



### Polypharmacy Among Geriatric Patients

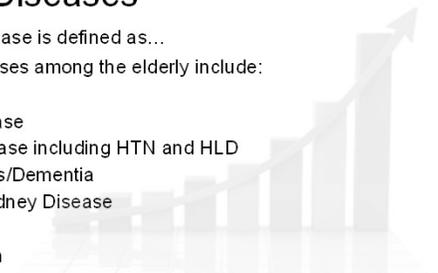
E. Monee' Reed (Carter-Griffin), DNP, MAOL, APRN, ACNP-BC  
Associate Chair for Advanced Practice Nursing  
Director, Adult-Gerontology Acute Care NP Program  
University of Texas at Arlington  
Pulmonary Critical Care NP, Dallas Pulmonary & Critical Care

### Disclosure

E. Monee' Reed, DNP, MAOL, RN, ACNP-BC has no financial relationships with commercial interests to disclose. Any unlabeled and/or unapproved uses of drugs or products will be disclosed.

- ### Objectives
- Describe the geriatric demographics/population in the US.
  - Define polypharmacy and discuss the potential problems with polypharmacy in the geriatric population.
  - Review and apply the Beers Criteria to inpatient and outpatient clinical scenarios.

- ### The Aging Population
- The world's elderly population is expected to grow from estimated 524 million in 2010 to nearly 1.6 billion in 2050.
  - By 2050, age 65 years and older will outnumber the population less than 5 years of age.
  - The US population is speculated to double, from 48 million to 88 million by 2050.
  - The growing number of elderly will represent ~21-27% of the US population.
  - Among the growing elderly population, noncommunicable diseases are a main health concern.

- ### Chronic Diseases
- A chronic disease is defined as...
  - Chronic diseases among the elderly include:
    - DM Type II
    - Lung Disease
    - Heart Disease including HTN and HLD
    - Alzheimer's/Dementia
    - Chronic Kidney Disease
    - Arthritis
    - Depression
    - Cancer
    - CVA
- 

As a result of chronic disease, it is estimated 90% of older adults take one prescription medication, almost 80% take two medications, and ~36% take five or more medications.

### Polypharmacy



- Result of multimorbidity.
- Increased complexity of therapeutic management
- \*5 or more medications is defined as polypharmacy.
- Number of medications does **NOT** account for specific comorbidities.
- Makes it difficult to assess appropriateness of the medications.

### What age related physiologic changes can result in drug level changes?

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### Physiologic Changes of Aging

- Body Composition
- Gastrointestinal
  - transit time decreased

### Physiologic Changes of Aging

- Hepatic
  - Decreased hepatic mass and blood flow
- Renal
  - Structural and functional changes
  - Possibility of change in drug levels with increased risk of adverse drug effects.

### Beers Criteria

- Set of criteria for use in adults 65 years and older
- The intent of the criteria is to:
  - Improve medication selection
  - Educate clinicians and patients
  - Reduce adverse drug events
  - Serve as a tool for evaluating quality of care, cost, and patterns of drug use of older adults

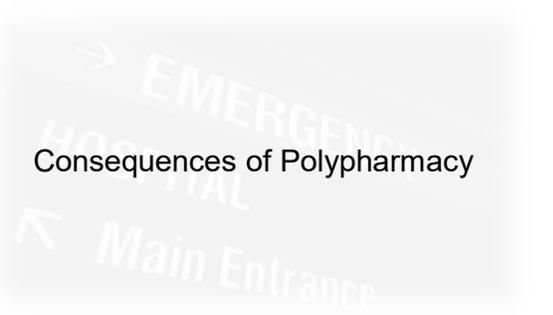
**Potentially Inappropriate Medications**

### Recap

- Polypharmacy
- Physiologic changes of aging
- Beers Criteria

**What's the relationship?**

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### Consequences of Polypharmacy

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### Mrs. Andrews

Mrs. Andrews is a 71-year-old woman with a past medical history hypertension (HTN), hyperlipidemia (HLD), coronary artery disease (CAD), HFpEF, depression, and chronic kidney disease (CKD, Stage 4). Over the past week, her daughter noted some changes in her mental status. She was concerned if her mother had an infection because she had a similar presentation in the past.

Current medications include:

- Amlodipine
- Hydralazine
- Simvastatin
- Aspirin
- Furosemide
- Citalopram
- Clopidogrel



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### Mrs. Andrews

The nurse practitioner completed labs/diagnostics including a urinalysis. The labs were unremarkable; however, the urinalysis showed many bacteria. The patient was prescribed Nitrofurantoin (Macrobid) for a UTI.

Approximately four days later, the patient presented to the ED with complaints of numbness and pain to her hands bilaterally. She has no prior history of diabetes mellitus (DM), nerve damage, trauma, or underlying nervous system disorders.

The work-up in the ED is negative for any overt indication of CNS damage.

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### Mrs. Andrews

- There are multiple issues with this situation.
- She is currently on 7 medications.
- Prescribed a new medication → antibiotic
  - Nitrofurantoin (Macrobid)



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### Mrs. Andrews

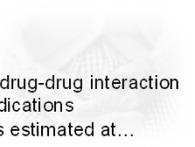
**How does this case relate to polypharmacy? The Elderly?**

Adverse Drug Events

- 1.3 million ED visits each year
- 350,000 patients are hospitalized.

Drug-Drug Interactions

- One aspect of adverse drug events
- One study indicated the potential for a drug-drug interaction was 80% for older adults taking >5 medications
- Other literature suggests that the risk is estimated at...

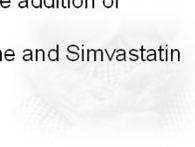


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### Mrs. Andrews

Mrs. Andrews case is reflective of an adverse drug event and drug-drug interaction.

- New medication → Nitrofurantoin (Macrobid)
  - Risk of nerve damage without the addition of medications
- Potential Interactions → Hydralazine and Simvastatin
  - Moderate risk of nerve damage
- Poor renal function



### Mr. Baker

Mr. Baker is 75-year-old man with an extensive past medical history pertinent for hypertension, diabetes, COPD, hyperlipidemia, CAD, atrial fibrillation, prostate cancer, and OSA. He was recently hospitalized for a COPD exacerbation.

The medication list on discharge indicated to continue 8 medications he was previously on including Metoprolol 25 mg, Lisinopril 5 mg, Metformin 500 mg, Atorvastatin, and Warfarin 5 mg plus the addition of 3 new medications – including a new one for blood pressure.

**What is wrong with this picture?  
How can this contribute to the consequences of polypharmacy in the elderly?**

### Mrs. Smith

Mrs. Smith is a 78-year-old woman with a past medical history of HTN, DM Type II, COPD, OA, CAD, and atrial fibrillation.

**What is the startling realization about Mrs. Smith's care as it relates to polypharmacy?**

The type and dose of medications determine meaningful outcomes *not* necessarily the number of medications.

### Ms. Daniels

Ms. Daniels is a 70-year-old woman with a past medical history of asthma, DM, HTN, depression, anxiety, HFREF, peripheral neuropathy, HLD, and CAD.

Current Medications → Aspirin, Glyburide, Metoprolol, Lisinopril, Lasix(furosemide), Simvastatin, Gabapentin, Sertraline, Alprazolam, Zolpidem, Advair(fluticasone and salmeterol)

### Ms. Daniels

Which of these medications are potentially inappropriate in the elderly?

- Aspirin
- Glyburide
- Metoprolol
- Lisinopril
- Lasix (furosemide)
- Simvastatin
- Gabapentin
- Sertraline
- Alprazolam
- Zolpidem
- Advair (fluticasone and salmeterol)

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### Ms. Daniels

Why are these medications potentially appropriate in the elderly?

### Beers Criteria

Potentially Inappropriate Medications in Older Adults	
Diphenhydramine (Benadryl) – oral	Zolpidem (Ambien)
Promethazine (Phenergan)	Sulfonylureas (e.g., Glyburide)
Nitrofurantoin	Proton-pump inhibitors
Alpha-1 Blockers (e.g., Doxazosin)	Meperidine (Demerol)
Digoxin	NSAIDs – oral
Nifedipine (immediate release)	
Amiodarone	
Antidepressants (e.g., amitriptyline, paroxetine)	
Benzodiazepines	

### Mrs. Lewis

Mrs. Lewis is a 72-year-old woman with a past medical history of HFpEF, HTN, DM, atrial fibrillation, CAD, and CKD Stage II who presented with a skin and soft tissue infection to her left leg and was started on sulfamethoxazole – trimethoprim (Bactrim).

Current medications include:

- Lasix (furosemide)
- Amlodipine
- Lisinopril
- Levemir (insulin detemir)
- Regular Insulin
- Eliquis (apixaban)
- ASA
- Atorvastatin
- Multivitamin

### Mrs. Lewis

Approximately 4 to 5 days after being evaluated for her left leg infection, Mrs. Lewis presents to the ED with generalized weakness, nausea, and vomiting. Her left leg infection does not appear to be worse. There is minimal redness and swelling, no drainage, or obvious open wounds. Her vital signs are stable.

On further work-up, labs reveal worsening renal function from baseline, mild dehydration and a hyperkalemia. Her remaining labs are normal. Mrs. Lewis denies any changes in medication, new medications, change in diet, etc. to explain her renal function or potassium level.

**What is the likely etiology?**

### Mrs. Lewis

**Lisinopril (ACE Inhibitor) + Sulfamethoxazole - trimethoprim (Bactrim)**

- Combination of these drugs → increase risk of acute kidney injury and hyperkalemia
- Reduction of potassium transport → hyperkalemia
- Increased risk of hospitalization

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### Beers Criteria: Drug-Drug Interactions

- The interaction between two or more medications resulting in a physiologic reaction.
- Increases with the number of medications.
  - For example, a patient taking 5 to 9 medications has a 50% chance of a drug-drug interaction.
- Additional drug-drug interactions
  - Oral/parental steroids + NSAIDs → increased risk of PUD or GIB.
  - Warfarin + \_\_\_\_\_ → increased risk of bleeding.

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### Drug-Disease Interactions

Mr. XYZ is a 75-year-old man with past medical history of HTN, HFrEF, atrial fibrillation, CAD, CKD, DM and COPD.

Medications include → Lasix(furosemide), Metoprolol XL, Lisinopril, Diltiazem, Rivaroxaban (Xarelto), Amiodarone, Symbicort (budesonide and formoterol), Albuterol, Aspirin, Simvastatin, and 70/30 Insulin.

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### Diseases & Polypharmacy

Certain diseases are linked or more likely to have polypharmacy...

-  Cardiovascular Diseases
-  Diabetes mellitus
-  COPD

Polypharmacy can result in...

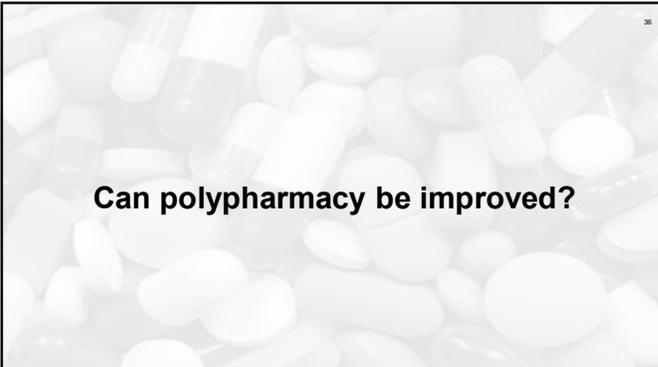
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### Polypharmacy can result in...

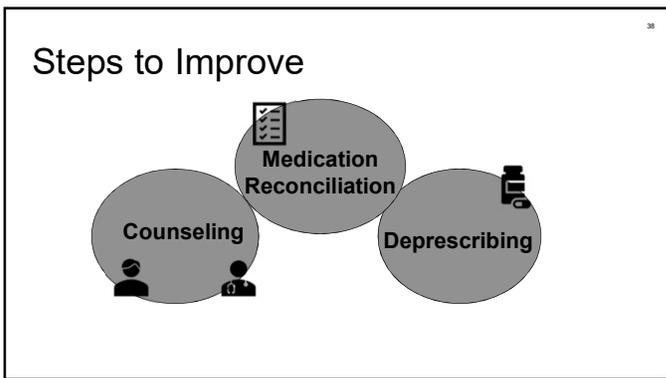
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### Can polypharmacy be improved?



### Polypharmacy arises...

- Multiple chronic disease states → multiple medications
- Chronic diseases → usually have clinical guidelines
- Adherence to guidelines can quickly lead to polypharmacy
- Multiple providers siloed healthcare →
- Duplication prescribing



### ...an Essential Part of Good Prescribing

- Determining all medications
  - Assessing a particular adverse effect across all medications
  - Asking if a patient's problem may be caused by their medications
  - Legacy prescribing
- Risk of adverse events
- Discontinuation assessment
  - Focusing on a specific medication(s)
- Prioritizing discontinuation
- Implementing and monitoring drug discontinuation

**Communication is key!**



### Mrs. Gonzalez

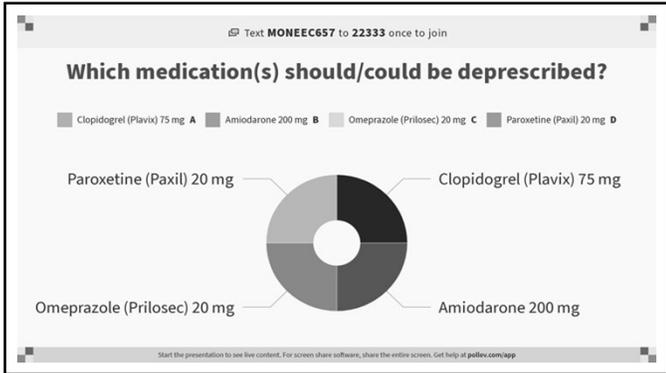
Mrs. Gonzalez is a 69-year-old woman with a past medical history of atrial fibrillation, Barrett's esophagus, MI s/p stent over 4 years ago, HF/EF, hypertension, hyperlipidemia, and depression. Her current medication regimen includes:

- Amiodarone 200 mg
- Apixaban (Eliquis) 5 mg
- Furosemide (Lasix) 20 mg
- Lisinopril 10 mg
- Metoprolol 50 mg
- Omeprazole (Prilosec) 20 mg
- Clopidogrel (Plavix) 75 mg
- Paroxetine (Paxil) 20 mg
- Aspirin 81 mg
- Simvastatin 20 mg



### Which medication(s) is/are potentially inappropriate?

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Thank you.  
Contact Information: [monee@uta.edu](mailto:monee@uta.edu)