

QUALITY OF LIFE BALANCE & FALLS



Dr. Zeinab Shiravi

Ph.D., PT

Assistant Professor

Today's Discussion

- ▶ Definition of a fall
- ▶ Fear of falling
- ▶ Risk factors for falling
- ▶ Action steps to reduce fall risk



Definition of Falls

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



Introduction

- Falls and fall-related injuries are a common& serious problem for older people.
- Fall potentially life- threatening events and may be simply the first signs of single problem.
- It lead to hospitalization and increase cost and burden on society and even lead to death .

Background & Significance:

Falls among older adults & patient populations

- 1/3 community living adults fall at least once annually.
- 50% of people 85 years and older fall.
- 80% of people living with PD, MS, stroke, AD fall at least once a year.
- 1/3 of older adults develop a fear of falling that results in:
 - self-limiting mobility
 - reduced activity
 - depression
 - social isolation
 - increased fall risk

The impact of falling

Injury caused by falls is the leading cause of accidental death for people aged 75 and over⁵

Physical effects	Psychological effects
<ul style="list-style-type: none">• Death• Immobility• Incontinence• Cuts, bruises, soft tissue injuries• Fractures• Head injuries• Dislocation• Pneumonia/chest infection• Pressure ulcers• Dehydration• Hypothermia• Moving into care	<ul style="list-style-type: none">• Increased dependency• Emotional distress• Loss of control• Social isolation/withdrawal• Fear of further falls• Low esteem• Embarrassment• Anxiety/depression• Loss of confidence• Worries of increased care costs

Why do older people fall?

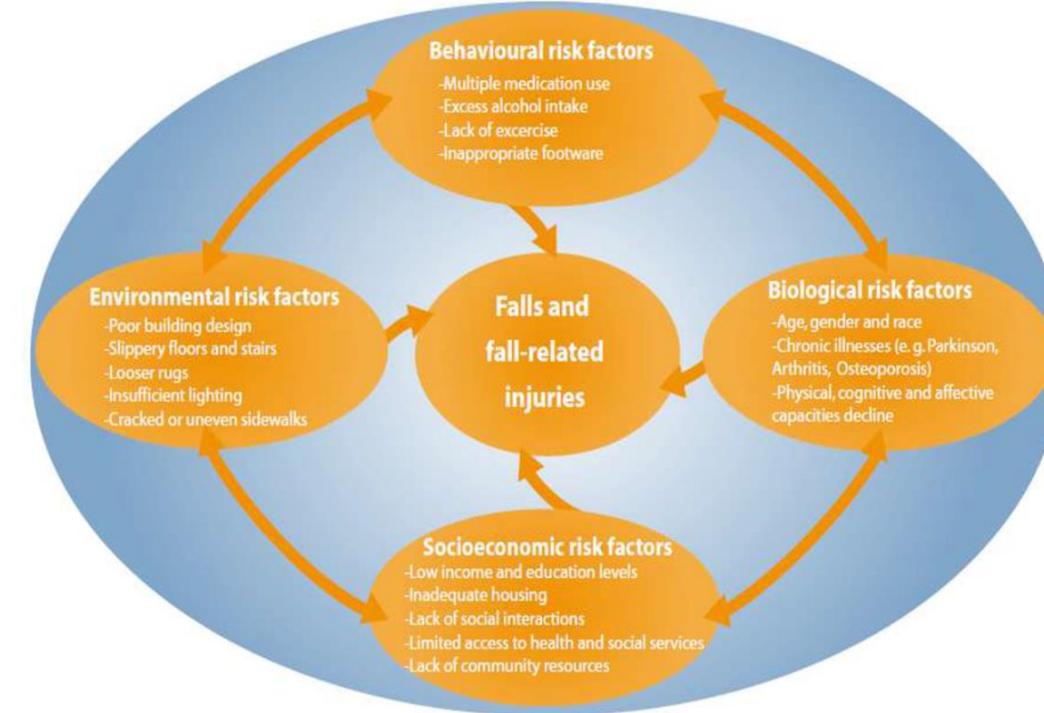
- There are known to be over 400 different reasons why an older person might fall, these reasons are known as risk factors. Early identification of these risk factors coupled with taking action to remove or reduce risk can prevent a fall. This is a core component of proactive, falls prevention management.

Types of Fall Risk Factors

Most falls result from a number of risk factors:

- ▶ **Physical risk factors:** Changes in your body that increase your risk for a fall
- ▶ **Behavioral risk factors:** Things we do or don't do that increase our fall risk
- ▶ **Environmental risk factors:** Hazards in our home or community

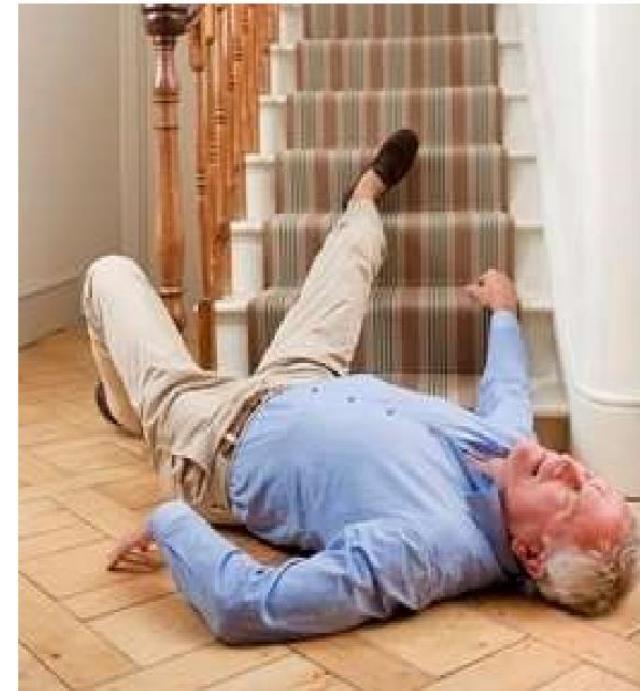
Risk factor model



(WHO, 2007)

Falls: Extrinsic Risk factors

- Drugs
- Environmental
- Improper assistive devices



Risk factors

Extrinsic risk factors

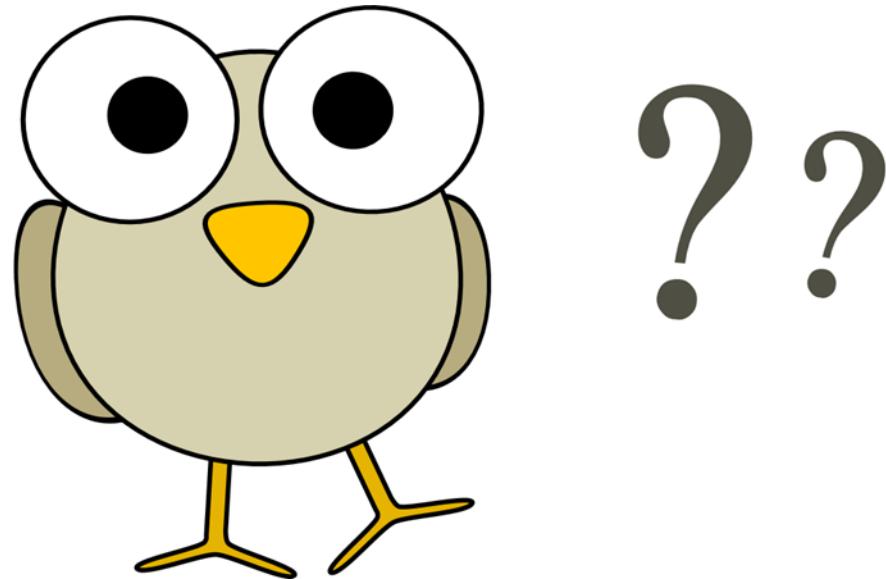
- Environmental hazards – trailing cables, wet floors.
- Other environmental influences – poor lighting, shadows, patterns on carpets.
- Loose clothing, trailing dressing gowns, poorly fitting footwear.
- Walking aids in poor condition or the person using the wrong walking aid.
- Inappropriate use of equipment.
- Not putting the brakes on a wheelchair.
- Time of the year (learning disability).

Risk factors

Intrinsic risk factors

- History of previous falls.
- Infections – urine, chest infections.
- Medical conditions – stroke, diabetes, Parkinson's disease.
- Medicines.
- Incontinence.
- Cognitive impairment – dementia, memory problems.
- Visual and hearing impairment.
- Foot conditions – bunions, callouses, painful feet.
- Poor muscle strength.
- Poor balance.
- Mental health conditions – depression, anxiety, fear of falling.
- Constipation.
- Malnourishment.
- Dehydration.
- Postural hypotension.
- Behaviour – challenging behaviour, risk takers.
- Premature physiological ageing process (learning disability).

Are falls preventable?



YES!

Falls are largely
preventable!
Come learn how.

Risk Factors

You CAN change

- ▶ Physical inactivity
- ▶ Home environment
- ▶ Vision
- ▶ Medication Use
- ▶ Fear of falling
- ▶ Social isolation
- ▶ Weakness
- ▶ Improper use of assistive devices

You CAN'T change

- ▶ Age
- ▶ Gender
- ▶ Ethnic background

Fear of falling

- Anxiety and a fear of falling can lead to a reduction in activity and willingness to mobilise. Loss of confidence following a fall can also become disabling. Being supportive and reassuring can help to reduce anxiety accompanied by appropriate supervision for mobility.

Suggested actions to reduce risk:

- Provide reassurance and encouragement.
- Enable regular and safe opportunities to mobilise.
- Consider referral to a Physiotherapist for assessment of mobility.
- Consider referral to an Occupational Therapist for confidence building whilst participating in activities of daily living.

Why does a fear of falling matter?

- May stop you from activities
- Legs weaken with inactivity
- Inactivity leads to falls
- May make the person feel alone
- May cause depression



Do you limit activities?

- **Fear of Falling** is a lasting concern about falling that may cause a person to stop doing activities s/he remains able to do.

Tinetti & Powell, 1993



Incontinence

- As with falling, there is a misconception that incontinence is a natural part of ageing. Incontinence is very treatable but it is essential that it is diagnosed properly.

Type	Symptoms
Stress incontinence	Occurs when urine leaks as pressure is put on the bladder, for example, during exercise, coughing, sneezing, laughing, or lifting heavy objects. It's the most common type of bladder control problem in younger and middle-age women. It may begin around the time of menopause.
Urge incontinence	Happens when people have a sudden need to urinate and aren't able to hold their urine long enough to get to the toilet. It may be a problem for people who have diabetes, Alzheimer's disease, Parkinson's disease, multiple sclerosis, or stroke.
Overflow incontinence	Happens when small amounts of urine leak from a bladder that is always full. A man can have trouble emptying his bladder if an enlarged prostate is blocking the urethra. Diabetes and spinal cord injury can also cause this type of incontinence.
Functional incontinence	Occurs in many older people who have normal bladder control. They just have a problem getting to the toilet because of arthritis or other disorders that make it hard to move quickly.

Incontinence

- There is a very strong link between urinary incontinence and falls in the older person.

Suggested actions to reduce risk:

- Consider referral to incontinence service.
- Develop a toileting regime.
- Ensure adequate hydration during the day.
- Provide commode if necessary/sit near the toilet.



Poor balance and restricted mobility

- Maintaining balance requires a complex interaction between a number of different systems in the body.

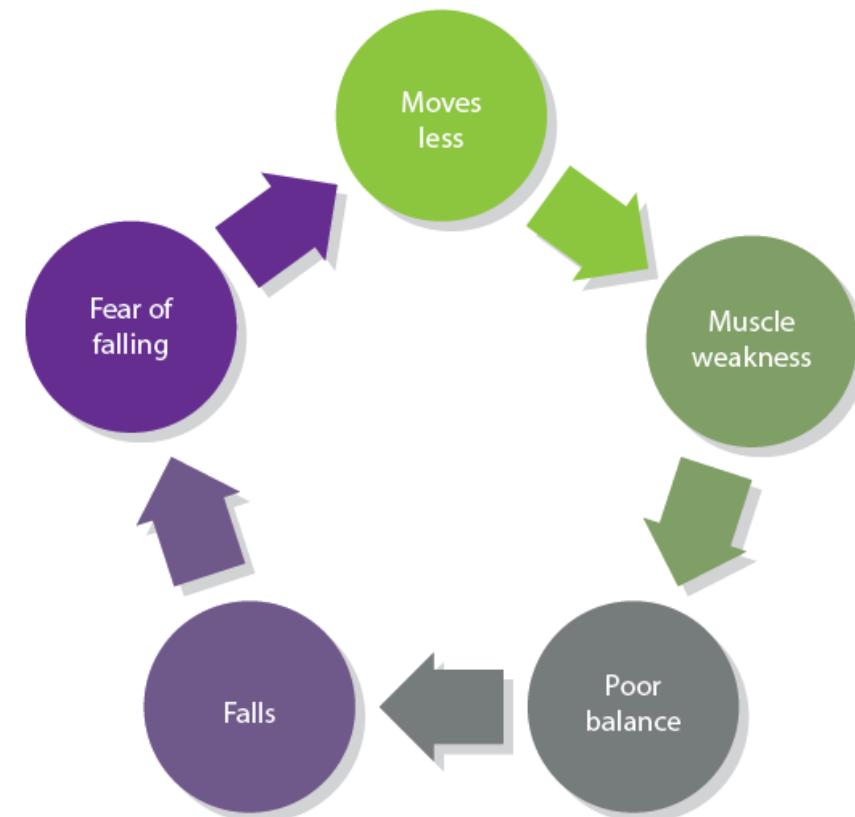
Suggested actions to reduce risk:

- Ensure mobility aids are used correctly.
- Ensure mobility aids are in good repair.
- Provide supervision as required.
- Offer regular opportunities to mobilise.
- Refer to Physiotherapist.
- Ensure people who are known not to ask for help are not left unsupervised on commodes etc.



Poor balance and restricted mobility

- Restricted mobility can result from underlying medical conditions that reduce joint movement and cause muscle weakness.



Cognitive impairment

- Cognitive impairment may be associated with learning disability or may be caused by a number of different conditions, for example different types of dementia, stroke, multiple sclerosis, and alcoholism. People with a learning disability are at risk of developing early dementia.
- Cognitive impairment can also produce variations in the way our environment is perceived.

Suggested actions to reduce risk:

- Do not leave the person unattended on commodes, in showers.
- Request a medical review of cognition – monitor for any changes in behaviour.
- Medicines review.
- Investigate the person's previous patterns through liaison with friends and family. Incorporate into daily routine wherever possible.
- Consider the need for falls prevention equipment such as chair sensors.
- Keep friends and family informed as appropriate.
- Dementia friendly environments.

Fall, Balance

- The prevalence of balance and gait deficits increases with age and is associated with the increased incidence of falls seen in the elderly population; these falls are associated with significant morbidity and mortality.

Definitions and Nature of Balance

- Balance is the ability to keep the body's center of gravity (COG) within the base of support when maintaining a static position, performing voluntary movements, or reacting to external disturbances.
- Static
- Dynamic
- Functional

Static, Dynamic, and Functional Balance

- Static balance is the ability to maintain COG within the supporting base while standing or sitting.
- Dynamic balance is maintaining an upright position while COG and base of support are moving and the COG is moving outside of the supporting base.
- Functional balance is the ability to perform daily movement tasks requiring balance.

Factors Affecting Balance and Risk of Falling

- The further the COG from the base of support, the lower the stability.
- The broader the base of support, the higher the stability.
- Resistance training and stretching programs may be useful for maintaining and improving balance.
- Exercising on unstable surfaces can challenge balance response and provide variety.

Factors Affecting Balance and Risk of Falling (continued)

- Balance, resistance, and flexibility training programs are more effective than endurance training for reducing risk of falling.
- No optimal fall prevention program has been identified yet.



Gait & Aging

- No clearly accepted standards to define normal Gait in Older Adults
- Changes at Aging
 - 10-20 % reduction in Gait Velocity & Stride Length.
 - Increase Stance Width.
 - Increase time spent in the Double Support Phase.
 - Bent Posture.
 - Slow & Wide Based Gait.
- Up to 20% maintain normal Gait pattern into very old age, reinforcing that Aging not inevitably accompanied by disordered Gait.

Gait & Balance Disorder

- Most common causes of falls in Older Adults
- Evaluation of Gait & Balance disorder parallels the evaluation of **FALLS**
- It can lead to
 - Injury & Disability
 - loss of independence & reduces level of functioning
 - limited quality of life
 - Increase morbidity & mortality
- 60% 80-84 yrs, 25% 70-74 yrs, & 30% 65 yrs have difficulty :
 - walking 3 blocks or
 - climbing 1 flight of stairs
- 20 % require Assistive Devices to ambulate

American Geriatrics Society/British Geriatrics Society clinical practice guideline: prevention of falls in older persons <http://www.medcats.com/FALLS/frameset.htm>. Accessed June 3, 2010

Evaluation

- **History**

- Acute and Chronic Medical problems
- Complete ROS
- Falls History (Previous Falls, Injury resulted, circumstances, & associated Sx.)
- Nature of Difficulty with Walking (e.g. Pain, imbalance)
- Surgical History
- Usual Activity, mobility status, and level of function

- **Medication review**

- New medication or dosing review
- Number and type of medications

Hough JC, McHenry MP, Kammer LM. Gait disorders in the elderly. *Am Fam Physician*. 1987;35(6):191-196

Sudarsky L. Clinical approach to gait disorders of aging: an overview. In: Masdeu JC, Sudarsky L, Wolfson L, eds. *Gait Disorders of Aging: Falls and Therapeutic Strategies*. Philadelphia, Pa.: Lippincott-Raven; 1997:147-157

Evaluation

- **Presence of environmental Hazards**

- Clutter
- Electrical Cords
- Lack of grab bars near bathtub & toilets
- Low chairs
- Poor Lighting
- Slippery Surfaces
- Throw rugs

Evaluation

- **Physical Examination**

- **Vitals**
 - (Wt. Ht. Orthostatic BP & Pulse)
- **Affective/cognitive**
 - (Delirium, Dementia, Depression, Fear of Falling)
- **Cardiovascular**
 - (Murmur, Arrhythmias, Carotid Bruit, Pedal Pulses)
- **Musculoskeletal**
 - (Joint swelling, deformity, Limited ROM or instability)
- **Neurological**
 - (M/S strength, tone, reflexes, coordination, sensation tremors, cerebellar, vestibular, sensory & proprioception)

Intervention

- Interventions may impact important Functional outcomes, including Reduction in
 - Falls
 - Fear of falling
 - Overall limitation in mobility

Gillespie LD, Gillespie WJ, Robertson MC, Lamb SE, Cumming RG, Rowe BH. Interventions for preventing falls in elderly people. Cochrane Database Syst Rev. 2009;(2):CD000340.

Tinetti ME, Baker DI, McAvay G, et al. A multifactorial intervention to reduce the risk of falling among elderly people living in the community. N Engl J Med. 1994;331(13):821-827.

Intervention

- Other options includes
 - EXERCISE INTERVENTION & PHYSICAL THERAPY
 - Target strengths
 - Balance training
 - Functional exercises
 - Flexibility
 - Evidence supports HOME ENVIRONMENT ASSESSMENT prevent falls & related injuries
- Above Interventions augment Gait, Function & Reduces number of falls

Schenkman M, Rieger-Krugh C. Physical intervention for elderly patients with gait disorders. In: Masdeu JC, Sudarsky L, Wolfson L, eds. *Gait Disorders of Aging: Falls and Therapeutic Strategies*. Philadelphia, Pa.: Lippincott-Raven; 1997:327-353.

Interventions

- Modest improvement in Gait & Balance achievable by ASSISTIVE DEVICES.
- Unfortunately, most cases its unlikely that Gait Disorder are reversible

Evidence-Based Fall Prevention Programs

Exercise Recommendations



Balance Training

Designing Balance Training Programs

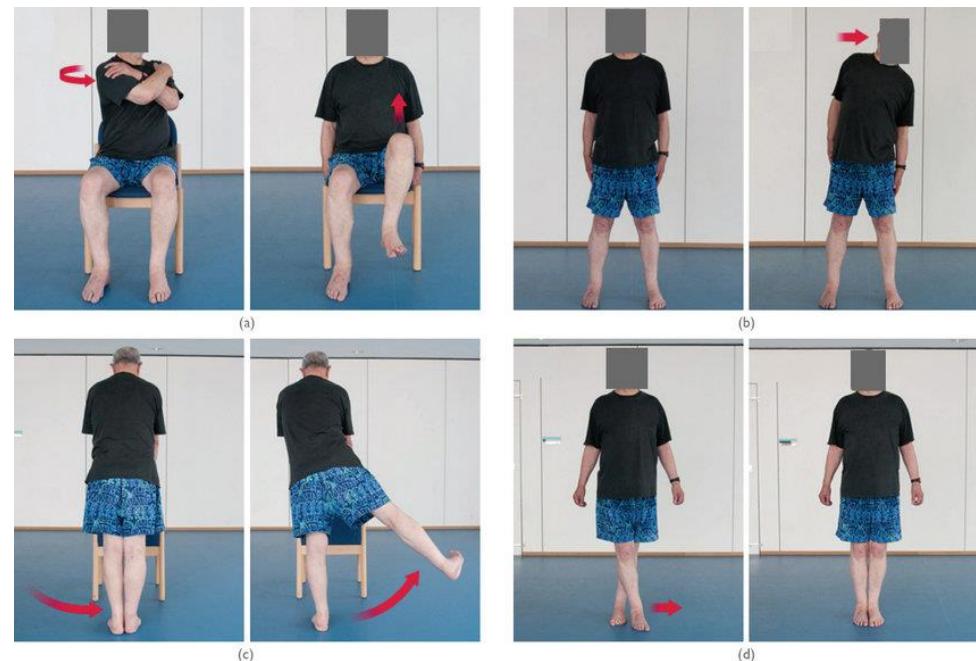
- 2008 Physical Activity Guidelines for Americans suggests balance training at least 3 days a week for inactive and active older adults (≥ 65 years).
- ACSM stated that balance, agility, and proprioceptive training is effective for preventing falls.



Designing Balance Training Programs (continued)

General guidelines:

- Engage in balance activities 2 or 3 days a week.
- Progressively increase difficulty of the balance exercises by using a narrower base of support.
- Include dynamic movements that challenge the COG.
- Use exercises that stress postural muscles.



Balance Training Exercise Prescription

- Resistance training, stretching programs, and numerous other forms of exercise may help maintain and improve balance.
- Uneven surfaces and computerized balance training systems may add variety and challenge to balance training programs.



Balance Training Exercise Prescription (continued)

- Exercises specifically designed to improve functional ability of lower extremities may help improve balance and prevent falls in older adults.
- Square-stepping exercise is better than regular walking in reducing risk factors associated with falling.



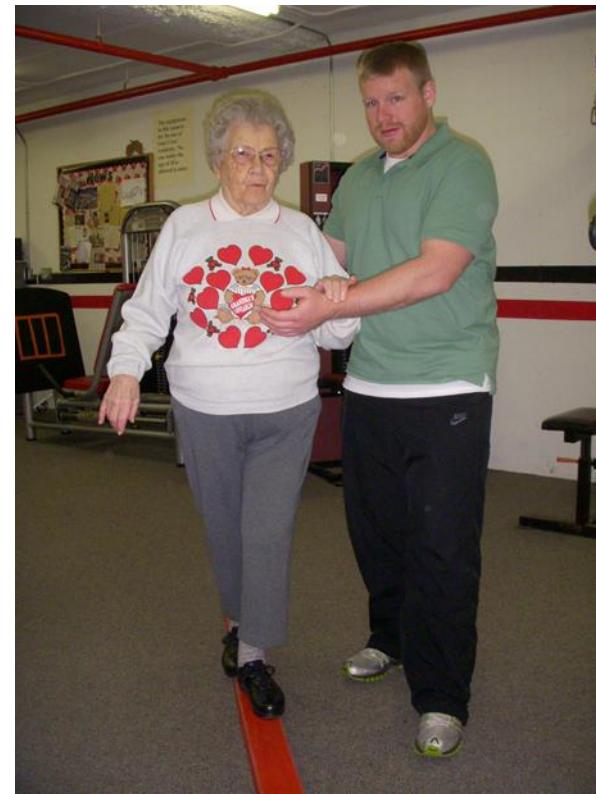
Balance Training Exercise Prescription (continued)

- Resistance training as an isolated intervention is not shown to consistently improve balance of older adults.
- Therefore, strength alone is not the major underlying mechanism for poor balance.



Otago Exercise Program (OEP)

- ▶ Done one-to-one with a trained PT and is delivered as part of a complete PT program
- ▶ Includes exercise and walking program designed for you
- ▶ If you or your physician feel you should begin with PT, be sure your PT includes the OEP
- ▶ Great start for later Stepping On® (SO) program



Matter of Balance

- ▶ Eight weekly 2-hour sessions including peer group discussion, exercise, education, and some behavior modification
- ▶ All exercises can be done in sitting or supported standing
- ▶ Excellent for people who are fearful of falling
- ▶ Great start for later Stepping On



Stepping On® (SO)

- ▶ Seven weekly 2-hour classes including peer discussion, exercise, expert lectures
- ▶ Great follow-up to Otago (OEP)
- ▶ SO classes include standing exercises that are done by a chair independently
- ▶ You should feel safe standing and walking independently before you begin SO
- ▶ Visit <https://wihealthyaging.org/stepping-on>

Tai Chi



- ▶ Fantastic program for ongoing fitness and balance training
- ▶ Does not include educational component
- ▶ Classes are usually ongoing and not limited to certain weeks
- ▶ Participants should be able to stand on one leg for 5 seconds

Ghandali E, Moghadam ST, Hadian MR, Olyaei G, Jalaie S, Sajjadi E. The effect of Tai Chi exercises on postural stability and control in older patients with knee osteoarthritis. *J Bodyw Mov Ther*. 2017;21(3):594-598. doi:10.1016/j.jbmt.2016.09.001

A brief review of the evidence linking cognitive function to falls

- Evidence:
- People with cognitive impairment fall two times that of cognitively intact people.
- Neurologic-based gait abnormalities predict development of dementia 6-10 years later.
- 60% of cognitively impaired people fall annually.
- 80% of people with dementia fall.
- Linking cognitive function to falls:
- Falls among people with dementia are not only a motor dysfunction.
- A connection between cognition and gait exists because gait utilizes cognitive function.
- Gait decline may be a biomarker for future development of full-blown cognitive decline

Karami M, Hadian M R, Abdolvahab M, Raji P, Yekaninejad S, Montazeri A. Effects of mental practices on quality of life in elderly men (60-80yrs). mrj. 2014; 8 (3) :21-30.

Attention

- It is now well-accepted that walking is not just a rhythmic and automated process, but also demands attention. These demands increase with age, and with the complexity of the task being performed.
- More specifically, the ability to inhibit inappropriate responses and selectively attend to relevant environmental features while suppressing other inputs.

Shiravi Z., Talebian S., Hadian MR., Oliaie GR., Effect of cognitive task on postural control of the patients with chronic ankle sprain .Journal of Foot and Ankle Research volume 5, Article number: P24 (2012)

Attention contributes to gait & fall risk

- Attention is a dynamic cognitive function involving sensory perception, stimulus selection, stimulus filtering, and action.
- Dual-tasking evidence:
 - DT is a common aspect to Activities of Daily Living.
 - DT effects are larger in older fallers than in older non-fallers.
 - DT effects are larger in people with neurological disease.
 - DT effects on gait variability and on fall risk are controversial.

Dual Task

- Dual-task interference occurs when there are competing demands for attentional resources . Specifically, when the attentional demands of the two tasks exceed the total attentional capacity, performance in one or both of the tasks declines relative to single-task performance.

Shiravi Z., Talebian S., Hadian MR., Oliaie GR., Effect of cognitive task on postural control of the patients with chronic ankle sprain. *Journal of Foot and Ankle Research* volume 5, Article number: P24 (2012)

Pirayeh N, Talebian S, Hadian M R, Olyaei G R, Jalaei S. Assessment of effect of cognitive task on postural control in female patients with knee osteoarthritis. mrj. 2013; 7 (2) :35-41

Dual Task

- The interplay between physical and cognitive domains is evaluated using the dual-task (DT) paradigm, which refers to the ability to perform two tasks simultaneously. Specifically, the two tasks refer to mobility tasks (e.g. a walking task) and a simultaneous additional attention task, of either the cognitive (e.g. an arithmetic task) or motor type (e.g. holding a glass of water)



Shiravi Z., Talebian S., Hadian MR., Oliaie GR., Effect of cognitive task on postural control of the patients with chronic ankle sprain .Journal of Foot and Ankle Research volume 5, Article number: P24 (2012)

Dual Task

- Dual-task interference during walking can substantially limit mobility and increase the risk of falls among community dwelling older adults.

Khanmohammadi R, Talebian S, Hadian MR, Olyaei G, Bagheri H. Preparatory postural adjustments during gait initiation in healthy younger and older adults: Neurophysiological and biomechanical aspects. *Brain Res.* 2015;1629:240-249.
doi:10.1016/j.brainres.2015.09.039

DT exercises

- DT exercises that incorporate balance or gait tasks and additional cognitive tasks might reduce the attentional resources required for mobility tasks. Consequently, additional central resources would be available for carrying out additional attention tasks (Pellecchia, 2005).



Preliminary support for cognitive dual-task training using computer games

Li KZ, et al. 2010: study (N=20, healthy older adults were assigned to either computer game training or control groups).

- Measured cognition, balance, and mobility (single-support balance, dynamic posturography, sit-to-stand, 40-foot walk) under single- and dual-task conditions.
- The computer game training group completed five sessions of cognitive dual-task training spaced at least 2 days apart. The two tasks involved making two-choice decisions to visually presented stimuli.
- The training group showed significant improvements in body sway during single-support balance and center of gravity alignment during double-support dynamic balance. The control group showed no appreciable improvements.
- Cognitive dual-task training-related positively benefitted gross motor performance.

Preliminary support for using treadmill and virtual reality dual-task training to improve motor learning and reduce fall risk

Mirelman A, et. al. 2011: study (N=20, people age 67.1 ± 6.5 years and had a mean Parkinson's disease duration of 9.8 ± 5.6 years).

- 18 sessions (3 per week) of progressive intensive treadmill training with virtual obstacles (TT + VR).
- Outcome measures included gait under usual-walking and dual-task conditions and while negotiating physical obstacles.
- Post-training, gait speed significantly improved during usual walking, during dual task, and while negotiating over ground obstacles.
- Dual-task gait variability decreased (ie, improved gait performance).
- Gains in functional performance measures and retention effects, 1 month later, were also observed.



DT exercises

- Task automaticity can be increased by repetitive practice . Alternatively, dual-task interference may be improved through the repeated practice of dual-tasking (i.e., dual-task interventions) in accordance with the principles of task-specific training.

Studies:

- Recently, several studies in healthy older adults or in individuals with neurodegenerative diseases (e.g., Parkinson's disease) showed an improvement in balance and gait ability, using DT training. Examples of DT training included balance or gait exercises with the concurrent performance of an additional cognitive task such as **spelling words backwards, computing mental arithmetic counting or** or motor tasks such as manipulation of objects.

Brustio PR, Rabaglietti E, Formica S, Liubicich ME. Dual-task training in older adults: The effect of additional motor tasks on mobility performance. *Arch Gerontol Geriatr*. 2018;75:119-124. doi:10.1016/j.archger.2017.12.003

Gonçalves, Ansai, Masse, Vale, Takahashi, Andrade, Dual-task as a predictor of falls in older people with mild cognitive impairment and mild Alzheimer's disease: a prospective cohort study, Brazilian Journal of Physical Therapy, Volume 22, Issue 5, 2018.

Studies:

- For example, Silsupadol and colleagues (2009) conducted an intensive balance DT training with three sessions per week for 1 month and reported improvements and benefits in motor and cognitive performance under DT conditions compared with single-task (ST) training. Similarly, using **aerobic exercises combined with cognitive tasks** (i.e. phonetic and verbal fluency and arithmetic tasks), Gregory and colleagues (2016) demonstrated an improvement in gait characteristics (i.e. gait velocity, step length, stride time variability) under DT conditions compared with aerobic exercises alone.

Karen Z. H., Louis, Anat, Inbal, Jeffrey M. Cognitive Involvement in Balance, Gait and Dual-Tasking in Aging: A Focused Review From a Neuroscience of Aging Perspective . *Frontiers in Neurology*. 2018; 9: 913.

Wollesen, B., Schulz, S., Seydell, L. *et al.* Does dual task training improve walking performance of older adults with concern of falling?. *BMC Geriatr* **17**, 213 (2017). <https://doi.org/10.1186/s12877-017-0610-5>

conclusion

- DT performance is common and relevant to most activities of daily living, and the inability of older adults to efficaciously perform two different tasks may have several implications. For this reason, physical training (e.g. fall prevention programmes) should incorporate exercises to enhance DT performance (Pellecchia, 2005).

Assistive Devices

- 6.1 million use assistive devices, 2/3 >65 years of age
- ASSISTIVE DEVICES IMPROVE:
 - Balance
 - Reduce pain
 - Compensate for weakness or injury
 - Increase Mobility & Confidence
- ASSISTIVE DEVICE SELECTION DEPENDS:
 - Amount of support assistive device offers
 - Coordination required
 - Strength, ROM, Balance, Stability, General Condition, & WB restrictions

Bateni H, Maki BE. Assistive devices for balance and mobility: benefits, demands, and adverse consequences. *Arch Phys Med Rehabil.* 2005; 86(1): 134-145.
Faruqui SR, Jaeblon T. Ambulatory assistive devices in orthopaedics: uses and modifications. *J Am Acad Orthop Surg.* 2010; 18(1): 41-50.

Assistive Device

- Patients get Assistive Device without recommendations from Medical Professional
- Evaluation should be done routinely for proper Fit & Use
 - Cane preferred for balance with one UE
 - Crutches or a walker appropriate for Both
- CORRECT HEIGHT & FIT
 - Correct height of cane/walker
 - At the level of the patient's wrist crease, as measured with the patient standing upright with arms relaxed at his or her sides, the patient's elbow naturally flexed at 15 – 30 degree angle

Assistive Devices

- **INSTRUCTIONS FOR PROPER USE:**

- **Cane:**

- Should be held contralateral to weak/painful LE & advanced simultaneously with Contralateral Leg.
 - Need upright posture without forward or lateral leaning.
 - Take time when turning & should not lift the device off the ground.

- **Walker:**

- Both feet should stay between the posterior legs or wheels.
 - Need upright posture without forward or lateral leaning.
 - Take time when turning and should not lift the device off the ground.

Kumar R, Roe MC, Scrimin OU. Methods for estimating the proper length of a cane. *Arch Phys Med Rehabil.* 1995; 76(12): 1173-1175

Assistive Devices

- **INSTRUCTIONS FOR PROPER USE**

- **Navigating Stairs with Cane/Walker:**
 - Patients with unilateral LE impairment advance the Unimpaired Extremity first when going up stairs **AND** advance the Impaired Extremity first when going down stairs.
 - Simply remember this phrase,
“Up with the good and down with the bad.”

CANES

STANDARD CANE

- Indications:
 - Mild ataxia (sensory, vestibular, or visual)
 - Mild arthritis
- Advantages:
 - Inexpensive
 - Adjustable
 - Improves balance
- Disadvantages:
 - Umbrella handle cause carpal tunnel syndrome
 - Not for weight bearing



Figure 1. Standard cane.

CANES

OFFSET CANE

- Indication:
 - Moderate arthritis
- Advantages:
 - Inexpensive
 - Intermittent weight bearing
 - Shotgun handle put less pressure on palm
- Disadvantages:
 - Commonly used incorrectly



Figure 2. Offset cane. The curved handle helps distribute weight over the cane.

Liu HH, Eaves J, Wang W, Womack J, Bullock P. Assessment of canes used by older adults in senior living communities. *Arch Gerontol Geriatr.* 2011; 52(3): 299-303

CANES

QUADRIPOD

- Indications:
 - Hemiparesis
- Advantages:
 - Increased base of support
 - bear large weight
 - Stands freely on its own
- Disadvantages:
 - Slightly heavier
 - Awkward to use correctly with all four points on ground simultaneously

Laufer Y. Effects of one-point and four-point canes on balance and weight distribution in patients with hemiparesis. *Clin Rehabil.* 2002; 16(2): 141-148



Figure 3. Quadripod cane. These canes have four legs for increased stability.

CRUTCHES

AXILLARY CRUTCHES

- Indication:
 - Lower extremity fracture
- Advantages:
 - Inexpensive
 - Completely redistribute weight off of lower extremities
 - Permits 80-100 % weight-bearing support
- Disadvantages:
 - Difficult to learn to use
 - Requires energy & strength
 - Risk of nerve or artery compression



Figure 4. Axillary crutches. The height of the crutches leaves ample space between the crutch and axilla.

CRUTCHES

FOREARM CRUTCHES:

- Indication:
 - Paraparesis
- Advantages:
 - Frees hands without having to drop crutch
 - Less cumbersome to use, particularly on stairs
 - No Axillary compression
- Disadvantages:
 - Permits only occasional weight bearing



Figure 5. Forearm crutches. These are easier to use on stairs than other types of crutches.

WALKERS

STANDARD WALKER

- Indications:
 - Severe myopathy
 - severe neuropathy
 - Cerebellar ataxia
- Advantages:
 - Most stable walker
 - Folds easily
- Disadvantages:
 - Slower
 - Needs to be lifted up with each step
 - Less natural gait



Figure 6. Standard walker. These walkers require lifting when propelling forward.

WALKERS

FRONT-WHEELED WALKER

- Indications:
 - Severe myopathy
 - Severe neuropathy
 - Paraparesis
 - Parkinsonism
- Advantages:
 - Maintains normal gait pattern
 - No need to be lifted up with each step
- Disadvantages:
 - Large turning arc
 - Less stable



Figure 7. Front-wheeled walker.

Cubo E, Moore CG, Leurgans S, Goetz CG. Wheeled and standard walkers in Parkinson's disease patients with gait freezing. *Parkinsonism Relat Disord*. 2003; 10(1): 9-14

WALKERS

ROLLATOR

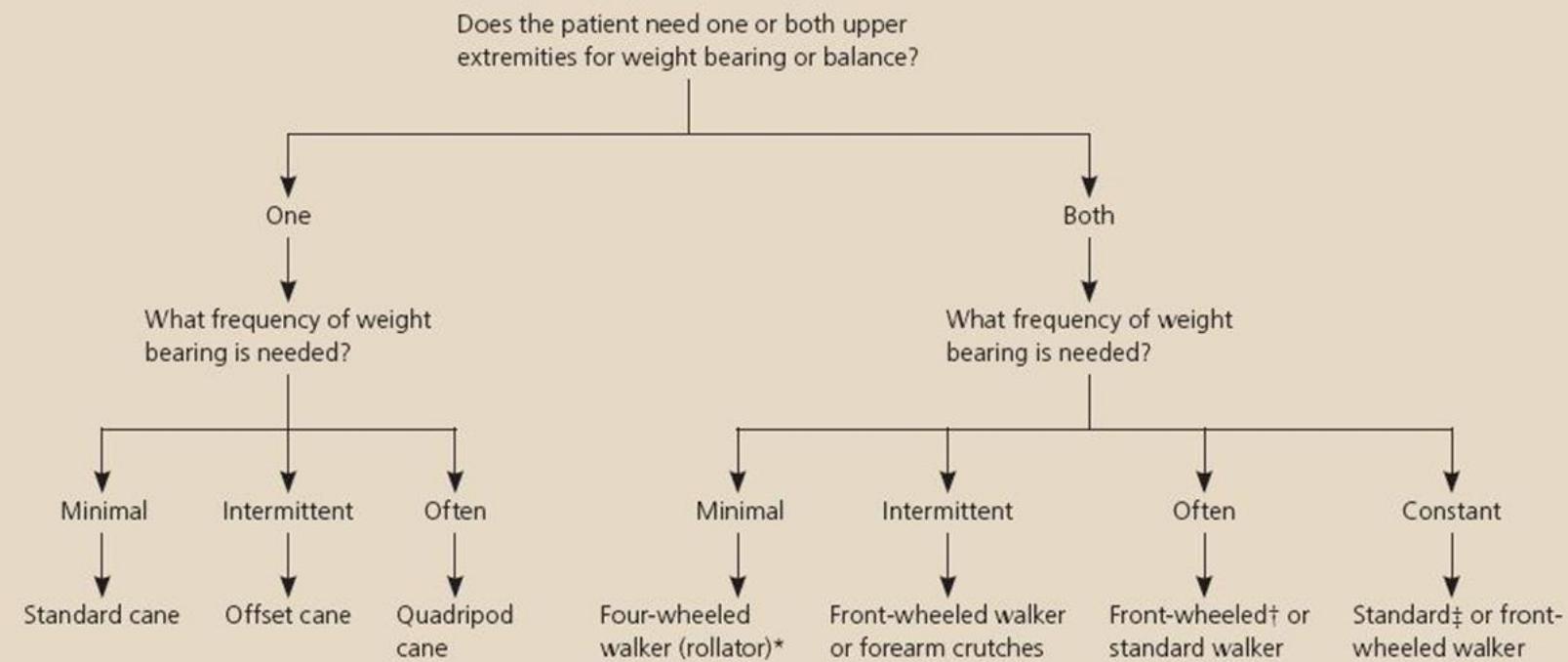
- Indications:
 - Moderate arthritis
 - Claudication
 - Lung disease, CHF
- Advantages:
 - Easy to propel
 - Highly movable
 - Small turning arc
 - Has seat & basket
- Disadvantages:
 - Not for weight bearing
 - Less stable
 - Does not fold easily



Figure 8. Four-wheeled walker. Although these walkers are easier to use than other types of walkers, they can roll forward unexpectedly and may increase fall risk.

Selection of AD

Geriatric Assistive Device Selection



*—Use with caution; this type of walker is appropriate if balance or cognitive impairment is mild and the patient could benefit from having a seat.

†—If the patient requires weight-bearing assistance, but not constantly, a front-wheeled walker may suffice.

‡—If the patient requires weight bearing all of the time, a standard walker may be preferred because it is more stable.

Assistive Devices

List providing stability & support from most to the least :

Parallel bars

Walker

Axillary crutches

Forearm crutches

Two canes

One cane

Assistive Devices

List requiring Coordination from least to the most:

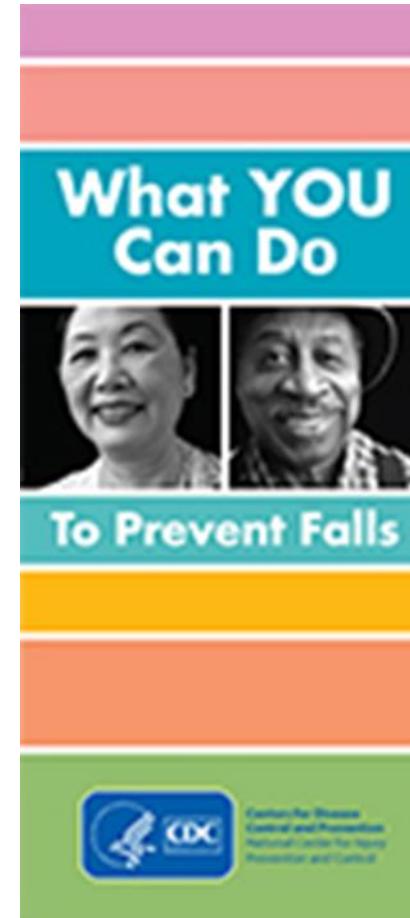
- Parallel bars
- Walker
- One cane
- Two canes
- Axillary crutches
- Forearm crutches

Messages:

- Emerging evidence supports a cognitive component to measuring falls and treating fall risks.
- Preliminary pharmacologic and non-pharmacologic cognitive interventions can impact functional and physical health domains, and visa versa.
- Dual-task training may reduce fall frequency and fall risks in people with impairments in cognitive, functional and physical health.
- More research is needed!

What can YOU do to prevent falls?

- ▶ Exercise to improve your balance and strength
- ▶ Have your doctor or pharmacist review your medicines
- ▶ Have your vision checked
- ▶ Make your home safer



REMEMBER

Move More!

Enjoy Every Moment...

