Falls Risk: The Impact of Aging and Dementia

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Falls are NOT a part of normal aging
Facts About Falls

• Every 19 minutes, an older adult dies from a fall-related injury.
• One out of five falls leads to a fracture, concussion, or other serious injury
• Estimated one in three people over 65 who live outside of a nursing home will fall each year.
• Injuries from falls are growing faster than the U.S. population, especially for people 65 and older
• Many falls are preventable!
Types of Balance

Visual

Somatosensory

Vestibular

Central Sensorimotor Integration

Static Balance

Dynamic Balance

openi.nlm.nih.gov/detailedresult.php?img=PMC5324311_12883_2017_812_Fig1
Maintaining Balance
Impact and Implications of Falls

NYS Department of Health

• Leading cause of accident-related hospitalizations for people over 25
• Leading cause of accidental death for those over 45
• Single most disabling event likely to result in nursing home placement for those over 65

Worldwide

• Second leading cause accidental death
Impact and Implications of Falls

- Fractures
- Traumatic brain injury
- Neck injuries
- Back injuries
- Eye injuries
- Fear of falling
Age and Falling

- Medications
- Lower-body weakness
- Muscle atrophy
- Previous falls
- Chronic pain
- Vitamin D deficiency
- Poor sleep
- Poor vision
Fall Risk in Men and Women

- More likely to die from falls
  - Greater heights
  - Take more risks
  - Dangerous occupations/hobbies

- More likely to fall
- More likely to be injured
  - 75%-95% hip fractures
Environmental Hazards

• Poor lighting
• Slippery floors
• Loose rugs, cords
• Moveable furniture
• Stairs
• Poorly fitting shoes
Alcohol
Medical Conditions That Effect Balance
Vestibular Disorders

- Infections
- Allergies
- Head injuries
- Benign paroxysmal positional vertigo (BPPV)
- Labyrinthitis
- Meniere’s disease
Vision Disorders

- Cataracts
- Glaucoma
- Diabetic retinopathy
- Age-related macular degeneration
Chronic Pain

Arthritis
• Join pain and stiffness
  • Ankles, knees, hips
• Muscle weakness

Peripheral Neuropathy
• Nerve damage feet, lower legs
  • Diabetes
  • Degenerative disc disease
• Loss of sensation
Cardiovascular disease

• Arrhythmia
• Valvular disease
• Postural hypotension
• Postprandial hypotension
• Carotid sinus syndrome

Neuromotor disease

• Stroke
• Parkinson’s disease
• Hydrocephalus
• Depression
Cognitive Impairment and Dementia

Frontal Lobe
- thinking, memory, behavior and movement

Temporal Lobe
- hearing, learning and feelings

Parietal Lobe
- language and touch

Occipital Lobe
- vision

Cerebellum
- balance and coordination

Brain Stem
- breathing, heart rate and temperature
What is Dementia?

• General term to describe disorders that cause significant decline in one or more areas of cognitive functioning severe enough to result in functional decline

• Progressive and disabling

• *Not* an inherent aspect of aging
Differential Diagnosis

• Normal aging
• Mild neurocognitive disorder (mild NCD)/mild cognitive impairment (MCI)
• Alzheimer disease
• Vascular dementia
• Dementia (or NCD) with Lewy Bodies
• Frontotemporal dementia
• Delirium
• Depression
• Other (alcohol, Parkinson disease, neurosyphilis)
Normal Aging

• Mild decline in memory

• Requires more effort and time to recall new information

• Decline does not impair functioning

• New learning is slower but still occurs
  • Usually well-compensated with lists, calendars, other memory supports
Mild Cognitive Impairment (MCI)

- MCI: Subjective complaint of decline in at least one cognitive domain: noticeable and measurable
- No impairment in independent living
- 9.4 to 14.3/1000 person-years convert to Alzheimer disease; higher in amnestic MCI
- ~50% with amnestic MCI maintain stable level of impairment or return to normal cognitive status in 3–5 yr
Delirium vs Dementia

• Delirium and dementia often occur together in older hospitalized patients

• The **distinguishing signs of delirium** are:
  - Acute onset
  - Cognitive fluctuations throughout the course of a day
  - Impaired consciousness and attention
  - Fluctuating levels of alertness
  - Altered sleep cycles

  ➢ Search for underlying dementia once delirium cleared
Alzheimer’s Disease

- **Onset**: gradual

- **Cognitive symptoms**: memory impairment core feature with difficulty learning new information, language, visuospatial

- **Motor symptoms**: rare early, apraxia later

- **Progression**: gradual, over 8–10 yr on average

- **Lab tests**: normal

- **Imaging**: possible global atrophy, small hippocampal volumes
Vascular Dementia

• **Onset:** may be sudden/stepwise

• **Cognitive symptoms:** depend on anatomy of ischemia, but dysexecutive deficits and slowing common

• **Motor symptoms:** correlates with ischemia

• **Progression:** gradual or stepwise with further ischemia

• **Lab tests:** normal

• **Imaging:** cortical or subcortical changes on MRI
Lewy Body Dementia

- **Onset:** gradual

- **Cognitive symptoms:** memory, visuospatial, hallucinations, fluctuating symptoms

- **Motor symptoms:** parkinsonism

- **Progression:** gradual, but faster than AD

- **Lab tests:** normal

- **Imaging:** possible global atrophy
Frontotemporal Dementia

- **Onset:** gradual, usually age <60
- **Cognitive symptoms:** executive, disinhibition, apathy, language, +/- memory
- **Motor symptoms:** none (rare genetic forms associated with ALS)
- **Progression:** gradual but faster than AD
- **Lab tests:** normal
- **Imaging:** atrophy in frontal and temporal lobes
Mobility and Your Brain
Six Neurocognitive Domains & Subdomains in DSM 5

- **Perceptual-motor function**: visual perception, visuoconstructional reasoning, perceptual-motor coordination
- **Language function**: object naming, word finding, fluency, grammar and syntax, receptive language
- **Executive Function**: planning, decision-making, working memory, responding to feedback, inhibition, flexibility
- **Learning/Memory**: free recall, cued recall, recognition memory, semantic and autobiographical long-term memory, implicit learning
- **Complex Attention**: sustained attention, divide attention, selective attention, processing attention speed
- **Social Cognition**: recognition of emotions, theory of mind, insight
Not only is my short term memory horrible, but my short term memory is horrible.
Hippocampus – This area of the brain, apart from its other functions, is primarily responsible for short term memory.
Working Memory

- Operates over a few seconds
- Temporary storage
- Manipulates information
- Focuses attention

Diagram of a brain with various icons and labels.
Executive Function

• Keeping task-relevant goals on-line (task setting)
• Initiating and sustaining activity
• Anticipating, monitoring outcomes/rewards
• Inhibiting (stopping) activity
• Predicting mental states/responses of others
• Evaluating, responding to changes in salience
Mood and Motivation
Multimorbidity

- Diabetes
- Dementia
- Heart Failure
- Patient
- HTN
- CKD
- Cancer
Polypharmacy

Medications That Increase Fall Risk

• Antidepressants (TCAs, SSRIs, SNRIs)
• Anxiolytics (benzodiazepines)
• Anti-spasmotics
• Antihistamines (diphenhydramine)
Medications That Increase Fall Risk

• Blood pressure agents (alpha blockers, ACEI/ARB, beta blockers)
• Diabetes drugs (insulin, glipizide, glyburide)
• Anti-arrhythmics, nitrates/vasodilators, digoxin
• Pain medications (TCAs, narcotics)
• Sedatives and hypnotics
Evaluation: Physical Exam

• Postural vital signs
• Carotid bruits and upstroke
• Murmurs
• Evidence of anemia
• Neurologic exam: sensation, motor, reflexes, cerebellar
• Observe activities associated with the event
“Get Up and Go” Test

1. Chair stand: get up from chair without using hands
2. Romberg: eyes open and closed, then sternal push
3. 20 foot walk
4. 360 degree turn
Gait Observations

- Shuffle: Parkinsonism
- Petit-pas: frontal/CVD
- Hemiparetic: stroke
- Ataxic: cerebellar
- Antalgic: arthritic
- Spastic: cervical spondylosis
- Foot Drop: peroneal
- Sensory: neuropathy
Laboratory Studies

- CBC, electrolytes, BUN/Cr, glucose
- Drug levels
- Syncope or cardiac sx: EKG
- Suspected arrhythmia: event monitor
- Focal neuro abnormalities: EEG, MRI/CT
- Suspicious murmurs: cardiac echo
Multifactorial Approach to the Faller

- History and Physical Exam
- Get Up and Go Test
- Observe Precipitating Activities

- Leg Extension Weakness
- Poor Balance
- Medication Toxicity
- Hypotension
Leg Weakness

- Impaired Chair Stand
- Stair Climbing
- Slow Gait Speed

Result in:

- Resistance Training
- Quadriceps Sets
Poor Balance

- Positive Romberg
- Unstable Sternal Push
- Poor Vision

→

Balance Training
- Tai Chi
- Wide Soled Shoes
- Assist Devices
Medication Toxicity

- Anticonvulsants
- Antihypertensives
- Anticholinergics
- Alcohol
- Psychotropics
- Nitrates/Dig

- Drug Withdrawal
- Drug Substitution
- Dose Reduction
Hypotension

Orthostatic and Post-Prandial Hypotension

- Drug Reduction
- Drug/Meal Separation
- Exercise

- Head of Bed Elevation
- Fluids/Salt
- Stockings

- Caffeine
- Fludrocortisone
- Midodrine
Preventing Falls – maintaining general health

• Standard annual eye exam
• Avoiding acute illness
• Treating common colds, viruses, allergies
• Weight loss
• Bone and joint health
Maintaining Mobility
Exercise Programs that Help Prevent Falls

Key Features
• Strength, endurance, and balance training
• Sustainable
• Power training
• Functional exercises
Get Moving!

• Cycling, stir climbing, walking
• Swimming, water aerobics
• Weight training and resistance exercises
• Yoga
• Tai Chi
# Interventions to Prevent Falls

Significant Factor from 40 RTCs

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Risk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle Strengthening &amp; Balance Training</td>
<td>0.80</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>0.51</td>
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<tr>
<td>Home Hazard Assessment &amp; Modification</td>
<td>0.64</td>
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<tr>
<td>Withdrawal of Psychotropic Medications</td>
<td>0.34</td>
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<tr>
<td>Multidisciplinary, Multifactorial</td>
<td>0.75</td>
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</tbody>
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*Home/Environment Risk Screening/Intervention*

Cochran Database of Systematic Reviews. 2002, Issue 3
Final Thoughts - 
*Keeping your brain healthy*

• Stay physically active
• Manage medical conditions
• Check your medications
• Exercise your brain
• Get enough rest
Thank you!

Leaves are supposed to fall. People aren’t.

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