Why Are Falls Important?

- Leading cause of injury in elders
- Costs to the system (CDC, 2008)
  - ER Visits: 2.2 million
  - $28.2 billion in healthcare costs
  - Mortality 19,700
  - Hospitalizations 581,000
- Falls reduce quality of life
  - Issues with mobility, self care
  - Anxiety / depression
Risk Factors for Falls

- Advanced age
- Female gender
- Previous fall history
- Impaired mobility
- Arthritis / joint disorder
- Parkinson’s disease
- Vision impairment
- Hearing impairment
- Cognitive impairment
- Low level of activity
- Postural hypotension
- Depression
- Urinary incontinence
- Stroke
- Cardiovascular disease
- Dizziness
- Chronic disease
- Pain

Some Ways Medications May Contribute

- Adverse CNS Effects - Dizziness, Drowsiness
  - Numerous medications have this potential side effect

- Bladder and Bowel Changes
  - Particularly, diarrhea and increased urination
    - Increased trips to bathroom and sense of urgency may result in falls

- Gait disturbances / pseudoparkinsonism
  - Muscle rigidity and abnormal movements may make ambulation difficult
Adverse CNS Effects
Dizziness and Drowsiness

Medications that can cause these side effects are “TNTC” (too numerous to count). Some main of concern:
- Antidepressants
- Antipsychotics
- Sedative hypnotics
- Anxiolytics, especially benzodiazepines
- Pain medications, particularly opioids
- 1st generation antihistamines
- Anticholinergic medications

- All of the above - we try to reduce use!
Sedative Hypnotics

- Class includes: Zolpidem, Zaleplon, Triazolam, Temazepam, Eszopiclone, Suvorexant
- Used to promote sleep and combat insomnia
- Drawbacks:
  - Tolerance
  - Addictive potential / Dependence
  - Side effects
  - Potential relationship with dementia

Sedative Hypnotics - Alternatives

- Melatonin
  - Natural chemical used by the body in the regulation of sleep (circadian rhythm)
  - Does not lead to dependence
- Bedtime routines
  - Warm milk or decaffeinated tea before bed
  - Warm blanket
  - Soothing music
  - Foot / hand treatments before bed
- Environmental Factors
  - Quiet environment
  - Lights reduced
  - Appropriate temperature for resident
Anxiolytics

- Examples: clonazepam, alprazolam, lorazepam, diazepam
- Anxiolytics, particularly benzodiazepines, can contribute to falls
  - Also carry risks of tolerance and dependence
- Consider, for chronic anxiety:
  - Antidepressants should be attempted first
    - These do carry a fall risk as well
  - If antidepressant monotherapy fails, then adjunctive agent could be added for anxiety, BUT be sure we have attempted non-pharmacologic methods first
    - Address boredom
    - Make use of home routines
    - Address environmental factors

Drugs with Anticholinergic Side Effects

- Anticholinergic side effects include urinary retention, blurred vision, constipation, dizziness, and drowsiness
- Numerous medications have anticholinergic side effect potential, some examples:
  - Benzodiazepines
  - 1st generation antihistamines
  - Tricyclic antidepressants (TCAs)
  - Some antidepressants
  - Urinary anticholinergics
  - Benztropine, Amantadine
  - Antipsychotics
  - (Ox)Carbamazepine
  - Valproic acid
  - Metoclopramide
  - Muscle relaxants
  - Opioids
Beers Criteria and STOPP/START

- These listings attempt to identify potentially inappropriate medications in the elderly
  - Not surprisingly, there is considerable overlap
  - Numerous anticholinergic drugs listed
  - Some differences between
  - In the U.S., it seems Beers Criteria better known and more popular
- Beers Criteria will itemize potentially problematic drugs and give a recommendation, rationale, quality of evidence and strength of recommendation
- If resident is on a Beers' listed med, be sure:
  - Medication is truly needed
  - Alternatives have been considered (possibly attempted)
  - Lowest effective dose of the medication is in use

Beers, Snapshot
Reducing Anticholinergic Burden, Examples

- If urinary anticholinergic is needed, consider solifenacin or trospium, rather than oxybutynin
  - Mirabegron?
- If antihistamine is needed, consider a second generation (cetirizine, loratadine, fexofenadine) rather than first (diphenhydramine, chlorpheniramine)
- If antidepressant is needed, avoid tricyclic antidepressants (nortriptyline, desipramine, etc.) and paroxetine (SSRI) and use SSRIs with lower anticholinergic burden (e.g. escitalopram, sertraline) or SNRIs

Bowel & Bladder Changes
### Bowel & Bladder Changes

#### Cause Diarrhea
- Proton Pump Inhibitors (PPIs)
- Antacids
- Antibiotics!
- Antidepressants
- Lithium
- Chemotherapy
- Metformin, Victoza, Trulicity, etc.
- Colchicine
- ACE Inhibitors
- NSAIDs
- Overuse / too high of a dose of laxative

#### Cause Inc. Urination
- Diuretics
- Alpha blockers (e.g. doxazosin, prazosin, terazosin)
- Bethanechol

#### Constipation also needs to be addressed
- Numerous agents can cause constipation
  - Opioids
  - Medications with anticholinergic side effects
  - Antidepressants
  - … the list goes on.
- Constipation can put pressure on the bladder and reduce its ability to expand, in turn leading to increased urgency and frequency.
Drug Induced Parkinsonism, Abnormal Movements, Gait Abnormalities

Drugs With Abnormal Muscle Movements, Parkinsonism, Gait Disturbances

- Antipsychotics
  - Seroquel and Clozaril less so than others in class
    - These are your preferred agents for Parkinsons psychosis if traditional antipsychotic must be used, or,
    - Nuplazid has different mechanism of action - *no worsening of Parkinson motor symptoms*
      - *More of an effect on serotonin than dopamine*
  - Metoclopramide
  - Depakote (valproic acid)
  - Lithium
Drugs With Abnormal Muscle Movements, Parkinsonism, Gait Disturbances

- Table from Journal of Clinical Neurology

<table>
<thead>
<tr>
<th>Drug frequently causing parkinsonism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical antipsychotics</td>
</tr>
<tr>
<td>Phenothiazine; chlorthiazide; prochlorperazine; perphenazine; fluphenazine; thioridazine; haloperidol; diphenylbutyramid; pimozide; benzamide substitutes; sulpiride</td>
</tr>
<tr>
<td>Atypical antipsychotics</td>
</tr>
<tr>
<td>Risperidone, olanzapine, ziprasidone, amisulpride</td>
</tr>
<tr>
<td>Dopamine antagonists</td>
</tr>
<tr>
<td>Rasagiline, pramipexole, apomorphine</td>
</tr>
<tr>
<td>Antiepiletics</td>
</tr>
<tr>
<td>Metoclopramide, levosulpiride, cisapride</td>
</tr>
<tr>
<td>Calcium-channel blocker</td>
</tr>
<tr>
<td>Flunarizine, nimodipine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mood stabilizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium</td>
</tr>
<tr>
<td>Antidepressants</td>
</tr>
<tr>
<td>SSRIs: citalopram, fluoxetine, paroxetine, sertraline</td>
</tr>
<tr>
<td>Antipsychotic drugs</td>
</tr>
<tr>
<td>Valproic acid, phenytoin</td>
</tr>
<tr>
<td>Antiemetics</td>
</tr>
<tr>
<td>Domperidone, diphenidine</td>
</tr>
</tbody>
</table>

“Drug-induced parkinsonism usually resolves within weeks to months after stopping the offending drug; however, parkinsonism may persist or progress in 10-50% of patients.”

Further argument against antipsychotic use for inappropriate indications

Other Factors to Consider

Unaddressed Needs

- Pain
  - Is the patient in pain, and is getting up or moving in bed, attempting to find comfort
  - Is pain limiting the patient’s range of motion, thereby increasing fall risk
  - Is neuropathy in feet impairing patient’s ability to walk
  - NOTE: If patient is in chronic pain, they’ll be more likely to limit motion and exercise, which could lead to weakness and functional decline
Unaddressed Needs

- **Physical & Occupational Therapy**
  - PT/OT should be considered
  - Restore strength, balance and coordination
  - Safe transfer techniques

- **Appropriate footwear**
  - Medicare will cover diabetic shoes given proper documentation

- **Environmental considerations**
  - Provide good lighting
  - Clean spills immediately
  - To the best of your ability, keep floors clutter free
  - Consider bed position

---

Unaddressed Needs

- **Boredom**
  - Activities
    - Try to schedule activities around “peak” fall times

- **Diet**
  - Ensure diet is appropriate for patient
  - Weight loss may be associated with weakness

- **Toileting Programs**
  - More to come...
Recapping Falls and Meds

Agency for Healthcare Research & Quality

- The AHRQ has a tool for hospitals to evaluate fall risk

<table>
<thead>
<tr>
<th>Point Value (Risk Level)</th>
<th>Drug Class</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (High)</td>
<td>Analgesics, antipsychotics, anticonvulsants, benzodiazepines†</td>
<td>Sedation, dizziness, postural disturbances, altered gait and balance, impaired cognition</td>
</tr>
<tr>
<td>2 (Medium)</td>
<td>Antihypertensives, cardiac drugs, antiarrhythmics, antidepressants</td>
<td>Induced orthostasis, impaired cerebral perfusion, poor health status</td>
</tr>
<tr>
<td>1 (Low)</td>
<td>Diuretics</td>
<td>Increased ambulation, induced orthostasis</td>
</tr>
<tr>
<td>Score ≥ 6</td>
<td></td>
<td>Higher risk for fall; evaluate patient</td>
</tr>
</tbody>
</table>
Overall Medication Concerns

- Reduce anticholinergic burden
  - Find alternatives
  - Find lowest effective dose
- Evaluate all psychotropic medications periodically for potential reduction
  - Reserve antipsychotic use for truly needed conditions
  - Consider alternatives to hypnotics and benzodiazepines
- Reduce any routine pain medications to the minimum effective dose
  - Employ any/all means of pain control possible to reduce systemic pain medication use
- Ensure bowel and bladder function is where it should be
  - Are med changes needed?

Beers and STOPP/START

- American Geriatric Society (AGS):
  https://www.americangeriatrics.org/publications-tools
- To purchase a Beers list pocket card or other publication through AGS:
  https://geriatricscareonline.org/ProductAbstract/beers-criteria-pocketcard/PC001
Bibliography


- Agency for Healthcare Research and Equality, “Preventing Falls in Hospitals,” Tool 3I: Medication Fall Risk Score and Evaluation Tools


- “Are Your Medications Causing or Increasing Incontinence?” Cleveland Clinic, Urinary and Kidney Team, 2014. health.clevelandclinic.org/are-your-medications-causing-or-increasing-incontinence/amp/