GERIATRICS: PHYSIOLOGY, POLYPHARMACY & PHARMACEUTICAL CARE IN AN AGING POPULATION

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DISCLOSURE DECLARATION

- We do not have a vested interest in or affiliation with any corporate organization offering financial support or grant monies for this continuing education activity, or any affiliation with an organization whose philosophy could potentially bias our presentation.

LEARNING OBJECTIVES

- Describe 3 factors to consider when initiating and discontinuing medications in the elderly
- Identify common medications that are generally recommended to avoid in the elderly and potential therapy alternatives
- Review Beers criteria, STOPP/START criteria and other resources utilized when initiating and discontinuing medications in the elderly

PRE-TEST QUESTIONS

- 67 year old male arrives today with a past medical history of cardiovascular disease and BPH
- Medication list:
  - Lisinopril 20mg daily
  - Metoprolol 50mg twice daily
  - Hydrochlorothiazide 25mg in the morning
  - Atorvastatin 40mg daily
  - Doxazosin 2mg at bedtime
  - Aspirin 81mg daily
- He requests his new prescription of hydrocodone/APAP 5/325mg for his broken foot
1. What side effects is he at an increased risk for given his age and medication list?

2. What medications would you consider “red flags”?

- The man returns 5 days later complaining of constipation
- Upon chart review and patient interview, you identify some potentially inappropriate medications
- Prescription medications:
  - Lisinopril 20mg daily
  - Metoprolol 50mg twice daily
  - Hydrochlorothiazide 25mg in the morning
  - Atorvastatin 40mg daily
  - Doxazosin 2mg at bedtime
  - Aspirin 81mg daily
  - Hydrocodone/APAP 5/325mg 1 tablet every 6 hours prn pain
- OTC medications:
  - Ferrous sulfate 325mg once daily
  - Diphenhydramine 25mg to 50mg as needed for sleep

3. Which of the following is NOT a risk factor for falls in the elderly?
   A. Dim lighting in the hallway
   B. Diet low in protein
   C. Lack of exercise
   D. Polypharmacy of 9 medications

PRE-TEST QUESTIONS
The process of getting older...

Who defines old?
- You are as young as you feel!
- It is not easy to define, precisely

The age of 65 is often used as the cut-off to be considered “elderly”

Most people do not need geriatric expertise until age 70 or 75

The age of 65 is often used as the cut-off to be considered “elderly”

Most people do not need geriatric expertise until age 70 or 75

Increase in co-morbidities
- More disease states
- Ailments and pains with age
- Changes in mental status

Change in physiology
- Pharmacodynamics
- Decreased absorption and changes in body composition
- Pharmacokinetics
- Changes in renal function and hepatic function

Healthy aging is the ability to continue to function mentally, physically, and socially as the body slows down its processes

Healthy older persons usually maintain a level of social activity that is only slightly changed from that of earlier years

Principles for successful aging:
- Optimum health and nutrition
- Maintain interests and relationships
- Regular schedule of activities
- Strong support system
Huge population suffering from many diseases
- Elderly obesity is growing
- Significant economic differences
- More elders are divorced compared to previous generations
- "Baby boomer" generation reaching elder ages
  - May contribute to a 75% increase in Americans over the age of 65 requiring nursing home care (2.3 million in 2030 from 1.3 million in 2010)
- As the elder population increases, disease states seen primarily in this population increase
  - Alzheimer's is projected to triple by 2050 to 14 million elders compared to 5 million 2013

**AGE RELATED CHANGES**

<table>
<thead>
<tr>
<th>System</th>
<th>Age-related physiological changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Increased body fat</td>
</tr>
<tr>
<td></td>
<td>Reduced total body water</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Decreased gastric acidity</td>
</tr>
<tr>
<td></td>
<td>Decreased gastric emptying</td>
</tr>
<tr>
<td>Renal</td>
<td>Decreased renal filtration, glomerular</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>Decreased muscle mass</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Decreased blood pressure</td>
</tr>
<tr>
<td>Central nervous</td>
<td>Brain atrophy</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>Urethral / renal atrophy</td>
</tr>
<tr>
<td>Endocrine</td>
<td>Decreased renal clearance</td>
</tr>
<tr>
<td></td>
<td>Decreased renal clearance</td>
</tr>
</tbody>
</table>

GERIATRIC CHALLENGES

- As we age there is a steady decline in physiological reserves
  - Recovery takes longer
  - Reduced ability to compensate for illness or physiological demands
  - Illnesses accumulate in number and severity
  - Physiological decline plus disease results in excess morbidity and disability

**GENERAL**

- Reduced capacity to maintain homeostasis during stress
- Reduced total body water
  - Water soluble drugs have a decreased volume of distribution ($V_d$)
  - May lead to reduced therapeutic window and risk of toxicity
  - May require a dose reduction for certain medications
- Increase in total body fat
  - Increased $V_d$ of lipid soluble drugs may require increased dosing for therapeutic efficacy

**GASTROINTESTINAL**

- Atrophy of salivary glands and taste buds
- Slowed gastric emptying
- Decreased GI muscle tone
- Decreased gastric pH
- Decreased size and blood flow to the liver
- Decreased appetite
- Constipation
- Reflux and diverticular disease
- Decrease oral absorption
- Decreased drug metabolism
**RENAI**

- Renal mass and function decline
- Decrease in number of glomeruli
- Decreased renal blood flow
- Thickening of tubular walls

Significant alterations to kidney function with age, resulting in decreased GFR and decreased ability to respond to changes in fluid and electrolyte balance

**RENAI PROGRESSION**

- GFR decreases about 0.75-1.0 mL/min/1.73m² each year beginning about 40 years of age
- Chronic Kidney Disease occurs after accumulated damage to kidneys causes proteinuria or GFR < 60 mL/min
- Factors that accelerate damage to the kidney:
  - Hyperglycemia
  - Hypertension
  - Proteinuria
  - Hyperlipidemia
  - Smoking
  - Obesity

Individuals with GFR ≤ 60 mL/min often require dose adjustments for medications renally eliminated

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**EXAMPLES OF RENALLY DOSED MEDICATIONS**

<table>
<thead>
<tr>
<th>Medication / Class</th>
<th>CrCl (mL/min) for Intervention</th>
<th>Recommendation</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rivaroxaban</td>
<td>30-50</td>
<td>Reduce dose</td>
<td>Increased bleeding</td>
</tr>
<tr>
<td></td>
<td>&lt; 30</td>
<td>Avoid</td>
<td></td>
</tr>
<tr>
<td>Spironolactone</td>
<td>&lt; 30</td>
<td>Avoid</td>
<td>Increased K+</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>&lt; 30</td>
<td>Avoid</td>
<td>CNS adverse effects</td>
</tr>
<tr>
<td>Tramadol</td>
<td>&lt; 30</td>
<td>IR: Reduce dose</td>
<td>CNS adverse effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ER: Avoid</td>
<td></td>
</tr>
<tr>
<td>Duloxetine</td>
<td>&lt; 30</td>
<td>Avoid</td>
<td>GI adverse effects</td>
</tr>
<tr>
<td>H2 blockers</td>
<td>&lt; 50</td>
<td>Reduce dose</td>
<td>Mental status change</td>
</tr>
<tr>
<td>Colchicine</td>
<td>&lt; 30</td>
<td>Reduce dose</td>
<td>GI, neuromuscular, bone marrow toxicity</td>
</tr>
</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>Nitrofurantoin</td>
<td>&lt; 60</td>
<td>Avoid</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>&lt; 30</td>
<td>Reduce frequency</td>
<td></td>
</tr>
<tr>
<td>Cephalexin</td>
<td>&lt; 30</td>
<td>Reduce dose/frequency</td>
<td></td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>&lt; 30</td>
<td>Reduce dose/frequency</td>
<td>Avoid</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>&lt; 50</td>
<td>Reduce dose/frequency</td>
<td></td>
</tr>
<tr>
<td>Clarithromycin</td>
<td>&lt; 30</td>
<td>Reduce dose/frequency</td>
<td></td>
</tr>
<tr>
<td>Fluconazole</td>
<td>&lt; 50</td>
<td>Reduce dose</td>
<td></td>
</tr>
<tr>
<td>Acyclovir</td>
<td>&lt; 10 (PO) &lt; 25 (IV)</td>
<td>Reduce dose/frequency</td>
<td></td>
</tr>
<tr>
<td>Piperacillin/tazobactam</td>
<td>&lt;40</td>
<td>Reduce frequency</td>
<td></td>
</tr>
</tbody>
</table>

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**MUSCULOSKELETAL**

- Decreased muscle mass and tone
  - Age related
  - Weakness from disuse and deconditioning
- Decreased bone mass and osteoblastic activity
  - Osteoporosis and fractures
- Deterioration and drying of joint cartilage
  - Joint pain and stiffness
- Loss of height and changes in gait and posture
  - Instability and decreased balance

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**CARDIOVASCULAR**

- Cardiac disease is the leading cause of death in elderly patients
  - Stiffening of ventricles and arterial wall
  - Reduced pacemaker cells
  - Diminished beta-adrenergic responsiveness
  - Reduced ability to relax the heart
  - Loss of early filling from atrial contraction
  - Cardiac hypertrophy
  - Systolic hypertension
  - Orthostatic hypotension and syncope
  - Heart failure
**CARDIOVASCULAR**

- Increased risk of cardiovascular disease
- Elevated blood pressure
- Increased cholesterol levels
- Atherosclerosis

**CENTRAL NERVOUS SYSTEM**

- Neuronal loss in the brain throughout life
- Slowed neuronal transmission
- Decreased catecholamine synthesis
- Changes in sleep cycle
- Sensory loss
  - Vision, hearing, smell, taste & touch
- Age related mental decline
  - General decreased memory
  - Alzheimer’s disease & dementia

**CAUSES OF CNS IMPAIRMENT**

- Medications known for CNS depression
  - Benzodiazepines
  - Pain medications (opioids)
  - Antihistamines (1st generation)
    - If used concurrently with alcohol, CNS depression risk may be higher
- Organ damage/failure
- Infection
  - Often the only sign something is wrong in elderly person is confusion/dementia

**GENITOURINARY**

- Decreased bladder muscle tone and decline in bladder capacity
- Urinary incontinence
- Reduction in hormone production
  - Atrophy of cervical and uterine walls
  - Decreased testosterone
  - Prostate enlargement
  - Sexual dysfunction

**ENDOCRINE**

- Decreased hormone secretion
- Increased nodularity and fibrosis of thyroid
- Decreased basal metabolic rate
- Decreased ability to tolerate stressors
- Decreased febrile response, thermoregulation
- Decreased insulin response, glucose tolerance
- Weight gain
- Increased incidence of thyroid disease
- Diabetes

**FACTORS TO CONSIDER**

- Glucose intolerance
- Increased blood pressure
- Increased body fat
- Decreased total body water
- Kidney function (Creatinine Clearance & Serum Creatinine)
- Decreased muscle mass & bone density
- Decreased sleep
- Decreased gastric acidity
- Decreased G1 motility
- Decreased hepatic and splanchnic blood flow
- Vulnerable to stress
- Socioeconomic background
- Obesity
- Increased blood pressure
- Brain atrophy
- Polypharmacy
- Weight
- Age
**Polypharmacy**

- What is polypharmacy?
- WHO defines it as "the administration of many drugs at the same time or the administration of an excessive number of drugs."

**Polypharmacy Case**

- 78 year old female with past medical history of congestive heart failure, glaucoma, hypertension and osteoarthritis
- Medical list: furosemide, potassium, lisinopril, metoprolol, aspirin, timolol maleate ophthalmic solution (Timoptic), acetaminophen (as needed), multivitamin and a calcium/vitamin D supplement (800 IU daily)
- Appointment with a new orthopedic physician with a chief complaint of persistent arthritic pain in her knee
- Physician prescribes an NSAID, meloxicam (7.5 mg per day), for pain and inflammation

**Why the Elderly?**

- Increased risk of adverse drug events due to metabolic changes in the body and decreased drug clearance associated with aging
  - Risk is compounded by increasing numbers of drugs used

**Polypharmacy Consequences**

- Adverse drug reactions → prescribing cascades
- Drug-drug interactions
- Potentially inappropriate medications prescribed
- Adherence issues
  - Increase chance if coupled with visual or cognitive impairments
  - More medicine = greater complexity = risk of poor adherence
- Unnecessary drug expenses
- Poor outcomes
- Reduced quality of life

**Polypharmacy Consequences**

- Prescribing Cascades

**Polypharmacy**

- A balance is required between over- and under-utilization of prescription and over-the-counter medications in order to provide the best health care to geriatric patients
- Imperative to reconsider medication therapy later in life
  - Consider remaining life expectancy
  - Consider goals of care
- Treatment goals MATCH medication regimen
**2015 BEERS CRITERIA**

- List of PIMs to be avoided in elderly
- New to the update:
  - Drugs for which dose adjustments is required based on kidney function
  - Drug-drug interactions
- NOT a definitive list for medications that are restricted or must be stopped in patients >65 years old

**Printable Pocket Guide:**
https://www.mnhospitals.org/Portals/0/Documents/patientsafety/Delirium/AGS_2015_BEERS_Pocket-PRINTABLE.PDF

**COMMON GUIDELINES**

- American Geriatric Society: Beers Criteria
  - List of potentially inappropriate medications (PIMs) to be avoided in elderly
  - STOPP - Screening Tool of Older Person’s Prescriptions
  - START - Screening Tool to Alert doctors to Right Treatment

*Look at the entire patient – these resources are guidelines
*No convincing evidence that these guidelines decrease mortality, morbidity or cost

**PRESCRIBING TOOL**

- Is there an indication for the drug?
- Is the medication effective for the condition?
- Is the dosage correct?
- Are there clinically significant drug-drug interactions?
- Are there clinically significant drug-disease/condition interactions?
- Is there duration of therapy acceptable?
- Is there unnecessary duplication with other drugs?
- Is this drug the least expensive alternative compared with others of equal usefulness?
- Is the dosage correct?
- Are the direction correct? Are they practical?
- Is the medication effective for the condition?
- Is there unnecessary duplication with other drugs?
- Are there clinically significant drug-drug interactions?
- Is there duration of therapy acceptable?
- Is this drug the least expensive alternative compared with others of equal usefulness?

**2015 BEERS CRITERIA**

**POTENTIALLY INAPPROPRIATE MEDICATION USE IN OLDER ADULTS**

<table>
<thead>
<tr>
<th>Medication Class</th>
<th>Rationale</th>
<th>Recommend</th>
<th>Alternative</th>
</tr>
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<tbody>
<tr>
<td>Antihistamines/Anticholinergics</td>
<td>Highly anticholinergic, clearance reduced, increased risk of confusion, dry mouth, constipation or tachycardia</td>
<td>Avoid</td>
<td>Intranasal normal saline, second-generation antihistaminics (e.g., cetirizine, fexofenadine, loratadine)</td>
</tr>
<tr>
<td>Antipsychotics/Neuroleptics</td>
<td>Not recommended for treatment of Dementia or psychosis</td>
<td>Avoid</td>
<td>Carbidopa/levodopa</td>
</tr>
<tr>
<td>Anti-inflammatory Therapeutics</td>
<td>Potential for pulmonary toxicity, hypotension</td>
<td>Avoid when CVA &lt;80% or for long term use</td>
<td>Check for 3rd line treatment option based on disease state</td>
</tr>
</tbody>
</table>

- *Use for acute treatment of severe allergic reactions may be appropriate
### POTENTIALLY INAPPROPRIATE MEDICATION USE IN OLDER ADULTS

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</tr>
</thead>
<tbody>
<tr>
<td>Short- and intermediate-acting benzodiazepines</td>
<td>Older adults have increased sensitivity to benzodiazepines; decreased metabolism of long-acting agents; in general, all benzodiazepines increase risk of cognitive impairment, delirium, falls, fractures, and motor vehicle crashes in older adults</td>
<td>Avoid</td>
<td>Anxiety; buspirone, SSRI, SNRI, sleep medication therapy, NMDA receptor antagonists, zolpidem, ramelteon, eszopiclone</td>
</tr>
<tr>
<td>Long-acting benzodiazepines</td>
<td>May be appropriate for treatment of insomnia, sleep disorders, restless legs syndrome, withdrawal, alcohol withdrawal, severe generalized anxiety disorder, and post-procedural sleepworth</td>
<td>Avoid</td>
<td></td>
</tr>
<tr>
<td>Nonbenzodiazepine, benzodiazepine-receptor agonists</td>
<td>Benzodiazepine-receptor agonists have adverse events similar to those of benzodiazepines in older adults (e.g., delirium, falls, fractures); increased emergency department visits and hospitalizations; older adult-specific motor vehicle crashes; minimal improvement in sleep latency and duration</td>
<td>Avoid</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 discusses PIMs use in older adults due to drug-drug or drug-disease interactions that may exacerbate the disease or syndrome. Table 4 discusses PIMs to be Used with Caution in Older Adults

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### POTENTIALLY INAPPROPRIATE MEDICATION USE IN OLDER ADULTS

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<tr>
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<th>Recommend</th>
<th>Alternative</th>
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</thead>
<tbody>
<tr>
<td>NSAIDs</td>
<td>Increased risk of GI bleeding or peptic ulcer disease in high risk groups, including those aged &gt;70, or taking oral or parenteral anticoagulants; use of PPI or misoprostol reduces but does not eliminate risk.</td>
<td>Avoid</td>
<td>Aspirin, ibuprofen, naproxen, salsalate, ketoprofen, ibuprofen, etodolac, misoprostol (proton pump inhibitor or protective agent can take gastroprotection)</td>
</tr>
<tr>
<td>Nonsteroidal anti-inflammatory drugs (NSAIDs)</td>
<td>Acute mild/mod pain: APAP, nonacetylated salicylate (e.g., salicylate, salsalate), propionic acid derivatives (e.g., ibuprofen, naproxen) if no heart failure, eGFR &gt;30 mL/min and CVD, use of PPI or misoprostol reduces but does not eliminate risk</td>
<td>Avoid</td>
<td>Small; do not use COX selective inhibitor or rapid acting agent; in absence of basal or long-acting insulin</td>
</tr>
</tbody>
</table>
CHOLINERGIC SYMPTOMS

- Cholinergic: Salivation
- Anti-Cholinergic: Dry Mouth
- Cholinergic: Lacrimation
- Anticholinergic: Dry Eyes
- Cholinergic: Urination
- Anticholinergic: Urinary retention
- Cholinergic: Diarrhea
- Anticholinergic: Constipation
- Cholinergic: Gastrointestinal distress
- Anticholinergic: Dry Eyes
- Cholinergic: Emesis

STOPP/START CRITERIA

- **STOPP**
  - Screening Tool of Older Person’s Prescriptions
- **START**
  - Screening Tool to Alert doctors to Right Treatment

The 1st physiological systems-based screening tool for potentially inappropriate drug therapy in older people

- Cardiovascular, respiratory, central nervous system, gastrointestinal, locomotor and endocrine
- It includes potentially inappropriate prescribing and instances of omission of potentially beneficial pharmacotherapy
- Improve medication appropriateness
- Prevent adverse drug events

STOPP/START EXAMPLES

Table 1. STOPP/START version 1 criteria removed from the proposed version 2 because of weak or equivocal supporting evidence

STOPP criteria

- Agranulocytosis with history of severe hematologic disorders
- Non-cardiovascular cyanosis with chronic obstructive pulmonary disease
- Use of aspirin and vitamins in combination without bleeding risk for platelet aggregation
- Occurrence of serious or life-threatening complications
- Use of antihistamines with concurrent cardiovascular disease

START criteria

- Mortality with type 2 diabetes mellitus
- Sudden death syndrome in the absence of treated hypothyroidism
- Severe myopathy or pseudo myopathy
- Loss of consciousness in patients with diabetes mellitus

2015 UPDATE

Table 2. Proposed criteria updated by the expert panel for inclusion in STOPP/START version 2 using Delphi consensus

- Reduced new STOPP criteria
- Added new START criteria

DE-PRESCRIBING

- The goal of de-prescribing is to reduce polypharmacy and improve health outcomes
- "Alternative Medications"
  - 15 classes of alternatives for high-risk meds
  - 10 classes for drug-disease interactions
- Details about how to switch to alternatives not provided
- Barriers to de-prescribing
- Factors to consider:
  - Preferences
  - Benefits vs. risks
  - Drug utilization

General Tips:
- Advise patient not to discontinue meds on their own
- Taper slowly rather than stop abruptly
- Ideally one change per visit

DE-PRESCRIBING

General Tips:

- Advise patient not to discontinue meds on their own
- Taper slowly rather than stop abruptly
- Ideally one change per visit

Section A: Indication of medication

1. Any drug prescribed without an evidence-based clinical indication
2. Any drug prescribed beyond the recommended duration, where treatment duration is well defined
3. Any duplicate drug class prescription e.g. two concurrent NSAIDs, SSRIs, loop diuretics, ACE inhibitors, anticoagulants (optimization of monotherapy within a single drug class should be observed prior to considering a new agent)
### POLYPHARMACY CASE

- **78 year old female with past medical history of congestive heart failure, glaucoma, hypertension, and osteoarthritis**
- **Medical list:** furosemide, potassium, lisinopril, metoprolol, aspirin, timolol maleate ophthalmic solution (Timoptic), acetaminophen (as needed), multivitamin, and a calcium/vitamin D supplement (800 IU daily)
- **Appointment with a new orthopedic physician with a chief complaint of persistent arthritic pain in her knee**
- **Physician prescribes an NSAID, meloxicam (7.5 mg per day), for pain and inflammation**

### POLYPHARMACY CASE DISCUSSION

- **Orthopedic standpoint:** Is meloxicam an appropriate choice?
- **Cardiac standpoint:** Is meloxicam an appropriate choice?
- **Patient contacts her PCP who instructs her to not take the NSAID. Instead, he makes an appointment for her the following day and explains they will create a pain management plan specific to her that will minimize potential risks.**
- **Prior to her appointment, the PCP calls his trusted pharmacist for some medication recommendations. What would you consider an appropriate recommendation?**
- **What other non-pharmacological recommendations would you consider appropriate in this patient?**

### COMPLICATIONS OF FALLS

- **Injuries**
  - Painful soft tissue injuries
  - Fractures
  - Subdural hematoma
  - Hospitalization
  - Disability
  - Increased risk of disability
    - Due to injury
    - Due to fear, loss of self-confidence
  - Increased risk of death

### FALLS

<table>
<thead>
<tr>
<th>Intrinsic Factors</th>
<th>Extrinsic Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease/Condition</td>
<td>Medications</td>
</tr>
<tr>
<td>Impaired vision and hearing</td>
<td>Improper prescribing or use of assistive devices</td>
</tr>
<tr>
<td>Age related changes in neuromuscular function, gait, postural reflexes</td>
<td>Environmental hazards</td>
</tr>
</tbody>
</table>

### MODIFYING INTRINSIC RISK FOR FALLS

- **Advanced age**
- **Previous falls**
- **Muscle weakness**
- **Gait, foot or ankle disorder**
- **Vestibular disorder/poor balance**
- **Poor vision**
- **Cognitive impairment and dementia**
- **Postural hypotension**
- **Chronic conditions including**
  - Arthritis, stroke, incontinence, diabetes, Parkinson’s, dementia
- **Fear of falling**

- Treatment of neuromuscular, musculoskeletal, and sensory impairments
- PT, exercise and strength training regimens
- Improved vision care and updated lens prescriptions
- Behavioral & educational interventions
**MEDICATION SIDE EFFECT: RISK OF FALLING**

- Anything with dizziness, vertigo, syncope, sedation, or confusion as a side effect can be a risk factor for falls
  - Antihypertensives
  - Antidepressants
  - Antiparkinsonian
  - Diuretics
  - Sedatives
  - Antipsychotics
  - Hypoglycemics
  - Alcohol

**ENVIRONMENTAL RISKS FOR FALLING**

- Lack of stair handrails
- Poor stair design
- Lack of bathroom grab bars
- Dim lighting or glare
- Obstacles & tripping hazards
- Slippery or uneven surfaces
- Improper use of assistive device

CDC’s STEADI tools and resources can help you screen, assess, and intervene to reduce your patient’s fall risk. For more information, visit www.cdc.gov/steadi.

**THE CHALLENGE OF ADHERENCE**

**Contributing Factors**
- Interpersonal factors
  - Personal attitude
  - Cultural variations
  - Involvement in decision making
  - Depression
  - Polypharmacy
  - Physical/Cognitive

**Solutions**
- Partnership
  - Inquire, assess, understand
  - Med alignment
  - De-prescribing
  - Mediset
  - Caregiver in the home

**VACCINE RECOMMENDATIONS**

- Influenza (Flu) vaccine – annually
- Diphtheria / Tetanus
  - Td
    - Given as a booster every 10 years
    - Given post-exposure to tetanus
  - Tetanus / Diphtheria / Pertussis
    - Tdap
      - Given as a one-time booster in place of Td
      - Given post-exposure to tetanus
      - Especially important for those in close contact with infants

- Shingles (Herpes Zoster) – one time dose
  - Zostavax®
  - Shingrix®
    - FDA approved on October 20, 2017 for adults 50 years and older to prevent shingles
    - October 26, 2017, the Advisory Committee on Immunization Practices (ACIP) voted that Shingrix® is:
      - Recommended for healthy adults aged 50 years and older to prevent shingles and related complications
      - Recommended for adults who previously received the current shingles vaccine, Zostavax®, to prevent shingles and related complications
      - The preferred vaccine for preventing shingles and related complications
    - CDC recommends vaccination at age 60
    - No maximum age for getting this shingles vaccine

- Zostavax®
  - Reduces risk of developing shingles by 51%
  - Reduces risk of post-herpetic neuralgia by 67%

- Shingrix®
  - Reduces risk of developing shingles by over 90%
  - Study 1: Randomized, placebo-controlled, observer-blind
  - Compared with placebo, Shingrix® significantly reduced the risk of developing herpes zoster by 97.2% (95% CI: 93.7, 99.0) in subjects 50 years and older & sustained efficacy over a follow-up period of 4 years
  - Subjects (age 50 years and older) in the primary efficacy analysis population (n=14,759), no cases of PHN were reported in the vaccine group compared with 18 cases reported in the placebo group
**VACCINE RECOMMENDATIONS**

- **Pneumococcal: PCV13 & PPSV23**
  - Recommend 1 dose of PCV13 for adults over 65 years old if they have not previously received the PCV13
  - Recommend a dose of PPSV23 at least one year later
  - If the geriatric patient has already received a dose of PPSV23
    - 1 dose of PCV13 is recommended at least one year after the most recent PPSV23 immunization
    - 1 dose of PPSV23 at least one year later

**VACCINE RECOMMENDATIONS: PNEUMOCOCCAL**

**OTC CONSIDERATIONS & VITAMINS**

- **Tips:**
  - Always ask about OTC medication uses and vitamin
  - Check for drug interactions and medication side effects
  - It's usually better to get nutrients from a healthy diet unless

- **Vitamin D**
  - Take with food for better absorption
  - Chronic high doses: nephrocalcinosis, bone demineralization and pain

- **Calcium**
  - Constipation
  - Calcium carbonate vs. calcium citrate

- **Iron**
  - Upset stomach, constipation, black stools

- **B vitamins - Water soluble limits toxicity**
  - Niacin – flushing, GI discomfort, itching
  - Pyridoxine – neuropathy with long term high doses

**OTC CONSIDERATIONS (VITAMINS)**

**POST TEST QUESTIONS**

- 67 year old male arrives today with a past medical history of cardiovascular disease and BPH

  **Medication list:**
  - Lisinopril 20mg daily
  - Metoprolol 50mg twice daily
  - Hydrochlorothiazide 25mg in the morning
  - Atorvastatin 40mg daily
  - Doxazosin 2mg at bedtime
  - Aspirin 81mg daily

  He requests his new prescription of hydrocodone/APAP 5/325mg for his broken foot

  1. What side effects is he at an increased risk for given his age and medication list?

**POST TEST QUESTIONS**

- The man returns 5 days later complaining of constipation

  Upon chart review and patient interview, you identify some potentially inappropriate medications

  **Prescription medications:**
  - Lisinopril 20mg daily
  - Metoprolol 50mg twice daily
  - Hydrochlorothiazide 25mg in the morning
  - Atorvastatin 40mg daily
  - Doxazosin 2mg at bedtime
  - Aspirin 81mg daily
  - Hydrocodone/APAP 5/325mg 1 tablet every 6 hours prn pain

  2. What medications would you consider “red flags”?

- **OTC medications:**
  - Ferrous sulfate 325mg once daily
  - Diphenhydramine 25mg to 50mg as needed for sleep