Degenerative Diseases

Summer 2010 Volume 10 Issue 1

Newsletter of the Degenerative Diseases Special Interest Group

A Message from the Chairperson

Hello to everyone! I'd first like to extend my sincere thanks to Donna Fry, PT, PhD and Dan White, PT, ScD, NCS for their dedication and outstanding contributions to the DDSIG serving as the Vice Chair and Nominating Committee Chair respectively. I also want to extend a warm welcome and congratulations to Michael Harris-Love, PT, MPT, DSc who was elected to the DDSIG Vice Chairperson position and Lisa Brown, PT, DPT, NCS who was elected to the Nominating Committee. As they join with other Executive Committee members Evan Cohen, PT, MA, NCS (Secretary), Kirk Personius, PT, PhD and Deb Kegelmeyer, PT, DPT, MS, GCS (Nominating Committee) I look forward to an exciting and productive year ahead.

I hope that you will find the articles in this newsletter informative for your practice. The article entitled "Toolbox of Outcome Measures for Individuals with Parkinson's Disease", by Teresa Steffen, PT, PhD, is the third in our series of "toolbox" articles highlighting each of the major neurodegenerative disease. Lisa Muratori, PT, EdD has written an excellent critique of an article entitled "Evidence for motor learning in Parkinson's disease: Acquisition, automaticity and retention of cued gait performance after training with external rhythmical cues."

The DDSIG programming at CSM 2010 was well received by participants. Many thanks to Becky Farley, PT, PhD for her wonderful presentation at our business meeting on "An Intensive Whole Body Forced Use Exercise Approach for People with Parkinson Disease: LSVT BIG." Deb Kegelmeyer

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Combined Sections Meeting 2010
San Diego, California

DDSIG Programming at CSM 2010

The DDSIG provided some excellent programming at the 2010 Combined Sections Meeting of the APTA. Becky Farley, PT, MS, PhD presented at the DDSIG business meeting, and our own Anne Kloos, PT, PhD, NCS and Deb Kegelmeyer, PT, DPT, MS, GCS hosted the DDSIG Roundtable.

Dr. Farley's presented "An Intensive Whole Body "Forced Use" Exercise Approach for People with Parkinson's Disease: LSVT® BIG" to rave reviews. You can find the handouts from her presentation by clicking on this link.

Drs. Kloos and Kegelmeyer led the DDSIG's annual roundtable. The spirited discussion was on the topic of "Fitness and Community Exercise Programming in Neurodegenerative Diseases"

Combined Sections Meeting 2011
New Orleans, Louisiana

DDSIG Programming at CSM 2011

The DDSIG is very excited to be heading back to N'awlins for CSM 2011. The SIG has some great programming in the works. We hope to see you there!

Toolbox of Outcome Measures for Individuals with Parkinson's Disease

Teresa M. Steffen, PT, PhD (tsteffen@regis.edu)
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Parkinson's disease (PD) is the most common form of Parkinsonism, the name for a group of movement disorders characterized by resting tremor, rigidity, bradykinesia and postural instability.[1] The etiology of the disease is idiopathic in most cases, but scientists believe that certain environmental exposures and/or genetic factors increase a person's risk of developing the disease. The pathology of the disease is characterized by loss of dopamine-producing neurons in the substantia nigra that results in dysfunction of neuronal circuits within the basal ganglia.[1]

Drug and surgical treatments often improve motor symptoms associated with PD. There is no single laboratory or imaging test to confirm the diagnosis of PD. Diagnosis is made through neurological exam.[1] The most prescribed medication for PD is levodopa (l-dopa) combined with carbidopa. This was commonly known as Sinemet. Presently it is offered in generic formats.[1] The therapist who is taking repeated measures to determine changes in function over time in individuals with PD who are taking medications should be aware of where they are in their cycle if they are taking l-dopa. For some clients the severity of motor symptoms could vary depending on the level of the drugs. Deep brain stimulation (DBS) is also used in some individuals with PD to alleviate motor symptoms of Parkinsonian tremor, rigidity and dyskinesias. Therapists treating individuals with the DBS should indicate whether their assessments were done with or without use of a brain stimulator on.[2]

Parkinson's plus syndromes (tau protein diseases) are neurodegenerative disorders that have Parkinsonian symptoms in addition to other neurological symptoms. These syndromes include progressive supranuclear palsy (PSP), corticobasal degeneration (CBD), and dementia with Lewy bodies (DLB). Multiple system atrophy (Shy dragger syndrome, striatonigral degeneration or olivopontocerebellar atrophy) could also mimic Parkinson's disease initially. Descriptions of these diseases can be found at the website www.wemove.org. Unlike idiopathic PD, individuals with these disorders may have symmetry of symptoms on both sides of the body, postural instability early in their diseases, and respond poorly to l-dopa. Therefore, if a person initially presents without being able to report a sidedness to their symptoms and has experienced multiple falls the therapist should suspect that the client may have a Parkinson's plus syndrome or multiple system atrophy.

The Movement Disorder Society Unified Parkinson Disease Rating Scale (MDS-UPDRS)[3] is the revised UPDRS tool used to track disease progression and response to pharmacologic, medical and therapeutic interventions. The scale is comprised of three sections which can be scored separately including 1) mentation, behavior, & mood (0-52); 2) activities of daily living (0-52); and 3) motor examination (0-132). The lower the score the less disability the client has. Staging of the disease is done using the Hoehn & Yahr (H&Y) staging scale.[4] H&Y scores range from 0-5 with lower scores indicating less involvement. Copies of these scales can be found on the MDS website.

Physical therapists can consult the *Guide to Physical Therapist Practice*[5] on Practice Pattern 5E for guidelines regarding the examination of clients with PD. Because people with PD will be living with the disease for many years after onset of symptoms, it is highly recommended that therapists reassess the client with PD at least 1-2 times a year to determine their functional status and decide if changes to their plan of care are warranted. Specific tests and measures for clients with PD should include the same measures in both on and off states of l-dopa. This will help assess the ongoing symptoms of disability. Not all aspects of the disease can be assessed with a specific test or measure (e.g., fear behavior). Outcome tools may help the therapist ask additional questions related to the disease (e.g., hypotension and behavioral changes). For example, a person with PD who cannot remember simple directions when doing the Timed Up and Go test (TUG)[6] may need to have further assessment of his or her cognitive status. Outcome tools assist the person with PD to track changes in their function over time as well as assist health professionals determine the rate of

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disease progression, to design and adjust treatment plans, and to determine the efficacy of interventions. The tests and measures listed here are summarized in Table 1.

*Aerobic Capacity and Endurance***.** The Parkinson Fatigue Scale (PFS) is the only validated measure (in the United Kingdom) of fatigue in people with PD.[7] An important question is whether fatigue can be separated from problems such as sleep disturbances, depression and cognitive deficits. Ambulation endurance can be measured with the six-minute walk test (6MWT)[8] which is described below (see gait tests and measures).

Protas et al.[9] measured cardiovascular function in 8 males in early to middle stages of PD using a cycle ergometer and found that their maximal oxygen consumption and heart rate was similar to age-matched controls, but their efficiency was decreased as they consumed 20% more oxygen and had higher heart rates than the control group during submaximal exercise. The heart rate of the subjects with PD in this study was judged safe at 120-140 bpm for 15-60 minutes.[9] In contrast, Werner et al.[10] reported that 16 individuals with PD (Hoehn and Yahr stage 2) who were tested on a treadmill had cardiovascular responses to submaximal exercise that were similar to age-matched controls, but half of the subjects had a blunted heart rate and blood pressure response and reported a greater rate of perceived exertion compared to the control group during maximal exercise testing. Thus, therapists may want to monitor perceived exertion using the Borg rating of perceived exertion (RPE) scale[11] in individuals with PD undergoing cardiovascular training programs who have blunted heart rate and blood pressure responses at higher intensities of exercise. In addition the therapist may request aerobic capacity testing if individuals with PD have other co-morbidities affecting the cardiovascular system.

*Anthropometric Characteristics***.** Many individuals with PD experience weight loss that starts early and continues throughout the disease process.[12] Girth and/or weight measurements may be appropriate to perform in individuals with PD with weight loss or those with co-morbidities that cause anthropometric changes (e.g., edema).

Arousal, Attention, and Cognition. Executive functioning including response inhibition and task switching, working memory and sustained and selective attention can be impaired in PD.[1] In memory tests individuals with PD exhibit greater deficits on verbal verse, nonverbal memory measures, and procedural memory.[13] The prevalence of dementia in individuals with PD is being debated, but one review study reported a prevalence of approximately 29%.[14] Part of the diagnostic problem is deciding when cognitive impairment is classified as dementia. Therapists observe variability in cognitive function and attention based on medications, time of day, and whether a person has exercised. The Mini-mental Status Examination (MMSE)[15] can be used in the clinic to judge gross cognitive status; however, it has not been validated in the PD population and one study of 873 patients with PD found that the MMSE had low sensitivity to diagnose PD dementia using a cut-off score of ≤24.[16]

*Assistive, Adaptive, Orthotic, Protective, and Support devices***.** Due to balance and gait impairments, individuals with PD in the middle to late stages of the disease often experience falls. Assistive ambulatory devices such as canes, walking sticks, and rollator walkers are often prescribed for individuals who are experiencing falls although their effectiveness to prevent falls is not known. A four-wheeled walker with front swivel casters produced the most safe and efficient gait pattern during ambulation in a straight path and maneuvering around obstacles compared to other commonly prescribed assistive devices in ambulatory individuals with PD.[17]

*Circulation***.** Many individuals with PD experience problems with orthostatic hypotension (OH); the frequency of OH in individuals with PD ranged from 30-58% in 5 studies that involved over 80 patients with PD.[18] The cause of the OH has been attributed to treatment with l-dopa but there is also evidence of generalized sympathetic denervation in some individuals with PD that may be a contributing factor.[19] In people with PD reporting symptoms of lightheadedness or fainting during positional changes or with Valsalva maneuvers, the therapist should assess their vital signs during position changes.

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Cranial Nerve Integrity. Hearing is generally not affected by the disease. Visual difficulties (i.e., visual hallucinations, double vision, difficulty estimating spatial relations, and contrast sensitivity deficits) are under-recognized symptoms with broad functional consequences, including effects on gait, balance and driving ability.[20] The sense of smell is often impaired.[21] An estimated 89% of individuals with PD develop a speech or voice disorder.[22] Typical speech and voice characteristics of people with PD include reduced speech volume, monotone, breathy and hoarse voice quality and imprecise articulation.[22] They will often have a loss of facial expression earlier in the disease resulting in a "masked expression" and trouble swallowing towards the later stages. This all leads to the client being less communicative.[1]

Environmental, Home, and Work (Job/School/Play). As symptoms of PD progress over time, therapists need to assess architectural, transportation, and other barriers to an individual's ability to participate in home, work, and recreational activities.

Ergonomics and Body Mechanics. Therapists may need to assess the ergonomics and body mechanics of the person with PD in home and work environments to offer suggestions on how to maximize safety and efficiency of movements. Body mechanics of caregivers should also be assessed if they are providing assistance.

Gait, Locomotion, and Balance. Specific gait, balance, and mobility tests that have been utilized with people with PD are described below. Refer to the Appendix for examples of how to utilize these tests and measures over time.

GAIT TESTS AND MEASURES

Six-minute walk test (6MWT). The 6MWT measures the maximum distance a person can walk in six minutes (with or without an assistive device).[8] The test in this population appears to be a measure of exercise endurance rather than maximal exercise capacity. It evaluates the global and integrated responses of all of the systems involved during exercise including the pulmonary, cardiovascular, and neuromuscular systems. The test has gained clinical acceptance due to its ease of set up, administration, patient tolerance, reproducibility and similarity to requirements of client function and participation. The test is appropriate on clients for whom ambulation improvement is required for a participation restriction and for whom endurance is a functional issue. The American Thoracic Society has set forth guidelines for the 6MWT.[23] Test-retest reliability and minimal detectable change (MDC) of the 6MWT when administered in 37 clients with PD found an $ICC_{(2,1)}$ of .95 and a MDC_{95} of 86 meters.[24] Only one study demonstrated a statistical improvement in 6MWT distance following a strengthening intervention in people with PD.[25] The mean

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Call for Nominations

The DD SIG wants YOU!

The Degenerative Diseases Special Interest Group is seeking nominations for two positions for the coming year: Vice Chair and Nominating Committee Member.

If you are interested, or know someone who is, please contact a member of the Nominating Committee

and standard deviation of the 6MWT distance among the group of 37 people with PD was 316 (142) meters which was below the distance of 382-505 meters for the 6MWT in healthy women aged 60-89 (n=631) and 228-582 meters in men aged 60-89 (n=690) that was reported in a meta-analysis study of community dwelling elderly.[26] Repeat testing over years using the 6MWT in individuals with PD can help people with PD understand their ambulation endurance issues.

Comfortable (CGS) and Fast Gait Speed (FGS). Gait speed is measured as distance walked per unit of time with or without an assistive device. Speed is commonly measured over a relatively short distance and thus does not include endurance as a factor. It is appropriate to use these tests for clients with whom ambulation improvement is a goal. Both speeds should be tested. The ability to increase/decrease walking speed above or below a "comfortable" pace characterizes normal healthy walking and indicates the potential to adapt to varying environments (example: crossing the street). Clients who cannot change their walking speed when requested may require gait training to regain this normal skill. Steffen and Seney[24] reported that the test-retest reliability of CGS and FGS when administered in 37 people with PD was high ($ICC_{(2,1)} = 0.96$ & 0.97 respectively) and the MDC_{95} was .18m/s for CGS and .25m/s for FGS. A study of 26 people with PD found CGS to have an $ICC_{(2,1)}$ of .81 and a MDC of .19m/s.[27] Two exercise studies used CGS and FGS to measure functional change over time; the most recent study demonstrated a statistically significant change in both CGS and FGS gait speeds but the changes did not surpass the .18-.25m/s MDC listed above.[28] The second study comparing tango dancing to a strengthening and flexibility exercise program did not demonstrate a clinical or statistical change over time.[29] Studies of people with PD report CGSs of 1.15m/s (n=12)[30] and .98m/s (n=56).[31] Most studies have shown that healthy older adults, without known pathologies, have significantly slower gait speeds than younger adults. Men tend to walk faster than women.[32] Older adults without known impairments are able to increase walking speed from 21-56% above a comfortable pace.[33-37]

Functional Gait Assessment. The Dynamic Gait Index (DGI) was developed as part of a profile for predicting likelihood of falls in older adults.[38] The tool was presented in 1993 as a way to assess and document a client's ability to respond to changing task demands during walking. The initial use was for people with vestibular dysfunction. In 2004, the test was adapted into the Functional Gait Assessment (FGA). The new test was similar to the DGI

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Contribute to your DDSIG!

Do you have any resources to share with our SIG? Home exercise materials, videos, books or even ideas for others to follow up with would help to advance our SIG and help our patients to achieve their goals!

Do you have ideas for a case study or a research project involving degenerative diseases? Contact us and we may be able to point you in the right direction regarding collaborators or other ideas!

but allowed for more specific measurement outside the 30 cm (12 inch) dimensions.[39] Normative means and standard deviations for the FGA by decade cohorts in 200 community -dwelling adults ages 40-89 were published.[40] Recently the third article on the test has been published that states the test provides both discriminative and predictive validity.[41] The test allows therapists to evaluate motor control issues in clients with PD during walking; such as walking with eyes closed, walking backwards, and walking with head turning. None of these higher-level dual tasks are tested in the 6MWT and gait speed tests.

BALANCE TESTS AND MEASURES

When assessing the balance function of individuals with PD, the therapist needs to judge what tests would capture the client's skills the best. For example, if an individual demonstrates a perfect or near perfect score on the Berg Balance Scale[42] (i.e., 55 or 56), the therapist might select more challenging tests such as the pull test (part of the MDS-UPDRS), the sharpened Romberg test with eyes open and eyes closed,[43] and the one-legged stance test [44] and/or have them complete the Activities Specific Balance Confidence scale.[45]

Berg Balance Scale (BBS). This test was developed as a performance-oriented clinical measure of balance in elderly individuals.[42] This test has 14 items with ordinal scoring from 0-4. The total score range is 0-56. When the BBS was administered to 37 clients with PD it had a high test-retest reliability (ICC $_{(2,1)}$ =0.94) and a MDC_{95} of 5.[24] A second study of the BBS in 26 people with PD reported a high test-retest reliability (ICC =0 .87) and a MDC_{95} of 2.[46] Using a cutoff score of 44 the sensitivity of the BBS to assess fall risk was 68% and the specificity was 96% in 49 individuals with PD.[47] No change over time was measured using the BBS in 142 individuals with PD utilizing a personalized home program of exercises and strategies.[48] The BBS improved 8.5 points over the control group following an 8 week intervention of incremental speed dependent treadmill training in 21 individuals with PD.[49] Reference data in community-dwelling adults on this test shows a decline with age but little difference between genders.[32,50]

Functional Reach (forward and backward FR). The test was developed as a clinical measure of the limits of stability (in balance assessment) in adults.[51,52] One study in 20 people with PD reported that the MDC_{95} of the forward FR test in people who had fallen was 4 cm whereas the MDC_{95} of people who had not fallen was 8 cm.[52,53] Another study with 26 people with PD reported that the MDC_{95} for the forward FR test was 12 cm.[52,53] In a study of 37 clients with PD, the test-retest reliability for forward and backward FR was the lowest of several balance measures (ICC $s_{(3,1)}$ of .73 and .67 respectively) and the MDC_{95} was 9 cms for forward FR and 7 cms for backward FR.[24] Using a cutoff of 25.4 cms on 58 people with PD the forward FR test had a sensitivity of 30% and a specificity of 92% to determine fall risk.[54] In an exercise study of 46 people with PD the average change in FR after intervention was an improvement of 1.6(4.4) cm and declined for the control group by -.28(4.2) cm.[55] In 56 clients with PD the difference between people with PD and controls without PD was 2.8cm.[31] The changes were statistically significantly different on the 2 studies but not clinically significant by any of the MDC_{95} scores listed above.

The backward FR test may not be a sensitive test to identify individuals who are at fall risk, but it can help therapists to identify individuals with early impairments in spinal extension so that corrective postural exercises may be prescribed.

Pull test. The backwards pull test is part of the MDS-UPDRS and is used frequently by neurologic physical therapists and neurologists. This test by itself is not sensitive to detect individuals at risk of falling.[56] Therapists need to ensure the patient's safety when performing this test by guarding and getting assistance if needed.

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Romberg & Sharpened Romberg (eyes open and eyes closed). These are tests of balance maintenance or equilibrium with a narrowed base of support.[43] Clients are given 3 trials per each test position until 60 seconds per trial is reached. The Romberg requires the feet to be positioned together; the Sharpened Romberg requires that the dominant foot be positioned behind the non-dominant foot. There appears to be no short-term learning effects of this test.[57] In one study utilizing 37 people with PD the test-retest reliability of the Romberg eyes open and closed was good ($ICC_{(3,1)}$ =.86 and .84 respectively) with a MDC_{95} of 10 s for the Romberg eyes open and 19 with eyes closed.[24] The test-retest reliability of the Sharpened Romberg eyes open and closed was good to excellent ($ICC_{(3,1)}$=.70 and .91 respectively); the MDC_{95} of the Sharpened Romberg eyes open was 39 s and of the Sharpened Romberg eyes closed was 19 s.[24] The Romberg test eyes open mean and SD was 58(10) s, the Romberg eyes closed was 54 (17) s, the Sharpened Romberg eyes open was 39(25) s, and the Sharpened Romberg eyes closed was 15(22) s.[24] With age and with disease progression individuals with PD may become more reliant on vision for balance control and this test helps to distinguish changes in visual dependence over time. Results of this test may assist the therapist to decide whether to include activities with visual changes in a person's treatment program.

Single Limb Stance Test (SLST). This test is also referred to as unipedal stance test and one -leg standing balance test. Eyes are open for this test. The client is given three trials with the best of the three as the measure. A ceiling of 30s is set.[44] In 10 people with PD (with a history of falls) the test-retest reliability of the SLST was high for the right (ICC=.94) and left (ICC=.85) legs; the test-retest reliability for 10 individuals with PD (with no reported falls) was moderate for the right (ICC=.66) and left (ICC=.5) legs.[53] Individuals with PD who were non-fallers had SLST times of 12 to 14s. whereas those with PD who were fallers had SLST times of 8 to 10s.[53] In another study individuals with PD who were non-fallers had a mean SLST of 16(10)s on the right leg and 18(9)s on the left; those with PD who were fallers had a SLST of 9(10)s on the right leg and 9(9)s on the left leg.[58] Using a cut-off time of $\leq$ 10s 75% of people with PD were fallers and those with times greater than 10s had a 74% chance of being a non-faller.[59] The SLST test has been used as an outcome measure for studies of tai chi[60] and physical therapy[58] in people with PD. Normative values of a meta-analysis on SLSTs for 60-69 year old community-dwelling individuals was 27s (range=20-34), for 70-79 year old individuals was 17s (range 12-23), and for 80-89 year old individuals was 9 s (1-16).[44] Multiple studies have shown that stance time decreases with age.[61]

Activities-Specific Balance Confidence (ABC) Scale. This tool was designed to measure an individual's confidence in his/her ability to perform daily activities without falling.[45] It was designed for use with older adults. The scale has 16 items that are rated on a 0-100 percent (%) scale with 0% being no confidence and 100% being complete confidence. The percent of at least 12 of the questions are needed for a summary percentage of the tool. When tested in 36 people with PD the ABC Scale had a mean of 70%(19), an excellent test-retest reliability ($ICC_{(2,1)}$ = .94), and a MDC_{95} of 13%.[24] Using a Chinese version of the ABC scale, scores of over 80% were associated with a low fall risk,[62] and scores between 50-80% were associated with a moderate increase of fall risk in 67 clients with PD.[63] In a study of 49 individuals with PD a cutoff of 76% predicted falls with a sensitivity of 84%.[47] There was no change in ABC Scale scores in 19 people with PD following a home exercise program.[64] Among 83 healthy adults ages 50-89 the average ABC Scale score was 91(11) with a confidence interval of 89-93.[50] When administered along

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with balance tests, the ABC Scale helps the therapist to distinguish whether a person's perceived capability rather than physical ability is predictive of his or her behavior. This information guides the therapist as to whether PT goals need to focus on improving the individual's balance confidence or on performance of specific balance activities.

Falls History. An increased risk of falls occurs with PD with a relative risk of 6.1 compared to controls for a single fall and a relative risk of 9 for repeated falls.[56] The ability to predict who will fall in PD is poor. Many falls occur with turning, some occur due to a hypotensive episode, freezing of gait (FoG), and/or decreased foot clearance. It is imperative for therapists to record falls on every client visit and more important to discover the cause of the fall. The strongest predictor of falls is a previous history of falls.[65]

MOBILITY TESTS AND MEASURES

Timed up and go test (TUG). The test contains the balance and gait maneuvers used in everyday life.[6] Clients may use an assistive device. A lower score demonstrates a better (faster) performance. A test-retest reliability study of the TUG in 37 people with PD showed an $ICC_{(2,1)}$ of .85 and a MDC_{95} of 11.[24] The mean TUG time and SD was 15(10) with confidence intervals of 12 to 19.[24] Another study of 9 males with PD reported that the TUG had a moderate test-retest reliability (ICC=.72) with a MDC of 5 seconds.[66] There is controversy about whether the TUG using cutoff scores of 12-14s utilized in healthy older adults predicts falling in people with PD.[67] The TUG does help to discriminate between H&Y stages 2 versus 2.5 or 3.[68] In a cohort of 71 individuals with PD, a TUG score of greater than or equal to 16 s was independently associated with increased risk of falling with an odds ratio (OR) of 3.86.[62] This test is easy and quick to administer and gives therapists useful information for treatment planning about functional tasks that individuals have difficulties performing such as sit to stand or turning.

Tinetti Mobility Test (TMT) is comprised of two parts: a balance subscale that assesses static, dynamic, and reactive balance control, and a gait subscale that assesses eight components of gait.[69] Each item of the TMT is scored using a scale of 0 to 1 or 2. The total possible score on the TMT is 28 points, with higher scores indicating better performance. Individuals are permitted to use ambulatory assistive devices and/or orthotics if needed during the TMT. The TMT had high intra- and interrater reliability (0.69-0.94) and had a sensitivity and specificity of 76% and 66% respectively when using a cutoff value of 20 for assessing fall risk in 126 individuals with PD.[70] This test provides information about reactive balance control and gait deviations that are not assessed with the Berg and TUG.

Timed sit to stand test (TSTS). The timed chair stand was first documented by Dr. Csuaka in 1985.[71] It was proposed as a simple measure of lower extremity strength. Since then it has been used to examine functional status, lower extremity muscle force/strength, neuromuscular function, balance, vestibular dysfunction and to distinguish fallers from non-fallers. There are multiple versions of the timed chair stand. One method is to measure the number of times that a person stands over a given set of time. More commonly, the time that it takes a person to complete one, five, or ten repetitions of sit to stand is measured. In all cases, individuals are not allowed to use their hands for push off. The 5 timed chair stand is the most frequently used method in clinical trials. In a large study of 5,403 community dwellers over the age of 60 the mean TSTS score was 13s(.19) for men and 14s(.72) for women.[72] No studies were found of people with PD on this test. This particular skill is of primary importance to people with PD. They often lack the ability to come forward in the chair or have a fear of leaning too far forward to get up. Chair height should be consistent across testing sessions as the higher the chair or mat from the floor the easier the ascent. The test can be used as a therapy goal for people with PD.

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Integumentary Integrity. Skin integrity is not usually affected in PD because sensation is intact. However, skin inspection is recommended in those individuals with sensory deficits due to aging or co-morbid conditions and motor deficits that severely limit their mobility.

Motor Function (Motor Learning and Motor Control). Bradykinesia (slow movements), hypokinesia (reduced movement amplitude and speed), and/or akinesia (inability to initiate long or complex movement sequences), and Freezing of Gait (FoG) characterized by cessation of movement midway through a long or complex locomotor sequence are hallmarks of the disease. Tests of gait can detect the above conditions. Fine motor dexterity is often impaired and can be assessed using writing, dressing, cutting food and handling utensils tasks and tests such as the Purdue Pegboard Test.[73] The location, severity, and type (i.e., resting or intention) of tremors and whether they interfere with functional tasks such as writing, feeding, and dressing should be recorded.

Muscle Performance: Overall strength is not initially a problem in PD. Over time, strength can be diminished. It is not clear how much of the strength loss is due to disuse, normal aging, or altered central drive to muscles.[74] Extensor muscle groups are particularly affected including the gastrocnemius/soleus muscle group,[75] hip extensors, back/neck extensors, and lower/middle trapezius muscles. Therapists should perform strength testing in individuals with PD who are experiencing functional declines.

Pain.: Pain occurs in approximately 40% of individuals with PD.[76] The cause of that pain can be musculoskeletal, radicular/neuropathic, dystonia, central or primary pain and akathisia. Some pain originates from the disease, disuse, depression, or secondary to medication involvement.[76] Therapists can measure pain using numerical or visual analog scales.

Posture. Individuals with PD may develop a stooped posture with flexion of the knees and trunk. Posture can be assessed with posture grids or plumb lines, still photography or videotapes to record changes. A back assessment should include analysis of kyphosis and scoliosis.

Psychological function. Depression occurs in 40-65% of PD.[77] Physicians are advised to treat depression in PD before establishing a diagnosis of dementia. Anxiety occurs in 30% of people with PD, including phobias and panic attacks.[77] There are no depression or anxiety scales dedicated to people with PD. Depression and anxiety are covered in the MDS-UPDRS mentation section. In addition, the Geriatric Depression Screen[78] or the three-question depression screener[79] may be utilized.

Range of Motion. Clients with PD often develop tightness of flexor muscle groups including hip flexor, abdominal and pectoral muscles that result in reductions in axial extension and rotation, shoulder flexion, and functional reach.[80] Therapists should check full extension of all of these groups of muscles.

Reflex integrity and Tone. Deep tendon reflexes are typically not affected by PD. When a client is utilizing l-dopa or dopamine agonists, it may be difficult to elicit increased muscle tone. Clients who are on these medications should be seen when they are off their dopamine medications or weaning from them. Rigidity can be assessed using items in the motor examination section of the MDS-UPDRS.

Self-Care and Home Management (Including ADL and IADL). Activities of daily living (ADLs) are assessed in the MDS-UPDRS. Instrumental ADLs are assessed in the Parkinson's Disease Questionnaire [81](listed below). In addition the Functional Status Index,[82] Katz Activities of Daily Living Index,[83] the Lawton Instrumental Activities of Daily Living scale,[84] and the Older Americans Resources and Services (OARS) Instrumental Activities of Daily Living assessment[85] have been used with the elderly. Living assessments can be helpful to the client.

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Sensory Integrity. Some clients report numbness or tingling in their hands or feet. Assessment of skin sensations and proprioception should be performed in individuals with PD with sensory complaints, balance problems, or those with co-morbidities that affect somatosensory function.

Ventilation and Respiration. Respiratory function is known to be directly affected by the disease, with restrictive changes due to chest wall rigidity and upper airway obstruction being the major pulmonary abnormality.[86] However, most people do not report respiratory symptoms until later stages of the disease. Since pulmonary infections may contribute to morbidity and mortality in individuals with PD, therapists may desire to include respiratory function assessments in their examinations of people in the later stages of the disease.

Work, Community, and Leisure Integration. PD symptoms can affect an individual's ability to function at home, work, and in community activities. Thus, therapists should include quality of life, general health, and community participation measures in their evaluations.

Parkinson's Disease Questionnaire (PDQ-39). This instrument is a quality of life measurement related to PD disease.[81] The instrument measures mobility, activities of daily living, emotional well being, stigma, social support, cognitions, communication and bodily discomfort. The scores are reported in per cents ranging from 0% (perfect health) to 100% (worst health). There are 139 questions and the instrument takes 15-20 minutes to complete. The individual with PD should complete the form and not the spouse, caretaker or assistant. The questionnaire provides useful information about the impact of PD on health status.

Medical Outcomes Study 36-item Short-Form Health Survey (SF-36). The SF-36 Health Survey is a general quality of life inventory and consists of mental health, social functioning, role-emotional, and physical functioning subscales.[87] Each of the subscales can be used alone, and higher scores are indicative of better health. The mean score and standard deviation on the physical functioning subscale was 57% (23) with a MDC_{95} of 28% in 37 individuals with PD.[24] Interestingly the mental health, social functioning and role-emotional subscales had higher means (74-83%) than the general health subscales.[24]

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Would you like to contribute to the DDSIG Newsletter?

Contact us and let us know what you are interested in writing about!

Table 1. Summary of Outcome Measures for PD

Category	Test or Measure
Aerobic Capacity and Endurance	Aerobic capacity during functional activities, or during standardized exercise test (early stages) Cardiovascular and pulmonary signs and symptoms in response to exercise or increased activity
Anthropometric Characteristics	Weight measurements Girth measurements of extremities
Arousal, attention, and cognition	Ability to follow multistep commands Alert, oriented times 4 Mini Mental State Examination (MMSE)[15]
Assistive, Adaptive, Orthotic, Protective, and Supportive Devices	Assessments of different devices and equipment used during functional activities including the safety during use, alignment, fit, and the patient's ability to care for the devices or equipment
Circulation	Blood pressure measurement Heart rate and rhythm
Cranial Nerve Integrity	Screen of cranial nerves Assessment of oral motor function, phonation and speech production through interview and observation
Environmental, home and work barriers	Evaluation of patient's home and work environments for current and potential barriers, and access and safety issues
Ergonomics and Body Mechanics	Assessment of ergonomics and body mechanics during self-care, home management, work, community, or leisure activities (may include caregivers)
Gait, Locomotion, and Balance	Gait Assessment: six minute walk test, [8] gait speeds and functional gait assessment, [39] Balance: Berg Balance test, [42] Functional Reach, [51,52] Pull test, [3] Romberg and sharpened Romberg, [43] Single limb stance, [44] Activities-specific balance confidence scale, [45] and fall history Mobility tests: Timed up and go, [6] Tinetti Mobility Test, [69] timed sit to stand, [71]
Integumentary Integrity	Skin inspection at contact points with devices and equipment and the sleeping surface
Motor Function (Motor Learning and Motor Control)	ADL subscale of the MDS-UPDRS[3] Purdue pegboard test[73]
Muscle Performance (Strength, Power, and Endurance)	Manual muscle testing (MMT) Hand-held dynamometry
Pain	Pain numerical rating scale Pain visual analog scale (VAS)
Posture	Assessment of spinal alignment
Psychological Function	MDS-UPDRS mentation section[3] Geriatric Depression Screen[78] Three-question depression screener[79]

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Table 1. Summary of Outcome Measures for PD (continued)

Category	Test or Measure
Range of Motion (ROM)	Goniometry End feel assessment Multisegment flexibility tests
Reflex Integrity	Deep tendon reflexes Rigidity testing
Self-Care and Home Management	MDS-United Parkinson disease rating scale ADL scale[3] Functional Status Index[82] Katz Activities of Daily Living Index[83] Lawton Instrumental Activities of Daily Living scale[84] Older Americans Resources and Services (OARS) Instrumental Activities of Daily Living assessment[85]
Sensory Integrity	Sensory testing
Ventilation and Respiration/ Gas Exchange	Respiratory rate, rhythm, and pattern Auscultation of breath sounds Cough effectiveness testing Vital capacity (VC) testing or Forced vital capacity (FVC) testing
Work, Community, and Leisure Integration	Parkinson's Disease Questionnaire(PDQ-39)[81] SF-36 Health Survey[87] Many other quality of life questionnaires are available

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Merci!
Danke!
Grazie!
Thanks!

The Leadership of the DDSIG would like to extend its gratitude to the outgoing members of the Executive Committee: Donna Fry, PT, PhD the outgoing DDSIG Vice Chair, and Dan White, PT, ScD, NCS, the outgoing DDSIG Nominating Committee Chairperson.

Donna and Dan, please accept our sincerest thanks for your service to the SIG and your profession. Your contributions will long be remembered. We hope that you will both continue your involvement with the DDSIG!

The DDSIG Leadership would like to extend it warmest welcome to the newly elected Leaders. Michael Harris-Love, PT, DSc was elected as the new Vice Chair. Lisa Brown, PT, DPT, NCS was elected to the vacant position on the SIG Nominating Committee.

Thanks are also due to Kirk Personius, PT, Phd , who will Chair the Nominating Committee for the coming year.

Bienvenue!
Willkommen!
Benvenuto!
Welcome!

1. Trail M, Protas EJ, Lai EC. *Neurorehabilitation in Parkinson's Disease*. Thorofare, NJ: Slack Incorporated; 2008.
2. Kumar R, Lozano AM, Sime E, Halket E, Lang AE. Comparative effects of unilateral and bilateral subthalamic nucleus deep brain stimulation. Neurology 1999; 53:561-566.
3. Goetz CG, Tilley BC, Shaftman SR, et al. Movement Disorder Society-sponsored revision of the Unified Parkinson's Disease Rating Scale (MDS-UPDRS): scale presentation and clinimetric testing results. Mov Disord 2008; 23 (15): 2129-2170.
4. Hoehn MM, Yahr MD. Parkinsonism: onset, progression and mortality. Neurology 1967;17:427– 442.
5. American Physical Therapy Association. *Guide to Physical Therapist Practice, 2nd ed*. Fairfax, VA: American Physical Therapy Association; 2001.
6. Podsiadlo D, Richardson S. The Timed "Up and Go": A test of basic functional mobility for frail elderly persons. JAGS 1991;39 (2):142-148.
7. Brown RG, Dittner A, Findley L, Wessely SC. The Parkinson fatigue scale. Parkinsonism and Related Disorders 2005; 11(1):49-55.
8. Cooper KH. A means of assessing maximal oxygen intake. JAMA 1968; 203(3):135-138.
9. Protas EJ, Stanley RK, Jankovic J, MacNeill B. Cardiovascular and metabolic responses to upper- and lower-extremity exercise in men with idiopathic Parkinson's disease. Phys Ther 1996; 76 (1):34-40.
10. Werner WG, DiFrancisco-Donoghue J, Lamberg EM. Cardiovascular response to treadmill testing in Parkinson disease. J Neurol Phys Ther 2006;30 (2):68-73.
11. Borg G. *Borg's Perceived Exertion and Pain Scales*. Human Kinetics; 1998.
12. Chen H, Zhang SM, Hernan MA ,et al. Weight loss in Parkinson's disease. Ann Neurol 2003; 53:676-679.
13. Zakzanis KK, Freedman M. A neuropsychological comparison of demented and nondemented patients with Parkinson's disease. Appl Neuropsychol 1999; 6(3): 129-146.
14. Rajput AH. Prevalence of dementia in Parkinson's disease. In: Huber SJ, Cummings JL, eds *Parkinson's Disease: Neurobehavioral Aspects*. New York: Oxford University Press; 1992:119-131.
15. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 1975;12:189-198.
16. Kulisevsky J, Pagonabarraga J. Cognitive impairment in Parkinson's disease: tools for diagnosis and assessment. Movement Disorders 2009; 24:1103-1110.
17. Kloos AD, Kegelmeyer DA, Kostyk SK. Effects of assistive devices on gait measures in Parkinson Disease [Abstract]. J Neurol Phys Ther 2009;33(4):227.
18. Goldstein DS. Orthostatic hypotension as an early finding in Parkinson's disease. Clin Auton Res 2006:16:46-54.
19. Goldstein DS, Holmes C, Dendi R, Bruce S, Li S-T. Orthostatic hypotension from sympathetic denervation in Parkinson's disease. Neurology 2002;58:1247–55.
20. Davidsdottir S, Cronin-Golomb A, Lee. Visual and spatial symptoms in Parkinson's *disease*. Vision Res 2005; 45 (10):1285-1296.
21. Ponsen MM, Stoffers D, Wolters ECh, Booij J, Berendse HW. Olfactory testing combined with dopamine transporter imaging as a method to detect prodromal Parkinson's disease. J Neurol Neurosurg Psychiatry 2010; 81 (4): 396-399.
22. Trail M, Fox C, Ramig LO, et al. Speech treatment for Parkinson's disease. Neurorehabilitation 2005; 20:205-221.
23. Society AT. Guidelines for the six-minute walk test. Amer J Resp Crit Care Med 2002;166:111-117.
24. Steffen T, Seney M. Test-retest reliability and minimal detectable change on balance and ambulation tests, the 36-item short form health survey, and the unified Parkinson disease rating scale in people with Parkinsonism. Phys Ther 2008;88(6):733-746.
25. Dibble L, Lange M. Predicting falls in individuals with Parkinson disease: a reconsideration of clinical balance measures. J Neurol Phys Ther 2006;30(2):60-67.
26. Bohannon R. Six-minute walk test: A meta-analysis of data from apparently healthy elders. Topics in Geriatr Rehab 2007;23:155-160.
27. Lim L, van Wegen E, Goede C, Jones D, Rochester L, Hetherington V et al. Measuring gait and gait-related activities in Parkinson's patients own home environment: a reliability, responsiveness and feasibility study. Parkinsonism and Related Disorders 2005;11:19-24.
28. Fisher B, Wu A, Salem G, Song J, Lin C, Yip J et al. The effect exercise training in improving motor performance and corticomotor excitability in people with early Parkinson's disease. Arch Phys Med Rehabil 2008;89:1221-1229.
29. Hackney ME, Kantorovich S, Levin R, Earhart GM. Effects of tango on functional mobility in Parkinson's disease: a preliminary study. J Neurol Phys Ther 2007;31:173-9.
30. Bond JM, Morris M. Goal-directed secondary motor tasks: their effects on gait in subjects with Parkinson disease. Arch Phys Med Rehabil 2000; 81 (1):110-116.
31. Schenkman M, Morey M, Kuchibhatla M. Spinal flexibility and balance control among community-dwelling adults with an without Parkinson's disease. J Gerontol 2000;55(8):M441-M445.
32. Steffen T, Hacker T, Mollinger L. Age-and gender-related test performance in community-dwelling elderly people: Six-Minute Walk test, Berg Balance Scale, Timed Up & Go test, and Gait Speeds. Phys Ther 2002; 82:128-37.
33. Ferrandez A-M, Pailhous J, and Durup M. Slowness in elderly gait. Exp Aging Res 1990;16(2):79-89.
34. Elble RJ, Thomas S, Higgins C, Colliver J. Stride-dependent changes in gait of older people. J Neurol 1991;238:1-5.
35. Himann J, Cunningham D, Rechnitzer P, Paterson D. Age-related changes in speed of walking. Med Sci Sports Exerc 1988; 20(2):161-166.
36. Murray P, Kory R, Clarkson B. Walking patterns in healthy old men. J Gerontol 1969;24(2):169-78.
37. Bohannon RW. Comfortable and maximum walking speed of adults aged 20-79 years: reference values and determinants. Age Ageing 1997; 26:15-19.
38. Shumway-Cook A, Woollacott M. Motor control: theory and practical applications. Baltimore: Williams & Wilkins; 1995.
39. Wrisley DM, Marchetti GF, Kuharsky DK, Whitney SL. Reliability, internal consistency, and validity of data obtained with the functional gait assessment. Phys Ther 2004; 84(10):906-918.
40. Walker ML, Austin AG, Banke GM, Foxx SR, Gaetano L, Gardner LA et al. Reference group data for the functional gait assessment. Phys Ther 2007; 87(11):1468-1477.
41. Wrisley DM, Kumar NA. Functional gait assessment: concurrent, discriminative, and predictive validity in community-dwelling older adults. Phys Ther 2010; 90 (5): 761-773.
42. Berg K, Wood-Dauphinee S, Williams J, Gayton D. Measuring balance in elderly: Preliminary development of an instrument. Physiother Canada 1989;41:304-311.
43. Fitzgerald B. A review of the sharpened Romberg Test in diving medicine. SPUMS Journal 1996; 26(3):142-146.
44. Bohannon R. Reference values for single limb stance: A descriptive meta-analysis. Topics Geriatric Rehabilitation 2006; 22(1):70-77.
45. Powell L, Myers A. The activities-specific balance confidence (ABC) scale. J Gerontol Med Sci 1995:M28-M34.
46. Lim L, van Wegen E, de Goede C, Jones D, Rochester L, Hetherington V et al. Measuring gait and gait-related activities in parkinson's patients own home environment: a reliability, responsiveness and feasibility study. Parkinsonism Relat Disord 2005;11:19-24.
47. Landers M, Backlund A, Davenport J, Fortune J, Schuerman S, Altenburger P. Postural instability in idiopathic Parkinson's disease: discriminating fallers from nonfallers based on standardized clinical measures. J Neurol Phys Ther 2008;32(2):56-61.
48. Ashburn A, Fazakarley L, Ballinger C, Pickering R, McLellan LD, Fitton C. A randomised controlled trial of a home based exercise programme to reduce the risk of falling among people with Parkinson's disease. J Neurol Neurosurg Psychiatry 2007;78:678-84.

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49. Cakit BD, Saracoglu M, Genc H, Erdem HR, Inan L. The effects of incremental speed-dependent treadmill training on postural instability and fear of falling in parkinson's disease. Clin Rehabil 2007;21(8):698-705.
50. Steffen T, Mollinger L. Age- and gender related test performance in community-dwelling adults: multi-directional reach test, berg balance scale, sharpened romberg tests, activities-specific balance confidence scale, and physical performance test. J Neurol Phys Ther 2005;29 (4):181-188.
51. Duncan P, Weiner D, Chandler J, Studenski S. Functional Reach: A new clinical measure of balance. J Gerontol Med Sci 1990;45:M192-7.
52. Chevan J, Atherton H, Hart M, Holland C, Larue B, Kaufman R. Nontarget-and target-oriented functional reach among older adults at risk for falls. J Geriatr Phys Ther 2003;26(2):22-5.
53. Smithson F, Morris M, Iansek R. Performance on clinical tests of balance in Parkinson's disease. Phys Ther 1998;78(6):577-92.
54. Behrman A, Light K, Flynn S, Thigpen M. Is the functional reach test useful for identifying falls risk among individuals with Parkinson's Disease? Arch Phys Med Rehabil 2002;83:538-42.
55. Schenkman M, Cutson TM, Kuchibhatla M, Chandler J, Pieper CF, Ray L et al. Exercise to improve spinal flexibility and function for people with Parkinson's disease: A randomized, controlled study. J Am Geriatr Soc 1998;46:1207-16.
56. Bloem B, Grimbergen Y, Cramer M, Willemsen M, Zwinderman A. Prospective assessment of falls in Parkinson's disease. J Neurol 2001;248:950-958.
57. Diamantopoulos I, Clifford E, Birchall J. Short-term learning effects of practice during the performance of the tandem Romberg test. Clin Otolaryngol 2003;28:308-313.
58. Stankovic I. The effect of physical therapy on balance of patients with Parkinson's disease. Int J Rehab Res 2004;27(1):53-57.
59. Jacobs J, Horak F, Tran V, Nutt J. Multiple balance tests improve the assessment of postural stability in subjects with parkinson's disease. J Neurol Neurosurg Psychiatry 2006;77:322-326.
60. Hackney ME EG. TaiChi improves balance and mobility in people with parkinson disease. Gait Posture 2008.
61. Nakao H YT, Mimura T, Hara T, Nishimoto K, Fujimoto S. Influence of lower-extremity muscle force, muscle mass and asymmetry in knee extension force on gait ability in community-dwelling elderly women. J Phys Ther Sci 2006;18:73-79.
62. Mak M, Pang M. Balance confidence and functional mobility are independently associated with falls in people with Parkinson's disease. J Neurol 2009;256(5):742-749.
63. Jacobs J, Horak F, Tran V, Nutt J. An alternative clinical postural stability test for patients with parkinson's disease. J Neurol 2006;253:1404-1413.
64. Lun V, Pullan N, Labelle N, Adams C, Suchowersky O. Comparison of the effects of a self-supervised home exercise program with a physiotherapist-supervised exercise program on the motor symptoms of parkinson's disease. Mov Disord 2005;20(8):971-975.
65. Wood B, Bilclough J, Bowron A, Walker R. Incidence and prediction of falls in Parkinson's disease: a prospective multidisciplinary study. J Neurol Neurosurg Psychiatry 2002;72:721-725.
66. Campbell F, Ashburn A, Thomas P. An exploratory study of the consistency of balance control and the mobility of people with Parkinson's disease (PD) between medication doses. Clin Rehabil 2003;17:318-324.
67. Matinolli M, Korpelainen JT, Korpelainen R, et al. Mobility and balance in Parkinson's disease: a population-based study. Eur J Neurol 2009;16 (1):105-111.
68. Tanji H, Gruber-Baldini AL, Anderson KE, et al. A comparative study of physical performance measures in Parkinson's disease. Mov Disord 2008;23 (13):1897-1905.
69. Tinetti ME. Performance-oriented assessment of mobility problems in elderly patients. J Am Geriatr Soc 1986;34:119-126.
70. Kegelmeyer D, Kloos A, Thomas K, Kostyk S. Reliability and validity of the Timetti Mobility Test for individuals with Parkinsons Disease. Phys Ther 2007;87(10):1369-1378.
71. Guralnik J, Simonsick E, Ferrucci L, Glynn R, Berkman L, Blazer D et al. A short physical performance battery assessing lower extremity function: Association with self-reported disability and prediction of mortality and nursing home admission. J Gerontol 1994;49(2):M85-M94.
72. Ostchega Y, Harris T, Hirsch R, Parsons V, Kington R, Katzoff M. Reliability and prevalence of physical performance examination assessing mobility and balance in older persons in the US: Data from the third national health and nutrition examination survey. JAGS 2000;48:1136-1141.
73. Tiffin J. Purdue Pegboard: Examiner manual. Chicago: Science Research Associates; 1968.
74. Falvo MJ, Schilling BK, Earhart GM. Parkinson's disease and resistive exercise: rationale, review, and recommendations. Mov Disord 2008;23:1-11.
75. Chong R, Horak F, Woollacott M. Parkinson's disease impairs the ability to change set quickly. J Neurol Sci 2000;175:57-70.
76. Ford B. Pain in Parkinson's disease. Mov Disord 2010; 25 Suppl 1: S98-103.
77. Goetz CG. New developments in depression, anxiety, compulsiveness, and hallucinations in Parkinson's disease. Mov Disord 2010; 25 Suppl 1: S104-109.
78. Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: A preliminary report. J Psych Res 1983; 17*:* 37-49.
79. Levy I, Hanscom B, Boden SD. Three-question depression screener used for lumbar disc herniations and spinal stenosis. Spine 2002;27 (11):1232-1237.
80. Schenkman M, Clark K, Xie T, Kuchibhatla M, Shinberg M, Ray L. Spinal movement and performance of a standing reach task in participants with and without parkinson disease. Phys Ther 2001;81:1400-1411.
81. Jenkinson CF, R; Peto, V. The Parkinson's Disease Questionnaire: User manual for the PDQ-39, PDQ-8 and PDQ Summary Index. Oxford: Joshua Horgan Print Partnership; 1998.
82. Jette AM. The Functional Status Index: reliability and validity of a self-report functional disability measure. J. Rheumatol. Suppl 1987;14 Suppl 15:15-21.
83. Katz S, Down TD, Cash HR, et al. Progress in the development of the index of ADL. Gerontologist 1970; 10: 20 – 30.
84. Lawton MP. Functional assessment of elderly people. J Am Geriatr Soc 1971; 9(6): 465-481.
85. George LK, Fillenbaum GG. OARS methodology: A decade of experience in geriatric assessment. J Am Geriatr Soc 1985; 33: 607–615.
86. Shill H, Stacy M. Respiratory function in Parkinson's disease. Clin Neuroscience 1998;5:131-135.
87. Hickey AM, Bury G, O'Boyle CA, et al. A new short form individual quality of life measure (SEIQoL-DW): Application in a cohort of individuals with HIV/AIDS. Br Med Journal 1996;313:29-33.

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For more resources on Parkinson's disease, check the resources page of the DDSIG's website!

Appendix 1

The following chart is an EXAMPLE of how one might want to collect data over time utilizing multiple evaluation tools measuring balance, ambulation, mobility, overall level of the disease and a quality of life instrument. My example outlines the research published on Parkinson's disease. When used in the clinic it helps the therapist remember the MDC (used to set goals), the variance in confidence interval for what clients the same age would be performing in the community, and most important the improvement or decline in scores over time.
The author had a client George with Parkinson's disease. When he entered the clinic November 2009 he had terrible dyskinesias, a comfortable gait speed of .95m/s and a fast gait speed of 1.29m/s. On his May 2010 testing date, he had a comfortable gait speed of 1.41m/s and a fast gait speed of 1.85m/s. These new gait speeds are within the confidence interval of men his age (see below). Now we need to work on his freezing of gait when he turns. His May 2010 six minute walk test was only 316 meters; the reference data for men his age are 478-575 meters (see below). We still have many goals!

Name: George Example	**MDC_{95} PD[24]**	**Men 70-79**	**11/2009**	**5/2010**
Date of Birth 1/15/1934	**N=37**	**Community[32,50]**		
Balance Scales (higher is better)		**X(SD) CI**		
Berg Balance Scale (56 total)	4	54(3) 52-56	NT	NT
Sharpened Romberg-Eyes Open	38	54(17) 42-60	15	NT
Sharpened Romberg-Eyes Closed	19	26(20) 12-40	0	NT
Right Single leg Stance (s)			NT	NT
Left Single leg Stance (s)			NT	NT
Forward Functional Reach (cm)	9	29(5) 26-32	NT	NT
Backward Functional Reach (cm)	7	19(7) 14-24	NT	NT
Activities Specific Balance Test (%)	13	96(4) 93-98	36	49
Falls in past 6 months			1	2
Ambulation Tests (higher is better)			cane	cane
Comfortable Gait Speed (m/s)	0.18	1.4(.2)1.3-1.5	0.95	1.41
Fast Gait Speed (m/s)	0.25	1.8(.4)1.6-2.1	1.29	1.85
Difference of FGS-CGS (m/s)		.5(.3)	0.34	0.44
Six Minute Walk test (m)	86	527(85) 478-575	NT	316
Functional Gt. Assessment (30 total)			NT	20
Mobility Tests (lower is better)				
Timed Up & Go (s)	11	9(3) 7-11	20	10
5X Timed chair stand (s)			48	NT

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Appendix 1 (continued)

Name: George Example			**11/2009**	**5/2010**
Date of Birth 1/15/1934				
MDS-UPDRS (lower is better)				
MDS-UPDRS mentation (total 52)				5
MDS-UPDRS ADL (total 52)				20
MDS-UPDRS motor (total 132)				47
Modified Hoehn & Yahr (range 0-5)			3	3
Parkinson Disease Questionnaire (%)				
Mobility			40	NT
ADL			4	NT
Emotional well being			0	NT
Stigma			13	NT
Social Support			0	NT
Cognitions			0	NT
Communication			0	NT
Bodily discomfort			33	NT

End ■

A Message from the Chairperson (continued from page 1)

and I led a lively roundtable discussion on "Community-Based Exercise Programs for People with Parkinson Disease" that drew a large crowd. Look for more programming on that topic at CSM 2011.

The DDSIG is committed to providing patient and therapist resources in the coming year. To that end, we are seeking individuals who would be interested in writing patient education "fact sheets" about the role of physical therapy in the management of neurodegenerative diseases. These "fact sheets" would be concise and easy to read (about an 8th grade reading level). Examples of patient education fact sheets can be found on the Vestibular Rehabilitation SIG website. If you are interested in volunteering for this project please contact me (Anne Kloos) at Kloos.4@osu.edu. People who volunteer will be asked to write a one-page fact sheet on a topic related to a neurodegenerative disease. Each fact sheet will undergo review by content experts and then be posted on the DDSIG website. This is a great opportunity for anyone who wants to get more involved in the DDSIG.

Enjoy the rest of the summer,
Anne

Parkinson's Disease Article Review

Lisa Muratori, PT, EdD
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Rochester L, Baker K, Hetherington V, Jones D, Willems AM, Kwakkel G, Van Wegen E, Lim I, Nieuwboer A. Evidence for motor learning in Parkinson's disease: Acquisition, automaticity and retention of cued gait performance after training with external rhythmical cues. Brain Research. 2010 Jan 11. [Epub ahead of print]

Abstract:
People with Parkinson's disease (PD) have difficulty learning new motor skills. Evidence suggests external stimuli (cues) may enhance learning; however, this may be specific to cued rather than non-cued performance. We aimed to test effects of cued training on motor learning in PD. We defined motor learning as acquisition (single task), automaticity (dual task) and retention of single- and dual-task performance (follow-up). 153 subjects with PD received 3 weeks cued gait training as part of a randomised trial (the RESCUE trial). We measured changes in cued gait performance with three external rhythmical cues (ERC) (auditory, visual and somatosensory) during single and dual tasks after training and 6 weeks follow-up. Gait was tested without cues to compare specificity of learning (transfer). Subjects were 'on' medication and were cued at preferred step frequency during assessment. Accelerometers recorded gait and walking speed, step length and step frequency were determined from raw data. Data were analysed with SAS using linear regression models. Walking speed and step length significantly increased with all cues after training during both single- and dual-task gait and these effects were retained. Training effects were not specific to cued gait and were observed in dual-task step length, and walking speed however was more limited in single-task non-cued gait. These results support the use of ERC to enhance motor learning in PD as defined by increased acquisition, automaticity and retention. They also highlight the potential for sustained improvement in walking and complex task performance.

Previous research has suggested learning may be compromised in Parkinson's disease (PD) due to the central role of the basal ganglia. The goal of this study was to determine if motor learning, defined as skill acquisition, automaticity, and retention, could be achieved in individuals with PD. The study is a part of the RESCUE trial (Nieuwboer et al., 2007) examining gait training with external rhythmical cues (ERC). The authors hypothesized that extended training with ERC would lead to improved gait performance in acquisition (single task analysis) and improved automaticity (dual task analysis), and that these improvements would be retained six weeks post-training. In order to determine if participants were able to transfer learning, gait was also analyzed without cueing. The study used a cross-over design so that all subjects were given an opportunity to receive gait training with ERC with each participant serving as both an experimental and control subject.

The ability of patients with PD to learn new skills and improve existing skills is an important aspect of all physical therapy interventions. While the role of external cues in PD has been well documented, it is less clear whether these individuals are able to use cues to make long term functional gains. This study used an instrumented wristband to deliver three distinct forms of ERC (visual, auditory, somatosensory/pulsed vibrations) in conjunction with a three week intensive physical therapy program aimed at improving step length and gait speed. Training included single task (walking alone), dual-task (walking carrying an object) and multitasking (walking combined with non-specified tasks). For specific cueing guidelines and for detailed information about the methodology, the reader is directed to the RESCUE project website. However, the methodology outlines gait components addressed by therapists, including initiation and termination, heel strike and push-off, sideways and backwards stepping, walking over different surfaces and long distances. They also highlighted that tasks were separated into simple and complex to vary attentional demands. By investigating aspects of dosing (extended training periods) and carryover (testing for retention), this paper provides useful information for the clinician working with individuals with PD.

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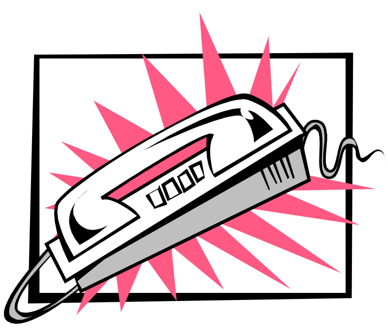
Article Review - continued from Page 18

The methodology is clear but abbreviated as the RESCUE trial has been described previously. Multiple linear regressions were used to account for repeated measures and the authors were able to use corrections from these models for differences in gait variables at baseline, time effects, and carryover effects. Subjects performed a 6m walk test to determine preferred walking speed and walked with each of the three types of ERC during baseline

testing. Subjects were then asked to choose a preferred cue for the three week training which occurred immediately after baseline (early group) or three weeks later (late group). Retention and transfer tasks with all three ERC types were performed six weeks after the final training session. The researchers examined changes in performance of both single and dual tasks. The significant improvement in step length and walking speed found in this large cohort of individuals with PD suggests this study is applicable to a wide group of patients. Importantly, the ability to retain improvements six weeks after training regardless of ERC type and to perform well during dual tasks even when cueing was withdrawn has tremendous implications for PT. In fact, individuals with PD showed a greater improvement (i.e, more change from pre to post training) in dual task performance which may be more relevant to everyday function. However, the use of a cross-over design does mean that the researchers could not control for all testing procedures. The addition of groups receiving separate pieces of the experimental procedure, i.e., one group receiving ERC (without extensive PT gait training) and one group receiving extensive gait training (without ERC), would have strengthened the findings. In addition, looking at the effect of different dosing regimens (i.e., how much for how long), withdrawal of cues and long term changes (6-12 month follow-up) would add an interesting perspective. Finally, future studies may consider capturing changes in the level of disability/participation when using ERC to measure improvement in quality of life for individuals with PD.

End ■

National Resource Center for Parkinson's Disease at Boston University



This past winter Terry Ellis PT, PhD, NCS Clinical Associate Professor at Boston University and the American Parkinson's Disease Association (APDA) launched a first of its kind national "helpline". The center's toll free helpline number (888-606-1688) allows callers to speak with a licensed Physical Therapist who can answer questions about exercise, provide information about programs in the caller's area, and offer educational materials. It's a valuable source of information about current, evidence-based management of Parkinson's disease symptoms through safe, effective exercise and rehabilitation interventions.

Evidence supporting the benefits of exercise for people with Parkinson's Disease has been well established in the literature by Dr. Ellis and other researchers in this field. The objective of the helpline is to share this knowledge with patients, caregivers, students, and healthcare professionals across the country.

Further information can be found at the program's website: http://www.bu.edu/neurorehab/resource-center/.

Degenerative Diseases

Newsletter of the
Degenerative Diseases Special Interest Group

NEUROLOGY SECTION
American Physical Therapy Association
P.O. Box 327
Alexandria, VA 22313

DD SIG Information

DD SIG Web Page

http://216.197.105.189/go/special-interest-groups/degenerative-diseases

PT Provider Directory

http://216.197.105.189/download.cfm?DownloadFile=25F39ABB-F01C-A304-542459E5F2A210A5