

# Inappropriate Drug Use

## **Background**

1. While elderly represent 13% of the U.S population
  - They receive disproportionately large amount (>1/3) of medications compared to younger population
2. Nursing home residents receive an average of 6.7 routine prescription medications per day and 2.7 additional medications on an "as needed" basis
3. Polypharmacy has been linked to increased risk of hospitalization and increased utilization of ambulatory services

## **Pathophysiology**

1. Physiological changes w/aging
  - Aging has minimal effect on absorption of drugs
    - However, there may be changes in rate of absorption in older pts taking many medications
  - Drug distribution changes w/aging due to changes in body composition, incr in fat stores, and decr in total body water
  - Water-soluble drugs (eg, ethanol, lithium) have lower volume of distribution
    - Reduced volume of distribution can result in incr concentration of drugs
  - Fat-soluble drugs (eg, diazepam) have larger volume of distribution
    - Half-life considerably prolonged
  - Decr in hepatic blood flow and liver size affects metabolism of many drugs
    - Drugs that undergo phase 1 reaction in liver are converted to active metabolites and often accumulate in elderly
      - Eg, diazepam, amitriptyline
  - Drug elimination also reduced in elderly because of decr renal blood flow, kidney size, and GFR
    - Serum creatinine may not be accurate measure of kidney function
    - Creatinine production reduced in elderly because of decr in lean muscle mass
    - Creatinine clearance is more reliable indicator of renal function than serum creatinine
2. Incidence, prevalence
  - Overall rate of adverse drug events due to inappropriate prescribing: 50.1 per 1000 person years
3. Risk factors
  - Age >85 yo
  - Low body weight or BMI
  - 6 concurrent chronic diagnoses
  - Estimated creatinine clearance < 50 mL/min
  - Use of more than 9 meds
  - 12 or more doses of meds/ day
  - Prior adverse drug reaction
4. Morbidity/ mortality
  - Risk of hospitalization due to adverse medication outcome is 6x greater among elderly than in general population
  - In 2000, medication-related problems resulted in estimated 106,000 deaths

## **Diagnostics**

### **1. History**

- Review of all meds incl OTCs, supplements and herbal preparations
- Review chronic medical problems
- Look for medication side effects as a possible cause of any new symptom

### **2. Clinical S/S**

- Anticholinergic agents generally not well tolerated in elderly patients
  - Can cause sedation, blurred vision, urinary retention, confusion, hallucinations, dry mouth and constipation
- Fatigue
- Over-sedation
- Agitation
- Dizziness
- Falling
- Depression
- Skin rashes
- Bleeding/ hemorrhage

### **3. Diagnostic testing (as appropriate)**

- Check medication levels
- Basic metabolic panel to look for electrolyte imbalances and renal failure
- Liver function tests to look for hepatic toxicity due to drugs
- CBC w/differential for anemia in pts at risk for bleeding

### **4. Beers Criteria**

- In 1991, a group of clinicians led by Mark Beers, MD, produced a list of drugs to be avoided in elderly pts along w/ a list of recommended alternatives (see Beers drug list)
- US Dept of Health and Human Services (DHHS) incorporated many of the "Beers' list" recommendations into the drug therapy guidelines issued in its 1999 Survey Procedures and Interpretive Guidelines
- Beers' list recommendations are also included in CMS (Center for Medicare and Medicaid Services) surveys on unnecessary drug use and in the monthly drug regimen reviews in the nursing homes
- About 50% of nursing home residents in a recent AHRQ (Agency for Healthcare Research and Quality)-funded study were found to have at least one potentially inappropriate medication prescription, defined according to Beers' criteria

## **Prevention & Therapeutics**

### **1. Familiarize yourself with Beers' list**

- See Table 2 for recommendations regarding Rx of specific conditions

### **2. DO NOT prescribe:**

- Drugs to treat adverse effects of another drug
- Anticholinergic drugs
- Diphenhydramine (Benadryl) for sleep in elderly pts
- Long-acting benzodiazepines
  - Chlordiazepoxide (Librium)
  - Diazepam (Valium)
  - Flurazepam (Dalmane)

- High doses of digoxin (>0.125 mg/day) for elderly pts
  - Except when treating atrial arrhythmias
- Propoxyphene (Darvon, Darvocet) or meperidine (Demerol) to treat pain
  - Not well tolerated by elderly
- 3. "Start low, go slow"
  - Titrate dose upward slowly
  - Monitor for Sx of toxicity as medication achieves steady state
- 4. Avoid starting more than one medication at a time
- 5. Determine if potential drug-drug or drug-dz interactions exist
  - Look for meds w/duplicate therapeutic, pharmacologic and adverse effect profiles
- 6. Simplify medication schedules
  - Use fewest possible number of medications and doses in a day
- 7. Withdraw or hold medication responsible for adverse effect
- 8. Incorporate pharmacist recommendations
- 9. Incorporate computerized alerts
- 10. Eliminate unnecessary meds and confer w/other prescribers if necessary
- 11. Review changes w/pt & caregiver and provide instructions

### Follow-Up

1. DHHS regulations require review of each nursing home resident's drug regimen at least once a month by a licensed pharmacist
  - Pharmacist must report any irregularities to attending physician
  - These reports must be evaluated and acted upon by physicians

### References

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### Table 1: Drugs to avoid in elderly

#### 1. Propoxyphene

- Side effect: adverse effects of narcotic drugs
- Severity rating: low

2. **Indomethacin**
  - Side effect: of all NSAIDs, most CNS adverse effects
  - Severity rating: high
3. **Muscle relaxants (flexeril)**
  - Side effect: anticholinergic effects
  - Severity rating: high
4. **Amitriptylline**
  - Side effect: anticholinergic and sedation effects
  - Severity rating: high
5. **Doxepin**
  - Side effect: anticholinergic effects
  - Severity rating: high
6. **Short acting benzodiazepine**
  - Side effect: increased sensitivity
  - Severity rating: high
7. **Long acting benzodiazepine**
  - Side effect: long half life
  - Severity rating: high
8. **Digoxin**
  - Side effect: decreased renal clearance
  - Severity rating: high
9. **Disopyramide**
  - Side effect: negative inotropic effect
  - Severity rating: high
10. **GI antispasmodics (bentyl)**
  - Side effect: anticholinergic
  - Severity rating: high
11. **Benadryl**
  - Side effect: confusion / sedation
  - Severity rating: high
12. **Barbiturates**
  - Side effect: addictive / sedation
  - Severity rating: high
13. **Meperidine (Demerol)**
  - Side effect: confusion
  - Severity rating: high
14. **Ketorolac (Toradol)**
  - Side effect: GI side effects
  - Severity rating: high
15. **Amphetamines**
  - Side effect: dependence, HTN, angina, MI
  - Severity rating: high
16. **Macrochantin**
  - Side effect: potential for renal impairment
  - Severity rating: high
17. **Prozac**
  - Side effect: long half-life, CNS stimulation
  - Severity rating: high

**18. Clonidine**

- Side effect: orthostatic hypotension, CNS side-effects
- Severity rating: high

**19. Estrogen**

- Side effect: carcinogenic potential
- Severity rating: low

**Table 2: Medication use in elderly with consideration of diagnosis or condition (5)**

**1. Heart failure**

- Drug: Norpace and high sodium containing drugs
- Concern: Negative inotropic effect; promote fluid retention
- Severity rating: High

**2. Hypertension**

- Drug: Pseudoephedrine, diet pills, amphetamines
- Concern: Elevate BP due to sympathomimetic effect
- Severity rating: High

**3. Gastric/ duodenal ulcers**

- Drug: NSAIDS/ aspirin (coxibs excluded)
- Concern: Exacerbate or produce new ulcers
- Severity rating: High

**4. Seizures or epilepsy**

- Drug: Clozapine, chlorpromazine, thioridazine thiothixene, bupropion
- Concern: May lower seizure threshold
- Severity rating: High

**5. Blood clotting disorders**

- Drug: Aspirin, NSAIDS, dipyridamole, ticlopidine, Plavix
- Concern: May prolong clotting time, elevate INR or inhibit platelet aggregation
- Severity rating: High

**6. Bladder outflow obstruction**

- Drug: Anticholinergics/ antihistamines
- Concern: May decr urinary flow
- Severity rating: High

**7. Stress incontinence**

- Drug: Alpha blockers, long-acting benzodiazepines
- Concern: Polyuria or worsening incontinence
- Severity rating: High

**8. Arrhythmias**

- Drug: TCA
- Concern: Proarrhythmic activity, QT interval changes
- Severity rating: High

**9. Cognitive impairment**

- Drug: Barbiturates, anticholinergics, antispasmodics, muscle relaxants, CNS stimulants
- Concern: Possible CNS-altering effects
- Severity rating: High

**10. Syncope/ falls**

- Drug: Short-/intermediate-acting benzodiazepines, TCAs
- Concern: Ataxia, impaired psychomotor function, syncope, falls
- Severity rating: High

**11. Obesity**

- Drug: Olanzapine
- Concern: Stimulates appetite
- Severity rating: High

**12. Chronic constipation**

- Drug: Calcium channel blockers, Anticholinergics, and TCAs
- Concern: May exacerbate constipation
- Severity rating: Low

**13. Anorexia**

- Drug: CNS stimulants
- Concern: Appetite-suppressing effects
- Severity rating: High

**14. SIADH**

- Drug: SSRIs
- Concern: May exacerbate or cause SIADH
- Severity rating: Low

**15. COPD**

- Drug: Long-acting benzodiazepines, B-blockers
- Concern: CNS-adverse effects, respiratory depression
- Severity rating: High

**16. Parkinson's disease**

- Drug: Metoclopramide, tacrine, conventional antipsychotics
- Concern: Antidopaminergic/cholinergic side effects
- Severity rating: High

**Abbreviations**

CNS, central nervous system

COPD chronic obstructive pulmonary disease

SIADH, syndrome of inappropriate anti-diuretic hormone secretion

SSRIs, selective serotonin reuptake inhibitors

TCAs, tricyclic antidepressants

NSAIDs, nonsteroidal anti-inflammatory drugs

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