the patients' functional status remains independent for activities of daily living and life expectancy id more than 5 years

(vi) ACE inhibitor in chronic heart failure, where no contraindication exists.

(vii) ACE inhibitor following acute myocardial infection.

(viii) Beta blocker in chronic stable angina, where no contraindication exists.

Central Nervous System

(i) L-DOPA in idiopathic Parkinson's disease with definite functional impairment and resultant disability.

(ii) Antidepressant in the presence of clear-cut depressive symptoms, lasting at least 3 months.

Gastrointestinal System

(i) Proton pump inhibitor in the presence of chronic severe gastro-oesophageal acid reflux or peptic stricture requiring dilatation.

(ii) Fibre supplement for chronic, symptomatic diverticular disease with constipation.

Locomotor System

(i) Disease-modifying anti-rheumatic drug (DMARD) with known, moderate--severe rheumatoid disease lasting more than 12 weeks.

(ii) Bisphosphonate in patients taking glucocorticoids for more than 1 month (i.e. chronic corticosteroid therapy).

(iii) Calcium and vitamin D supplement in patients with known osteoporosis (previous fragility fracture, acquired dorsal kyphosis).

Endocrine System

(i) Metformin with type 2 diabetes +/- Metabolic Syndrome (in the absence of renal impairment

Objective 3 – Part 2

Strategies for Managing Polypharmacy in Older Adults

Davena Norris, Pharm.D., BCPS, PhC

Strategies for Managing Polypharmacy

1. Use screening tools as "Warning light"
2. Determine if medication is truly need
   - Medication Appropriateness Index (MAI)
3. Are there safer, more effective alternatives?
   - AGS Alternative Medications List
4. Prudent prescribing decisions to avoid polypharmacy
   - Avoid prescribing cascade
5. Medication Therapy Management

Medication Appropriateness Index (MAI)

- Is there an indication for the drug?
- Is the medication effective for the conditions?
- Is the dosage correct?
- Are the directions correct?
- Are the directions practical?
- Are there clinically significant drug-drug interactions?
- Are there clinically significant drug-disease/condition interactions?
- Is there unnecessary duplication with other drugs?
- Is the duration of therapy acceptable?
- Is this drug the least expensive alternative compared with others of equal usefulness?

Hanlon et al. J Clin Epidemiol 1992;45:1045

Safer, more effective alternatives?

- AGS Alternatives List
- Consider non-pharmacologic first

Patient Case #1: JP's PIM	**Alternatives/Management**
Glyburide 10 mg daily	Short-acting SU (glipizide), metformin
Amitriptyline 50 mg HS	Increase gabapentin, SNRI
Doxazosin 4 mg HS	Alternative antihypertensive (CCB?)
Diphenhydramine 25 mg BID prn	Second-generation antihistamine, intranasal saline or corticosteroid
Pantoprazole 40 mg daily	Evaluate duration and if had a trial of an alternative (H2 blocker)

Hanlon et al. JAGS. 2015.

The Basics:
Principles of Prescribing for Older Adults

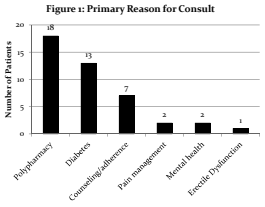
- Start with a low dose
- Titrate upward slowly, as tolerated
- Avoid starting 2 drugs at the same time
- Avoid the "prescribing cascade"
  - AKA: starting a new drug to treat side effect of another
- Assess adherence and barriers to adherence
- Stop potentially unnecessary, ineffective therapy

Medication Therapy Management (MTM)

- Use pharmacists as members of the TEAM
- Complete comprehensive medication reviews
- Minimize polypharmacy
- Address barriers to adherence
- Optimize drug therapy and improve patient outcomes

MTM at the Family Medicine Clinic

- Results from November 2014 – July 2015



Medications at initial visit: 0 – 32, 13 (median)

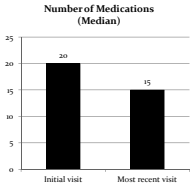
Medical conditions addressed: 1 – 14, 7 (median)

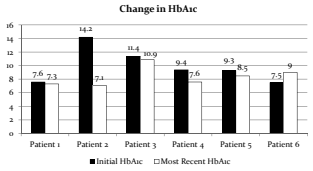
Age: 23 – 91, 44% over 65 years of age

Gender: 67% female

MTM at the Family Medicine Clinic

- Results from November 2014 – July 2015





References

- American Geriatrics Society. AGS 2015 Updated Beers criteria for potentially inappropriate medication use in older adults. JAGS. Available at http://geriatricscareonline.org.
- Hanlon JT, Semla TP, Schmader KE. Alternative medications for medications in the use of high-risk medications in the elderly and potentially harmful drug-disease interactions in the elderly quality measures. JAGS.
- START and STOPP criteria. Pharmacist Letter. September 2011.
- Wooten JM. Rules for improving pharmacotherapy in older adults, part 1. Southern Medical Journal. 2015 Feb; 108(2): 97-104.
- Wooten JM. Rules for improving pharmacotherapy in older adults, part 2. Southern Medical Journal. 2015 Mar; 108(3): 145-150.