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DNP Final Report: MEDICATION ADHERENCE: EVIDENCE-BASED INTERVENTIONS FOR PARKINSON'S DISEASE

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MEDICATION ADHERENCE:
EVIDENCE-BASED INTERVENTIONS FOR PARKINSON'S DISEASE

by

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Dedication

At the completion of this all-consuming project, I wish to thank my spouse, Samuel M. George, for his enduring patience during this endeavor. Thank you for cooking most of the meals without his beloved sous-chef and pulling me away to clear my head with a pleasant game of golf. His work ethic, kindness, and love encouraged me to achieve this personal goal. I could not have done it without him.

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Abstract

MEDICATION ADHERENCE:

EVIDENCE-BASED INTERVENTIONS FOR PARKINSON'S DISEASE

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Parkinson's disease (PD) is a challenging, progressive neurodegenerative process projected to affect greater than one million patients in the United States over the next decade. Pharmacological interventions are the hallmark of treatment and are used for symptom management; there is no cure for this lifelong disease. Once-daily preparations are typically inadequate as a sole treatment or contraindicated related to comorbid or drug-induced psychiatric symptoms or behaviors. In addition, multiple medications and a variety of dosing times have an increasingly negative effect on medication adherence.

The literature contains many resources to measure and understand what medication non-adherence is, who is at risk, and some novel ways to improve the outcomes. Being a chronic disease, PD follows similar consequences caused by inconsistent medication self-management. The scales imported from hypertension and kidney transplant patient education make it essential to know that no one scale will do it all. Comparatively, intervention strategies were also imported and seen throughout the literature, including time-tested patient education, newer ideas using technology like electronic pill dispensers, smartphone timers or reminders, simplified doses, telephone call follow-up, and support groups. The care of PD patients has come a long way. However, we must implement more effective interventions until the evidence shows higher medication adherence. This project aimed to illustrate how to recover PD patients' quality of life through symptoms management using evidenced-based interventions to improve medication non-adherence.

Chapter One

Nature of the Problem

Parkinson's disease predominantly relies on pharmaceuticals to manage symptoms and maintain physical and cognitive functioning; however, the literature consistently finds that medication adherence rates identified as a significant problem have not improved in more than twenty years. This chapter will illustrate the background and significance of the problem. The internal evidence is compared to the external findings in the literature and leads to formulating the PICOT question.

Background of the Problem

Parkinson's disease is the second most prevalent neurodegenerative process, the first being Alzheimer's disease, affecting nearly three-quarters of a million patients in the United States (Marras et al., 2018). This neurodegenerative disease relies on pharmaceutical intervention as the mainstay of symptom management from the onset of the disease to the end of life. Unfortunately, the course of medication therapy consistently increases the risk of non-adherence due to polypharmacy and multiple-dose times, which affect PD patients' financial burden and quality of life (QoL) (Malek & Grosset, 2015). Due to the lack of suitable medication and treatment options, the PD patient must adapt to a complex, timed medication plan to maintain optimal physical and cognitive function. Optimal physical functioning is movement without bradykinesia, rigidity, and tremor. Additionally, cognitive function is preserved with medication therapy without bradyphrenia; however, hallucinations or delusions may be refractory (Daley et al., 2014; Malek & Grosset, 2015). In treating PD, understanding patient behavior and utilizing medication adherence interventions is perhaps the most critical goal of the clinician and patient relationship necessary for good therapeutic effectiveness and sustained results (Straka et al., 2017; Wright & Walker, 2013).

According to the 2010 census, Parkinson's disease patients' prevalence was >45 years standardized by age and sex in the United States population was 572 per 100,000, equaling

680,000 cases (Marras et al., 2018). This number is estimated to have risen to 930,000 in 2020 and will be 1,238,000 by 2030 (Marras et al., 2018) and 1.6 million by 2037 (Yang et al., 2020). In the United States, the annual per-person cost related to non-adherence with this disease, including pharmacy, outpatient care, hospitalizations, and medical supplies, ranges from $5,271 to $52,341 per person (Cutler et al., 2017). By 2037, the U.S.'s economic burden will surpass $79 billion annually (Yang et al., 2020).

Significance of the Problem

External Evidence

In PD, medication management estimates of non-adherence range from 10% to 81%. This range includes provider perception of patients' adherence, self-reporting, and physical pill counting (Fleisher & Stern, 2013; Malek & Grosset, 2015; Shin et al., 2015: Straka et al., 2018). Fleisher & Stern (2013) admit that false provider perception of patient medication non-adherence is grossly underestimated, the lowest at the 10% mark. Inconsistent data in patients' self-reported medication non-adherence ranges from 0% to 81% (Malek & Grosset, 2015; Shin et al., 2015). The highest measurement level has relied upon actual pill counts and pharmacy refill data, with a non-adherence result of 67% (Fleisher & Stern, 2013).

Many studies discussed the types of non-adherence, such as missed doses, altered doses, or cessation of doses. A missed dose's unintended action is considered the most common event, attributed equally to younger busy patients and forgetful events in older patients (Feldmann et al., 2020; Malek & Grosset, 2015; Shin et al., 2015). The alteration of doses is the intended change in the medication plan. These dose changes are commonly related to the patients' attempt to alleviate side effects like drowsiness, nausea, and dyskinesia (Malek & Grosset, 2015; Shin et al., 2015; Straka et al., 2018). Complete cessation of medication therapy has a lack of information. However, this action's consequences increase the risk of myocardial infarction, hyperpyrexia, hospitalization, and death (Fleisher & Stern, 2013; Malek & Grosset, 2015).

Medication non-adherence is an anticipated complication of therapy; therefore, risk management begins at the onset of treatment using screening tools to form baselines and expose the potential areas for improvement. Initially, the clinician obtained the patient and caregiver history through the interview and self-report. A baseline tool to measure physical ability, symptom severity, and effects on Activities of Daily Living (ADL), including motor and non-motor aspects, is known as The Movement Disorder Society-Unified Parkinson's Disease Rating Scale (MDS-UPDRS). In addition, the Parkinson's Disease Questionaire-39 (PDQ-39) relates the effects of medication non-adherence on patients' including decreased quality of life, endangering earning capacity, and loss of participation in hobbies and fitness. Another tool to measure the quality of life is the EuroQoL (EQ-5D). Though they do not directly measure non-adherence, they are invaluable for gauging medication adherence's potential cause and effect pre and post-intervention (Daley et al., 2014; Feldmann et al., 2020; Malek & Grosset, 2015; Wright & Walker, 2013).

Outcome measurement tools consistently used in PD non-adherence studies came directly from other targeted chronic disease populations. These tools do not always address non-adherence classifications like doses taken at the wrong times, missing doses, or therapy cessation. For instance, the Morisky Medication Adherence Scale (MMAS-4), a four-question screen developed in 1986, was designed for hypertension medications and did not recognize timed dosing. Likewise, the Brief Medication Questionnaire (BMQ), developed in 1999, included 20 questions and was designed for hypertension management use. The Germans created the Stendal Adherence to Medication Score (SAMS) developed for kidney transplant patients. In 2003 The World Health Organization (WHO) made recommendations that scales were needed to meet the "peculiar illness-related demands" of the PD patient population. Tosin et al. (2020) agreed that the social, economic, and health conditions necessary for optimal care of PD are not addressed (Tosin et al., 2020).

Measuring this disease's economic burden of medication non-adherence is necessary to project adequate healthcare policy to protect the patient and society. The annual cost of non-adherence, direct and indirect healthcare expenses in the United States, ranges from $100 to $290 billion. In 2015, the cost unadjusted for comorbid illness in the individual PD patient was second only to cancer and addiction treatment and expenses (Cutler et al., 2017; Fleisher & Stern, 2013). Further, in its most recent revision, the International Classification of Diseases (ICD-10) confers a billable code: Z91.14, and a host of disease-specific linked codes to designate the significant problem of medication non-adherence. The average rate of non-adherence is approximately 67% in the United States (Fleisher & Stern, 2013). Therefore, if healthcare providers employed feasible interventions to improve disease quality management, there would be an expected likelihood of sustainable outcomes and reduced expenses (Cutler et al., 2017; Fleisher & Stern, 2013; Malek & Grosset, 2015; Straka et al., 2018).

In the elderly with chronic disease, the hospitalization rate related to medication non-compliance is significantly higher, between eight and 11% (Fleisher & Stern, 2013; Malek & Grosset, 2015). PD generally strikes older persons; however, it occurs in the middle-aged during their employment years, active with home and social responsibilities. This age group has more significant financial implications like lost wages, lack of health insurance, and no liquid assets for automobile or home purchases affecting the economy.

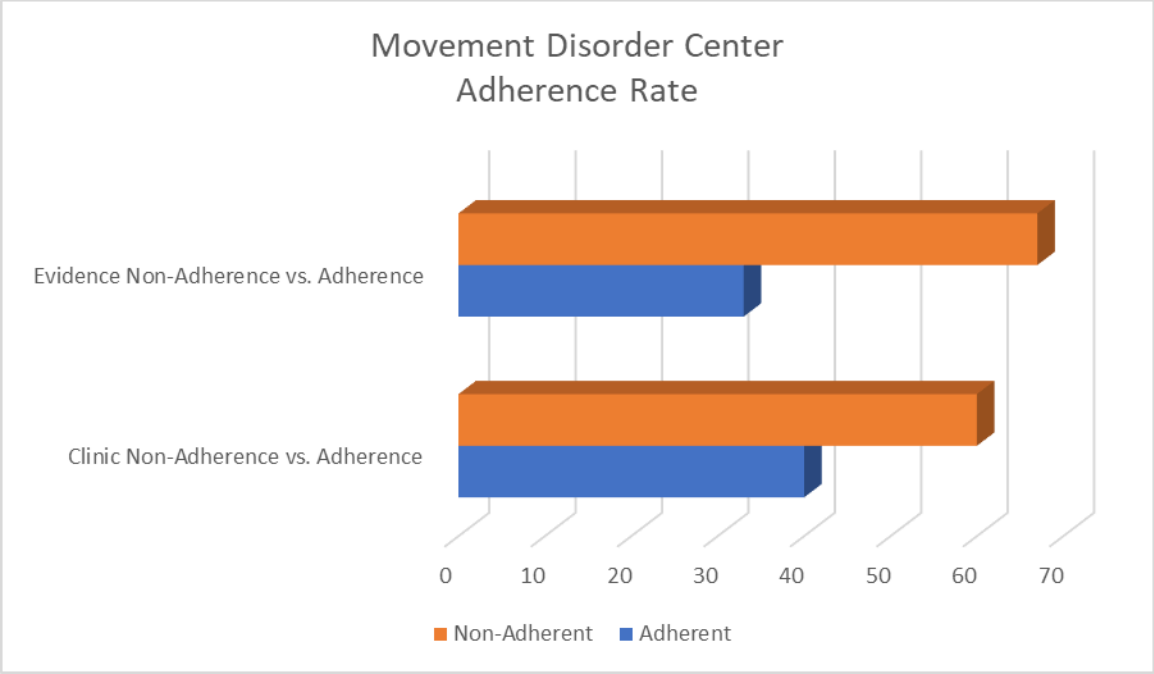
Internal Evidence & Data Collection

Because the electronic medical record (EMR) system did not have a designated documentation point for medication adherence, a chart review of 40 movement disorder patients was reviewed for descriptive wording about medication adherence in any form in the history of present illness, review of systems, physical exam, impression, and plan. The chart review encompassed 30 days, with a goal of 10 charts randomly selected each week. There is no consideration of age, gender, or length of illness. The data collection found 16 cases of documented adherence with medications and 24 cases in which patients did not follow

medication instructions as directed by the last office visit and were considered non-adherent. There was a 60% rate of medication non-adherence found. This internal data concurred with the literature see Figure 1.

Figure 1

Internal Evidence on Medication Adherence



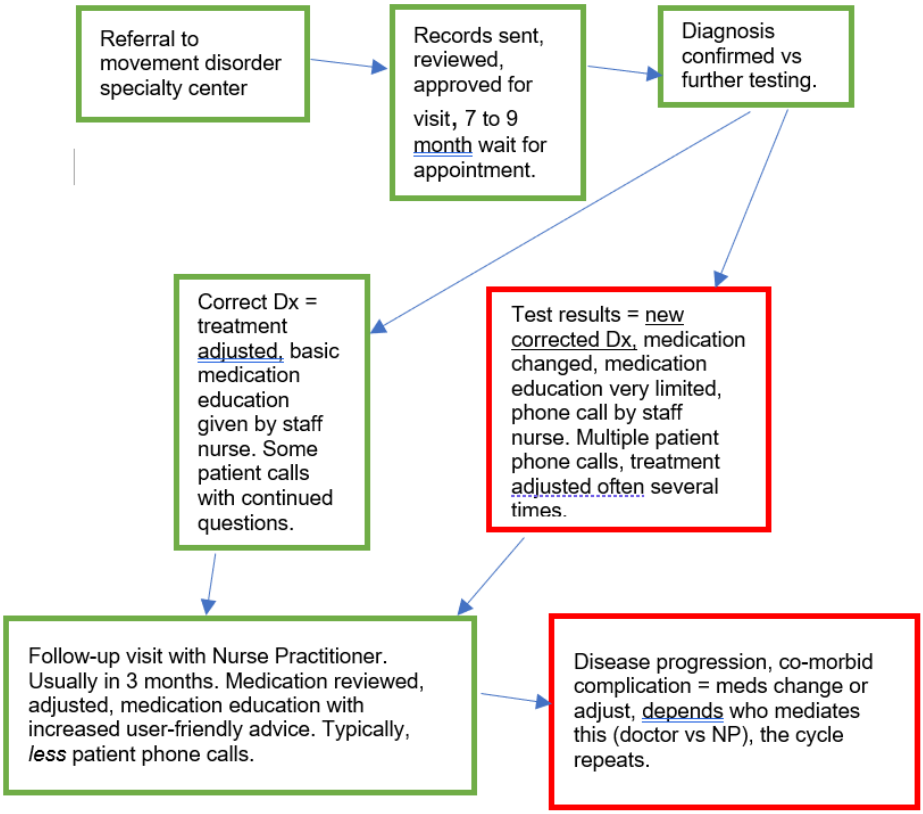
Target System or Population Description

The first goal for the patient in a movement disorder center is to establish an accurate diagnosis, which is paramount to commencing treatment. The local delay in seeing a movement disorder specialist currently takes months. Primary care and general neurology frequently institute inappropriate treatment; medications started without proper patient education often lead to non-compliance or cessation. General practice clinicians do not consistently assess medication non-adherence and do not consider all the variables, such as physical access or cognitive decline, as barriers (Daley et al., 2014; Fleisher & Stern, 2013). Outpatient medical

centers must juggle the frequency of follow-up visits dictated by the insurers with the patient's needs; documentation of this identified need supports the services given.

Figure 2

Current Population and Process



Practice Problem

Therefore, the question arises: Would specialized interventions such as medication adherence therapy, timed reminders, simplified doses, or caregiver support, compared to basic routine medication information, improve medication adherence in Parkinson's disease (PD) patients over three months?

Conclusion

Parkinson's disease management is a rapidly growing healthcare problem, with a population growing by more than 1% per year. Because pharmaceutical therapy is the mainstay of treatment, the literature identifies the need for better medical management and improved

patient outcomes to lessen society's physical and financial burden. Therefore, the PICOT question was designed to apply the evidence of medication adherence interventions to improve the medical outcomes for Parkinson's disease.

Chapter Two

Evidence Synthesis and Models

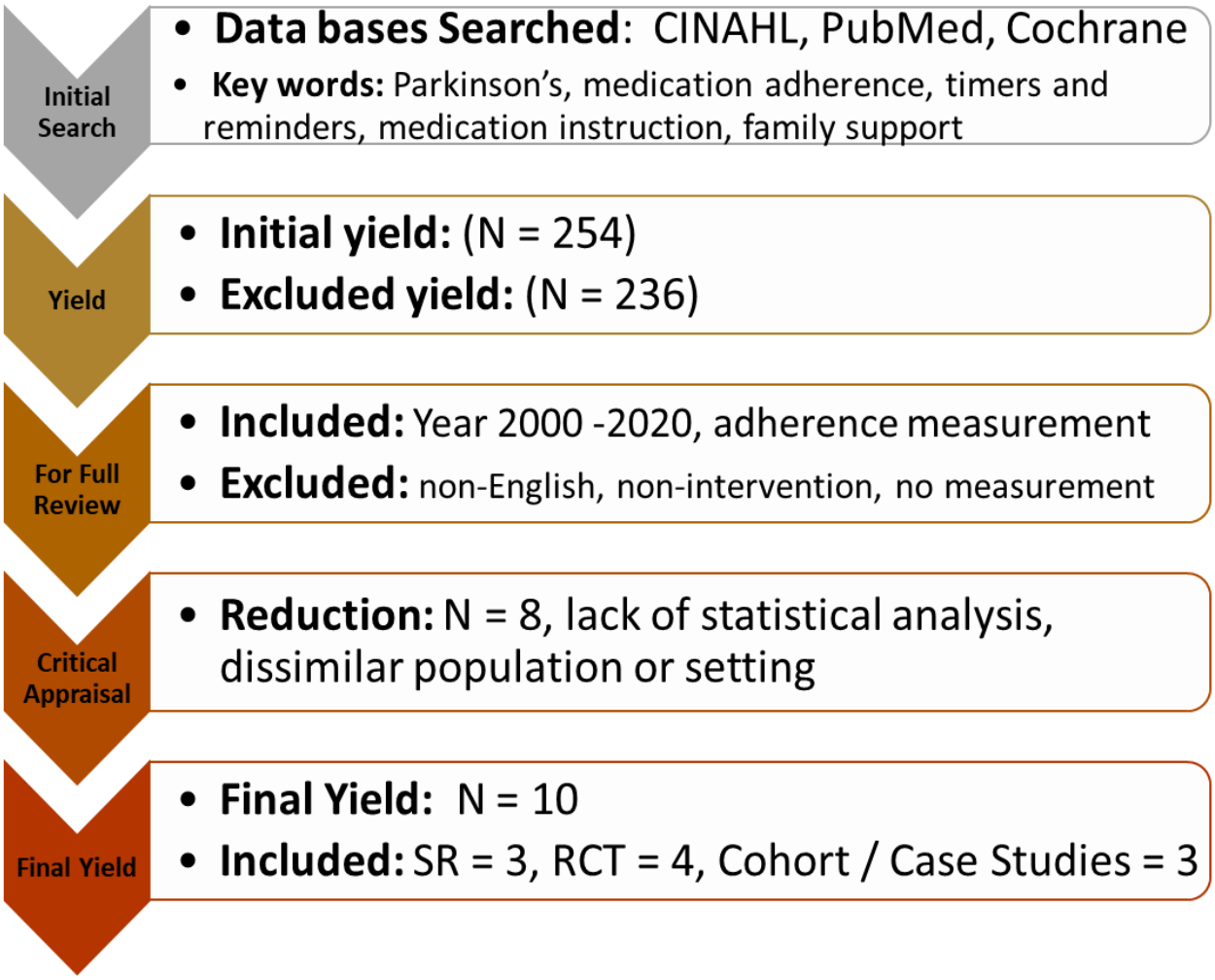
Chapter two comparatively describes the evidence known about medication non-adherence in the literature, the search for credible information, the method of appraisal, and how that information evokes change in the practice setting. The evidence retained was critically appraised for being worth applicable to a clinical practice setting of a similar population and culture. This chapter is about using the knowledge found in the internal and external evidence to guide change in clinical practice.

Evidence Search

A systematic search was conducted to answer the PICOT question. Keywords from the PICOT question used for the search were Parkinson's Disease, Medication Adherence or Compliance, Caregiver Support, Medication Reminders, and Medication Instruction across all databases. Keywords were systematically searched individually and combined to yield the most relevant articles in each database. This technique searched three databases: CINAHL, PubMed, and Cochrane Library. In CINAHL, 39,218 hits were obtained using combined Keyword searching. Subject Headings used included Parkinson's, Medication Adherence, Medication Reminders, and Caregiver Support, which yielded 79 final articles. In PubMed, 282,502 hits were obtained using combined Keyword searching. MESH Headings used included Parkinson's and Adherence, which yielded 173 final articles. In Cochrane Library, 121,612 hits were obtained using combined Keyword searching. Finally, the same Subject Headings used in PubMed were used to search Cochrane; this search had 49,921 articles and yielded two definitive studies. Inclusion criteria included the English language, humans, and the years 2000 to 2020. These criteria were applied to the combined search results from all three databases, with 443,335 total hits. The results were further narrowed down through filtering to produce an initial yield of 254. The final count of keeper studies retained for critical appraisal was 18.

Figure 3

Record of Systematic Search



Critical Appraisal

The appraisal process included critical components in an orderly, consistent fashion to ensure the evidence was valid and reliable. For example, consideration of the sample and setting helps ensure the population fits the needs of the problem and the solution or outcome. Further, the appraisal process checks for validity and scientific quality, identify bias and considers confounding variables. In essence, all studies do not agree and have flaws in the design, conduction, and reporting; therefore, evidence users must critically evaluate the research to determine their worth to practice (Melnyk & Fineout-Overholt, 2019).

The systematic review (SR) studies offered positive affirmation that medication adherence therapy improves adherence by up to 70%. Adherence therapy was a primary variable in all of the SR studies; however, only two of the three reported statistical results. The SR studies were conducted within three years and are relevant to current practice. The total number of studies reviewed in these three SRs was 79, but there was a flaw in their search strategy: only one of the three searched at least three databases.

Kini & Ho (2018), the SR was completed in the United States, encompassing 18 years of articles but limited by using only a single database: PubMed. This review had a significant independent variable pool, including medication adherence therapy, simplified dose changes, and medication timers and reminders. This study included diverse data for many common chronic diseases and was not specific to Parkinson's disease. This study was retained because it produced robust statistical data for medication adherence improvement.

Malek & Grosset (2015), also a SR, utilized three databases, including the Cochrane Library. Although the studies reviewed were small in number, being nine, the inclusion criteria were specific, and the dependent variable measurement defined details. Although this study lacked statistical data, it had rich details of medication regimen complexity and closely mirrored the clinic setting for this project.

Straka et al. (2018) was the third SR and targeted PD in 50% of their review. The tools used to measure adherence were introduced and are the most prevalent in all medication adherence studies. Similar to Malek and Grosset (2015), this study describes and quantifies the varieties of medication non-adherence. The conclusion is that medication adherence improvement requires more than one intervention.

Randomized clinical trials (RCT) numbered four in the keeper group. These tended to be smaller studies with 76 to 158 subjects. The study dates ranged from 2007 to 2019. The length of the studies averaged three to four months and would be comparable to the proposed DNP

project of three months. However, there was a split in independent variables. Two looked at adherence therapy the other two looked at interventional devices.

Daley et al. (2014) compared medication adherence therapy to routine medical care over three months. The Morisky Medication Adherence Scale (MMAS) is the most accepted outcome measurement tool. There was strong statistical evidence for medication adherence improvement and significantly positive secondary outcome data. The flaw in this scenario is the unknown impact of "home adherence therapy visits," which is not a reasonable option for the project or the clinical practice.

Grosset and Grosset (2007) utilized the gold standard for physical function and symptomology on all patients pre and post-intervention and measured by the Unified Parkinson's Disease Rating Scale (UPDRS). Unfortunately, the medication monitoring device intervention is too costly, and 32% could not manipulate it due to loss of hand dexterity. Nevertheless, the study has merit in the details of the unique insight into the critical effect of medication timing and pathophysiology of the disease and responsiveness.

Hannink et al. (2019) focused on an interventional device, the "Medido," a medication dispensing system used to measure functional disability, being a state of symptoms management by proxy. The measurement tools were practical, also using the UPDRS, among others. In addition, statistical data supported the interventions.

Lakshiminarayana et al. (2016) also utilized a device to assist with medication adherence; a smartphone tracker application. This intervention is a readily available idea for patients to participate in self-regulation. The statistical data reinforced the effectiveness of smartphone technology, which is already popular with the clinical population for this project. This study also used the MMAS to account for medication adherence. The study lacked the inclusion of functional status with a more reliable tool such as the UPDRS; they opted for a lesser-known questionnaire.

Cohort and Case-Controlled Studies included were three kept for the body of evidence. These studies included 330 study participants. The study settings were all outpatient clinics, one of which was a movement disorder specialty clinic. None of the keep studies had a conceptual framework except the last; Fernandez Lazaro et al. (2019) stated they used the World Health Organization (WHO) conceptual framework. These studies exposed the importance of medication adherence therapy's social aspect or collaboration and improved outcomes.

Carne et al. (2005) was a retrospective cohort study utilizing chart review to ascertain the benefits of an interdisciplinary care team on medication adherence in PD patients. The consecutive population sample was more reflective of the general PD population regarding age and race; it lacked adequate distribution of gender, being all male. Disheartening is the honest declaration of failure to account for medication "on or off-peak" during physical functional testing. However, recognition supports the value of this critical consideration not addressed in most literature.

Cilia et al. (2014) was a retrospective case-control study examining an unusual form of medication non-adherence. However, the interventional approach to adherence therapy was the same. In addition, this study was conducted in a specialty movement disorder clinic, which mirrors the clinical setting for the adherence therapy project. This unusual form of non-adherence reminds clinicians how complex medication non-adherence can be and the need for evidence-based adherence interventions to improve all outcomes.

Fernandez-Lazaro et al. (2019) measured medication adherence through barrier identification, complications caused by inadequate healthcare literacy, economic limitations, and comorbidity. The focus on inadequate healthcare literacy is an antecedent to medication adherence therapy. This study lacks intervention testing statistical data but does recognize that patients and caregivers benefit from some form of adherence therapy. The inclusion criteria for comorbidity bring realism comparable to the general population of PD patients.

Rapid critical appraisal was completed on the ten studies retained from the systematic search. The studies retained for appraisal included three systematic reviews, four randomized clinical trials, and three cohort or case-controlled studies. See Table 1.

Table 1

Level of Evidence Table

Level of Evidence	1	2	3	4	5	6	7	8	9	10
Level I: Systematic Review / Meta-Analysis	**X**	**X**	**X**							
Level II: Randomized Clinical Trial				**X**	**X**	**X**	**X**			
Level III: QE Studies / Non-Randomized										
Level IV: Cohort & Case Studies								**X**	**X**	**X**
Level V: Systematic Review (Qualitative)										
Level VI: Single Qualitative Study										
Level VII: Expert Opinion										

Legend: 1= Kini & Ho, 2018; 2= Malek & Grosset, 2015, 3= Straka et al., 2018; 4= Daley et al., 2014; 5= Grosset, K. & Grosset, D., 2007; 6= Hannink et al., 2019; 7= Lakshminarayana, 2016; 8= Carne et al., 2005; 9= Cilia et al., 2014; 10= Fernandez-Lazaro, 2019.

Interventions are the cornerstone method for improvement in medication adherence. All articles retained in the project had a minimum of three interventions utilized. In addition, all but one of the SRs and RCTs utilized metrics to measure the effectiveness of the interventions supporting the importance of these higher-level studies. The most prominent intervention was specialized medication adherence therapy. The most infrequently used intervention was specialized packaging or containers and was described as unwilling or unable to manage the device due to loss in dexterity, among others (Grosset & Grosset, 2007).

Table 2

Interventions per Levels of Evidence

Study Type	SR	SR	SR	RCT	RCT	RCT	RCT	CT	CT	CS	
Intervention Type											
Medication Adherence Therapy	X	X	X	X	X			X	X	X	8 of 10
Self-Reported Adherence Questionnaires	X	X	X	X	X	X	X	X		X	9 of 10
Medication Adherence Metrics	X	X	X	X	X	X		X		X	8 of 10
Programmed / Timer Devices	X	X	X		X	X	X				6 of 10
Simplified Dosing		X	X			X	X	X	X	X	7 of 10
Special Containers / Packaging			X							X	2 of 10
Family / Caregiver Support			X					X	X	X	4 of 10

Legend: 1= Kini & Ho, 2018; 2= Malek & Grosset, 2015, 3= Straka et al., 2018; 4= Daley et al., 2014; 5= Grosset, K. & Grosset, D., 2007; 6= Hannink et al., 2019; 7= Lakshminarayana, 2016; 8= Carne et al., 2005; 9= Cilia et al., 2014; 10= Fernandez-Lazaro, 2019.

Eight of the ten studies found that medication adherence therapy improved adherence outcomes. Seven out of ten reported that at least two or more interventions were utilized to make these improvements. The study's strengths and weaknesses recognized method imperfections, statistical flaws, level of detail, and uncommon samples. Feasibility for replication was not a limiting factor for this body of evidence which logically benefited from the study's strengths and conclusions.

Table 3

Outcomes and Synthesis Table

Intervention	1	2	3	4	5	6	7	8	9	10	Summary
Medication Adherence Therapy	↑ up to 70%	↑ r/t SpD	↑ r/t SpD	↑ r/t SpD	↑ r/t SpD	↑ r/t SpD	↑ r/t SpD	↑ r/t SpD	↑ r/t SpD	↑ r/t SpD	↑ 8 of 10
Timers or Reminders	↑ to 81%	↑ .	↑ .	-----	-----	↑ > 50%	↑ 5.1%	-----	-----	-----	↑ 5 of 10
Simplified Doses	↑ to 51%	↑ 13 to 26%	↑	-----	-----	-----	-----	-----	-----	↑	↑ 5 of 10
Electronic Monitoring Devices	↑ 9 to 33%	-----	↑ 9.5%	-----	↑ 13.4%	-----	-----	-----	-----	-----	↑ 3 of 10
Medication Dispensing System	-----	-----	-----	-----	-----	↑	-----	-----	-----	↑	↑ 2 of 10

Legend: 1= Kini & Ho, 2018; 2= Malek & Grosset, 2015, 3= Straka et al., 2018; 4= Daley et al., 2014; 5= Grosset, K. & Grosset, D., 2007; 6= Hannink et al., 2019; 7= Lakshminarayana, 2017; 8= Carne et al., 2005; 9= Cilia et al., 2014; 10= Fernandez-Lazaro, 2019.
Symbol Legend: ↑ = increase, ↓ = decrease, ↑ ≈ = discussed/non-quantitative

Recommendations for Change

Intervention strategies utilized in chronic disease studies seen throughout the literature include time-tested patient education and are a substantial part of the plan. In addition, technological innovations like electronic pill dispensers, cellular phone timers, simplified doses, telephone call follow-up, and support groups have become prominent interventions.

Medication Adherence Therapy

Robust data supports individualized medication adherence counseling and education and requires repetition to reinforce its importance over multiple visits. For example, when patient education regarding medication information compared to routine care, adherence was improved by 2% to 13% (Kini & Ho, 2018). In addition, when patients understand medications' measurable effects on their symptoms, they develop greatly enhanced behaviors (Daley et al., 2014). Further, Daley et al. (2018) utilized the Morisky Medication Adherence Scale (MMAS-4)

and found that in a sample of 76 subjects, 60% had an improved adherence rating (OR 8.2;95% CI: 2.8, 24.3). Ongoing efforts to keep the patients engaged included assessment and attitudes, medication side effects, problem-solving, reflection on experience, and the perception of cause and effect (Daley et al., 2014; Fleisher & Stern, 2013; Malek & Grosset, 2015; Straka et al., 2018).

Simplified Dosing

the most common solution to reduce multiple daily dosing is to forgo the three to six doses of levodopa and use once-daily dopamine agonists (DA). Instituting dual once-daily therapy is also helpful for monoamine oxidase inhibitors (MAOI) and dopamine agonists (DA), prescribed at the opposite ends of waking hours. The MAOI works as an activator and can disrupt sleep; the (DA) has a common side effect of causing somnolence, thus better tolerated in the evening (Balestrino & Schapira, 2020; Jankovic & Aguilar, 2008).

These once-daily medications have several drawbacks, including cost, medical contraindications, and psychiatric-related side effects. The insurers often insist on the same medicine's more economical multiple-day dosing form, eliminating the whole purpose, which is poorly addressed in the literature. The side effects differ regarding age; the younger population is at increased risk of impulsive behaviors. The older population is at risk for impulsive behaviors and psychiatric complications like delusions and hallucinations. Clinicians see DA as a short-lived primary solution; they are, however, frequently utilized as adjunctive therapy (Balestrino & Schapira, 2020; Jankovic & Aguilar, 2008; Malek & Grosset, 2015: Shin et al., 2015).

Simplified dosing related to dopamine offers two additional options, the dopamine jejunostomy tube (J-tube) and pump system and deep brain stimulation (DBS) (Straka et al., 2018). The J-tube supplies a lower dose dopamine formula directly through an implanted tube through the abdominal wall and into the intestinal point of dopamine absorption in the jejunum. This system is activated in the morning and is discontinued at bedtime, eliminating the entire

pill-taking schedule. The implantation of a DBS system excites the dopamine present in the functional brain tissue, optimizing both the native and supplemental dopamine (Balestrino & Schapira, 2020; Jankovic & Aguilar, 2008). However, the DBS system does not always eliminate multiple daily dosing; DBS often reduces the amount needed, decreasing the risk of side effects. In addition, patients' aversion limits these surgical procedure options. Avoiding these surgical options maintains the misconception of waiting until all the other non-invasive interventions have failed; DBS is far more effective with an early induction.

Timers and Reminders

Studies find that organizational tools like pillboxes, portable pill carriers, schedule spreadsheets with check-off records, and timer alarms or cellular phone-based reminding systems effectively improved medication adherence (Kini & Ho, 2018; Malek & Grosset, 2015; Straka et al., 2018). Many caregivers assist in setting up advanced technology like pill cases and reminding timers, with medication adherence improvement ranging from 7% to 33% (Kini & Ho, 2018). However, in one study, older PD patients reported difficulty using the pill bottle technology, making them unwilling or unable 32% (Grosset, K. & Grosset, D., 2007). Patients also reported PD-related loss in hand dexterity caused by problems with manually opening the pill bottles. However, this intervention's benefit for data collection is availability; having been used to gather research data and provide interventional treatment, they are accessible everywhere (Fleisher & Stern, 2013; Malek & Grosset, 2015; Straka, 2018).

One study found that 75% of PD patients who used smartphone-based reminders felt this tool significantly improved their success in overcoming non-adherence (Shin et al., 2015). According to Lakshminarayana et al. (2017), patients generally like smartphone reminder applications, and the evidence showed their use versus standard treatment was supported (mean difference: 0.39, 95% CI: 0.04-0.74; p=0.0304). However, one limitation is that the patients need assistance setting them up. Another problem identified was that if the alarms get turned off to delay the dose, it was often completely missed. Therefore, embracing these tools

and the necessary behavior patterns to use them as intended is crucial to harness this degenerative disease's progression (Malek & Grosset, 2015: Shin et al., 2015; Straka et al., 2018).

Family and Caregiver Support

The care partner is encouraged to organize medications and schedules, observe and translate therapy results, listen when the patient becomes overwhelmed, and reinforce medical instruction and guidance. One study found that the assistance of social support and caregivers is significant in maintaining engagement and consistency in medication adherence (OR 8.2; 95% CI: 2.8-24.3), an improvement of 60.5% (Malek & Grosset, 2014). Providing caregiver adherence education makes them active participation liaisons, including attending office visits and support groups, to help the patients cope (Shin et al., 2015). PD medications taken correctly improves bradyphrenia and coordination, which improves both the patient QoL (OR -9.0; 95% CI: -12.2 to -5.8; p=0.001) and reduces the sense of emotional burden (OR -5.5; 95% CI: -10.0 to -0.9; p=0.020) for patients and caregivers (Daley et al., 2014). Careful coordination of meals and waketime activities with medication doses will enhance acceptance and adherence (Daley et al., 2014; Fleisher & Stern, 2013; Malek & Grosset, 2015; Shin et al., 2015; Straka et al., 2018).

Conclusion

In chapter two, the search for credible information was appraised and developed to accomplish changes in the practice setting. Again, the literature was critically reviewed and the studies were comparable in the population of the planned clinical setting were retained.

Chapter Three

Project Plan

In this section, the synthesized evidence is prepared for translation into practice. The implementation includes the project models, including the Stetler model to guide the scholarly project, PDSA to implement the evidence, and the Common Sense Model to guide patient interaction during their changes. The preparation planning for action included a risk assessment and mitigation, communication, stakeholder, and Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. Next, the project setting supported translating the evidence in the current clinical practice with a ready-for-change population. Next, the patient population's culture, stakeholder priorities, barriers, and facilitators to the project played a developmental role in the planning. Finally, an actionable timeline and progress markers organized the scholarly effort; this included data management, budget planning, dissemination, and sustainability.

Project Models

The Stetler Evidence-Based Practice Model

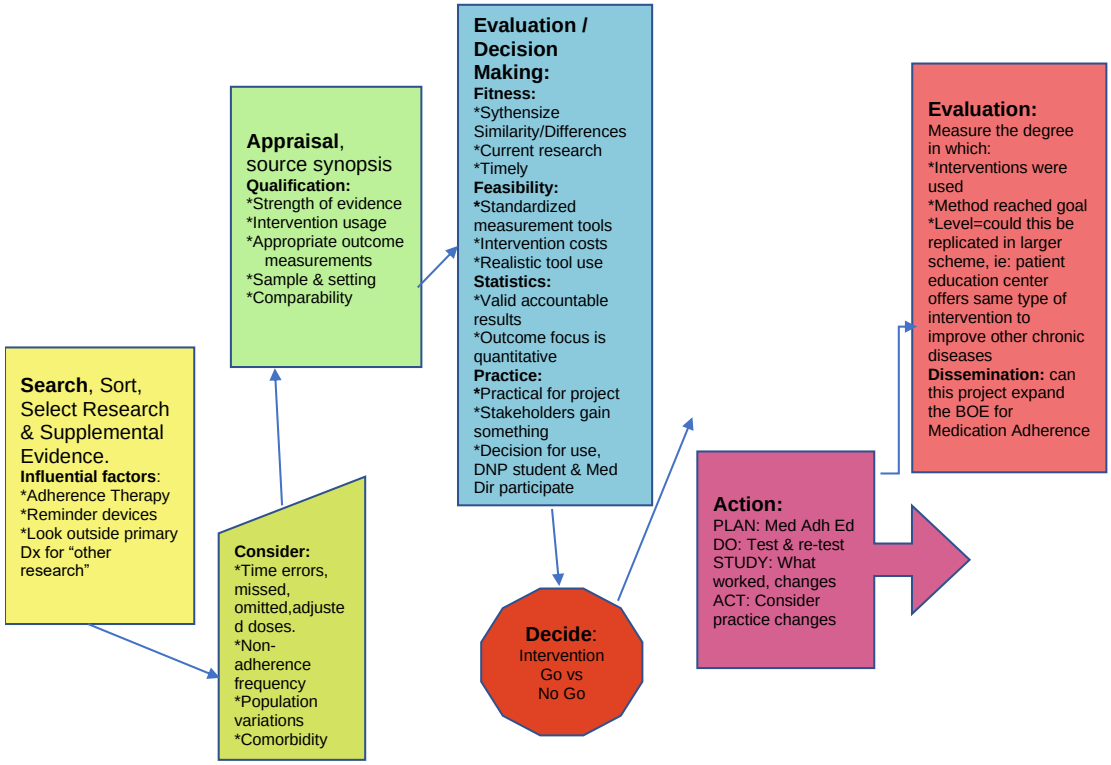
The Stetler Model is an evidence-based practice model that has evolved to include access to evidence using steps to implement change in practice. It is advantageous as a practitioner-oriented model due to the focus on critical thinking and using those findings. This model supports the idea of flexibility in the evidence source as long as it is systematically obtained, replicable, observable, credible, and verifiable for safe and effective use (Melnyk & Fineout-Overholt, 2019). The relationships within research with additional evidence produce the term coined as "evidence-informed practice" (Stetler, 2001). Additionally, Stetler (2001) assumes the use of knowledge occurs from the conceptual effect or how one thinks because of the evidence and symbolic effect when evidence influences the thinking or behavior of others.

The Stetler Model uses five phases: Preparation, validation, evaluation/decision-making, translation/application, and evaluation. Phase 1: Preparation entails searching, sorting, and

selecting research and other supplemental evidence. Phase 2 Validation: perform a detailed appraisal and synthesis for each source. Phase 3 Evaluation/Decision Making: fitness, feasibility, sustainability, and current practice, deciding to keep or pass evidence. Phase 4 Translation: Confirm type, level, and method in practice and document design packaged for dissemination. Phase 5 Evaluation: evidence intervention sufficiently addressed the issue (Melnyk & Fineout Overholt, 2019).

Figure 4

The Stetler Model In Practice



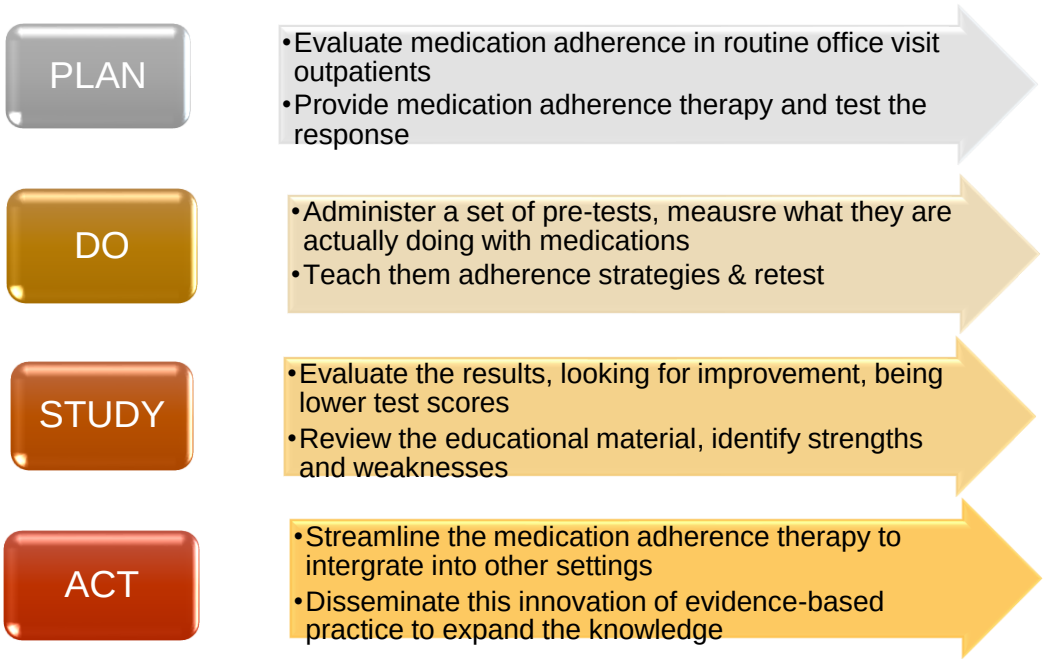
The Model for Improvement: PDSA

The action-oriented scientific method for change, ideal for smaller-scale learning and driving a scholarly project, is the Plan-Do-Study-Act (PDSA) (Melnyk & Fineout-Overholt, 2019). This Quality Improvement method internalizes the evidence on a small scale as a precursor to

potentially more significant change. For example, the medication adherence intervention project is an organized process that follows the acronym PDSA:

Figure 5

Plan-Do-Study-Act



The Common Sense Model of Self-Regulation

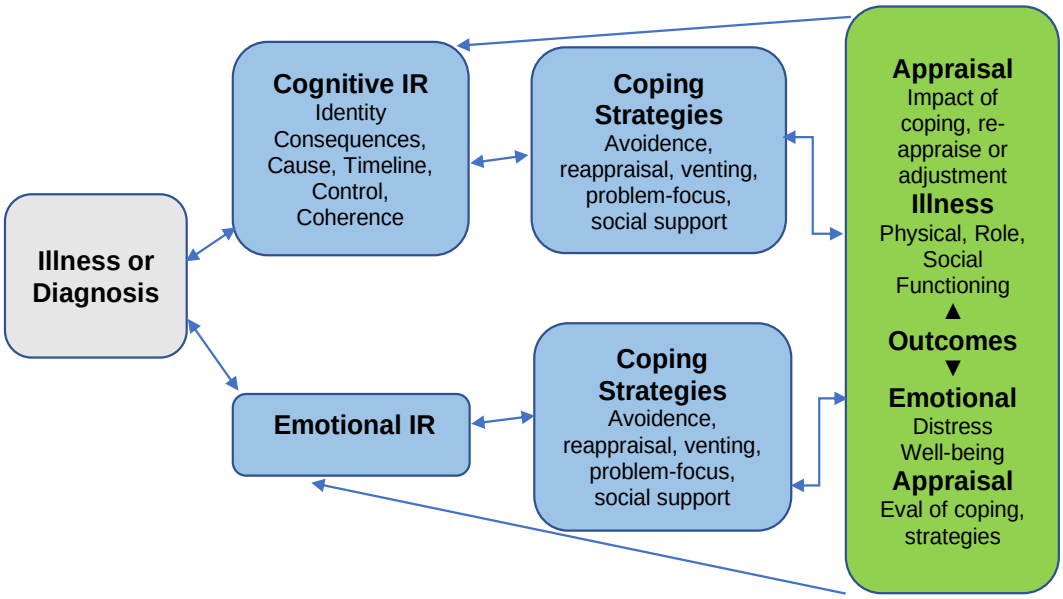
The problem of non-adherence is the omission or delay of medication use with Parkinson's disease patients. Medication adherence per patient self-reporting is 24.3% to 73%, by electronic monitoring devices is 51.3% to 82.1% (Straka et al., 2018). Adherence and collaboration of care are two significant concepts to improve the management of this chronic illness.

Psychologists developed the Common Sense Model of Self-Regulation (CSM) in the 1960s and 1970s (Wyke et al., 2013) to conceptualize illness representation as a health threat for ongoing coping (Leventhal et al.,1992). The CSM's basic assumption is that individuals are goal-directed (Kucukarslan, 2012) and active problem solvers based on illness perception, whose beliefs change regarding treatment and experiences (Phillips et al., 2012). This model

will provide the necessary framework to transition the patient's perception of illness, including cognitive and emotional understanding, by collaborating with the clinician and caregiver support to improve medication adherence.

Figure 6

The Common Sense Model Related to Medication Adherence



Action Plan Prerequisites

The project base was a hospital-based movement disorder center where ongoing clinical research routinely implements evidence-based practices to improve patient outcomes. UT Health East Texas has partnered with the University of Texas Health Science Center to increase community exposure to this higher level of care. Additionally, a specialized branch of neurology that caters solely to patients with a movement disorder allowed the focus of the project to improve medication adherence for Parkinson's disease patients necessary and possible. Further, the clinic's medical director, a Ph.D.-prepared practicing physician, and industry mentor supported integrating this evidence-based clinical process into the care of our patients.

The primary barrier to producing this project was related to infection control mandates. The SARS-CoV-2 pandemic required all porous materials, such as paper, magazines, and books, to be removed from all patient areas to reduce the spread of viruses. Therefore, disposable or laminated and disinfectable items replaced all typically used paper products. Lastly, potentially the most disruptive concern was gathering patients in a meeting venue for group participation. Thankfully, the freedom to gather publicly ensued at precisely the necessary time, and data collection occurred as planned. No other barriers arose, and the project proceeded as the timeline predicted.

Action Plan for Translation

Ethical Review

All clinical research conducted at UT Health East Texas properties must apply in writing to The University of Texas Health Science Center at Tyler. The Research Regulatory Specialist, a Senior Certified Clinical Research Coordinator, was contacted for application guidance to seek this project's Internal Review Board (IRB) approval. A Form 26-Project Summary was completed and filed on July 13, 2021. This 13-page document was completed requesting approval to implement the evidence and be classified as an exempt study. In summary: outpatients, healthy volunteers, no specimens to be collected, the population are the investigators' patients, utilizing informed consent, no investigational drug use, and questions about compensation and costs incurred. Additionally, there was a large section regarding health information management, counseling or social support, biospecimen samples, electronic data, radiation exposure, human gene transfer, and the use of DNA identified as not applicable.

Next, additional required paperwork included a current curriculum vitae (CV) and verification of current completed Collaborative IRB Training Initiative (CITI) training. Additionally, copies of the planned patient questionnaires and the project public announcement are known as the Quality Improvement (QI) invitation to participate. The application process was completed

on August 27, 2021. Finally, the IRB determined that this project was: Not Human Subject Research (NHSR) and did not require further IRB oversight effective September 20, 2021.

Description of the Stakeholders

The stakeholders in the lens of the top downward include the organization leadership team, the staff, the community, and ultimately the patients. At UT Health East Texas, the organization's culture fosters caring and protecting the patients, families, and employees. The central theme in the code of conduct is "One Person, One Moment, One decision," meaning that each detail is essential to provide excellence in care for everyone. It is the center of quality and has ample resources to guide any employee or clinician's situation. In addition, this organization has partnered with The University of Texas Health Science Center at Tyler, long affiliated as a center for teaching and research. As a result, access to improving evidence-based practice has doubled.

For UT Health East Texas, a for-profit organization, it is vital to remember that financial responsibility is the foundation for survival and growth. Medication non-adherence is recognized and means unsatisfactory symptom management, sometimes leading to or extending hospital stays. In the insurance culture, patients repeatedly returning with the same diagnostic criteria indicates a lack of resolution for the treated problem. Since healthcare payment denials occur from failure to resolve the medical cause, the institution is ethically and financially motivated to improve the outcomes. Improving PD patients' medication adherence reduces lengthy and recurrent hospitalizations, significantly improving the problem.

In the hospital-based movement disorder center, participating in clinical research is a standard currently practiced. The center's providers routinely implement evidence-based practices to improve patient outcomes, and this higher level of care is encouraged. For example, the medical director actively seeks focused evidence and disseminates this knowledge daily to patients and the medical staff. Furthermore, the medical director

enthusiastically supported this medication adherence therapy project and was an industry mentor.

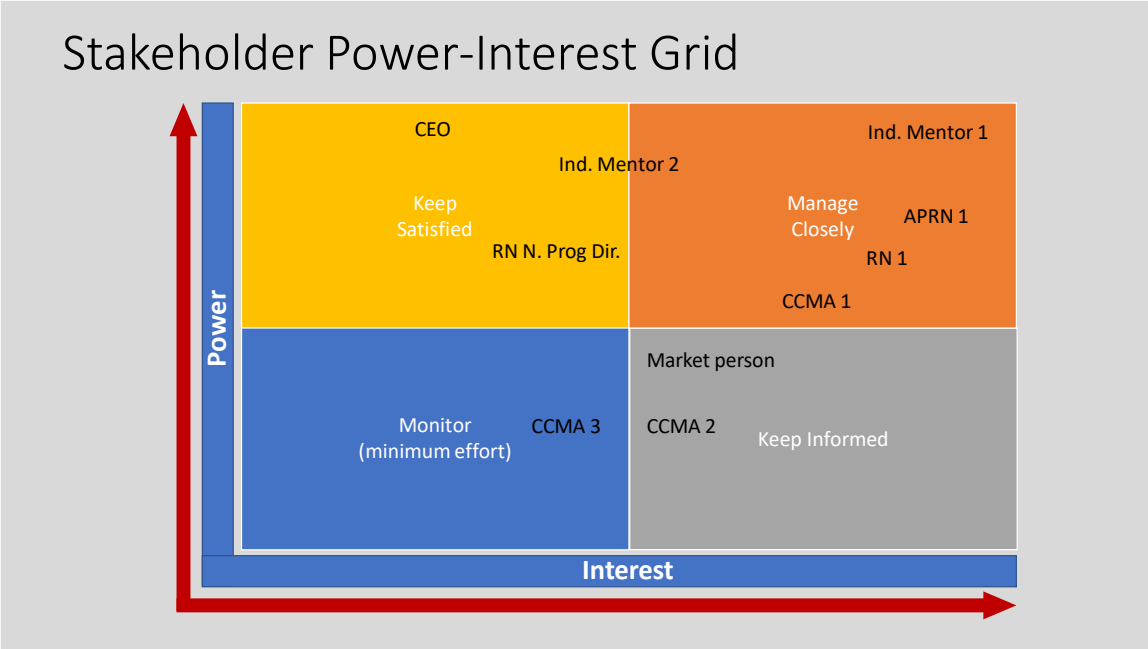
Additional stakeholders were the center's frontline staff, including admission representatives, nurses, and medical assistants. This support staff spends equal amounts of time with the patients and is vital to identifying the focused needs of the patient visit. Typically, the support staff attends 100% of the between-visit patient interactions, such as telephone calls, patient portal contact, and the documentation required to obtain the patients' financial assistance for treatments. Thus, they are invaluable to the quality of patient care.

The patients and their spouses, caregivers, and families are the direct beneficiaries of improved care quality and have the most to gain. They were responsible for giving accurate details about adherence practices. Additionally, they were encouraged to ask questions and confirm their understanding of the directions and risks of treatment. Realistically, the patient population catchment area is far beyond the reach of the center's immediate control. Enlisting the help of many other people extends the stakeholder base beyond this project's scope.

Some stakeholder roles had a brief but powerful impact on the project's success, such as marketing and meeting coordination staff. Finally, information technology and dietary services made the presentations smooth and hospitable. A power-interest grid is included to project stakeholder emphasis.

Figure 7

Stakeholder Power-Interest Grid



Project Risk Assessment and Mitigation Plan

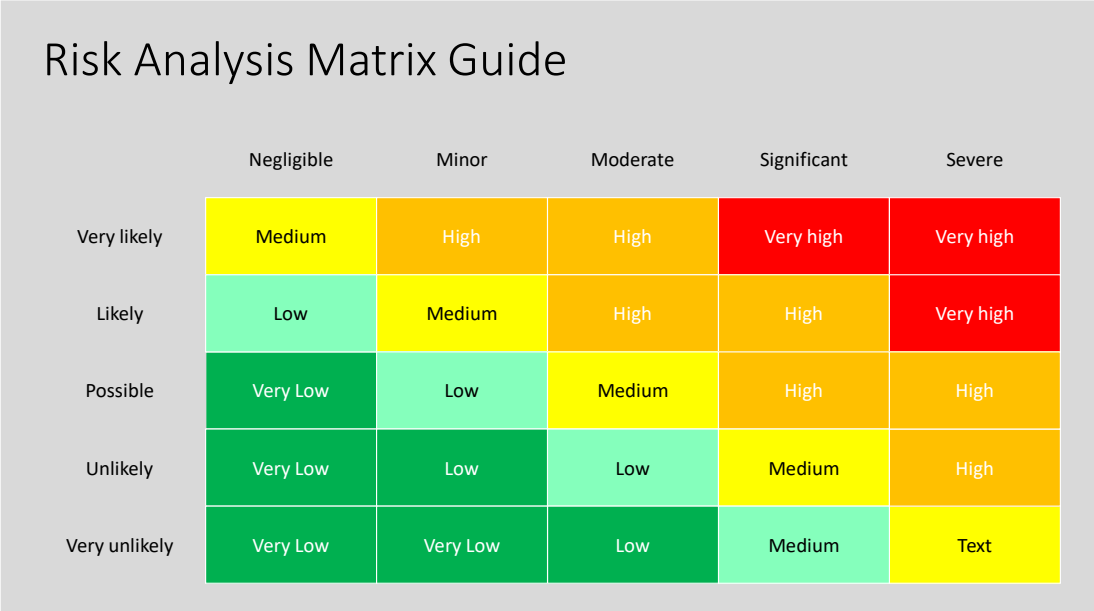
Risk assessment and analysis is the process by which the project manager and stakeholders consider problems or potential complications of a project and allow for planned response to mitigate the perceived threats. Risk management is necessary with projects that involve innovative technology, innovative work, and engineering; risks are more significant in areas without sufficient data. However, medication non-adherence has been well studied and has comprehensive data entailing the processes of similar projects, including the risks encountered. Therefore, the risk analysis matrix for this project was composed of a team effort, including some stakeholders.

Risk Analysis Matrix

Risks are stratified by the likelihood of occurrence and severity of their impact. This guide is the reference used to examine each identified risk and formulate mitigation planning. The following matrix was used as a guide.

Figure 8

Risk Analysis Matrix Guide



Risk Analysis

The risk analysis process identified fourteen initial risks to the successful completion of the project. Most of these risks were categorized as low or very low negative impacts on the project. Additionally, three risks would impact the project in either a medium or high-threat result. Six risk-related themes emerged: 1) people, 2) metrics, 3) blocks to proceed, 4) access, 5) unanticipated clinical findings, and 6) time. The most significant risk focus lies in human relations issues and the logistical limitations affecting the presentation or testing. The viral SARS-CoV-2 pandemic can potentially influence five of these overlapping themes. The probability scores were all low except one, and the impact scores were also in an acceptable range except one. Overall, the risk analysis supported the development of a mitigation plan.

Figure 9

Risk Analysis Matrix

Risk Analysis Matrix				
	***DNP Scholarly Project Name*:**	**Medication Adherence: Interventions for Parkinson's Disease**		
	Student:	Amanda Mullins		
#	**Risk**	**Probability Score**	**Impact Score**	**Risk Score**
1	Student changes positions during DNP program and has to change project as well	3	5	8
2	Clinic staff support less than enthusiastic	2	3	5
3	Lack of enough interested participants	2	3	5
4	Continued ban on in-person group meetings	3	2	5
5	Difficulty making an effective and acceptable 1 hr patient education video (recorded meeting)	2	3	5
6	Breakthrough new literature that shows something better than my planned interventions	1	3	4
7	Poor time planning to conduct pre-post testing	2	2	4
8	Higher than acceptable drop out rate	2	3	5
9	QI project did not complete data collection by the end of June 2023	1	3	4
10	Outcome measures did not meet expectations	2	2	4
11	Dr. Donaldson Annual Neurosymposium Canceled for 3rd year r/t SARS-CoV-2 (dissemination)	2	2	4

Mitigation Plan

Upon completing the risk analysis matrix, the mitigation plan is developed to address the three essential components: goals, actions, and action plan. Mitigation goals are generally long-term outcomes achievable with minimized or avoided risks. One example would be to remain employed in the project practice setting throughout the project's life. Quality time management entailed obtaining metric permission, internal review board (IRB) approval, and getting the sample population involved and tested. Finally, mitigation goal setting aimed to reduce or avoid losses to identified risks.

Mitigation actions are specific activities aimed directly at a known threat. For example, obtaining permission for all three metrics utilized to measure the effect of medication non-adherence required permission and, in one case, included a fee to use it. Addressing this problem required the assistance of an academic professional to reach the owner at a higher level of communication. Mitigation also included acceptance of risk, such as not obtaining permission for one of the metrics to include either using an alternative metric or narrowing the focus of the testing to eliminate its loss. Therefore, action plans can partially be anticipated and enacted should the need arise.

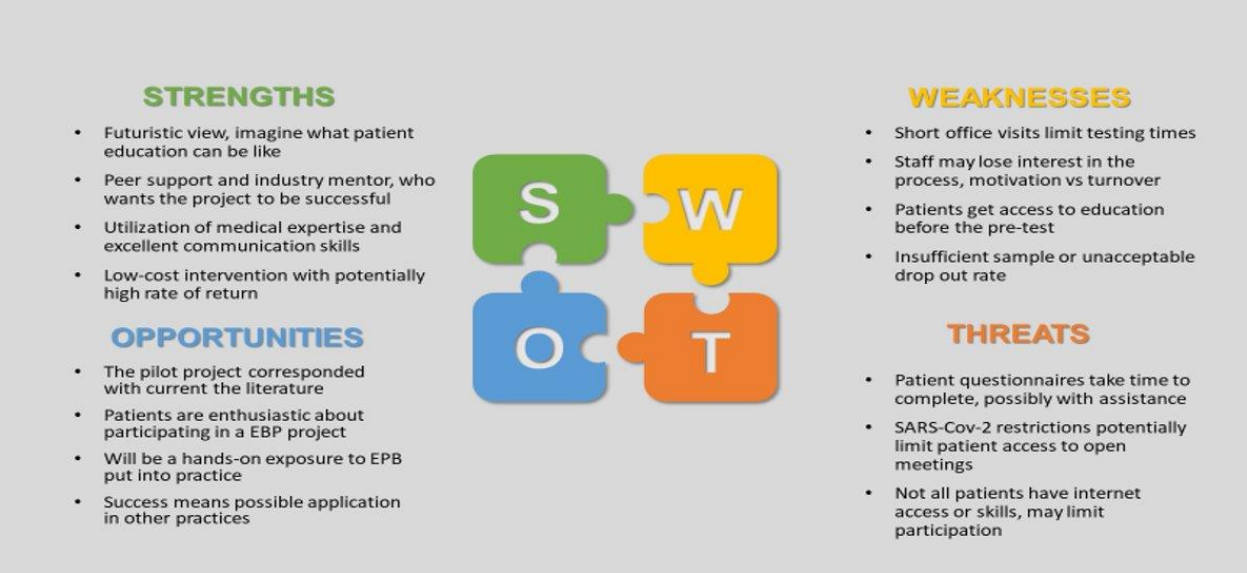
The mitigation action plan describes risk priority and implementation of critical action. For example, the availability and permission to use the metrics have equally high priority as the sample population's volume and the support of the office nursing staff. Though there are very different types of risk, they are critical to the project's success. Additionally, time management is precious to the project and the stakeholders; risks that require planning and punctuality are precarious and have a high impact.

The SWOT Analysis

The SWOT Analysis plan is a tool used to provide an overview of risks and actions. The acronym SWOT is a visual form to describe Strengths, Weaknesses, Opportunities, and Threats as a listing tool to address risk response internally and externally. The strengths identified the positive energy of the practice setting and the economic nature of the project. Weaknesses considered included barriers like visit time, staff turnover, or low sample volume. Opportunities include two significant organizational benefits: 1) public exposure to the value of evidence-based practice and 2) the potential to expand successful practices into other healthcare specialties. Finally, Threats focused on potentially limiting patient access to the project due to infection control provisions and population limitations for ease of use of technology. Therefore, the SWOT grid assists in the conception of the mitigation process.

Figure 10

The SWOT Grid



Communication Plan

Communication will begin with portraying routine office practice habits of the future and careful attention to the benefits expected for the direct care staff and the patients who improve medication adherence. Staff personality traits will assist in working with their strengths and within their level of comfort in assigning tasks. For example, the driver personality is suited to offer participant inclusion with patients frequently calling with problems taking or adjusting to their medications. Another example would be to assign a supportive or steady personality by dispensing self-questionnaires. Communication planning will include what and when the direct care staff must know at an orientation luncheon.

The advanced practice nurses will meet twice a week minimally regarding patient testing updates or questions. In addition, the direct care staff will be encouraged daily to identify potential patients who are willing to hear about the current evidence on medication adherence and can complete testing or have a support person available to assist them. The medical director will be updated weekly with the project's progress and consulted on sample population

volume as needed. Additionally, the organization's Chief Executive Officer (CEO) was briefed in writing about the quality and quantity of staff participation and patient participation. Finally, after completing the project, the patients and caregivers attended one or more presentations on medication adherence therapy and results meetings. Interprofessional team communication is valuable for creative thinking and objective observations and demonstrates a plan for higher patient care.

Implementation Plan

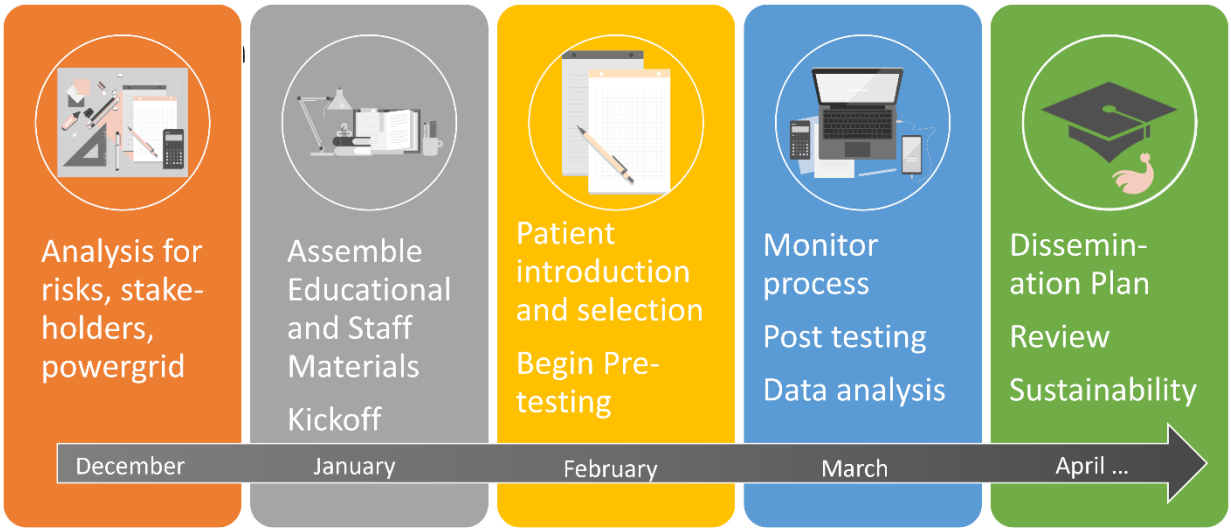
Upon approval from the project committee, this scholarly project began by preparing the educational experience for PD patients to learn medication adherence skills. First, a PowerPoint presentation that included medication adherence interventions utilizing visual aids, physical examples, and written information in the form of printed handouts were developed for the subjects. An educational video was also considered, accessible after completion of pre-testing, to be accessed online if infection control limitations restricted in-person interactions.

Concurrently, staff instructions were produced and organized into notebooks, including the project plan and timeline, examples of the testing materials, and a clinical needs description of potential project participants. Complete resource packets, including instructions, were given to all staff members. In addition, a central location was designated in the clinic for staff access to replenish their supplies of testing materials and project information.

Implementation of the project was introduced to the office staff approximately two weeks before the project started. A kick-off luncheon introduced the staff to the teaching materials, the opportunity to view the training video, and a discussion of their roles in engaging them in the planning as frontline leaders. The following figure timeline delineates the change process.

Figure 11

Implementation Timeline



The Gantt Chart

The Gantt chart planned the length of the project in fine detail. Further, it linked necessary predecessors to designate required action or steps before the following task can be accessed or completed. The extended Gantt chart is available in Appendix A, table 4.

Data Collection Plan

The physical and cognitive effects of non-adherence include physical discomfort, uncontrolled movements, and in some, a decline in thought processing. The planned metrics will measure their level of function physically, cognitively, and quality-of-life issues regarding the ability to carry out activities of daily living successfully. The metrics used included two scales collecting ordinal data by paper testing. The pre-test was administered by an Advanced Practice Registered Nurse (APRN), and the patient or caregiver completed the post-test at a later date. The third was a four-question, yes or no choice nominal data questionnaire that scored numerically. The data was calculated in a before and after format for comparison that seeks measurable improvement after receiving medication adherence therapy.

Open enrollment allowed current PD patients to join by asking or accepting our offer. Pre-testing was provided at that time or as scheduled. After the participant viewed or attended an educational program individually or in a group setting and had time to utilize the adherence therapy information and interventions, a post-test of the same metrics was completed at home and returned to the center by mail. However, some patients completed post-testing via video calls per their request approximately one month later.

The data was de-identified using a random number generator application. Furthermore, pre-tests will be filed in a lockbox numerically. The patients retained that random number, and the post-testing packet and a return envelope with the same number. Tabulation of the test results was completed for comparison. Once the data reported numeric values, the test forms were destroyed as directed by the organization's policy. Data collection was backed up by entering it into a spreadsheet and updated weekly. This electronic document was stored on a worksite computer hard drive and e-mailed to a secured cloud storage file with each update.

The standardized scales to measure medication adherence include the PDQ-39, the MDS-UPDRS, and the MGLS. The Parkinson's Disease Questionnaire – 39 (PDQ-39) used worldwide measures eight quality of life dimensions within 39 questions (Shirley Ryan Ability Lab, 2017). The International Parkinson's and Movement Disorder Society (n.d.) maintains the rights to the Unified Parkinson's Disease Rating Scale (MDS-UPDRS). Only sections Part 1: Non-Motor Aspects of Experiences of Daily Living (nM-EDL) and Part 2: Motor Aspects of Experiences of Daily Living (M-EDL), 26 questions were used with permission. The MDS-UPDRS and the PDQ-39 are ordinal tests; improvement occurs with a decline in numeric value. The Morisky, Green, Lavine Scale (MGLS) measures self-reported medication-taking behavior. The MGLS indicates stronger adherence tendencies with an increased numerical value (Morisky Medication Research, 1986). These metrics are industry standards for measuring the consequences of medication non-adherence found throughout the retained literature.

Data Analysis Plan

The pre-test and post-test analysis is a paired hypothesis testing format known as matched samples or repeated measures. Two measurements for each element are taken and matched or repeated. As anticipated, the project population sample size for a specialty medical practice was small. The project sample population included 37 participants who completed the entire educational and testing plan. The sample population is typically greater than 60 years, and comorbidities that may affect their outcome measures will not be considered part of their generalized outcome. Additionally, because symptoms are unique to most PD patients, the standardized scales allowed greater control for confounding variables. Patients with significant health status changes or requested withdrawal were removed from the project, and their data was eliminated.

There were no other external databases utilized for use in this project. Therefore, there are no ownership or permission requests completed. Additionally, the paper forms utilized are not part of the electronic medical health record and will not be scanned into that record.

Dissemination Plan

The dissemination plan for this project includes taking the applied evidence outcomes to real-world end-users by tapping into the existing networks of healthcare practice sites and reaching the population of Parkinson's disease patients (AHRQ, 2005). Components of the dissemination plan include six major elements: 1) specifically what will be disseminated, 2) who will apply it into practice, 3) what organizations or networks will partner to reach the end-users, 4) what type of communication will convey the outcomes, 5) how will evaluation depict what worked, 6) develop a dissemination work plan (AHRQ, 2005).

In the first element, what will be disseminated is the outcome findings of medication adherence therapy with interventions to improve physical symptoms and, therefore, patients' quality of life. The rationale for putting this evidence into practice is that this clinical problem has been described extensively throughout the literature but has made no statistical improvement

for almost fifty years. Further, the disease population rate is multiplying faster than medical economics can absorb. Finally, dissemination will clarify whether introducing medication adherence into broad-spectrum practice can be accomplished or if it branches into another arm of clinical focus independently.

The identification of end-users at this point is the prescribing medication provider. In current practice, providers incorrectly assume that patients get adequate guidance regarding medication adherence from the printed material on the prescription packaging. Some organizations allow non-licensed clinical staff to explain medication strategies during the visit discharge instructions. Nevertheless, medical economics limits most practices to use non-licensed support staff to provide basic information without handling patient questions. Therefore, tools must be in place to provide consistent and appropriate medication adherence information as a standard of care.

The electronic medical record (EMR) becomes the network platform to disseminate patient directives that can be individualized and manually accessed; this is the current practice routine. When individual care directives are partnered with patient education software ancillary within these modern EMR programs, medical staff have double the information to extend to the patients. The difference between giving more printed information and improving patient outcomes is the partnership of willing providers to improve patient outcomes and their influence on the direct care staff.

The dissemination of the value and efficacy of medication adherence therapy for a larger audience requires communication on a much more diverse scale. Audience targets include speaking locally and statewide. The local venue, the Ronald J. Donaldson Neuroscience Symposium, a presentation of this project was accomplished at the spring 2022 event. Additionally, the Texas Nurse Practitioners Association calls for abstracts on current topics with considerable patient impact potential; medication adherence therapy is a worthy topic. Finally, the practice outcomes will be presented to significant healthcare insurers such as Blue Cross &

Blue Shield, United Health care, and Humana. The financially negative impact of medication non-adherence is well known to them; leveraging their backing would potentially maximize exposure to this cause.

Evaluation of dissemination will come in stages, beginning with the responses received from the neuro symposium comments and questions. The health insurer as a partner is an untapped resource; they already recognize financial risks and have implemented many programs to reduce costs using a large workforce of nurses for more home visits and patient education. Additionally, these insurers have made getting medications and diagnostic approvals difficult and time-consuming for providers. Medication failure and changes in therapy could be averted if medication adherence therapy improved the response the first time. Finally, there is possibly a connection similar to past pay for performance incentives and energizing the insured population to demand more remarkable results. Local evaluation of the benefits and efficacy of consistent medication adherence therapy will begin with a patient support group meeting with the results presented and explained as discussed in the sustainability plan.

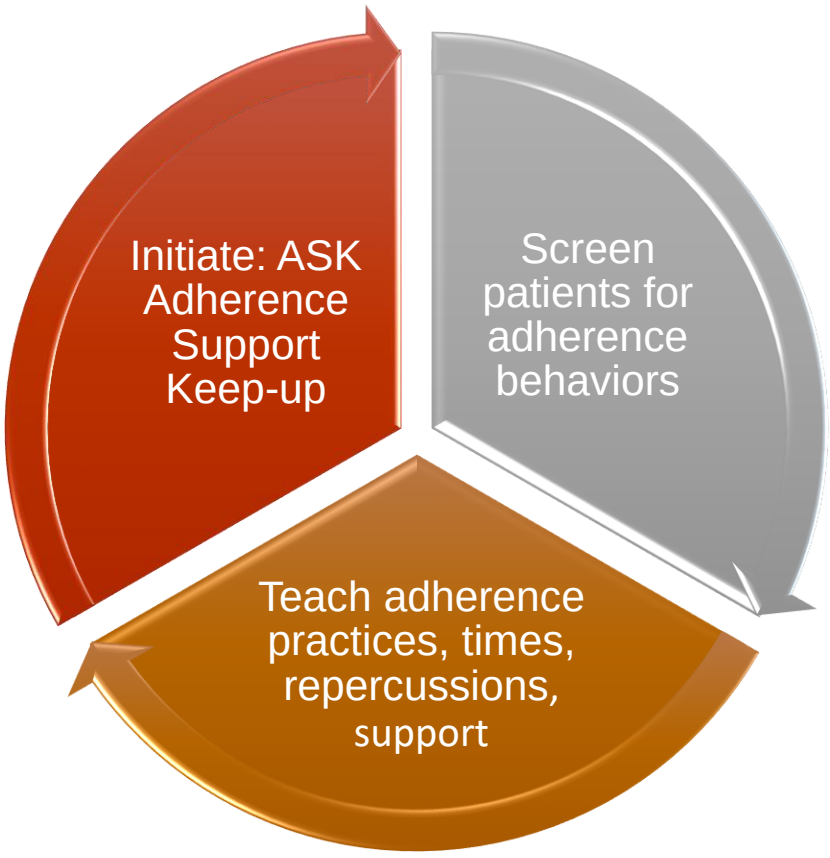
Sustainability Plan

This plan aimed to describe how to continue using the interventions on a long-term scale with reproducible outcomes. New patient consults are scheduled daily in the clinical setting and often include a new or affirmed diagnosis of Parkinson's disease. Currently, the first visit ends with non-licensed staff explaining medication management. The patient returns to see an APRN for "risk assessment" and adherence therapy in about a month. Implementation of the risk assessment comes directly from the scholarly project. Plans include moving the neuropsychological test completed by an APRN during the introductory process of medication adherence therapy. This visit will occur on the same day as the new patient consult visit, billed under a different code. Maintenance of medication adherence therapy will focus on the long-term adoption of standardized self-management training.

Measurement of sustainability will require monitoring of the clinic practice population regularly. For each patient visit, the clinic staff will assess ongoing patients' medication adherence readiness with the acronym A.S.K. This acronym means to Ask how they are doing with taking their medications, identify what support they need and assist them, and encourage them to keep up the good work.

Figure 12

Sustainability Plan



Proposed Budget

The proposed budget included materials and labor, staff orientation and training materials, presentation location or video platform, and the people required to carry out these processes. This project took place in the daily practice of an outpatient medical office and clinic support group meetings. Therefore, there were no anticipated expenses related to office space, utilities, data entry time, or professional services clinically necessary to conduct face-to-face patient assistance with questionnaires that the doctoral student conducted.

When compared, the proposed and actual budgets had minimal differences in actual expenses. However, the actual expenses totaled $5.17 less than anticipated. The estimate for "In-Kind" donations of $583.40 was more significant than planned. The estimates of time to collect the data and tabulate the results were reasonable. Finally, the organization graciously provided the meeting rooms and video technology to make this project possible. See Appendix A for the itemized budgets.

Conclusion

In this section, the synthesized evidence was planned for translation into practice. First, the change models were chosen, including the Stetler model to guide the scholarly project, PDSA to implement the evidence, and the Common Sense Model to guide patient interaction during their changes were supportive and personalized to meet the needs of the project population and goals. Next, the stakeholders were mobilized, and the risks were identified with a prepared mitigation strategy. Next, the testing process was formulated, data stewardship was agreed upon, and a preliminary budget was projected. A timeline and Gantt chart were also organized to plan and monitor the project's progress. Finally, plans for results analysis, dissemination of the evidence, and sustainability were planned.

Chapter 4

Project Results

This chapter discusses the results of the Medication Adherence Therapy (MAT) project over three months in early 2022. Located in Northeast Texas, a set of health risk assessments were administered in groups and individually to patients with Parkinson's disease and their caregivers. Additionally, these people received specialized education on the most beneficial ways to manage their neurological medications. Finally, the readministered health risk assessments and the calculated numerical values demonstrated the positive effect of MAT on medication adherence.

Results

Demographics

The initial sample of 46 decreased to 37 participants who completed each element of the project (~80%); the final sample included 25 males and 12 females. The age distribution included: under 65 years = 9, age 66 to 80 years = 15, age 81 to 90 years = 5, and no age disclosed = 8. The pre-test and MAT were provided individually for 22 participants and through the support group setting for 15 participants. Females were underrepresented in the office setting, comprising only 27% of the sample; females represented two-thirds of the support group sample.

Table 6

Population and Demographic Table

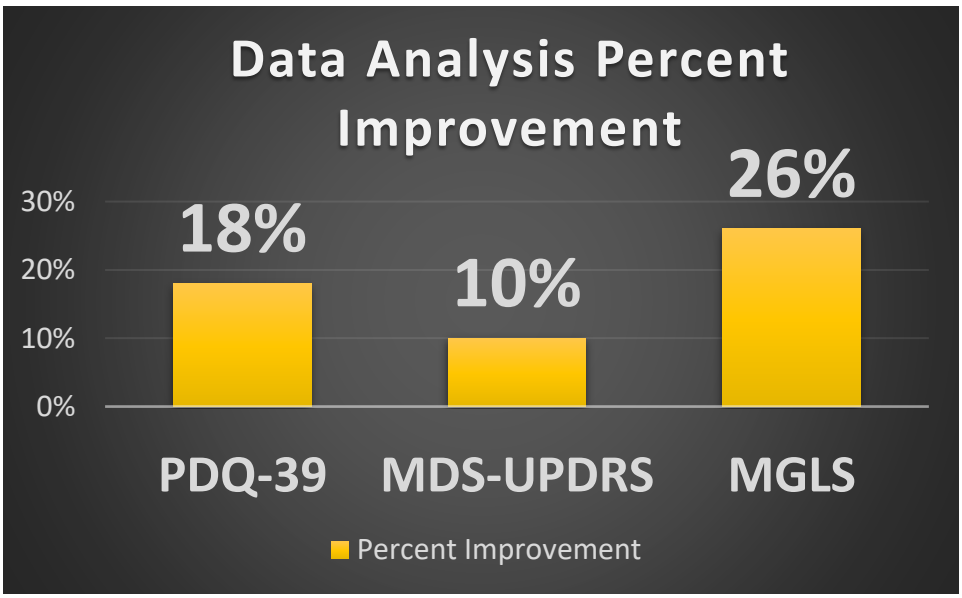
Encounter Type	Sample						
	Total	Male	Female	>50 yrs.	>65 yrs.	>80 yrs.	No Age
Office Visit	22	16	6	8	11	3	0
Support Group Meeting	15	9	6	1	4	2	8
Column Total	37	25	12	9	15	5	8

Data Analysis Results

Results demonstrated after one session of MAT were encouraging. Medication adherence behavior, physical mobility, and quality of life improved. The percentage improvement for each instrument was as follows: PDQ-39 = 18%, MDS-UPDRS = 10%, and the MGLS = 26%.

Figure 13

Data Analysis Percent Improvement



PDQ-39

The PDQ-39 scoring pattern reflected improvement with a decrease in the numerical result. The overall improvement with the PDQ-39 metric was 18%. Males began with an average score of 53.52 and improved to 43.40; this score translates to an 18.90% improvement. Females began with an average score of 61.25 and improved to 50.66; this score translates to a slightly smaller improvement of 17.28%. PD patients under 70 years improved by 20%; similarly, those over 71 years improved by 19% in medication-taking behaviors.

MDS-UPDRS

The MDS-UPDRS scoring pattern also reflects improvement with a decreased numerical result. The overall improvement with the MDS-UPDRS metric was 10%. However, there was a marked disparity between the scores of the male and female participant cohorts. Males began with an average score of 34.16 and improved to 32.20, reflecting a low 5.73% improvement. Females began with an average score of 35.50 and improved to 29.25, demonstrating a significant improvement of 17.60%. The scores for participants under 70 years improved by 6.5%; however, those over 71 years improved by 11.4% in medication-taking behaviors.

MGLS

The MGLS scoring pattern demonstrates improvement with an increased numerical score. The mean MGLS pre-test was 2.59, and the mean post-test of 3.270, rendering a 26% overall improvement. Male participants had a mean pre-test score of 2.60 and a mean post-test of 3.28, translating to a 30% improvement. Females began with a mean score of 2.58 compared to their mean post-test score of 3.25, indicating a 25.97% increase. The MGLS post-test scores improved for 75% of the participants younger than 70 years of age. PD patients under 70 years improved by 39%; however, those over 71 years only improved by 13% in medication-taking behaviors.

Outcomes Analysis

There were gender similarities between the literature and this project. The most prominent is the ratio of males to females; male participation generally dominates the sample populations nearly twice as often as females (Cilia et al., 2014; Daley et al., 2014; Feldmann et al., 2020; Fernandez-Lazaro et al., 2019; Grosset & Grosset, 2007; Hannink et al., 2019; & Lakshminarayana et al., 2017). However, the literature does not explain this phenomenon; according to Marris et al. (2018) report, the prevalence of PD occurs nearly even between the genders. Further, none of the retained studies defined gender differences or improvement ratios. Though the three scales used in this study showed comparable results in two metrics,

females reported 18% compared to the males' 6% improvement in sections 1 and 2 of the MDS-UPDRS.

Table 7

Outcomes Analysis Table

Gender		Pre-test	Post-test	Percent Imp.
Male				
	PDQ-39	53.52	43.0	19.65
	MDS-UPDRS	34.16	32.2	5.73
	MGLS	2.60	3.28	26.15
Females				
	PDQ-39	61.25	50.66	17.28
	MDS-UPDRS	35.5	29.25	17.60
	MGLS	2.58	3.25	25.96
Total				
	PDQ-39	56.03	45.76	18.33
	MDS-UPDRS	34.59	31.24	9.69
	MGLS	2.59	3.27	26.01

Key: Imp.- Improvement; MDS-UPDRS – Movement Disorder Society-Unified Parkinson's Disease Rating Scale; MGLS – Morisky, Green, Lavine Scale, PDQ-39 – Parkinson's Disease Questionnaire 39.

Limitations

The intention of a composite of health risk assessment tools was to capture the subjects' current state of medication adherence and spark interest in self-measurement. The first metric, PDQ-39, was the least threatening in all cases because it used everyday language and short questions. Further, self-reporting physical and emotional fears opened genuine communication, enhancing the patient-provider relationship. Parts 1 and 2 of the most current versions of the MDS-UPDRS provided the second metric. This instrument, intended for use by a certified rater, remains problematic for patients due to the complex questions and defined time frames. Therefore, items were read aloud and discussed until the subject and caregivers felt the patient chose the most realistic answer; it appeared to be the most challenging instrument for the project. Finally, the MGLS questions inquire without assumption or intention to lead response; caregivers affirmed that patients' immediate reactions were accurate. The tools utilized in this project are available for implementation into any medical office's routine practice.

Additionally, the EBP project created interest in our health system's coding and reimbursement departments because patient education meets the newest CMS request to improve the social and economic burden of medication non-adherence. Properly coding medication non-adherence using the ICD10 code Z91.1_, with extensions including intentional and unintentional, age-rated, or financial hardship, generates necessary data to target improvement areas. To justify the time spent doing this valuable work, including interpretation of a standardized health risk assessment tool, clinical decision-making, and treatment planning with interactive patient feedback, is billable separate from the typical office visit, coded as 96161. If the office visit is scheduled for completing a risk assessment and MAT, utilize the specialized office visit code 96132. Adequate provider reimbursement is a necessary component to drive provider buy-in to improve the quality of patient care.

Conclusion

In 2003 the World Health Organization declared medication non-adherence a crisis (World Health Organization, 2003); nearly 20 years later, no significant improvement has evolved. The escalation in the number of PD patients and the estimated financial burden follows second to unadjusted cost data related to cancer (Cutler et al., 2018). These expenses are difficult to quantify due to varying disease states within categories. However, they represent significant financial consequences (Cutler et al., 2018), including care in-patient, outpatient, and pharmaceuticals that cannot be sustained economically. The use of MAT applies to all areas of healthcare and is reimbursable for the time invested. Medication non-adherence requires vigilant measurement and integrated treatment planning. Nurses can expertly convey meaningful information that acknowledges patient preferences through a trustworthy interactive partnership. The APRN is well suited to assume leadership in improving medication adherence, a worldwide healthcare deficiency.

Chapter 5

Project Sustainability, Conclusions, and Recommendations

Medication adherence must be improved if we continue enjoying the medical system we currently depend upon. The sheer cost of medications in 2019 was $370 billion, of which Medicaid and Medicare Part D programs account for 41% (U.S. Department of Health and Human Services: Office of Inspector General (2023). These programs have tried to reduce costs through the pressured use of generic medications but have not addressed the financial waste of treatment failure. Further, using substitute medications without the patient understanding the effects and benefits leads to the cessation and potentially short-term acute care and long-term end-organ damage that was preventable.

Internal Implications

Upon approval from the project committee, this scholarly project began by preparing the educational experience for PD patients to learn medication adherence skills. Testing their actual perception of self-care was well-received and enlightening for them. Using standardized tests is an acceptable format for financial reimbursement and provides a basis for the educational content. In addition, video-recorded learning provided during the office visit, followed by printed information, will build the patients' knowledge in self-management. Therefore, a knowledgeable nurse educator will provide expert information at the onset of care. Providing a video format is not intended to replace personal counseling but to accelerate medication adherence and prepare the patients' healthcare literacy.

External Implications

At a national level, healthcare providers struggle with ever-increasing amounts of "paperwork" that takes them farther away from actual patient care. The required documentation to support the visit reimbursement already takes up more than half of the allotted visit time; asking them to educate patients more thoroughly will meet rejection.

The need for improved medication adherence is critical in managing many chronic diseases, such as diabetes found that one-on-one counseling effectively used facilitators, including nurses (Williams et al., 2014). Likewise, management of hypertension described the most effective patient education points included individualized, repeated, and with changes in medication or dosage (Choudhry et al., 2022). Further, community pharmacists have also been identified in the literature as patient educators for new prescription medication adherence counseling but have minimal exchanges after that.

In counseling provided outside the provider's office, only the pharmacist and the diabetes medical nutrition therapist (MNT) practice independently. The CPT codes exist for MNT; however, health and wellness coaching remains a Category III code with possible insurance company exclusions. Therefore, the most significant external influence would be through The Centers for Medicare and Medicaid for the recognition and need to develop a new billable patient service for Medication Adherence Therapy.

Dissemination Methods

Dissemination occurs in regional or national conference presentations; routine office visit encounters require consistent candid information. Likewise, Journal articles aimed at the general practitioner need to make the terminology around medication adherence easy to apprehend and supported with the tools for individualized interventions and to document the effort of patient teaching. Many studies list similar interventions for specific chronic illnesses with similar findings; however, this compartmentalization detracts from a more comprehensive solution.

Addressing the problem of non-adherence needs to be more broad-based. First, we must address a change in the language used in the research literature, representing the evolution from paternalistic to today's level of autonomous care. Consistent provider behavior and wording about adherence instead of compliance is the first step in building patient empowerment through joint participation. Second, we must update the plethora of printed

instructions and patient education materials. For example, a medical clinic dispensed printed patient adherence education about continuous positive airway pressure (CPAP) and their "CPAP compliance Report"; this sends a mixed message. Communication sent to the developers of our current EMR will ensure the printed patient education and the ICD-10 codes reflect contemporary medical language. Finally, nursing leaders as mentors require reframing antiquated ideas as they arise in everyday interactions. After all, just like the evolution from paternalism to autonomy, compliance will evolve into adherence when enough voices are heard.

Conclusion

Utilizing the most trusted healthcare team member, nurses have the most significant potential to make a paradigm change in the well-documented patient care crisis more than 50 years in the making, medication non-adherence. Unfortunately, busy provider clinics do not have the time or resources to provide one-on-one medication adherence counseling as part of routine medical visits. There are reimbursable billing codes to do the task, but the descriptive language makes them sound exclusive to neurology; they are not. For example, "neuro-psychological testing" means measuring patients' medication-taking behaviors, understanding, and direct actions in any clinical practice. The provider then utilizes this information to educate the patient and the rationale for medication adherence. In addition, these same codes are successively billed to meet the needs of medication or dose changes and the repetitive information established to gain and maintain changed behavioral responses.

This writer plans to integrate medication adherence questioning and annual testing while simultaneously documenting a diagnostic ICD-10 code of "Non-Adherence to Medications" and query these results in the future to confirm this measurable change. Additionally, share this information with other advanced practice providers and assist in identifying comparable tools, practice processes, and appropriate reimbursement coding through collective system-level collaboration. The long-term benefit of patient care excellence and protecting our nation's

healthcare economics depends on nurse leaders to forge and sustain evidence-based practice initiatives to improve medication adherence.

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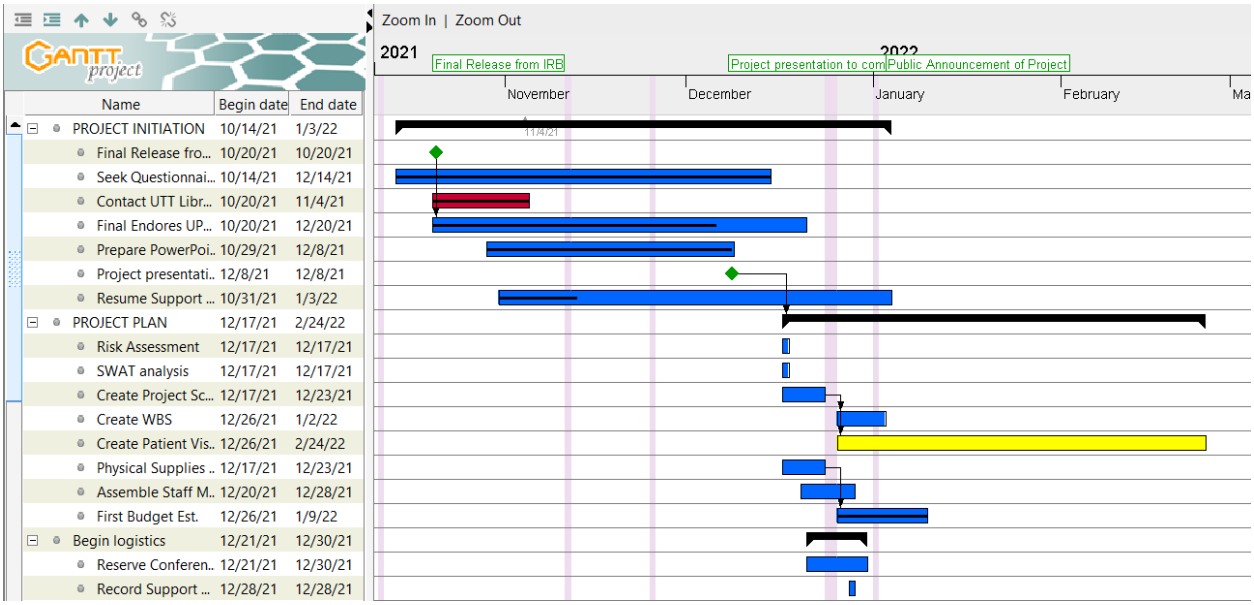
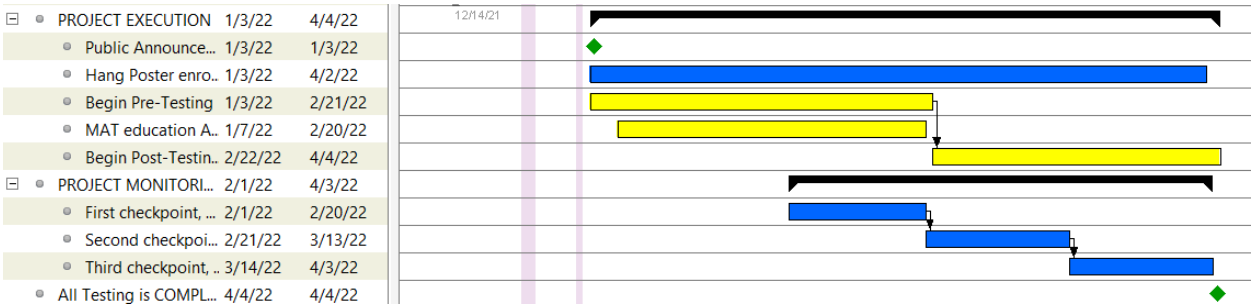
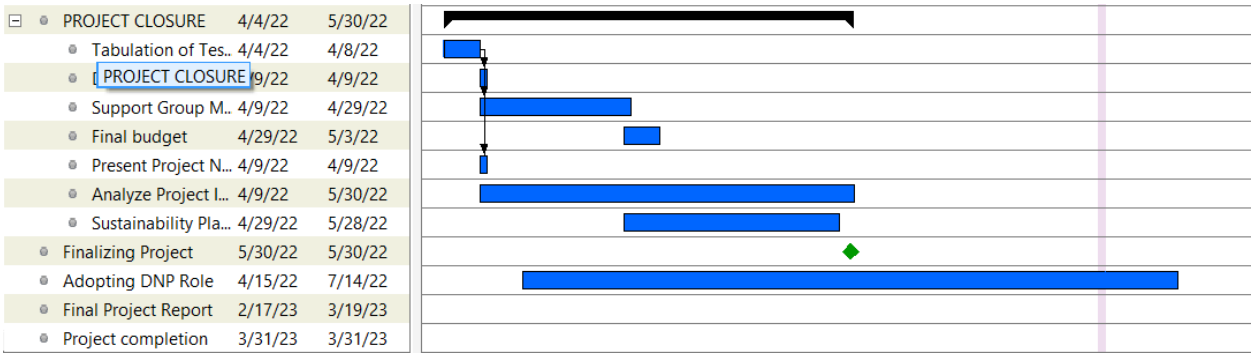
Appendix A

Full Gantt Chart







Appendix B

Budgets: Proposed and Actual

Figure B1

Proposed Budget

DNP Medication Adherence Interventions for Parkinson's Disease

Proposed Project Budget — updated 6/5/2022

Project Lead:	Amanda Mullins
Start Date:	12/17/2021

Tasks	Description	Hrs/Units	Rate/Cost	Subtotal	In-Kind Donation	Budget	Comments
Initiation					$1,767.32	$2,172.96	
1.0 Questionnaire	Morisky, Green, Lavine Scale	1.00	$100.00	$100.00	$0.00	$100.00	Difficult / delayed communications
1.0 Training Materials	Paper and Printing	2.00	$25.00	$50.00	$50.00	$0.00	Estimated cost, given unlimited free access
1.0 Training Materials	Binders and paper	9.00	$3.00	$27.00	$0.00	$27.00	
1.0 Document Security	File Lock Box & Files	1.00	$60.64	$60.64	$0.00	$60.64	A one time purchase
1.0 Meeting Lunch	Steak Kabobs	13.00	$10.00	$130.00	$0.00	$130.00	Presented at monthly "Team Meeting"
Planning							
2.0 Reserve Conference Room	Reservation Applied For	0.00	$0.00	$0.00	$0.00	$0.00	
2.0 Videographer	Medication Adherence Video	1.00	$0.00	$0.00	$0.00	$0.00	The back-up plan if live meetings not allowed
2.0 Video Presentation Created	Myself	3.00	$57.69	$173.07	$173.07	$0.00	
2.0 Video Posting / Patient Access	Marketing Coordinating	1.00	$0.00	$0.00	$0.00	$0.00	Unknown Estimate
2.0 Educational Materials	Preparation of Packets / # hrs	4.00	$13.00	$52.00	$52.00	$0.00	My preporation time
Execution							
3.0 Staff Education	Orientation to Materials / # hrs	1.00	$57.69	$57.69	$57.69	$0.00	
3.0 Live Presntations	Myself per hour	3.00	$57.69	$173.07	$173.07	$0.00	2 Support Group Meetings & Neurosymposium
3.0 Individual Appointments	Myself per hour	20.00	$57.69	$1,153.80	$1,153.80	$0.00	No cost to employer is anticipated
3.0 Neuro-Coordinator	Attends all meetings	3.00	$0.00	$0.00	$0.00	$0.00	Unknown Value
Monitoring & Controlling							
4.0 Weekly Report of Sample	Tabulation of Scores # hrs	14.00	$57.69	$807.66	$0.00	$807.66	Scored three separate questionnaires by hand
4.0 Excel Report	Developed Results Table & Loaded Scores / # hrs	8.00	$57.69	$461.52	$0.00	$461.52	Data manipulation
Closing							
5.0 Presentation Development	PowerPoint / Results / # hrs	6.00	$57.69	$346.14	$0.00	$346.14	
5.0 Neuro-Symposium	Presentation of Project & Results	1.00	$57.69	$57.69	$57.69	$0.00	Was included as a guest speaker
5.0 Support Group Mtg for Results	Two FNP presentors / # of mtgs	2.00	$120.00	$240.00	$0.00	$240.00	Dates to be determined
5.0 Snacks for Support Groups	Facility Supplies	1.00	$50.00	$50.00	$50.00	$0.00	Cookies, coffee and iced tea
5.0 Destruction of Paper Documents	HIPAA Compliance	1.00	$0.00	$0.00	$0.00	$0.00	No charge

Figure B2

Actual Budget

DNP Medication Adherence Interventions for Parkinson's Disease

Actual Project Expenses updated 1/2/2023

Project Lead:	Amanda Mullins - George
Start Date:	12/17/2021

Tasks	Description	Hrs/Units	Rate/Cost	SubTotal	In-Kind Donation	Actual	Comments
Initiation					$2,350.72	$2,167.79	
1.0 Questionnaire	Morisky, Green, Lavine Scale	1.00	$100.00	$100.00	$0.00	$100.00	Difficult / delayed communications
1.0 Training Materials	Paper and Printing	2.00	$25.00	$50.00	$50.00	$0.00	Estimated cost, given unlimited free access
1.0 Training Materials	Binders and paper	9.00	$3.75	$33.75	$0.00	$33.75	Plan to recycle into publicly placed patient information
1.0 Document Security	File Lock Box & Files	1.00	$60.64	$60.64	$0.00	$60.64	A one time purchase
1.0 Meeting Lunch	Mexican Food Spread	1.00	$75.00	$75.00	$0.00	$75.00	Presented at monthly "Team Meeting"
Planning							
2.0 Employee Breakroom	In Office Space, no appt needed	0.00	$0.00	$0.00	$0.00	$0.00	The conference room was not available
2.0 Videographer	Future Plan April 2023	1.00	$200.00	$200.00	$200.00	$0.00	Plan: Online patient accessible video during national Parkinson's disease awareness month
2.0 Educational Materials	Preparation of Packets / # hrs	4.00	$13.00	$52.00	$52.00	$0.00	A medical assistant volunteered, mngr allowed
Execution							
3.0 Staff Education	Orientation to Materials / # hrs	1.00	$63.28	$63.28	$63.28	$0.00	Completed during lunch breaks
3.0 Live Presntations	Two FNP presentors / # of mtgs	2.00	$120.00	$240.00	$240.00	$0.00	Both the FNP's volunteered time after work hours
3.0 Individual Appointments	Incorporated into the office visits	22.00	$63.28	$1,392.16	$1,392.16	$0.00	No cost to employer, patients volunteered during a routine office visit
Monitoring & Controlling							
4.0 Weekly Report of Sample	Tabulation of Scores	14.00	$63.28	$885.92	$0.00	$885.92	Scored three separate questionnaires by hand
4.0 Excel Report	Developed Results Table & Loaded Scores / # hrs	10.00	$63.28	$632.80	$0.00	$632.80	Data manipulation
Closing							
5.0 Presentation Development	PowerPoint Created From Results / # hrs	6.00	$63.28	$379.68	$0.00	$379.68	Completed after hours
5.0 Neuro-Symposium	Presentation of Project & Results	1.00	$63.28	$63.28	$63.28	$0.00	An annual event by guest speakers
5.0 Support Group Mtg for Results	Two FNP presentors / # of mtgs	2.00	$120.00	$240.00	$240.00	$0.00	Both the FNP's volunteered time after work hours
5.0 Snacks for Support Groups	Facility Supplies	1.00	$50.00	$50.00	$50.00	$0.00	Cookies, coffee and iced tea
5.0 Destruction of Paper Documents	HIPAA Compliance	1.00	$0.00	$0.00	$0.00	$0.00	No charge

Appendix C

Permission to use MDS-UPRDS

Advance.
Improve.
Educate.
Collaborate.

www.movementdisorders.org

International Parkinson and Movement Disorder Society

September 23, 2021

Amanda Mullins
UT Health East Texas
700 Olympic Plaza #904
Tyler, TX 75701
T: 903-535-6092
E: aemullins@uthet.com

Re: Authorization to Use Materials Owned by the International Parkinson and Movement Disorder Society (MDS)

Dear Ms. Mullins,

Thank you for your interest in the MDS Unified Parkinson's Disease Rating Scale ("MDS-UPDRS"). MDS grants permission for use of the MDS-UPDRS in English within the project titled, "Medication Adherence Interventions for Parkinson's Disease," developed by you, Amanda Mullins, and carried out under the academic supervision of Cheryl Parker, PhD. This approval is contingent upon submission of a study specific identifier once available. As this project is being done toward the completion of Doctorate of Nursing Practice degree at The University of Texas at Tyler, there is no associated fee for this use.

By submitting your request to MDS, you agreed to the following:

I understand that the MDS-UPDRS may only be used in paper format for the purposes described above. I also understand that reproduction, distribution, translation, or sale of any portion of the MDS-UPDRS is strictly prohibited. Changes, modifications, adaptations, and derivative works of the MDS-UPDRS are not permitted without the permission of MDS. Furthermore, the MDS-UPDRS may not be incorporated into clinical trials, training materials, certification programs, software programs, electronic platforms or otherwise except through express authorization of MDS and payment of any applicable fees. Further, MDS shall have no liability related to use of the MDS-UPDRS or any other MDS owned rating scale, and I hereby release, hold harmless, and indemnify MDS, its officers, directors, employees, volunteers, and agents, from any loss, damage, or claim based on such use.

Please do not hesitate to contact me with any questions or concerns.

Sincerely,

Shazia Ali
Director of Scientific Programs
International Parkinson and Movement Disorder Society
ratingscales@movementdisorders.org

Appendix D

Permission to use the Morisky, Green, Lavine Scale

DM

Donald Morisky <donald.morisky@moriskyscale.com>

To: Amanda Mullins

Cc: Barbara McAlister <bmcalister@uttyler.edu> **+1 other**

Sun 6/5/2022 8:50 PM

Dear Ms. Mullins,
Thank you for your follow up note regarding another paper you wish to publish.

Yes, you are allowed to use the MGL data that you have collected in your study and publish as many manuscripts as possible. Congratulations in advance for all your hard work in your scholarly research and your desire to do the ethical thing when it comes to publishing.

The NIH.gov article on 'Ethical considerations in scientific writing' by Carver et al discusses in detail the issues of plagiarism and authorship that could become problematic for researchers/publishers who fail to cite or reference other people's work. This is especially true when other people's Intellectual Property is involved. Here is the NIH.gov link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3195176/.

When you publish your findings in journals, others may start referencing your work and you would naturally want them to acknowledge you in their reference or citation section.

Let me know if you have further questions.

Professor Donald Morisky, ScD, ScM, MSPH
Research Professor Emeritus and Former Chair

Lifetime Career Award, American Public Health Association
Department of Community Health Sciences
UCLA Fielding School of Public Health