Medications and Fall Risk in the Elderly

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Objectives

• Identify the impact of falls in the elderly
• Understand medication-related fall risk
• Describe physiological changes that alter medication effects in the elderly
• Recognize medication side effects
• Identify drug/drug classes to consider in fall assessment
• Describe medication alternatives and fall-prevention strategies
Clinical Relevance

• About 50–75 percent of nursing home residents fall each year\textsuperscript{1}
• In long-term care (LTC) settings, 10–20 percent of falls result in an injury\textsuperscript{2}
• Falls are the leading cause of injury deaths in the geriatric population\textsuperscript{3}
• Each year, 2.5 million older adults are treated in emergency departments (EDs) for fall injuries\textsuperscript{4}

\textsuperscript{1} Willy & Osterberg, 2014
\textsuperscript{2} CDC 2015
\textsuperscript{3} CDC 2012
\textsuperscript{4} CDC 2016
Modifiable and Non-Modifiable Risk Factors for Falls

- Age
- History of Falls/Fractures
- Lower Extremity Weakness
- Visual/Auditory Impairment
- Cognitive Impairment/Dementia
- Polypharmacy (≥4 meds)
- Female Gender
- Comorbidities
- Balance/Gait Impairment
- Environment

5) Van Voast Moncada, 2011
Medications and Fall Risk

• ↑ number of Rx meds = ↑ risk for falls\textsuperscript{6}
• Frailest patients most likely to be receiving the most medications\textsuperscript{7}
• 44 percent of men and 57 percent of women age 65 and older use ≥5 medications and about 12 percent of both men and women take ≥10 per week\textsuperscript{8}

\textsuperscript{6} Freeland et al., 2012
\textsuperscript{7} Haumschild et al., 2003
\textsuperscript{8} Woodruff, 2010
Medications and Fall Risk

No risk factor is as preventable or reversible as medication use.⁹

⁹) Leipzig et al., 1999
Why are the Elderly More at Risk?

• **Absorption**: effects are variable
  – Decreased gastrointestinal motility
  – Reduced gastric acid secretion → increased pH

• **Distribution**: effects water and fat soluble drugs
  – Decreased muscle mass and total body water
  – Increased body fat

• **Metabolism**:  
  – Decreased liver function

• **Elimination**:  
  – Decreased kidney function

10) Wooten, 2012
Medication Side Effects Associated with Falls

- Agitation
- Arrhythmias
- Confusion
- Dizziness
- Gait / EPS
- Sedation
- Syncope

- Impaired balance
- Orthostatic hypotension (OH)
- Increased ambulation
- Cognitive impairment
- Visual disturbances

11) Huang et al., 2012
Anticholinergic Effects (AE)

- Blurred vision
- Flushing
- Altered mental status
- Dry mouth, dry eyes
- Urinary retention
- Elevated body temperature

12) Ramnarine & Tarabar, 2015
Medications/Classes

• Central Nervous System
  – Anti-Parkinson drugs
  – Antidepressants*
  – Antipsychotics*
  – Benzodiazepines*
  – Non-benzodiazepine hypnotics
  – Antihistamines
  – Anticonvulsants*
  – Muscle Relaxants
  – Narcotic Analgesics

• Cardiovascular
  – Antihypertensives
  – Antiarrhythmics
  – Digoxin
  – Nitrates
  – Diuretics

• Others
  – Hypoglycemics
  – H2-receptor blockers
  – Proton pump inhibitors
  – NSAIDs
  – Corticosteroids

*Indicates classes most strongly associated with falls

5) Van Voast Moncada, 2011
13) Woolcott et al., 2009
Antidepressants

- **Classes:** TCAs and SSRIs
- **Examples:** amitriptyline (Elavil®), paroxetine (Paxil®), nortriptyline (Pamelor®)
- **Effects:** anticholinergic effects (AE), orthostatic hypotension (OH), dizziness, sedation, blurred vision, decreased alertness
- **Alternatives:**
  - SSRIs with shorter $t^{1/2}$: escitalopram (Lexapro®), sertraline (Zoloft®)
  - SNRIs: venlafaxine (Effexor®), duloxetine (Cymbalta®)
  - Bupropion (Wellbutrin®)
Antipsychotics

• **Classes:** Typical and atypical
• **Examples:** chlorpromazine (Thorazine®), haloperidol (Haldol®), olanzapine (Zyprexa®)
• **Effects:** sedation, dizziness, orthostatic hypotension (OH), extrapyramidal symptoms (EPS), increased mortality in dementia patients\(^\text{16}\)
• **Alternatives:**
  – Dependent on clinical situation\(^\text{14}\)
    • Always use lowest dose for shortest duration possible
    • Non-anticholinergic agents such as aripiprazole (Abilify®) for schizophrenia or bipolar disorder only.

\(^{14}\) Hanlon, 2015
\(^{15}\) Bulat et al., 2008
\(^{16}\) FDA 2008
Benzodiazepines (BZDs)

- **Classes:** Long-acting/short-acting
- **Examples:** diazepam (Valium®), clorazepate (Tranxene®), alprazolam (Xanax®)
- **Effects:** sedation, cognitive impairment, unsteady gait
- **Alternatives:**
  - **Insomnia:** sleep hygiene, cognitive behavioral therapy, melatonin\(^{17}\)
  - **GAD/Anxiety:** buspirone (Buspar®), SNRIs\(^{14}\)

14) Hanlon, 2015
17) Bulat et al., 2008
Prevention Strategies: BZDs

- Avoid combining with other high-risk medications (e.g., opioids)\(^{18}\)
- Close monitoring and regular medication review necessary
  - Risk increased in first 1-2 weeks of initiating therapy and when using higher doses\(^{18}\)
  - Decrease dose or use lowest dose possible if applicable
  - Avoid abrupt discontinuation of medication; slow taper is recommended

\(^{18}\) Institute for Clinical Systems Improvement, 2012
Non-Benzodiazepine Hypnotics

- **Examples:** eszopiclone (Lunesta®), zolpidem (Ambien®), zaleplon (Sonata®)
- **Effects:** sedation, delirium, unsteady gait
- **Alternatives:**
  - Sleep hygiene
    - Minimize caffeine intake
    - Limit frequent daytime napping
    - Avoid late heavy dinner
  - Cognitive behavioral therapy (CBT)

14) Hanlon, 2015
Cardiovascular Medications

• **Types:** Antihypertensives
• **Examples:** doxazosin (Cardura®), nifedipine (Procardia®), prazosin (Minipress®), clonidine (Catapres®), methyldopa (Aldomet®)
• **Effects:** orthostatic hypotension (OH)
• **Alternatives:**
  – Alpha blockers (selective)
    • Tamsulosin (Flomax®) – Benign prostatic hyperplasia (BPH)
  – Thiazide-type diuretics
    • Hydrochlorothiazide

14) Hanlon, 2015
Prevention Strategies: Cardiovascular Meds

• Alpha blockers
  – Take at bedtime

• Diuretics\textsuperscript{17}
  – Take in a.m. to avoid nighttime ambulation

• Patient Education: Orthostatic Hypotension (OH)
  – Stand up slowly after sitting or lying down
  – Get adequate hydration
  – Monitor blood pressure routinely

\textsuperscript{17} Bulat et al., 2008
Antihistamines

- **Types:** 1st generation antihistamines
- **Examples:** hydroxyzine (Atarax®), diphenhydramine (Benadryl®)
- **Effects:** anticholinergic effects (AE), sedation, cognitive impairment
- **Alternatives:**
  - Intranasal normal saline
  - 2nd generation antihistamines
    - Loratadine (Claritin®), fexofenadine (Allegra®), cetirizine (Zyrtec®)
  - Intranasal steroids
    - Fluticasone (Flonase®)

14) Hanlon, 2015
Skeletal Muscle Relaxants

• **Examples:** cyclobenzaprine (Flexeril®), carisoprodol (Soma®), metaxalone (Skelaxin®), baclofen (Lioresal®)

• **Effects:** anticholinergic effects (AE), sedation, cognitive impairment, weakness

• **Alternatives:**
  – Physical Therapy
  – Acetaminophen (if pain is present)
Narcotic Analgesics

• **Examples:** oxycodone/APAP (Percocet®), hydromorphone (Dilaudid®)

• **Effects:** dizziness, confusion, sedation

• **Alternatives:**
  – Acetaminophen alone (recommended max dose 3g/d)
  – Short-acting NSAIDs: ibuprofen (Advil)

• Controversy in literature if narcotics are associated with increased falls\(^\text{19}\)

\(^{19}\) Leipzig, 2015
Problems with Medication Management in Nursing Homes

• Multiple medications
• Multiple prescribers
• Multiple prescription drug plans
• Relationships between providers
• Medication reconciliation/transitions of care
• Pressure to institute or continue medications
  – Family (less aware of risks)

5) Van Voast Moscada, 2011
Prevention Strategies

• “Treat the whole patient…..”
• Multidisciplinary approach
• Medication Review

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<td>• Indications Must be Clear</td>
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<td>• Lists of Drugs</td>
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20) Lee, 1998
Prevention Strategies

• “Optimize physician-pharmacist relationship”\textsuperscript{21}
  – Policy for Medication Regimen Review (MRR)
    • Process for communication
    • Timing of communication
    • Expected documentation on recommendation and response
    • Completed document retained

\textsuperscript{21} Levenson & Saffel, 2007
Prevention Strategies

• Chronic diseases appropriately treated
  – Screen and treat Osteoporosis
  – Vitamin D
    • Dose: 800 IU daily
    • Improves skeletal function
    • Decreased risk of falls in elderly\(^{22}\)
  – Calcium
    • 1000-1200 mg/daily\(^ {23}\)

22) Murad & Elamin, 2011
23) Ross, 2010
- Fall Root Cause Analysis
  - Nursing homes can use this form to identify fall risk factors

- Fall Prevention Intervention Care Plan
  - This worksheet helps the interdisciplinary nursing home team develop a multidisciplinary plan of care to prevent falls

- Restraints and Falls: Alternative Interventions
  - Provides suggested interventions to avoid restraints utilizations and/or reduce falls

- Fall Risk Assessment
  - Assist with identifying fall risk factors

Summary

• Falls are substantial cause of morbidity and mortality
• Polypharmacy is a risk factor for falls
• Elderly are at greater risk of side effects
• Adverse drug events (ADEs) are not widely recognized
• Most evidence exists for fall risk and psychotropics
• Medication review can minimize risk
• Preventative medications should be considered

13) Woolcott et. al, 2009
References

References


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