Polypharmacy in the Elderly
November, 2016

Objectives
1. Review physiological changes that impact pharmacodynamics and pharmacokinetics in older adults
2. Discuss screening instruments
3. Discuss quality measures of prescribing
4. Discuss deprescribing
5. Case studies

Question
- How many drugs must an older person take to make them at risk for polypharmacy?
  a) 2
  b) 5
  c) 10
  d) A lot

Polypharmacy
- Use of multiple medications by a patient – Ranges from 5-10
  - May have different definition
- Also includes OTC and herbal supplements
- Issue for older adults
  - Chronic conditions
  - Greater number of drug therapies increases the risk of an adverse drug event

Prescriptions in older Adults
- 1 prescription – 81%
- > 5 prescriptions:
  - 29% of all adults
  - 36% (75-85 years old)
- 46% use at least one OTC medication
- 75% of adults do not report unconventional therapies to their clinicians

Pharmacokinetics
- How the body processes a specific drug after its administration
  - Absorption
  - Distribution
  - Metabolism
  - Excretion
Pharmacodynamic
- How a specific drug affects the body
- With aging, affinity with particular receptor sites may change, and the number of receptors sites may change over time
- Neuronal and vascular changes

Physiologic Changes with Aging
- Eye: lens become more rigid
- Hearing: high level hearing loss
- Body fat:
  - 14% in young person
  - 30% in person aged 70
- Body water:
  - 61% in younger adult
  - 53% in older person

Physiologic Changes with Aging
- Liver:
  - Decreased hepatic mass
  - Decreased enzymes production
  - Histologic changes
- Kidney:
  - Decreased GFR (10% per year after age 40)
- Brain:
  - Atrophy and circulatory changes

Impact of Polypharmacy
- Greater use of medication lead to
  - Increase risk of adverse drug reactions
  - Poorer patient adherence to treatment plan
  - Larger economic burden
- Drug-drug interaction can lead to:
  - Change in functional status
  - Cognitive impairment
  - Urinary incontinence
  - Change in nutrition status

Aggravating factors for Polypharmacy
- Chronic conditions
- Multiple providers
- Socioeconomic disparities
- Generic vs. Brand name
- Hospitalization
- Infrequent healthcare visits

Screening Instruments
- Beers criteria – American Geriatric Society
- STOPP – Screening Tool of Older Person’s Prescriptions (Gallagher, Ryan, Byrne, & O’Mahony, 2008)
- MAI – Medication Appropriateness Index (Hanlon, Samsa, Weinberger, Uttech, Lewis, & Feussner. 1992)
- HAT – Hyperpharmacotherpay Assessment Tool (Bushardt et al., 2008)
Anticholinergics
- First generation anti histamines
- Reduced clearance

Antiparkinsonian agents
- Benzotropine, Trihexphenidyl
  - Not recommended for extrapyramidal symptoms

Antithrombotics
- Dipyridamole, oral short-acting
  - Orthostatic hypotension

Nitrofurantoin
- Avoid in those creatinine clearance < 30ml/min

Quality Measures of Prescribing
- Avoidance of inappropriate medications
- Appropriate use of indicated medications
- Monitoring for side effects and drug levels
- Avoidance of drug-drug interactions
- Involvement of the patient
- Integration of patient values

Case Study 1 – Mrs. D
- 77 year old obese woman with diabetes, high blood pressure, heart failure, moderately severe kidney disease, high cholesterol, heart burn, severe knee arthritis, burning neuropathy in her feet, glaucoma, depression, and insomnia.
- In addition to her primary doctor, seen by an endocrinologist, cardiologist, neurologist, psychiatrist, and ophthalmologist.
Deprescribing Protocol

1. Ascertain all drugs the patient is currently taking and the reasons for each one
2. Consider overall risk of drug-induced harm in individual patients in determining the required intensity of de-prescribing intervention
3. Assess each drug in regard to its current or future benefit potential compared with current or future harm or burden potential
4. Prioritize drugs for discontinuation that have the lowest benefit–harm ratio and lowest likelihood of adverse withdrawal reactions or disease rebound syndromes
5. Implement a discontinuation regimen and monitor patients closely for improvement in outcomes or onset of adverse effects

Mr. T’s Medications

- Metoprolol ER: 50 mg daily
- Aspirin: 325 mg daily
- Lisinopril: 10 mg daily
- Furosemide: 40 mg every day
- Potassium chloride: 20 mEq twice daily
- Atorvastatin: 20 mg daily
- Acetaminophen: 650 mg twice daily
- Tramadol: 50 mg, as needed
- Multivitamin daily

Mr. T is transferred to the emergency department for increased shortness of breath. He is diagnosed with pneumonia and bronchitis. He spends 24 hours in the hospital for observation before being transferred back to the long-term care facility for ongoing care. At the care facility, the receiving practitioner reviews the medication list from the hospital:

- Levofloxacin: 500 mg daily
- Prednisone: 20 mg daily
- Tiotropium bromide, inhalation: 1 puff daily
- Levalbuterol tartrate, inhalation solution for nebulizer: As needed for shortness of breath
- Promethazine: 25 mg every six hours as needed
- Haloperidol: 1 mg every four hours as needed
- Bisacodyl: 10 mg every day as needed
- Omeprazole: 20 mg daily

CASE STUDY 2 – MR. T

MR. T, 84 year old gentleman, who resides in a long-term care facility. He has been diagnosed with congestive heart failure, hypertension, arthritis, and hyperlipidemia and has a history of two myocardial infarctions (eight and two years previously). He requires minimal assistance with his activities of daily living and remains ambulatory with a cane.

Deprescribing Protocol

1. Current list and reason for each medication
2. Risk of harm and potential for harm with deprescribing
3. Current and future benefits of the drug vs. current or future harm
4. Prioritize drugs for discontinuation
5. Implement a discontinuation regimen and monitor patients closely
### REVIEW OF MR. T’S MEDICATIONS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Indication/Diagnosis</th>
<th>Potential Reduction</th>
<th>Considerations for Reduction or Discontinuation of Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metoprolol extended-release (50 mg daily)</td>
<td>Hypertension</td>
<td>No</td>
<td>If blood pressure or heart rate fail, or symptoms of orthostasis or hypotension occur, dosage reduction should be considered.</td>
</tr>
<tr>
<td>Aspirin (325 mg daily)</td>
<td>Heart disease</td>
<td>Yes</td>
<td>Lowest effective dose. Would 81 mg dose be as effective with less risk of gastrointestinal (GI) bleeding?</td>
</tr>
<tr>
<td>Omeprazole (20 mg daily)</td>
<td>Gastritis</td>
<td>Yes</td>
<td>Possibility that this may no longer be necessary if given for an acute episode. Consideration for GI prophylaxis related to steroids and/or aspirin.</td>
</tr>
<tr>
<td>Lisinopril (20 mg daily)</td>
<td>Congestive heart failure, hypertension</td>
<td>No</td>
<td>ACE inhibitor should be part of treatment plan for patients with congestive heart failure. Renal function must be monitored.</td>
</tr>
<tr>
<td>Furosemide (40 mg daily)</td>
<td>Congestive heart failure, hypotension</td>
<td>Yes</td>
<td>Consideration of the lowest effective dose. During acute illness (except congestive heart failure), especially with dehyperization, dose reduction or holding dose may be appropriate.</td>
</tr>
</tbody>
</table>

### Medication List

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<tr>
<td>Potassium chloride (20 mEq [oral] daily)</td>
<td>Diarrhea</td>
<td>No</td>
<td>Potassium levels should be monitored, with adjustment of dose as required.</td>
</tr>
<tr>
<td>Atorvastatin (20 mg daily)</td>
<td>Hyperlipidemia</td>
<td>Yes</td>
<td>Limited evidence base for use of statins in patients older than 80 years of age. Consideration for reduction or discontinuation based on placebo-controlled trials.</td>
</tr>
<tr>
<td>Acetaminophen (650 mg [oral] twice daily)</td>
<td>Arthritis</td>
<td>No</td>
<td>1,300 mg of acetaminophen daily is well below the maximum recommended dose. Caution when used with alcohol or other drugs metabolized by the liver.</td>
</tr>
<tr>
<td>Tramadol (50 mg every four hours as needed)</td>
<td>Pain</td>
<td>Yes</td>
<td>Not used regularly.</td>
</tr>
<tr>
<td>Multivitamin (1 tablet daily)</td>
<td>Supplement</td>
<td>No</td>
<td>This was started because the patient had weight loss and poor intake of food and fluid. The nutritional support could potentially help.</td>
</tr>
</tbody>
</table>

### Mr. T New Medication List

<table>
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<tr>
<th>Medication</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metoprolol extended-release (25 mg daily)</td>
<td>Patient was experiencing some orthostasis with position changes that placed him at risk for falls. The daily dose was reduced to 25 mg, which helped normalize the blood pressure readings while still providing the benefits of a beta-blocker.</td>
</tr>
<tr>
<td>Enteric-coated aspirin (81 mg daily)</td>
<td>Dosage was reduced due to risk of bleeding.</td>
</tr>
<tr>
<td>Lisinopril (10 mg daily)</td>
<td>Dose was reduced to the lowest effective dose, and blood pressure improved.</td>
</tr>
<tr>
<td>Furosemide (20 mg daily)</td>
<td>Dosage reduced as the patient’s heart failure was stable. Chest x-ray clear, no edema.</td>
</tr>
<tr>
<td>Potassium chloride (10 mEq daily)</td>
<td>As the furosemide is reduced, the potassium dosage can be reduced, with follow-up testing ordered to monitor levels.</td>
</tr>
<tr>
<td>Atorvastatin (10 mg daily)</td>
<td>When tested, the cholesterol was 159 mg/dL, so the dosage was reduced.</td>
</tr>
<tr>
<td>Acetaminophen (650 mg twice daily)</td>
<td>This helped with his arthritis pain, so it was continued for pain management.</td>
</tr>
<tr>
<td>Multivitamin (1 tablet daily)</td>
<td>This was continued for nutritional support and per patient preference.</td>
</tr>
</tbody>
</table>
Bibliography