There Are No Conflicts of Interests
Overview

- Definitions and demographics
- Risks associated with polypharmacy in older adults - adverse drug reactions
- Causes of polypharmacy
- Consequences of polypharmacy
- Prevention of polypharmacy
Polypharmacy in Older Adults: General Definitions

Polypharmacy:
- Inappropriate prescribing of duplicative medications where interactions are likely
- Use of 5 or more medications

Adverse Drug Events (ADE):
- Drug interaction that results in an undesirable/unexpected event that requires a change in management
Polypharmacy

- Many different drugs, often duplicative
- Drugs in excess of that which is clinically-indicated
- Excessive number of inappropriate drugs
- Includes Rx, OTC, nutraceuticals
- Differs from polymedicine or polytherapy, which refers to multiple meds which are all clinically-indicated and appropriate
Polypharmacy

In general:

- 5+ Rx drugs is considered “clinically-relevant” polypharmacy
- 10+ Rx drugs is considered “excessive” polypharmacy

Pts and providers often only consider chronic tx

CAM, short-term meds, topicals, and PRNs often excluded
Older adults comprise 12% of the U.S. population, but use 35% of the prescription medications and 50% of OTC medications.

The average medication usage for persons over 65 is:
- 2 to 6 prescription drugs
- 1 to 4 OTC medicines.

In 2013, 72% adults 65 years or older reported taking 5 or more medications and 18% reported taking 10 or more (CDC, 2014).

The average American senior spends $670 annually for pharmaceuticals.
Polypharmacy in Seniors: Not Going Away

- Due to longer life expectancy and the aging baby boomer population, by 2030, the number of Americans 65+ y.o. is expected to double to 71 million.

- 85+ y.o. represent the fastest-growing segment of population.

- Multi-morbidity
  - Majority of older adults have 3+ chronic conditions or diseases.
  - About 20% have 5+ chronic conditions.
Clinical consequences of polypharmacy in elderly.

Maher RL, Hanlon J, Hajar ER.

Abstract

INTRODUCTION: Polypharmacy, defined as the use of multiple drugs or more than are medically necessary, is a growing concern for older adults. MEDLINE and EMBASE databases were searched from January 1, 1986 to June 30, 2013) to identify relevant articles in people aged > 65 years.

AREAS COVERED: We present information about: i) prevalence of polypharmacy and unnecessary medication use; ii) negative consequences of polypharmacy; and iii) interventions to improve polypharmacy.

EXPERT OPINION: International research shows that polypharmacy is common in older adults with the highest number of drugs taken by those residing in nursing homes. Nearly 50% of older adults take one or more medications that are not medically necessary. Research has clearly established a strong relationship between polypharmacy and negative clinical consequences. Moreover, well-designed interprofessional (often including clinical pharmacist) intervention studies that focus on enrolling high-risk older patients with polypharmacy have shown that they can be effective in reducing aspects of unnecessary prescribing with mixed results on distal health outcomes.
The US Government Accountability Office found that ~ 25% of clinical trials included representation of those over 65.

- Highly heterogeneous due to multiple medical problems
- Conflicts/concerns about competency
- FDA recommends to have a larger representation of geriatrics
Adverse Drug Events (ADE)

ADEs occur as a result of

1. Drug-drug interactions
2. Drug-disease interactions
3. Drug-food interactions
4. Drug side effects
5. Drug toxicity
Adverse Drug Events

- Frequent symptoms
  - Confusion (75%)
  - Nausea
  - Loss of balance
  - Change in bowel pattern
  - Sedation
Adverse Events – Risk Factors

- Advanced age
- Female
- Hepatic/renal insufficiency
- Polypharmacy
- Lower body weight
- History of prior drug reaction
Adverse Drug Events

- About 3 to 7% of all hospital admissions in the United States are for treatment of adverse drug events.
- Adverse drug events occur during 10 to 20% of hospital admissions, and about 10 to 20% of these reactions are severe.
- The most consistent risk factor for an adverse drug event is: The number of drugs being taken.
- The risk increases exponentially as the number of drugs increases.
Adverse Drug Events

![Graph showing the relationship between the number of drugs taken and the percent of patients with ADR.](image)
“If medication related problems were ranked as a disease, it would be the fifth leading cause of death in the US!”
Factors Associated with Polypharmacy

**Health System-related**

- Longer life span means more elderly patients with chronic diseases
- More treatment options due to medical developments
- Primary and Secondary prevention strategies
- Increased use of healthcare services means more hospitalizations (known risk factor for polypharmacy)
Factors Associated with Polypharmacy

Patient-related
- Age: one of most common risk factors for excessive polypharmacy
- Female gender
  - More pronounced in younger populations
  - Evens out ~age 70
- Race
  - 84% of white Americans use meds
  - 57% Asian descent
- Socioeconomic—conflicting data
  - Higher risk with good insurance coverage
  - Less wealthy
  - Less educated
Factors Associated with Polypharmacy

- **Patient-related**
  - Clinical conditions
    - Cardiovascular disease
    - Anemia
    - Respiratory disease
    - Depression, HTN, asthma, angina, diverticulitis, osteoarthritis, gout, DM
  - Medication therapy
    - 5 most prevalent drug groups for patients with 5+ meds: Abx, analgesics, psycholeptics, antithrombotics, B-blockers
  - Self-treatment
    - 1/3 of 75yo in community use 3+ OTC drugs daily
    - 37% take Rx drugs without PCP’s knowledge
      Old prescription use, borrowing/sharing often unreported
Factors Associated with Polypharmacy

- **Physician/Provider-related**
  - Practice environment: lack of time and high workload results in meds remaining in pt records longer than necessary
  - Education and competence levels
    - However, age or time in practice is not associated
  - Male gender
  - Difficulty applying guidelines to patients with multiple diseases
Factors Associated with Polypharmacy

- **Physician/Provider-related**
  - Prescribing habits
    - Patient expectation of a prescription
    - ADEs resulting in prescribing cascade
  - Improper medical review
  - Lack of communication between PCPs, specialists, and hospitalists
  - Skepticism regarding new guidelines, resulting in fall-back on older prescribing practices (improper dosing, multiple meds)
Factors Associated with Polypharmacy

Related to Provider-Patient Interaction

- Adherence depends on confidence in physician
- Pt failure to review entire med list with physician
- Lack of continuity due to multiple health providers, prescribers, and pharmacies
- Pt expectation of a prescription for each medical visit
- Pt requesting specific medications
- Disagreement between pt and provider regarding treatment
Reducing Polypharmacy

- **Nursing homes and Care homes**
  - Academic detailing with face-to-face interaction between experts and prescribers
  - Nursing workshops
  - Family education
  - Computerized clinical decision support systems
  - Multidisciplinary team meetings
Reducing Polypharmacy

- Community and Hospital
  - Multidisciplinary case conferences involving geriatrician
  - Combination of following likely required:
    - Education
    - Regular med review, Important when Rx drug plan formularies change
    - Geriatrics consultation
    - Multidisciplinary team meetings
    - Computerized decision support systems
    - Regulatory policies and procedures
    - Improved documentation of medication indication
    - Increased vigilance during transitions of care
The most commonly used list is the Beers criteria, which include 48 “Potentially Inappropriate Medications (PIMs)” for which there are more effective or safer alternatives for older patients.
**Beers Criteria**

- **Pros**
  - Easy to use
  - Easy to incorporate into computer systems and drug reviews

- **Cons**
  - Includes some older drugs
  - Harm from some drugs may be minor compared to inappropriate prescribing of meds not on the list
START Criteria

Screening Tool to Alert To Right Treatments

- Used in conjunction with STOPP criteria
- Identify correct treatments for elderly patients
- Composed of 22 criteria

START: Screening Tool to Alert doctors to Right Treatments

These medications should be considered for people ≥ 65 years of age with the following conditions, where no contraindication to prescription exists.

**Cardiovascular System**

1. Warfarin in the presence of chronic atrial fibrillation.
2. Aspirin in the presence of chronic atrial fibrillation, where warfarin is contraindicated, but not aspirin.
3. Aspirin or clopidogrel with a documented history of atherosclerotic coronary, cerebral or peripheral vascular disease in patients with sinus rhythm.
4. Antihypertensive therapy where systolic blood pressure consistently >160 mmHg
5. Statin therapy with a documented history of coronary, cerebral or peripheral vascular disease, where the patient’s functional status remains independent for activities of daily living and life expectancy is greater than 5 years
6. Angiotensin Converting Enzyme (ACE) inhibitor with chronic heart failure
7. ACE inhibitor following acute myocardial infarction
8. Beta-blocker with chronic stable angina

**Respiratory System**

1. Regular inhaled β2 agonist or anticholinergic agent for mild to moderate asthma or COPD
2. Regular inhaled corticosteroid for moderate-severe asthma or COPD, where predicted FEV1 <50%.
3. Home continuous oxygen with documented chronic type 1 respiratory failure or type 2 respiratory failure.

**Central Nervous System**

1. L-DOPA in idiopathic Parkinson’s disease with definite functional impairment and resultant disability
2. Antidepressant drug in the presence of moderate-severe depressive symptoms lasting at least three months.
STOPT Criteria

Screening Tool of Older Persons’ Potentially Inappropriate Prescriptions

Comprised of 65 clinical criteria

More common avoidable practices

Some overlap with Beers criteria

Not comprehensive

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<thead>
<tr>
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<td>Analgesics</td>
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<tr>
<td>Duplicate drug classes</td>
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</table>
STOPP: Screening Tool of Older People’s Potentially Inappropriate Prescriptions

The following drug prescriptions are potentially inappropriate in persons aged ≥ 65 years of age

**Cardiovascular System**

1. Digoxin at a long-term dose > 125μg/day with impaired renal function
2. Loop diuretic for dependent ankle oedema only i.e. no clinical signs of heart failure
3. Loop diuretic as first-line monotherapy for hypertension
4. Thiazide diuretic with a history of gout
5. Non cardioselective Beta-blocker with Chronic Obstructive Pulmonary Disease
6. Beta-blocker in combination with verapamil
7. Use of diltiazem or verapamil with NYHA Class III or IV heart failure
8. Calcium channel blockers with chronic constipation
9. Use of aspirin and warfarin in combination without histamine H₂ receptor antagonist
10. Dipyridamole as monotherapy for cardiovascular secondary prevention
11. Aspirin with a past history of peptic ulcer disease without histamine H₂ receptor antagonist or Proton Pump Inhibitor
12. Aspirin at dose > 150mg day
13. Aspirin with no history of coronary, cerebral or peripheral vascular symptoms or occlusive event
14. Aspirin to treat dizziness not clearly attributable to cerebrovascular disease
15. Warfarin for first, uncomplicated deep venous thrombosis for longer than 6 months duration
16. Warfarin for first uncomplicated pulmonary embolus for longer than 12 months duration
17. Aspirin, clopidogrel, dipyridamole or warfarin with concurrent bleeding disorder
Beers vs. STOPP

- 600 patients screened using either criteria
- Teaching hospital over 4-month period
- ADEs recorded and verified by expert panel for causality or contributory
- STOPP Criteria associated with avoidable ADEs leading to hospitalization (p<0.001)
- Beers Criteria NOT associated with reduction (p=0.11)

*Arch Intern Med.* 2011;171(11):1013-1019
Good Palliative-Geriatric Practice Algorithm

- Reduction in mortality, hospitalization, and cost
- Avg 2.8 drugs discontinued without significant adverse effects
- 82% discontinuation success
Discuss the following with the patient/guardian

An evidence-based consensus exists for using the drug for the indication given in its current dosing rate in this patient’s age group and disability level, and the benefit outweighs all possible known adverse effects

---

No/Not sure

Indication seems valid and relevant in this patient’s age group and disability level

---

No

Do the known possible adverse reactions of the drug outweigh possible benefit in old, disabled patients?

---

Yes

STOP DRUG

---

No

Any adverse symptoms or signs that may be related to the drug?

---

No

SHIFT TO ANOTHER DRUG

---

Yes

Is there another drug that may be superior to the one in question?

---

No

---

Can the dosing rate be reduced with no significant risk?

---

No

---

Yes

Reduce dose

---

Continue with the same dosing rate
Anticholinergic Risk Scale

- Specific meds in patient’s regimen are assigned a value based on anticholinergic properties and tallied.
- The higher the ARS score, the lower the physical function score.
- Easy to calculate.
- Time consuming and impractical in clinical settings.
<table>
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<td>Baclofen</td>
<td>Entacapone</td>
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<td>Cetirizine hydrochloride</td>
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<td>Selegiline hydrochloride</td>
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<tr>
<td>Trifluoperazine hydrochloride</td>
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**Drug Burden Index**

- Similar to ARS—describes anticholinergic and sedative drug burden
- Higher DBI associated with reduced physical and cognitive function
- Potential to be incorporated into EMR software, but not readily available to most clinicians
- Need studies to determine if improving DBI score results in better outcomes
Other Considerations

Physiologic changes

- Decline in Renal and Hepatic function
  - Reduced clearance
  - Accumulation
  - More severe side effects if doses are not adjusted

- Reduced body weight, muscle mass, fluid
  - Altered drug distribution—abx, phenytoin,
  - Increased fatty tissue
  - Prolonged half-life of lipophilic drugs, i.e. diazepam
• Reduced intestinal, gastric perfusion, decreased stomach acid, and gastric emptying impact the rate and amount of absorption.

• Drug binding properties such as albumin levels are dynamic in the geriatric.
<table>
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<td>Drug absorption</td>
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<td>Slower/ decreased</td>
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<tr>
<td>Metabolism</td>
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<td>Slower</td>
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<td>Excretion</td>
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<td>Fat: lean body mass</td>
<td>![downward arrow]</td>
<td>![upward arrow]</td>
</tr>
<tr>
<td>Volume distribution</td>
<td>![downward arrow]</td>
<td>![upward arrow]</td>
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</table>
Drugs Given in Reduced Doses in the Elderly

- Aminoglycosides
- Benzodiazepines
- Digoxin
- Haloperidol
- Metoclopramide
- Thyroxine
- Vitamin D
Drug Caution with Decreased Kidney Function

- Aminoglycosides
- ACE-I
- Digoxin
- Diuretics
- Lithium
- H2 blockers
Other Considerations

- Physiologic changes
  - Vision impairment—40% unable to read Rx label
  - Hearing impairment
    - Difficult to understand counseling
  - Loss of dexterity

- Cognitive Impairment
  - Difficulty understanding and remembering medication instructions, complex regimens
  - 67% unable to understand information given
Other Considerations

- **Medication Errors**
  - Elderly are 4X as likely as those < 65 years of age to be hospitalized for a medication error
  - Nonadherence
  - Inadequate Monitoring/Follow-up
    - INR, dig levels, etc
  - Accidental Overdose
    - 85% of elderly who present to ER with accidental overdose were taking antidiabetics, warfarin, antiepileptics, digoxin, theophylline, or lithium

- **Insulin**
  - Pens/prefilled syringes vs. vials
  - Simplify regimen, premixed insulins
  - If regimen changes ensure pt knows to stop taking previously-prescribed insulin
  - “Start low and go slow”
Other Considerations

- Medication Errors
  - Device Problems
    - 40% errors related to product or device issues
    - Pens
  - Inhalers
- Institute of Safe Medication Practices (ismpinfo@ismp.org)
- FDA MedWatch (www.fda.gov/Safety/MedWatch/HowToReport/default.htm)
Other Considerations

- **Nonadherence**
  - 55% of Medicare beneficiaries are nonadherent
  - Up to 40% who skip doses or stop drug do not tell provider
  - **Reasons:**
    - Forgetfulness
    - Side effects
    - Perceived inefficacy
    - Cost—76% more likely to have decline in overall health
Polypharmacy and Medication Non-adherence

Additional contributing factors:

- Large number of medications
- Expensive medications
- Complex or frequently changing medication schedule
- Adverse reactions
- Confusion about brand name/trade name
- Difficult-to-open containers
- Rectal, vaginal, subcutaneous modes of administration
- Limited patient understanding of medication’s purpose
Polypharmacy and Medication Non-adherence

Like polypharmacy itself, the strongest predictor of medication non-adherence is the number of medications.

- Non-adherence rates are estimated at 25-50 percent of older adults.
- Non-adherence is intentional about 75% of the time:
  - Changes in medication regimen made by patients to:
    - Increase convenience
    - Reduce adverse effects
    - Decrease refill expense
Reducing Polypharmacy and Promoting Medication Adherence

- Ask the right questions!
- You can help protect older clients against polypharmacy by asking these questions:
  - Are you currently taking five or more prescription medications?
  - Do you ever borrow medications from other people?
  - Do you use over-the-counter medications, including vitamins, dietary supplements, or herbal preparations?
  - Do you request refills without seeing your health care provider?
  - Do you have prescription medications from more than one health care provider?
  - Do you have prescriptions filled at more than one pharmacy?
Encourage your clients to:

- Use one pharmacist/pharmacy.
- Use your PCP as intended...avoid seeing multiple physicians (except when necessary for second opinions).
- Do not use medications from others.
- Report all symptoms to PCP.
- All medicines, even over-the-counter vitamins and herbal remedies, can have adverse effects.
- Report all products used to PCP.
**SO...**

- There are profound medical and economic consequences of polypharmacy and adverse drug events
- Elderly have unique pharmacokinetics
- There are particular high risk medications
Strategies for Elderly Compliance

- Make drug regimens and instruction as simple as possible
- Instruct relatives and care givers on the drug regimen
- Make sure patient can get to a pharmacist, can afford the prescription, and can open the container
Strategies for Elderly Compliance

- Enlist others (HHA, pharmacist) to help ensure compliance
- Use aids (special pill boxes and drug calendars)
- Keep updated medication record
- Review knowledge of and compliance with regimens regularly
Promote Compliance

- Reducing the number of prescribed drugs
- Simplifying dosage regime
- Evaluating patient’s functional ability to take medication
Measures of Compliance

- Direct method
  - Drug concentration in the blood, urine, or saliva

- Indirect method
  - Therapeutic response
  - Self report
  - Pill counts
  - Pharmacy records
The Brown Bag Test
Low-Hanging Fruit

- CDC estimates ADEs cause over 177,000 ED visits in United States
- Drugs on Beers List < 10%
- 33% of visits due to one of the following:
  - Warfarin
  - Insulin
  - Digoxin
Warfarin—Reasons for ADE

- Dietary indiscretion
- High patient variability
- Loading doses
- Multiple drug interactions
  - Antibiotics (FQ, Bactrim, Macrolides, Rifampin, Fluconazole, Metronidazole)
  - Anticonvulsants
  - Amiodarone (Reduce warfarin 25-50%)
Warfarin Pearls

- Restrict aspirin to 81mg daily
- Consistently reassess need for warfarin with CHA2DS2-VASc and HAS-BLED
- Novel anticoagulant switch in nonvalvular Afib and DVT/PE patients
  - Rivaroxaban for DVT/PE
  - Any of three potentially for nonvalvular Afib
Insulin

- 85% of ED visits due to hypoglycemia
- 24% resulted in LOC or seizure
- 25% required hospitalization
Insulin Pearls

- Start low and go slow in new insulin patients
- Hypoglycemia increases mortality in several populations
- Hemoglobin A1c goals not < 7% for all
- American Geriatric Society recommends < 8% for:
  - Frail older adults
  - Life expectancy ≤ 5 years
Digoxin

- 80% of ED visits due to digoxin require hospitalization
- Over half involved doses > 0.125mg daily
- Does not decrease mortality in systolic heart failure
- Renally excreted
**Digoxin-Pearls**

- Use with caution in atrial fibrillation patients
- Stick with doses of 0.125mg once daily
- Try to avoid in CKD patients
  - If required do q2-3 day dosing

Pretorius RW et al. *Am Fam Physician.* 2013;87:331-6
High Risk Medications: Drug Classes

- Analgesics
  - NSAIDs
  - Narcotics
  - Muscle relaxants

- Narrow Therapeutic Index
  - digoxin
  - phenytoin
  - warfarin
  - theophylline
  - lithium
High Risk Medications: Drug Classes

- **Cardiovascular**
  - Calcium channel blockers
  - Anti-HTN
  - Beta blockade
  - Diuretics

- **Psychotropics**
  - TCAs
  - Antipsychotics
  - Benzodiazepines
  - Sedative/Hypnotics
Pearls for Decreasing Polypharmacy

- Start low and go slow
- Don’t set it and forget it
- Don’t leave home with it
- Ask about herbs, roots, nuts, berries
- Trust but verify
- Avoid narrow therapeutic index meds
Polypharmacy is a Flag
Prescribing Practices

- First consider non-drug therapies
- Match drugs to specific diagnoses
- Reduce meds when ever possible
- Avoid using a drug to treat side effects of another
- Review meds regularly (at least q3 months)
- Avoid drugs with similar actions / same class
- Clearly communicate with pt and caregivers
- Consider cost of meds!
Principles of Prescribing

- Make a diagnosis before drug therapy is initiated
- Carefully weigh the risks versus benefits
- Suspect a medication as the cause of any major medical or cognitive change
- Begin with the end in mind !!!!!!
Multiple diseases and polypharmacy in the elderly: challenges for the internist of the third millennium

Alessandro Nobili, Silvio Garattini, Pier Mannuccio Mannucci

Abstract

The pattern of patients admitted to internal medicine wards has dramatically changed in the last 20–30 years. Elderly people are now the most rapidly growing proportion of the patient population in the majority of Western countries, and aging seldom comes alone, often being accompanied by chronic diseases, comorbidity, disability, frailty, and social isolation. Multiple diseases and multimorbidity inevitably lead to the use of multiple drugs, a condition known as polypharmacy. Over the last 20–30 years, problems related to aging, multimorbidity, and polypharmacy have become a prominent issue in global healthcare. This review discusses how internists might tackle these new challenges of the aging population. They are called to play a primary role in promoting a new, integrated, and comprehensive approach to the care of elderly people, which should incorporate age-related issues into routine clinical practice and decisions. The development of new approaches in the frame of undergraduate and postgraduate training and of clinical research is essential to improve and implement suitable strategies meant to evaluate and manage frail elderly patients with chronic diseases, comorbidity, and polypharmacy.

Questions?