Falls and Balance Problems in the Elderly: Assessment and Management in Primary Care - Part 1

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How many community living adult persons over the age of 65 fall each year?

1. 10 – 20%
2. 21 – 30%
3. 31 – 40%
4. 41 - 50%
4. > 50%
Which of the following statements about falls and injuries in older adults is true?
1. Falls are the leading cause of injury deaths
2. The majority of adults who die from falls are age 75 years and older
3. Among fallers 20-30% suffer moderate to severe injuries such as hip fractures or head injuries
4. Fallers age 75 years and older are 4-5 times more likely to be admitted to a nursing home
5. All of the above

Which of the following statement about fall outcomes in older adults is true?
1. Majority of falls cause fractures
2. Men sustain about 80% of all hip fractures
3. Over 300,000 hospital admissions per year for hip fractures in the United States
4. Pelvic fractures are associated with the highest mortality among all fall-related
Definition of a ‘Fall’

Anyone inadvertently coming to rest on the ground or a lower level but not due to trauma or other overwhelming medical event (stroke, syncope)

Overview of causes for falls

• 1/3 - Intrinsic risk factors (medical and age-related factors)

• 1/3 - Medications, alcohol use and OTC products

• 1/3 - Extrinsic risk factors (environmental)
Falls: Intrinsic Risk factors

- Increasing Age
- History of Falls
- Female gender
- Medical Illness
- Peripheral Neuropathy
- Orthostasis
- Cognitive impairment
- Visual impairment
- Lower extremity weakness
- Abnormal gait/mobility
- Incontinence
- Depression
- Foot problems
- Hearing impairment

Falls - Extrinsic Risk Factors

*Medications*

- **Anticholinergics** – consider total anticholinergic load
- **Neuropsychiatric** – benzodiazepines, neuroleptics, antidepressants, anticonvulsants, antiparkinson, muscle relaxants, analgesics
- **Cardiovascular** – antihypertensives, antiarrythmics (type 1 A), digoxin, nitrates
- **Alcohol**
- **Histamine (H2) blockers** – cimetidine
- **Over-the-counter** – cough / cold remedies, sedatives, antihistamines
Which of the following CNS medications has been associated with the largest increase in Falls?

1. Benzodiazepines (short and long acting)
2. Antidepressants-SSRI
3. Antidepressants-Tricyclics
4. Anticonvulsants
5. Narcotics

Falls: Extrinsic factors

Environment

- Indoor hazards – slippery floors, rugs/carpet, poor lighting, shoes, bathroom fixtures, height of chair and bed, unstable furniture, stairways.
- Outdoor hazards- uneven pavement, steps, snow and ice.
Multiple Falls vs. Number of Risk Factors

Percent with Two or More Falls in One Year

- 0-1: 10
- 2: 16
- 3: 39
- 4+: 69

* White, previous falls, arthritis, parkinsonism, difficulty rising, poor tandem gait.

Nevitt JAMA, 1989. (n=325)

Clinical Approach to Falls

- **NOT** WHAT DISEASE caused the problem? (Based on one disease/diagnosis model)

- **BUT** WHAT COMBINATION of Physiologic changes, impairments and diseases are contributing?

- **AND** WHICH ONES can be modified? (Multifactorial Impairment and Intervention Model)
Timed ‘Up and Go’ test

• Simple test of observing a person stand up from a chair, walk 10 feet, turn around, walk back, and sit down again.
• Correlates with ADLs
• Normal person takes < 10 seconds to complete the task
• Note: use of hands, staggering.

Sensitivity
• Sensitivity, 54-87%; Specificity

Timed ‘Up and Go’ test

• Two video clips
  – Normal
  – Abnormal
Case Study 1

- Rose, an 80 years old widow, fell at home in bedroom.
- Able to ambulate after the fall but has slight abrasion on the right fore arm and bruise on the face.
- She has PMH of another fall 4 months ago, has OA of knees and hip, HTN, DM type 2, Macular Degeneration, urinary urgency with occasional incontinence and sleep difficulties.
- Chronic pain from OA but functional prior to the fall
- Daughter has noticed mild confusion at times and limitation of her activities due to weakness.
Case Study 1

- Medications: HCTZ, Fentanyl patch, KCL, Tylenol PM, Multivitamin
- Examination: BP normal, no orthostasis, edema, vision 20/50, Chest – few basal crackles on right, absent ankle reflexes, Romberg’s negative, painful right hip – antalgic gait
- Timed get up and go test: 18 seconds, use of arms to get out of chair

What is the most important risk factor for Rose’s recent fall?

1. History of previous falls
2. Medications
3. Possibility of infection (UTI) and delirium
4. Gait disorder
5. Visual impairment
What other risk factor(s) may be contributing to Rose’s falls?

Falls: Multifactorial Risk Factors

- Orthostasis
- Electrolyte abnormalities
- Dehydration
- Visual Impairment
- Dementia
- Chronic Pain
- Urinary urgency
- Diabetes
- UTI!
- Medication side-effects and OTC
- Deconditioning
- Delirium
- Environment
- OA and poor mobility
What is Rose’s most important physical examination finding related to her falling?

1. Extent of injury and pain
2. Result of BP (sitting and standing)
3. Result of Timed ‘Up and Go’ test
4. Visual acuity
5. Neurological examination
   (Romberg’s, peripheral neuropathy, dementia)

What additional test would be most helpful?

1. 24 hour Holter monitor
2. Carotid doppler studies
3. EEG
4. Radiograph of chest and hips
5. Brain CT imaging
6. Head-up tilt testing
What is the most important initial step in managing Rose’s fall?

1. Reduction of HCTZ and CNS medications
2. Hydration and treatment of UTI
3. Treatment of injury and pain
4. Osteoporosis treatment
5. Counseling for ‘fear of falling’
6. Recommendation for use of hip protector
Hip Protector

What additional referral would be most useful for Rose?

1. Ophthalmology consult
2. PT consult and strengthening exercises
3. Home safety assessment by OT
4. Neurology consult
5. Cardiology consult
Summary

• Falls are a significant cause of morbidity and mortality in the elderly

• Falls in the elderly are multifactorial

• Multidisciplinary intervention approaches provide the best evidence for prevention and management.

Falls and Balance Problems in the Elderly: Assessment and Management in Primary Care - Part 2
Overview of causes for falls

- 1/3 - Intrinsic risk factors (medical conditions and age-related factors)

- 1/3 - Medications, alcohol use and OTC products

Multiple Falls vs. Number of Risk Factors

Percent with Two or More Falls in One Year

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Clinical Approach to Falls

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Detectable gait abnormalities are present in...

1. <10% of adults age 65 and over
2. 21 – 40% of adults age 65 and over
3. 41 – 50% of adults age 65 and over
4. 21 - 40% of adults age 85 and over
5. 41 - 50% of adults age 85 and over
Which of these statements is true for adults age 75 and older?

1. 10% need assistance to walk across a room
2. 20% cannot climb stairs without help
3. >20% need personal assistance with ADLs
4. 40% cannot walk a half-mile

5. All of the above
Demonstration of Romberg’s test

• Test for proprioception primarily to differentiate sensory ataxia (central and peripheral) from cerebellar ataxia
• Sharpened Romberg’s may be helpful in the elderly

Sharpened Romberg’s

Balance (Sharpened Romberg test). Patient stands with feet together, semi-tandem, and tandem, with eyes open for 10 seconds then closed for 10 seconds in each position.
Demonstration of single leg stance test

- Best balance measure for any individual
- If one can stay on one leg for 10 seconds, there are usually no significant balance problems

Modified Single leg Stance

Hip abductors. Patient stands behind back of chair and—while using fingertips for light support—slowly lifts one leg for 5 seconds. Repeat for other leg. Pelvis drop on non-weight-bearing side indicates muscle weakness.
Functional Reach Test

- Measures forward and lateral balance; Sensitive to change over time
- Simple to administer
  - Arm extension with 90 degrees of shoulder flexion while patient is upright and leaning forward or sideways
- Results
  - < 6 inches related to falls
  - Minimal fall risk if >10 inches
Model of Balance Dysfunction

- **Age-related physiologic changes**
  - Depth perception, contrast sensitivity, reaction time, muscle mass, wide base, stride length

- **Usual aging impairments**
  - Vision, Vestibular dysfunction, neuropathy

- **Presence of acute and chronic diseases**
  - CVA, TIA, BP postural drop, arrhythmia, OA, Parkinson’s, dementia

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**Sudden/Acute**
CVA, MI, Rx, Toxins, Infections
exclude SYNCOPE

**Chronic/Recurrent**

**Vertigo**
- peripheral vestibulopathy
  in 50%
  - BPPV
- v.neuronitis
  - central cause

**Pre-syncope**
- orthostasis
- neurocardiogenic
- situational
- organic heart
- arrhythmias

**Disequilibrium**
- Balance & gait
disorder
- sensorimotor
dysfunction
- neurodegeneration
- presbystasis (aging balance)

**Psychogenic**
- anxiety
- depression
- panic disorder
- hyperventilation
Case study 2

• Bill, a 73-years man got up after a restful night, ate a heavy breakfast and then fell in the bathroom
• He reports passing out briefly
• Past history of CAD, HF, OA, and early cataracts.
• Episodes of similar nature in the past in other places, sometimes with dizziness and mostly in the mid-morning.

Case Study 2

• Medications: Captopril, Lasix, digoxin, calcium carbonate, multivitamin
• Examination: BP 106-110/70-75, pulse irregular, ankle edema, Kyphoscoliosis, absent ankle reflexes, wide gait, Romberg’s unstable on closing eyes, Folstein 27/30
• Single leg stance – not possible, Functional Reach 5”, Timed get up and go: 12 seconds
• EKG: atrial ectopics, rest blood and urine normal
What is the most important risk factor for Bill’s recent fall?

1. Visual impairment
2. Low toilet seat
3. Medication Side Effects
4. History of cardiovascular disease
5. Recent meal

What other risk factor(s) may be contributing to Bill’s falls?
Falls: Multifactorial Risk Factors

- Orthostasis
- Visual Impairment
- TIAs
- CAD/Arrhythmias
- Medications side-effects
- Gait and balance disorder
- Misuse of alcohol
- Environment
- Aging changes
- Seizures

What is Bill’s most important physical examination finding related to his falling?

1. Result of Functional Reach test
2. Result of BP (sitting and standing)
3. Wide based gait changes
4. Romberg’s test
5. Folstein mini-mental status exam result
What additional test would be most helpful?

1. Digoxin levels
2. Carotid Doppler studies
3. Echocardiogram
4. Holter’s 24-hour EKG tape
5. Cardiac Event (loop) recording

What is Bill’s most likely contributor for falls in your opinion?

1. Adverse drug effect and alcohol misuse
2. Carotid sinus hypersensitivity
3. Postprandial hypotension
4. Transient ischemic attacks
5. Disequilibrium disorder
What is the most important initial step in managing Bill’s recurrent falls?

1. Medication review and dose adjustment
2. Small meals with increase in fluid and salt intake
3. Reduction in alcohol consumption
4. Use of support stockings
5. PT consult and balance exercises

Fall Mnemonic

S  Symptoms
P  Previous falls
L  Location
A  Activity
T  Time: time of day or night
T  Trauma
Fall Mnemonic

I  Inflammation of joints (or joint deformity)
H  Hypotension (orthostatic blood pressure changes)
A  Auditory and visual abnormalities
T  Tremor (Parkinson’s disease or other causes of tremor)
E  Equilibrium (balance) problem

F  Foot problems
A  Arrhythmia, heart block or valvular disease
L  Leg-length discrepancy
L  Lack of conditioning (generalized weakness)

N  Nutrition (poor; weight loss)
G  Gait disturbance

Fracture and fall dynamics

[Diagram showing the relationship between Fall, Fracture, Force, and Fragility]
Preventing Fractures and Injury

- Osteoporosis
- Hip Protectors
- Use of alarms
- ‘Breaking a fall’ techniques
- Environment (indoor/outdoor) modification
- Shoe-wear (Types of Footwear, Subtalar Neutral Position)
- Sitter, one-on-one, 1:1, in the presence of the person’s carer, supervised

Preventing Fractures and Injury

- Vitamin D3 (Cholecalciferol. Liver transform into calcifediol or 25(OH)D). Levels above 65 n/ml shown to reduce falls by > 20%
- Exercises: Tai-Chi. Reduction in falls >50%

(Li and Harmer 2005, Journal of Gerontology: Medical Sciences.)
Hip Protector
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