



Why we lose balance and how to maintain it

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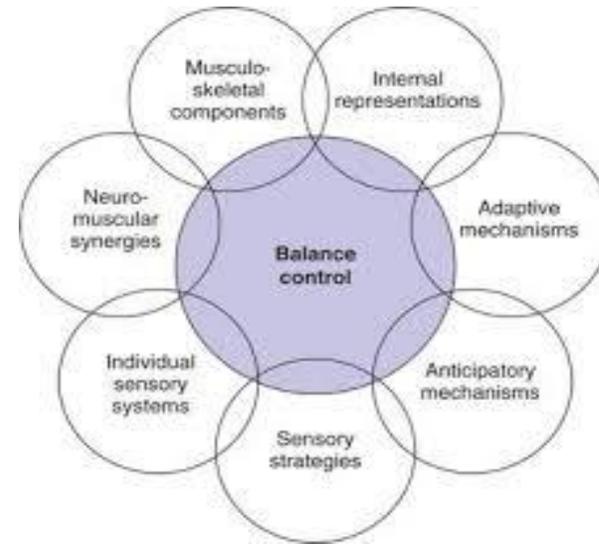
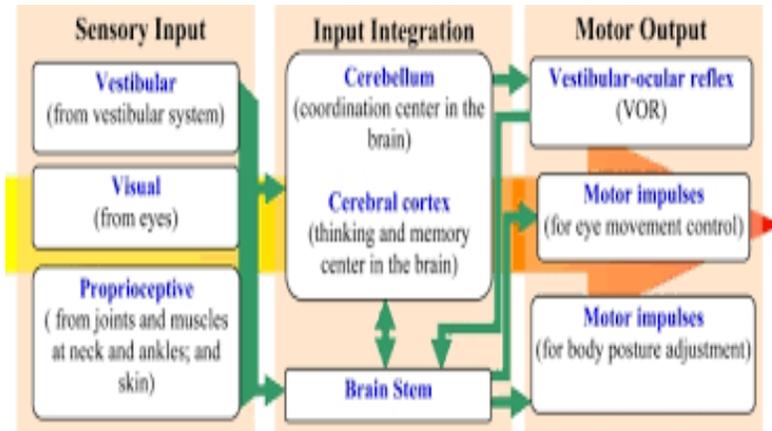
Goals

- Define balance
- Review Fall Statistics
- Review Aging and the Vestibular System
- Review Causes of Balance Disorders
- Review treatment of balance disorders and future trends



What is balance?

- The state of having your weight spread equally so that you do not fall.
- The ability to move or to remain in a position without losing control or falling.
- Regulated by input from multiple sensory, mechanical and nervous system functions



Aging Statistics

- In 2013, the world population of older adults was 841 million
- It is projected to reach >2 billion by 2050

Fall Statistics in the United States

- Each year over 3 million people are seen in Emergency Departments for fall injuries
- Over 800,000 patients a year are hospitalized because of a fall related injury
- Over 300,000 older people are hospitalized for fractures each year
- More than 95% of hip fractures are caused by falling

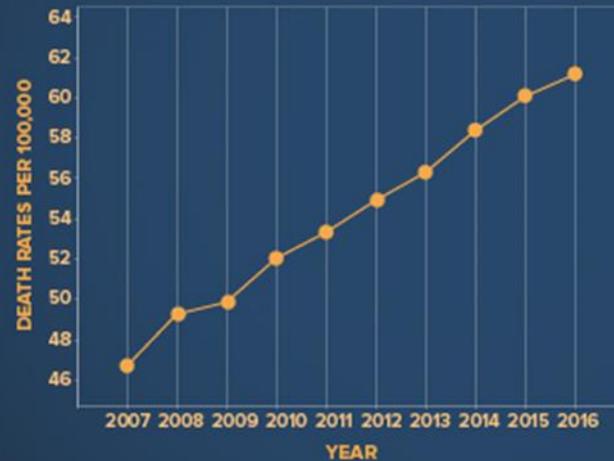


Source: www.cdc.gov/HomeandRecreationalSafety/Falls/adultfalls.html

Falls Statistics

Fall Death Rates in the U.S. **INCREASED 30%**

FROM 2007 TO 2016 FOR OLDER ADULTS



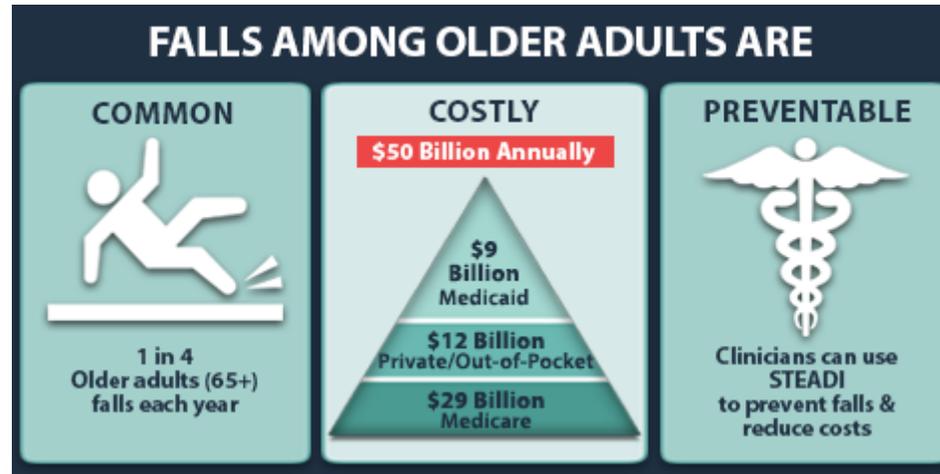
If rates continue to rise,
we can anticipate

**7 FALL
DEATHS**
EVERY HOUR
BY 2030

Learn more at www.cdc.gov/HomeandRecreationalSafety.



Falls Statistics



www.cdc.gov/HomeandRecreationalSafety/Falls/adultfalls.html

Balance and Aging

- Aging Leads to Reduced Reaction Times
 - Reduces time to shift to another balance modality
 - Leads to an Increased Risk of Falling

- Hearing Loss
 - Increased Risk of Falls
 - Affects Postural Control
 - Affects ability to Monitor and Perceive Auditory and Environmental Cues That Provide Spatial Orientation

Balance and Aging

- Vestibular structures
 - Loss of cells within the semicircular canals
 - Nerve cell degeneration
 - Cerebellar volume decreases
- Vestibular function
 - Reflexes that link eye and muscle coordination become slow
 - Loss of Postural Control
 - Affects 35% of Adults >70

Causes - Neurologic

- Stroke
- Dementia
- Parkinson's Disease
- Seizures
- Peripheral neuropathy
 - Common Complication due to Diabetes
 - B12 Deficiency
- Cerebellar Disease

Causes - Neurologic

- Visual Impairment
 - Glaucoma
 - Cataracts
 - Macular degeneration
- Normal Pressure Hydrocephalus
- Muscle diseases
- Brain Injury
- Subdural Hematoma
- Vestibular Dysfunction

Causes - Cardiovascular

- Congestive heart failure
- Abnormal heart rhythms
- Peripheral artery disease
- Orthostatic hypotension

Causes - Musculoskeletal

- Spinal stenosis
- Arthritis/pain
- Deformities
 - Congenital
 - Acquired
 - Amputation
 - Injury
 - Kyphosis

Causes - Medications

- Diuretics
- Pain medication
- Sleep aids
- Benzodiazepines
- Seizure medications
- Antidepressants
- Psychotropics
- Anticholinergics

Causes - Other

- Diabetes
- Obesity
- End stage kidney disease
- Alcohol abuse
- Substance abuse
- Normal aging
 - Walking speed reduces by 1% every year after age 60

Medical assessment

- Medical/Surgical history
- Social history
- Family history
- Medications
- Physical examination
- Labs
- Imaging

Physical Assessment

- Vital signs
 - Orthostatic blood pressure
- Vision
- Cardiopulmonary exam
- Joint deformity/limitation
- Neurologic Exam
 - Sensation
 - Strength
 - Coordination/muscle tone

Physical Assessment

- Functional
 - Rise from chair
 - Gait assessment
 - Balance on one leg
- Posture
- Footwear
 - Possible need for Podiatry assessment

High fall risk shoes

Flip Flops



Slides



Causes - Dementia

- The impaired ability to remember, think, or make decisions and interferes with daily activities
 - 2014- 5 million adults with dementia
 - 2060- Projected to be 14 million
- Alzheimer's is the most common type
- **Not a normal part of aging**

Causes - Dementia

- Increased risk for problems with mobility, balance and muscle weakness
- Difficulty finding a certain location
- Difficulty processing and reacting to situations
- Difficulty communicating needs
- Medication side effects
- Increased risk for depression

Causes - Dementia

- Important to continue to encourage participation in activities based on abilities
 - Gardening
 - Swimming
 - Walking
 - Museum visits

Causes – Balance Disorders

- Affect 1/3 of older adults
- Benign Paroxysmal Positional Vertigo
 - Most common vestibular disorder in the elderly
 - Episodes of vertigo
 - an illusion of motion
 - Triggered by change in position
 - Episodes last for several weeks
 - Diagnosed with the Dix-Hallpike maneuver



Benign Paroxysmal Positional Vertigo

- Recommend definitive diagnosis by an MD/ACP
- Treatment
 - Positional maneuver depending on where the otolith is located
 - Most common is the Epley maneuver



Benign Paroxysmal Positional Vertigo

Treatment

- Home maneuver
- Meclizine
 - Side effects
 - Dizziness
 - Drowsiness
 - Impaired coordination
 - Visual disturbance

Meniere's Disease

- Elderly account for 15% of cases with initial presentation
 - Two episodes of vertigo, each lasting 20 minutes to 12 hours
 - Hearing loss verified by a hearing test
 - Tinnitus or a feeling of fullness in ear
 - Exclusion of other known causes of these problems

Meniere's Disease

- No cure exists for Meniere's disease
- No treatments for the hearing loss
- Medications can help reduce the severity of vertigo episodes
 - Meclizine
 - Promethazine
 - Diuretics and low salt diet to reduce fluid retention

Treatment of Balance Disorders

- Exercise
 - Tai Chi
 - Pilates
- Physical therapy
- Dance
- Medication review and adjustment
- Environmental assessment

Treatment of Balance Disorders - Exercise

- Improves
 - Flexibility
 - Endurance
 - Strength
 - Balance
- Research data
 - Exercise reduced rate of falls by 21% in community-dwelling older people
 - At least 3 hours/week and include balance challenges

Treatment - Exercise

- Tai chi
 - Improves balance
 - Leads to a reduction in falls
 - Google: Tai Chi Charlotte



Treatment - Exercise

- Pilates
 - Review of published studies (February 2018)
 - Included 6 studies - small
 - Conclusions
 - Effective form of exercise to improve balance in older adults
 - Further studies recommended

Treatment - Exercise

- Dance
 - Review of studies published January 2019
 - Included 5 types of dance
 - Most studies were 12 weeks/60 minutes/3 times a week

Treatment - Exercise

- Dance
 - Assessed outcomes
 - Balance
 - Gait ability
 - Arm and leg strength
 - Cardiopulmonary fitness
 - Flexibility
 - Fall risk
 - Quality of life

Treatment - Exercise

- Dance
 - Assessed outcomes
 - Lipid and glycemic profile
 - Systolic and diastolic blood pressure
 - Body composition
 - Inflammatory markers
 - Conclusions
 - Any dance style can induce positive functional outcomes in older adults
 - Metabolic improvements were also noted



Treatment – Physical Therapy

- Full assessment of strength, endurance, balance and flexibility
- Individualized program based on specific needs
 - Vestibular Rehabilitation
- Monitoring by a professional until it is deemed safe to perform program at home safely and independently
- **Lifelong home program**

Treatment - Medication Review

- Consultation with a pharmacist to review medications
 - Assess for drug interactions
 - 7 or more medications-prescribed and over the counter = 100% chance of medication interaction
 - Develop a daily schedule
 - Deprescribe
 - Done in conjunction with the MD/NP/PA
 - Study showed 39% reduction in rate of falling

Treatment - Environmental Assessment

- In Home Occupational Therapy Consult
 - Often done after discharge from the hospital
 - Removal of rugs
 - Footwear assessment
 - Non-slip bathmats
 - Grab bars
 - Stair rails
 - Lighting at night
 - Assistive devices for self care

Treatment – Future Trends

- Exergaming
 - Wii balance board
 - Virtual reality
 - Parkinson's Disease
 - Stroke
- Mobile Phone Applications
- Visual Biofeedback

Conclusions

- Maintenance of balance is highly complex and involves multiple organ systems
- normal aging can affect balance
- multiple diseases can affect balance
- Fall risk increases with aging
- Evaluation and treatment of balance disorders is multidisciplinary
- Treatment often involves commitment to a lifelong program

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Questions

Thank you!

Stay Safe!

Don't Fall!

Resources

- Cdc.gov
 - Important Facts About Falls
- Balance Problems and Fall Risks in The Elderly, Ramon Cuevas-Trisan, Clin Geri Med 35(2019)173-183
- Balance Disorders in Older Adults, David Eibling, Clin Geri Med 34(2018)175-181
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- The Association between Hearing Loss, Postural Control, and Mobility in Older Adults: A Systematic Review, Agmon M et al, Journal of the American Academy of Audiology.28(6):575-588, 2017 Jun
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