Learning Objectives

- Recognize the different types of balance systems affected by PD
- Consider how cognitive deficits affect functional mobility in PD, and why intense Cognitive-Agility based exercises may help mobility.
- Understand role of Occupational Therapy in PD
- Learn strategies to improve ADL’s and computer access
Where exactly is balance located?
Balance

- Consists of 6 domains
- Allows you to identify which balance systems most affected, & focus treatment on these systems
1. Anticipatory Postural Control

- **Definition**: prior to initiation of movement the body will automatically adjust itself (weight shifting) to maintain center of pressure (COP) over the base of support (BOS).
- Complex circuitry: Midbrain, BG, SMA
- Examples: 1) sit to stand and 2) walking initiation
2. Postural Sway/Limits of Stability

- Postural sway affected by PD, esp. with dual task distraction
- Clinical Biomechanics 23 (2008) 450–458
- (e.g. chopping vegetables while standing in kitchen, conversation)
2. Postural Sway/Limits of Stability

- Limits of Stability (LOS)
  - Anterior (forward) most limited
  - Causes excessive weight on heels
  - Tested with sustained heel raise
3. Reactive Postural Control

- **Definition**: once stability limits are exceeded, the body will respond with an **automatic** stepping response to regain balance.

- **PD**: slower and smaller steps, causing multiple shuffling steps to recover balance.

- Common source of falls

- Can improve with training
4. Dynamic Gait/Dual Task Ability

• Balance and posture: How much attention is required?
  • BG is the “autopilot”

• Walking with a dual task -cognitive load slows people with early PD down more than age matched controls.
  • Difference between TUG vs TUG cog, and 360 degree turns both with and w/o dual cog task

• Deficits in turning are apparent in early PD even when other motor deficits are not present (bradykinesia, gait, etc.)
Due to defective “auto pilot” of cortical striatal circuit, PD patients will compensate with fronto-striatal circuit, to drive gait. Also responsible for executive function (Stuss et al. 2000)
Cognition and Balance

- Cognitively impaired older people fall twice more than cognitively intact

- Gait and balance are not automatic processes in older people, esp with PD (Stuss et al. 2000)

- PD patients with worse cognitive deficits have more falls (Sergev-Jacubovski, et al 2011)
Importance of Challenging Executive Function

- People with PD require more attention to balance and walk

- Focused attention leads to improved performance in the PT clinic, but carryover at home?

- Restoration vs Compensation: FoG/falls
Intervention Ideas:

Sensorimotor Agility Training with cognitive component (fronto-striatal circuit)

1) Recoil band
2) Agility/Obstacles course
3) Treadmill training with dual task
4) Rock Steady Boxing
5) Dance courses

Goal: Make balance and gait more automatic
What Should Physical Therapy Be?

1. Treatment should be individualized to fit each person
   • Rigidity/stiffness = posture stretching emphasis
   • Accurate/Objective baseline balance scores
   • Interests of the patient

2. Physical Therapists should empower, inspire, and educate the patient on the importance of “the daily dose” of posture stability and agility based cognitive and balance training.
Role of Occupational Therapy (OT)

- Improve arm strength, coordination, hand function & overall movement
- Improve ADL’s (feeding, grooming, bathing, dressing, toileting)
- Improve IADL’s (cooking, cleaning, laundry)
- Improve standing up/sitting down from surfaces: bed, chair, toilet, shower
- Provide education/training with DME & adaptive equipment
- Improve work related tasks including computer access and handwriting
- Perform wheelchair seating & mobility assessments
Strategies to Improve Bed Mobility

- Use a bed ladder to pull from supine to long-sitting
- Use legs to assist with rolling into sidelying
- Use a bedrail to assist with rolling and pulling into sitting
- Use momentum from your arms/legs to assist in rolling
Strategies to Improve Sit to Stands

1. Scoot to edge of surface
2. Align feet slightly behind knees
3. Lean trunk forward
4. Place hands under buttocks or on armrests (preferred)
5. Push off using hands and lean trunk forward to come to standing position
6. Make sure walker is positioned in front of you
7. Never use 2 hands to pull onto walker
Strategies to Improve Car Transfers

More difficult vs. getting out of a chair

- Car seat slopes back
- Must scoot uphill to get to edge of seat
- Side of car is blocking your feet from sliding back to stand up
  - A wedge seat cushion can help to level out the slope
  - Using various transfer handles
Strategies to Improve Bathroom Safety

- Keep in mind principals of sit to stand
- Adaptive equipment
  - Elevating toilet seat
  - Grab bars
  - Shower/tub seats
  - Hand held shower head
  - Safety mats or treads
  - Ensure proper lighting
  - Supervision
Strategies to Improve Kitchen Mobility

- Keep mobility device in front of you
- Use rolling cart vs. carrying items
- Use walking trolley or tray
- Remove loose throw rugs
- Keep favorite dishes within reach
- Use pull-out drawers
- Use oven pull
- Sit to prepare meals
Strategies to Improve Dressing

- Sit to don/doff underwear & pants vs. standing
- Use foot stool to elevate feet when tying shoes
- Use sock-aid or reacher to assist
- Adaptive clothing: Velcro vs. buttons
- Using a button-hook or a magnetic zipper
Strategies to Improve Handwriting

• Improve hand strength, coordination & posture
• Write your name in the air as large as you can
• Support elbow, forearm & wrist on a table
• Utilize highlighted & lined paper
• Exercise prior to handwriting
• Trace letters & objects
• Daily practice
Assistive Technology

- Track ball mouse
- On-screen keyboard
- Use 2 mouse; 1 on each side of keyboard
- Larger tablet or PC; 27-inch
- orbiTouch keyless keyboard
- Stylist for smart phone/I-pad
AT: Computing Made Easier

- Filter Keys
  - When you are getting too many characters when you hit a key; adjust the filter key setting so you only get one character.

- Sticky keys
  - When you have difficulty holding down two or more keys at a time such as Ctrl-Alt-Delete.
  - The Ctrl+P for StickyKeys allows you to press one key at a time instead of pressing them simultaneously.

- Bounce keys
  - Allows you to configure the computer to ignore rapid, repeated keypresses of the same key.
AT: Computing Made Easier

• Decreasing mouse speed
  • Slowing down the way the mouse works too might be useful. If clicking the mouse is
difficult you can alter the double click speed.

• Dragon Dictate
  • Train voice recognition to recognize your voice
  • Spend 1-2 hours daily for a week using voice recognition, by the end of it you will have
a good grasp of how to use it.

• Eye Tracking
  • Sensor technology that uses your eyes as a “pointer” on a screen
  • Facilitates interactions with computers & other devices when the user cannot or does
not wish to use their hands as the input form.
SLP’s Role in PD Management

Evaluate and treat individuals with the following:

- Speech Impairments
- Voice Impairments
- Swallowing Impairments
- Cognitive-Communication Impairments
Thank you