Case Discussion: Medication-Related Problems in a Geriatric Patient: The Role of Pharmacy

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Objectives

• This presentation will introduce the participant to the process of assessing the patient for medication-related problems. When identified, what interventions are available, and do we as practitioners recognize the medications that should be avoided in geriatric patients. And lastly, if a treatment is deemed problematic, what alternative treatments could be available to address the patient’s needs.

1. Be able to differentiate pharmacological treatment choices in the geriatric patient.

2. Recognize possible drug-induced cognitive or psychological impairments and discuss the expectations and possible outcomes of psychotropics if they are prescribed to a geriatric patient.

3. Be able to recommend alternative pharmacological interventions given the patient’s medical co-morbidities and medication-related problems.
Outline

• **Case Review**

• **Overview of the Role of Pharmacy**
  – Pharmaceutical Care
  – Medication Therapy Management

• **Identification of Medication-Related Problems**

• **Member and Role within the Healthcare Team**

• **Case Review**
Mr. Pereza’s Medication List

- Lisinopril 20mg daily
- Metoprolol 75 mg twice daily
- Advil (ibuprofen) 200 mg 1-2 tabs several times per day
- HCTZ 25 mg daily
- Clonidine 0.1 mg PRN HTN
- Lorazepam 0.5 mg PRN insomnia/anxiety
- Metformin 850 mg twice daily
- Multivitamin / Garlic Supplement daily / Vit. B-12 inj. monthly
- Aspirin 325 mg daily
- Folate 1 mg daily

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- Allopurinol daily
- Glipizide 5 mg twice daily
- Crestor 10 mg daily
- Coenzyme-Q10 200 mg daily / B-complex daily
- Vit. E 400 IU twice daily
- Fish Oil OTC 2 tablets daily / Beta-carotene 25,000 IU daily
- Terazosin 4 mg at bedtime

- Physician’s Assessment & Plan:
  - CAD & HTN: EKG / Labs ordered / Referred to cardiologist
  - BPH: Rx Flomax and Finasteride / reduce fluid intake after dinner
  - Gout: Allopurinol renewed
  - Poor energy: Labs ordered – testosterone, growth hormone levels
Mrs. Pereza’s Medication List

- Acyclovir PRN
- Calcium & Vit. D. / Glucosamine 4 tablets daily
- Crestor 10 mg daily
- Metformin 850 mg daily
- Aspirin 81 mg daily
- Amlodipine 5 mg daily

- Physicians Assessment & Plan:
  - Osteoporosis: BMD / Vit. D levels ordered
  - Urinary Incontinence: urinalysis ordered / referral to GYN
  - Diabetes: HbA1c / CMP / Lipids / Metformin renewed
  - Hypertension: Medication renewed
The Basics of Pharmacy Services

• Traditional Roles:
  – Accurate interpretation of the prescriber’s orders and dispensing the appropriate drug, dose and quantity to the patient or ward
  – Formulary maintenance
  – Reporting of Adverse Drug Reactions
  – Staff and Patient Education
Pharmaceutical Care
(Current Roles of the Pharmacist)

• Establish the patient-pharmacist relationship

• Collect and interpret relevant patient information to determine if the patient has a medication-related problem

• Identify medication-related problems
  ie: Increased vigilance for ADRs
       Drug-Drug / Drug-Disease Interactions

• Work with treatment team to identify and describe the desired therapeutic goals
Pharmaceutical Care
(cont.)

• Identify feasible therapeutic alternatives to achieve therapeutic goals.

• Select and individualize the most appropriate treatment regimen

• Implement the therapy regarding medication use

• Design a monitoring plan to assess the achievement of the desired therapeutic goals or negative outcomes.
“Medication Therapy Management”

- Provision of Pharmaceutical Care
- Collaborative relationships with healthcare team & patients
- Reimbursement for services
Medication-Related Problems

1) Untreated Indications requiring a Medication

2) Improper Medication Selection

3) Sub-therapeutic Dosage & Over-dosage of the Correct Drug
Medication-Related Problems (cont.)

• 4) Failure to Receive the Medication
  • pharmaceutical, psychological
  • sociological/cultural, economic reasons

• 5) Adverse Drug Reactions

• 6) Drug-Drug / Drug-Disease Interactions

• 7) Drug Use Without an Indication
Drug-related problems (DRPs) identified from geriatric medication safety review clinics

- Drug-related problems (DRPs) were identified from baseline data of 193 Medication Safety Review Clinic (MSRC) patients.

- Mean age was 76.2 ± 6.2 years and 53% of participants were male. Participants had, on average, 9.0 ± 2.6 chronic conditions and took 8.9 ± 3.1 chronic medications and 1.7 ± 1.8 dietary supplements.

- **87% percent had at least one DRP.**
  For the 1713 medications and 331 diet supplements reviewed, 427 DRPs were found, 490 causes (1.1 ± 0.4 per problem) identified and 1067 interventions proposed (2.5 ± 0.6 per problem).

- The most common DRP category was “‘drug not taken / administered”’ (35%).

- The most common offending drug category was cardiovascular agents (33%).

- Prevalence of DRPs was high among geriatric outpatients prescribed multiple medications. Careful medication review is needed in routine clinical practice to improve prescription quality.

Educational Services

*Healthcare Provider Education*

- Promote the role of the pharmacist in the multi-disciplinary treatment team
- New drug updates, ADRs and applications
- Drug interactions
- Formulary changes and management
- *Counter-detail pharmaceutical marketing*
- Provision of drug information to the team
Educational Services
(cont.)

- **Patient Education**
  - Enhance Compliance and *Adherence*
    - Assuring optimal treatment outcomes
    - Required by OBRA in the outpatient setting
  - Knowledge of Common Side Effects and Drug Interactions
  - Motivational Interviewing techniques
Educational Services (cont.)

• **Patient Education & Services**
  – Non-Prescription Drugs and Alternative or Herbal Remedies
  – Diagnostic & Monitoring Services
    • Blood pressure, Cholesterol, Coagulation
  – Promotion of Non-pharmacological interventions and treatments
Pharmacist Effect on Costs of Care

• Literature consistently reports Decreased Length of Hospital Stay and Decreased Overall Costs of Care
  – Recognition & Prevention of Drug-Related Problems
  – Assistance in Drug Selection
    • Same Drug Class, Same Efficacy Profile, Same ADR profile…. Different Costs
  – Effectiveness vs Efficacy
    • Real world clinical outcomes VS research data
  – Pharmacoeconomics
Medication Management in the Elderly
The Scary Numbers

• The elderly (>65 yo) consume THREE times the medications as those <65 yo

• >93% of those >85 yo are taking medications

• Outpatient elderly are taking an average of 4.5 medications per day (45-55% are taking ≥5)

• Nursing home residents are receiving ~8 meds/day.
The Scary Numbers

• 12% of elderly take \(>10\) medications/day

• Approximately \(\frac{1}{2}\) of elderly are on medications with no indication / ineffective / duplication of tx.

• Drug-related problems may account for 10 to 20% of hospital admissions
The Aging Process and Medications Overview

• The accumulation of disease states as we age.

• More illnesses = More drugs = Longer/Better life?
  – Is there a Law of Diminishing Returns?
  – Using Drugs to Treat Other Drugs’ Side Effects

• Changes in drug sensitivities (increased) and pharmacokinetics (decreased)
  – Increased Risk for ADRs and Drug Interactions
Pharmacodynamic and Pharmacokinetic Changes Associated with Aging Represent a Portion of the Risk Factors for ADRs
Pharmacokinetics

• “What the body does to the drug”
• Absorption
• Distribution
• Plasma Protein Binding
• Hepatic Metabolism / Clearance
• Renal Clearance
Pharmacokinetics

Absorption

• Decreased swallowing
• Increased gastric pH
• Decreased gastric emptying
• Decreased intestinal motility
• Decreased mesenteric blood flow
  – Rate of Absorption is Decreased
  – Effect is compounded by anticholinergics, antacids, and other drugs affecting pH and other gastric processes such as H2-antagonists and proton pump inhibitors
Pharmacokinetics

Distribution & Protein Binding

• Decreased muscle mass
• Decreased total body water
• Increased total body fat
  – Changes the half-life of a drug
  – Lipophilic vs Hydrophilic Drugs
• Decreased albumin
• Increased alpha-1 acid glycoprotein
  – Changes the availability of free drug
  – Competition for protein binding sites by multiple drugs
Pharmacokinetics

Metabolism and Renal Clearance

• Decreased liver volume
• Decreased hepatic blood flow
• Decreased oxidative metabolism
• Decreased renal blood flow
• Decreased glomerular filtration rate
  – These events typically result in Increased drug Half-Life, Concentrations, and Accumulation
Pharmacodynamics

• “What the drug does to the body”
• Receptor Sensitivities Change
• Decreased Neurotransmitter Production
  \[\downarrow\]
• Increased Risk for Adverse Drug Reactions
Pharmacodynamics

Receptors

• Decreased Cholinergic
  – Muscarinic & Nicotinic

• Decreased Dopaminergic

• Decreased Noradrenergic
  – alpha-2 receptors & beta receptors
  – baroreceptors

• Decreased Serotonergic
Pharmacodynamics

Neurotransmitters

• Decreased Acetylcholine production
• Decreased Dopamine production
• Decreased Norepinephrine production
• Decreased Serotonin production
Drug Classes and Risks for Adverse Drug Reactions

• Cholinergic Antagonists
• Dopaminergic Agonists and Antagonists
• Antidepressants
• Cardiovascular Effects of Drugs
• Drugs and the Risk for Falls
• Herbal Remedies / Alternative Medicine
Potentially Inappropriate Medication Use in Older Adults

- Recurring review of medications used in the older adult population that have minimal to no benefit vs significant risks.
- Literature review
- Expert Panel evaluation
- Recommendations based on evidence

Dementia Mnemonic for Differential Dx. of Cognitive Impairment

- **D = drugs !!!**
- **E = eyes and ears**
- **M = metabolic (endocrine, electrolytes)**
- **E = emotional (depression)**
- **N = neurological (parkinson’s, alzheimer’s)**
- **T = trauma / tumor**
- **I = infections**
- **A = arteriosclerosis**
Iatrogenesis: Focus on Medications

Inappropriate use of medications with **anticholinergic effects** may lead to:

- Confusion and Memory Loss
- Delirium
- Delusions, hallucinations
- Agitation

Source: Schneider LS. *J Clin Psychiatry*. 1999;60(suppl 8):54-60.
Cholinergic Antagonists

• ADRs
  – Blurred vision
  – Urinary retention
  – Constipation
  – Dry mouth
  – Impaired cognition / memory
  – Delirium

• Benztropine (Cogentin)
• Trihexyphenyldil (Artane)
• Oxybutinin (Ditropan), Tolterodine (Detrol)
Cholinergic Antagonists (cont.)

- Diphenhydramine (Benadryl)
- Hydroxyzine (Atarax, Vistaril)
- Doxylamine (OTC-Unisom and others)
- Dramamine, Meclizine (Antivert, Bonine)
- Scopolamine (Transderm Scope Patch)
Antidepressant Medications With Anticholinergic Properties

- Tertiary amine tricyclics
  - Amitriptyline
  - Clomipramine
  - Doxepin
    - Silenor® – newest FDA-approved hypnotic
  - Imipramine
- Nortriptyline and other secondary amines
Antipsychotic Medications With Anticholinergic Properties

- Phenothiazines:
  - Thioridazine
  - Chlorpromazine
  - Loxapine

- Clozapine
  - Olanzapine

Medications With Anticholinergic Effects Commonly Prescribed in the Elderly

- Cimetidine
- Prednisolone
- Theophylline
- Digoxin
- Furosemide
- Ranitidine
- Nifedipine
- Isosorbide
- Warfarin
- Dipyridamole
- Codeine
- Triamterene and hydrochlorothiazide
- Captopril

Dopaminergic Agonists and Antagonists

• Drugs for Parkinson’s Disease
  – Bromocriptine, Pergolide
  – Pramipexole, Ropinerole, Amantadine

• Drugs for Psychosis / Agitation (Antipsychotics)
  – Chlorpromazine, Thioridazine, Perphenazine
  – Haloperidol, Fluphenazine
  – Clozapine, Risperidone, Olanzapine
  – Quetiapine, Ziprasidone

• Older Anti-Emetic / Nausea Drugs
Antidepressants

- **Selective Serotonin-Reuptake Inhibitors**
  - Fluoxetine, Sertraline, Paroxetine
  - Citalopram, Escitalopram,
  - Fluvoxamine, Vilazodone

- **Tricyclic Antidepressants**
  - Amitriptyline, Imipramine, Doxepin
  - Nortriptyline, Desipramine

- Trazodone, Nefazodone

- Bupropion, Mirtazapine

- Duloxetine, Venlafaxine, Desvenlafaxine
Cardiovascular Adverse Effects of Drugs

• Tachycardia
  – sinus (anticholinergics)
  – reflex from orthostasis (alpha-1 blockers)
  – direct stimulation (some antidepressants)

• Changing of the Heart Rhythm
  – QT-prolongation

• Orthostasis
  – risk for dizziness and falls

• Unintentional Blood Pressure Changes
Drugs and the Risk for Falls

• Older and Newer Antipsychotics
• **Benzodiazepines**
• Antidepressants
• Non-BZD Sedative-Hypnotics
• **Alpha-1 Antagonists** (terazosin, doxazosin) – For benign prostatic hypertrophy
• Many Antihypertensive Medications
• Anti-Parkinson’s Disease Medications
Herbal Remedies / Alternative Medicine

• Increasing Use by the Public
• Multi-Billion Dollar Industry
• “Perceived” Safety and Efficacy with Little Proof
• Increasing Number of ADRs and Drug-Drug Interactions Reported in the Literature
• Vitamin Supplementation
Substance Abuse in the Elderly

• 5-10 % of the elderly population
  – Mostly Alcohol

• Abuse vs Dependence

• Difficult to assess

• Night caps and social alcohol use
  – Withdrawal reactions in hospitals / NHs

• Physical dependence with chronically prescribed benzodiazepines and opiates

• Nicotine and Caffeine
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Medication Therapy Management

• What Medication-Related Problems are identified?
  – Non-Adherence?
  – Unnecessary Medication? / Use without Indication?
  – Need for a Medication?
  – Ineffective Medication?
  – Dosage too Low? / Dosage too High?
  – Adverse Drug Event? / Interactions?
Recommendations for Interventions

• **Minimize the Number of Medications**
  – eg. Why have one BZD for back pain, a different BZD for anxiety, and a third BZD for sleep?

• Try to treat two conditions with one drug

• Poor data regarding positive outcomes from use of two or more medications from the same class
Recommendations for Interventions

- **Vigilance for Adverse Drug Reactions**

- Utilize medications with a low risk for drug-drug interactions
  - Low protein binding
  - No metabolic inhibition

- Avoid treating the Side Effects of one drug with another drug
  - EPS and use of anticholinergics
Recommendations for Interventions

• When initiating drug therapy utilize the method of....
  – “Start Low and Go Slow”
  – Give the Drug Time to Work

• Avoid chronic use of medications for one-time or acute illnesses

• Utilize Non-Pharmacological Interventions
  – Ex: Insomnia / Disturbed Behaviors / Diet / Exercise
Conclusions & Discussion