



FALLS

in Parkinson's Disease (PD)

By: Justin Martello, MD
Christiana Care Neurology Specialists

Adapted from slides by: Stephen Grill, MD, PHD



CHRISTIANA CARE
HEALTH SYSTEM

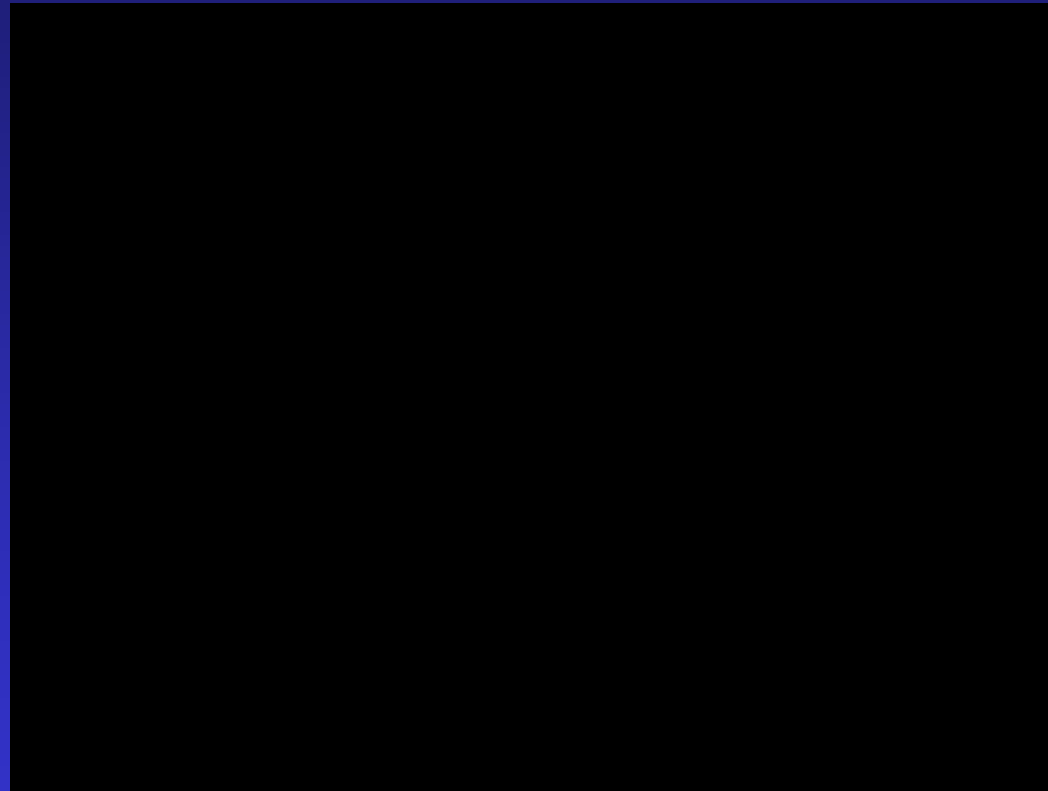
Objectives

1. What is a fall?
2. Fall Ex's.
3. Gait and Types of Gait Disorders
4. Falls in PD
5. Fall Prevention
6. Future therapies

What is a fall?

A sudden, unintentional change in position causing an individual to land at a lower level, on an object, the floor, or the ground, other than as a consequence of sudden onset of paralysis, epileptic seizure, or overwhelming external force.
(AAN Fall Outcome Measure)

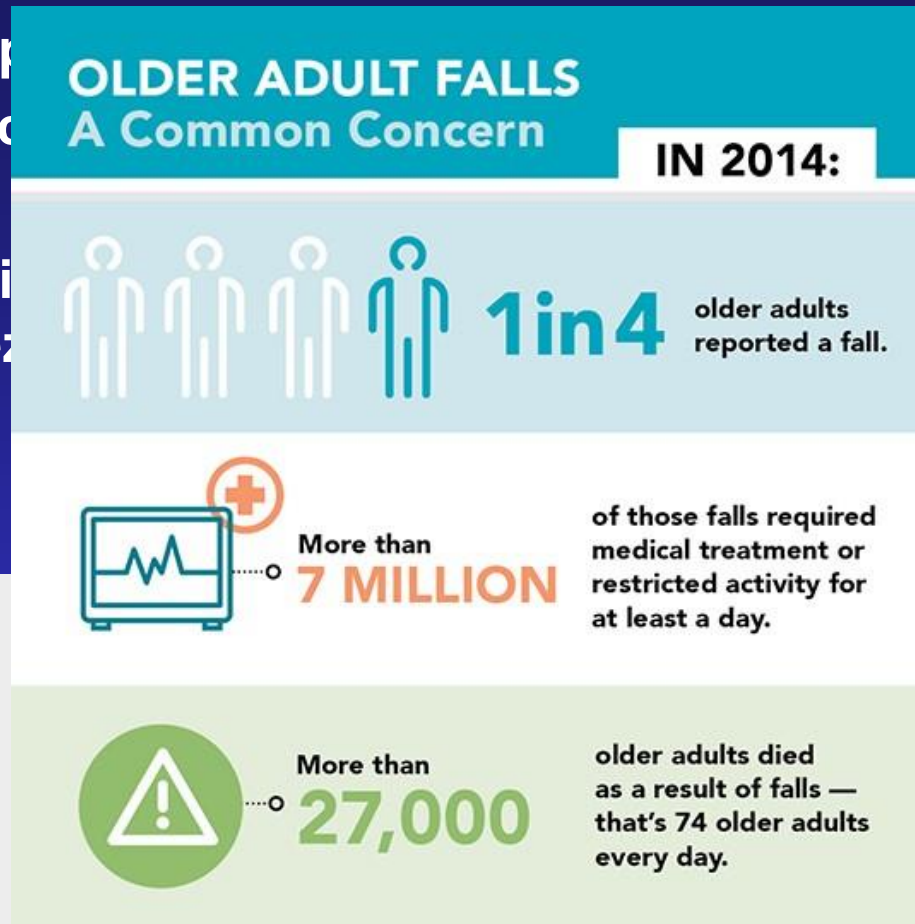
Fall Examples?



Falls in Parkinson's Disease

- Falls and gait impairment
- Falls are “game-changers”
- Increased costs
- Medications are important for gait/balance/freezing

of poor quality of life



fall related injuries =
for people 65 yrs.+ =

\$30 billion
dollars
in medical costs



Parkinson's Gait

- Earliest abnormality is decreased arm swing
- Becomes slowed with short, shuffling uncertain steps
- Gait initiation and turning become difficult
- Postural reflexes are impaired
- Stooped posture
- Festinating gait: faster and faster walking as legs try to catch up to forward momentum
- Worsening balance impairment



Parkinson's Gait



0 - Normal



1 - Slowed, may shuffle



2 - Difficult, no assistance, may festinate



3 - Severe, needs assistance



4 - Essentially cannot walk

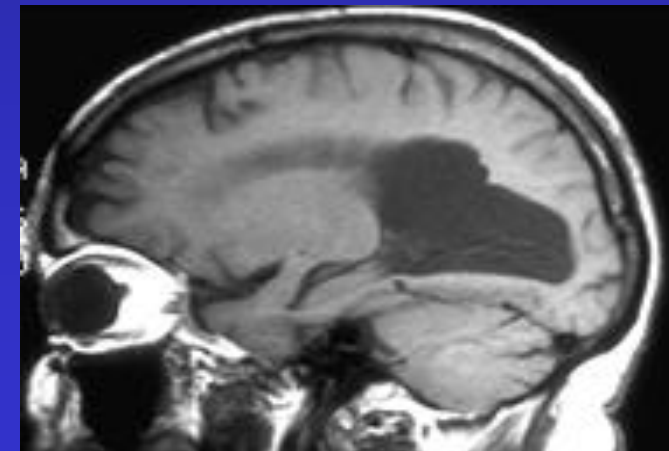
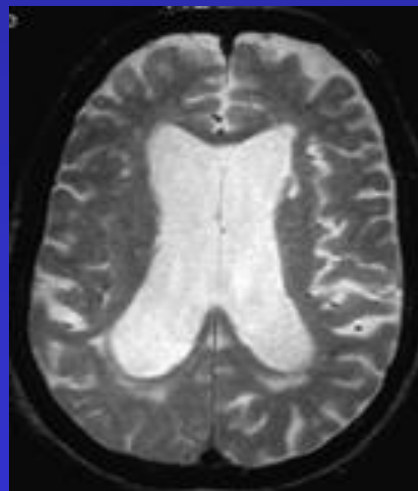
Freezing Gait

- Common in PD
- “Freezes” commonly occur when:
 - initiating gait
 - when turning
 - doorways and tight/crowded spaces
 - transitioning between different flooring
- Feels like feet are glued to the floor
- Once freezing is overcome, gait may be quite normal
- Sensory cues may be helpful
 - Visual
 - Auditory
 - Marching/side-to-side movements
 - Tactile?



Normal Pressure Hydrocephalus

- Syndrome of dementia, gait impairment and urinary incontinence
- Complex gait disorder with a tendency to lurch and fall
- May take short “magnetic” steps
- Fluid cavities in brain (ventricles) are enlarged



Senile/Multifactorial Gait Disorder

- A disorder characterized by stooped posture, wide base, reduced arm swing, stiff turns and balance impairment
- Multifactorial: visual loss, minor strokes, mild weakness, arthritis, sensory loss, injuries none of which on its own would impair gait

Balance Control Mechanisms

RQPCTRS01 NEW2/6/02

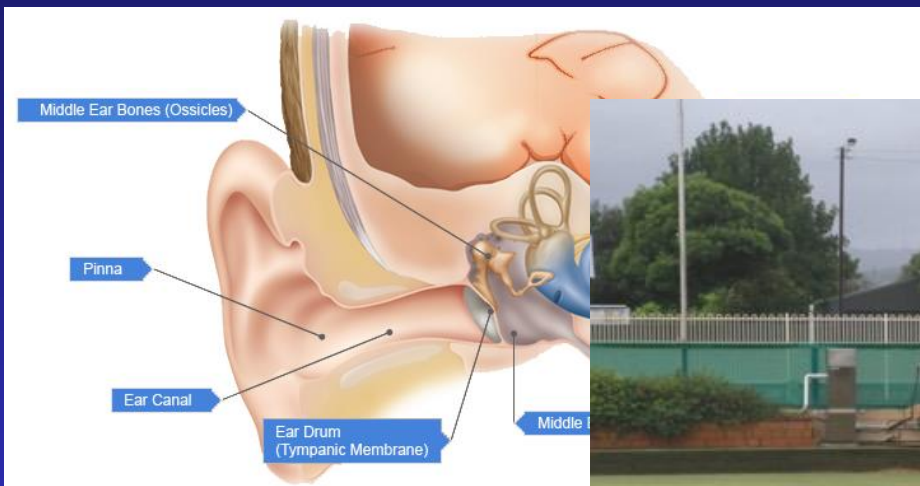
Vision



Strength

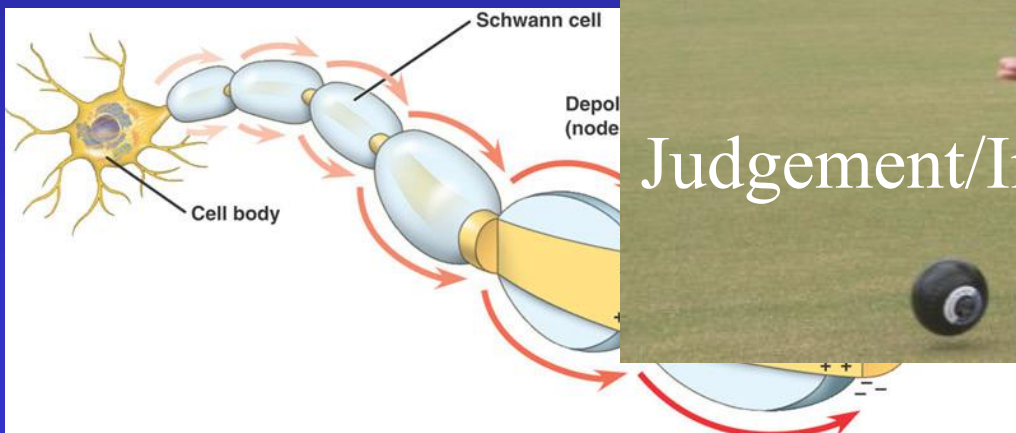


Vestibular/Inner Ear System



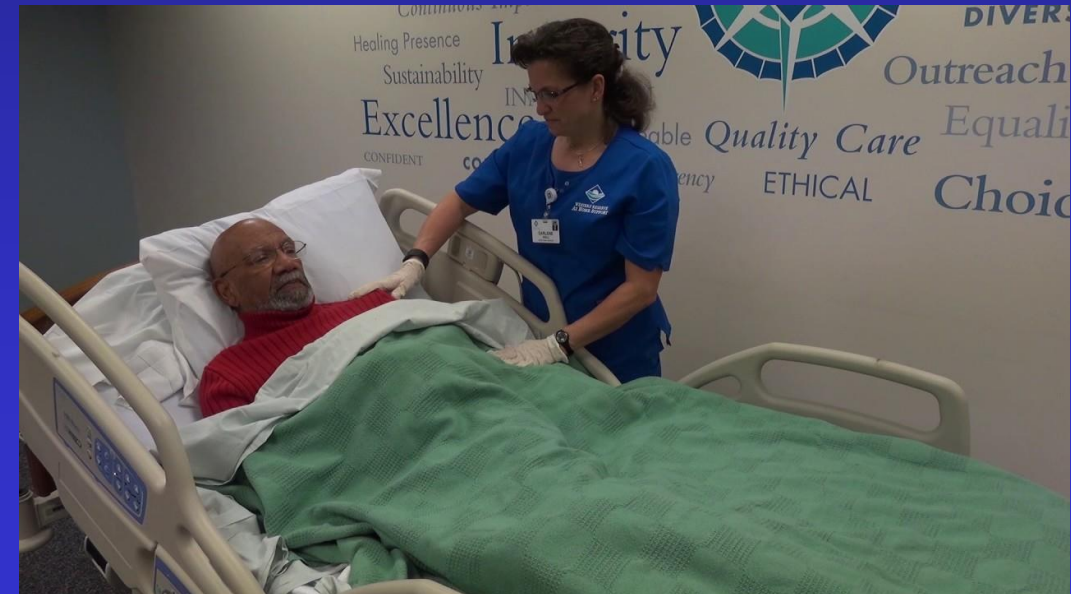
Cerebellum

Proprioception/Large fiber nerves



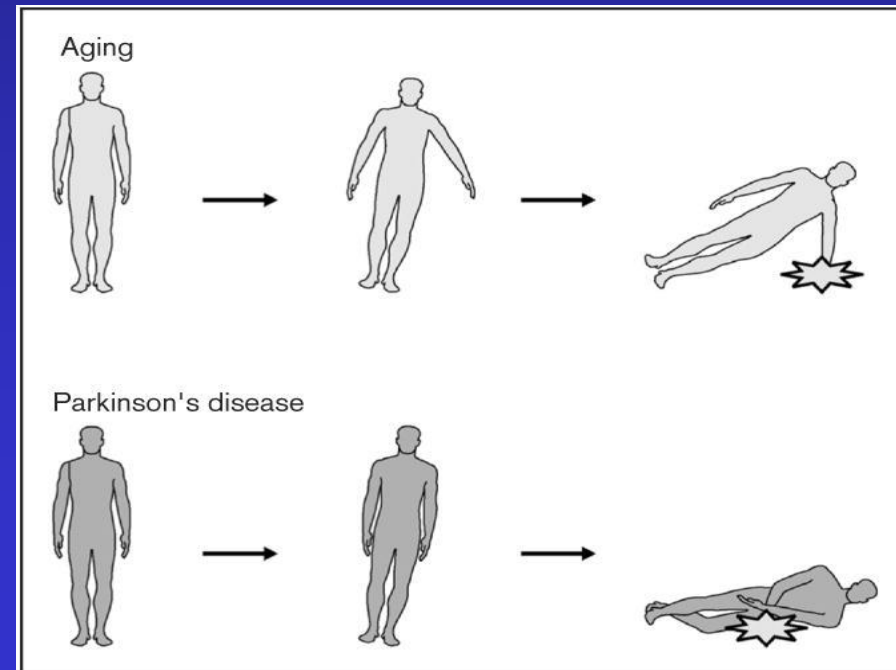
Falls in Parkinson's Disease

- Falls and injuries are common BUT **NOT OK** in PD
- Fall risk assessment important
- Medications are largely ineffective



Falls: Pathophysiology

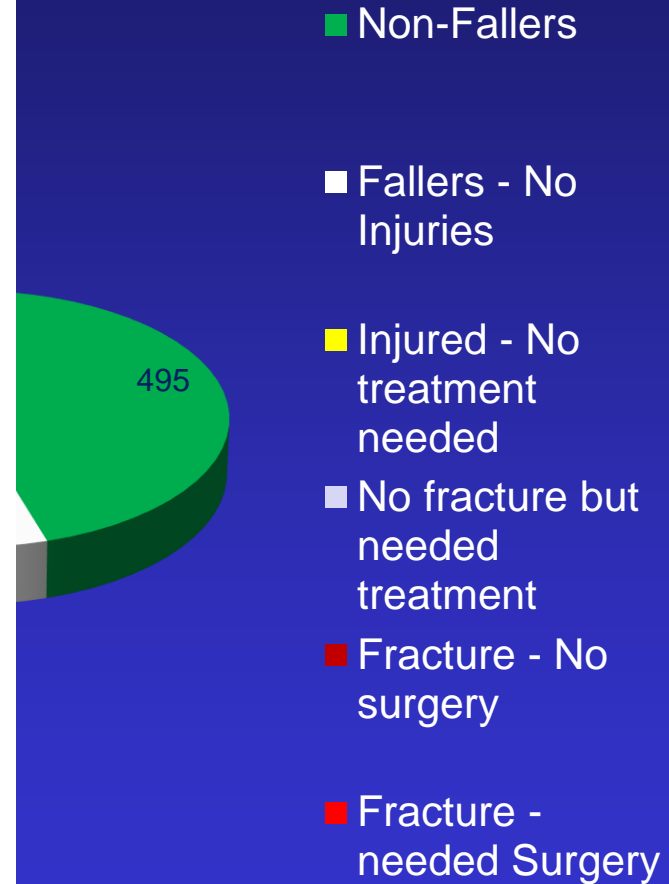
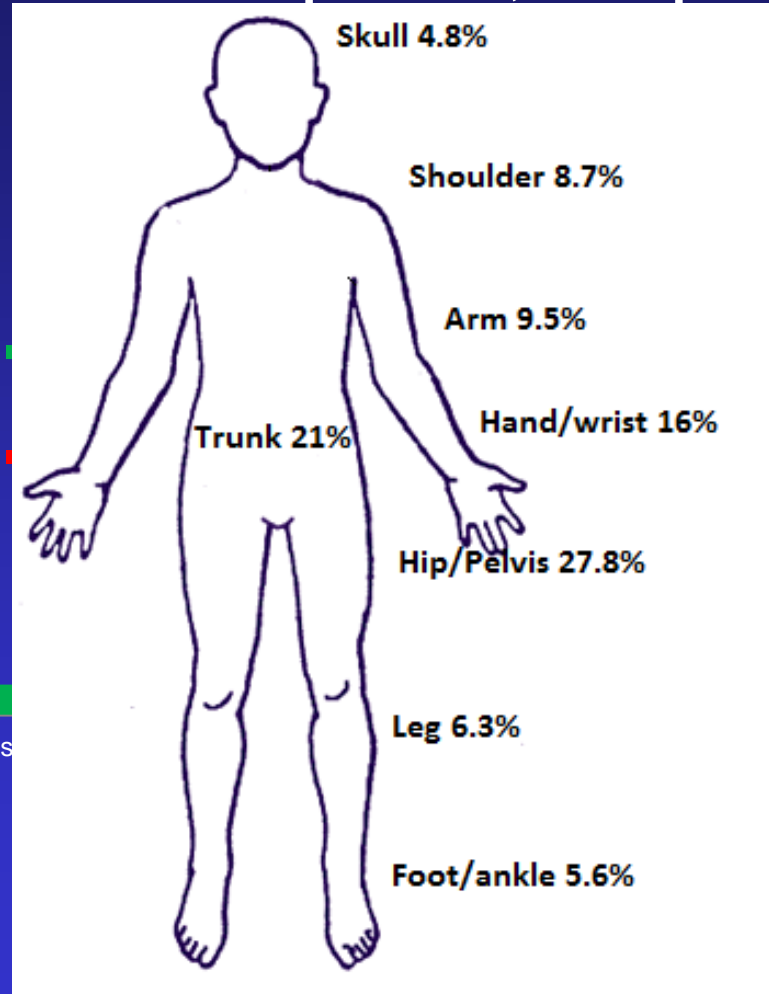
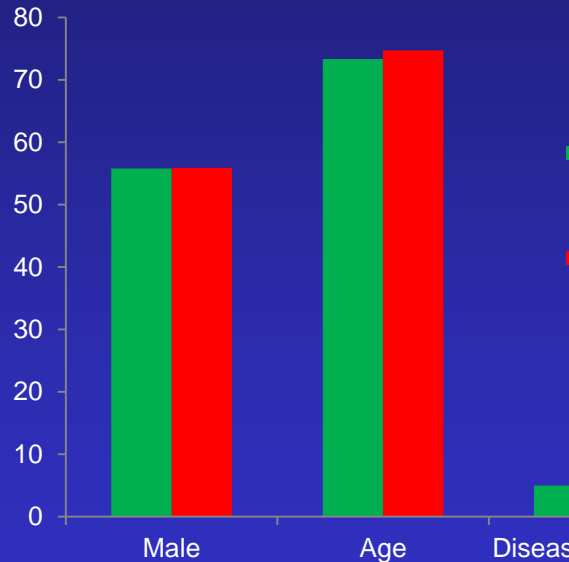
- Protective arm movements are delayed
- Axial stiffness
- ?Proprioceptive deficits (sensory loss)
- Freezing
- Impaired dual tasking
- Syncopal (fainting)
 - Orthostasis/
Orthostatic hypotension



Falls and Injuries Resulting from Falls Among Patients with Parkinson's Disease and Other Parkinsonian Syndromes

RS01 NEW2/6/02

- Survey mailed to 1,417 PD clinic patients; 1092 patients included

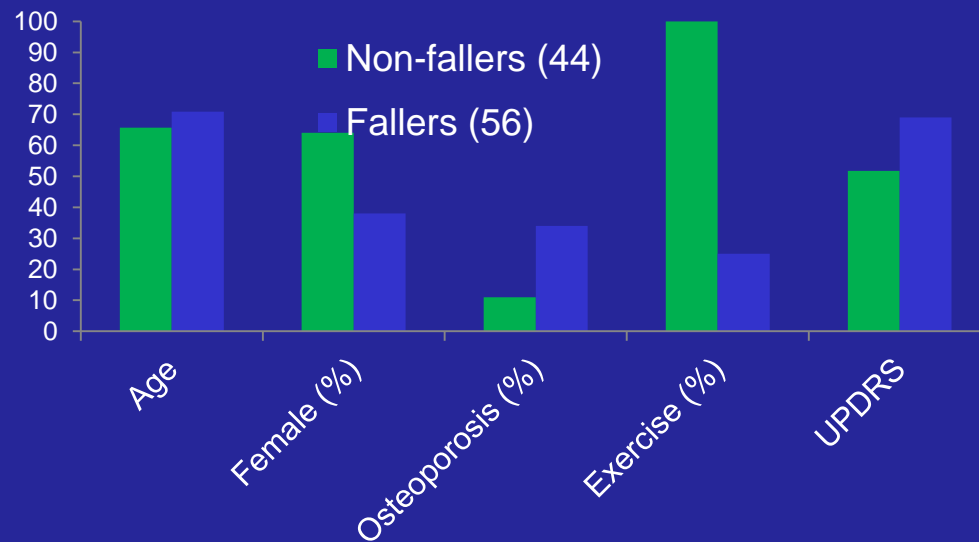


Factors Associated with Fall-Related Fractures in Parkinson's Disease

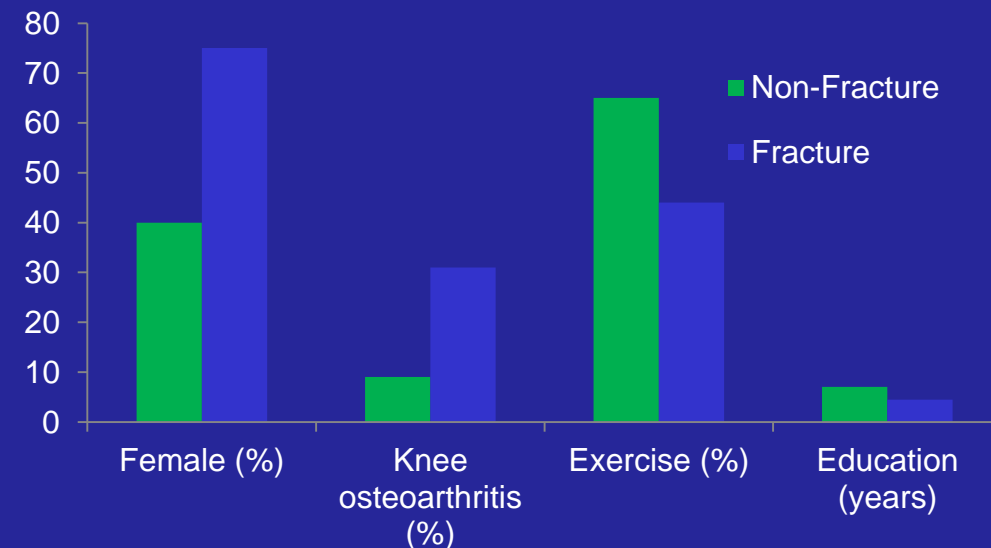
(Cheng et al 2014)

- Prospective study, 100 patients, 51 females, mean age - 68
- 56 patients fell
- 32 fall-related fractures

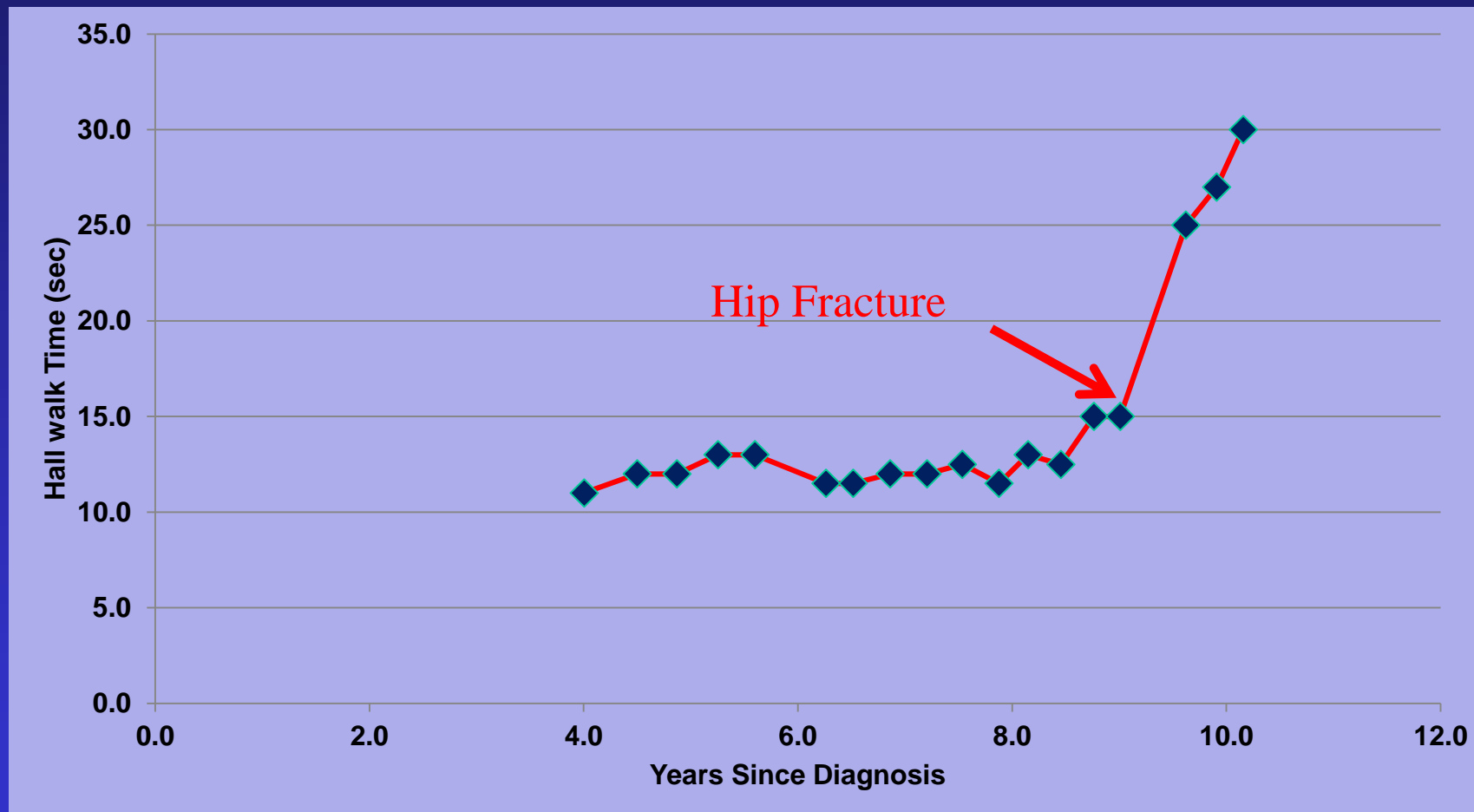
Falls



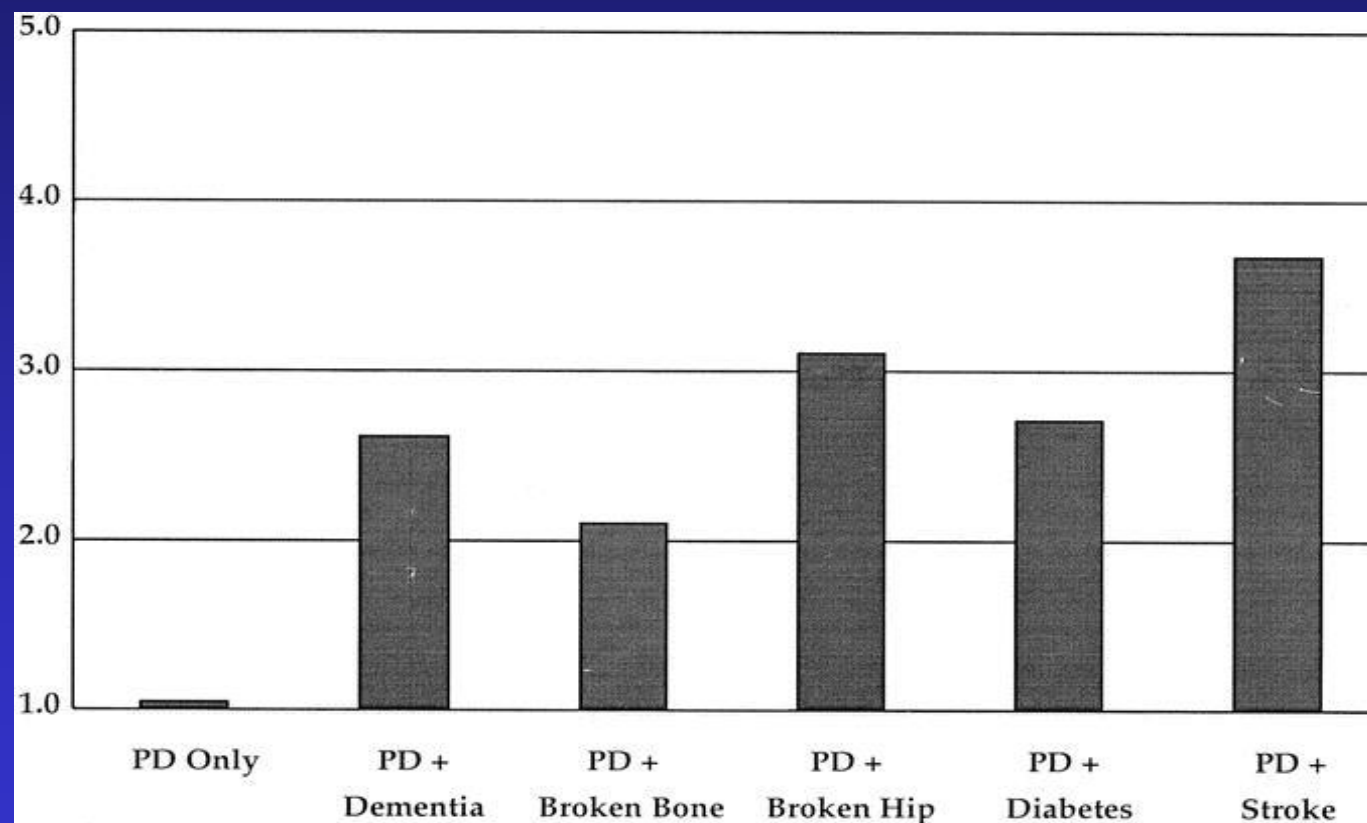
Fractures



Example of “Game-Changer”



Comorbidity Cost Ratios in PD



Main Fall Risk Factors

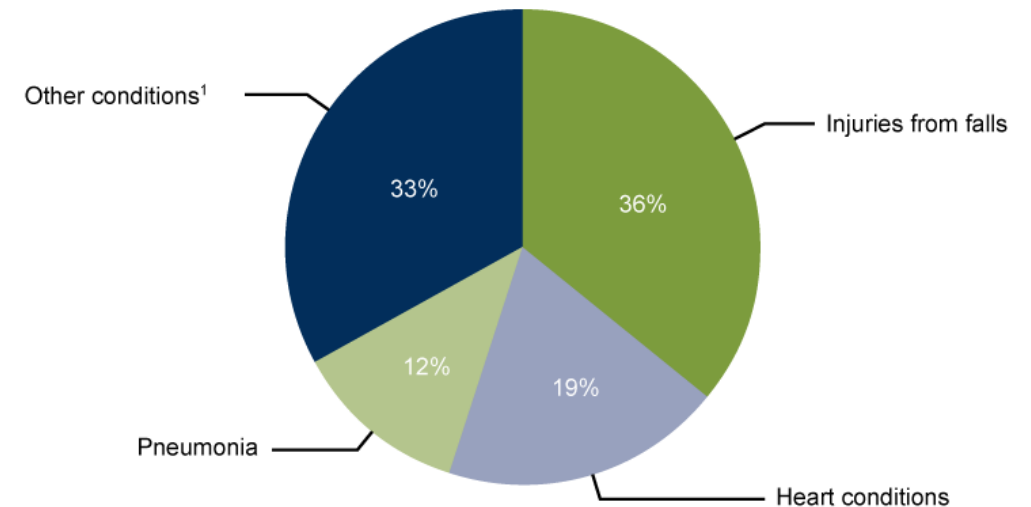
- Decreased arm swing
- Duration of disease
- Previous falls
 - “Near falls” and “stumbles” also important
- Dementia
 - Impulsivity
- Gait: Short stride length, Freezing
- Motor fluctuations
- Poor balance on exam
- Orthostatic hypotension

Physical Therapy

- Balance training
- Teaches adaptive strategies
- Trains in the use of assistive devices
- Methods/cues to break freezing
- PD experience is important!



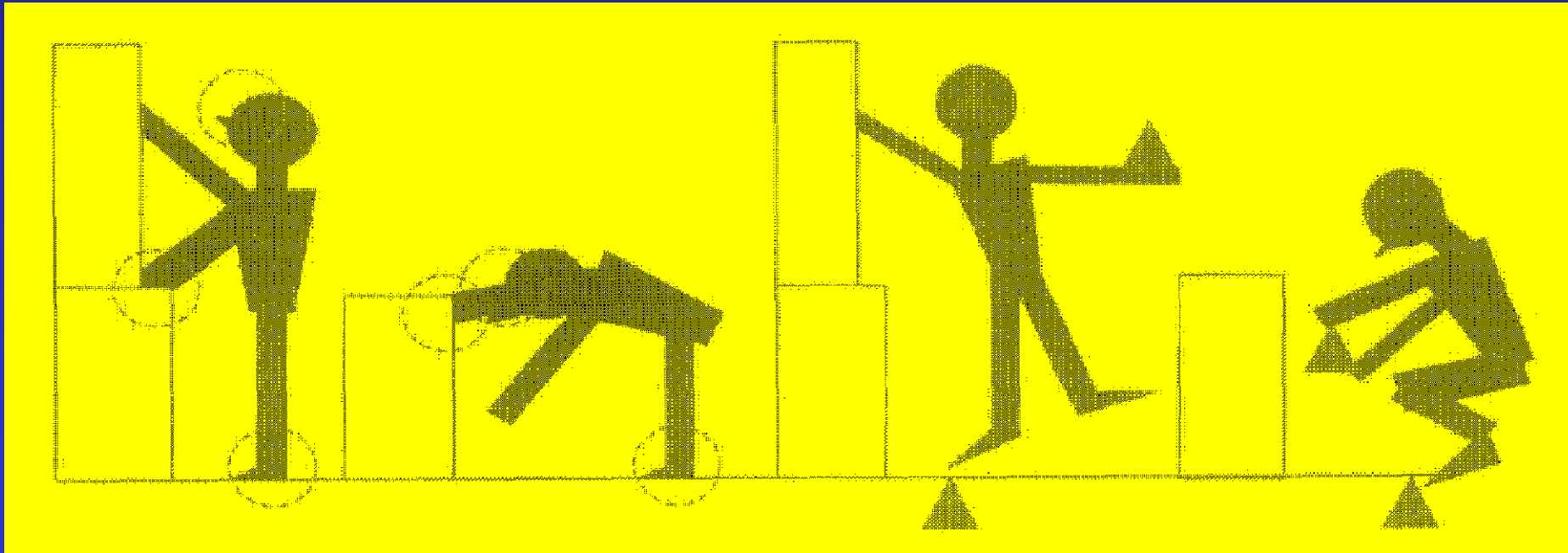
Figure 3. Percent distribution of the conditions accounting for potentially preventable ED visits by nursing home residents in the past 90 days: United States, 2004



¹Other potentially preventable conditions included the following: fever, mental status changes, gastrointestinal bleeding, urinary tract infections, metabolic disturbances, and diseases of the skin.

Adaptive Strategies

- Facing forwards when doing manual tasks
- Using a fixed support
- Maintaining a stable unchanging base
- Rearrange home to avoid dangerous situations (AKA home safety eval with occupational therapy)



Emerging Therapies for Gait Disability and Balance Impairment: Promises and Pitfalls

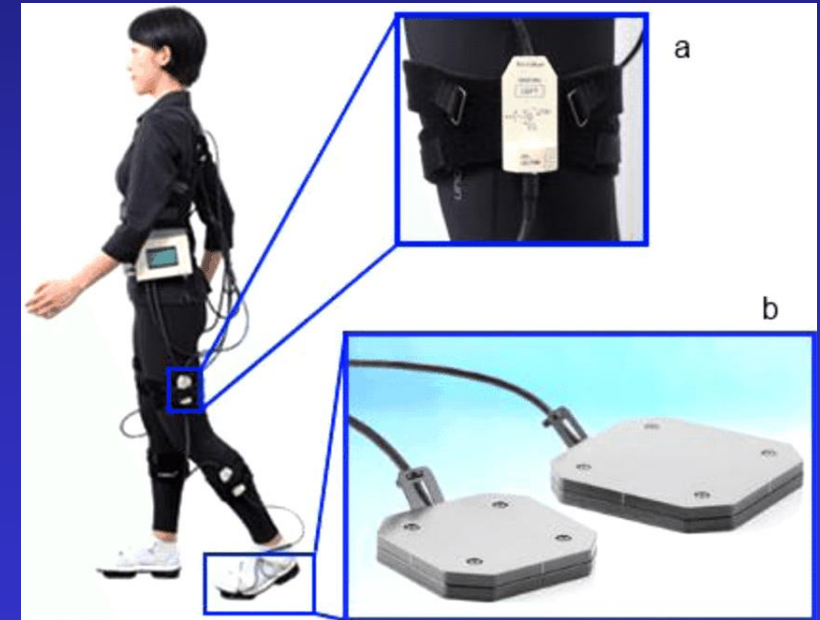
- **Pharmacotherapy**
 - Better medication therapy may alleviate medication OFF state freezing
- **Deep Brain Stimulation**
- **Physiotherapies**
 - External/other cueing models for freezing
 - Group and home-based exercise programs
 - Home safety evaluations by occupational therapist
 - “Big” therapy
 - Cognitive training



Wearable Technologies



- Analyzing gait, fall risk, exercise relationships
- Feasibility?
- Costs?
- Adherence?



Conclusions

- Patients with PD are at risk of falls and subsequent traumatic injury
- It is important to identify people who are at risk of falling
- Physical therapy and assistive devices may prevent falls



Questions?