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Parkinson's Disease and Lumbar Compression Fracture Physical Therapy Management: A Case Report.

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PARKINSON'S DISEASE AND LUMBAR COMPRESSION FRACTURE PHYSICAL THERAPY MANAGEMENT: A CASE REPORT

By

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This Scholarly Project, submitted by McKinley Bender in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

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PERMISSION

Title	PARKINSON'S DISEASE AND LUMBAR COMPRESSION FRACTURE PHYSICAL THERAPY MANAGEMENT: A CASE REPORT
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Signature McKinley Bender, SPT

Date 10/14/2020

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ABSTRACT

Background and purpose Parkinson's disease is a slow, variable, progressive, neurodegenerative disease. It is the most common serious movement disorder in the world. Falls are common in people with Parkinson's disease and may lead to devasting outcomes such as compression fractures. This article describes the outpatient physical therapy course of a 76-year-old female patient with Parkinson's disease whom sustained a L3 lumbar compression fracture from a fall. It also discusses the outcomes she obtained as a result of physical therapy intervention. **Case Description** The patient presented to physical therapy with decreased overall strength, gait difficulty with decreased foot clearance, postural instability and impaired balance, decreased coordination, and reduced activity tolerance. Interventions performed included gait training, therapeutic exercise, therapeutic activity, and patient education to improve the patient's strength, gait, balance, coordination, and activity tolerance while allowing for lumbar compression fracture healing. **Outcomes** Following physical therapy intervention, the patient demonstrated improved strength, balance, coordination, and gait potential as evidenced by improved 30 Second Chair Stand, Tinetti Balance & Gait Assessment, and Timed Up and Go Test scores. The patient also demonstrated improved activity tolerance by being able to ambulate longer distances with fewer rest breaks. **Discussion** Rationale for rehabilitation was based off literature for fall reduction, Parkinson's disease, and vertebral compression fractures. This case report

concluded that gait training, therapeutic exercise, therapeutic activity, and patient education intervention resulted in improvements in the patient's strength, gait, balance, coordination, and activity tolerance.

CHAPTER 1

BACKGROUND AND PURPOSE

In 1817 James Parkinson first described Parkinson's disease as a peculiar form of progressive motor impairment with a resting tremor.[1] He described it in his "Essay on the Shaking Palsy."[1] Parkinson's disease is a slow, variable, progressive, neurodegenerative disease and is the most common serious movement disorder in the world. It is noted that Parkinson's disease is likely a result of a combination of factors including aging, genetic susceptibility, and environmental exposures.[2]

Degeneration and deterioration of dopaminergic neurons, neurons related to dopamine, in the midbrain causes Parkinson's Disease.[3] Cells in certain parts of the brain stem are destroyed, particularly in the substantia nigra.[4] Dopamine, a neurotransmitter that has an impact on individuals' movement, behavior, cognition, attention, sleep, and learning is produced from nerve cells in the substantia nigra.[5] These cells are in charge of transmitting messages that plan and control body movement. Damage to dopamine-producing nerve cells in the substantia nigra reduces the control of movement and coordination. In addition, accumulation of alpha-synuclein proteins occurs in the nervous system.[3] The accumulation of alpha-synuclein in large masses known as 'Lewy bodies' are associated with brain cell death.

Approximately 60,000 Americans are diagnosed with the disease every year.[6] According to the Parkinson's Foundation,[6] about one million people are living with

Parkinson's disease in the United States. It is noted that this is more than the number of individuals diagnosed with multiple sclerosis, muscular dystrophy and Lou Gehrig's Disease combined.[6] Due to the high prevalence and the fact that there is no specific test to diagnose Parkinson's disease, it is important for clinicians to have thorough and continual knowledge regarding the presentation and treatment options for this disease when it transpires.

Resting tremor, rigidity, and bradykinesia are motor symptoms and three cardinal features of Parkinson's disease.[1] A resting tremor consists of a slow and rhythmic tremor. It typically begins in one hand, foot or leg and progresses to affect both sides of the body. Rigidity can be defined as the presentation of inflexible movement due to tightness or stiffness that results in the limbs or torso. Bradykinesia refers to slow movements where an individual may feel as though their body is not obeying their brain's command resulting in a decrease in voluntary movement. Postural instability is a motor symptom occasionally identified as a cardinal feature; however, it is non-specific and is usually absent in younger patients and in early stages of the disease.[1] Postural instability, a balance issue, is the inability to maintain steady upright posture. An individual may have instability in standing which could lead to falls and appose challenges with the prevention of falls. Gait impairment results from the combination of these cardinal features, specifically postural instability and bradykinesia. A patient may present with a slow shuffling gait, difficulty turning, reduced gait speed and step length, decreased arm swing, and/or impaired rhythmicity.

Although motor symptoms typically define the disorder of Parkinson's disease, other non-motor symptoms may be present. Non-motor symptoms may include sleep

disorders, cognitive and psychiatric changes, autonomic dysfunction, and sensory symptoms.[1] These symptoms are often overlooked because Parkinson's disease is a type of movement disorder. However, it is important to be aware of these non-motor symptoms because they can be serious and interfere with an individual's quality of life. Physical therapists are able to educate patients in regard to non-motor symptoms and refer them to specialized healthcare professionals to address these symptoms appropriately. It is important for physical therapists to address non-motor symptoms in individuals' physical therapy plan of care in order to improve their quality of life and physical abilities to the highest degree attainable.

To avoid failure of detecting signs or symptoms of additional illnesses and health conditions, it is extremely important to treat the whole patient rather than treating their specific condition/disease. Depression is one of the more common neuropsychiatric disturbances reported in Parkinson's disease.[7] Slaughter et. al[8] reported the prevalence of depression in individuals with Parkinson's disease is 31% for all patients. It is important to educate patients, their families, and other colleagues on depressive disorders in Parkinson's disease. It will allow for the awareness of symptoms of depressive disorders in Parkinson's disease, the knowledge that they are treatable, and the ability to understand that recovery is possible. Individuals who have depression may feel isolated because of their condition. Physical therapists can help by supporting these individuals, referring them to specialized healthcare professionals, and educating individuals about support groups that are available.

Motor and non-motor features of Parkinson's disease previously discussed may cause people with Parkinson's disease to experience falls. Fasano et. al[9] stated that an

average rate of 60.5% of patients with Parkinson's disease sustain at least one fall according to a recent systematic review. Devastating outcomes can result in response to falls. Individuals may incur injuries and negative psychological effects from falling that restrict their ability to perform activities of daily living. Additionally, falls can lead to patients acquiring a fear of falling. With a fear of falling, individuals may limit their degree of mobility obtaining more debilitating effects such as general weakness, instability, and obesity in addition to existing conditions. It is important for physical therapists to assess balance through balance assessments to help determine what is causing patients to fall. Falls are not a normal part of aging; however, they are preventable through physical therapy interventions such as physical rehabilitation and fall prevention education.

Physical therapy interventions such as strength training, movement strategy training, education on fall prevention, and balance training are very important to consider for treatment of Parkinson's disease to reduce the risk of falls and improve postural instability. In a randomized control trial by Morris et. al,[10] strength training or movement strategy training with fall prevention education has been shown to reduce the risk of falls in individuals with Parkinson's disease during a 12-month follow-up period. Additionally, balance exercises of self-destabilization of the center of body mass, tasks that externally induced destabilization of the center-of-body mass and destabilizing activities that involve emphasized coordination between leg and arm movements during walking and locomotor dexterity have been shown to have positive effects on postural instability.[11]

In addition to physical therapy, medication and deep brain stimulation can be used to treat Parkinson's disease. All three forms of treatment may be administered alone or in combinations. Medications are initiated when symptoms are evident and causing an individual a reduced ability to perform activities of daily living.[3] Deep brain stimulation, a surgically implanted device, may be considered for patients whose symptoms are poorly controlled despite receiving previous, superlative medical treatment.[3] It is important for healthcare professionals to be aware of different treatment options that exist due to the fact that there is no cure for Parkinson's disease and it is common for symptoms to worsen overtime. Physical therapists should be mindful of different treatment options to allow the patient to have a favorable prognosis and quality of life. Additionally, understanding and identifying signs and symptoms of side effects to different forms of treatment is necessary to appropriately refer a patient in the case of an emergency situation.

Vertebral compression fractures are prevalent in older adults. They are specifically prevalent in osteoporotic patients and occur when the body of a vertebra collapses. A fracture may be caused from trauma such as falling, tripping or lifting in moderate osteoporosis.[12] Even an individual with a healthy spine has the ability to acquire a compression fracture if experiencing a traumatic event, so it is important to be aware of signs and symptoms and not dismiss this diagnosis.[12]

Old and Calvert[12] list nonmodifiable and modifiable risk factors for sustaining a compression fracture. Nonmodifiable risk factors may include advanced age, female gender, Caucasian race, history of dementia, susceptibility to falling, a history of fractures in adulthood, and a history of fractures in a first-degree family member.[12] A

few potential modifiable risk factors may include being in an abusive situation, alcohol use, tobacco use, a history of osteoporosis and/or estrogen deficiency, early menopause, premenopausal amenorrhea, frailty, impaired vision, decreased physical activity, low body weight, and dietary calcium and/or vitamin D deficiency.[12] Ironically, obesity has been known to be a protective factor to fractures occurences.[12] Although nonmodifiable risk factors cannot be changed, minimizing the modifiable risk factors is very important to reduce the chance of obtaining a compression fractures.

There are conservative and non-conservative treatment options for compression fracture management. Treatment options for conservative management may include pharmacology, bracing, physical therapy, or a combination of these treatments.[13] Conservative treatment options focus on pain control, promoting appropriate posture, education on ways to avoid pain, exercises to build strength and endurance to prevent future fractures, and weight bearing activities and resistance training to maintain bone health.

Non-conservative treatment options may be considered when conservative management in unsuccessful. Several surgical options exist for the management of painful osteoporotic fractures including kyphoplasty, percutaneous vertebroplasty, Osseo-Fix Spinal Fracture Reduction System, and internal bracing.[14] Placement of screws, plates, cages and rods are more invasive treatment techniques that may be considered for the treatment of compression fractures that require decompression and stabilization.[14]

The purpose of this case report is to describe the interventions used for a patient with Parkinson's disease who sustained a lumbar compression fracture following a fall.

This case report discusses the outcomes the patient demonstrated as a result of out-patient physical therapy management. Interventions that were used in this case report consisted of gait training, therapeutic exercise, therapeutic activity, and patient education to improve gait, strength, and balance deficits. It is important to note that the information presented in this case study may not apply to all other cases of Parkinson's disease as the presentation of the disease is variable.

CHAPTER II

CASE DESCRPTION

Presented in this case study is a retired, 76-year-old female who underwent outpatient physical therapy treatment after sustaining a compression fracture of the L3 lumbar vertebra from falling while reaching for something in her kitchen. The patient reported her four-wheeled walker was within reach; however, it was unable to prevent her from falling. The patient had a history of Parkinson's disease that was diagnosed about 9 years before this incidence. Additional past medical history included a previous left ankle fracture, previous compression fracture of T8 and T12 vertebrae, aortic valve stenosis, heart murmur, mitral and aortic regurgitation, coronary artery disease, B12 deficiency, depression, dyslipidemia, hypertension, impaired fasting glucose, macrocytosis, osteoporosis, polyneuropathy, bilateral hearing loss, cataract, and pseudophakia of both eyes.

After falling, the patient was hospitalized in July 2019 and then went to a transitional care unit for ongoing physical and occupational therapy to regain strength and improve functional abilities before arriving back to her residence at a long-term care facility. The patient was seen in outpatient physical therapy approximately 5 weeks and 2 days after being initially hospitalized and sustaining her injury. Prior to her fall, the patient was independent with transfers and ambulation. At the initial evaluation, the patient was performing transfers and ambulating around her apartment with facility staff

present. When out of bed, the patient wore a lumbar-sacral orthosis at all times directly over the L3 vertebra and was using a four-wheeled walker with all transfers and locomotion. She lived on the second floor of her resistance but was able to use the elevator when moving from different floors in the building. The patient enjoyed getting her hair done, which was available to her in her residence. She also enjoyed walking in the hallways, reading, watching movies, and having family visit. The patient's goal was to return to her prior level of function where she was able to walk independently around her apartment and in the hallways a few times a week. The patient had previous physical therapy treatment for her diagnosis of Parkinson's disease, including the LSVT BIG Program exercises. In addition to physical therapy services, the patient was attending occupational therapy services two times a week. With occupational therapy, the patient was working on increasing balance potential while performing activities of daily living, improving gait abilities, and toileting independently.

A review of systems was completed through history taking and observation which concluded the patient to be safe for physical therapy treatment. The patient was appropriate for physical therapy treatment to improve strength, balance, and gait abilities to overall reduce fall risk. The Patient/Client Management Model can be used to guide decision making regarding examination, evaluation, diagnosis, prognosis, interventions, and outcomes. See Figure 1 on the following page for the patient's individualized Patient/Client Management Model used throughout care to guide decision making.

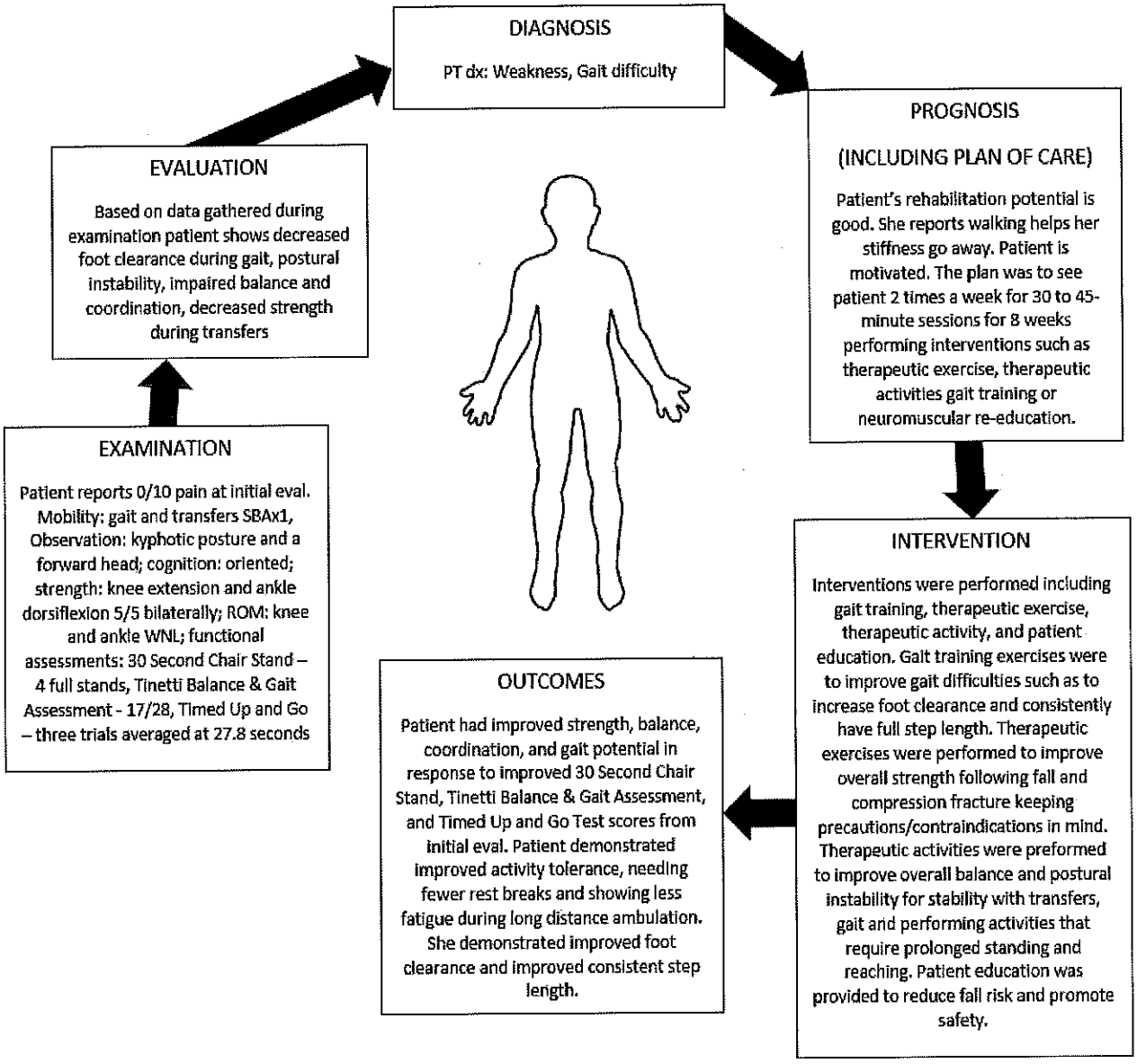


Figure 1. Patient/Client Management Model that guided decision making

Examination, Evaluation and Diagnosis

The initial examination included history taking, a review of systems, a posture observation, range of motion testing, strength testing, transfer and gait assessment in the patient's living environment, and performance-based tests assessment. During the initial examination, the patient presented with a kyphotic posture, her lower extremity range of motion was within normal limits, and her knee extension and dorsiflexion strength were manual muscle tested for gait purposes as 5/5 bilaterally. Range of motion and strength testing of the spine and hip was deferred due to the patient's recent compression fracture. At initial evaluation, the patient was using a four-wheeled walker for ambulation; she indicated that she was using it before her fall. The patient required stand-by assistance for ambulation and transfers.

Balance, gait, and functional mobility performance-based tests were used to evaluate the patient's balance and mobility. Balance, gait, and functional mobility performance-based tests evaluate fall risk among older adults, including individuals with Parkinson's disease.[9] The tests that were used in this case were the 30 Second Chair Stand or 30 Second Sit-to-Stand Test, the Tinetti Balance & Gait Assessment and the Timed Up and Go Test. These tests were chosen based on the time efficiency of performing the tests in the clinic and clinical evidence.

Lower extremity strength, coordination, balance, and transfer ability was further assessed using the 30 Second Chair Stand or 30 Second Sit to Stand test (see Appendix 1. for assessment score sheet). The test was performed using a standard chair with arm rests. The patient was instructed to stand up and sit down as many times as she could in 30 seconds. The patient was told she could use her upper extremities to

stand up and sit down into the chair. A study by Petersen et al[15] reported the 30 second Sit-to-Stand test has moderate-to-excellent test-retest intraclass correlation coefficient of 0.94 and a minimum detectable change at the 95% confidence level of 3 times in people with Parkinson's disease. The study concluded that the 30 second Sit-to stand test can be used reliably in patients with Parkinson's disease.[15]

Balance and gait were assessed using the Tinetti Balance & Gait Assessment (see Appendix 2. for assessment score sheet). There are two separate sections of the assessment: a balance assessment and a gait assessment. This test assesses both static and dynamic balance. The test was performed using a standard chair with arm rests. The patient was given instruction on how the test would be performed as per protocol. The Tinetti Balance & Gait Assessment has a sensitivity of 76% and a specificity of 66%.[16,17] Additionally, a study by Kegelmeyer et. al,[16] found interrater and intrarater reliability of the test as a fall risk screening tool in individuals with Parkinson's disease to be good to excellent with an intraclass correlation coefficient of >0.80.

Balance and gait were assessed using the Timed Up and Go test (see Appendix 3. for assessment score sheet). The test was completed using a standard chair with arms rests. The patient was instructed to stand up from the chair, walk around a cone marked 3 meters from the chair, and sit back into the chair using a comfortable walking speed. The patient was told she could use her upper extremities to stand up and sit down into the chair. The Timed Up and Go Test has a sensitivity of 87% and a specificity of 87%.[17] A study by Morris et. al[18] found high retest and interrater reliability of the Timed Up and Go Test. Measurements reflected changes in performance according to levodopa use.[18] Also, the Timed up and Go Test can be used to detect

differences in performance between people with Parkinson's disease and elderly people without Parkinson's disease.[18] The patient's scores on the three balance, gait and functional mobility performance-based tests are described in Table 1.

Table 1. Balance, Gait, and Functional Mobility Performance-Based Test Results at Initial Evaluation

Test	Test Score	Test Details
30 Second Chair Stand	4 full sit/stands	Patient used upper extremities to push up from the chair
Tinetti Balance & Gait Assessment	17/28	The patient had safe sitting balance, she used upper extremities to rise and sit into chair, and she used upper extremity support for initial standing balance. The patient was steady standing for 60 seconds with eyes open and for 10 seconds with eyes closed without upper extremity support. The patient caught herself with 3 nudges and she was unsteady turning in a circle. The patient had full step length but did not have full foot clearance with ambulation. The patient used a four-wheeled walker for ambulation.
Timed Up and Go Test	Three trials in order of performance: 27.6 seconds, 29.3 seconds, and 26.5 seconds for an average of 27.8 seconds	The patient used a four-wheeled walker when performing the test. She used upper extremities to stand up and sit down into the chair.

Based on initial examination data, the patient showed decreased overall strength that affected her ability to perform transfers, ambulation, and activities of daily living that

require a great amount of muscle endurance including prolonged standing. She demonstrated decreased foot clearance during gait. Postural instability/impaired balance and coordination were apparent during the performance of performance-based tests. Additionally, the patient demonstrated decreased overall activity tolerance that affected her ability to perform all activities of daily living. These movement dysfunctions are likely a result of the patient's history of Parkinson's disease, her recent compression fracture, and potential deconditioning. The patient problem list is in Table 2 below.

Table 2. Patient Problem List

1. Parkinson's disease
2. L3 Compression Fracture
3. Decreased overall strength
4. Gait Difficulty/decreased foot clearance
5. Postural Instability/Impaired Balance
6. Decreased coordination
7. Decreased activity tolerance

These impairments interfered with the patient's ability to perform transfers and to ambulate around her apartment, to the hair salon in the facility, and to her mailbox on the first floor of the facility. The patient is appropriate for physical therapy management to increase her strength, improve her gait abilities, improve her balance and coordination, and increase her activity tolerance. This will allow for the patient to have a reduced fall risk and prevent further injury. Additionally, this will allow her to participate in activities of daily living safely and with decreased difficulty. Using the Guide to Physical Therapy Practice, the patient was placed in Practice Pattern 5E: Impaired

Motor Function and Sensory Integrity Associated With Progressive Disorders of the Central Nervous System.[19] The patient's physical therapy diagnosis was weakness (ICD-10-Code M61.81 muscle weakness (generalized)) and gait difficulty (ICD-10-Code R26.2 Difficulty in walking, note elsewhere classified).[20]

Prognosis and Plan of Care

The patient's rehabilitation potential was good to meet her physical therapy goals by the end of the course of physical therapy management due to her motivation. She reported that walking reduced stiffness and increased her overall flexibility. The first physical therapy short term goal was for the patient to perform 6 sit-to-stands in order to increase strength and balance potential to be able to stand up independently from different chairs and surface heights with decreased difficulty. The second physical therapy short term goal was to ambulate 100 feet with full step length and bilateral foot clearance with stand by assistance in order to improve her endurance so she can ambulate around her apartment. The first physical therapy long-term goal was for the patient to score a 20/28 on the Tinetti Balance & Gait Assessment in order to be more steady performing activities of daily living and to reduce her fall risk. The second physical therapy long-term goal was to be independent with her home exercise program, so she could perform it safely and independently at home to maintain her strength and endurance gained during physical therapy sessions. The third physical therapy long term goal was for the patient to be able to ambulate throughout the facility independently at least 300 feet with her four-wheeled walker to allow her to get her mail demonstrating less complaints of fatigue. Meeting these goals would demonstrate that the patient had improved strength, improved balance, improved gait ability, improved

activity tolerance, a decreased fall risk, and healing of her compression fracture. Additionally, they would allow the patient to perform transfers around her apartment independently, ambulate throughout the facility to go to the hair salon and get her mail independently, decrease her overall fall risk, and reduce the risk of sustaining a future compression fracture.

The plan of was to see the patient twice a week for 30-45-minute sessions over the course of 8 weeks. Interventions may consist of therapeutic exercise, therapeutic activities, gait training or neuromuscular re-education to improve strength, balance, and gait deficits. The patient's response to activity was to be evaluated throughout the continuum of care.

CHAPTER III

INTERVENTION

Interventions that were used in this case report consisted of gait training, therapeutic exercise, therapeutic activity, and patient education. Gait training interventions were used to improve gait abilities, coordination, and activity tolerance. Therapeutic activity focused on the improvement of postural instability/balance. Therapeutic exercise included lower extremity/core strengthening exercises. A majority of the exercises facilitated a neutral spine posture while improving overall strength and endurance which is favorable following a compression fracture.[13] These interventions were administered so that the patient would be able to demonstrate safe and efficient performance of activities of daily living with reduced fall risk. They additionally promoted improved posture and body mechanics to protect and facilitate healing of the patient's lumbar compression fracture.

The patient wore a lumbar-sacral orthosis over the L3 fractured vertebra throughout therapy management. Braces are used for pain control, to provide comfort, to promote ideal posture, to provide support for patients who have muscular deconditioning.[13] The lumbar-sacral orthosis provided support to the patient during exercise at therapy sessions. It improved her posture while performing exercises and other activities of daily living. It also limited her degree of lumbar flexion. This was desired as forward stooped-spinal flexion movements should be avoided following a

compression fracture.[21,22] Forward stooped-spinal flexion may lead to increased spinal load, spinal strain and stresses, back pain, and exacerbation of current spinal fractures.

Gait hypokinesia is the slowness of gait with deficits in step length regulation and ground clearance. Morris[23] describes the use of external cues and cognitive strategies as the main training options for gait hypokinesia to help reduce the considerable risk of tripping over obstacles during the swing phase of gait. External cues and cognitive strategies may include visual and auditory cues. Visual cues may consist of markings on the floor for the patient to step over facilitating a big step with full clearance. Auditory cues may include the therapist saying "big step" as the patient ambulates a desired distance. An aerobic conditioning program may also help the patient reduce fear of incurring a new vertebral compression fracture or progressing a current fracture.[13]

Gait training was used throughout the course of therapy to teach the patient how to conserve energy taking bigger steps consistently versus small steps. Furthermore, it was used to improve the patient's foot clearance to reduce the chance of falls and/or injury. Improving the patient's activity tolerance was also an important goal of gait training throughout the course of therapy. Gait training would improve the patient's ability to ambulate around her apartment and the facility with decreased difficulty and fatigue maintaining full step lengths and foot clearance.

Balance exercises have been shown to have positive effects on postural instability, which can be referred to as the inability to maintain balance.[11] These effects have been shown to be maintained for at least 1 month after the discontinuation of performing these exercises during treatment.[11] These include exercises of self-destabilization of the center of body mass, tasks that externally induce destabilization of

the center-of-body mass, and destabilizing activities that involve emphasized coordination between leg and arm movements during walking and locomotor dexterity.[11] Self-destabilization of the center of body mass exercise examples include shifting body weight onto the toes and altering hands when bouncing a ball during gait.[11] Tasks that externally induce destabilization of the center-of-body mass entail maintaining balance with differing external factors.[11] Differing external factors may include standing balance on foam support bases, on moveable platforms, or with sternal or dorsal pulling.[11] Lastly, obstacle courses and other potentially destabilizing activities can be performed to elicit coordination between leg and arm movements during walking and locomotor dexterity.[11] In addition to improved postural instability patients may have an improved level of confidence while performing daily activities that require balance and reduce the frequency of falls in patients with Parkinson's disease.[11]

In a randomized control trial by Morris et. al,[10] strength training with fall prevention education has been shown to reduce the risk of falls in individuals with mild to moderately severe Parkinson's disease during a 12-month follow-up period. The study included three randomized groups of progressive resistance strength training coupled with fall prevention education, movement strategy training combined with falls prevention education, and a control group provided with life-skills information.[10] The results showed that the strength training and fall prevention education group had 84.9% fewer falls than the control group.[10] Strength training and education containing fall prevention information have the potential to reduce falls in individuals with Parkinson's disease that will further prevent injury and improve quality of life.

Table 3 shows the interventions that were performed and examples of each type of intervention. The patient was seen for a total of 14 visits. She was seen 1-2 times a week for 30-45-minute sessions in 8 weeks. Communication with occupational therapy occurred when necessary. No performed interventions were excluded due to safety reasons.

Table 3. Examples of Interventions

Intervention	Examples
Gait Training	I. Stepping forward and back over a band on the floor working on foot clearance a. A band was placed on the ground as a visual marking. With unilateral upper extremity on her four-wheeled walker and appropriate assistance, the patient stepped one foot over the band and back attempting to clear the foot with each attempt. II. Weaving in between cones using four-wheeled walker a. Cones were placed on the ground and the patient used her four-wheeled walker to navigate in between the cones with auditory cueing to focus on taking big steps and clearing her feet while weaving between and around the cones. Appropriate assistance was provided to the patient. III. Ambulation with four-wheeled walker a. Ambulation distances increased throughout care. Decreased assistance and auditory cueing for foot clearance and step length were needed with ambulation throughout care and the patient needed decreased rest breaks. Appropriate assistance was provided.
Therapeutic Exercise	I. Seated Strengthening Exercises a. Seated strengthening exercises were performed with the patient seated in a chair. These exercises consisted of seated marching, knee extension, knee flexion, hip abduction, and hip adduction. TheraBand and ankle weights with increasing resistance were used to progress these seated exercises. Appropriate assistance was provided to the patient. II. Standing Strengthening Exercises a. Standing exercises were performed with the patient using bilateral, unilateral or no upper extremity support

	on her four-wheeled walker. Standing exercises consisted of standing marches, mini squats, standing hip extension, standing hip abduction and calf raises. Exercises such as standing marches, standing hip extension and standing hip abduction were progressed by adding TheraBand with increasing resistance proximal to the knees. Appropriate assistance was provided. III. Step Ups a. Step ups were performed on a single stair step approximately 6 inches high using bilateral upper extremity support. The patient stepped up and down with the same lead foot for the full set before switching to perform on the contralateral side. Appropriate assistance was provided to the patient. IV. Monster Walks a. This exercise was performed with the patient using her four-wheeled walker and TheraBand just proximal to knees. Appropriate assistance was provided to the patient. V. Side stepping a. This exercise was performed with bilateral upper extremity support on a railing with TheraBand just proximal to knees. Appropriate assistance was provided to the patient.
Therapeutic Activity	I. Transfers and sit-to-stands a. Performed from various surface heights to improve lower extremity strength, coordination, and balance. Appropriate assistance was provided to the patient. II. Single leg stance balance training a. Included single leg stance with opposite foot taping a cone; single leg stance holds with opposite foot on top of cone, a 4-inch step, and a 4-inch step with a cone on top. This exercise was progressed by the patient playing ball catch in single leg stance with the opposite foot on a 4-inch step. Appropriate assistance was provided to the patient. III. Standing Lateral Weight shifts a. Appropriate assistance was provided to the patient. IV. Forward and lateral lunges with arm reaching a. Appropriate assistance was provided to the patient. V. Balloon tapping with upper extremities a. Performed with varying bases of support. Appropriate assistance was provided to the patient. VI. Stair climbing

		a. Practiced ascending and descending 4 stairs with bilateral handrail support and progressing to single handrail support. Appropriate assistance was provided to the patient.
Patient Education	VII.	Informing the patient of motions to avoid following a compression fracture a. Avoiding flexion and twisting motions
	VIII.	Educating the patient to wear her lumbar-sacral orthosis directly over the site of the compression fracture of the L3 vertebrae
	IX.	Education on safety techniques/fall prevention a. Pushing up from and reaching back for the chair when moving from sit to stand b. The importance of using brakes on her four-wheeled walker
	X.	Interventions were appropriately taught to patient based on her learning style to ensure understanding and reduce the potential for an adverse event.

The first week of physical therapy management included the initial evaluation. Sit to stand transfers were practiced from toilet, bed and different chair heights using arm rests with stand-by assistance. The patient was educated to use her upper extremities to push up from and reach back for the chair when moving sit to stand and stand to sit in order to reduce fall risk and decrease compressive forces on the spine during transfer.

Week 2 of treatment included gait, strength, and balance training. The patient performed gait activities such as stepping forward and back over a band on the floor to work on foot clearance and use of unilateral upper extremity support on her four-wheeled walker. When this exercise was performed at sessions during week 2, the patient completed one set of 10 repetitions bilaterally and needed contact guard assistance. The patient ambulated distances of 200 feet 1 to 2 times during therapy sessions with her four-wheeled walker and stand-by assistance needing 1-2 standing

rest breaks; gait training was initiated to increase gait/activity tolerance. Seated strengthening exercises were performed such as hip flexion and knee extension using a 2lb ankle weight. The patient was educated on proper posture to avoid kyphosis while performing this exercise. Seated knee flexion with an Orange TheraBand around the heel, hip abduction and hip adduction with an Orange TheraBand around the thigh were performed with therapist holding onto ends of the TheraBand. Standing marches and mini squats were performed with unilateral upper extremity support. One set of 10 repetitions was performed for each exercise when performed at sessions with stand-by assistance. Patient performed 7 sit to stands from an armchair using her upper extremities to push up and reach back for chair with stand-by assistance at sessions. The patient performed the following balance activities needing contact guard assistance: 10 repetitions of toe taps on a cone bilaterally and single leg stance with the opposite foot resting on a cone while using bilateral upper extremity support holding 30 seconds and completing one repetition bilaterally. Additionally, the patient was instructed to perform standing lateral weight shifts using bilateral upper extremity support at home 1 time a day throughout the course of therapy to increase standing tolerance and help with gait. The patient had no complaints of pain and tolerated exercises and activities well.

Week 3 of treatment included gait, strength and balance training. The patient performed gait activities such as stepping forward and backward over a band on the floor working on foot clearance and using unilateral upper extremity support on her four-wheeled walker. When performed at sessions, the patient competed one set of 10 repetitions bilaterally for this activity needing contact guard assistance. The patient

ambulated distances of 125 feet 2 times during therapy sessions with her four-wheeled walker needing stand-by assistance and 1-2 standing rest breaks. Seated strengthening exercises were performed such as hip flexion and knee extension with 2lb weight around the ankle and seated knee flexion with an Orange TheraBand around the heel with therapist holding onto ends of the TheraBand. Standing marches, standing hip extension, standing hip abduction, mini squats and calf raises were performed with unilateral upper extremity support on her four-wheeled walker. The patient was given cues for proper posture when performing these exercises. When performed at sessions, one set of 10 repetitions was performed for each exercise with stand-by assistance. The patient performed one set of 10 sit to stands from a plinth using her upper extremities to push up and reach back for the plinth with stand-by assistance at sessions. The patient performed the following balance activities: toe taps on a 4-inch step bilaterally and single leg stance with the opposite foot resting on a 4-inch step while using unilateral upper extremity support holding 30 seconds and completing one repetition bilaterally. These exercises were progressed by placing a cone on top of the 4-inch step. The patient needed contact guard assistance to minimal assistance to maintain balance performing balance activities. The patient performed a forward and lateral lunge to tap a cone with the upper extremity in the direction lunging. The patient did not use upper extremity support and needed contact guard assistance when performing this activity. The patient tapped a balloon back and forth with another therapist tolerating 1-2 minutes with a wide base of support (feet apart) and 1-2 minutes with a narrow base of support (feet together). The patient performed this exercise without upper extremity

support and required contact guard assistance to minimal assistance to maintain balance.

Week 4 of treatment included gait, strengthening and balance training. The patient ambulated 450 feet at a session this week with equal steps, good cadence and endurance requiring stand-by assistance. One set of 10 sit to stands was performed from plinth using upper extremities to push up from and reach back for plinth. When performed at sessions, the patient completed one set of 15 repetitions of standing marches, calf raises, mini squats. The patient practiced weaving in between cones using her four-wheeled walker while maintaining balance, performed one set of 15 repetitions of step ups on a single stair using bilateral upper extremity support, and performed single leg stance with opposite foot on a 4-inch box playing ball catch. All balance activities required stand-by assistance to minimal assistance to maintain balance.

Week 5 and 6 treatment included continued gait, strengthening and balance training. The patient ambulated distances of 200-350 feet at therapy sessions with equal steps, good cadence and endurance requiring stand-by assistance. The patient continued to perform exercises such as sit to stands, forward lunges, toe taps, and single leg stance with opposite foot on a four-inch step. The patient used her upper extremities to perform sit to stands. She required handheld assistance when performing forward lunges. The patient used unilateral upper extremity support to perform toe taps and no upper extremity support when performing single leg stance with opposite foot on four-inch step. Patient performed additional strengthening exercises such as monster walks and side stepping with an Orange TheraBand around thighs and bilateral upper

extremity support on her four-wheeled walker and hand railing. Standing marches, standing hip extension, and standing hip abduction were performed with an Orange TheraBand around thighs just proximal to the knees with bilateral upper extremity support. When performed at sessions, the patient completed one set of 10 repetitions for each exercise. The patient practiced ascending and descending 4 stairs using bilateral handrails and a single handrail maintaining balance. When performed at sessions, she completed one set of 15 repetitions of step ups on a single stair using bilateral upper extremity support. A proper level of assistance was provided to the patient for all exercises and activities as necessary to maintain patient safety.

Week 7 and 8 treatment included gait, strengthening and balance training. The patient ambulated distances of 200-550 feet at treatment sessions needing 2-3 short standing rest breaks recovering in 20-30 seconds; the patient moved towards ambulating with independence, full foot clearance and improved heel strike. The patient practiced opening and closing the door of her apartment independently. She continued to perform exercises such as sit to stands, step ups, and single leg stance holds with opposite foot on a stack of cones. She performed 10 sit to stands from a standard chair taking 1 minute and 34 seconds using upper extremities to push up and sit into a chair. The patient progressed balance activities by performing 10 repetitions of toe taps bilaterally on a standard chair seat with unilateral upper extremity support and stand-by assistance. She continued to practice ascending and descending 4 stairs using 1 handrail and bilateral handrails with stand-by assistance working on an alternating stepping pattern.

The patient was reassessed performing the 30 Second Chair Stand, the Tinetti Balance & Gait Assessment, and the Timed Up and Go Test on the 8th visit to determine progress in response to outpatient physical therapy management. She scored 3 full sit/stands using upper extremities on the 30 Second Chair Stand during this visit. She scored a 22/28 on the Tinetti Balance & Gait Assessment and an average of 31.1 seconds for 3 trials on the Timed Up and Go Test. At this reassessment, the patient showed improved static and dynamic sitting and standing balance. She appeared steadier performing sit to stands from various surface heights due to improved lower extremity strength. Also, she ambulated with improved step length and foot clearance bilaterally during gait. At this point, the patient would benefit from continued skilled outpatient physical therapy to reach unmet short and long-term goals.

At the final treatment session, discharge session, the patient was reassessed performing the 30 Second Chair Stand, the Tinetti Balance & Gait Assessment, and the Timed Up and Go Test. She performed 5 full sit/stands using upper extremities on the 30 Second Chair Stand. She scored a 22/28 on the Tinetti Balance & Gait Assessment and an average of 26.17 seconds for 3 trials on the Timed Up and Go Test. The patient ambulated longer distances with full step length and foot clearance bilaterally. She able demonstrated opening and closing her apartment door independently and safely in response to improved balance and coordination. The patient was given a home exercise program at the discontinuation of outpatient physical therapy management to maintain balance and strength gains.

Chapter IV

OUTCOMES

In response to physical therapy management the patient demonstrated improved lower extremity strength, balance, coordination, and gait potential in addition to a reduced fall risk as per her scores on various standardized assessments. The patient had improved 30 Second Chair Stand, Tinetti Balance & Gait Assessment and Timed Up and Go Test scores when compared to initial evaluation. The patient demonstrated improved activity tolerance, needed fewer rest breaks during activity, and showed less fatigue during long distance ambulation. The patient had improved foot clearance and consistent improved step length with ambulation. Additionally, the patient demonstrated increased ability of prolonged standing without losing her balance.

Patient was discharged from physical therapy meeting all goals except 1, which regarded scoring 6 full sit/stands on the 30 Second Chair Stand. At discharge patient was one full sit/stand away from reaching this goal which may have been due to factors such as fatigue. Table 4 shows the gait and functional mobility performance-based tests that were used at evaluation and how the scores improved at discharge.

Table 4. Balance, Gait, and Functional Mobility Performance-Based Test Results at Initial Evaluation and Discharge

Test	Test Score at Initial Evaluation	Test Score at Discharge	Test Details at Discharge
30 Second Chair Stand	4 full sit/stands	5 full sit/stands	Patient used upper extremities to push up from the chair
Tinetti Balance & Gait Assessment	17/28	22/28	The patient had safe sitting balance, she used upper extremities to rise and sit into chair. The patient did not use upper extremity support for initial standing balance. The patient was steady standing for 60 seconds with eyes open and for 10 seconds with eyes closed without upper extremity support. The patient was steady with 3 nudges, was safe turning in a circle but had discontinuous steps. The patient had full step length and full foot clearance with ambulation. The patient's steps were symmetrical and continuous. The patient used a four-wheeled walker for ambulation during assessment.
Timed Up and Go Test	Three trials in order of performance: 27.6 seconds, 29.3 seconds, and 26.5 seconds for an average of 27.8 seconds.	Three trials in order of performance: 25.3 seconds, 28.1 seconds, and 25.0 seconds for an average	The patient used a four-wheeled walker when performing the test. She used upper extremities to stand up and sit down into the chair.

		of 26.1 seconds.	

To progress the patient's current home exercise program of standing lateral weight shifts, she was given a home exercise program to perform at the discontinuation of physical therapy services that consisted of standing marches, hip extension, hip abduction, mini squats, knee flexion and calf raises. This home exercise program focused on standing exercises for strengthening that allowed the patient to have neutral spine posture. The patient was instructed to complete her home exercise program one time per day following a handout performing 15-20 repetitions of each exercise. The patient reported feeling stronger and steadier on her feet as a result of physical therapy management. She reported feeling safe performing transfers, ambulating around her apartment, and ambulating around the facility independently.

Chapter V

DISCUSSION

Physical therapy management has shown to be beneficial in treating Parkinson's disease.[10,11,23] For example, gait training techniques such as external cues and cognitive strategies have been described to improve the swing phase of gait by helping to reduce the risk of tripping over obstacles regarding gait hypokinesia.[23] Balance exercises have been shown to have positive effects on postural instability.[11] Additionally, strength training with fall prevention education has been shown to reduce the risk of falling.[10] These benefits can improve an individual with Parkinson's disease's overall quality of life and confidence performing activities of daily living.

Bracing along with physical therapy has been described in literature as a valuable treatment for vertebral compression fractures. Braces are used for pain control, to provide comfort, to promote ideal posture, and to provide support for patients who have muscular deconditioning.[13] In addition to bracing, exercises can facilitate a favorable, neutral spine posture while improving overall strength and endurance.[13] Also, aerobic conditioning programs have potential to help patients reduce fear of incurring a new vertebral compression fracture or progressing a current fracture.[13]

The use of performance-based tests at initial evaluation helped to identify the patient problem list which further guided intervention planning and outcomes. Objective measures were found when the patient performed the 30 Second Chair Stand, the

Tinetti Balance & Gait Assessment and the Timed Up and Go Test at initial evaluation. These included decreased strength, decreased foot clearance with each step during gait, impaired balance and coordination, and decreased activity tolerance. Gait activities, strengthening exercises, balance activities, and patient education interventions were then chosen to address the problem areas that presented. The 30 Second Chair Stand, the Tinetti Balance & Gait Assessment and the Timed Up and Go Test were performed at initial evaluation and discharge to assess progress and patient outcomes as a result of physical therapy management.

Physical therapy intervention showed beneficial outcomes for this patient. Strengthening exercises, balance activities, gait training, and patient education improved the patient's 30 Second Chair Stand, Tinetti Balance & Gait Assessment and Timed Up and Go Test scores in addition to improving her strength, balance, coordination, and gait abilities. The patient improved her 30 Second Chair Stand comparing her initial evaluation and discharge. She scored 4 full sit-to-stands at initial evaluation and 5 full sit-to-stands at discharge. At discharge she appeared to perform each sit-to-stand steadier and stronger compared to when performing them at initial evaluation.

The patient improved her Tinetti Balance & Gait Assessment scores comparing initial evaluation and discharge. At initial evaluation, the patient's Tinetti Balance & Gait Assessment was a 17/28. She improved this test score to a 22/28 at discharge placing her out of the high-risk category of falling and into the moderate risk category. Points lost on the Tinetti Balance & Gait Assessment were due to using upper extremities to

rise from and sit into a chair, having discontinuous steps turning in a circle, and using a walker for gait.

Also, the patient had an improved Timed Up and Go Test score comparing her initial evaluation average score and discharge average score. Her initial evaluation Timed Up and Go average score was 27.8 seconds and her discharge average score was 26.1 seconds. According to Timed Up and Go cut-off scores the patient is still at risk of falls.[24,25] According to Nocera et. al,[24] the cut-off score indicating risk of falls for patients with Parkinson disease is greater than 11.5 seconds. Dibble and Lange[25] identify the cut-off score indicating risk of falls for patients with Parkinson disease as greater than 7.95 seconds. Although she is still as risk of falls according to the cut-off score for the Timed Up and Go test, she has shown progress and improvements in time.

Activity tolerance improved from initial evaluation to discharge. At initial evaluation, the patient ambulated approximately 180 feet before needing a prolonged standing rest break. At discharge as the patient ambulated distances of 550 feet with full step length and foot clearance. Additionally, she needed few to minimal rest breaks to ambulate these distances.

The patient was adherent with physical therapy intervention and plan of care. She was given a home exercise program in order to maintain the strength, gait, and balance gains made during physical therapy treatment. She was instructed to complete it one time a day after therapy was discontinued. The home exercise program consisted of standing strengthening exercises using bilateral upper extremity support. At the discontinuation of physical therapy management, the patient was able to return to her

prior level of function by performing transfers independently and ambulating with her four-wheeled walker safely and independently with a reduced fall risk.

Reflective Practice

The examination procedures performed provided a comprehensive view of the patient's mobility and activity level. Further evidence seeking in performance-based tests may show that other test combinations could have been more appropriate for this patient. However, the tests performed did have favorable evidence behind them. Additionally, the use of a patient self-report questionnaire could have been used to identify the patient's perspective of her quality of life. Additional history questions regarding the patient's quality of life outside of her physical abilities could have been asked regarding the positive and negative features of her social and emotional well-being.

Interventions that addressed the patient's goals, impairments, activity limitations and participation restrictions were chosen to treat this patient. These interventions were performed keeping compression fracture precautions in mind. The goal of the patient's plan of care was to improve her strength, gait, balance, coordination, and activity tolerance while allowing for the L3 vertebra to heal without reinjury. Further referrals were not necessary in regard to the patient's plan of care. Complications did not arise where the patient needed to see another practitioner or specialist.

Limitations of this case report are that the patient's initial evaluation Timed Up and Go Test score reflected her performance at the second therapy session rather than the first session when the 30 Second Chair Stand and Tinetti Balance and Gait

Assessment were performed. This was due to limited time at the initial evaluation. Additionally, personal factors such as comorbidities, age, and differing levels of fatigue on a daily basis may influence results of this study. Future studies on physical therapy management of Parkinson's disease and compression fractures should include a larger sample size. Due to the presentation of Parkinson's disease being variable, the information in this case report may not apply to other cases of the disease. Future studies should also consider a wider use of performance-based tests and standardized assessments. Bloem et. al[26] identify recommended tests, scales, and questionnaires to assess posture, gait, and balance in Parkinson disease. Those recommended in the literature review included the Postural Instability and Gait Difficulty score, the Berg Balance Scale, the Mini-BESTest, the Dynamic Gait Index/Functional Gait Assessment, Freezing of Gait Questionnaire, Activities-specific Balance Confidence scale, Falls Efficacy Scale, modified version of the Survey of Activities and Fear of Falling in the Elderly, 6-Minute walk test, 10-m walk test, Functional Reach Test, and the Timed Up and Go test.[26] A variety of combinations of these recommended tests, scales and questionnaires should be considered in future studies to broaden the knowledge of the best combination of performance-based tests to use for the evaluation of Parkinson's disease outcomes.

In conclusion, past literature has shown to support physical therapy management for Parkinson's disease and compression fractures. The patient's outcomes in this case study report further align with the benefits of physical therapy management. Interventions including gait training, therapeutic exercise, therapeutic activity, and patient education resulted in improvements in the patient's strength, gait, balance,

coordination, and activity tolerance. Improvements in lower extremity strength, balance, coordination, and gait potential in addition to a reduced fall risk were observed in 14 physical therapy treatment sessions in an 8-week course of physical therapy management.

Appendix

ASSESSMENT

30-Second Chair Stand

Purpose: To test leg strength and endurance.

Equipment: A chair with a straight back without arm rests (seat 17" high), and a stopwatch.

NOTE: Stand next to the patient for safety.

① Instruct the patient:

1. Sit in the middle of the chair.
2. Place your hands on the opposite shoulder crossed, at the wrists.
3. Keep your feet flat on the floor.
4. Keep your back straight, and keep your arms against your chest.
5. On "Go," rise to a full standing position, then sit back down again.
6. Repeat this for 30 seconds.

② On the word "Go," begin timing.

If the patient must use his/her arms to stand, stop the test. Record "0" for the number and score.

③ Count the number of times the patient comes to a full standing position in 30 seconds.

If the patient is over halfway to a standing position when 30 seconds have elapsed, count it as a stand.

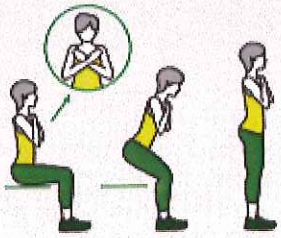
④ Record the number of times the patient stands in 30 seconds.

Number: _____ Score: _____

Patient _____

Date _____

Time _____ ☐ AM ☐ PM



SCORING

Chair Stand
Below Average Scores

AGE	MEN	WOMEN
60-64	< 14	< 12
65-69	< 12	< 11
70-74	< 12	< 10
75-79	< 11	< 10
80-84	< 10	< 9
85-89	< 8	< 8
90-94	< 7	< 4

A below average score indicates a risk for falls.

CDC's STEADI tools and resources can help you screen, assess, and intervene to reduce your patient's fall risk. For more information, visit www.cdc.gov/steadi

Centers for Disease Control and Prevention
National Center for Injury Prevention and Control

2017

STEADI Stopping Elderly Accidents, Deaths & Injuries

Appendix 1. 30-Second Chair Stand Score Sheet

TINETTI BALANCE & GAIT ASSESSMENT

BODYWORKShfr.com

For both assessments, enter the date of each exam and circle your rating for each item. Indicate totals at the bottom of each section.

BALANCE ASSESSMENT

To perform this assessment, seat the patient in a hard, armless chair.

Evaluated Function	Description of Behavior	Date:	Date:
Sitting Balance	Leans or slides in chair	0	0
	Steady, safe	1	1
Rises From Chair	Unable to rise without help	0	0
	Able to rise using arms to help	1	1
	Able to rise without using arms to help	2	2
Attempts To Rise	Unable to rise without help	0	0
	Able to rise, requires more than one attempt	1	1
	Able to rise, requires one attempt	2	2
Standing Balance (1st 5 Seconds)	Unsteady (staggers, moves feet, trunk sways)	0	0
	Steady, but uses walker or other support	1	1
	Steady without walker or other support	2	2
Standing Balance	Unsteady	0	0
	Steady, but with wide stance and uses support	1	1
	Narrow stance without support	2	2
Nudged	Begins to fall	0	0
	Staggers, grabs, catches self	1	1
	Steady	2	2
Eyes Closed	Unsteady	0	0
	Steady	1	1
Turning 360 Degrees	Discontinuous steps	0	0
	Continuous steps	1	1
	Unsteady (grabs, staggers)	0	0
	Steady	1	1
Sitting Down (Getting Seated)	Unsafe (misjudged distance, falls into chair)	0	0
	Uses arms or not a smooth motion	1	1
	Safe, smooth motion	2	2
	Balance Score		
	Potential Points: 16	/16	/16

GAIT ASSESSMENT

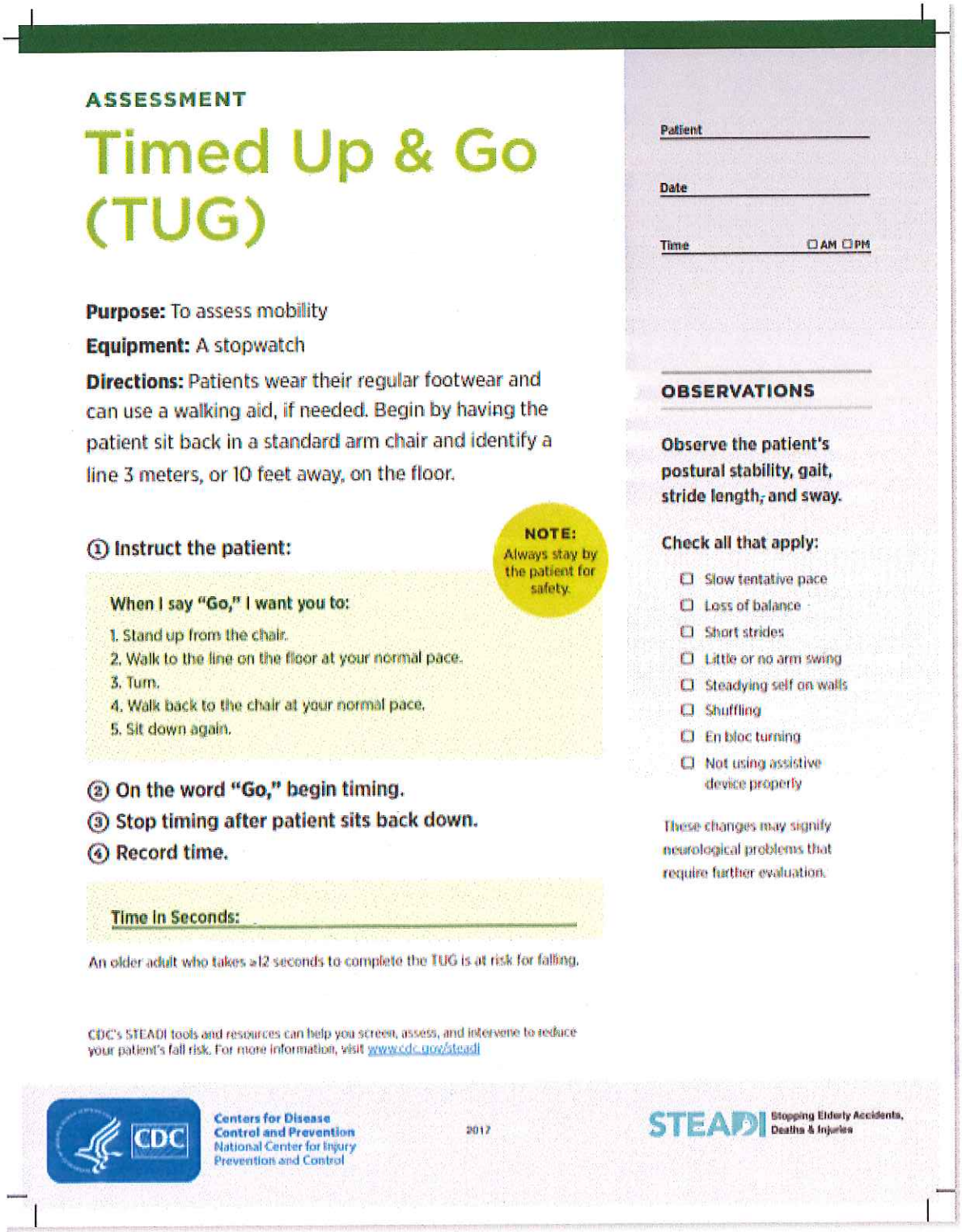
Stand with the patient. Walk across the room (+/- aids) at a usual pace, then rapidly

Evaluated Function	Description of Behavior	Date:	Date:
Indication of Gait	Any hesitancy or multiple attempts	0	0
	No hesitancy	1	1
Step Length & Height	Step to	0	0
	Step through right	1	1
	Step through left	1	1
Foot Clearance	Foot drop	0	0
	Left foot clears the floor	1	1
	Right foot clears the floor	1	1
Step Symmetry	Right and left step length are not equal	0	0
	Right and left step length appear equal	1	1
Step Continuity	Stopping of discontinuity between steps	0	0
	Steps appear continuous	1	1
Path	Marked deviation	0	0
	Mild/moderate deviation or uses a walking aid	1	1
	Straight without a walking aid	2	2
Trunk	Marked sway or uses a walking aid	0	0
	No sway, flexes knees/back/uses arms to balance	1	1
	No sway, no flexion of knees or back use of arms, or walking aid	2	2
Walking Time	Heels apart	0	0
	Heels almost touching while walking	1	1
	Gait Score		
	Potential Points: 12	/12	/12

Combined Score
Potential Points For Balance & Gait /28 /28

Risk of Falls: 18 Points or Less - High Risk; 19-23 Points - Moderate Risk; 24 or More Points - Low Risk

Appendix 2. Tinetti Balance & Gait Assessment Score Sheet



ASSESSMENT

Timed Up & Go (TUG)

Patient _____

Date _____

Time _____ ☐ AM ☐ PM

Purpose: To assess mobility

Equipment: A stopwatch

Directions: Patients wear their regular footwear and can use a walking aid, if needed. Begin by having the patient sit back in a standard arm chair and identify a line 3 meters, or 10 feet away, on the floor.

NOTE: Always stay by the patient for safety.

① Instruct the patient:

When I say "Go," I want you to:

1. Stand up from the chair.
2. Walk to the line on the floor at your normal pace.
3. Turn.
4. Walk back to the chair at your normal pace.
5. Sit down again.

② On the word "Go," begin timing.

③ Stop timing after patient sits back down.

④ Record time.

Time in Seconds: _____

An older adult who takes ≥12 seconds to complete the TUG is at risk for falling.

OBSERVATIONS

Observe the patient's postural stability, gait, stride length, and sway.

Check all that apply:

- ☐ Slow tentative pace
- ☐ Loss of balance
- ☐ Short strides
- ☐ Little or no arm swing
- ☐ Steadying self on walls
- ☐ Shuffling
- ☐ En bloc turning
- ☐ Not using assistive device properly

These changes may signify neurological problems that require further evaluation.

CDC's STEADI tools and resources can help you screen, assess, and intervene to reduce your patient's fall risk. For more information, visit www.cdc.gov/steadi

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Appendix 3. Timed Up and Go Score Sheet

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