**Name of Activity**: Interventions for Parkinson’s Disease

*Intervention*

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**Course Information**: Interventions for Individuals with Neuromuscular Disorder; 3 units (2 hours lecture, 3 hours lab per week); Fall of year 2 (semester 5 out of 9 total). Students have already had Evaluation of the Individuals with Neuromuscular Disorders, Neuroanatomy, and Neuropathology.

**Learning Activity Description:**

Context: Students have a 50 minute lecture on medical and evidence-based physical therapy interventions for Parkinson’s Disease (PD). They have previously had a lecture on pathophysiology and examination of individuals with PD.

Purpose: This lab is designed to help the students integrate their knowledge of examination with the new material from both lecture and readings in designing an evidence-based intervention.

The class is split into 8 groups of 4 students. Two groups work on the same case, so a total of 4 cases are needed (see below). Students practice performing and instructing others in the interventions that are discussed. They also participate in a movement lab to experience the application of both amplitude and intensity to functional movements. The movement lab and practice of interventions are interspersed with discussion that is guided by the table included in the lab handout. The lab progresses through each Hoehn and Yahr (H & Y) stage, reviewing common clinical presentation and deficits, assessment, and adding new material related to interventions. **Interventions in bold in the chart below are practiced during the lab.** These focus on increasing thoracic spinal mobility, increasing amplitude, postural strategy training, and compensatory techniques. The lab finishes with application of concepts using cases. The students complete the lab by applying their knowledge to a case that is assigned. The students present their case and receive feedback from both the instructor and their classmates.

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| **Early PD: H & Y I: “Unilateral involvement, minimal or no functional impairment”.**  **H & Y II: “Bilateral or midline involvement, without impairment of balance “** | | | |
| **Deficit** | **Assessment** | | **Intervention** |
| Spinal rotation | Functional Axial Rotation (FAR) | | **Thoracic extension mobilization; AROM spinal rotation; ex. Arm circles, seated rotation** |
| Brady/hypokinesia | Unified Parkinson’s Disease Rating Scale (UPDRS) | | **Amplitude training with functional activities** |
| Postural control  (preventative) | mCTSIB, tandem gait, Push & Release | | Adapting to varied surfaces (community); dual motor and cognitive tasking |
| Gait | FGA, 10MW, stride length, cadence | | Treadmill training (speed, amplitude, endurance, dual task, adaptability) |
| Functional Mobility | Dual task TUG | | Dual task challenges with varied functional skills |
| Coordination/agility | Timed endurance with coordination task | | (King & Horak), boxing, braiding, skipping, jump rope, dance |
| Hand function | 9 hole peg test, dynamometer, handwriting sample | | Amplitude-based handwriting; toss/catch; juggling; basketball dribbling |
| **Mid-stage PD/ H & Y III: “First sign of impaired righting reflexes and balance impairment; remains independent with gait and ADLs. Mild to moderate disability”** | | | |
| **Deficit** | **Assessment** | | **Intervention** |
| Spinal rotation/other flexibility | FAR; PROM hip extension, shoulder flexion/abduction | | **Thoracic extension mobs, AROM spinal rotation, arm circles (if tolerated); seated rotation; AROM hip extension, shoulder flexion/abduction** |
| Brady/hypokinesia | UPDRS | | **Amplitude training with functional activities (context dependent)** |
| Postural control | mCTSIB, Berg, Push & Release | | **Postural strategy training (ankle, hip, and step strategy)** |
| Gait | Functional Gait Assessment/Dynamic Gait Index (FGA/DGI,) 10MW,stride, cadence | | Emphasize community training (context-dependent); treadmill training (endurance, adaptability) |
| Functional Mobility | TUG, cognitive-TUG | | Context dependent training of varied functional skills |
| Coordination/Agility | Timed task | | Crossovers, backward gait, direction change, dance, boxing |
| Hand function | 9 hole peg test (HPT), handwriting | | Daily handwriting, ball bounce, toss/catch |
| Visual perception | Clock drawing | | Tape on stairs, doorways to increase contrast |
| Cognition | Montreal Cognitive Assessment (MOCA) | | Referral to neuropsychologist, aerobic training, cognitive games |
| **Late-Stage PD/ H & Y IV : “ Fully developed severely disabling disease; the patient is still able to walk and stand unassisted but is markedly incapacitated”.** | | | |
| Deficit | Assessment | Intervention | |
| Spinal rotation &extension; UE/LE ROM | FAR, PROM hip, knee, ankle, shoulder, elbow, wrist (all planes) | BID daily AROM or PROM exercises ex. Pulley, LE bike; **postural supports in sitting (Nada chair, wedge)** | |
| Brady/hypokinesia/ akinesia | UPDRS | **Compensatory strategies**  **1) Auditory cueing: metronome, music**  **2) Visual cueing: taped lines on the floor, U-step walker**  **3) Proprioceptive cueing: rocking to assist step initiation;**  **reach to tap table for start hesitation**  **4) Attentional strategies: “step estimation”**  **5) Home safety modifications: floor to ceiling pole; bed**  **rail; foot cradle; raised toilet.**  **6) Adaptive equipment** | |
| Postural control | Berg, Push-Release | Fall risk education (patient/family); home modification recommendations; postural strategy training | |
| Gait | 10MW, stride, cadence, presence of freezing and triggers | Assistive device training; FWW or **U Step; compensatory strategies for freezing/festination** | |
| Functional Mobility | TUG, timed supine-sit | Instruct caregiver in cueing for increased amplitude; home modifications; practice functional mobility in the home | |
| Hand function | 9HPT, handwriting | Daily handwriting on large-lined paper; grasp/release tasks; toss/catch | |
| Visual perception | Clock drawing | Visual cues on stairs, steps, doorways, in front of chairs, toilet | |
| Cognition | MOCA | Family training (realistic expectations); emphasize daily aerobic activity; cognitive games | |
| Dyskinesia | Diary of when it occurs | Report findings of diary to MD (medication adjustment); relaxation training | |
| Pain | Orthopedic assessment for mechanical pain | Orthopedic assessment for mechanical pain and treat accordingly; referral to MD for central pain | |
| **Late-stage PD/ H & Y V: “Confined to bed or wheelchair unless aided”** | | | |
| Deficit | Assessment | Intervention | |
| Spinal rotation &extension; UE/LE ROM | PROM hip, knee, ankle, shoulder, elbow, wrist (all planes) | Instruct family in BID PROM exercises  Educate family on bed positioning to encourage extension in all joints  Wheelchair seating assessment | |
| Brady/hypokinesia/  akinesia | UPDRS | Assess benefit of compensatory strategies described under H & Y IV. Educate family to utilize strategy to facilitate movement. | |
| Postural control | Modified functional reach test (seated); level of assist in standing | Educate family regarding fall risk; home modification recommendations  Instruct family in safe transfers and standing for ADLs | |
| Gait | Level of assist | Educate family on providing assist with gait with appropriate assistive device (U-step, FWW); recommend daily walking | |
| Functional Mobility | Leve of assist | Instruct family/caregiver in safe handling with bed mobility, transfers, standing for ADLs; home modifications; practice functional mobility in the home | |
| Pain | Assess for mechanical cause of pain | Orthopedic assessment for mechanical pain and treat accordingly; referral to MD for central pain | |
| Skin integrity | Skin checks | Educate family/caregiver on frequent assessment of areas at risk for skin breakdown; recommend positioning aids for bed/wheelchair; educate regarding frequent position change | |
| Pulmonary Hygiene | Monitor for signs of aspiration | Educate family/caregiver on upright positioning during meals; monitor for signs of aspiration and refer to MD | |

**Group Activity**: Divide into four groups. Develop an intervention as described in the case and a home exercise. Be prepared to demonstrate both the intervention and the home exercise to the whole group. Be specific with your home program including frequency, repetitions, etc…

Case 1: Bob is a 72 year old male with a 12 year history of PD, H & Y stage III. He has been having difficulty rolling in bed and getting out of bed to use the bathroom at night. Develop a functional exercise using the concept of “Amplitude” training to address his difficulty with rolling and supine to sit.

Case 2: Joe is a 55 year old male diagnosed with PD 6 months ago, H & Y stage II. He works full-time as an electrician. He reports increasing stiffness throughout his body and difficulty getting down onto the ground (for work activities) and back up to standing. Develop a functional exercise using the concept of Amplitude training to address his difficulty with floor to stand transfers.

Case 3: Sarah is a 75 year old female with a 15 year history of PD, H & Y stage IV. She reports increasing difficulty with her walking. She states that her “feet stick to the ground” and she feels as if she is going to fall. She has tried using a walker but it does not seem to help. Develop an intervention using a compensatory strategy that would address freezing with gait.

Case 4: Mary is a 68 year old female diagnosed with PD 3 years ago, H & Y stage II. She reports worsening fatigue over the past 6 months. She also reports “slowness” with her ADLs and walking. She used to participate in a walking group 3x/week but can no longer keep up with the group. Develop an intervention using the concepts of Amplitude and Intensity training to address her goal to improve her endurance and gait speed.

Time for student to complete the activity: Approximately 2-3 hours to read the articles below before class; 3 hour lab

Readings/other preparatory materials:

1. Farley, B. Training BIG to move faster: The application of the speed-amplitude relation as a rehabilitation strategy for people with Parkinson’s Disease. *Exp. Brain Res.* 2005;167:462-467.
2. Morris, M.E. Locomotor Training in People with Parkinson’ Disease. *Phys Ther*, 2006;86:1426-1435.
3. Morris, M.E. Movement Disorders in people with Parkinson Disease: A Model for physical Therapy. 2000;80:578-597.
4. King, L.A., Horak, F.B. Delaying Mobility Disability in People with Parkinson Disease using a Sensorimotor Agility Exercise Program. *Phys Ther* 2009;89:1-10.

Learning Objectives:

1. Develop a therapeutic intervention using recovery and/or compensation considering the patient presentation.
2. Develop a preventative program for a patient with PD at any stage of the disease.
3. Identify 3 cueing strategies for motor instability in PD.
4. Apply amplitude training principles to functional activities for varied neuro population.

Methods of evaluation of student learning:

There is no specific evaluation during this laboratory activity. Students have a laboratory examination at the end of the unit, which contains a case similar to cases used in lab. Students are asked to instruct the patient to increase independence in functional movement using amplitude concepts and to demonstrate a compensatory strategy to increase independence with function.

The following rubric is used for all laboratory examinations:

Given a PD case, **H & Y II-III**, the student is asked to verbally or manually cue patient to **increase amplitude** of relevant component of movement to increase independence with functional activity.

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| Criteria | Met  (1 point) | Not Met (0 points) | Comments |
| 1.***Movement analysis***: selects relevant component of movement to cue for increased amplitude |  |  |  |
| 2. ***Cueing instruction***: cueing is effective at increasing amplitude |  |  |  |
| 3. ***Movement outcome***: cueing results in improved movement efficiency (use of momentum, speed, decreased effort) |  |  |  |
| 4. ***Communication***: verbal cues are appropriate to ensure patient understanding |  |  |  |
| 5. ***Critical thinking***: able to modify cues to achieve desired outcome |  |  |  |
| 6. ***Safety***: closely guards patient and modifies cues to avoid unsafe movement |  |  |  |

Given a PD case, **H & Y IV**, the student is asked to verbally describe a home modification to increase independence and safety with gait, bed mobility or transfers and asked to demonstrate a **compensatory technique** to decrease freezing of gait.

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| Criteria | Met  (1 point) | Not Met (0 points) | Comments |
| 1. ***Home modification***: recommendation is appropriate to increase safety and independence for given functional deficit |  |  |  |
| 2. ***Compensatory strategy***: recommendation is appropriate given patient’s level of function |  |  |  |
| 3. ***Application of compensatory strategy***: accurately instructs patient in use of compensatory strategy |  |  |  |
| 4. ***Communication***: verbalizes purpose of home modification and compensatory strategy in language appropriate for patient understanding |  |  |  |