Medication Use in the Elderly

Benjamin Smith, PharmD, BCACP, CPP, BCGP
Pharmacy Manager, DukeWELL
Duke Population Health Management Office
Acknowledgements

2018 presentation created by Katherine Fuller, PharmD, BCPS

Slides for 2019 updated by Jason Funaro, PharmD, BCPS
Objectives

• Review pharmacokinetic changes in the elderly

• Discuss the 2019 Updated Beers Criteria for potentially inappropriate medication use in older adults

• Evaluate strategies to reduce adverse drug events in the elderly
• Up to 16.6% of all hospital admissions in elderly have been contributed to by adverse drug reactions (ADR)
  – Up to 88% of ADR related hospitalizations in elderly are preventable

• 65.7% of hospitalizations due to unintentional overdoses
• Four medications/drug classes contributed to 67% of hospitalizations:
  – Warfarin (Coumadin): 33.3%
  – Insulin: 13.9%
  – Oral antiplatelet medications: 13.3%
    • Aspirin, clopidogrel (Plavix), prasugrel (Effient), etc
  – Oral hypoglycemic agents: 10.7%
    • Glyburide (Diabeta), glimepiride (Amaryl), etc

ADEs Following Hospital Discharge in Patients ≥ 65

ADE occurred following 18.7% of discharges

- Over 50% within 14 days of discharge

16.5% of ADEs due to Beers Criteria med

- Most common ADE meds: CV, diuretics, opioids, antibiotics, anticoagulant/antiplatelet agents

35% of ADEs were considered preventable

- 32% of the preventable ADEs were considered serious

What are common adverse drug events in geriatric patients?
Pharmacokinetic Changes in Elderly

Absorption
- Increased stomach pH; slowed gastric emptying

Distribution
- ↓ muscle mass; ↑ adipose tissue; ↓ albumin

Metabolism
- ↓ Phase 1 P450 metabolism; no change for Phase 2 (conjugation reactions)

Elimination
- ↓ CrCl and ↓ GFR

Prescribing Cascade

Ibuprofen → ↑ BP → HCTZ → Oxybutynin → Urinary Retention

Ibuprofen → ↑ BP → HCTZ → Oxybutynin → Terazosin → Orthostatic Hypotension → Falls → Hip Fracture

Slide from: Dr. Mitchell Heflin, MD, MHS
Polypharmacy Causes

**Patient Factors**
- Multiple comorbidities ("A pill for every ill")
- Non-adherence to current therapies

**Prescriber Factors**
- Inappropriate prescribing
- Lack of de-escalating therapies

**System Factors**
- Multiple pharmacies, multiple prescribers
- Direct-to-consumer advertising
- A culture that promotes "a pill for every ill"
Polypharmacy Consequences

- Adverse drug reactions
- Increased risk of drug-drug interactions
- Worsened health outcomes
- Excessive costs
Created in 1991 by the late geriatrician Mark Beers, MD

A list of high-risk medications that should generally be avoided in older adults > 65

Updated every ~3 years, available online at: www.americangeriatrics.org

*Last published 2019
Guideline Goals

- Improve medication selection
- Educate clinicians and patients
- Reduce adverse drug events
- Serve as a tool for evaluating quality, cost, and patterns of care

Medication Inclusion Criteria

1. Potentially inappropriate in most older adults
2. Avoid in older adults with certain conditions
3. Use with caution in older adults
4. Significant drug-drug interactions
5. Need renal dose adjustment

### Beers Criteria

<table>
<thead>
<tr>
<th>Therapeutic Category/ Drug(s)</th>
<th>Rationale</th>
<th>Recommendation</th>
<th>Quality of Evidence</th>
<th>Strength of Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha1 blockers</td>
<td>High risk of orthostatic hypotension; not recommended as routine treatment for hypertension; alternative agents have superior risk/benefit profile.</td>
<td>Avoid use as an antihypertensive.</td>
<td>Moderate</td>
<td>Strong</td>
</tr>
<tr>
<td>Doxazosin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prazosin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terazosin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

↑ Read this to understand why drug is considered potentially inappropriate in older adults, e.g., frequent adverse events, risk/benefit profile, other guideline recommendations.

↑ Read this to understand in what circumstances the drug is considered a potentially inappropriate medication (PIM). In this example, use of an alpha1-blocker for routine treatment of hypertension is considered potentially inappropriate. Use for other conditions such as lower urinary tract symptoms in men is *not* considered potentially inappropriate by this criterion. However, this does not automatically make the medication appropriate; usual clinical judgment applies.

↑ Quality of evidence on which recommendation is based. Evidence was rated by the Beers panel based on a structured process.

↑ Strength of recommendation. This was decided by the Beers panel based on the anticipated balance of risks and benefits from the medication.

## 1. Select Potentially Inappropriate Medications

<table>
<thead>
<tr>
<th>Therapeutic Category</th>
<th>Select Agents in Class</th>
<th>Recommendation/Rationale</th>
</tr>
</thead>
</table>
| **Antidepressants**  | Tricyclic Antidepressants (TCAs)  
Amitriptyline (Elavil®)  
Nortriptyline (Pamelor®)  
Others: paroxetine (Paxil®) | Avoid – highly anticholinergic and sedating                                               |
| **Antiemetics**      | PROMETHAZINE (Phenergan®)  
Meclizine (Antivert®) | Avoid – highly anticholinergic                                                           |
| **Antihistamines**   | Diphenhydramine (Benadryl®)  
Hydroxyzine (Vistaril®)  
Chlorpheniramine (Aller-Chlor®) | Avoid – highly anticholinergic and sedating                                               |
| **Barbiturates**     | Butalbital (Fioricet®)  
Phenobarbital (Phenobarb®) | Avoid – high rate of physical dependence, greater risk of overdose                        |
| **Benzodiazepines**  | Diazepam (Valium®)  
Alprazolam (Xanax®)  
Clonazepam (Klonopin®) | Avoid – increased sensitivity in older adults → falls, delirium                           |
1. **Select Potentially Inappropriate Medications**

<table>
<thead>
<tr>
<th>Therapeutic Category</th>
<th>Select Agents in Class</th>
<th>Recommendation/ Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiovascular Agents</strong></td>
<td>Digoxin (Lanoxin ®)</td>
<td>Avoid in doses &gt; 0.125 mg/day, not 1st line for afib or heart failure</td>
</tr>
<tr>
<td></td>
<td><em>Alpha-1 Blockers</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Doxazosin (Cardura®)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prazosin (Minipress®)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Avoid</strong> – high risk of orthostatic hypotension</td>
<td></td>
</tr>
<tr>
<td><strong>Anti-hyperglycemics</strong></td>
<td><strong>Long-Acting Sulfonylureas (SUs)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glyburide (Diabeta ®)</td>
<td>Avoid – high risk of severe prolonged hypoglycemia</td>
</tr>
<tr>
<td></td>
<td>Glimepiride (Amaryl ®)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Avoid</strong> – high risk of severe prolonged hypoglycemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insulin regimens using sliding scale <strong>only</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Avoid - risk &gt; benefit</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Estrogens</strong></td>
<td>Any systemic estrogen therapy</td>
<td>Avoid – risk of carcinogenic effect exceeds benefit</td>
</tr>
<tr>
<td><strong>Hypnotics (“Z-drugs”)</strong></td>
<td>Zolpidem (Ambien ®)</td>
<td>Avoid – similar ADE profile to that of benzos</td>
</tr>
<tr>
<td></td>
<td>zaleplon (Sonata®), eszopiclone (Lunesta®)</td>
<td></td>
</tr>
</tbody>
</table>
# 1. Select Potentially Inappropriate Medications

<table>
<thead>
<tr>
<th>Therapeutic Category</th>
<th>Select Agents in Class</th>
<th>Recommendation/Rationale</th>
</tr>
</thead>
</table>
| NSAIDs                                   | Indomethacin (Indocin ®)  
Ketorolac (Toradol ®)  
Chronic use of other NSAIDs       | Avoid – risk of GI bleed                                                             |
| Skeletal Muscle Relaxants                | Cyclobenzaprine (Flexeril®), carisoprodol (Soma®), methocarbamol (Robaxin®)           | Avoid – anticholinergic, limited efficacy                         |
| Dessicated Thyroid Products             | Armour thyroid ®                                                                     | Avoid – safer alternatives available                              |
| Appetite Stimulants                     | Megestrol (Megace ®)                                                                  | Avoid – risk of thrombotic events                                 |
| Antiparkinsonian Agents                  | Benztropine (Cogentin ®)  
Trihexylyphenidyl                                                                 | Avoid – don’t use for EPS, more effective agents available        |
| Proton Pump Inhibitors                  | Pantoprazole (Protonix ®), esomeprazole (Nexium ®), omeprazole (Prilosec ®), etc.     | Avoid scheduled use > 8 weeks, risk of C. diff, fractures         |

## 2. Select Drug-Disease / Drug-Syndrome Interactions

<table>
<thead>
<tr>
<th>Syndrome/Disease</th>
<th>Agents to Avoid</th>
</tr>
</thead>
</table>
| Heart Failure                     | • Certain calcium channel blockers (diltiazem, verapamil)  
• NSAIDs (use with caution, avoid if symptomatic)  
• Thiazolidinediones (pioglitazone, rosiglitazone) |
| Syncope                           | • Acetylcholinesterase inhibitors (e.g. donepezil, rivastigmine)  
• Tricyclic antidepressants  
• Nonselective peripheral alpha-1 blockers (e.g. prazosin)  
• Certain antipsychotics (olanzapine, chlorpromazine) |
| Dementia or Cognitive Impairment  | • Anticholinergics  
• Benzodiazepines  
• Nonbenzodiazepine, benzo receptor agonists (e.g. zolpidem)  
• Antipsychotics |
| History of Falls/Fractures        | • Benzodiazepines & Z-drug hypnotics  
• Opioids  
• Antidepressants (TCAs, SSRIs, SNRIs)  
• Antiepileptics |

3. **Select** Medications to Use with Caution in Older Adults

<table>
<thead>
<tr>
<th>Agents</th>
<th>Risk in Older Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trimethoprim-sulfamethoxazole (Bactrim, Septra)</td>
<td>• Increased risk of hyperkalemia when used concurrently with ACE-I or ARB in presence of decreased creatinine clearance</td>
</tr>
<tr>
<td>Antipsychotics</td>
<td>• May exacerbate or cause SIADH or hyponatremia</td>
</tr>
<tr>
<td>Carbamazepine/oxcarbazepine</td>
<td>• May exacerbate or cause SIADH or hyponatremia</td>
</tr>
<tr>
<td>Diuretics</td>
<td>• Monitor sodium levels closely on initiation or dose changes</td>
</tr>
<tr>
<td>Mirtazapine</td>
<td></td>
</tr>
<tr>
<td>SNRIs, SSRIs, TCAs</td>
<td></td>
</tr>
<tr>
<td>Tramadol</td>
<td></td>
</tr>
</tbody>
</table>

## 4. Select Drug-Drug Interactions

<table>
<thead>
<tr>
<th>Object Medication or Drug Class</th>
<th>Interacting Drug or Class</th>
<th>Rationale</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAS inhibitors (ACEIs, ARBs, aliskiren) or potassium-sparing diuretics (amiloride, triamterene)</td>
<td>Other RAS inhibitors</td>
<td>Hyperkalemia risk</td>
<td>Avoid routine use in patients with CKD stage ≥ 3</td>
</tr>
<tr>
<td>Anticholinergics</td>
<td>Anticholinergic</td>
<td>↑ Risk of cognitive decline</td>
<td>Avoid, minimize number of anticholinergics</td>
</tr>
<tr>
<td>Antidepressants Antipsychotics Antiepileptics Benzodiazepines Z-drugs Opioids</td>
<td>&gt;2 other CNS-active drugs</td>
<td>Fall and fracture risk</td>
<td>Minimize number of CNS-active drugs if possible</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>NSAIDs</td>
<td>Risk of ulcers</td>
<td>Avoid combination if possible or give GI protection</td>
</tr>
</tbody>
</table>

### 4. Select Drug-Drug Interactions

<table>
<thead>
<tr>
<th>Object Medication or Drug Class</th>
<th>Interacting Drug or Class</th>
<th>Rationale</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral alpha-1 blockers</td>
<td>Loop diuretics</td>
<td>↑ Urinary incontinence</td>
<td>Avoid in older women unless conditions warrant</td>
</tr>
<tr>
<td>Warfarin</td>
<td>Amiodarone</td>
<td>↑ Bleeding risk</td>
<td>Avoid if possible; monitor INR closely</td>
</tr>
<tr>
<td></td>
<td>NSAIDs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ciprofloxacin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(excluding azithromycin)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sulfamethoxazole-trimethoprim</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 4. Select Drug-Drug Interactions

<table>
<thead>
<tr>
<th>Object Medication or Drug Class</th>
<th>Interacting Drug or Class</th>
<th>Rationale</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opioids</td>
<td>Benzodiazepines</td>
<td>↑ overdose risk</td>
<td>Avoid</td>
</tr>
<tr>
<td></td>
<td>Gabapentin, pregabalin</td>
<td>↑ severe sedation-related adverse events (e.g. respiratory depression, death)</td>
<td>Avoid, exceptions are made when transitioning from opioid therapy to gabapentinoid to reduce opioid dose</td>
</tr>
</tbody>
</table>
# 5. Select Renal Dose Adjustments

<table>
<thead>
<tr>
<th>Medication</th>
<th>CrCl (mL/min)</th>
<th>Rationale</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amiloride</td>
<td>&lt; 30</td>
<td>↑ K, ↓ Na</td>
<td>Avoid</td>
</tr>
<tr>
<td>Spironolactone</td>
<td>&lt; 30</td>
<td>↑ K</td>
<td>Avoid</td>
</tr>
<tr>
<td>Triamterene</td>
<td>&lt; 30</td>
<td>↑ K, ↓ Na</td>
<td>Avoid</td>
</tr>
<tr>
<td>Duloxetine</td>
<td>&lt; 30</td>
<td>↑ GI effects</td>
<td>Avoid</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>&lt; 60</td>
<td>CNS adverse effects</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Levetiracetam</td>
<td>≤ 80</td>
<td>CNS adverse effects</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Pregabalin</td>
<td>&lt; 60</td>
<td>CNS adverse effects</td>
<td>Reduce dose</td>
</tr>
</tbody>
</table>

### 5. Select Renal Dose Adjustments

<table>
<thead>
<tr>
<th>Medication</th>
<th>CrCl (mL/min)</th>
<th>Rationale</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tramadol</td>
<td>&lt; 30</td>
<td>CNS adverse effects</td>
<td>IR: decrease dose ER: avoid</td>
</tr>
<tr>
<td>Cimetidine</td>
<td>&lt; 50</td>
<td>Mental status changes</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Famotidine</td>
<td>&lt; 50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nizatidine</td>
<td>&lt; 50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranitidine</td>
<td>&lt; 50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colchicine</td>
<td>&lt; 30</td>
<td>GI, neuromuscular, bone marrow toxicities</td>
<td>Reduce dose and closely monitor for adverse effects</td>
</tr>
<tr>
<td>Probenecid</td>
<td>&lt; 30</td>
<td>Loss of efficacy</td>
<td>Avoid</td>
</tr>
</tbody>
</table>

## 5. Select Renal Dose Adjustments

<table>
<thead>
<tr>
<th>Medication</th>
<th>CrCl (mL/min)</th>
<th>Rationale</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciprofloxacin</td>
<td>&lt; 30</td>
<td>Increased risk of seizures, tendon rupture, confusion</td>
<td>Avoid or dose reduce</td>
</tr>
<tr>
<td>Trimethoprim-sulfamethoxazole</td>
<td>&lt; 30</td>
<td>↑ K, ↓ eGFR</td>
<td>Reduce dose if 15-29 mL/min, avoid if &lt;15</td>
</tr>
<tr>
<td>Dofetilide (Tikosyn)</td>
<td>&lt; 60</td>
<td>QTc prolongation, risk of torsades de pointes</td>
<td></td>
</tr>
</tbody>
</table>
CARING FOR ELDERLY POPULATIONS
• High risk agents

• Assessment and monitoring
  – S/S of bleeding and/or thrombosis
  – Renal and/or hepatic changes
  – Drug interactions
  – Dietary considerations (warfarin)
  – Upcoming procedures
  – Duration of therapy
Warfarin

- Increase INR
  - “FAB-4”
    - Fluconazole
    - Amiodarone
    - Bactrim (sulfamethoxazole/trimethoprim)
    - Flagyl (metronidazole)
  - Consider proactively reducing warfarin for these agents
  - Ensure anticoagulation clinic follow-up
- Decrease INR
  - Rifampin, carbamazepine
- Maintain consistent dietary vitamin k intake
  - High vitamin k intake $\rightarrow$ decreased INR

This is not a comprehensive list!
Direct Oral Anticoagulants

• Agents:
  – Apixaban (Eliquis), rivaroxaban (Xarelto), dabigatran (Pradaxa), edoxaban (Savaysa)
  – Dabigatran and rivaroxaban: Use with caution in patients ≥ 75
    • Greater risk of GI bleeding vs. warfarin

• Duke Anticoagulation Fact Sheets
  – Available on the Duke Intranet Formweb site, under Medication Usage Guidelines:
    • http://formweb.com/duke/
# Direct Oral Anticoagulants

<table>
<thead>
<tr>
<th>Medication</th>
<th>Renal Dose Adjustment</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apixaban (Eliquis)</td>
<td>ESRD on dialysis</td>
<td>Dose reduction vs. not</td>
</tr>
<tr>
<td></td>
<td>Afib with ≥ 2 of: SCr ≥ 1.5, age ≥ 80, wt &lt; 60 kg</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Dabigatran (Pradaxa)</td>
<td>CrCl &lt; 30 mL/min</td>
<td>Avoid</td>
</tr>
<tr>
<td>Edoxaban (Savaysa)</td>
<td>CrCl 15-50 mL/min CrCl &lt; 15 OR &gt; 95 mL/min</td>
<td>Reduce dose Avoid</td>
</tr>
<tr>
<td>Rivaroxaban (Xarelto)</td>
<td>CrCl 30-50 mL/min CrCl &lt; 30 mL/min</td>
<td>Decrease dose Avoid</td>
</tr>
</tbody>
</table>

**Monitoring:** CBC, SCr, hepatic function panel

Lexicomp online; Duke Anticoagulation Fact Sheets: dabigatran, apixaban, rivaroxaban.
Antiplatelet Agents

- Prasugrel (Effient ®): Use with caution in patients ≥ 75
  - Greater risk of bleeding

- Aspirin for *primary* prevention of cardiovascular disease in patients ≥ 70
  - The recently published ASPREE trial confirms there is a lack of evidence of benefit when compared to risks
  - Use with caution
• Aimed to evaluate the effect of aspirin on cardiovascular events and bleeding in **healthy elderly** (age ≥ 65-70)
  – No coronary heart disease, cerebrovascular disease, atrial fibrillation, dementia, uncontrolled hypertension, high risk of bleed, or anemia
  – Patients on anticoagulation or with compelling indication for aspirin were excluded

• Randomized patients in a 1:1 ratio to aspirin 100 mg daily vs. placebo

ASPREE Trial Results

- N=19,114 patients enrolled, 9,525 on aspirin and 9,589 on placebo
  - Median of 4.7 years of follow up

When used for primary prophylaxis in elderly patients, low dose aspirin:
1. Does not significantly reduce risk of CVD
2. Increases risk of GI & intracranial bleed

- Upper GI bleed: HR 1.87 (95% CI: 1.32 to 2.66)
- Intracranial bleed: HR 1.5 (95% CI: 1.11 to 2.02)

Medications that Affect Dementia/Cognitive Impairment

- Anticholinergics
- Benzodiazepines
  - Increase risk for cognitive impairment, delirium, falls, fractures
  - Chronic uses have higher risk of cognitive decline
- Non-benzodiazepine hypnotics ("Z-drugs")
  - Similar adverse effect profile to benzodiazepines
- H$_2$-receptor antagonists
- Anti-psychotics
<table>
<thead>
<tr>
<th>Select Strong Anticholinergic Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amitriptyline (Elavil)</td>
</tr>
<tr>
<td>Benztropine (Cogentin)</td>
</tr>
<tr>
<td>Brompheniramine (Dimetapp)</td>
</tr>
<tr>
<td>Chlorpheniramine (Chlor-Trimeton)</td>
</tr>
<tr>
<td>Clemastine (Tavist)</td>
</tr>
<tr>
<td>Clozapine (Clozaril)</td>
</tr>
<tr>
<td>Cyclobenzaprine (Flexeril)</td>
</tr>
<tr>
<td>Darifenacin (Enablex)</td>
</tr>
<tr>
<td>Diphenhydramine (Benadryl)</td>
</tr>
<tr>
<td>Doxepin (Sinequan) at doses &gt; 6 mg</td>
</tr>
<tr>
<td>Doxylamine (Unisom)</td>
</tr>
<tr>
<td>Fesoterodine (Toviaz)</td>
</tr>
<tr>
<td>Hydroxyzine (Atarax, Vistaril)</td>
</tr>
<tr>
<td>Hyoscyamine (Levsin)</td>
</tr>
</tbody>
</table>

Anticholinergics may increase the risk of cognitive impairment

- A 46% increase over 6 years has been shown

Anticholinergic medications have been associated with increased mortality at 2 years

- Dose-response effect

Anticholinergic Side Effects

Anti-SLUD: Salivation, Lacrimation, Urination, Defecation

“Hot as a hare, blind as a bat, dry as a bone, red as a beet, mad as a hatter”

“Can’t see, can’t pee, Can’t spit, can’t… ...defecate”
## Medications that Increase Fall Risk

<table>
<thead>
<tr>
<th>Effect</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension</td>
<td>Tricyclic antidepressants (e.g. amitriptyline), antipsychotics, diuretics, erectile dysfunction medications</td>
</tr>
<tr>
<td></td>
<td>Orthostatic hypotension: tamsulosin, trazodone, clonidine, carbidopa/levodopa</td>
</tr>
<tr>
<td>Sedation</td>
<td>Benzodiazepines, nonbenzodiazepine hypnotics (e.g. zaleplon, eszopiclone), antipsychotics, skeletal muscle relaxants, anticholinergic agents, opioids, anticonvulsants</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>Insulin, oral hypoglycemic agents</td>
</tr>
</tbody>
</table>
Medications that Increase Constipation Risk

- Opioids
- Anticholinergics (see prior slide)
- Tricyclic antidepressants:
  - (Amitriptyline (Elavil®), Nortriptyline (Pamelor®))
- Calcium channel blockers
  - E.g., verapamil (Calan ®)
- Antacids
  - Calcium carbonate (Tums)
- Iron products

Hypertension

• Target BP
  – <130/80 mmHg (per the 2017 AHA/ACC HTN guidelines)

• First line: CCB, thiazide diuretic, ACEI, ARB
  – Evaluate for compelling indications for one agent over another

American Geriatrics Society and Choosing Wisely recommend:
- Avoid using medications other than metformin to achieve A1c < 7.5% in most older adults

ADA Goal Recommendations:

<table>
<thead>
<tr>
<th>Consider A1c Goal &lt; 8%:</th>
<th>Consider Goal &lt; 8.5%:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate life expectancy</td>
<td>Moderate-to-severe cognitive impairment</td>
</tr>
<tr>
<td>Falls or hypoglycemia risks, including 2+ ADL impairments</td>
<td>Very complex/poor health with limited life expectancy</td>
</tr>
<tr>
<td>Mild to moderate cognitive impairment</td>
<td></td>
</tr>
</tbody>
</table>

Diabetes Care. 2017;40(Suppl. 1):S1–S134
• Avoid glyburide, glimepiride due to increased risk of prolonged hypoglycemia
  – Consider glipizide as an alternative
• Metformin dosing in renal impairment

<table>
<thead>
<tr>
<th>eGFR Cutoff</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 45 mL/min/1.73m²</td>
<td>No dose adjustment necessary</td>
</tr>
</tbody>
</table>
| 30-45 mL/min/1.73m²     | • Do not initiate metformin  
                          | • If already on metformin consider risk vs. benefit of continuing therapy  
                          | • If continuing, dose reduce by 50%                                         |
| < 30 mL/min/1.73m²      | Use is contraindicated                                                         |
• Avoid first-generation antihistamines
  – Examples: diphenhydramine, chlorpheniramine, hydroxyzine
  – Use of diphenhydramine for acute treatment may be appropriate
    • e.g., severe allergic reactions

• Use loratadine (Claritin®), cetirizine (Zyrtec ®), fexofenadine (Allegra ®)
Insomnia

- Optimize treatment for contributing conditions
  - Depression, pain, etc.
- Sleep hygiene
- Cognitive behavioral therapy for insomnia
  - Veteran’s Affairs developed app: CBT-I Coach
  - www.cbtforinsomnia.com

- Avoid sedative hypnotics, benzodiazepines, diphenhydramine, and amitriptyline

Insomnia

• Benzodiazepines
  – Increase risk for cognitive impairment and falls (as previously discussed)

• Non-BZD Hypnotics
  – Minimal improvement in sleep latency/duration
  – Similar adverse events to BZDs
  – Zolpidem in women: Limit IR to 5 mg and ER form to 6.25 mg

Age Ageing 2013;42:764-770
Asian J Gerontol Geriatr 2012;7:107-11
Insomnia

- Non-pharmacological options 1st line
- Pharmacologic considerations
  - Melatonin 3-5 mg daily
  - Doxepin 3-6 mg daily within 30 minutes prior to bedtime, do not exceed 6 mg/day

Lexi-Comp
Natural Medicines Database
Anxiety

- Avoid benzodiazepines, if possible
- Consider counseling
  - e.g., Silver Linings
- Consider trial of SSRI, SNRI, or buspirone

Pain

• Non-pharmacologic
  – Heat and cold, physical therapy, and massage

• Pharmacologic
  – Avoid NSAIDs and skeletal muscle relaxants due to sedation risk and anticholinergic effects
  – Consider scheduled acetaminophen 1000 mg TID
  – Consider topical capsaicin or lidocaine
  – If opioids are required, ensure appropriate education
    • GI, CNS, falls, and respiratory risks

Lexi-Comp
Gastroesophageal Reflux (GERD)

• Proton Pump Inhibitors are often overused and carry risks:
  – Increased risk of *C difficile* infections
  – Increased bone loss and fracture risk
  – B12 malabsorption (reasonable to periodically assess with long-term use)

• Avoid use > 8 weeks unless high-risk
  – Chronic NSAID use
  – Erosive esophagitis
  – Failure of discontinuation trial etc.

• Avoid promethazine, meclizine
• Avoid metoclopramide
  – May cause extrapyramidal effects, including tardive dyskinesia
  – Risk may be increased in frail elderly
  – Consider for gastroparesis if benefits > risks
• Consider ondansetron
MASTER

M = Minimize number of drugs used
A = Alternatives should be considered
S = Start low and go slow
T = Titrate therapy
E = Educate the patient and caregiver
R = Review regularly
## Obstacles to Medication Management in Elderly

<table>
<thead>
<tr>
<th>Obstacle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childproof caps</td>
</tr>
<tr>
<td>Ability to correctly use nebulizer</td>
</tr>
<tr>
<td>Ability to correctly use inhalers</td>
</tr>
<tr>
<td>Ability to use blood glucose meter</td>
</tr>
<tr>
<td>Interpretation of medication labels</td>
</tr>
<tr>
<td>Difficulty recognizing color of pills</td>
</tr>
<tr>
<td>Large pill size</td>
</tr>
</tbody>
</table>
Medication Use in the Elderly

Benjamin Smith, PharmD, BCACP, CPP, BCGP