Falls in Older Adults: Risk Factors and Prevention

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Introduction - Setting the Stage

- **A Pervasive Geriatric Syndrome:** Falls are not merely accidents; they are a significant geriatric syndrome and a major public health concern globally.
- **Context:** This presentation follows a case study on osteoporosis, a condition intrinsically linked to fracture risk following a fall.
- **Our Focus:** We will delve into the definition, scale of the problem (epidemiology), the multifaceted reasons why older adults fall (risk factors), and crucially, how we can proactively prevent these events from happening in the first place (primary prevention).
- **The Goal:** To equip healthcare professionals with the knowledge to identify at-risk individuals and implement effective primary prevention strategies.

What is a Fall? - Defining the Event

- **Standard Definition:** A fall is an event which results in **a person coming to rest inadvertently on the ground** or **floor** or **other lower level.**

- **Key Characteristics:**
  - **Unintentional:** The change in position is unplanned.
  - **Loss of Balance:** It is not a result of a major intrinsic event (e.g., stroke, seizure) or an overwhelming external hazard (e.g., being pushed).

Epidemiology of falls

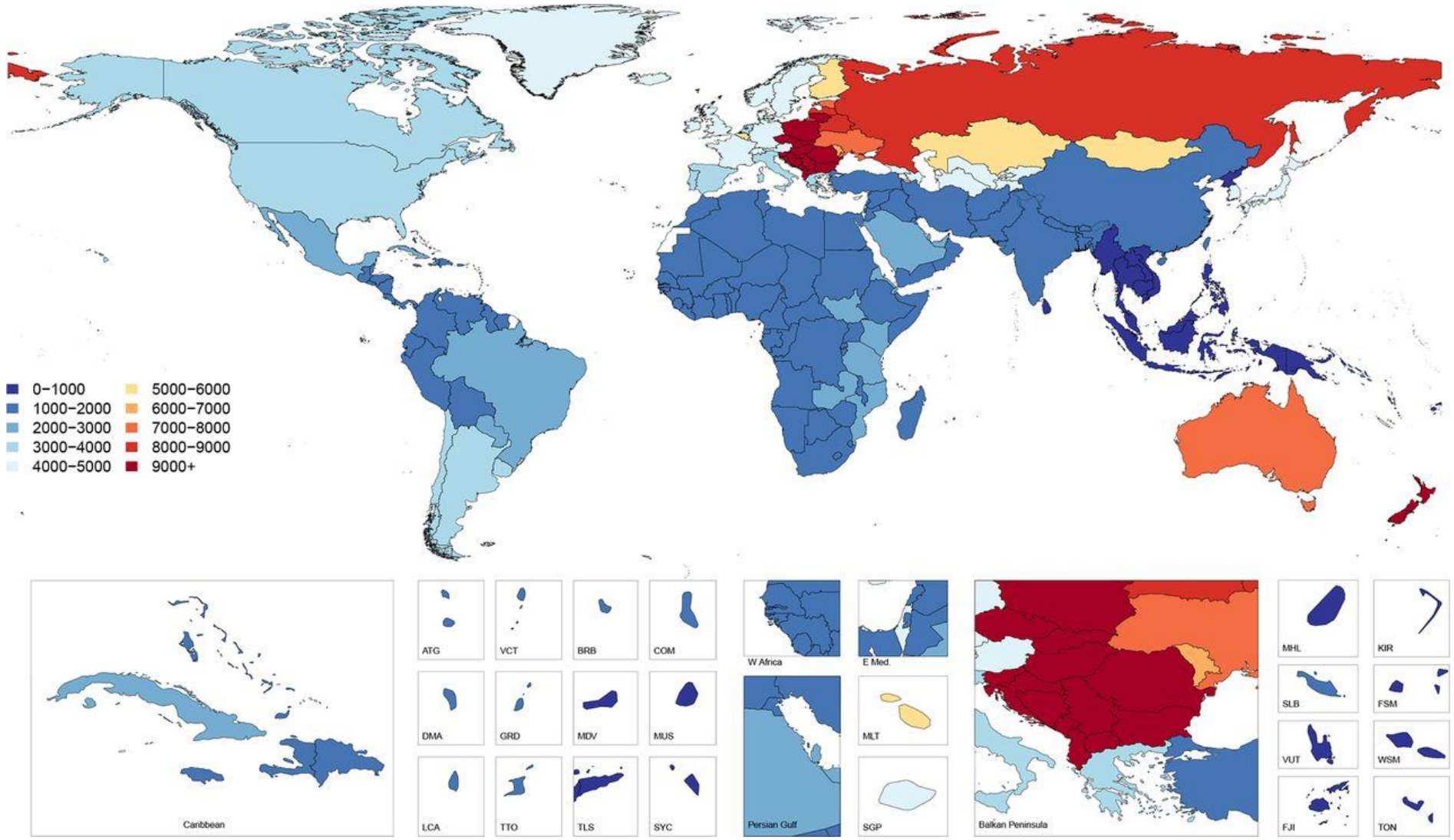
Epidemiology of Falls - A Global Burden

- **Staggering Numbers:** Falls are the second leading cause of unintentional injury deaths worldwide.
- **Global Affected:** In 2021, 548.8 million people were affected by falls.
- There were 215 million incidence, 43.8 million DALYs, and 800,000 deaths caused by falls.
- **Global Incidence:** The incidence rate of falls increases with age, and sex inequalities exist.
- Compared with 1990, the age-standardized incidence rate (ASIR), death rate (ASDR), and DALY rate (ASDALYsR) declined despite an increase in absolute numbers.
- **Prevalence in Older Adults:**
  - Approximately **28-35%** of people aged 65 and over fall each year.
  - This increases to **32-42%** for those over 70 years of age.

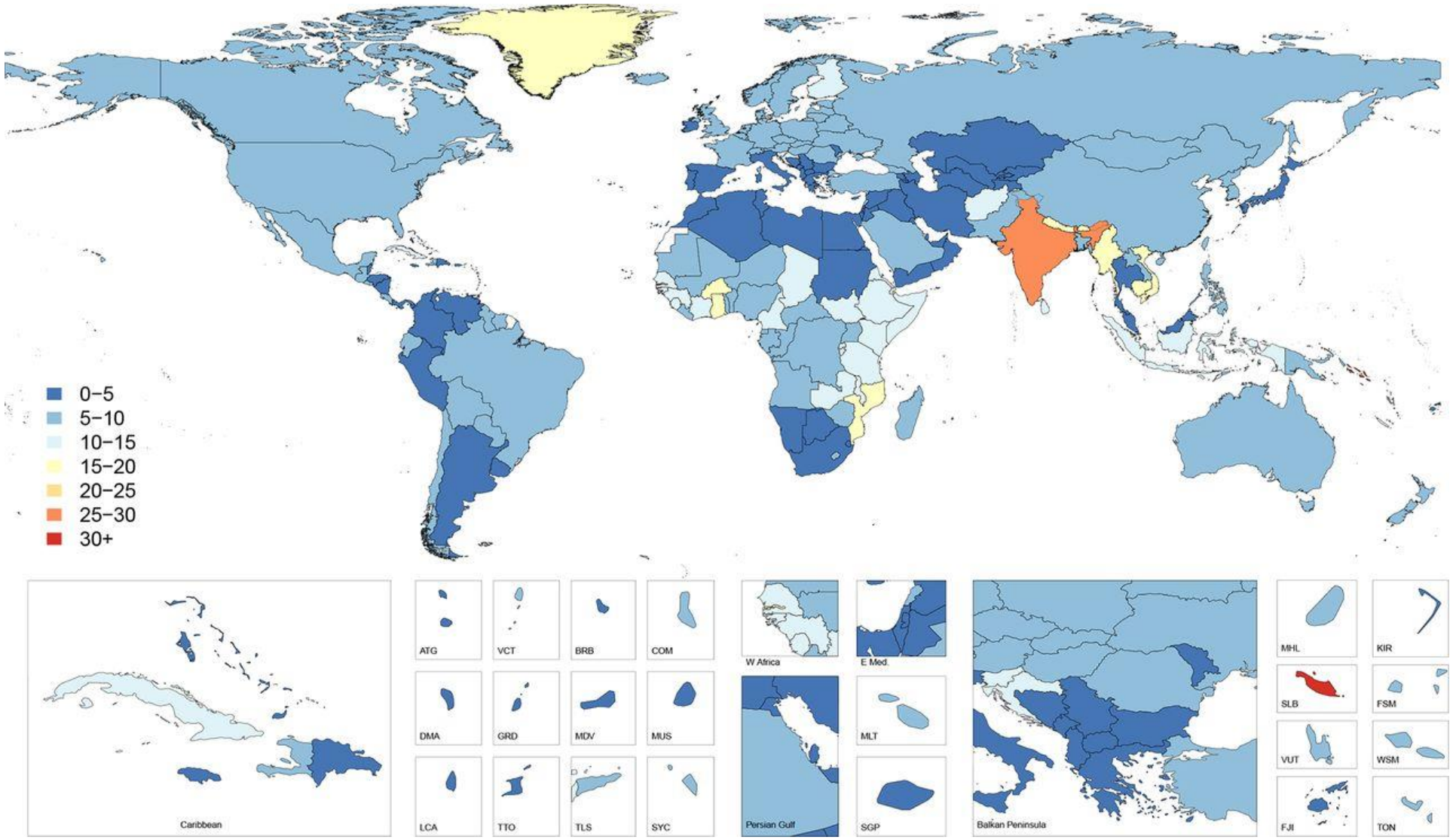
Epidemiology of Falls in Iran - A National Concern

- Similar to global trends, falls are a major health issue for the aging population in Iran.
- **Lifetime Prevalence:** Studies in Iran have reported a lifetime fall prevalence among older adults ranging from **21.6% to 44.1%**.
- **Annual Incidence:** In 2021 in Iran, the incidence rate of falls among older adults was **1674.0 (95% UI: 1454.9-1897.3),** the prevalence rate was **11302.5 (10504.7-12095.7),** the death rate was **16.9 (12.9–21.0),** and the **DALYs rate was 736.3 (647.6-825.4).**

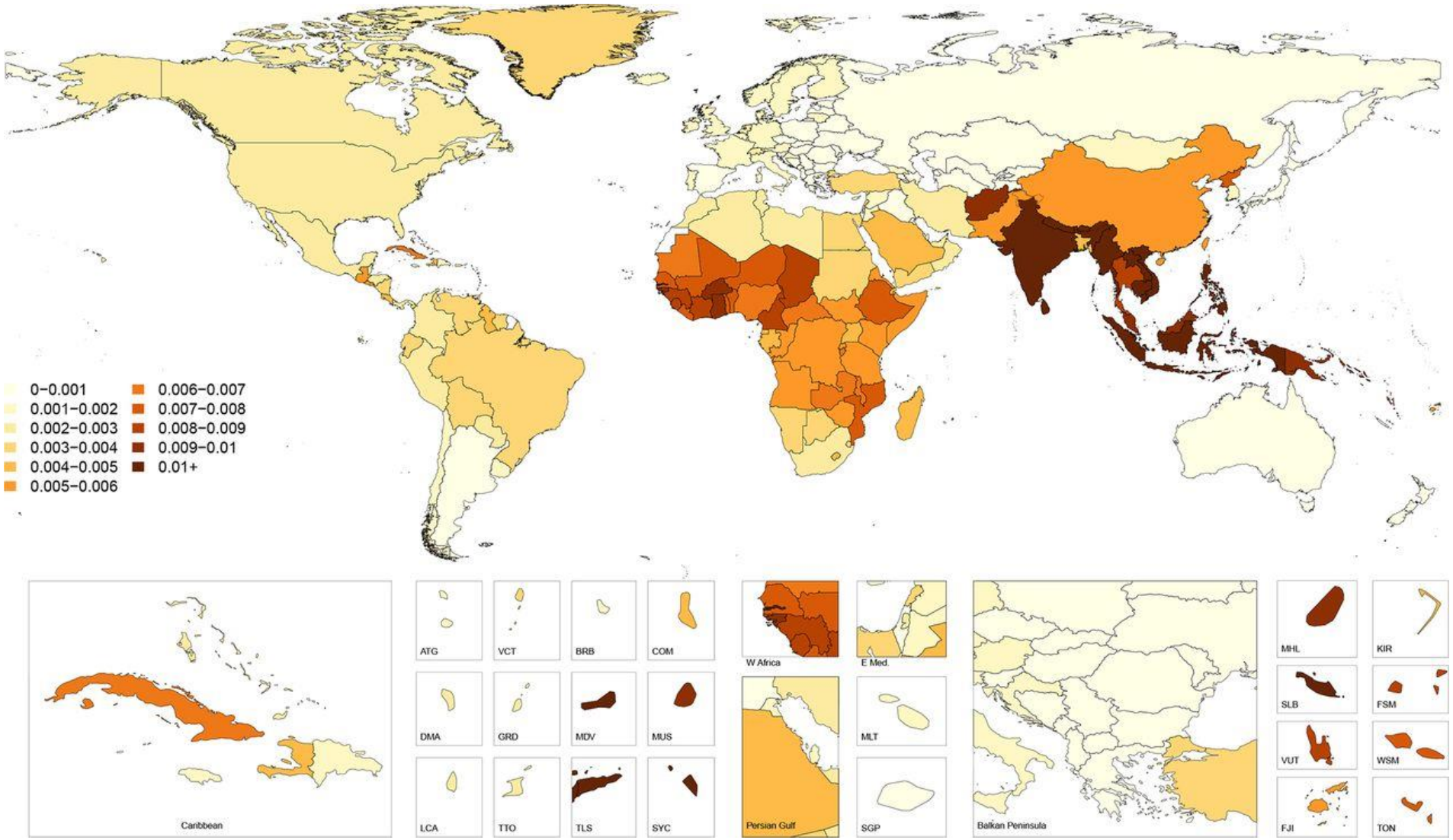
Age-standardied incidence rates per 100 000 of falls, 2017, both sexes.



Age-standardized cause-specific mortality rate per 100 000 of falls, 2017



Ratio of age-standardized mortality to incidence rates, 2017, both sexes.



Fall consequences

The Vicious Cycle of Falling

A fall can initiate a downward cascade in an older adult's life.

Burden of Falls - More Than Just Injury

- **Physical:**
  - Fractures (hip, wrist, spine), head injuries, soft tissue damage.
  - Chronic pain and disability.
- **Psychological:**
  - **Fear of Falling (FOF):** A lasting concern about falling that can lead to self-imposed activity restriction.
  - Anxiety, depression, loss of confidence.
- **Social:**
  - Reduced participation in social and physical activities.
  - Increased dependency on caregivers.
- **Economic:**
  - High costs for healthcare systems (hospital stays, rehabilitation).
  - Costs for individuals and families (caregivers, home modifications).

Risk factors of falls

Risk Factors for Falls - A Multifactorial Problem

- No single cause typically leads to a fall.
- It is the **cumulative effect of multiple risk factors** that pushes an individual over their stability threshold.
- Understanding these factors is the cornerstone of effective prevention.
- We can categorize them into three main groups:
  - **Intrinsic (Internal) Factors**
  - **Extrinsic (Environmental) Factors**
  - **Behavioral (Situational) Factors**

Intrinsic Risk Factors - Patient-Related

- These factors relate to the individual's own health and physical functioning.
- **Medical Conditions:**
  - Previous falls (the single best predictor of future falls)
  - Neurological disorders (Parkinson's, stroke, dementia)
  - Cardiovascular issues (orthostatic hypotension, arrhythmias)
  - Musculoskeletal problems (osteoarthritis, sarcopenia)
  - Vestibular disorders, visual impairment, foot problems.
- **Medication-Related:**
  - **Polypharmacy:** Use of 5 or more prescription medications.
  - **High-Risk Medications:** Benzodiazepines, sedatives, antidepressants, antipsychotics, antihypertensives.

Extrinsic Risk Factors - The Environment

- These factors are external to the individual and relate to the environment they live in and navigate.
- **Home Hazards:**
  - Poor lighting
  - Loose rugs and carpets
  - Clutter and obstructed pathways
  - Lack of safety equipment (e.g., grab bars in bathrooms)
  - Unstable furniture
- **Community Hazards:**
  - Uneven sidewalks, cracks, curbs
  - Slippery surfaces (ice, wet leaves)
  - Inadequate public lighting

Behavioral Risk Factors - Actions and Choices

- These factors are related to the activities and choices an individual makes.
- **Risky Behaviors:**
  - Rushing or not paying attention
  - Climbing on unstable objects (chairs, stools)
  - Carrying heavy or bulky items
  - Inappropriate footwear (slippers, high heels)
- **Lifestyle Factors:**
  - Sedentary behavior leading to muscle weakness
  - Excessive alcohol consumption
  - Poor nutrition and hydration

Primary Prevention

Transition to Prevention

- Now that we have established the 'what' (definition), 'who' and 'where' (epidemiology), and 'why' (risk factors), we can focus on the most important question:

How do we PREVENT falls?

- Our focus is on **Primary Prevention**: Interventions aimed at preventing the first fall from ever occurring in at-risk individuals.

Primary Prevention of Falls - A Multifactorial Approach

- Because falls are multifactorial, prevention must also be **multifactorial** and **individualized**.
- A "one-size-fits-all" approach is ineffective.
- The most effective strategies involve multiple components tailored to the individual's specific risk profile.

Key Pillars of Primary Prevention:

- Screening and Assessment
- Exercise and Physical Activity
- Medication Management
- Environmental Modification
- Management of Medical Conditions

Screening and Risk Assessment

- **Proactive Identification is Key.** We must identify at-risk individuals before they fall.
- **Annual Screening:** The American Geriatrics Society (AGS) and British Geriatrics Society (BGS) **recommend all adults 65+ be asked at least once a year about falls.**
  - **Key Questions:**
    - **"Have you fallen in the past year?"**
    - **"Do you feel unsteady when standing or walking?"**
- An affirmative answer to either question should trigger a more detailed assessment of gait and balance.

Gait and Balance Assessment

- If screening is positive, simple performance tests can quantify risk.
- **Timed Up and Go (TUG) Test:**
  - Patient rises from a chair, walks 3 meters, turns, walks back, and sits down.
  - **>12 seconds** indicates an increased risk of falling.
- **4-Stage Balance Test:**
  - Assesses static balance in progressively challenging stances.
- These tests are quick, require minimal equipment, and can be easily performed in a clinical setting.

The 4-Stage Balance test

Instructions to the patient:

- I'm going to show you four positions.
- Try to stand in each position for 10 seconds.
- You can hold your arms out, or move your body to help keep your balance, but don't move your feet.
- For each position I will say, **"Ready, begin."** Then, I will start timing. After 10 seconds, I will say, **"Stop."**

	① **Stand with your feet side-by-side.**	Time: _____seconds
	② **Place the instep of one foot so it is touching the big toe of the other foot.**	Time: _____seconds
	③ **Tandem stand: Place one foot in front of the other, heel touching toe.**	Time: _____seconds
	④ **Stand on one foot.**	Time: _____seconds

Exercise - The Most Effective Single Intervention

- **Strongest Evidence Base:** Exercise programs are proven to be the most effective single intervention to reduce fall rates.
- **What kind of exercise?**
  - Programs must include **balance and functional exercises**.
  - They should be progressive and challenging.
  - **Examples:** Tai Chi, Otago Exercise Program.
  - **Strength training** (especially for lower limbs) is also a critical component.
- **Dosage:** At least **50 hours of exercise over 3-6 months** is needed to see a significant effect.

An Exercise Prescription for Our Patient

- **The Most Effective Intervention She Missed.**
- Based on her profile, an ideal exercise program would have included:
  - **Balance Training:** To improve stability and ability to recover from a slip (e.g., Tai Chi).
  - **Strength Training:** Critically, to combat her sarcopenia, focusing on lower limb and core muscles.
- A referral to a physical therapist or a structured program like Otago would have been a cornerstone of her primary prevention plan.

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Medication Management

- **Medication Review is Crucial.**
- The goal is to reduce or stop medications that increase fall risk, particularly psychotropic medications.
- **Beers Criteria:** A valuable tool for identifying potentially inappropriate medications in older adults.
- This should be a collaborative process involving the physician, pharmacist, and patient.
- Deprescribing should be done gradually and with careful monitoring.

Medication Management for Our Patient

- **A Medication Review Was Needed.**
- A pharmacist or physician should have reviewed her list of 5 medications (polypharmacy).
- **Key Action:** Assess for orthostatic hypotension, a known side effect of her antihypertensives (Losartan/HCTZ). This involves checking blood pressure lying and standing.
- Reducing dosage or changing medication timing could have minimized this risk.

Environmental & Home Modification

- **Making the Environment Safer.**
- A healthcare professional (e.g., occupational therapist) can conduct a home safety assessment.
- **Common Recommendations:**
  - Improving lighting (e.g., night lights)
  - Installing grab bars and handrails (bathroom, stairs)
  - Removing trip hazards (clutter, cords, rugs)
  - Ensuring furniture is at an appropriate height and stable.
- These are often simple, low-cost changes that can have a high impact

Environmental Modification for Our Patient

- **The Simplest, Most Direct Prevention.**
- The single most effective action to prevent this *specific* fall event would have been a home safety assessment.
- **Primary Recommendation:**
  - **Remove loose rugs** or secure them firmly to the floor with double-sided tape.
- An occupational therapist could have identified this and other hazards, providing simple solutions that could have averted disaster.

Management of Contributing Medical Conditions

- **Treating the Underlying Causes.**
- **Vision:** Regular eye exams and updated prescriptions. Expedited cataract surgery has been shown to reduce fall rates.
- **Foot Health:** Regular podiatry assessment. Advising on appropriate, supportive footwear.
- **Orthostatic Hypotension:** Patient education (e.g., rising slowly), medication adjustment.
- **Vitamin D:** Supplementation for individuals who are deficient, as it is crucial for bone and muscle health. The role of universal supplementation for fall prevention is debated, but correcting insufficiency is key.

Management of Medical Conditions the Case

- **Key Opportunities for Prevention Were Missed.**
- **Osteoporosis:** As a post-menopausal woman over 65, she should have been screened for osteoporosis. Identifying her T-score of -3.1 earlier would have led to treatment, making her bones more resilient.
- **Vitamin D & Calcium:** Her lab results show clear deficiency. Supplementation should have been initiated long before the fall.
- **Sarcopenia:** Identifying her severe muscle loss via DXA or clinical assessment would have prompted targeted nutritional advice (e.g., increased protein) and an exercise prescription.
- **Diabetes:** Better glycemic control would reduce risks of complications like peripheral neuropathy, which further impairs balance.

Putting It All Together: An Integrated

- **Approach**
- **No Magic Bullet:** Fall prevention is a team effort.
- **Patient-Centered:** The plan must be developed *with* the older adult, respecting their goals and preferences.
- **Integrated Care:** Requires communication between geriatricians, primary care physicians, pharmacists, physical therapists, occupational therapists, and the patient's family.
- This integrated approach ensures all risk factors are addressed comprehensively.

Putting It All Together: A Prevention Plan for Her

- **An Integrated, Proactive Approach was Needed.**
- Imagine if our patient had received this care:
  - **Annually:** Screened for fall risk.
  - **At-Risk ID:** TUG test confirms high risk.
  - **Referrals:** Sent to PT for balance/strength training and OT for a home safety check (removing the rug!).
  - **Med Review:** BP checked for orthostatic changes; medication adjusted.
  - **Medical Care:** Screened and treated for osteoporosis; Vitamin D levels corrected.
- This is the model of comprehensive, primary prevention.

Conclusion - Key Takeaways

- **Falls are Common, Dangerous, but Preventable.** They should be considered a medical syndrome, not an inevitable part of aging.
- **Risk is Multifactorial:** Prevention must therefore be multicomponent and individualized.
- **Primary Prevention is the Goal:** Proactively screen and identify at-risk individuals before the first fall occurs.
- **Exercise is Paramount:** Balance and strength training are the most evidence-based interventions.
- An integrated, team-based approach is essential for success.

References

1.World Health Organization. (2021). *Falls*. Fact Sheet. Retrieved from https://www.who.int/news-room/fact-sheets/detail/falls

2.World Health Organization. (2021). *Step safely: evidence-based strategies for preventing falls and fall-related injuries in older people.* Geneva: World Health Organization.

3.American Geriatrics Society and British Geriatrics Society. (2010). AGS/BGS Clinical Practice Guideline: Prevention of Falls in Older Persons.

4.Mortazavi, S. S., & Sharifi, F. (2019). Incidence and risk factors of falling in a prospective cohort of the elderly population of Bushehr, Iran: the Bushehr Elderly Health (BEH) program. *Archives of osteoporosis, 14*(1), 1-9.

5.Heidari, M., et al. (2021). Prevalence of falls and its related factors in Iranian older adults: A systematic review and meta-analysis. *Journal of Mazandaran University of Medical Sciences, 31*(198), 162-177.

6.Sherrington, C., et al. (2019). Exercise for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews*, (1).

7.2023 American Geriatrics Society Beers Criteria® Update Expert Panel. (2023). American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *Journal of the American Geriatrics Society, 71*(7), 2052-2081.