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Improving Screening for Sleep Disturbance in Patients with Parkinson's Disease

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DNP Project Final Report: Improving Sleep Screening in Patients with Parkinson's Disease

Abstract

Background: Sleep disturbance (SD) is one of the most common and debilitating non-motor manifestations of Parkinson's disease (PD). SD intensifies the disease-related disabilities of motor and non-motor symptoms. In spite of this, it is often under-recognized and under-addressed by healthcare professionals. The Movement Disorder Society recommends the Parkinson's disease Sleep Scale (PDSS – 2) be used to screen and measure severity of overall sleep problems in this patient population.

Objectives: The purpose of this quality improvement (QI) project is to increase the utilization of the PDSS-2, a standardized approach to assessment of sleep difficulties. This can facilitate identification of individual SD to target treatment appropriately. There are two aims: 1) to improve the screening rate of SD in patients with PD to 80%, and 2), to assess for association between the screening and treatment planning.

Methods: Using the PDCA study design, the PDSS -2 sleep screening questionnaire were distributed to every returning patient over three cycles.

Results: We recruited 41 patients. The screening rate improved from 51.2% at the pretest to 82.9% at the posttest, reaching the goal of 80%. The change in the rate of treatment planning from pretest to posttest is from 52.5% to 31.7 % ($p = 0.03$). The use of PDSS – 2 did reduced the rate of treatment planning for sleep.

Conclusions: This QI project positively increased the rate of sleep screening in at risk patients with PD. An improvement in the rate of screening and pretest treatment reduced the rate of treatment planning at the follow up visit.

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Background

Sleep disturbance (SD) is one of the most common and debilitating non-motor manifestations of Parkinson's disease (PD) (Endo et al., 2020; Louter, 2012). Sleep disturbance intensifies the disease-related disabilities of motor and non-motor symptoms (Suzuki, 2021). In spite of this, it is often under recognized and under addressed by healthcare professionals. The American Academy of Sleep Medicine recommends using a disease specific, self-administered questionnaire for the evaluation of insomnia (Sateia, et al., 2017). The Movement Disorder Society recommends utilizing the Parkinson's disease Sleep Scale (PDSS-2) to screen and measure severity of overall sleep problems in this patient population (Högl et al., 2010). Increased utilization of a standardized approach to assessment of sleep difficulties can facilitate identification of individual sleep disturbances to target treatment appropriately. Resolution of sleep disturbances can optimize physical and mental health and greatly enhance the quality of life of affected patients. This quality improvement project was of interest to both patients with Parkinson's disease (PwPD) and the healthcare providers at the Brain Health center.

Problem Description

The current practice regarding screening for SD in the Movement Clinic at the Lou Ruvo Center for Brain Health varies among individual care providers. An assessment may be part of the review of systems for new patients, but is inconsistently documented for routine follow up care. The needs assessment completed before consideration of this process improvement project revealed that 38 of 56 (68%) patients with PD seen in our clinic had documentation of sleep assessment in their medical records. The Movement Clinic leadership set a goal to achieve documentation of SD screening in ≥ 80% of patients with PD seen for new/follow up visits.

Review of Literature

It is estimated that approximately 930,000 Americans live with Parkinson's disease and up to 98% of them experience SD (Melka, et al., 2019). The most common types include insomnia, rapid eye movement behavior disorder, and restless leg syndrome (Stefanie & Högl, 2020). Symptoms such as depression, pain, fatigue, poorer cognition, and impulse control behaviors were increased in patients with PD who had sleep problems (Figorilli, et al., 2018). Sleep dysfunctions were related to a worse quality of life and greater non-motor symptom burden (Santos-Garcia, et al., 2020). Suzuki (2021) suggested that early detection and management of sleep-related problems through screening in clinical practice may have a positive impact on the quality of life of patients with PD.

A systematic literature review was conducted to evaluate evidence in sleep screening for patients with Parkinson's disease (Appendix A). In the previous research, the Assessing Care of Vulnerable Adults project strongly suggested for routine screening of sleep disorders in the older adults (Martin & Song, 2007). Despite the project data and advocacy, there has been no development of standard of care in sleep screening procedures (Hughes et al., 2018). In a randomized clinical trial, more than two-thirds of participants screened positive for at least one indicator of poor sleep and 38% met criteria for insomnia (Hughes & Martin, 2015). Hughes et al. (2018) proposed challenges faced in this population in regards to their cognitive and functional impairments on the impact of sleep disturbances. Full et al. (2019) found that their higher sleep disturbance scores were strongly correlated with significantly higher pain, stress, and quality of life scores. Research findings support a strong correlation between sleep disturbance and adverse outcomes; thus, treatment would positively tip the scale in improving the quality of life and health outcomes (Martin et al., 2017; Scott et al., 2021; Weaver et al.,

2018). Despite the lack of formal recommendation for sleep screening, Mallen et al., 2017 found that it is feasible to administer point-of-care screening using validated and focused questionnaires. Validated sleep instruments for screening are vital as there may be discrepancy between subjective and objective measures of sleep (Hughes et al., 2018). In a non-experimental trial, 92% of participants underestimated and under-reported their total sleep time (Hughes et al.,2018). The feasibility of point-of-care screening has been shown to be effective in the ambulatory care setting, and even recruitment by pharmacists and trained nursing personnel (Dean et al. 2019, Fuller et al. 2014). Treatment interventions, including cognitive behavioral therapy, has been shown to improve quality of sleep at a long term follow up (Alessi et al., 2016). Sleep management begins with routine screening and treatment consideration. The emphasis in such efforts is to impact the progression of disease and disability, delay or prevent nursing home placement, and health outcomes (Hughes & Martin, 2017).

Providers recognize the importance of sleep to optimize physical and mental health in patient care but they may not routinely assess for SD, viewing it as less important than other aspects of PD management (Grandner & Malhotra, 2015). Additionally, with the majority of this patient population being 60 years of age or older, many patients interpret SD as a normal part of the aging process and fail to disclose it to their providers as an area of concern (Luyster, et al., 2015). Although often overlooked by both clinicians and patients, a thorough evaluation of SD is of paramount importance and should be mandatory for all providers involved in the care of patients with PD (Baumann, 2019; Voysey, et al., 2021). Identification of specific SD to optimize targeted treatments can not only enhance quality of life for these patients and their families, but may also mitigate disease burden and delay progression (Baumann, 2019; Voysey, et al., 2021). Treating sleep dysfunctions in patients with PD begins with a comprehensive

assessment of this aspect of their condition, preferably using objective scales (Voysey, et al., 2021). The Parkinson's Disease Sleep Scale, version 2 (PDSS-2) (Trenkwalder, et al., 2011) is recommended by the Movement Disorder Society Task Force as the preferred screening tool as it includes a broad range of possible sleep disturbances common in patients with PD (Kurtix, et al., 2018).

Purpose

The purpose of this Doctor of Nursing Practice Project was to improve the screening rate for sleep disturbance in PwPD. The study protocol engaged the clinicians and team members to work collaboratively to disseminate, gather, and document a standardized sleep screening scale, PDSS – 2 in at-risk patients to increase identification and targeted treatments to optimize patient care outcomes.

Methodology

Design

This quality improvement (QI) project used a pretest-posttest, same subject design to evaluate the outcomes. The PLAN-DO-CHECK-ACT (PDCA) model is used to guide the process.

Setting and Population

The setting for the project took place in a Midwestern Brain Health clinic, subspecialized in neurodegeneration. The population of focus was PwPD.

Interventions

The PDSS – 2 was implemented as a structured sleep dysfunction assessment tool for PwPD in the Movement Disorder Clinic. It was selected because of the recommendation by The

Movement Disorder Society, and for its ease of use for patients, and high test-retest reliability, validity, and precision, as well as its potential to measure treatment effectiveness (Trenkwalder, et al., 2011; Kurtis, et al., 2018). This is a revised PDSS scale, which includes subscales to address unmet needs, "motor problems at night," "PD symptoms at night," and "disturbed sleep." The scale consists of 15 items that are scored from 0 (never) to 4 (very frequent). The total score range is 0 – 60, where higher scores indicating increased severity of sleep problems. The diagnostic cut off score is ≥ 15. The scale has a sensitivity of 72.1% and specificity of 72.9% (Trenkwalder, et al., 2011). The self-administration time is approximately 10 minutes and reflects on the signs/symptoms within the past week. The score for each item response is marked on the survey allowing for easy scoring by providers. It is available free for use in clinical practice and non-funded research (Mapi Research Trust, 2019).

An Epic smart phrase entitled ". SLEEPSCREEN" was built into the electronic medical record to facilitate provider documentation of review of the PDSS-2 results. The ".SLEEPSCREEN" smart phrase included two items: "PDSS-2 completed – YES/NO," and "Score". Recommendations regarding management of SD was at the discretion of the provider.

Measures

The outcome measure was the percentage of PwPD with documented screening for SD in the medical record. This was calculated by dividing the number of patients who have documentation of SD screening in their medical records by the total number of PwPD seen on the day of the audit.

Pre-implementation

As part of the planning (P) phase of the PDCA cycle, the project leader completed a retrospective chart audit of 56 PwPD who were seen in the Movement Disorders clinic during a randomly selected work week. Thirty-eight of the 56 patients (68%) had documentation of some form of sleep assessment completed by the provider. The assessment and treatment plan reflected discussions of general sleep patterns and the presence/absence of active dream behaviors. Since the documentation rate fell below the department goal of 80% the project leader completed a literature review and created an evidence-based plan to increase SD screening among PwPD seen in the clinic. The project leader met with the director and leadership team and received support for this quality improvement project.

Implementation

In the Do (D) phase of the PDCA cycle, the project leader implemented the planned project beginning with orienting the Movement Disorders team (providers, nurses, and medical assistant staff) to inform them of the project purpose, rationale, and to solicit their engagement in the process. All team members were oriented to the process for the administration and scoring of the PDSS-2. The team leader reviewed patients scheduled for the Movement Disorders clinic and identified those diagnosed with PD prior to the start of clinic each day. She prepared a Patient Information Sheet (Appendix B) and a PDSS-2 for each identified patient and placed them in easy access for the medical assistants who placed patients in exam rooms. The medical assistants were asked to review the Patient Information Sheet with each patient during the routine rooming in process, provide the volunteer patients with the PDSS-2, and request the patient hand the completed survey to the provider during the office visit. The medical assistants distributed the PDSS-2 paper and pencil questionnaires to those who agree to participate.

Providers were asked to briefly review the questionnaire, total the score, and document the results in the electronic medical record using the smart phrase ".SLEEPSCREEN." The documentation was captured within the office visit progress notes under the Objectives section. This uniformly captured all the PDSS – 2 screening questionnaires that were completed and the corresponding scores. Any recommendations based on the questionnaires were at the discretion of the provider. Once the providers completed the ".SLEEPSCREEN" documentation in the medical record, they handed them to the nursing team for collection.

During the Check (C) phase, the project leader audited the medical records of all PwPD seen in the clinic on a randomly selected day in weeks two, four, and six of the project. The number of patients with documentation of SD assessments were divided by the total number of patients seen on that day to determine percentage with completed assessments. After each audit the project leader prepared and present a summary of progress to the Movement Disorder team using run charts.

In the Act (A) phase of the cycle, the project leader met with the movement staff and providers to update them on the progress toward the goal of 80%. This was done biweekly at the team meeting. The results were presented in a run chart. This enhanced staff and provider engagement with continued screening. Feedback was obtained after each cycle (a total of 3 cycles) on barriers, feasibility, and general recommendations. Using feedback from the team, the process was repeated. Modifications to improve provider/staff engagement and/or patient engagement was made based on the progress and team feedback.

Post-implementation

At the completion of the QI project, the project leader continued to conduct chart audits bi-monthly for the following six months, then on an as needed basis thereafter. The PDCA cycle may be repeated as necessary to support sustainability.

Study Aims/Analysis Plan

The study had three primary aims: to improve the screening rate of sleep disturbance in at risk PwPD, to meet the benchmark goal of a minimum of 80% sleep screening consistently documented, and to assess whether the PDSS – 2 impacts the treatment planning.

- To improve the screening rate of sleep disturbance in at risk PwPD, a baseline assessment of sleep screening documentation was conducted and revealed that 38 of 56 (68%) PwPD seen in the clinic had documentation of sleep assessment in their medical records. An assessment may be part of the review of systems for new patients, but is inconsistently documented for routine follow up care. The intervention was the distribution of the PDSS – 2 questionnaires, education regarding score, and documentation of the scale. The posttest data was the collection of completed sleep screening.
- A benchmark goal of 80% was set by Movement Clinic leadership, reflecting a 12% increase in documentation: The same sample participants had their previous charts reviewed for prior documentation of sleep screening, creating the pretest data. The completed documentation of sleep screening in the same sample participants was the posttest data.
- Assessment for an association between the PDSS – 2 questionnaire and treatment planning: The sleep treatment planning documentation from the pretest and posttest was assessed for change.

Data Analysis

Data for the QI project was collected and entered into an Excel spreadsheet. SPSS was then used to analyze the data. Controlled charts were utilized to assess for trends and maintain a visual progress.

Descriptive statistics was used for categorical variables, age, and gender to check for distribution, data entry errors, and missing data. McNemar test was used to answer the clinical question, is there a change of screening rate from pretest to posttest? The outcome data were also compared to the bench mark to assess success.

Alignments of Aims and Outcomes

The first aim to improve the screening rate of sleep disturbance in at risk PwPD was measured using the change in percentage of patients screened for PD sleep disturbance. The sleep disturbance is measured by the PDSS – 2. The change in the screening rate was assessed in two ways. First, the biweekly audits were assessed for a change in percentage of patients evaluated to determine progress. Secondly, the final percentage of patients screened was compared to the goal of 80% established by the department leadership to determine goal achievement.

To evaluate for a change in the rate of treatment planning for sleep pre/post intervention, we used the percentage of documented treatment planning in the electronic health record post intervention. An EHR chart review was completed for all PwPD follow ups during the biweekly audit. The percentage of completed documentation of treatment planning was compared to the total charts viewed for the same 41 patients. We anticipated that increased screening is correlated with greater likelihood for identification of SD and targeted therapy.

The project consisted of three cycles with each lasting a period of two weeks. The feedback obtained from the team after the first cycle was that the barrier in completing the PDSS – 2 involving new patients was difficult to determine. Providers found that some patients may be inappropriately screened if they were presenting first to confirm or rule out a diagnosis of PD or other movement related disorders. It also affected their consultation time dedicated to patient interview and diagnostics to derail to discussion of sleep concerns. This was factored into the change made for cycle 2.

In cycle 2, the project was revised to screen only returning PwPD. The medical assistants who were responsible for the rooming and distributing the questionnaires were made aware of the revision. The removal of new patient screening contributed to the lack of total daily charts available for auditing. This variable was not initially taken into account resulting in a second revision. The project leader met with the project mentor and clinical site nurse scientist to factor in the change. The feedback from the panel was to reduce the minimum chart audit to 12.

To summarize, in cycle 2, we reduced the minimum number of charts audited. After the completion of cycle 2, the team feedback was regarding incomplete questionnaires. Some patients were unable to complete the questionnaires between the rooming process and the time the provider begins the appointment. This led to a bit of confusion from both parties as the patient tries to submit post visit (completion of paperwork in the waiting room) as the chart would already be completed, or the provider is unable to review the score or provide evaluation and management for any sleep disturbance. The project leader recommended that the patients complete the form at home and return at the next follow up meeting. This would provide patient reinforcement that their health data is valuable. For the incomplete screening, providers were notified to document in the chart “NO” in the screening portion of the objective assessment.

In cycle 3, the PDSS – 2 screening was only applied to PwPD returning for follow up visits. Any incomplete screenings were encouraged to be returned at the next visit. The results for each cycle were compared to the goal set by the clinic leadership of 80%. The charts with completed PDSS – 2 continued to trend up after each review toward meeting the final goal.

The outcomes measured all align with increasing sleep disturbance screening in at risk PwPD and engaging the clinicians and team members in the process of patient care delivery.

Instruments/Tools

The PDSS – 2 is a standardized sleep screening questionnaire. The PDSS – 2 was assessed for internal and test-retest-reliability. For the internal consistency, Trenkwalder et al. (2011) computed the Cronbach alpha of 0.73, and for subscales, 0.47 to 0.66. For the test-retest-reliability, the questionnaire was repeated after 1 – 3 days and the intra-class-coefficient for the total score was 0.80, a sufficiently high result (Trenkwalker et al., 2011, p. 648). In regarding to discriminative validity, there were significant differences found with the PDSS – 2 score with the Clinical Global Impression Severity Scale (item 1) and Hoehn and Yahr severity. It is available free for use in clinical practice and non-funded research (Mapi Research Trust, 2019).

Data Accuracy

A biweekly chart audit was completed per cycle, for a total of three cycles. The following data from the electronic health record was gathered: The participant's age, gender, previous screening prior to enrollment (pre-intervention), screening at the enrollment visit (post-intervention), previous treatment planning related to sleep (pre-intervention), treatment planning at the enrollment visit (post-intervention), participant report taking dopamine replacement therapy (PD medication), and the Unified Parkinson's disease Rating Scale (UPDRS-III) Motor

Score. The Objective section was reviewed for documentation of PDSS-2, along with the score, if available. The intervention was the dissemination, administration, and scoring of PDSS – 2.

To maximize the number of scheduled patients, the audit was done on a day when all providers were scheduled to be in clinic. A minimum of 12 charts was audited per cycle. To ensure data accuracy, the project leader reviewed the data entered and verified it with the number of entries against the daily chart count. The gender and age match were also used for verification.

Data collection

To collect screening data, the project leader completed biweekly chart audits. The objective section of the progress notes was reviewed for the pre-conceived EPIC smart phrase 'Parkinson's Disease Sleep Scale (PDSS-2), PDSS - 2 completed: *YES/NO, Score.' If the chart did not contain this documentation, the patient or provider failed to complete the questionnaire and/or documentation within the chart. If the chart contained the above documentation, with 'PDSS – 2 completed: NO,' this indicates the patient declined to complete the questionnaire or they did not complete in time at the start of the appointment time. To avoid disruption to the visit, the incomplete questionnaires were documented as 'NO' sleep screening were completed. In the data set, the documentation was indicated as 'YES' or 'NO'.

To evaluate for objective 1, the project leader divided the total number of charts screened by the total number of PD patients scheduled. In cycle 1, 14 participant charts were evaluated for the completion of sleep screening. The same participant charts were reviewed one follow up visit prior, to assess for the presence of prior documentation of sleep screening assessment. The documentation from the prior assessment became the data for the pretest and the documentation for the current audit after the implementation of PDSS – 2 questionnaires became the posttest data. This provided two sets of pretest and posttest data for comparison.

Results

Participant characteristics

Table 3 shows the demographic of the patients. Of the 41 participants, male and female were about equal (male: 21, 51.8%; female: 20, 48.8%) and the median age group was 71 – 80 years of old. The participants were categorized into five age groups, 5 were within 51 – 60

(12.2%), 7 were within 61 – 70 (17.1%), 19 were within 71 – 80 (46.3%), 8 were within 81 – 90 (19.5%), and 2 were 91and above (4.9%).

The change in the rate of screening is summarized in table 4. In the pretest, 51.2% of participants received the sleep screening. Figure 1 is a bar chart demonstration of the data from table 4. In the posttest, 82.9% received sleep screening. The result is an improvement of 31.7%, which is not statistically significant, $p = 0.14$. The screening rate during each cycle is reported in table 5. Figure 2 is a run chart demonstration of the data summarized in table 5. In cycle one, the screening rate changed from 50% to 78.6%; in cycle 2, it changed from 53.3% to 80%; while in cycle 3, it changed from 50% to 91.7%. Overall, the goal of 80% screening rate was met.

For the second aim, the change in the rate of treatment planning from pretest to posttest is from 52.5% to 31.7 %, the result is shown in table 6. The result is a change of 20.8%, which is statistically significant, $X^2 = 5.03$, $p = 0.03$. The use of PDSS – 2 did impact the rate of treatment planning for sleep. The result indicates that if they had received an intervention or treatment planning related to sleep disturbance in the pretest, then they would be less likely to have a recurring sleep disturbance in the posttest that require follow up.

Discussion

The project's successful results were largely due to the team collaboration efforts and engagement. The implementation of the PDSS – 2 increased awareness of sleep disturbance in PwPD, its key role in patient care management, and engaged health care providers and patients to take charge of their health. The improvement in screening and targeted treatments may lead to improved patient satisfaction of consumer healthcare. Patient satisfaction has an implication on healthcare policy and value-based reimbursement.

The future plan to maintain project sustainability is to utilize the results to influence patient care outcomes through multidisciplinary team collaboration. The goal is to collaborate with the clinic's health psychologist to improve on efficiency of intervention for sleep disturbance. The project leader and the health psychologist have met to detail the plans for shared medical appointments for PwPD that suffer from sleep disturbance. The finding from this QI will contribute to the efforts for screening and identifying patients with the greatest needs for referral. The PDSS – 2 will aid in differentiating behavioral needs that may benefit from cognitive behavioral therapy rather than required for medical management.

The implication for quality and safety is that the project outcome supports standardized documentation to improve effective communication between providers and patients. This QI effort shifts how providers within a clinic communicate to one another of the screening assessment, plan of care, and serve as an effective tool for longitudinal follow up.

Proper documentation of a standardized sleep screening in PwPD will also enhance research recruitment. Clinical trials that focus on recruitment of sleep quality, safety, and intervention can easily connect with potential interested participants.

Conclusion

The results showed that the intervention improved the screening rate by nearly 32% to reach the pre-set goal of 80% (82.9%). As shown in table 5, there was an improvement in screening rate each cycle. Providers and staff were more likely to continue with sleep screening and documentation during the intervention and shortly after. The engagement and excitement with the QI is likely what was responsible for the positive trend in documentation of sleep screening. Nonetheless, the results were positive and showed that PDSS – 2 sleep screening documentation can be implemented seamlessly into the current clinic practice setting. It can

provide more longitudinal data for patient management and care outcomes. The treatment planning pre- and post- test data were statistically significant. Providers were less likely to document and evaluation and management of sleep screening in patients that were previously screened/treated. The overall goal is to increase awareness of sleep disturbance in patients with Parkinson's disease by both healthcare providers, medical assistants, patients, and caregivers. By increasing awareness through increasing screening with a standardized scale, there overarching goal is to provided targeted treatments for sleep disturbance and optimizing patient satisfaction with their health and quality of life.

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Table 1. Data Collection/Evaluation and Analysis Methods Table

Aims/Evaluation Questions	Measures	Measure Type	Data Source	Recruitment Method/ Population	Timing/Frequency	Calculation/ Statistics	Goal/ Benchmark
Improve sleep screening rate in patients with Parkinson's disease. *Does the use of a formal sleep scale, PDSS-2 improve the rate of screening?*	% of documented sleep screening completed in the electronic health record	Process	EHR chart review	All PD patient follow up visits during the project intervention period	Biweekly for 6- week; once per cycle	Percentage/ Proportion	80%
Evaluate for the change in the rate of treatment planning for sleep.	% of documented treatment plan for sleep in the	Process	EHR chart review	All PD patient follow up visits during the project intervention period	Biweekly for 6- week; once per cycle	Percentage/proportion	80%

Does the use of a sleep scale, PDSS – 2 improve the rate of treatment planning involving sleep?	electronic health record						
Providers are satisfied with PDSS – 2 content and usability. *How satisfied are providers with the content and usability of the scale?*	Provider satisfaction ratings	Outcome	Provider survey	All providers utilizing the scales during the project period	Administered once, 2 weeks post-intervention	Mean score	Mean score of 4 or above (5-point scale)

Table 2. Data Dictionary Table

Data Element	Data Label	Data Type	Definition/Purpose	Data Values & Coding
Participant number	Part#	Continuous	Participant	Numeric
Enrollment Date	Date	Alpha numeric	Enrollment Date	Alpha-numeric DD-MMM
Gender	Gender	Text	Self-identified gender from EHR	Categorical 1, Male; 2, Female
Participant Age Group	Age_Group	Numeric	EHR	Categorical 51, 51-60; 61, 61- 70; 71, 71-80; 81, 81-90; 91, 91+
PreSleep Screening	PreSlpScr	Text	Chart reviewed: sleep screening previous documentation in EHR.	Categorical 1, Y; 2 N
PostSleep Screening	PostSlpScr	Text	PDSS – 2 Questionnaire completed	Categorical 1, Y; 2 N

Post Sleep Screening Score	PostScreeScore	Numeric	PDSS – 2 Score	Numeric
Pre-Treatment Planning	PreTrtPln	Text	Chart reviewed: treatment planning documentation	Categorical 1, Y; 2, N
Post-Treatment Planning	PostTrtPln	Text	Chart reviewed: treatment planning documentation	Categorical 1, Y; 2, N
OnOFF	OnOFF	Text	Chart reviewed: Patient report ON PD medication.	Categorical 1, ON; 2 OFF
Motor Score	Motor_Score	Numeric	Unified Parkinson's disease Rating Scale (UPDRS III)	Numeric

Descriptive statistics of age and gender are summarized in table 3.

Table 3. Characteristics of the sample (n=41)

Variable	**Number (%)**
• **51-60**	5 (12.2%)
• **61-70**	7 (17.1%)
• **71-80**	19 (46.3%)
• **81-90**	8 (19.5%)

• **91**	2 (4.9%)
Gender	
• **Female**	20 (48.8%)
• **Male**	21 (51.2%)

Table 4. Pretest sleep screening and posttest sleep screening (n=41)

	Yes	**No**
Pretest	21(51.2%)	20 (46.3%)
Posttest	34 (82.9%)	7 (17.1%)
Statistics	X^2=2.14, p=0.14	

Figure 1. Bar Chart Demonstrating Pretest and Posttest Sleep Screening Difference

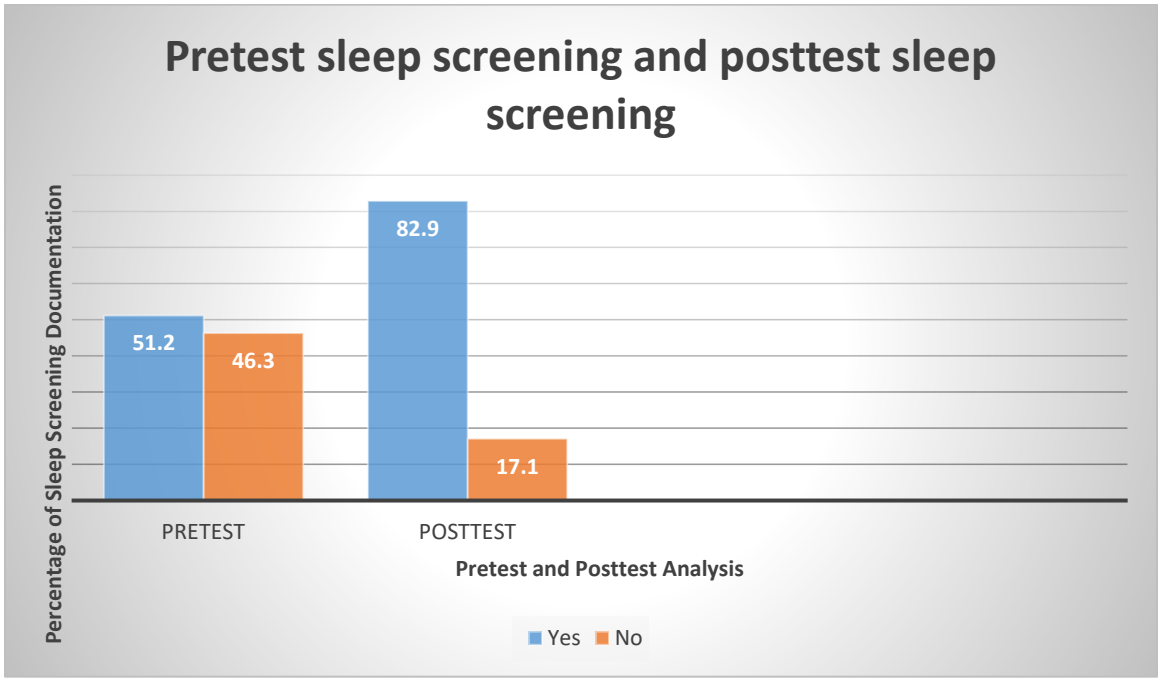

Table 5. Screening rate during each cycle

	n	Pretest screening	Posttest screening
Cycle 1	14	7 (50.0%)	11 (78.6%)
Cycle 2	15	8 (53.3%)	12 (80.0%)
Cycle 3	12	6 (50.0%)	11 (91.7%)

Figure 2. Run Chart for PDSA Cycles and Pre/Posttest Results

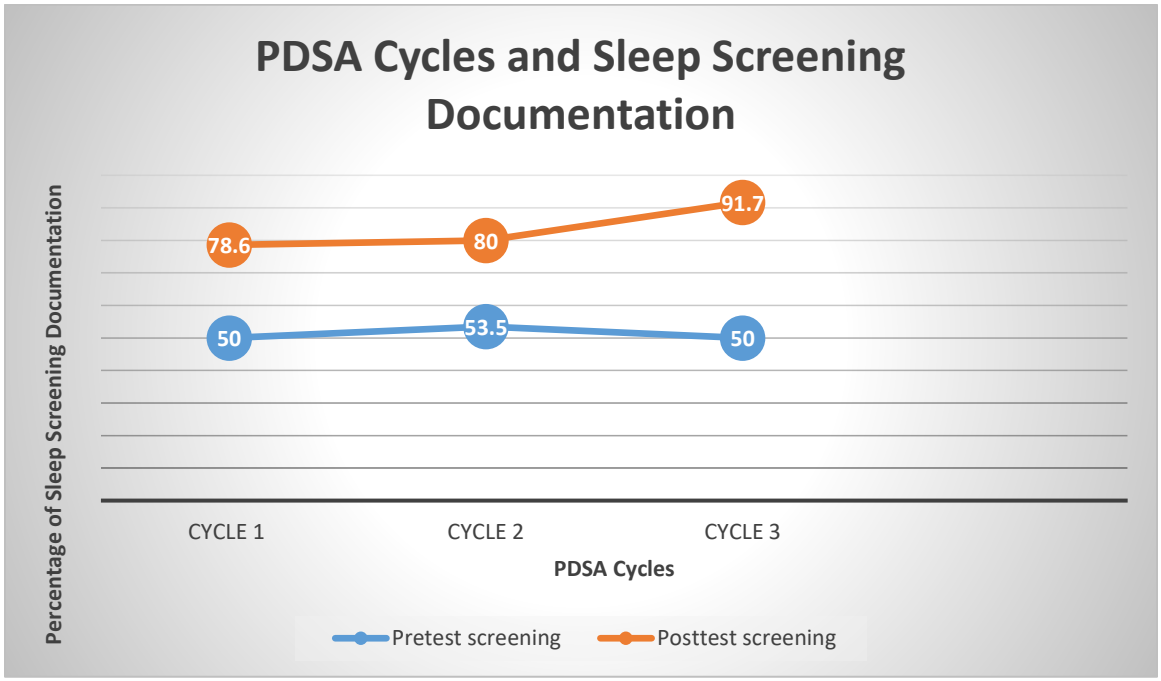

Table 6. Pretest Treatment Planning and Posttest Treatment Planning (n=41)

	Yes	No
Pretest Treatment Planning	21 (52.5%)	20 (48.7%)

Posttest Treatment Planning	13 (31.7%)	28 (68.3%)
Statistics	X^2=5.03 p=0.03	

Table 7. Control Chart Cycle 1 Chart Audit for PDSS – 2 Sleep Screening Documentation and Scores

Part#	Date	Gender	Age_grou	SlpScreen	Slpscreen	tScreeSc	PreTrtPlr	ostTrtPlı
1	14-Oct	M	51	1	1	17	2	1
2	14-Oct	M	61	2	1	23	1	1
3	14-Oct	F	81	1	1	8	1	2
4	14-Oct	M	61	2	1	11	2	2
5	14-Oct	M	51	1	1	33	1	1
6	14-Oct	F	61	2	2		2	2
7	14-Oct	F	71	2	1	21	2	2
8	14-Oct	M	81	2	1	11	2	1
9	14-Oct	M	81	2	1	24	2	2
10	14-Oct	F	71	1	1	21	1	2
11	14-Oct	M	71	2	2		2	2
12	14-Oct	F	51	1	1	49	1	1
13	14-Oct	F	61	1	1	38	1	1
14	14-Oct	M	71	1	2		1	2

Note: The control chart was imported from SPSS. The variable label 1 = Yes, 2 = No. The blanks are missing sleep screening score from incomplete documentation. The age is grouped as follow: 51, 51 – 60; 61, 61 – 70, 71, 71 – 80, 81, 81 – 90; 90 is 90 and above.

Table 8. Control Chart Cycle 2 Chart Audit for PDSS – 2 Sleep Screening Documentation and Scores

15	**28-Oct**	**F**	**61**	**1**	**1**	**11**	**1**	**2**
16	**28-Oct**	**M**	**71**	**2**	**1**	**10**	**2**	**2**
17	**28-Oct**	**M**	**71**	**1**	**1**	**36**	**1**	**1**
18	**28-Oct**	**F**	**81**	**2**	**1**	**7**	**2**	**1**
19	**28-Oct**	**M**	**71**	**1**	**1**	**28**	**1**	**1**
20	**28-Oct**	**F**	**51**	**1**	**1**	**8**	**1**	**1**
21	**28-Oct**	**M**	**71**	**1**	**2**		**1**	**2**
22	**28-Oct**	**M**	**71**	**2**	**2**		**2**	**2**
23	**28-Oct**	**F**	**71**	**1**	**1**	**7**	**1**	**2**
24	**28-Oct**	**M**	**71**	**2**	**2**		**2**	**2**
25	**28-Oct**	**M**	**81**	**1**	**1**	**10**	**1**	**2**
26	**28-Oct**	**F**	**71**	**1**	**1**	**12**	**1**	**2**
27	**28-Oct**	**F**	**71**	**2**	**1**	**3**	**2**	**2**
28	**28-Oct**	**M**	**91**	**1**	**1**	**11**	**2**	**2**
29	**28-Oct**	**F**	**71**	**2**	**1**	**10**	**2**	**2**

Note: The control chart was imported from SPSS. The variable label 1 = Yes, 2 = No. The blanks are missing sleep screening score from incomplete documentation. The age is grouped as follow: 51, 51 – 60; 61, 61 – 70, 71, 71 – 80, 81, 81 – 90; 90 is 90 and above.

Table 9. Control Chart Cycle 3 Chart Audit for PDSS – 2 Sleep Screening Documentation and Scores

30	**11-Nov**	**F**	**71**	**2**	**1**	**11**	**2**	**2**
31	**11-Nov**	**M**	**61**	**1**	**1**	**25**	**1**	**1**
32	**11-Nov**	**M**	**81**	**2**	**1**	**12**	**2**	**2**
33	**11-Nov**	**F**	**81**	**1**	**1**	**14**	**1**	**1**
34	**11-Nov**	**F**	**61**	**1**	**1**	**51**	**1**	**1**
35	**11-Nov**	**M**	**71**	**1**	**1**	**18**	**1**	**2**
36	**11-Nov**	**F**	**71**	**2**	**1**	**23**	**2**	**2**
37	**11-Nov**	**F**	**91**	**1**	**1**	**28**	**1**	**2**
38	**11-Nov**	**F**	**71**	**1**	**1**	**15**	**1**	**2**
39	**11-Nov**	**M**	**81**	**2**	**1**	**20**	**2**	**2**
40	**11-Nov**	**M**	**51**	**2**	**2**		**2**	**2**
41	**11-Nov**	**F**	**71**	**2**	**1**	**27**	**2**	**2**

Note: The control chart was imported from SPSS. The variable label 1 = Yes, 2 = No. The blanks are missing sleep screening score from incomplete documentation. The age is grouped as follow: 51, 51 – 60; 61, 61 – 70, 71, 71 – 80, 81, 81 – 90; 90 is 90 and above.

Appendix A

Evidence Table

Article #	Author & Date	Evidence Type	Sample, Sample Size, Setting	Study findings that help answer the EBP Question	Observable Measures	Limitations	Evidence Level & Quality
	Alessi et al., 2016	Randomized Controlled Trial	Community-dwelling veterans aged 60 and older who met diagnostic criteria for insomnia of 3 months duration or longer (N = 159).	Intervention subjects had greater improvement than controls between the baseline and posttreatment assessments, the baseline and 6-month assessments, and the baseline and 12-month assessments.	Primary outcomes, including self-reported (7-day sleep diary) sleep onset latency, wake after sleep onset, total wake time, and sleep efficiency; Pittsburgh Sleep Quality Index (PSQI); and objective sleep efficiency (7-day wrist actigraphy, were measured at baseline, at the posttreatment assessment, and at 6- and 12-month follow-up.	Predominant male veteran population, findings may not be generalized to the older women and non-veterans.	Level I Evidence: High quality
	Dean et al., 2019	Non-research/ Quality Improvement	Twelve nurses, mean age 42.6, 100% female, 92% Caucasian, 83% baccalaureate or higher, average nursing experience was 18 years, in the ambulatory cancer care setting.	Nurses reported 100% satisfaction and improved confidence in stimulation learning for identification of sleep disorders using an online screening tool.	Holland Sleep Disorders Questionnaire during tow in situ stimulations using standardized patients and debriefing.	Small sample size, extensive nursing knowledge may impact the impact beliefs and attitudes about sleep.	Level V Evidence: Good quality
	Full et al., 2019	Non-experimental	Older adults (N = 307) were recruited from retirement communities in San Diego,	Higher sleep disturbance scores were significantly associated with higher scores on the	Depression CSD C-10 Score, Quality of Life (PQOL) Score, Perceived Stress Score, and PROMIS Sleep	Self-reported sleep measures are limiting.	Level III Evidence: High quality

			CA, average 83.6 years (SD 6.4) and predominately female (72.3%).	depression scale, higher stress score, and lower quality of life.	Disturbance Scale.		
	Fuller et al., 2014	Randomized Controlled Trial	325 participants were recruited through 23 community pharmacies, mean age 55.5 ± 16.7, 46,7% male.	218 (67%) participants were at risk of OSA, insomnia or RLS and these participants were referred to their primary physician.	Subjective risk assessment only versus using a questionnaire, versus risk assessment + objective marker for OSA.	Participant biased as they were exposed to the screening after seeing the recruitment material.	Level I Evidence: Good quality
	Hughes & Martin, 2015	Randomized Controlled Trial (screening phase of a larger study)	Sixty – eight participants from an Adult Day Health Care (ADHC). 96% male, 4% female, mean age 79 years old.	More than two thirds (n = 48, 70.6%) reported one or more characteristics of poor sleep, and 38% of participants met basic criteria for insomnia. Individuals with insomnia attended ADHC less frequently, reported worse sleep quality and shorter sleep duration, and were more likely to endorse trouble falling asleep, staying asleep, and waking up too early (p < 0.001).	28-item insomnia screening tool using validated questionnaires with simplified response options.	The data was gathered based on a screening phase of a larger study. Medical and psychiatric information was not visible to the screener. Sample may be biased since the participants were recruited as a part of a VA program.	Level I Evidence: High quality

	Hughes et al., 2018	Non-experimental	Fifty-nine Adult Day Health Care participants (95% male, mean age = 78 years)	Disturbed sleep was common, yet there was no agreement between subjective and objective sleep assessment methods. Compared with objective measures, one-half of participants reported worse sleep efficiency (SE) on questionnaires while one-quarter over-estimated SE. Participants reporting worse pain had a greater discrepancy between subjective and objective SE.	Subjective sleep assessment using the Pittsburg Sleep Quality Index (PSQI) versus wrist-actigraphy. The 7-item Insomnia Severity Index and Dysfunctional Beliefs and Attitudes Scale (DBAS).	The length and complexity of the scales used, PSQI and ISI may be prohibitive to older adults with cognitive and functional impairments.	Level III Evidence: High Quality
	Mallen et al., 2017	Randomized Controlled Trial	Patients aged ≥45 years old with osteoarthritis attending a primary care clinic, mean age 65, 57% female, 98% white race/ethnicity, sample size was 2,042 patients.	Study found that it is feasible to incorporate point-of-care screening of anxiety (GAD-2) and depression (PHQ-2) in the electronic medical record. Primary outcome, yield higher pain scores at follow up; secondary outcome, anxiety and depression did not reduce	Depression symptoms (PHQ-2) at 3 months: Standardized Mean Difference (SMD) 0.14 (0.01 to 0.26) 6 months: SMD 0.22 (0.09 to 0.35) 12 months: SMD 0.10 (0.03 to 0.23)	Anxiety was screened in addition to depression. Included only patients with osteoarthritis in the primary care setting which may not be applicable to the general population.	Level I Evidence; high quality

				following intervention.			
	Martin et al., 2017	Randomized Controlled Trial	Forty-two individuals (mean age: 77 years, 93% male) enrolled in a VA ADHC program.	A short behavioral sleep intervention program showed improvement on sleep efficiency, number of night time awakenings, and minutes awake at night compared to information only controlled.	In-person sleep and health assessments at baseline, post treatment, and 4 month follow up, 3 days of wrist actigraphy, Pittsburgh Sleep Quality Index (PSQI), and the insomnia severity index.	Participants were not able to be screened for sleep-disordered breathing despite evidence of higher prevalence in the older adults.	Level I Evidence: High quality
	Scott et al., 2021	Meta-analysis of randomized controlled trials	Sixty-five trials comprising 72 interventions and N = 8608 participants were included	Improvement of sleep can lead to significant effect on composite mental health, depression, anxiety, and rumination, as well as stress and psychosis symptoms.	Self-reported measures of global sleep quality, the Pittsburg Sleep Quality Index (PSQI), outcomes specific to a given sleep disorder that assess sleep continuity and impact on daily life, and individual components of reported sleep quality.	Few studies reported impact for long term, those that did report longer follow up had smaller effects.	Level II Evidence: Good quality
	Weaver et al., 2018	Quasi-experimental (Prospective cohort study)	A sample of 416 shift workers at four hospitals participated, mean age is 33.2, 87.8% female, 11% male. full-time (80.8%) nursing staff (64.7%), 95% of the sample reported	Of the 416 hospital workers who participated, two in five (40.9%) screened positive for a sleep disorder and 21.6% screened positive for depression or anxiety.	88% of those who screened positive for a sleep disorder were previously undiagnosed and untreated. Nearly one-quarter of the study sample (*n* = 96, 23.1%) reported excessive	Treatment data were not collected, or follow up in reduction of symptoms.	Level II Evidence: Good quality

			predominant clinical role.	screening positive for a sleep disorder was associated with 83% increased incidence of adverse safety outcomes. Screening positive for depression or anxiety increased the risk by 63%.	daytime sleepiness (>10 on the Epworth Sleepiness Scale); seventy participants (16.8%) had previously been diagnosed with a sleep disorder and 6.0% (*n* = 25) were receiving treatment for a sleep disorder at study baseline.		

Appendix B

Parkinson's disease Sleep Scale – 2

Please rate the severity of the following based on your experiences during the past week (7 days). Please make a cross in the answer box

	Very often (This means 6 to 7 days a week)	Often (This means 4 to 5 days a week)	Sometimes (This means 2 to 3 days a week)	Occasionally (This means 1 day a week)	Never
1) Overall, did you sleep well during the last week?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
2) Did you have difficulty falling asleep each night?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
3) Did you have difficulty staying asleep?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
4) Did you have restlessness of legs or arms at nights causing disruption of sleep?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
5) Was your sleep disturbed due to an urge to move your legs or arms?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
6) Did you suffer from distressing dreams at night?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
7) Did you suffer from distressing hallucinations at night (seeing or hearing things that you are told do not exist)?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
8) Did you get up at night to pass urine?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
9) Did you feel uncomfortable at night because you were unable to turn around in bed or move due to immobility?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
10) Did you feel pain in your arms or legs which woke you up from sleep at night?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
11) Did you have muscle cramps in your arms or legs which woke you up whilst sleeping at night?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
12) Did you wake early in the morning with painful posturing of arms and legs?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
13) On waking, did you experience tremor?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
14) Did you feel tired and sleepy after waking in the morning?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
15) Did you wake up at night due to snoring or difficulties with breathing?	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0

Appendix C

Patient Information Sheet

Sleep Screening in Patients with Parkinson's Disease

Quality Improvement Project Information Sheet

This is a quality improvement project, with the aim to increase provider's sleep screening in patients with Parkinson's disease using a standardized tool. The Parkinson's Disease Sleep Scale – 2 is an objective tool developed to measure the severity of sleep problems, specific to this patient population. The scale is presented in a questionnaire format. There are 15 questions total and will take approximately 10 minutes to complete. The completion of the scale will be part of your pre-appointment visit and not take time from your visit with the provider. Your participation is voluntary and there is no compensation. The score will be calculated by the provider and entered into your visit notes.

Thank you for your cooperation,

Jenny Nguyen, MSN, FNP – C