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Annual Review of Changes in Healthcare



Treatment for Parkinson's Patients- A Collaborative Interprofessional Perspective

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Introduction

Parkinson's disease is a progressive nervous system disorder that often begins with a small unilateral tremor in the hand. In the early stages of Parkinson's, common symptoms that manifest include decreased facial expressions, minimal arm swing during ambulation, and slurred speech. Due to the progressive nature of the disease, these symptoms worsen as the condition advances. Over time, individuals begin to have overall slowing of movement known as bradykinesia.¹

The causes of Parkinson's disease have been heavily researched over the years. It has been determined that there is not one specific cause, but both genetic and environmental causes are related to the onset of the disease. Specific genetic mutations can increase the risk of developing Parkinson's; however, there is a relatively small risk with each of these mutations. Men in their 60s with a close relative that also has Parkinson's demonstrate the greatest risk factor for developing the disease.¹ Environmental triggers such as exposure to toxins like herbicides and pesticides can also alter neuronal activity. These genetic and environmental factors result in the break down and death of certain neurons in the area of the brain that produces dopamine, the substantia nigra. The presence of Lewy

bodies in the brain, which store the protein Alpha-synuclein, also have been found to decrease dopamine levels in the brains of individuals with Parkinson's disease.¹ When dopamine levels decrease, brain activity related to movement production decreases.¹ The severity of the signs and symptoms of Parkinson's disease manifest differently for each individual; however, they have many common characteristics. Early signs may be so mild that they are disregarded and go unnoticed and untreated. While symptoms begin unilaterally, they progress to affecting the extremities bilaterally, but they will often times remain worse on the side of the body the symptoms began on. Signs and symptoms associated with Parkinson's disease may include resting tremors, bradykinesia, muscle rigidity, impaired posture and balance, difficulty with automatic movements such as blinking or smiling, slurred speech, and decreased fine motor skills which affects writing. There are also secondary factors that are related to Parkinson's disease. These include cognitive difficulties, depression, anxiety, difficulty swallowing, chewing and eating, sleep disorders, incontinence, constipation, hypotension, fatigue, and pain.¹ Although there is no current cure for Parkinson's disease, there is a multifaceted collaborative approach to managing the disease progression and improving the





quality of life for these individuals. Medications, exercise, group programs, and balance training related fall prevention interventions can all be beneficial in significantly improving symptoms. In occasional instances, doctors may also suggest surgery to regulate certain regions of the brain and improve symptoms.

Patient Case

Parkinson's patient A.T., currently 65 years of age, resides in Russia.² The patient was admitted to the hospital following realization of left limb trembling steadily worsening over a nine-year period.² At the time of admission, A.T. was taking antiparkinsonian drugs consistently every two hours.² To ensure the best quality of healthcare going forward, how can a team of healthcare professionals from multiple disciplines work together to care for this patient?²

Physical Therapy Perspective

Stages of Parkinson's Disease

The goal of physical therapy as a profession is to address the physical impairments individuals experience that limit them from functioning independently in their environment. With this goal in mind for Parkinson's disease, physical therapists need

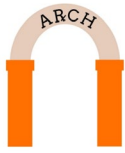
to determine what stage of the progression each patient is in currently.

Stage 1 is marked by mild unilateral tremors, changes in posture and walking, and flat facial expressions.³ In this stage, patients are able to complete all activities of daily living (ADLs) without symptom interference.³ Stage 2 is classified by bilateral tremors and beginning stages of rigidity in the trunk and extremities.³ Patients are still able to live alone in this stage; however, they have more difficulty and a larger time investment completing ADLs.³ Stage 3 shows signs including loss of balance and bradykinesia which is evidenced through increases in falls and shuffling gait.³ Patients in this stage are still independent with dressing and eating but have significant difficulties.³ In Stage 4, patients are required to use a walker or assistive device to ambulate safely and need assistance with ADLs.³ In Stage 5, full body stiffness and rigidity are present making it unlikely that they can ambulate.³ These patients require 24-hour nursing care to achieve grooming and ADLs.

Delay the Disease

Delay the Disease (DTD) is an exercise program designed for individuals in the first three stages of Parkinson's disease in order to assist them in maintaining independent living and a good quality of life.





Much like the goals of physical therapy, DTD focuses on those tasks that are necessary for completing ADL's independently: getting out of bed, rising from a chair, handwriting, dressing, stiffness and shuffling during ambulation, and increasing confidence with moving in a crowd.⁴

These programs exist in many facilities including YMCA's and senior centers across the United States. They exist not only to address these physical impairments individuals are facing but also to provide a group exercise environment that addresses cognitive and emotional aspects. Offering a group class exclusively for patients with Parkinson's diagnosis allows patients to form a support group in which they can relate to each other's experiences. DTD classes are research based in their deliverance of effective exercise prescription and require instructors to be trained in their protocol.⁴ This ensures instructors and volunteers are well equipped to manage individuals with Parkinson's disease and provide the most therapeutic and safe environment for the patients.

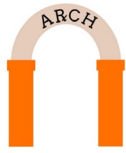
Therapeutic Exercise

Therapeutic exercise is a treatment category of physical therapy classified as the execution of planned gross motor movements. The intention of therapeutic

exercise activities are to remediate the current impairments of body function and structures and to progress the patient toward enhancing their activities and participation in the community. Overall, it aims to optimize health, fitness, and well-being.⁵

In a systematic review conducted in 2015, there were 37 studies included regarding the effects of physical therapy interventions on Parkinson's disease. Improvements in function were measured objectively through outcome measures including the Berg Balance Test, Timed Up and Go, walking speed, cadence, and step length. Each of these outcome measures showed statistically significant changes in participants after intervention. These findings also correlated with higher quality of life determined by a patient satisfaction survey upon therapy discharge as well as increased confidence with functional activities noted by the Activity Specific Balance Scale.⁶

Therapeutic exercise was administered across these 37 studies and included aerobic, strength training, stretching, and scapular stabilization. Aerobic exercises specifically included biking, walking, and swimming. These activities were most effective when performed between 20-60 minutes, 5-7 days per week.⁶ Aerobic activity was most beneficial following gait training in therapy



sessions to practice normalized gait mechanics; this was demonstrated in the findings by overall increase in gait speed and stride length.⁶ Strengthening was also shown to be beneficial, mainly in the lower extremities (LE). Low impact, body weight strengthening activities are most effective for Parkinson's patients because they are adaptable to home and able to be performed with safety in mind. Isometric exercises such as seated kicks, marches, and adductor ball squeezes are beneficial to increase strength prior to incorporating full weight bearing (FWB) in which balance becomes a cofactor. Once patients have mastered seated strengthening, they can progress to FWB and incorporate heel/toe raises, standing abduction, and theraband activities to integrate proprioception.

Stretching is an aspect of physical therapy intervention that is of utmost importance to improve rigidity, a common progressive symptom of Parkinson's disease. The muscles most prone to shortening and rigidity include the hamstrings, adductors, gastrocnemius, and hip flexors. The most practical position to stretch Parkinson's patients in is either supine, prone, or sitting to avoid falls. Lastly, scapular stabilization is essential in maintaining posture to prevent impairments in adjusting base of support (BOS) and airway clearance. Exercises to be

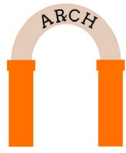
incorporated early in therapy include scapular retractions, rows, depressions, and prone I, T, Y horizontal abduction. These exercises, when performed correctly aid in decreasing forward head and rounded shoulders; thus, the patient is able to improve posture and maintain center of balance (COB) within their BOS.

Therapeutic Activity

Therapeutic activity is another treatment category of physical therapy. In contrast with therapeutic exercise, therapeutic activity focuses on functional and dynamic activities that are necessary to perform in daily life. Therapeutic activities involve functional tasks that directly imitate real-life activity. For example, therapeutic activity could be lifting an object and placing it on the top shelf, which is mainly to strengthen overhead shoulder movement.⁷

In a systematic review published earlier this year, 10 studies were included to determine the effects of functional task training on ADL management in Parkinson's patients.⁸ Outcome measures to determine the effectiveness of the interventions were the Nottingham Extended Activities of Daily Living Index and Functional Independence Measure.⁸ From the 10 included studies, it was concluded that exercise interventions containing functional-task training have a





statistically significant ($p=0.001$) effect on ADL performance compared to no intervention.⁸ It is also important to note that the intensity of the functional-task training should be as intense as possible, within the capabilities of the person with PD.

From the studies included, there was a range of functional task training time from 60-450 minutes a week with all but one study in the 60-120 minute range.⁸ Functional task training included stair negotiation, sit to stand with and without upper extremity assistance, bed mobility, transfers, squatting, and bending over to pick an object up off the floor.⁸ Completing functional tasks during therapy sessions is critical in order to monitor safety and instruct patients on body mechanics to maintain positioning within their COB to decrease falls. These interventions are especially useful for Parkinson's patients in order to promote independent living and ability to perform ADLs within their given capabilities and mindfulness of their symptom limitations.

Neuromuscular Reeducation

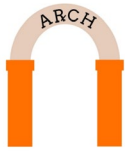
Neuromuscular reeducation (NMRE) is a third branch of physical therapy that consists of activities for balance and core control. The goal of NMRE is to redevelop controlled movement patterns in the correct muscle sequencing to perform the same tasks

that the compensatory muscle sequencing pattern was performing. For example, if the kinesthetic and proprioceptive sense of the cervical, thoracic, and lumbar regions are not functioning properly, then posture will be impaired and compensatory muscle sequencing will be activated in the upper trapezius and quadratus lumborum.⁹

In a study conducted in 2012, an intervention program was administered to determine its effect on mobility, falls, and quality of life in patients with Parkinson's disease.¹⁰ Outcome measures that were utilized included the Tinetti, self-reported falls measure, Parkinson's quality of life questionnaire, and Freezing of Gait Questionnaire.¹⁰ After 1-year of intervention, a statistically significant improvement was identified in gait freezing ($p=0.005$) and Tinetti scores. There was also a statistically significant reduction in the number of falls ($p=0.041$) and falls risk. Thus, a combination of exercise focusing on movement strategy training has the potential for reducing falls risk, and improving mobility and quality of life in Parkinson's patients.¹⁰

Interventions that are valuable to achieving these results include balance training and core stabilization. Balance training can begin with sitting with perturbations and progress to sitting on uneven surfaces. An effective exercise for





these patients is sitting on a swiss ball and receiving perturbations to challenge balance while working on postural alignment. When patients have mastered these tasks, balance and proprioceptive tasks can progress to standing on even ground with movement toward uneven surfaces (foam, air ex, bosu, etc). To mimic community activities, dual task training can be incorporated with single leg stance or tandem stance on an uneven surface with head movements or arm movements. Dynamic gait training can also be constructive for movement strategy training. Due to the shuffling, freezing gait that comes with the progression of the disease, focus on big walks and arm movements is critical. This can be achieved by verbal or tactile cueing in combination with ziddy sticks for upper extremity movement cueing.

Core stabilization is also a necessary aspect to incorporate as all movement and posturing comes from the core. Stabilization can begin in supine with abdominal draw ins with progression to marches. As patients are able to find pelvic neutral with core contraction, they can move to seated oblique ball pushes and up to standing stabilization against the wall. In order to address other symptomatology of Parkinson's disease, dual task training can be utilized. During dynamic gait training, a physical therapist can have a

patient count backwards or name objects starting with a certain letter to incorporate cognitive functioning. During overhead reaches, a physical therapist can have patients count the number of reps with loud voices to maintain voice composure. While it is more of an occupational therapist's scope of practice, physical therapists can also incorporate fine motor tasks into their training to address the small handwriting sign accompanying Parkinson's disease. Exercises for fine motor movements include isolated finger movements with ball squeezes, putty manipulation, and digi-flex.

Physician Assistant Perspective

Patient Interview and Physical Assessment

The job of a physician assistant is to diagnose illnesses, develop and manage treatment plans, and prescribe medication. Within the context of Parkinson's disease, a physician assistant's job, initially, is to assess the patient's progression of symptoms, gather the patient history, and establish a timeline for the disease. During the patient interview in combination with the patient's account, it is important to involve the patient's family regarding the patient's physical and neurological changes leading to date.

Physician assistants can work in a wide variety of settings, not all of which would be appropriate for diagnosing





Parkinson's. A physician assistant working in a neurology practice would be able to diagnose Parkinson's Disease under the supervision of a physician. However, from the scope of practice of family or emergency medicine, or another specialty, it would be best to refer the patient to a neurologist as they are better equipped to make such a diagnosis.

Diagnosing

For the purposes of this article, it will be assumed that the physician assistant in question is in a specialty/position that affords them the authority to diagnose a patient presenting with symptoms of Parkinson's disease.

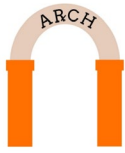
Parkinson's disease is unique in the sense that it is difficult to definitively prove that the disease is presenting itself in a patient. Symptoms are universally accepted, however the same symptoms can similarly manifest from other disease states/conditions. Imaging such as CT, MRI, DAT Scan, Ultrasound, and PET scans can be helpful to eliminate other causes of symptoms. With proper suspicion and symptomatic support, a physician assistant can prescribe medication to combat the symptoms of Parkinson's disease. Upon successful alleviation of symptoms, the PA can be confident in a diagnosis of Parkinson's disease. At such a

time, it would be appropriate to put into place a treatment plan for the patient which would include the help of healthcare professions such as physical therapists, pharmacists, occupational therapists, and skilled nursing professionals, to name a few.

Treatment

The main responsibility in treatment for a physician assistant is to manage the patient's care and refer them to the appropriate rehabilitation and medication services. Referrals would include physical therapy, occupational therapy, speech therapy, and pharmacy.¹¹ Occupational therapists can be utilized to help the patient with the execution of their daily tasks with any new limitations that the disease may cause. Physical therapists will work with the patient on stretching, providing exercises to prevent the muscles from becoming rigid, along with cognitive therapy exercises. Pharmacy will manage their medications prescribed by their physician or a physician assistant. And speech therapists will work with the patient on any language and speech challenges caused by the disease. For effective treatment and care, each team member must communicate and document their delivery, observations and progress which is managed by the neurologist or neurology PA.





It is also up to the physician assistant to gauge whether the prescribed medication is working optimally for the patient and if not, adjust accordingly. Parkinson's causes the body to produce less dopamine, a chemical that is responsible for transmitting signals to the brain. Drugs are prescribed to help the brain produce dopamine, and complementary drugs can be prescribed to manage symptoms of the disease.¹² It is up to the physician assistant to facilitate treatment and educate the patient on treatment options and help put together a team to provide the best care possible for the patient.

Pharmacy Perspective

Nonpharmacologic Therapy

Medication therapy is often reserved for some time after Parkinson's disease is initially diagnosed, therefore, nonpharmacologic therapy plays a very important role in its management. First, all healthcare professionals can assist in educating a newly diagnosed patient about Parkinson's Disease and can help the patient form a solid support system.^{1,13-15} As mentioned above, physical therapy and rehabilitation have been beneficial among patients with Parkinson's Disease because they can help maintain strength and decrease the risk of falls and other injuries.^{1,13-15} Likewise, patients with Parkinson's Disease

may benefit from speech therapy if they are experiencing difficulty with communication or swallowing.^{1,13-15} This also goes hand-in-hand with nutrition therapy, which helps ensure that Parkinson's patients are maintaining appropriate dietary habits and ingesting plenty of protein, fiber, and fluids.^{1,13-15} Lastly, sleep studies may be helpful for patients with Parkinson's disease who experience disturbances in sleep, including restless leg syndrome or excessive daytime sleepiness.^{1,13-15}

Pharmacologic Therapy

Although medication therapy can be quite helpful for patients who have been diagnosed with Parkinson's disease, it is often not started immediately upon diagnosis.^{1,13-15} Rather, medications are typically considered when symptoms of the disease begin to impact patients' daily lives.^{1,13-15} When it is time for medication therapy to be initiated, there are numerous different drugs available. A patient-specific approach must be taken when determining the appropriate medications to begin. However, it is important to remember that none of the medications on the market thus far are capable of curing Parkinson's Disease.^{1,13-15}

Carbidopa-levodopa





The medication that is considered the gold standard for Parkinson's disease treatment is carbidopa-levodopa. Levodopa works to treat Parkinson's disease because it is converted to dopamine in the brain and is used in combination with carbidopa to help reduce nausea and vomiting.^{1,13-15} The dose of this medication is often increased as the patient's symptoms worsen.^{1,13-15} As mentioned previously, nausea and vomiting are common side effects of carbidopa-levodopa.^{1,13-15} It is also important to note that taking carbidopa-levodopa long-term may lead to dyskinesia in patients as well as fluctuations in effectiveness with increasing frequency as treatment continues.^{1,13-15} For these reasons, this medication is often reserved for patients with more severe Parkinson's disease symptoms.^{1,13-15}

Monoamine Oxidase Type B (MAO-B) Inhibitors

These medications may be considered appropriate for patients who are in the early stages of the disease and who are not having severe symptoms.^{1,13-15} They may also be used as an add-on therapy with carbidopa-levodopa.^{1,13-15} The medications in this class are selegiline, rasagiline, and safinamide. MAO-B Inhibitors work by blocking dopamine from being degraded in the central nervous system. Some of the most common

side effects with these medications are headache and nausea.^{1,13-15} It is also important to be aware that these medications may lead to hypertensive crisis if the patient takes them in combination with certain foods, such as aged cheese and red wine, and other medications, such as amphetamines and SSRIs.^{1,13-15}

Amantadine

Amantadine is another medication that may be used for patients with less severe symptoms of Parkinson's disease, especially tremors.^{1,13-15} It was originally created as an antiviral medication, but it was later found to have some benefits among Parkinson's patients.^{1,13-15} Although the mechanism of the medication is not fully known, it is thought to increase the release of dopamine, inhibit dopamine reuptake, block NMDA receptors, and have some anticholinergic effects.^{1,13-15} Some potential side effects to watch out for with this medication include dizziness, hallucinations, and dry mouth.^{1,13-15}

Dopamine Agonists

Dopamine agonists are agents that are typically considered in Parkinson's patients when motor symptoms start to become more severe.^{1,13-15} Specifically, dopamine agonists are considered in younger patients whose





physicians may not yet be ready to begin levodopa.^{1,13-15} These medications work by replacing dopamine and helping it to stay in the body longer. Dopamine agonists can be separated into two different categories: Ergot derivatives, such as bromocriptine or cabergoline, and non-ergot derivatives, such as ropinirole or pramipexole.^{1,13-15} When taking these medications, patients should watch out for nausea, vomiting, or dizziness, especially upon standing.^{1,13-15}

Catechol-O-Methyltransferase (COMT) Inhibitors

Another class of medication that may be used to help treat Parkinson's disease is catechol-O-methyltransferase (COMT) inhibitors. The medications in this class are tolcapone and entacapone. These medications are typically only used in combination with carbidopa-levodopa to help increase its entry into the CNS.^{1,13-15} The side effects of these medications are similar to those of levodopa such as nausea, vomiting, and dyskinesias.^{1,13-15}

Anticholinergic Agents

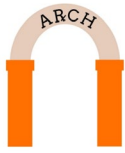
The last class of medications that is an option for treating patients with Parkinson's disease is anticholinergic agents. The anticholinergic drugs that are typically used in Parkinson's patients are trihexyphenidyl

and benztropine. Typically, these drugs are used in younger patients who struggle with tremors.^{1,13-15} They work by blocking acetylcholine from binding to anticholinergic receptors.^{1,13-15} These agents are not used in older adults due to the potential for increased risk of anticholinergic side effects, such as cognitive impairment, urinary retention, and constipation.^{1,13-15}

Other Considerations

Although there are many medications listed above to treat the motor symptoms of Parkinson's disease, it is important for healthcare professionals to remember the non-motor symptoms that may be associated with the disease. Patients with Parkinson's disease will likely require medications from other classes to assist in the treatment of these non-motor symptoms.^{1,13-15} For example, they may need various medications for depression, anxiety, psychosis, sleep, constipation, and many other symptoms or comorbidities.^{1,13-15} Though these are not the symptoms most people typically think of in relation to Parkinson's Disease, these symptoms may be even more troublesome for many patients than the motor symptoms of the disease.





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Summary:

Overall, caring for a patient with Parkinson's disease requires healthcare professionals to consider numerous factors when determining the best approach to assist the patient. For this reason, it is best for our patient A.T., and any patient with Parkinson's disease, to have healthcare professionals from multiple disciplines involved in their long-term care.



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