Pearls in Geriatric Care: Fall Risk Prevention and Sleep Disorders Management

Dr. Jeannette Mejias Arroyo PharmD.

Dr. Yaritza Lopez Lamboy PharmD.

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Disclosure

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- No conflict of interest to be disclosed.

Objectives:

1. Identify risk factors for falls in the geriatric patient.
2. Explain the STEADI algorithm.
3. Identify common medications (Rx and OTC) that can increase the risk of falls.
4. Mention non-pharmacologic and pharmacologic strategies to decrease the risk of fall.
5. Describe the most common sleep disorders in the geriatric individual.
6. Outline the pharmacologic and nonpharmacologic recommendations to address sleep disorders in the elderly.
7. Compare the pharmacotherapy used to treat common sleep disorders in terms of efficacy and safety.

Objectives for pharmacy technicians:

1. Identify risk factors for falls in the geriatric patient.
2. Identify common medications that can increase the risk of falls.
3. Mention non-pharmacologic and pharmacologic strategies to decrease the risk of fall.
4. Describe the most common sleep disorders in the geriatric individual.
5. Outline the nonpharmacologic recommendations to address sleep disorders in the elderly.

Snapshot

A patient ≥ 65 y/o is considered geriatric, mostly because this is the age that determines Medicare eligibility. Younger patients may require geriatric care.

By 2030, it is estimated 1 in 5 people in the US will be >65 y/o.[1]

On average each injury adds $14,000 to an individual hospitalization. Falls cost around 50$ billion annually to the US Healthcare. [2]

Geriatric Population Increase

- In 2022, the U.S. Census Bureau reported the number of adults aged 65 and older to be 59,710,183 (17.7% of the population).
  - By 2050, number expected to increase to 85,674,674 (22% of the population).
- Individuals aged 85 years and older is expected to almost triple by 2050 (6,922,921 in 2022 vs 18,561,257 in 2050)
- By this shift in population and age distribution, what to expect?
  - Increase need for primary health care, long-term care, age-friendly physical and social environments
  - Efforts should focus on promoting healthy aging to reduce health care system burden.

WHO Recommendations

- The World Health Organization (WHO) encourages changes in our current health care system to target this population needs.
  - Change how we think, feel, and act towards age and aging.
  - Communities should foster the abilities of older people.
  - Delivering person-centered integrated care and primary health services responsive to older people.
  - Providing long-term care access.

Complications in geriatric population

- Acute illnesses in the presence of multiple comorbidities
  - Worse health outcomes
  - Complex clinical management
  - Increased health care costs
- Effective caring for the geriatric population should consider some key principles:
  - Comprehensive approach to evaluation and management
  - Incorporate patient preferences into medical decision-making
  - Evaluate medical literature vs considerations in the elderly
  - Quality of life vs cure
  - Interprofessional collaboration (healthcare provider, patients and their family/caregivers)

Geriatric Syndromes

Is defined as, " multifactorial health conditions that occur when the accumulated effects of impairments in multiple systems render (an older) person vulnerable to situational challenges."

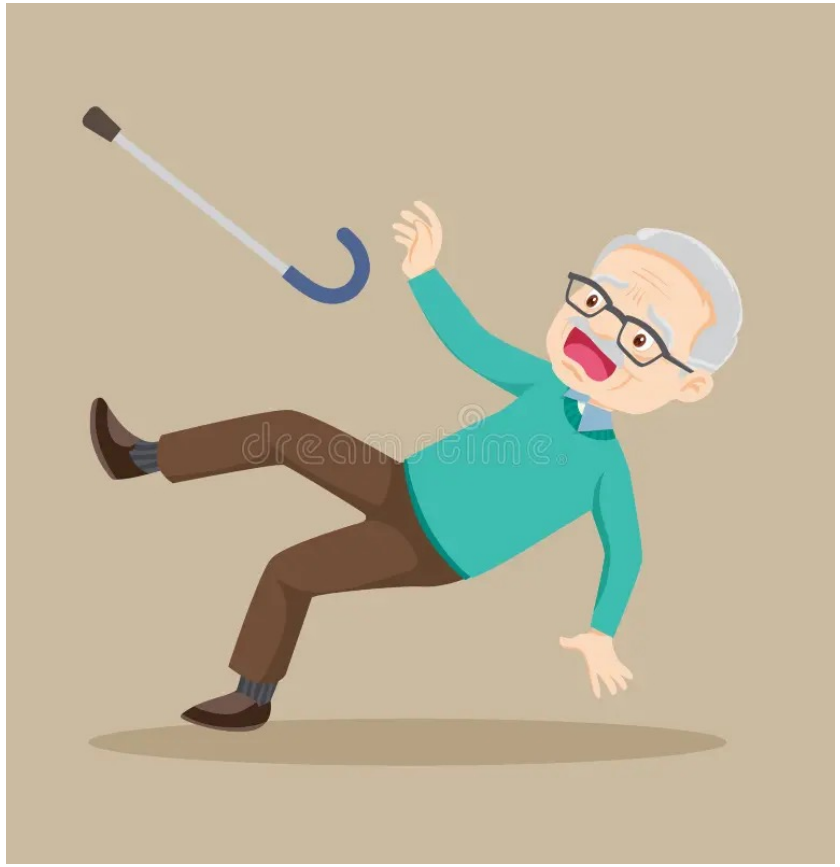
The pathophysiology of geriatric syndromes is not only influenced by biological causes but the complex interactions between an individual's vulnerabilities and exposure to specific challenges.

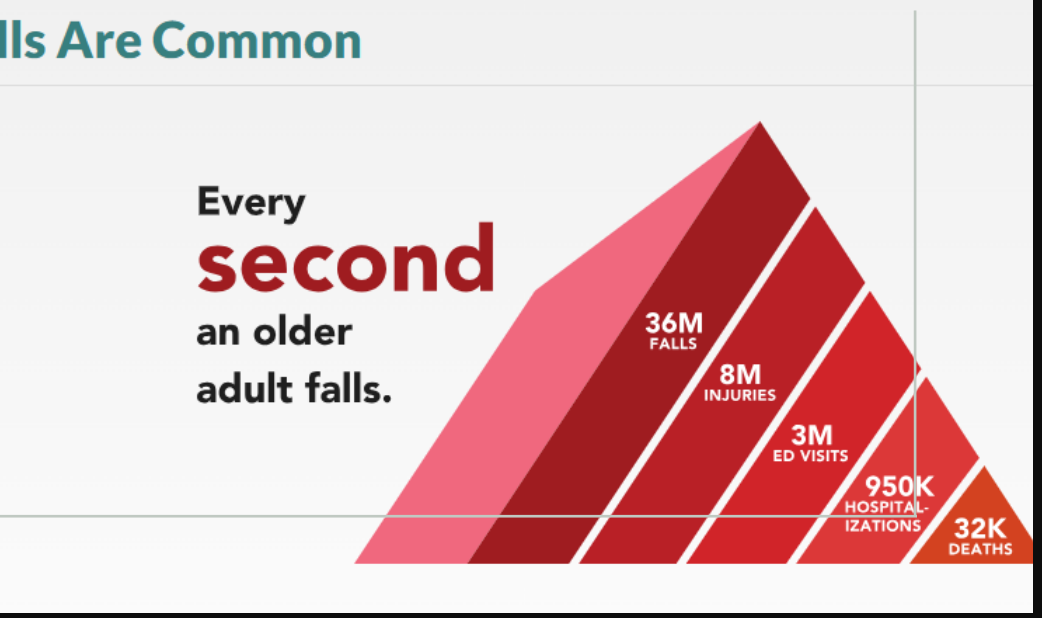
Its important to consider pathophysiological mechanisms and relevant social, spiritual, and economic domains.

Risk factors for geriatric syndromes includes older age, functional impairment, cognitive impairment, and impair mobility.

Falls

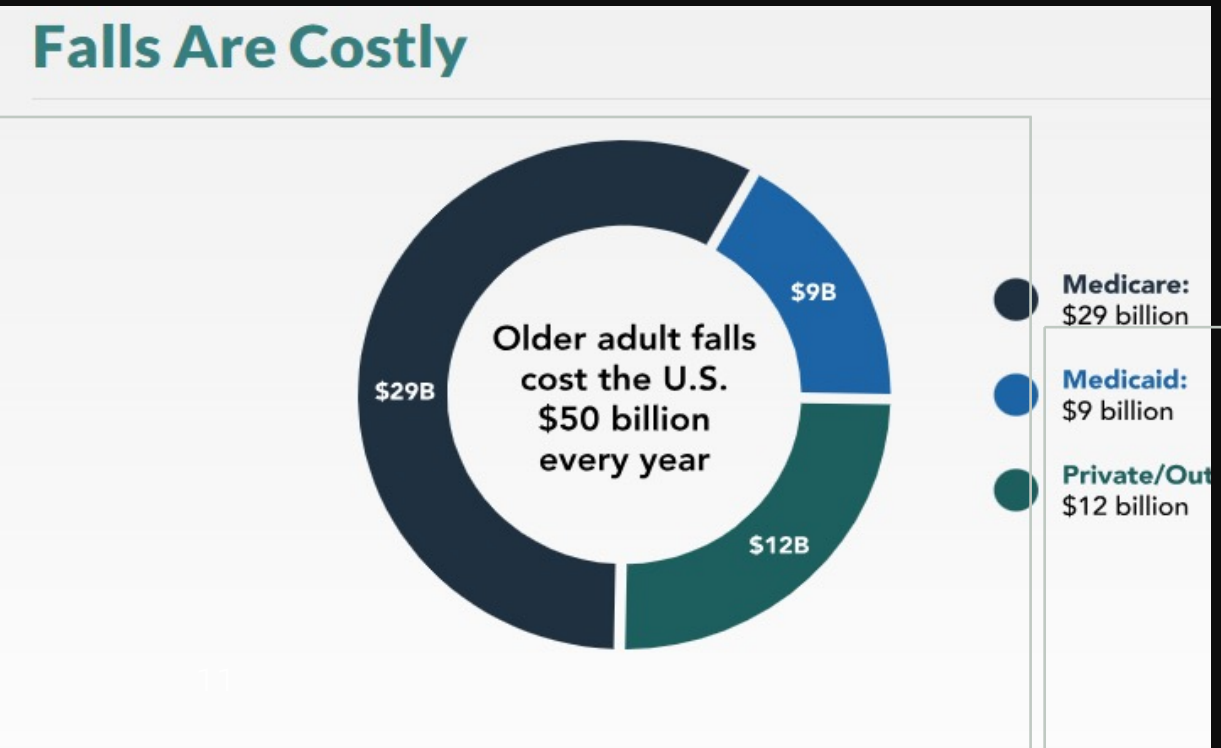
- Leading cause of unintentional injury
  - 30% of adults older than 65 years old
  - 40% of adults aged 80 years and older
  - 1 in 3 adults aged 65 years or older and 1 in 2 adults aged 80 years or older falls each year.
- Falls lead to functional decline, hospitalization, institutionalization, and increased health care costs.
- Possible development of a "post-fall syndrome"
  - Fear of new events → postural modifications → increases risk of new events → accelerate disabling cascade

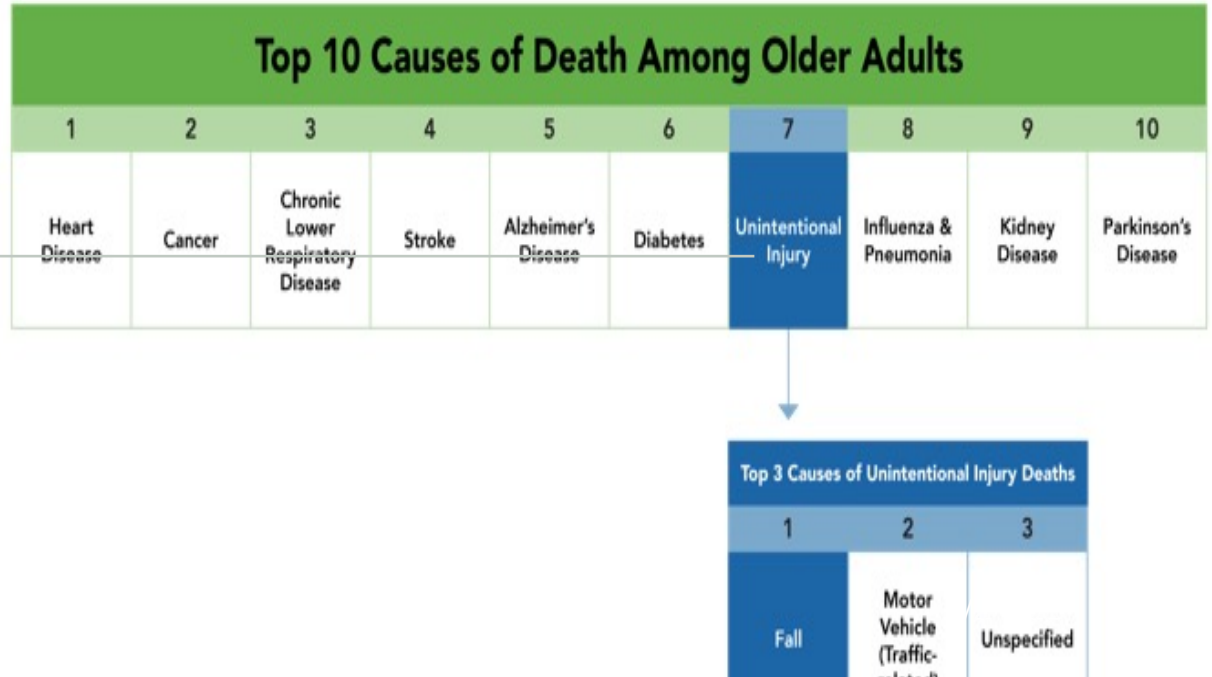




Statistics

- 7th cause of death
- 36 million falls a year
- Cost 50 billion/year





Poll question

- Which of the following is not considered a risk for fall?

a) High blood pressure

b) Urinary incontinence

c) Depression

d) Unsafe footwear

Risk Factors for Falls

Intrinsic factors	Extrinsic factors
Chronic diseases (e.g. arthritis, stroke, Parkinson's disease, dementia, incontinence)	Home hazards (e.g. clutter, inadequate lightning, lack of nonskid surfaces in bathtubs, poor stairway design and disrepair, slippery floors, unsecured mats and rugs)
Cognitive/psychological (e.g. reduced mental status test score, depression)	Neighborhood features (e.g. aisle placement, clutter in a store, lightning, unfamiliarity with a shopping center)
Demographics (e.g. age > 80 years, male sex)	Unsafe footwear
History of falls	Unsuitable assistive devices (e.g. cane or walker not appropriate fit)
Medications (e.g. sedative, hypnotics, anxiolytics, antidepressants, multiple medications)	
Mobility impairment	
Musculoskeletal changes (e.g.reduced knee, hip, or ankle strength; reduced grip strength; hipor knee pain)	
Sensory impairments (e.g. vision deficits) Physical performance	

Elements of a Fall Risk Assessment

Physical Exam	Lab Tests/Imaging
Cardiac examination (rate, rhythm, murmurs)	Computed tomography or MRI of the brain*
Distance visual acuity	Dual-energy x-ray absorptiometry scan
Gait and balance evaluation	Thyroid-stimulating hormone
Musculoeskeletal examination of back and lower extremities	Vitamin B12
Neurologic examination	25-hydroxy vitamin D
Orthostatic vital signs	

Interventions to Reduce Risks

Intervention	Comment
Initiation of a customized exercise program	Balance, gait, and coordination training; strength training; flexibility (muscle and joint stretching techniques); tai chi; cardiovascular, endurance, and fitness training
Manage foot/footwear problems	Wear shoes with low heel height and high surface contact area; treatment for bunions, toe deformities, ulcers, and deformed nails
Manage heart rate and rhythm abnormalities	Cardiac pacing for bradyarrhythmia; treatment of tachyarrhythmias
Manage postural hypotension	Medication reduction to modify postural blood pressure; hydration; elastic stockings; abdominal binders; medications (e.g. fludrocortisone and midodrine)
Minimize medications	Dose reduction/withdrawal of psychotropic medication; evaluate polypharmacy issues
Provide education	Access fall prevention resources (e. g. durable medical equipment, local exercise programs); build fall prevention skills (e.g. transferring safely into the bathtub, learning how to use mobility devices)
Treat vision impairment	Treat any abnormalities (e.g. cataracts, macular degeneration, glaucoma)
Vitamin D supplementation	Vitamin D supplements of at least 800 IU per day

Fall Assessment

- The American Geriatrics Society (AGS) and British Geriatrics Society clinical practice guideline recommends annual screening of all adults aged 65 years and older for fall risk.
  - Providers should ask patients whether they
    - **Have fallen 2 or more times in the past year or sought medical attention for a fall**
    - If they have not fallen, whether they feel unsteady when walking
  - Positive response to any of this questions should receive further assessment

Risk of Falls

- Falls are a common and costly outcome, especially among US people aged 65 and older.
- About 36 million falls are reported among older adults each year.
- Falls can be prevented.
- There are some steps that can be implemented to prevent falls.
- Pharmacist plays an important role education geriatric population, discuss any side effects, Including over-the-counter medicines and herbal supplements fall risk.
- Pharmacy technicians can help pharmacists in this effort.

AGS Beers Criteria

- First developed by the late Mark Beers, MD, and colleagues in 1991
- For the 2023 update, an expert panel reviewed more than 1,500 clinical trials and research studies published between 2017 and 2022. The resulting 2023 AGS Beers Criteria® include:
  - Individual medications or medication classes to avoid for most older people.
  - 40+ medications or medication classes to use with caution or avoid when someone lives with certain diseases or conditions.
  - Several medications were moved to different categories or revised guidance based on new evidence.
  - A separate list was developed for medications with low usage or are no longer available in the United States. However, are still considered potentially inappropriate for use in older adults.

AGS Beers Criteria 2023- Revised Ed.

- On May 4, 2023, the American Geriatrics Society (AGS) released the 2023 update to the AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults.
  - The AGS Beers Criteria® serves as a comprehensive list of medications that older people should potentially avoid or consider using with caution because they often present unnecessary risks for this population.
  - The National Center for Health Statistics, United States (NCHSUS), states that more than 88% of older people use at least one prescription and more than 66% use three or more in any given month.
  - AGS Beers Criteria® are an important clinical, educational, and quality assurance tool for clinicians.

AGS Beers Criteria

Though not an exhaustive catalogue of inappropriate treatments, **the five lists** included in the AGS Beers Criteria® describe medications where the best available evidence suggests they should be:

- Avoided by most older adults (outside of hospice and palliative care settings);
- Avoided by older adults with specific health conditions;
- Used with caution because of the potential for harmful side effects; or
- Avoided in combination with other treatments because of the risk for harmful "drug-drug" interactions; or
- Dosed differently or avoided among older adults with reduced kidney function, which impacts how the body processes medicine.

TABLE 6 2023 American Geriatrics Society Beers Criteria[68] for medications that should be avoided or have their dosage reduced with varying levels of kidney function in older adults.

Drug	CrCl (mL/min) at which action is required	Rationale	Recommendation	Quality of evidence	Strength of recommendation
Anti-infective					
Ciprofloxacin	<30	Increased risk of CNS effects (e.g., seizures, confusion) and tendon rupture.	Dosages used to treat common infections typically require reduction when CrCl <30 mL/min.	Moderate	Strong
Nitrofurantoin	<30	Potential for pulmonary toxicity, hepatotoxicity, and peripheral neuropathy, especially with long-term use. (See also Table 2).	Avoid if CrCl <30 mL/min	Low	Strong
Trimethoprim-sulfamethoxazole	<30	Increased risk of worsening of kidney function and hyperkalemia; risk of hyperkalemia especially prominent with concurrent use of an ACE, ARB, or ARNI.	Reduce dosage if CrCl is 15–29 mL/min. Avoid if CrCl <15 mL/min.	Moderate	Strong
Cardiovascular and antithrombotics					
Amiloride	<30	Hyperkalemia and hyponatremia	Avoid	Moderate	Strong
Dabigatran	<30	Lack of evidence for efficacy and safety in individuals with a CrCl <30 mL/min. Label dose for patients with CrCl 15–30 mL/min based on pharmacokinetic data.	Avoid when CrCl <30 mL/min; dose adjustment is advised when CrCl >30 mL/min in the presence of drug–drug interactions.	Moderate	Strong

TABLE 9 Medications/criteria added since 2019 American Geriatrics Society Beers Criteria[00].

Medication/Criterion	Reason for addition
Independent of diagnosis or condition (Table 2)	
Warfarin	Emerging data and changes in national recommendations/expert guidance
Considering disease and syndrome interactions (Table 3)	
Heart failure	
Dextromethorphan-quinidine	Supported by package insert
Delirium	
Opioids	Emerging data
History of falls or fractures Anticholinergics	Emerging data and consistency across recommendations
Use with caution (Table 4)	
Ticagrelor	Emerging data
Sodium-glucose co-transporter-2 (SGLT2) inhibitors	Emerging data and clinical concern
Clinically important drug–drug interactions (Table 5)	
Skeletal muscle relaxants added to any combination of ≥3 of these CNS-active drugs	Concern for adverse effects when used in combination with other CNS-active drugs
Lithium + ARBs and ARNIs	Supported by data and reference sources
Warfarin + SSRIs	Supported by data
Medications that should be avoided or have their dosage reduced with reduced kidney function (Table 6)	
Baclofen	Data supporting concern

Note: The updated version of the criteria includes specific lists of drugs that were not included in prior versions. These lists are meant to enhance clarity and searchability, and unless stated otherwise do not change the intent of the prior version of the criteria.

Abbreviations: ARBs, angiotensin receptor blockers; ARNIs, angiotensin receptor neprilysin inhibitors; CNS, central nervous system; SSRIs, selective serotonin reuptake inhibitors.

STEADI

Stopping Elderly Accidents, Deaths & Injuries

Stopping Elderly Accidents, Deaths, and Injuries (STEADI)

STEADI Algorithm for Fall Risk Screening, Assessment, and Intervention among Community-Dwelling Adults 65 years and older

START HERE

1 SCREEN for fall risk yearly, or any time patient presents with an acute fall.

Available Fall Risk Screening Tools:

- **Stay Independent: a 12-question tool** [at risk if score ≥ 4]
  - **Important:** If score < 4, ask if patient fell in the past year (If **YES** → patient is at risk)
- **Three key questions** for patients [at risk if **YES** to any question]
  - Feels unsteady when standing or walking?
  - Worries about falling?
  - Has fallen in past year?
    - If **YES** ask, "How many times?" "Were you injured?"

SCREENED NOT AT RISK

PREVENT future risk by recommending effective prevention strategies.

- Educate patient on fall prevention
- Assess vitamin D intake
  - If deficient, recommend daily vitamin D supplement
- Refer to community exercise or fall prevention program
- Reassess yearly, or any time patient presents with an acute fall

SCREENED AT RISK

2 ASSESS patient's modifiable risk factors and fall history.

Common ways to assess fall risk factors are listed below:

Evaluate gait, strength, & balance

Common assessments:
- Timed Up & Go
- 30-Second Chair Stand
- 4-Stage Balance Test

Identify medications that increase fall risk (e.g., Beers Criteria)

Ask about potential home hazards (e.g., throw rugs, slippery tub floor)

Measure orthostatic blood pressure (Lying and standing positions)

Check visual acuity

Common assessment tool:
- Snellen eye test

Assess feet/footwear

Assess vitamin D intake

3 INTERVENE to reduce identified risk factors using effective strategies.

Reduce identified fall risk
- Discuss patient and provider health goals
- Develop an individualized patient care plan (see below)

Below are common interventions used to reduce fall risk:

Poor gait, strength, & balance observed
- Refer for physical therapy
- Refer to evidence-based exercise or fall prevention program (e.g., Tai Chi)

Medication(s) likely to increase fall risk
- Optimize medications by stopping, switching, or reducing dosage of medications that increase fall risk

Home hazards likely
- Refer to occupational therapist to evaluate home safety

Orthostatic hypotension observed
- Stop, switch, or reduce the dose of medications that increase fall risk
- Educate about importance of exercises (e.g., foot pumps)
- Establish appropriate blood pressure goal
- Encourage adequate hydration
- Consider compression stockings

Visual impairment observed
- Refer to ophthalmologist/optometrist
- Stop, switch, or reduce the dose of medication affecting vision (e.g., anticholinergics)
- Consider benefits of cataract surgery
- Provide education on depth perception and single vs. multifocal lenses

Feet/footwear issues identified
- Provide education on shoe fit, traction, insoles, and heel height
- Refer to podiatrist

Vitamin D deficiency observed or likely

Screen

If patient is 65 years or older, screening for fall risk is recommended at least **once per year**.

Screening tools available

CDC's three key questions

CDC's "Stay independent" questionnaire

Screen

- CDC's three key questions
  1. Have you fallen in the past year?
  2. Do you feel unsteady when standing or walking?
  3. Do you worry about falling?

- Answer "Yes" to ANY key question → "At risk" of falling → Further assessment is warranted
- Answer "No" to ALL key questions → Rescreen annually and consider recommending strategies to prevent future fall risk

Screen

- CDC's Stay Independent questionnaire
  - A 12-item questionnaire
  - Offers information about patient's specific fall risk factors
  - Can be self-administered

- Score of 4 or more: at risk for falling → further assessment is warranted
  - If score is less than 4, but patient reports having a fall in the past year, patient is at risk
- Score less than 4: rescreen annually and consider recommending strategies to prevent future fall risk

Check Your Risk for Falling

Circle "Yes" or "No" for each statement below			Why it matters
Yes (2)	No (0)	I have fallen in the past year.	People who have fallen once are likely to fall again.
Yes (2)	No (0)	I use or have been advised to use a cane or walker to get around safely.	People who have been advised to use a cane or walker may already be more likely to fall.
Yes (1)	No (0)	Sometimes I feel unsteady when I am walking.	Unsteadiness or needing support while walking are signs of poor balance.
Yes (1)	No (0)	I steady myself by holding onto furniture when walking at home.	This is also a sign of poor balance.
Yes (1)	No (0)	I am worried about falling.	People who are worried about falling are more likely to fall.
Yes (1)	No (0)	I need to push with my hands to stand up from a chair.	This is a sign of weak leg muscles, a major reason for falling.
Yes (1)	No (0)	I have some trouble stepping up onto a curb.	This is also a sign of weak leg muscles.
Yes (1)	No (0)	I often have to rush to the toilet.	Rushing to the bathroom, especially at night, increases your chance of falling.
Yes (1)	No (0)	I have lost some feeling in my feet.	Numbness in your feet can cause stumbles and lead to falls.
Yes (1)	No (0)	I take medicine that sometimes makes me feel light-headed or more tired than usual.	Side effects from medicines can sometimes increase your chance of falling.
Yes (1)	No (0)	I take medicine to help me sleep or improve my mood.	These medicines can sometimes increase your chance of falling.
Yes (1)	No (0)	I often feel sad or depressed.	Symptoms of depression, such as not feeling well or feeling slowed down, are linked to falls.
Total _____		Add up the number of points for each "yes" answer. If you scored 4 points or more, you may be at risk for falling. Discuss this brochure with your doctor.	

This checklist was developed by the Greater Los Angeles VA Geriatric Research Education Clinical Center and affiliates and is a validated fall risk self-assessment tool (Rubenstein et al. J Safety Res; 2011: 42(6)493-499). Adapted with permission of the authors.

Assess

- Obtain fall history
- Identify comorbidities associated with fall risk
- Evaluate gait, strength and balance
- Conduct a medication review
- Assess Vitamin D intake
- Measure orthostatic blood pressure
- Check visual acuity
- Assess feet and footwear
- Assess home safety

Assess

- Common fall history questions
  - Have you had any falls in the last year?
  - How many times you have fallen?
  - Were you injured?
  - Did you require medical attention?
  - Did you have any symptoms prior to the fall?
  - Are you using any assistive device? If so, were you using it at the time of the fall?

Assess

- Comorbidities
  - Depression
  - Neurological conditions
  - Osteoporosis
  - Arthritis
  - Diabetes
  - Urinary incontinence
  - Cardiac conditions
- Optimizing management of comorbidities could help prevent risk for falls

Assess

- Medications
  - AGS Beers Criteria
  - Medication review
    - Goal: Identify medications that increase fall risk
    - Ask patient to bring all medications
    - Optimize medication use; consider deprescribing
      - STOP or taper down' try to decrease unnecessary polypharmacy
      - SWITCH to safer alternatives
      - REDUCE medication to the lowest effective dose
    - Check dosages and interactions
      - Age, renal and hepatic function, weight
    - Work with pharmacists

Assess

- Medications
  - Reevaluate need of medications periodically
  - Develop a monitoring plan
  - Consider non-pharmacological interventions

After assessment, healthcare provider should intervene in order to prevent future fall episodes.

Intervene

Fall Risk Factor	Assessment	Intervention
Gait, strength, and balance deficits	Conduct tests: - Timed Up and Go (TUG) - 30-second chair stand - 4-stage balance	• Physical therapy • Evidence-based fall prevention program

STEADI Resource

Components of STEADI: Examples

Fall Risk Factor	Assessment	Intervention
Medications that increase fall risk	Conduct a comprehensive medication review	Medication management - **Stop** medications when possible - **Switch** to safer alternatives - **Reduce** to lowest effective dose

STEADI Resource

Fact sheets: *Medications Linked to Falls, SAFE Medication Review Framework, STEADI-Rx Pharmacist Flyer*

References: (20,22)

Components of STEADI: Examples

Fall Risk Factor	Assessment	Intervention
Home hazards	Ask patients and their family members about home safety	• Refer to occupational therapy • Recommend tips to improve home safety

STEADI Resource
Educational material: *Check for Safety*

References: (20,22)

Components of STEADI: Examples

Fall Risk Factor	Assessment	Intervention
Orthostatic hypotension The patient has orthostatic hypotension if systolic blood pressure drops by at least 20 mm Hg or diastolic by at least 10 mm Hg	Measure orthostatic blood pressure 1. Have the patient lie down for 5 minutes 2. Check blood pressure 3. Have the patient stand 4. Check blood pressure within 3 minutes	• Treat underlying cause • Adjust medications if warranted

STEADI Resource

Handout: *Measuring Orthostatic Blood Pressure*
Educational material: *Postural Hypotension*

References: (20,22)

Components of STEADI: Examples

Fall Risk Factor	Assessment	Intervention
Vision impairment	• Ask patients about vision problems • Use Snellen eye chart to assess visual acuity • Ask if patient uses bifocal lenses when outdoors	• Refer to ophthalmology or optometry • Recommend single distance lenses for walking outside

STEADI Resource

Guide: *Coordinated Care Plan to Prevent Older Adult Falls*
Educational materials: *Family Caregivers: Protect your Loved Ones from Falling, What You Can Do to Prevent Falls*

References: (20,22)

Components of STEADI: Examples

Fall Risk Factor	Assessment	Intervention
Feet or footwear issues	• Look for foot deformities, deficits in sensation, or pain • Assess for inappropriate footwear	• Counsel on shoe fit, insoles, and heel height • Refer to podiatry

STEADI Resource

Guide: *Coordinated Care Plan to Prevent Older Adult Falls*
Educational materials: *Family Caregivers: Protect your Loved Ones from Falling, What You Can Do to Prevent Falls*

References: (20,22)

Components of STEADI: Examples

Fall Risk Factor	Assessment	Intervention
Vitamin D deficiency	Ask about patient's dietary vitamin D intake, use of vitamin D supplements, and sun exposure	Consider increasing dietary vitamin D or daily vitamin D supplements if the patient has a vitamin D deficiency

STEADI Resource

Guide: *Coordinated Care Plan to Prevent Older Adult Falls*
Educational materials: *Family Caregivers: Protect your Loved Ones from Falling, What You Can Do to Prevent Falls*

References: (20,22)

Components of STEADI: Examples

Fall Risk Factor	Assessment	Intervention
Comorbidities	Screen for comorbidities such as osteoporosis, depression, dementia, incontinence	Optimize treatments of identified conditions

STEADI Resource
Guide: *Coordinated Care Plan to Prevent Older Adult Falls* **Educational materials:** *Family Caregivers: Protect your Loved Ones from Falling, What You Can Do to Prevent Falls*

References: (20,22)

Follow-up

- Review care plan with your patient within 30 to 90 days.
- Encourage adherence to recommendations.
- Discuss and address barriers to adherence.

Prevention

- Education on fall prevention.
- Maintain adequate Vitamin D intake.
  - 800-1000IU per day
- Participate in community exercises or fall prevention program.
- Screen for fall risk annually.

Integrate

- Assess readiness for practice change
- Assess current fall prevention activities
- Identify a champion and create a team
- Obtain leadership support
- Determine components of the program
- Identify and link with community partners
- Adapt health record tools
- Identify team members' tasks
- Train the team
- Develop plans to implement and monitor
- Identify reimbursable services

Integrate Fall Prevention Into Practice

Integrate

Integrate screening tools to fit your clinic workflow

- Add to usual patient intake forms

Find

Find an optimal time to ask screening questions

- Before an office visit—by phone or online portal
- During routine office visit—in the waiting room or the exam room
- During Welcome to Medicare Examination or Medicare Annual Wellness Visit

Set

Set screening goals and monitor progress

- Example:

Pharmacist Role

- Pharmacists and pharmacy technicians can play a role in fall prevention by assessing medication regimens and providing clinical recommendations to help reduce the risk of falls.
- Certain medication classes affect cognition and physical function, which contribute to fall risk.
  - Anticonvulsants, antidepressants, antihistamines, antihypertensives, antipsychotics, benzodiazepines, muscle relaxants, opioids, and sedative hypnotics.
- Reducing medications for which the potential risks outweigh the potential benefits may reduce falls by 39–66%.
- Pharmacists can use geriatric support tools such as The American Geriatrics Society (AGS) Beers Criteria.
- The Centers for Disease Control and Prevention (CDC), in partnership with the University of North Carolina Eshelman School of Pharmacy and School of Medicine, developed STEADI-Rx to help pharmacists work with the healthcare team to promote safe medication use and healthy outcomes in older adults.

STEADI-Rx

- STEADI-Rx is based on CDC's Stopping Elderly Accidents, Deaths and Injuries (STEADI) initiative and incorporates the Joint Commission of Pharmacy Practitioners (JCPP) Pharmacists' Patient Care Process.
- STEADI-Rx offers a 3-step framework, or algorithm, for integrating fall screening and prevention into pharmaceutical care and a suite of tools that can be used to assist pharmacy staff in completing each step.
- It was developed by geriatric pharmacists, healthcare providers, and fall prevention experts committed to helping reduce fall injuries among older adults.

HOW STEADI-Rx WORKS:

STEP 1:
Screen
patients for fall risk in the pharmacy.

STEP 2:
Assess
modifiable risk factors.

STEP 3:
Coordinate Care
with primary care providers to reduce identified risk.

References

1. Learn about older adult fall prevention and STEADI resource. Available at www.cdc.gov/steadi
2. Earn continuing education with an online training on fall prevention STEADI: Empowering Healthcare Providers to Reduce Fall Risk. Available at www.cdc.gov/steadi/training.html
3. Hear from other healthcare providers on their STEADI experience. Available at www.cdc.gov/steadi/about/success-stories.html
4. By the 2023 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2023; 71(7): 2052-2081. doi:10.1111/jgs.18372
5. CDC. Algorithm for Fall Risk Screening, Assessment, and Intervention (online). (cited 2023 August 4). Available from URL: www.cdc.gov/steadi/pdf/STEADI-Algorithm-508.pdf. Atlanta, GA: Centers for Disease Control and Prevention
6. CDC. Web-based Injury Statistics Query and Reporting System (WISQARS) (online). (cited 2023 August 4). Available from URL: www.cdc.gov/injury/wisqars. Atlanta, GA: National Center for Injury Prevention and Control.
7. Moreland B, Kakara R, Henry A. Trends in Nonfatal Falls and Fall-Related Injuries Among Adults Aged ≥65 years—United States, 2012-2018. MMWR Morb Mortal Wkly Rep 2020;69(27):875-881. DOI: 10.15585/mmwr.mm6927a5
8. Schneider, S. Clinical Implications of the Aging Process: Challenges in Caring for the Geriatric Patient. Published on March 11, 2022. CE at PowerPak. (online) (cited 2023 August 4).
9. CDC. STEADI Our Staff for Fall Prevention. Intervention (online). (cited 2023 August 4). Available from URL: www.cdc.gov/steadi/provider-training/index.html . Atlanta, GA: Centers for Disease Control and Prevention

Sleep Disorders in Geriatric Patients

- Most Common [1]
  - Obstructive and central sleep apnea
  - Insomnia
- Less Common
  - Restless leg syndrome
  - Disrupted circadian rhythm

Sleep Disorders in Geriatric Patients

Prevalence: 23%-34% of the population, most common in women[2].

Total sleep hours decrease from 8.5hrs as adults to 5-7 hours in elder patients.

How it affects the patient?

- 23% increase in depression[3]
- 2.5 times more likely to develop diabetes and obesity [3]
- Increase risk of metabolic syndrome, stroke and HTN
- Increase in rates of cancer, lowers immune system
- Increase in cognitive impairment , dementia and Alzheimer's disease

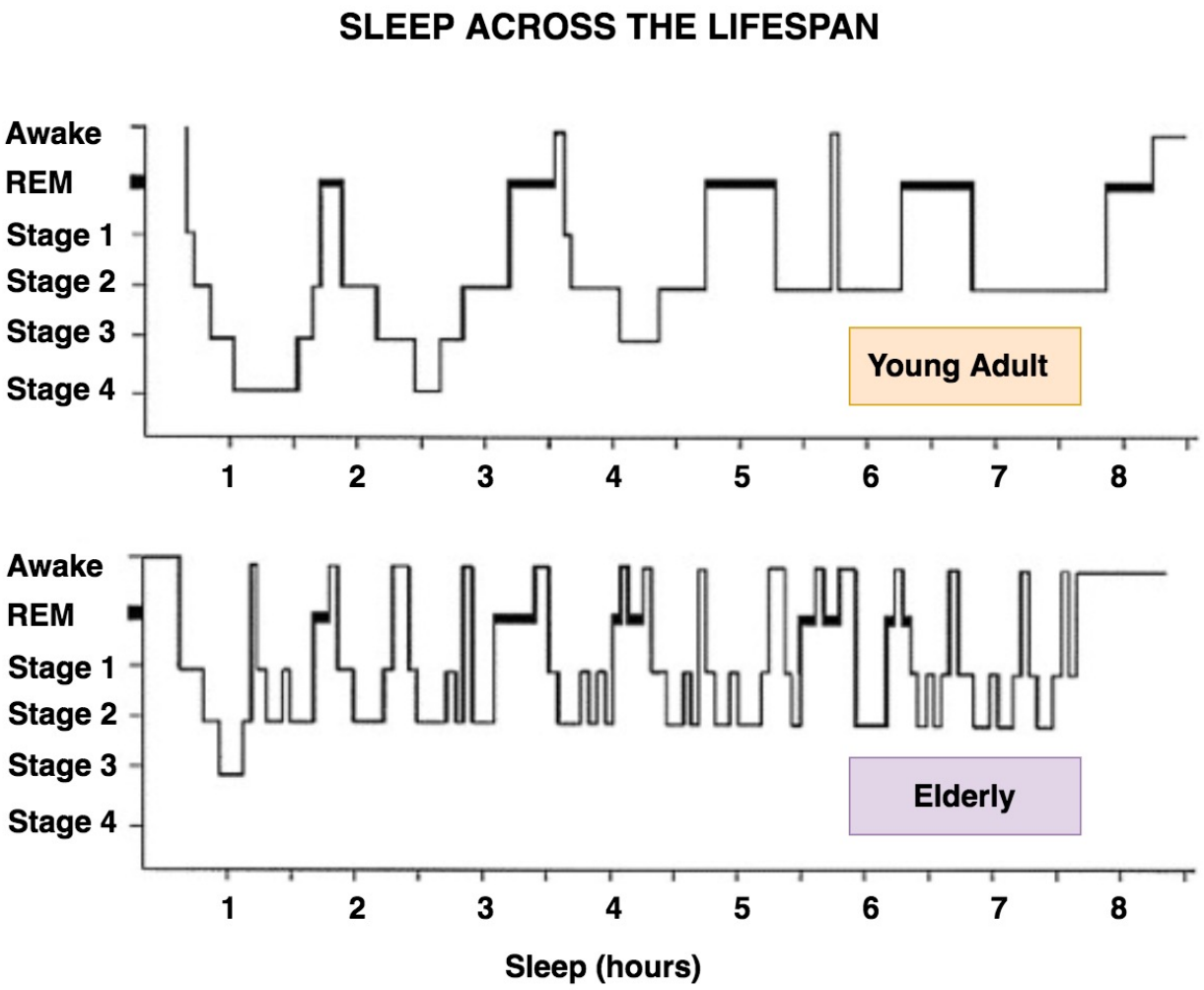
Physiologic Changes with Aging

- Relevant changes in Pharmacokinetics and Pharmacodynamics

Organ	Effect seen
Liver: decrease liver mass	• Decrease first pass effect • Increase in half life • Decrease clearance of drugs with high first pass metabolism
Body composition: more fat and less lean mass.	• Decrease Vd of water-soluble drugs • Increase Accumulation of lipid soluble drugs • Higher free fraction of highly protein bound drugs
Kidneys: decrease GFR, reduced renal function	• Decrease renal elimination

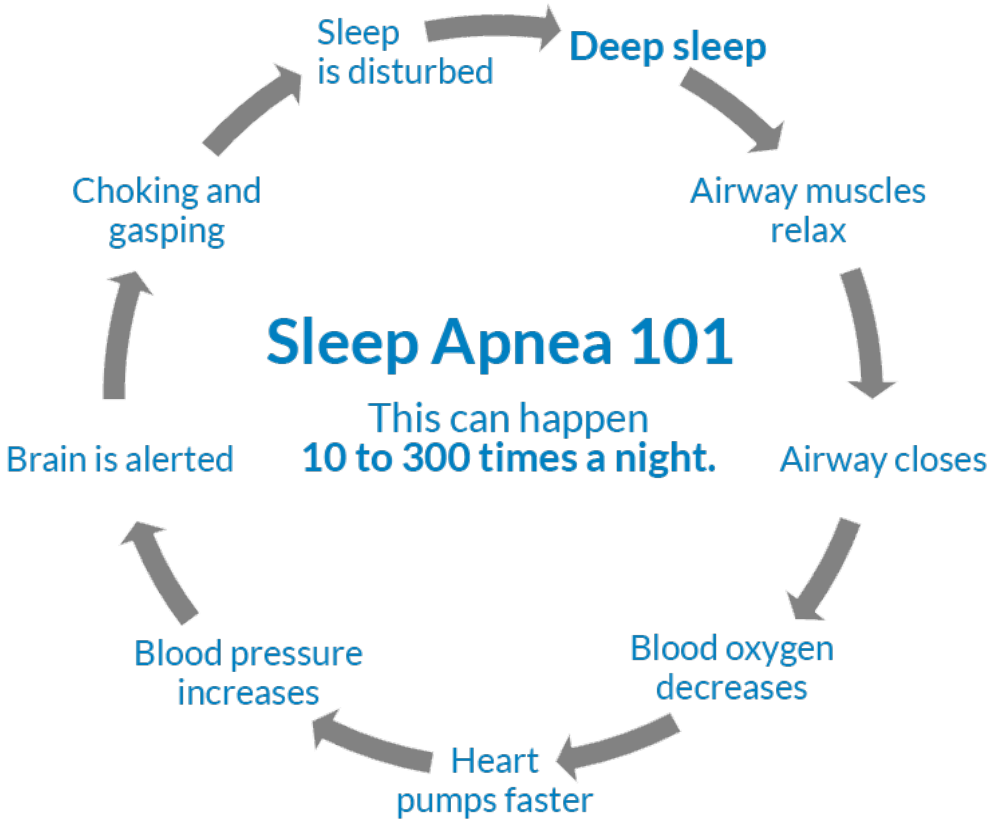
Architecture of Sleep

- Hypnogram
- Predictable patterns in young adults alternating between non-REM and REM
- In geriatric patients sleep oscillates more between N-1 and awakenings.



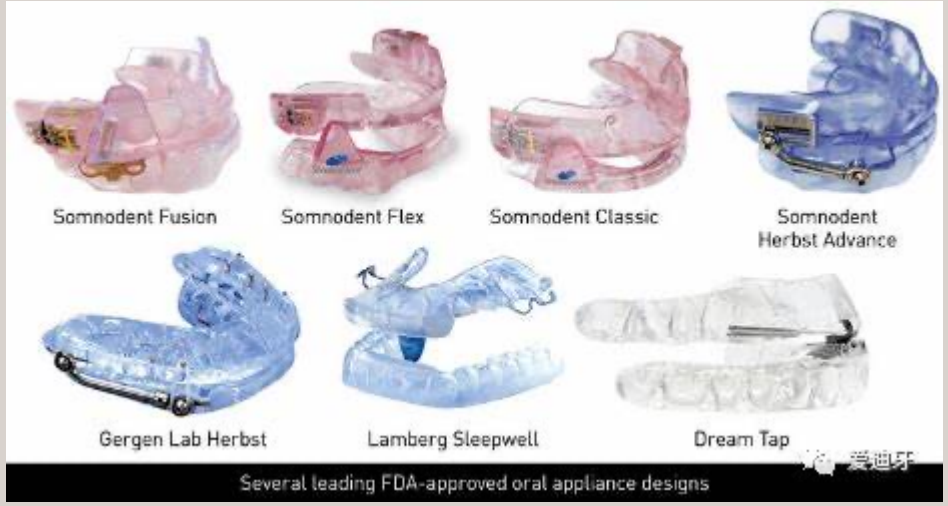
Sleep Apnea

- Prevalence of OSA is two to three times greater in men than in women and in older individuals (≥65 yr) compared with middle-aged individuals (30–64 yr). [4]
- OSA is characterized by recurrent collapse of the pharyngeal airway during sleep, resulting in substantially reduced (hypopnea) or complete cessation (apnea) of airflow despite ongoing breathing efforts.
- Loud snoring is a typical feature of OSA and in most cases the culmination of a respiratory event is associated with a brief awakening from sleep (arousal).



Non-Pharmacologic Approach of OSA

- Treatment gold standard is CPAP (positive airway pressure) via oral appliance. Challenge is nocturnal awakening and fitting.
- Encourage weight loss
- Avoid alcohol and sedatives
- Exercise, moderate intensity aerobics.



- Multiple mandibular appliances- OTC

Pharmacologic Approach of OSA

- Modafinil 100mg-200mg for excessive daytime sleepiness
- Surgery- invasive
  - Palatal implants
  - Hypoglossal nerve stimulation by implant device
  - Tracheostomy

Insomnia

Annual incidence is 5-8%[5]

DSM-5 definition

- Dissatisfaction with sleep quantity or quality and ≥1 of the following:
- Difficult to initiate or maintain sleep
- Early morning awakening

Chronic insomnia is at least 3 nights for at least 3 months

Comorbidities Associated with Insomnia

Psychiatric Disorders

- Anxiety, depression
- Dementia
- Delirium
- Alcohol/nicotine/ illicit substance abuse

Medical/Neurologic Disorders

- Arrythmias
- CHF
- Asthma/COPD
- Malignant/non-malignant pain
- Menopause
- Parkinson's Disease

Medications Associated with Insomnia

Stimulants

- Amphetamines, modafinil/armodafinil, caffeine

Decongestants

Antidepressants

- SSRI/SNRIS, Bupropion, MOIs, TCAs

Methyldopa/Levodopa

B-blockers

Corticosteroids

Treatment Approach of Insomnia

- Evaluation of the following:
  - ✓ Pre-treatment Phase

Examples of predisposing, precipitating, and perpetuating factors in insomnia

Predisposing factors	Precipitating events	Perpetuating factors
Factors that increase risk for insomnia disorder	Events that lead to sleep disruption	Behavioral and cognitive factors that sustain poor sleep over time
▪ History of childhood or interpersonal trauma ▪ Chronic mental health conditions, depression, or anxiety ▪ History of shift work or erratic sleep-wake patterns ▪ Chronic pain conditions	▪ Severe accident leading to physical injury ▪ Divorce or death of a spouse or close family member ▪ Change in occupation such as loss of a job or transition to a new job	▪ Watching television in bed while trying to fall asleep ▪ Staying in bed for extended periods of time in an effort to obtain more sleep or taking long naps during the day ▪ Anxiety and worry about sleep loss

Adapted from: Martin JL, Badr MS, Zeineddine S. Sleep Disorders in Women Veterans. Sleep Med Clin 2018; 13:433.

UpToDate®

Non-Pharmacologic Approach for Insomnia

- Cognitive Behavioral Therapy for Insomnia (CBT-I)
  - Is the standard of treatment with a licensed therapist or self guided
  - Focuses on sleep hygiene techniques
  - Divided in three components
    - **Cognitive**: addresses incorrect or unhelpful thoughts about sleep, expectations.
    - **Behavioral**: relaxation techniques, stimulus control, sleep restriction, establish a healthy routine.
    - **Psychoeducation**: educate about the connection between thoughts, feelings, behaviors and sleep.
  - Durable results in 70-80% of patients and reduction is sedative use.[6]

Sleep Hygiene Techniques

- Routine is key!
- At daytime
  1. Move from bed at the same time everyday even on weekends.
  2. Exercise but not 2h before bed
  3. Decrease or eliminate naps
  4. Limit alcohol, caffeine and nicotine
- At bedtime
  1. Avoid heavy meals, light snacks if hungry
  2. Bedroom only for sleep and sex
  3. Control environment (temperature, light, noise)
  4. Wear comfortable clothes
  5. Develop a ritual (ex. Bath at 9pm, then brush teeth, reading etc.)

Non-Pharmacologic Approach for Insomnia

Light Therapy

- A 2016 meta analysis on light therapy showed an improvement in Bergen Severity scores and composite variable combining ISI.
- Helps regulate light-dark cycle
- No consensus on time exposure neither an establish protocol.[6]

Music Therapy

- A 1995 pilot study found that 96% of the subjects reported sleep improvement.[6]

Acupuncture

- A 2015 meta-analysis showed an improvement in clinical effective rate .SQ (Relative Risk (RR) = 1.40, 95% confidence interval (CI) 1.07, 1.83). [6]
- Poor quality

Non-Pharmacologic Approach for Insomnia

- White Noise
  - Reduced sleep onset by 38%, but in a young adult study.
  - Not tested in diagnosed insomnia, poor data.

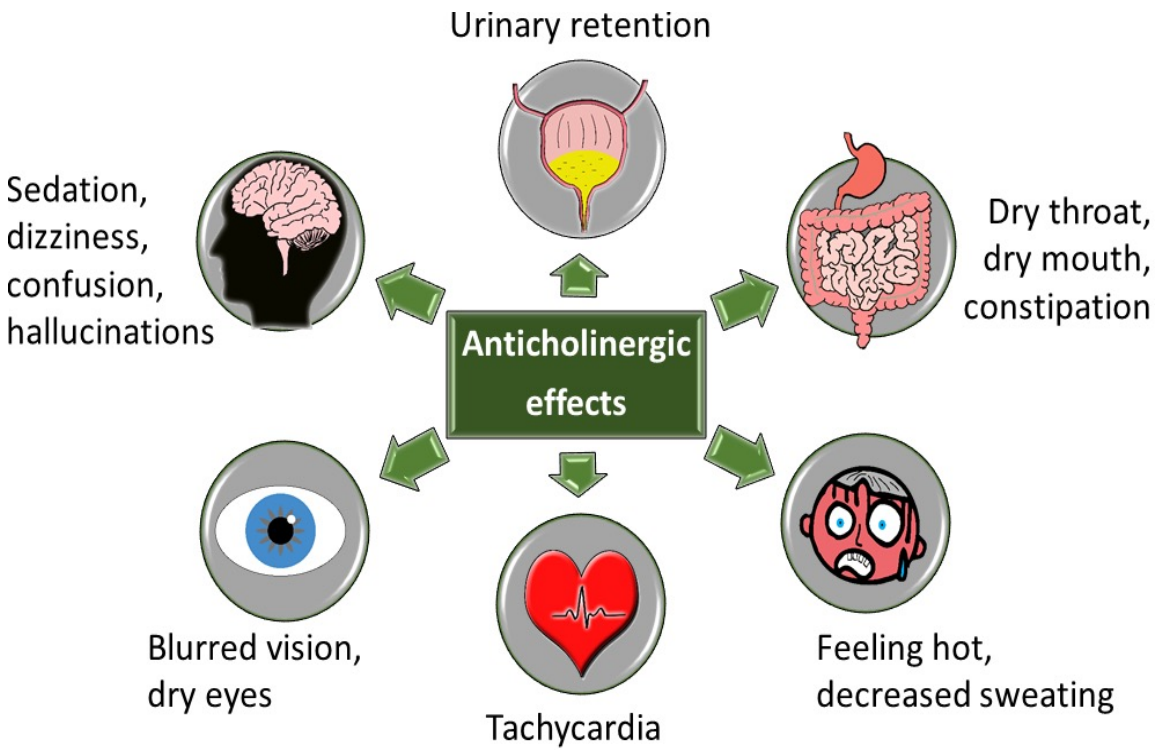
- Technology
  - Phone applications, timers
  - Do help to track metrics but no validity.
  - Cannot be used for diagnosis or treatment as per AASM.

Over the Counter Medications for Insomnia

- Melatonin- AASM 2017 does not recommend as poor-quality evidence, however dose used was 2mg.
- Herbals: Valerian root, chamomile, kava and Wuling.
  - No statistically significant difference between herbal and placebo.
- L-tryptophan: no studies focused on elderly. Is an amino acid that promotes melatonin and serotonin production. Available in the diet: turkey, chicken, tofu, fish, milk.

Over the Counter Medications for Insomnia

- Diphenhydramine (Benadryl) and Doxylamine (Unisom)
  - AGS Beers Criteria strongly recommends against its use.[6]
    - Anticholinergic effects
    - Drug clearance is reduced
    - Tolerance develops



Pharmacologic Approach for Insomnia in Geriatric Patients

Principles Of Prescribing

Combine medications with behavioral therapy

All increased risk of falls

OTC antihistamines NOT recommended

- AE: anticholinergic effects

Use intermittent dosing (2-4x week)

Identify if problem is for onset or maintenance

Benzodiazepines

- Reserved for patients in crisis about insomnia and for the shortest possible time. ≤ 4 weeks
- Higher effect due to PK/PD changes
- At risk of adverse effects: falls, sedation, confusion, cognitive impairment and delirium.
- LOT: Lorazepam, Oxazepam, **Temazepam.**
  - No first pass metabolism (PA- cytochrome p450 system.
  - In patients with liver disease phase II metabolism remains intact.
  - Also, no active metabolites which make them suitable for patients with renal impairment.

Benzodiazepines (BZD)

- Intermediate acting preferred. Avoid short acting.
- Take in consideration PK/PD changes.
- Half life can be prolonged.

Estazolam (*Prosom*)	Dose: 0.5-1mg T1/2: 12-18H	Rapidly absorbed , effective for initiating sleep, active metabolites.
Lorazepam (*Ativan*)	Dose: 0.25-2mg T1/2: 8-12 hrs	Effective for initiating and maintaining.
Temazepam (Restoril)	Dose: 7.5-15mg T1/2: 8-10 **up to 30 h!**	Effective for maintenance

De-prescribing BZD

Set an individualized plan. Consider personality, comorbidities, social support, time in therapy.

Taper time not established, case by case.

Do not d/c abruptly if taking it daily for ≥ 30 days.

Normally: reduction of 5-25% every 1-4 weeks, adjust per response.

Signs and symptoms of withdrawal: anxiety, insomnia, tremors, N/V, muscle pain, tachycardia among others.
Serious: convulsions

Z-Drugs

- As like with BZD, recommended for the shortest period possible.
- Beers criteria is against its use, as adverse effects outweighs benefits.

Eszopiclone (Lunesta)	Dose: 1mg T1/2: 5-6H	Many CYP3A4 interactions, avoid with fatty meals
Zaleplon (Sonata)	Dose: 5mg T1/2: 1H	
Zolpidem (Ambien)	Dose: 5mg T1/2: VARIES, depends on formulation • Tablet: 1.5-4.5h • SL(Intermezzo, Edluar): 2.8h • CR: 1.6-5.5h • Mist: 2-3h	CYP 3A4 interactions • For middle of the night awakening • Do not crush, or divide • Spray over tongue, rapid absorption

Antidepressants

Doxepin (Silenor)[7]

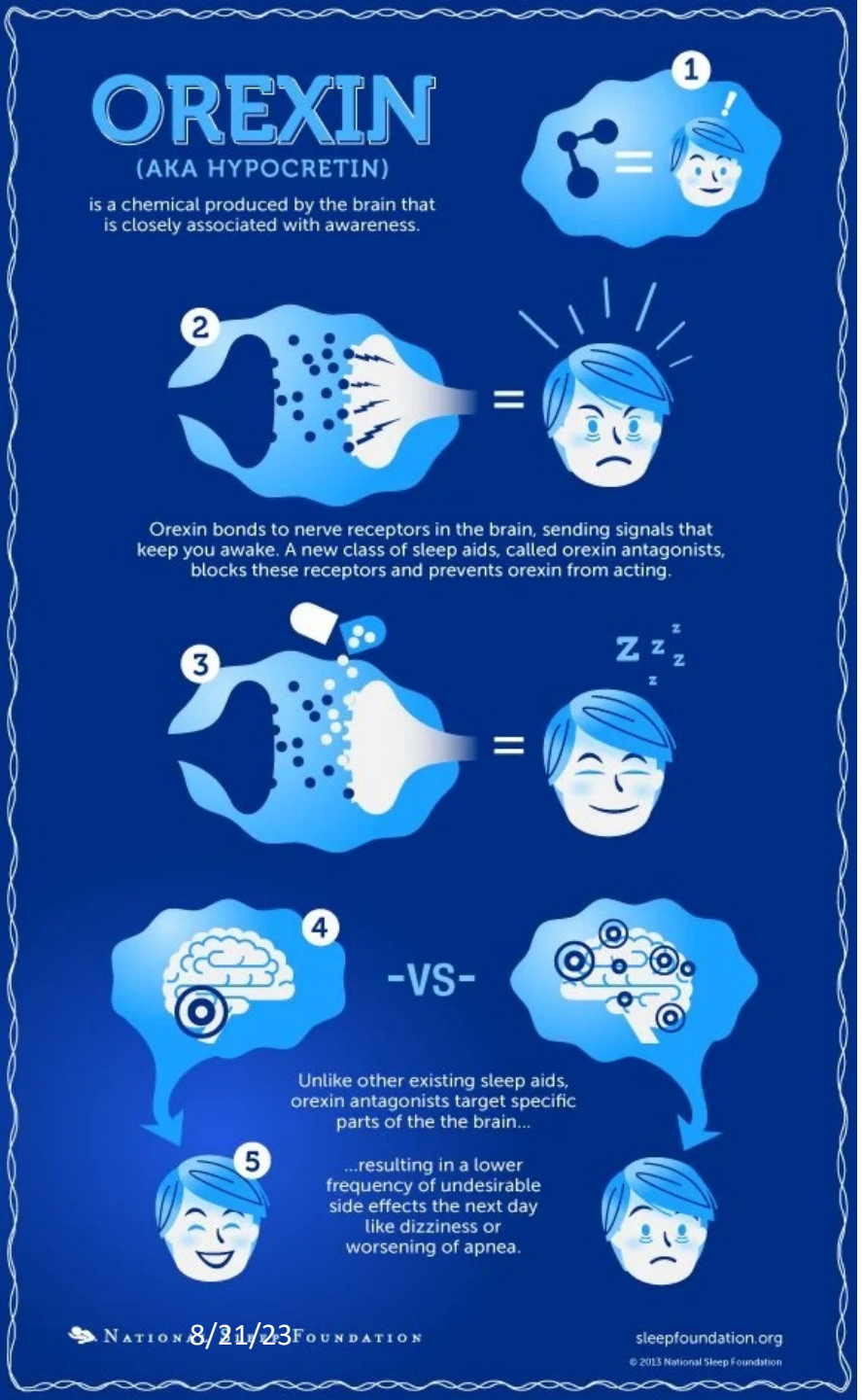
- Tricyclic antidepressant
- Doses ≤ 10mg has more histaminergic affinity, sedative effect.
- **Usual dose 3-6mg**, minimal serotonergic/adrenergic effect.
- Targets sleep **maintenance**
- Common side effects: constipation, **urinary retention,** next day sedation, xerostomia.

Trazodone (Desyrel)- off label use [7]

- For insomnia associated with depression
- **Usual dose is 25-100mg**
- AASM does not recommend its use as poor data exist.
- An office-based survey (1987-1996) showed over 50% declined in BZD prescriptions, together with a 150% increase in trazodone prescriptions. Widely used.*

Mirtazapine (Remeron)

- No studies focusing on elderly.
- Usual dose 7.5-15mg, dow doses has more sedative effect. More affinity for H1 receptors.
- Develops tolerance.
- May cause SIADH or hyponatremia.
- Beers advised to be cautious.



Orexin Receptor Antagonist

- Orexin is a neuropeptide produced in the hypothalamus. Promotes an awake state.
- Narcolepsy is linked to low orexin levels
- Suvorexant (Belsomra)
  - Effect on sleep maintenance, reduces wakefulness by 42-56 minutes.[9]
  - Usual dose is 10-20mg
- Lemborexant (Dayvigo)
  - Usual dose is 5-10mg
- Can cause hypnagogic hallucinations

Melatonin

Exogenous/synthetic hormone

The American Academy of Sleep Medicine (AASM) Clinical Practice Guideline 2017 does not recommend its use due to limited evidence. *These trials used 2mg*.

Mean difference in sleep latency relative to placebo was16 min, 95% CI 6–25 min. *

Despite the evidence it is commonly use. Widely available.

Well tolerated, less next day sedation

Usual dose is 2-12mg

Melatonin Analog

- Ramelteon (Rozerem)
  - Selective melatonin receptor MT1 and MT2 agonist.
  - Hypnotic with low abuse potential. Not a controlled substance.
  - Good option for pts with SUD, COPD or sleep apnea.
  - AASM does recommends its use for **sleep onset.**
  - Usual dose is 8mg within 30 min of bedtime.
  - Minimal rebound insomnia upon discontinuation.
  - Do not administer with or after a high fat meal.

Learning Check

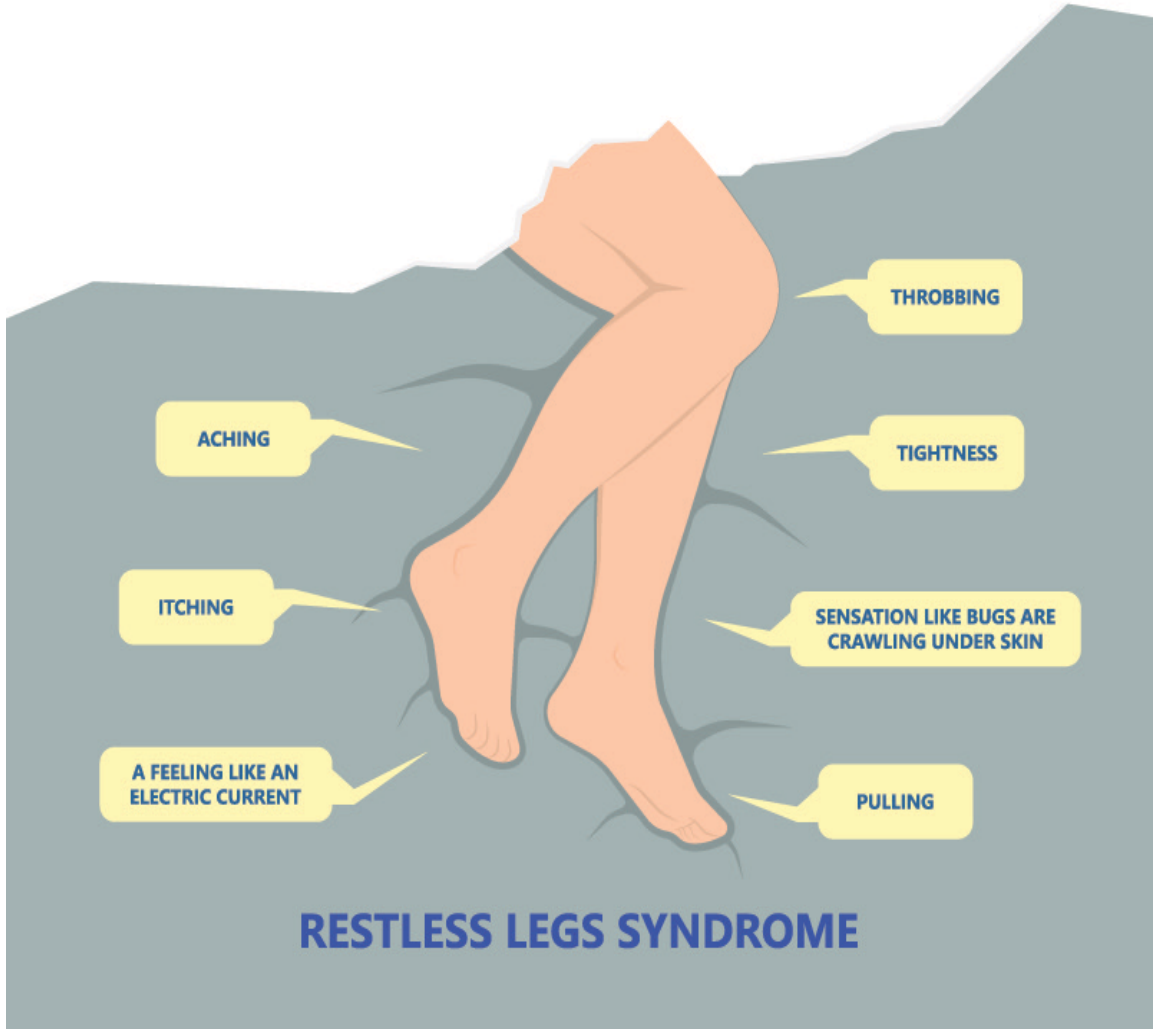
- A 75 y/o comes to your pharmacy to buy Benadryl for his "sleep". What are some sleep hygiene techniques to give to this patient?
  a) Decrease naps at daytime
  b) Limit alcohol on weekends only
  c) Exercise but not 2h before bed
  d) A and C

Learning Check

- Mr. BZD is an 80y/o male with dementia, osteoporosis and depression who is been taking temazepam 30mg x 15 years for insomnia. What is the most suitable taper down plan for this pt?
  a) D/c temazepam today and start melatonin 3mg
  b) Reduce temazepam to 7.5mg at bedtime
  c) Reduce temazepam to 22.5mg (15mg + 7.5mg) x 2 weeks, then 15mg x 2 weeks
  d) Switch pt to lorazepam 2mg

Restless Leg Syndrome

- An urge to move limbs due to sensation of crawling, itching, pulling, burning, among others.
- Symptoms relief by moving, touching skin, pacing leg.
- It has been associated with iron deficiency, spinal cord lesions, Parkinsons disease, venous insufficiency.
- Medications related to RLS: SSRIS, TCA, lithium, caffeine.
- Symptoms often confused with peripheral neurophaty.



Non-Pharmacologic Approach

- Reduce caffeine, nicotine and alcohol.
- Use hot or cold baths
- Rub limbs
- Relaxis pad- vibrating pillow size pad to place under legs. FDA approved.

Pharmacologic Approach for RLS

Treat underlying cause first!

- Iron supplementation if fasting serum ferritin is ≤ 75ng/ml
- Peripheral neuropathy? – DM control

Best quality evidence: Dopamine Agonist

- Pramiprexole 0.125mg
- Ropirinole 0.25mg

Gabapentin ER formulation 600mg

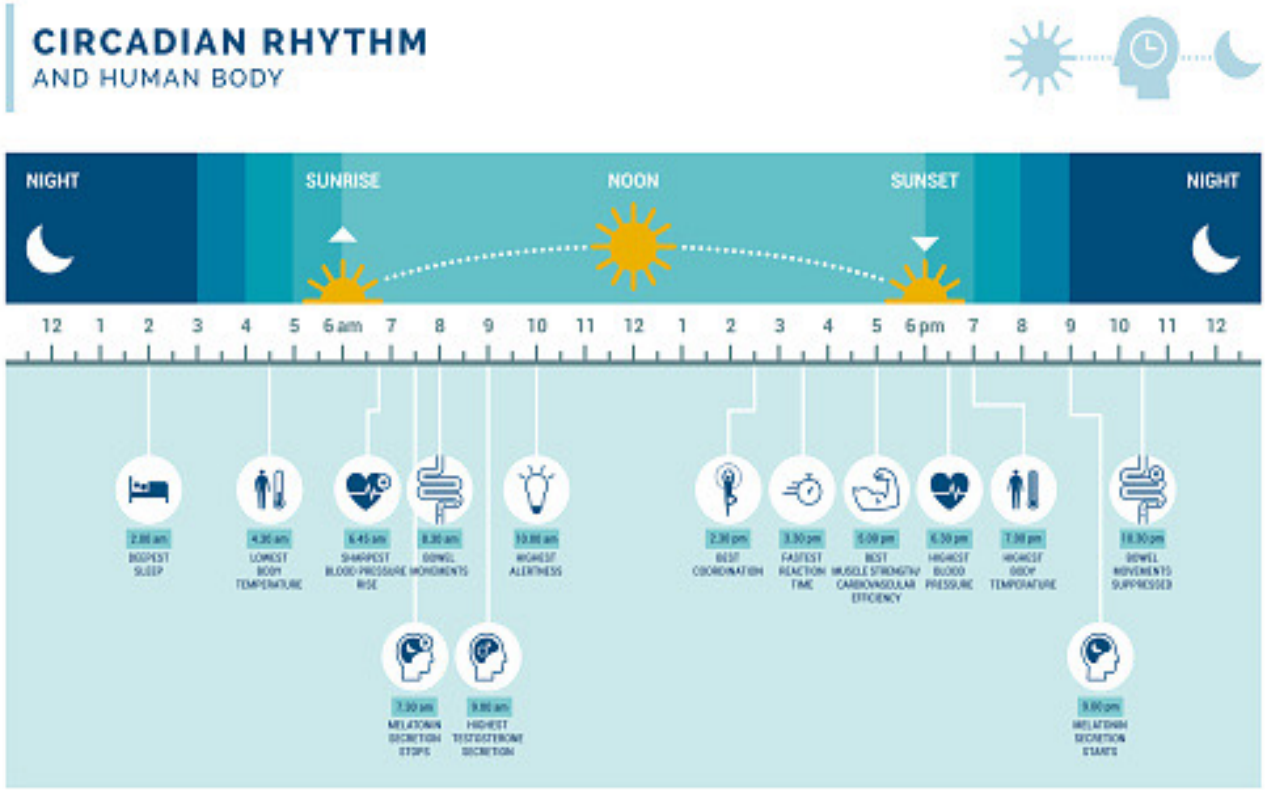
- Dose adjustment required if CrCl< 60ml/min

Pregabalin from 25mg-300mg

- Dose adjustment required if CrCl< 60ml/min

Disrupted Circadian Rhythm

- Natural timekeeping system that regulates many physiological systems, including body temperature, melatonin secretion, cortisol, and appetite. 24-24.2 hrs. [6]
- Circadian rhythms are regulated by the hypothalamic suprachiasmatic nucleus (SCN), the endogenous clock of the brain.
- Respond to light-dark cycle
- Also responds to outside stimulus such as meals, social contact, exercise, blue light from phones/tv.
- Dysregulation of circadian cycle in the elderly is common due to less exposure to light, deterioration of SCN. More prominent in dementia patients.



Non-Pharmacologic Approach of Disrupted Circadian Rhythm

CHRONOTHERAPY: MAINTAIN A FIXED SLEEP ROUTINE

LIGHT TREATMENT: AT EVENING AND/OR NIGHT

COGNITIVE BEHAVIORAL TREATMENT-INSOMNIA

SLEEP HYGIENE REINFORCEMENT

Pharmacologic Approach of Circadian Rhythm Disorder

- Evening melatonin: 3mg-12mg
- Aripiprazole 0.5mg-3mg under study for Delayed Sleep Phase Syndrome.

  Benefit in patients with concomitant depression.

Questions?

References

1. Feinsilver, S. H. (n.d.). *Causes of impaired sleep including sleep apnea in older adults*. UpToDate.https://www.uptodate.com/contents/search?search=sleep+disorders+in+geriatric+patients

2. Alessi, C. (2013, February 15). *Primary insomnia in older persons*. AAFP. https://www.aafp.org/pubs/afp/issues/2013/0215/p280.html#:~:text=A%20U.S.%20survey%20of%20persons%2018%20to%2079,in%20persons%2065%20to%2079%20years%20of%20age.

3. Patel, D., Steinberg, J., & Patel, P. (2018). Insomnia in the Elderly: A Review. *Journal of clinical sleep medicine : JCSM : official publication of the American Academy of Sleep Medicine*, *14*(6), 1017–1024. https://doi.org/10.5664/jcsm.7172

4. Eckert DJ, Malhotra A. Pathophysiology of adult obstructive sleep apnea. Proc Am Thorac Soc. 2008 Feb 15;5(2):144-53. doi: 10.1513/pats.200707-114MG. PMID: 18250206; PMCID: PMC2628457.

5. Suzuki, K., Miyamoto, M., & Hirata, K. (2017). Sleep disorders in the elderly: Diagnosis and management. *Journal of general and family medicine*, *18*(2), 61–71. https://doi.org/10.1002/jgf2.27

6. Flaxer, J., Heyer, A., & Francois, D. (2021). Evidenced-Based Review and Evaluation of Clinical Significance: Nonpharmacological and pharmacological treatment of insomnia in the elderly. *American Journal of Geriatric Psychiatry*, *29*(6), 585–603. https://doi.org/10.1016/j.jagp.2020.10.011

7. *Geriatrics at your fingertips* (By Geriatric Healthcare Professionals, D. Reuben, K. Herr, J. Pacala, B. Pollock, J. Potter, & T. Semla; 20th ed.). (2018).

8. Sateia, M. J., Buysse, D. J., Krystal, A. D., Neubauer, D. N., & Heald, J. L. (2017). Clinical Practice Guideline for the Pharmacologic Treatment of Chronic insomnia in Adults: An American Academy of Sleep Medicine Clinical Practice Guideline. *Journal of Clinical Sleep Medicine*, *13*(02), 307–349. https://doi.org/10.5664/jcsm.6470

9. Pharmacists, C. O. P. a. N., Bostwick, J., Carnahan, R., Paxos, C., Ehret, M., Ott, C., Mullen, S., Tallian, K., Cole, T., Goldstone, L., Daniel, J., English, C., Thomas, C., Thomas, M., Maroney, M., & Williams, G. (2019 p.627). *2020-2021 Psychiatric Pharmacotherapy Review*.