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Telehealth Appointments to Increase Therapy Compliance in Patients with MOSA

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Abstract

Background: At the VA Puget Sound Healthcare System, *care as usual* for patients with a new diagnosis of mild obstructive sleep apnea (MOSA) is a letter directing the patient to call the continuous positive airway pressure (CPAP) clinic to establish ongoing care.

Local Problem: This model has resulted in low therapy compliance and does not afford patients the ability to discuss their diagnosis and treatment options with a licensed healthcare provider. A literature review showed telemedicine interventions increase therapy compliance in patients with MOSA.

Context: The Doctor of Nursing Practice project implemented an evidence-based practice change to improve therapy compliance for patients with a diagnosis of MOSA utilizing telehealth appointments. The aim was to increase compliance by 10%.

Interventions: The interventions in this implementation project consisted of screening patients who met inclusion criteria for telemedicine appointments with a registered nurse (RN). The RN verified eligibility and sent a list of patients to the medical support assistant for scheduling. The RN conducted counseling sessions with the patient at the scheduled times to educate them on their diagnosis and treatment options and to answer their questions. The sleep medicine provider cosigned all encounters and made recommendations to the plan of care, as needed.

Outcome Measures: Outcome measures included assessment of patient satisfaction with telemedicine appointments using a five- to eight-question survey. Therapy compliance was assessed via usage reports for CPAP, body mass index for patients who elect lifestyle changes, and patient self-reports. Reimbursement rates were assessed to determine long-term feasibility.

Results: Sixteen patients from both the intervention group and the *care as the usual* group participated in the follow-up survey. Patient satisfaction was rated higher for the telehealth

intervention group than the *care as a usual* group; 96% of respondents in the intervention group were satisfied with their care, while only 74% in the *care as usual* group were satisfied with their care.

Keywords: *telemedicine, CPAP therapy, CPAP, patient satisfaction, nurse intervention*

Section II: Introduction

Background

Sleep problems affect 35% to 40% of the adult population in the United States (Ram et al., 2010). Sleep disorders are known to have a negative impact on quality of life, in addition to a variety of health conditions, such as hypertension, type II diabetes, heart failure, and cardiovascular disease (Bonsignore et al., 2019). Continuous positive airway pressure (CPAP) is the first-line therapy for obstructive sleep apnea (OSA). This is a highly effective treatment; however, the compliance rates with this form of therapy are low (Rotenberg et al., 2016). When CPAP therapy is followed as directed, patients can experience a decrease in daytime sleepiness and improvement in comorbidities; however, many patients are unable to tolerate CPAP, and compliance rates hover in the 30% to 60% range (Morgenthaler et al., 2008). The American Association of Sleep Medicine acknowledges that a large number of patients seek alternative treatments to CPAP therapy due to the overall discomfort of the device, noise level, and claustrophobia (Morgenthaler et al., 2008).

Problem Description

The *care as usual* model for patients with a new diagnosis of mild obstructive sleep apnea (MOSA) at the VA Puget Sound Healthcare System (VAPSHCS) includes a mailed letter to inform the patient of their diagnosis of MOSA based on home sleep study results reviewed by a sleep medicine provider. The letter instructs the patient to contact the CPAP therapy clinic to schedule an appointment to receive their CPAP equipment. Patients are not given the opportunity to learn about alternative therapies to CPAP from a licensed healthcare provider.

Setting

VAPSHCS is located in Seattle, Washington, with a second campus in Tacoma, Washington. Services provided at both campuses include acute and ambulatory care, domiciliary, and long-term care (U.S. Department of Veterans Affairs, 2020). VAPSHCS receives its funding from the federal government and is deemed not-for-profit. The Seattle facility has 291 acute care beds, and both facilities combined reported over one million outpatient encounters for the fiscal year 2019 (U.S. Department of Veterans Affairs, 2020). Clinical services provided include care for homeless Veterans, LGBTQ Veterans, and returning service members; women's health; caregiver assistance; and laboratory, prosthetics, community, and specialty care (U.S. Department of Veterans Affairs, 2020). Each campus has facilities dedicated to long-term care, rehabilitation, blind rehabilitation, domiciliary, and mental health.

Specific Aim

To increase patient satisfaction and therapy compliance by implementing video appointments with rural Veterans in Washington State who have newly diagnosed mild obstructive sleep apnea using an evidence-based tool kit 10% by August 31, 2021.

Available Knowledge**Background**

An estimated 22 million Americans suffer from a form of sleep apnea, and up to 80% of the cases of moderate to severe OSA are undiagnosed (American Sleep Apnea Association, n.d.). There are several types of sleep apnea, with OSA the most common. Patients with a diagnosis of OSA have an increased risk of cardiovascular and cerebrovascular morbidity and mortality (Jennum et al., 2015). OSA results when the muscles of the throat relax and intermittently block the airway. This condition is prevalent in 2% to 4% of middle-aged working adults (Stepnowsky

et al., 2007). Signs and symptoms of OSA include, but are not limited to, daytime sleepiness, snoring, a sudden waking from sleep while choking or gasping, poor concentration, and awakening with a dry mouth and a sore throat (Aardoom et al., 2020). The first-line therapy for OSA is CPAP. CPAP therapy delivers positive air pressure, keeping the airway from closing-collapsing. Air is dispatched through a variety of nasal and full-face masks. However, CPAP therapy is associated with low compliance rates (Rotenberg et al., 2016).

PICOT Question

In adults with a new diagnosis of MOSA, how do telemedicine appointments, compared to care as usual, effect therapy compliance at 90 days?

Search Methodology

An online search was conducted in the following databases: CINAHL, PubMed, The Cochrane Library, Medline, and ProQuest. The following search terms were used individually and in combination with each other: *continuous positive airway pressure, CPAP therapy, CPAP compliance, CPAP adherence, telehealth, telemedicine, telephone appointments, video appointments, and remote monitoring*. The reference lists of the selected publications were checked to identify other, possibly relevant, literature. Inclusion criteria selected were human subjects, age 18 years or older, and papers from peer-reviewed journals, published in the English language, and published between 2009 and 2020. Exclusion criteria selected were animal subjects, non-peer-reviewed studies, grey literature, papers not published in the English language, and study participants under 18 years of age. The Johns Hopkins Evidence-Based Practice Research evaluation tools (Dang et al., 2022) and a summary of the evidence are presented in Appendix A.

A literature review utilizing single search keyword terms resulted in a vast number of published articles (see Appendix B). Combining keywords resulted in a manageable number of published articles to consider (see Appendix C). A combination of CPAP and telemedicine and CPAP and telehealth returned the same five articles, so the duplicated items were removed. This resulted in a yield of 44 articles. After a further review of the articles based on the inclusion criteria, six papers were selected for review. The articles selected using the inclusion criteria provided objective and critical evaluation of the available evidence.

Integrated Review of the Literature

Telehealth is a broad term used to describe practicing medicine using technology at a distance (American Association of Family Physicians [AAFP], 2020), where the provider is in one location and utilizes a telecommunications network to provide care to patients at a remote site. Examples of telehealth may include health education services, remote monitoring, telephone appointments, video appointments, and secure messaging.

CPAP Adherence

While there are multiple studies of various sizes on the effects of telemedicine interventions and their influence on CPAP compliance, there have been no systematic reviews of the evidence to date. The research team of Aardoom et al. (2020) conducted a systematic review of telehealth interventions on adherence outcomes of adult patients with a diagnosis of OSA. Nineteen studies met inclusion criteria, and 18 studies were used for the meta-analysis. The analysis revealed that CPAP compliance increased, on average, 30 minutes per night when eHealth interventions were utilized when compared to *care as usual* alone. A review of the evidence showed that eHealth interventions improved CPAP compliance among adults with a diagnosis of OSA. The review also revealed suggestions for areas of future studies, such as the

implications of long-term eHealth interventions on CPAP compliance (Aardoom et al., 2020).

Currently, studies are focused on the short-term implications of one year or less.

Chen et al. (2020) conducted a meta-analysis of CPAP compliance regarding supervised CPAP titration versus auto-titration and if *care as usual* versus telemedicine interventions impacted CPAP compliance. Their meta-analysis included 19 studies and 2,464 patients and only included randomized control trials (RCTs) that compared telemedicine versus *care as usual*. After reviewing the included studies, Chen et al. concluded that with an average nightly usage of 5.1 hours for the telemedicine group and only 4.9 hours a night for the *care as usual* group, telemedicine interventions increased overall CPAP compliance.

Telemonitoring

Hoet et al. (2017) conducted an RCT to weigh the usefulness of telemonitoring in delaying the first technical intervention after CPAP therapy had been started. The secondary goal was to assess if telemonitoring increased CPAP compliance. Study participants were randomized into two groups, either usual care without telemonitoring or with telemonitoring for CPAP follow-up. Forty-six patients met the inclusion criteria. While the primary focus of this study was to evaluate the impact of telemedicine on the delay to technical intervention, the secondary focus was on telemedicine's impact on CPAP compliance. The study showed that the telemedicine group had greater adherence to CPAP therapy after 3 months; 82% of the telemedicine group was found to be compliant with therapy, compared to 64% of the usual care group (Hoet et al., 2017). For the telemonitoring group, the time to first intervention was markedly shorter at 29 days versus 47 days for the usual care group (Hoet et al., 2017). This study confirms that telemedicine interventions increase CPAP compliance in adults with OSA and shortens the time to first intervention. Additional research is needed to assess long-term telemedicine interventions.

Hwang et al. (2018) presided over an RCT examining telemedicine's effects on OSA education and CPAP telemonitoring with automated patient feedback messaging on CPAP adherence. The researchers aimed to determine the effectiveness of automated telemedicine interventions to improve CPAP adherence. Four telemedicine interventions were evaluated: (a) an online-based OSA education series, (b) CPAP monitoring with automated patient feedback, (c) patients who received both the online OSA education and CPAP monitoring with automated feedback, and (d) *care as usual*. CPAP usage was evaluated 90 days after interventions were administered. While the telemedicine group who received online OSA education did not show an increase in CPAP usage when compared to the *care as usual* group, with an average usage of 5.2 hours, they did have a higher clinic appointment adherence rate. The group who received automated CPAP usage had an average nightly use of 5.3 hours, which is a slight increase over the *care as usual* group. The group who received both had an average nightly usage of 5.8 hours (Hwang et al., 2018). The evaluation showed that telemedicine interventions did increase overall CPAP adherence.

Cost-Effectiveness

Lugo et al. (2019) conducted an RCT to evaluate if an off-site virtual sleep unit (VSU) utilizing telemedicine interventions was an acceptable intervention for patients with suspected OSA or an official diagnosis of OSA and if it would increase therapy compliance. The researchers investigated if telemedicine interventions would be a cost-effective option for increased therapy compliance. Patients were randomized into two groups: Hospital routine (face-to-face visits at 3, 6, and 12 months) or the VSU. Clinical improvement was evaluated by administering the Epworth Sleepiness Scale and the Quebec Sleep Questionnaire pre- and post-intervention. The cost-effectiveness of the interventions was assessed by a Bayesian analysis

based on quality-adjusted life years, with re-evaluation occurring 30 days after the initial intervention. The VSU had total costs of $557.54\text{€} \pm 63.21\text{€}$ for total care costs and $264.54\text{€} \pm 28.49\text{€}$ for OSA related costs. The hospital routine group had total costs of $710.88\text{€} \pm 85.27\text{€}$ and OSA related costs of $412.03\text{€} \pm 48.27\text{€}$ (Lugo et al., 2019). Lugo et al. concluded that VSU was a cost-effective intervention. The VSU group was shown to be more cost-effective, with a probability higher than 78%. There was no measurable increase in CPAP adherence; however, further research is needed.

Comorbidity Reduction

Pépin et al. (2018) conducted an RCT to gauge the capability of utilizing remote telemonitoring to assist in the reduction of blood pressure in patients with OSA on CPAP therapy, who also had high cardiovascular risk factors. Study participants were recruited from 32 sleep centers in France. There were two study arms: a usual care group and a group with interdisciplinary follow-up care based on remote telemonitoring. Inclusion criteria were adult patients age 18 years and older with an apnea-hypopnea index of 30 or more. Participants also had a minimum of one risk of having a cardiovascular event. Evaluation of the evidence showed that there was no distinction between the telemonitoring group and the usual care group in the reduction of high blood pressure. The study did reveal, however, that CPAP adherence was significantly higher in the telemonitoring group than the usual care group (Pépin et al., 2018). While there was no improvement in high blood pressure for patients who received telemonitoring versus patients who received usual care, there was a significant increase in CPAP adherence for the telemonitoring group (5.28 ± 2.23 vs. 4.75 ± 2.5 hours). As has been noted with other studies, improved CPAP compliance improves outcomes for patients with cardiovascular risk and other comorbidities.

Summary/Synthesis of the Evidence

The studies revealed that telemedicine interventions increased CPAP compliance. Non-compliance is a common problem with CPAP therapy, and it is projected that 30% to 80% of patients are non-compliant (Hoet et al., 2017). A patient is considered CPAP compliant when they have used their device a minimum of 4 hours a night and used the device 70% of 30 nights in a consecutive 30-day timeframe (Hoet et al., 2017). The meta-analysis conducted by Aardoom et al. (2020) revealed that with telemedicine interventions, CPAP usage increased an average of 30 minutes a night. The multi-site RCT affirmed that the average CPAP usage was 5.28 hours nightly in the telemedicine group, compared to the usual care group usage of 4.75 hours a night (Pépin et al., 2018). At the single-site RCT, the telemedicine group averaged 5.7 hours nightly, versus the usual care group at an average of 4.2 hours per night (Hoet et al., 2017). Hwang et al. (2018) found that after 90 days of CPAP usage, study participants averaged 4.8 hours a night for the telemedicine group, compared to the usual care group, which averaged 3.8 hours a night.

Based on the evidence review, telemedicine can be a powerful tool used to increase CPAP compliance in adults with OSA. Increased CPAP usage is associated with overall better health outcomes and improved quality of life.

Rationale

The health promotion model (HPM), developed by Dr. Nola Pender, was the theoretical model used for this change in practice project. Dr. Pender published her HPM in her book *Health Promotion in Nursing Practice* in 1982, which was revised in 2006 (Alligood, 2017). There are three main components to Pender's HPM: individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcome (Alligood, 2017).

In assessing patients for MOSA treatment, the first component of the HPM assisted in examining biological and psychological factors that can influence the acceptance of the health promotion interventions. The behavior-specific and affect part helped determine how accepting of change the patients were. Lastly, the behavioral outcome helped to measure compliance with the intervention and acceptance of the response.

The behavior-specific and affect components of the HPM helped in the design phase of this project with the identification of variables to measure outcomes in patients with MOSA. One variable to measure was barriers or perceived barriers to change. Measuring these variables guided interventions and individualized care for each patient, as these are not the same for each individual.

Section III: Methods

Context

The sleep medicine service line at VA Puget Sound diagnoses and treats problems related to sleep, including trouble sleeping, breathing difficulties while sleeping, snoring, teeth grinding, and jaw clenching. The outpatient clinic is staffed by 10 doctors, one psychologist, five respiratory therapists, two registered nurses (RNs), and four administrative support staff. There is an additional five support staff for the sleep lab. All sleep medicine services are provided at the Seattle campus, while the American Lake campus is reserved for the CPAP therapy clinic and behavioral health sleep classes.

Stakeholders for this intervention included the administrative officer for the sleep medicine clinic to evaluate access to care and to create clinic grids for scheduling, sleep medicine RNs to undergo training on alternative therapy options for OSA, respiratory therapists to provide education on CPAP devices and alternative therapy options for RNs, VA-ECHO sleep

medicine medical director for assistance in gaining buy-in from sleep medicine staff, sleep medicine physicians to answer clinic questions as they arise, and information technology to assist in the set-up of telemedicine technology for RNs.

Interventions

To implement this intervention, an RN in the VA-ECHO sleep medicine clinic utilized an evidence-based toolkit that consisted of a script for counseling sessions, examples of the mandibular device, and a CPAP machine with masks. The physicians developed a list of 30 patients who met inclusion criteria based on their home sleep study results. The physician then forwarded the list to the RN to verify that inclusion criteria were met through chart review. The RN then forwarded the list to the medical support assistant, who scheduled the patients into the telemedicine RN clinic. The RN video called the patient at their scheduled appointment time and educated the patient on their sleep study results, the implications of a diagnosis of MOSA, and their therapy options (see Appendix D). In the event of a technology failure, the appointment would have been conducted over the phone. Appointments did not exceed 30 minutes. The RN cosigned the physician in the encounter notes for the final review and sign-off. If the patient requested an appointment with the sleep medicine provider to discuss their options further, the RN entered the order for the patient to return to the clinic for a face-to-face encounter. At the 90-day mark, the RN reviewed the patient chart. For patients who elected CPAP therapy, their usage was remotely downloaded for the RN to review. A patient satisfaction survey was administered via telephone to assess their thoughts on the telemedicine appointment and to assess therapy compliance. This was conducted at the 90-day mark.

Gap Analysis

Numerous project management tools were utilized in planning this telehealth implementation. A gap analysis was conducted to discover the gap in the current *care as usual* model (see Appendix E). The gap analysis was broken down into the current process, the process step, recent result, desired result, and action items. The current *care as usual* process consists of a letter mailed to the patient, which results in therapy compliance 10% below the desired result. Evidence suggests that action in the form of telemedicine counseling sessions with RNs provides an increase in patient education and a reduction in the gap in performance.

Gantt Chart

A Gantt chart was utilized to provide a visual outline of the proposed telehealth implementation and who was responsible for each actionable item (see Appendix F). The tasks listed in the initiation section are the identification of the need for this Doctor of Nursing Practice (DNP) project and the identified stakeholders needed to ensure buy-in is obtained. The planning section includes the screening of patients for inclusion criteria, RN verification of eligibility, and scheduling of patients by the medical support assistant. Tasks related to implementation are the RN conducts telemedicine appointment, and the physician reviews encounter. Evaluation of the telehealth implementation includes a chart review, therapy compliance, and administration of patient satisfaction surveys (see Appendix G).

Work Breakdown Structure

The work breakdown structure (WBS) was completed to break down the tasks of the project into smaller deliverables (see Appendix H). Initiation, planning, implementation, and evaluation were identified as the first tier of this DNP project.

The initiation phase of the WBS involved identifying the need for the proposed telehealth implementation. The sleep medicine medical doctor (MD) realized that there was poor CPAP therapy compliance and proposed a change to the *care as a usual* model to improve compliance. Stakeholders were identified by the DNP student, who then solicited the buy-in of those identified.

The WBS planning phase included the MD identifying patients who met pre-determined inclusion criteria. Inclusion criteria were determined as patients with an apnea hypoxia index of <15 and a respiratory disturbance index of <15 with WatchPAT (portable apnea test) home sleep study or lab-based sleep study conducted at VAPSHCS within the last 12 months. The RN then verified eligibility by chart review, and the completed list was given to the scheduling clerk for scheduling.

Implementation of the telehealth implementation included the telemedicine appointment with the RN, where the patient received counseling on their diagnosis and treatment options. The MD reviewed the encounter and cosigned the note, making recommendations, if necessary. The RN then updated the patient on any changes to their plan of care.

Evaluating the telehealth implementation consisted of a chart review by the RN 90 days after the initial encounter. A follow-up counseling session with the RN also occurred at the 30-day mark with a patient satisfaction survey.

Responsibility/Communication Plan

The communication plan details the type of communication, reason for the communication, medium, frequency, audience, owner of the task, and any deliverables and the format in which they were delivered (see Appendix H). Types of communication include meetings and status reports. With the impact of COVID-19 and the need to physically distance

for safety, communication was limited to Skype video/audio calls and email. The frequency of updates varied from one time to weekly. The audience was identified as members of the intervention team and stakeholders, with the DNP student as the owner of all tasks. Meeting agendas, minutes, and updated project schedules were sent via email.

Communication with the administrative officer was imperative for this telehealth implementation, as they are responsible for building the clinic grids in which patients are scheduled. Access to care and balancing the availability of administrative support staff and intervention staff was a high priority. The telehealth RN kept open communication with the administrative officer to address any issues as they arose.

The telehealth RN communicated frequently with the sleep medicine RN. The sleep medicine RN's learning needs were continuously evaluated and assessed, and changes were made to the learning plan, if needed. The two RNs worked together to develop a training plan that encompassed the learner's needs.

Respiratory therapists were also identified stakeholders. They played a key role in the adherence of Veterans who participate in CPAP therapy. Respiratory therapists provided education to not only Veterans but also staff on techniques to help increase therapy compliance.

The sleep medicine medical director played a vital role in this telehealth implementation by providing supervision to all staff and serving as a subject matter expert in the clinic. The medical director was a point of contact who had the final say and input on the telehealth implementation.

Communication with the IT department was frequent, as they supplied and set up the equipment needed for the telemedicine clinic, which included a laptop, virtual private network, soft phone, and webcam. They set up all equipment and troubleshoot, when needed.

SWOT Analysis

A strengths, weaknesses, opportunities, and threats (SWOT) analysis was conducted in preparation for the proposed telehealth implementation (see Appendix J). The SWOT analysis is a tool used to assess the aspects of the intended project. The SWOT analysis evaluates the resources on hand, the organizational advantages, and how to reduce the chances of failure by identifying what may be lacking and eliminate potential hazards.

The organizational strengths identified for this DNP project included the availability of healthcare experts. The facility has multiple board-certified sleep medicine physicians. Respiratory therapists with expertise in CPAP therapy work closely with the Department of Sleep Medicine. This DNP project increased access to specialty care for patients and provided a cost-effective intervention. With the *care as usual* model, patients potentially would have to travel long distances for appointments and be reimbursed for their miles traveled and the cost of the hotel. This project saved the patients time traveling to appointments and facility expenses.

Additional strengths included an increase in therapy compliance. When patients make educated decisions regarding their healthcare, they have improved outcomes (Mehrtash et al., 2019). Patient satisfaction also increases when the patient is given the knowledge to make sound decisions (Broström et al., 2016). There is an interest in telemedicine, with younger generations of healthcare providers and patients eager to utilize new technologies.

One organizational weakness identified in the SWOT analysis was the availability of staff. There is no plan to hire staff dedicated to the implementation of this project, so this task was added to the staff's current workload. The telehealth implementation is technology-dependent, meaning telemedicine clinics can be interrupted due to network outages or

connectivity issues. Patient lack of technical skills is also a weakness. When patients do not understand how to use telemedicine services, it can reduce utilization and impede accessibility.

The external opportunities for this DNP project included the expansion of telemedicine interventions by the Centers for Medicare and Medicaid (CMS, 2020), which has allowed more comprehensive access to various services. The VA was a recipient of \$17.2 billion through the Corona Virus Relief and Economic Security Act (CARES; Office of Public and Intergovernmental Affairs, 2020). Part of the CARES Act funds has been utilized for the expansion of telemedicine infrastructure in an effort to accommodate the increased need to provide care to patients. This is more relevant than ever while we are currently in a global pandemic and need to reduce exposure to COVID-19 to vulnerable populations.

Threats to the success of this DNP project include the rapid advancement of technology. In many cases, the rate of innovation is outpacing the VA's ability to keep abreast of the latest developments and their potential impact on how appointments are conducted. Tools utilized today may quickly become obsolete as technology advances at a rapid pace. With any business that occurs utilizing the internet, there is the potential for security breaches, which may deter patients from wanting to participate in telemedicine interventions. Government funding can also vary, with no guarantee that any given program is allotted the same amount of funds per year.

Budget and Financial Analysis

The cost of implementation required hiring one staff RN for one FTE (full-time employee). The RN should be a nurse level III step one or higher. This FTE at step one is paid at a rate of \$96,302 annually. In addition, 30% of the base salary (\$28,890) is allotted for benefits, and new employee orientation costs \$30,000. This would make first-year expenses totaling \$155,192, and costs in year two would be \$125,192 (minus orientation costs). Beginning in year

three, the costs would increase as the RN would be awarded their time in grade step increase, which would increase their salary to \$99,191, making year three expenses \$128,081.

The average cost per stay for a patient with chronic heart failure (CHF) at the VAPSHCS is \$16,313 per day, with an average length of stay of 4.62 days, for a total cost per average length of stay of \$75,366 ($\$16,313 \times 4.62$). The average number of primary care follow-up visits is six, with a cost of \$6,614 per visit, and an average total cost for outpatient follow-up of \$39,684 ($6 \times \$6,614$). The total cost of care from admission to follow-up care is \$115,050 ($\$75,366 + \$39,684$). Of the 4,877 total admissions for the fiscal year 2020, 212 of those admissions were for CHF. Total cost of those admissions was \$24,390,600 ($\$115,050 \times 212$).

Observational studies show that OSA may lead to adverse cardiovascular consequences, such as hypertension, heart attack, and stroke (Ronksley et al., 2011). Also, OSA and type II diabetes mellitus (DMII) often coexist, and it is estimated that as many as 50% of patients with OSA also have DMII. Patients with OSA also utilize twice the number of hospital resources than patients without OSA (Ronksley et al., 2011). In a study of 181 patients with OSA, the data showed that OSA patients utilized twice the non-OSA patients' resources over 10 years (Ronksley et al., 2011). Evidence suggested that treating OSA can result in future medical cost avoidance by reducing overall healthcare utilization, as patients report improvement in their overall quality of life and experience reduction of symptoms related to comorbidities.

The implementation of the RN sleep medicine coordinator was to produce savings/cost avoidance over time by reducing the development of comorbid conditions associated with MOSA, resulting in a cost avoidance that benefited the healthcare system. If just two patients who were followed by the RN coordinator did not develop CHF, the cost avoidance would be \$230,100 ($\$115,050 \times 2$). I would anticipate the cost avoidance to increase over time as the RN

coordinator continues to counsel and follow patients. Specifically, cost avoidance for year one would be \$74,908, year two would be \$490,200, and year three would be \$687,411, with total cost savings over three years of \$1,892,535. The implementation of the RN coordinator to conduct counseling sessions for patients with a new diagnosis of MOSA has the potential for significant future cost avoidance, increased access to care, higher therapy compliance, and increased patient satisfaction. See Appendix K for return on investment and cost benefit analysis.

Study of the Interventions

The outcomes of this change of practice project were assessed by administering a patient survey to evaluate the patient's satisfaction with the video appointment and the education they received. Therapy compliance was measured via usage reports, body mass index, and patient self-reports. Pre- and post-implementation reimbursements were evaluated to determine the ongoing feasibility of the telehealth implementation. A round table discussion was conducted with stakeholders and ancillary staff to discuss the pros and cons of telehealth implementation, how workflows were impacted, and long-term feasibility.

The RN telemedicine clinic was the intervention chosen to address the therapy issue because it would provide in-depth education to Veterans that would allow them to make informed decisions about their care. A telemedicine clinic was chosen as it would not impact access to care for Veterans with more complex sleep medicine needs. There is also limited office space at both the Seattle and American Lake campuses, so this telehealth implementation was designed to be a telework position that required an RN III for the role. To assess the impact the telehealth intervention had on therapy compliance, a follow-up survey was administered for patients in both the telehealth implementation group and the *care as usual* group. For Veterans who elected CPAP therapy, their usage data were remotely downloaded for review. To determine

if the outcomes were due to the telehealth implementation, outcome data were compared between the telehealth implementation group and the *care as usual* group.

Outcome Measures

At 90-days post-implementation, the RN reviewed the patient chart for the compliance outcome measure. For patients who elected CPAP therapy, their usage was remotely downloaded for the RN to review. A patient satisfaction survey to assess the patient satisfaction outcome measure with the counseling session and to assess therapy compliance was also conducted at 90 days post-implementation. The RN nurse coordinator continued to follow patients and assess their therapy compliance every 6 months thereafter.

CQI Method and/or Data Collection Tools

A qualitative survey, consisting of five questions for patients who did not elect CPAP therapy and eight questions for those who did, was administered by telephone to assess patient satisfaction with the telemedicine appointment and the education received (see Appendix G). Survey respondents were tracked via a password-protected Excel spreadsheet. Each respondent was assigned a numerical identifier for tracking purposes, which was a measure implemented as part of the project design to protect personal patient identifiers in the event of a data breach.

Analysis

Patients who received the *care as usual* model had their CPAP usage reports downloaded and evaluated. The data were compared to patients who participated in the telemedicine intervention and chose CPAP therapy for their treatment. Therapy compliance was assessed via usage reports for CPAP and patient self-reports. The patient satisfaction questionnaire was administered via telephone by the RN nurse coordinator.

The goal of the statistical analysis was to make a comparison between the patients in the telehealth implementation and the *care as usual* group. The variables in the comparison were the outcome measures of patient satisfaction and compliance. An analysis that included descriptive and inferential statistics was performed. Minimum, maximum, mean, standard deviation, and variance were calculated using survey data imported to Qualtrics. A detailed statistical analysis is available in Appendix L.

Data analysis was performed using Excel *t*-tests to compare the patient satisfaction and therapy compliance outcome measures of the patients in the telehealth implementation group to the *care as usual* group. The analysis also used G-Power software to determine the effect sizes and statistical significance. A power analysis was done to identify the sample size needed to determine statistical significance.

Ethical Considerations

A letter of support, which identifies the project and grants permission to use the agency name in presentation and publications, was obtained during the planning phase of this quality improvement project (see Appendix M). The statement of determination was completed, and based on the evidence-based change of practice project checklist, Institutional Review Board (IRB) review was not required (see Appendix N).

A non-research application for this quality improvement telehealth implementation project was submitted to the Office of Transformation, Quality, Safety and Value department on October 26, 2020 and was approved by the director on November 8, 2020. This quality improvement project had a targeted benchmark (therapy compliance increase of 10%) and no control comparison was needed. The project success was defined by attainment of the goal upon

repeated tweaks rather than demonstration of superiority compared to a control, and it was determined based on the application that IRB approval was not needed.

When conducting any type of transaction online, there is an inherent risk to privacy. A primary privacy concern is the security of the patient's information. Risks to patient privacy include losing control of the data collected, how the data are used, and how the data are shared. The VA utilizes industry-standard encryption, including Secure Socket Layer (SSL) technology. In addition to SSL technology, the VA uses software programs to monitor network traffic to identify unauthorized attempts to upload information. These online safety measures ensure Veterans can feel confident in utilizing the telehealth initiatives the VA offers.

The University of San Francisco's (USF, n.d.) Jesuit values include *cura personalis* (care of the whole person), *people for others* (services to others), and commitment to diversity. This telehealth implementation speaks to the *person for others* Jesuit value (USF, 2020). Nurses lead a life of service to the patients we provide care to. This telehealth implementation speaks to that value, as we provide a service, in this case, patient education, that enables the patient to make an educated decision on their healthcare.

One of the provisions of the American Nurses Association's (2015) Code of Ethics is the promotion of personal health and well-being. This telehealth implementation aligns with this provision, as it focuses on patient education, allowing the patient to make the appropriate treatment option based on their lifestyle and individual circumstances. Patients experience better outcomes when they can make educated decisions about their care.

To provide psychological safety to Veterans who participated in the telehealth implementation, ensuring the Veterans felt comfortable discussing their healthcare was paramount. Veterans were given the option to participate in the telemedicine clinic and were

offered an appointment in the clinic with a provider if that worked best for them. During the telehealth implementation, Veterans were encouraged to ask questions as they came up. The intervention allowed for a personal one-on-one experience with the Veteran and the RN, and the Veteran was thanked for their participation and interaction. They were also provided direct contact information for the RN should questions arise at a later date, and they were also set up with secured messaging if they were not already utilizing it. Every effort was made to ensure that Veterans felt they were a priority and that their healthcare was important.

Section IV: Results

This DNP project was the implementation of a process improvement project aimed at improving therapy compliance and patient satisfaction for patients with a new diagnosis of MOSA. This telehealth implementation project was designed to help the Department of Sleep Medicine refine and evaluate using an RN to perform a specific subset of uncomplicated study results, notification of diagnosis, and patient education. The *care as usual* group was utilized to provide data to guide practical site-specific staffing decisions.

Of the 30 participants in the telehealth implementation, only 16 patients participated in the follow-up evaluation and survey. Three attempts were made by telephone on three different days to conduct follow-up. A voice mail message was left, when able, asking for a return call. The average age was 49.6 years. Twenty-seven participants were male, and three were female. Eighteen participants elected CPAP therapy, nine patients chose Zzoma positional pillow, one patient chose NightBalance positional aid, and one patient declined all therapy.

In the *care as usual* group, 16 patients participated in the follow-up evaluation and survey. The average age was 44.7 years. Eight participants were female, and 22 were male.

Twenty-six patients elected CPAP therapy, two patients chose Zzoma positional pillow, and two patients declined all therapy.

None of the patients who elected Zzoma or NightBalance in the telehealth implementation group or the *care as usual* group was compliant with therapy. Patients described the positional aids as “rock hard,” “extremely uncomfortable,” and “unforgiving.” Of note, upon follow-up, all patients in the telehealth implementation group who elected the positional devices were asked to initiate CPAP therapy.

The telehealth implementation group had 11 patients who elected CPAP therapy. Upon review of their usage history, only two patients were compliant with therapy (18%). The *care as usual* group had 16 patients who elected CPAP therapy, and three of those patients were compliant (18.8%). The aim statement goal was a 10% increase in compliance, and this goal was not met.

Patient satisfaction was rated higher for the telehealth implementation group than the *care as usual* group, based on the satisfaction survey: 96% of respondents in the intervention group were satisfied with their care, while only 74% in the *care as usual* group were satisfied with their care. Patient satisfaction met the aim statement goal of a 10% increase in patient satisfaction.

Independent *t*-tests were performed to compare the patient satisfaction and therapy compliance outcome measures of the patients in the telehealth implementation group to the *care as usual* group. An alpha of 0.5 was used for all statistical tests. Significant differences were noted in self-reported improvement of sleep apnea (.003), likelihood to continue treatment (0.022), desire to know more about sleep apnea (0.0001), and desire to know more about additional treatments (0.002). The *p*-value for these questions was less than .05, making the

results statistically significant. The effect sizes for self-reported improvement of sleep apnea ($d = 2.10$) and desire to know more about sleep apnea ($d = 3.68$) were small. A small effect size can indicate limited practical application. The effect size for the remaining questions and therapy compliance showed no effect and were not statistically significant due to sample size. A power analysis determined that the smallest sample size needed to generate the desired level of significance was 50.

Section V: Discussion

Summary

Key findings show that evaluation of the telehealth implementation did not support a significant increase in therapy compliance and did not satisfy the aim statement goal of 10% increase in compliance. However, patient satisfaction in the telehealth implementation group was 22%, which exceeded the aim statement goal. Veterans in the telehealth implementation group reported increased satisfaction with their experience over the *care as usual* group. Veterans in the telehealth implementation group reported they had a good understanding of their diagnosis and the treatment options available to them.

The telehealth implementation showed that both the RN and the Veterans viewed their interactions as positive. The Veterans received dedicated education that explained their diagnosis, disease process, and therapy options available to them. The RN also understood the importance of education and therapy interventions and was able to provide a service that was unique to the needs of the Veterans. The fact that the intervention was telemedicine intervention was also popular with the Veterans, and they expressed they felt their care needs were being met in uncertain times due to COVID-19.

It was clear when doing the follow-up survey that Veterans really appreciated the attentive care they received. The Veterans were very engaging and asked valuable questions. Veterans in the telehealth implementation group offered feedback that was all positive. The telehealth implementation showed that when given the opportunity, Veterans will engage in one-on-one care.

This telehealth implementation allows the RN to work at a high level of autonomy. This position allows the RN to make decisions on educating Veterans and how to meet their education needs. The RN has the ability to communicate and organize their work to ensure they have the freedom to act on nursing decisions using sound clinical judgment.

The role of the RN coordinator was requested and approved by facility leadership, and at the time of this writing, has been filled. Increased funds for staffing were provided by the CARES Act to all VA medical centers. The facility requires a full staffing methodology process to be conducted at least every 2 years. Generally, the facility associate director for patient care services, chief nurses, and the staffing methodology coordinator establish a timeline to evaluate the staffing plan annually or more frequently, when needed. The COVID-19 pandemic triggered a review of staffing; as units were combined, a large number of staff retired, and surge planning caused staffing realignments in many areas. Due to the increase in funding and the potential for significant savings, as shown on the return on investment covering a staff nurse salary, the position was approved.

Interpretation

Telemedicine has the potential to increase MOSA therapy compliance. Educating patients on what MOSA is, the implications of the diagnosis, and their therapy options allows them to make informed decisions about their care. Utilizing an RN to follow-up with the patients early

into the initiation of therapy allows for the early identification and resolution of problems related to therapy compliance. The early resolution of therapy compliance prevents the progression of MOSA and also increases access to care for other, more complex patients.

Patient satisfaction in the telehealth implementation group was higher than the *care as usual* group. Patients expressed that they felt supported in the decisions made, and if they had questions about other therapy options, there was a person they could reach out to. These patients were also more accepting of trying supporting interventions, such as switching to CPAP therapy or participating in CPAP sensitization classes.

Limitations

As with any process improvement project, there are unexpected risks and barriers that may become apparent during telehealth implementation. As healthcare is ever-changing, especially amid a global pandemic, access to licensed healthcare providers could become an issue. During this pandemic, doctors, nurses, and ancillary staff have been reassigned to plan for a surge in acutely ill patients. The advantage of this project is that it aims to implement video appointments, where patients can still receive high-quality healthcare without the risk of exposure to a highly contagious virus. A strong case can be made that personnel remain available for this telehealth implementation based on limiting exposure of both patients and staff.

The selection of participants was a limitation. The telehealth implementation group had an increased number of Veterans who selected therapy options other than CPAP, while the *care as usual* group had a very limited number who selected an alternative. Survey responses were barely over half, as each group only had 16 Veterans participate in the follow-up survey. Standard contact protocol was used to try and increase participation. All Veterans were contacted

by telephone three times on three separate occasions. HIPAA compliant voice mail messages were left, when able, with the direct contact information for the RN.

Follow-up survey results may have been skewed, as the survey was administered by telephone. Should this quality improvement be reproduced in another service line, another form of follow-up, such as computer or paper survey, could be utilized. When speaking with patients in person, you run the risk of them not being forthcoming with their answers, where they might be more open if administered electronically or on paper. Follow-up by other means could also decrease responses, and this should be taken into consideration when weighing follow-up options.

Conclusions

Implementation of telemedicine clinics to improve MOSA therapy compliance and patient satisfaction has short-term and long-term implications. In the short-term, patient satisfaction with the overall experience of telemedicine improves. Patients see firsthand how telemedicine interventions can deliver top-notch healthcare that does not take the place of face-to-face appointments. These patients may then want to take advantage of other telemedicine interventions offered by the VA. Therapy compliance should improve, which would lead to increased reimbursements in the long term. There is a level of autonomy that comes with this DNP project. This telehealth implementation allows the RN to form relationships with patients and a degree of freedom to make clinical judgments, with physician oversight. The current *care as usual* model for patients with MOSA will become a thing of the past, should the data show positive outcomes. Veterans in the telehealth implementation group reported a high level of satisfaction with the counseling they received. Over time, when patients are engaged in the process of learning about their diagnosis and treatment options, they may become more

compliant. The implementation was relatively smooth, and the stakeholder team was very responsive to issues as they came up.

Further study is warranted to examine the long-term implications of the telehealth implementation. It would be interesting to see if the development of comorbid conditions, such as diabetes and heart failure, is reduced for patients who receive RN counseling for their MOSA. The providers in the sleep medicine clinic were very impressed with the telehealth implementation, as it has increased access to care for their more complex patients, and they expressed their desire for the RN MOSA coordinator to be a permanent member of the clinical staff.

The RN MOSA coordinator can easily be implemented in other clinics, such as urology for prostate-specific antigen education and tracking, ophthalmology for glaucoma, and primary care for patients with glycated hemoglobin between 5.7 and 7.0. The development of comorbidities can be greatly reduced by implementing an RN coordinator to educate patients on therapy options and to track their adherence.

Section VI: Funding

Funding for this project was provided by the CARES Act of 2020 (Office of Public and Intergovernmental Affairs, 2020). Each VA healthcare system was awarded varying amounts of funds to be utilized for various purposes, including the hiring of new staff. This FTE was approved upon request and filled with a nurse level III in September of 2021.

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Appendix A. Evaluation Table

Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice (Johns Hopkins Evidence Appraisal Research Tool Rating)
Aardoom et al., 2020	None	Systematic review	$n = 5,429$	CPAP: continuous positive airway pressure CAU: care as usual	Increase in average use per night of CPAP.	Cochrane Collaboration risk of bias tool Random effects model	CPAP compliance increased on average of 30 minutes per night when eHealth interventions were utilized, when compared to care as usual alone.	Strengths: Cochrane SR highest level of evidence Limitations: Limited to adult population Moderate to high heterogeneity Variance in care as usual Critical Appraisal Rating: IA
Chen et al., 2020	None	Systematic review	$n = 2,464$	TM: tele-monitoring SPT: supervised PAP titration HAPT: home auto-adjusting	CPAP compliance is higher in TM group when compared to CAU group, with mean difference of 0.68 hrs.	Mean deviation Odds ratios w/ 95% confidence interval Fixed-effect model	TM care is correlated to greater CPAP compliance when compared to CAU.	Strengths: Meta-analysis Limitations: Follow-up time varied in each study HAPT limited to patients with AHI > 30

				pressure titration AHI: apnea hypoxia index		Random effects model Funnel plots		Critical Appraisal Rating: IA
Hoet et al., 2017	None	RCT	$n = 46$	CPAP: continuous positive airway pressure TM: tele-monitoring UC: usual care	TM group had better compliance compared to UC group at 3 months 5.7 h/night vs 4.2 h/night $p = 0.018$.	Mann-Whitney U unpaired test Bland-Atlman analysis	TM is associated with increasing compliance at 3 months.	Strengths: Adequate power Limitations: No cost calculation Nursing time spent with patients was not measured Critical Appraisal Rating: IB
Huang et al., 2018	None	RCT	$n = 1,455$	Tel-Ed: web-based OSA education Tel-TM: CPAP tele-monitoring w/automated patient feedback UC: usual care Tel-Ed + Tel-TM: Tel-Both	90-day CPAP usage. Attendance to OSA evaluation. Change in sleep score (Epworth Sleepiness scale).	Power analysis F -test one-way analysis of variance Mixed-effect general linear models Mixed-effect logical regression T -tests adjusted with Bonferroni correction	Tel-TM improved 90-day adherence in patients with OSA.	Strengths: Number of participants Adequate power Limitations: Study was at one site High number of drop outs Adherence not measured after 90 days Critical Appraisal Rating: IB
Lugo et al., 2019	None	RCT	$n = 186$	HR: hospital routine	Changes in Quebec Sleep Questionnaire.	T -test	CPAP compliance was similar in both groups. There was	Strengths: Adequate power

				VSU: virtual sleep unit	Changes in Epworth Sleepiness Scale. Changes in EuroQol Scale.	Two-sample <i>T</i> -test Non-parametric Mann-Whitney Chi-square Fisher's exact test PP sample	no statistically significant difference.	Large sample size Comparable baseline statistics in both groups Limitations: Conflicting results in quality-of-life surveys One diagnosis physician for both groups leads to possible bias Critical Appraisal Rating: IC
Pépin et al., 2018	None	RCT	<i>n</i> = 306	ITT: intent to treat TM: tele-monitoring BP: blood pressure SBP: systolic blood pressure	Reduction in BP. Pichot Fatigue Scale. CPAP compliance.	Logistic and linear regression model Linear mixed effects model Nonparametric Mann-Whitney test	TM improves CPAP adherence and patient-centered outcomes as reported as improved quality of life and decrease in daytime sleepiness.	Strengths: Multi-site study (32) Patients had well-defined homogeneous phenotype of moderate to severe OSA Limitations: Sample size not reached Critical Appraisal Rating: IC

Appendix B. Literature Search Results by Single Keyword

Keyword	Article Yield
CPAP	4,495
CPAP therapy	637
CPAP compliance	168
CPAP adherence	261
Telemedicine	18,924
Telehealth	18,819
Telephone appointments	174
Video appointments	47
Remote monitoring	1,334

Appendix C. Literature Search Results by Combined Keywords

Combined Keywords	Article Yield
CPAP and telemedicine	33
CPAP and remote monitoring	4
CPAP compliance and telemedicine	5
CPAP compliance and remote monitoring	2

Appendix D. Intervention Script

STEP 1: Introductions

Dear Mr./Ms. X. This is calling from VA Puget Sound. I'm calling to discuss your recent home sleep study results. Is this a good time to talk?

STEP 2: Elicit the patient's concerns & goals for their sleep.

Before we talk about your results, I'd like to ask you a few questions. What caused you to get this sleep testing? What areas of your sleep would you (or your bedpartner) like to improve?

Typical OSA symptoms may include: daytime sleepiness or fatigue, nighttime awakenings (maintenance insomnia), nocturia, snoring disrupting patient or bedpartner, apneas disrupting patient or partner, nonrestorative sleep.

Evidence suggests that one of the best predictors of therapy adherence is the expectation of symptomatic benefit. Acknowledging this patient's specific sleep concerns is an important part of counseling. Make particular note of the patient's concerns and goals, so you can call them out later.

STEP 3: Describe sleep study results, briefly.

Now let's discuss your sleep study results. A sleep physician interpreted your study as mild sleep apnea. What do you know about sleep apnea?

Provide details to the level the patient requests.

Sleep apnea is a condition in which the airway relaxes during sleep. This relaxation leads to obstruction of the upper airway, called "obstructive sleep apnea." This obstruction of airflow can lead to snoring or breathing pauses.

Mild sleep apnea can disrupt your sleep and reduce the quality of your sleep. It may be responsible for some of the symptoms you're describing {mention items relevant to this patient, if you can}.

Some patients may want numbers or a description of indices.

We grade sleep apnea severity by a number called the Apnea Hypopnea Index, or AHI. This is a measure of how many times an hour your breathing is abnormal. Your Apnea Hypopnea Index was XX. This means your breathing was abnormal XX times an hour.

Grading scale

AHI <5 normal

AHI 5 to <15 mild

AHI 15 to <30 moderate

AHI >30 severe

We also look at your oxygen level during sleep. Your oxygen level remained normal during sleep

{Anyone with significant hypoxemia would not be mild OSA and would be excluded from this intervention}

STEP 4: Offer counseling on treatment options.

Mild sleep apnea may disrupt your sleep or reduce the quality of your sleep {call out any typical OSA symptoms elicited from veteran}. The interpreting sleep physician has recommended a trial of treatment to see if your symptoms improve.

What do you know about treatment options for sleep apnea? {eliciting their current knowledge may help you tailor your counseling. Then review each option as mentioned in the sleep study report}

#1: CPAP

CPAP is the first line and most effective treatment we have for sleep apnea. The device consists of a blower connected to a mask. This creates a steady column of air to stent your airway open at night. If you're interested in this therapy, we can refer you to our CPAP clinic to get a device and education. The VA covers the cost of this equipment if you receive it from the VA.

{If you have a device on hand, show it on video}

#2: Oral appliance

Another option for mild sleep apnea is an oral appliance. This appliance consists of an upper and lower plate that are connected to each other. The device works to push your lower jaw out slightly and keep your airway open at night when you sleep. To use this device, you need to have a healthy set of teeth to anchor the device.

{If you have a device on hand, show it on video}

If patient wants to pursue oral appliance, you must complete the following screening questions to ensure they are eligible. If you're unsure, ask the supervising MD before placing a referral.

- When was your last dental check, and did they mention any problems with your teeth?
- Do you wear dentures? *Full dentures are a contraindication- teeth are needed to anchor the appliance.*
- Do you need any restorative dental work? *Restorative dental work must be complete before referral. VA does not cover restorative dental work unless vet is dental SC (rare).*
- Do you have lockjaw or TMJ? *While not a contraindication, this could be aggravated by an oral appliance.*

#3: Lifestyle changes

Another option for mild sleep apnea is to focus on lifestyle changes. Losing just 10-15% of your body weight can significantly improve, and sometimes cure, mild sleep apnea.

Sleeping on your side may also help. You can find a side sleeper pillow. There are also medical devices that you can wear (a belt with a buzzer, or a belt with a soft bump) that gently reminds

you to move to your side. If you want to discuss these options, I can notify our supervising sleep physician.

If patient desires a positional aid, please cosign sleep MD and mention which aid the patient prefers (zzoma or Nightbalance)

#4: Sleep surgery

There are surgeries to treat sleep apnea, but they are major procedures and we generally don't recommend them as first line. If you want to talk more about this option or others we haven't discussed, I can help arrange a consultation with one of our sleep doctors.

#5: No treatment

If you're not particularly concerned about your sleep right now, you have the choice to opt out of treatment. You should know that sleep apnea can worsen over time, or as you gain weight or new medical conditions. If you decide not to pursue treatment, we would recommend repeat testing in 5 years, or sooner if you develop symptoms.

STEP 5: Elicit patient's preferred treatment.

OK, now that we've discussed some options: which are you interested in?

Document patient's preference, enter appropriate orders, and cosign MD on your note.

1. CPAP: enter order to CPAP clinic. Reference the sleep study note, which should have specific order settings. If no order settings available, cosign sleep MD to your note and request that they enter a note addendum with specific settings.
2. Dental: enter referral to Dental.
3. Lifestyle changes: no order needed. Cosign sleep MD if patient wants a positional sleep aid. Sleep surgery or other options or just wants more discussion: enter order to sleep provider clinic

Appendix E. Gap Analysis

Process	Process Step	Current Result	Desire Result	Action Items
Current Care as Usual	Letter sent to patient educating them they have a new diagnosis of Mild Obstructive Sleep Apnea (MOSA) and to call CPAP clinic to initiate CPAP therapy.	Compliance with MOSA therapy is below Medicare Compliance rate which is greater than 4 hours a night for 70% of night over a 30-day period.	Increase MOSA therapy compliance by 10% by implementation of a telemedicine clinic where counseling is provided to patients on their MOSA diagnosis and available treatment options.	Identify patients who meet inclusion criteria. Develop educational script. Establish telemedicine appointments. Acquire examples of MOSA therapy options (CPAP, mandibular device, Zzoma pillow, NightBalance).

Appendix G. MOSA Patient Satisfaction Survey

1. Since your last sleep study on XXX date, how are your sleep apnea symptoms?
 - a) Improved
 - b) No Change
 - c) Worse
2. Did you start therapy for sleep apnea? (Yes or No)
3. If so, what treatment did you start?
4. How likely are you to continue this treatment?
 - a) Very likely
 - b) Somewhat likely
 - c) Somewhat unlikely
 - d) Very unlikely
5. Finally, we would like to see if there are topics you would want to know more about.

For each prompt, please rate how important each is for you.

- I. I need to know more about...what causes sleep apnea.
Would you say that you:

- a) Do not agree
- b) Somewhat agree
- c) Moderately Agree
- d) Very much agree

- II. I need to know more about... additional treatments for sleep apnea.
Would you say that you:

- a) Do not agree
- b) Somewhat agree
- c) Moderately Agree
- d) Very much agree

Complete the rest **ONLY** for those using CPAP.

6. I need to know more about... how to put together my CPAP machine.
Would you say that you:
 - a) Do not agree
 - b) Somewhat agree
 - c) Moderately Agree
 - d) Very much agree

7. I need to know more about...how to fit my CPAP mask.

Would you say that you:

- a) Do not agree
- b) Somewhat agree
- c) Moderately Agree
- d) Very much agree

8. I need to know more about...how clean my CPAP machine.

Would you say that you:

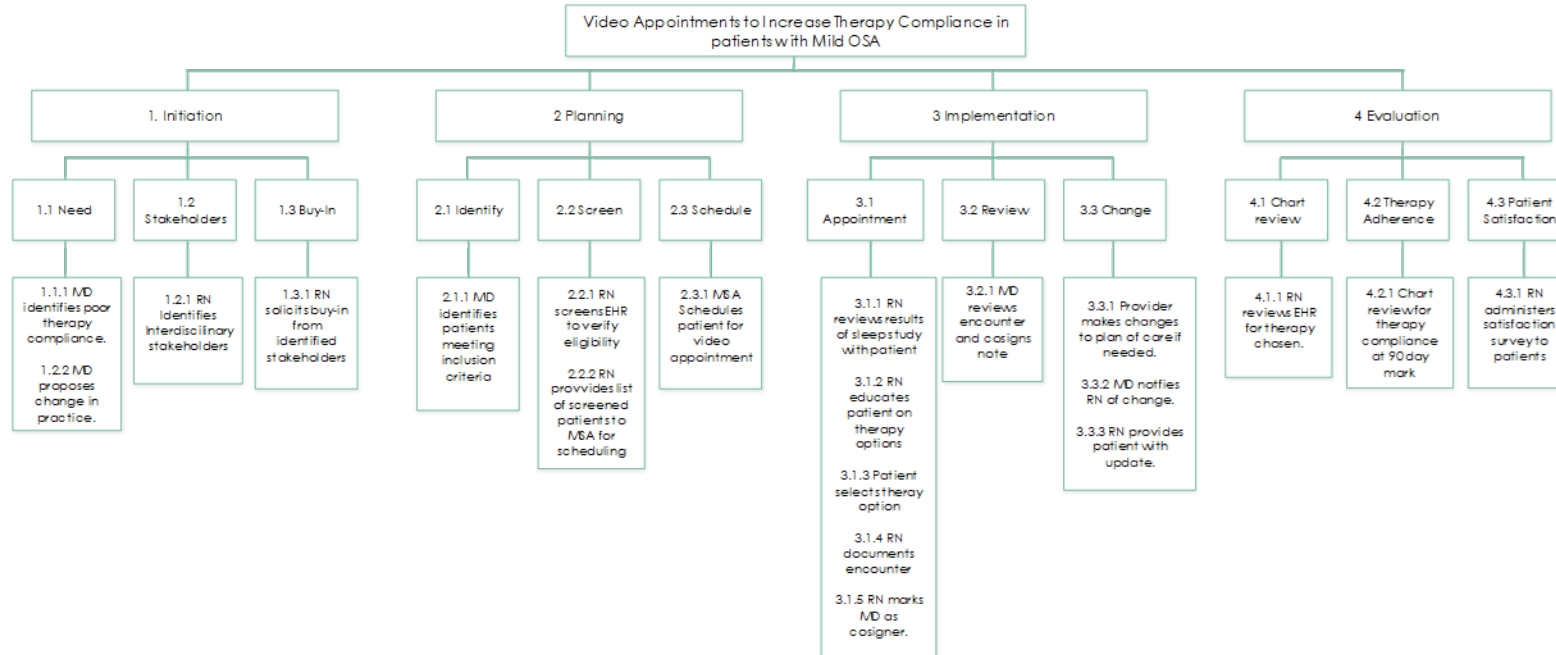
- a) Do not agree
- b) Somewhat agree
- c) Moderately Agree
- d) Very much agree

Appendix H. Work Breakdown Structure

WBS OUTLINE & DIAGRAM TEMPLATE



PROJECT TITLE	VVC for Mild OSA	COMPANY NAME	VAPSHCS
PROJECT MANAGER	TJP	DATE	23-Jul-20

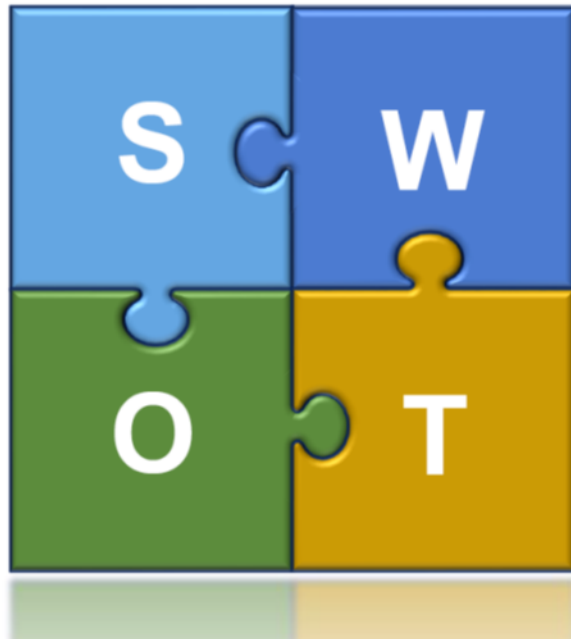


[CLICK HERE TO CREATE WBS OUTLINE & DIAGRAM TEMPLATES IN SMARTSHEET](#)

Appendix I. Communication Matrix

Type of Communication	Reason for Communication	Medium	Frequency	Audience	Owner	Deliverables	Format
Initiation Meeting	Introduce team to project goals and objectives	Skype	One time	Project team members	TJP	<ul style="list-style-type: none"> • Agenda • Meeting Minutes 	Word document via email with read receipt
Project Team Meeting	Review current status of PI project	Skype	Weekly	Project team members	TJP	<ul style="list-style-type: none"> • Agenda • Meeting Minutes • Project Schedule 	Word document via email with read receipt
Status Reports	Status of project to include activities, progress, costs, and any issues	Email	Monthly	Project team members	TJP	<ul style="list-style-type: none"> • Project Status Report • Project Schedule 	Email with read receipt

Appendix J. SWOT Analysis



STRENGTHS (+)

- Availability of healthcare experts
- Increased access to care
- Cost efficient
- Increased therapy compliance

WEAKNESSES (-)

- Technology dependent
- Staff availability
- Patient lack of technical skill

OPPORTUNITIES (+)

- CARES act funding for expansion
- Expanded telemedicine intervention coverage

THREATS (-)

- Funding
- Patient privacy
- Technology rapid advancement

Appendix K. CBA and ROI

YEAR	REDUCTION ON PATIENTS FROM PRIOR YEAR	CHF ADMISSIONS	NEW STAFF	COST PER PATIENT + NEW STAFF	SAVINGS FROM PREVIOUS YEAR	TOTAL COSTS OVER 3 YEARS
2020	0	212	0	\$24,390,600	0	\$73,171,800
2021	1 %	210	\$155,191	\$24,315,692	\$74,908	\$71,279,265
2022	2%	206	\$125,192	\$23,825,492	\$490,200	
2023	3%	200	\$128,081	\$23,138,081	\$687,411	
TOTAL SAVINGS OVER 3 YEARS						\$1,892,535

Appendix L. Statistical Analysis

Intervention Group (n=30)	Choice Count	Percentage %	Minimum	Maximum	Mean	Std Deviation	Variance
GENDER			1.00	2.00	1.10	0.30	0.09
Male	27	90.00%					
Female	3	10.00%					
Non-Binary/third gender	0						
Prefer not to say	0						
AGE			2.00	6.00	3.40	1.43	2.04
18-29	0	0.00%					
30-40	11	36.67%					
41-50	7	23.33%					
51-60	6	20.00%					
61-70	1	3.33%					
71 and over	5	16.67%					
Therapy Chosen			1.00	4.00	1.53	0.76	0.58
CPAP	18	60.00%					
Zzoma	9	30.00%					
Nightbalance	2	6.67%					
Declined therapy	1	3.33%					
Care as Usual Group (n=30)	Choice Count	Percentage %	Minimum	Maximum	Mean	Std Deviation	Variance
Gender			1.00	2.00	1.27	0.44	0.20
M	22	73.33%					
F	8	26.67%					
Non-Binary/third gender	0	0.00%					
Prefer not to say	0	0.00%					
AGE			1.00	5.00	2.73	1.26	1.60
18-29	5	16.67%					
30-40	11	36.67%					
41-50	4	13.33%					
51-60	7	23.33%					
61-70	3	10.00%					
71 and over	0	0.00%					
Therapy Chosen			1.00	4.00	1.27	0.77	0.60
CPAP	26	86.67%					
Zzoma	2	6.67%					
Nighbalance	0	0.00%					
Declined therapy	2	6.67%					

Statistical Analysis: P-value, Effect Size, and Power Analysis

	<i>P</i> -value	Effect Size	Effect	Minimum Sample Size to Determine Statistical Significance
Question 1	0.00379*	2.103185	Small	
Question 4	0.02186*	0.9404162	None	
Question 5.1	0.000117*	3.678732	Small	
Question 5.2	0.001742876*	1.778104	None	
Compliance	0.234698993	0.892687	None	
Power Analysis				50
The alpha of .05 was used for all statistical tests *Denotes statistically significant $p < 0.05$				

Appendix M. Letter of Support



DEPARTMENT OF VETERANS AFFAIRS
American Lake Veterans Administration
Medical Center
9600 Veterans Dr. SW
Tacoma, WA 98493

July 24, 2020

Dear Sir/Madam:

This is a letter of support for Tracy Partington to implement her DNP Comprehensive Project titled "Video Appointments to Increase Therapy Compliance in Patients with Mild Obstructive Sleep Apnea" at the Veterans Health Administration Puget Sound.

We give her permission to use the name of our agency in their DNP Comprehensive Project Paper and in future presentations and publications.

Regards,

A handwritten signature in black ink that reads "Elizabeth Parsons".

Elizabeth Parsons, MD, MSc
Medical Director, Sleep VA-ECHO Program
VA Puget Sound Healthcare System
1660 S Columbian Way, Seattle WA 98108

Appendix N. Statement of Non-Research Determination



DNP Statement of Non-Research Determination Form

Student Name: Tracy Partington

Title of Project:

Video Appointments to Increase Therapy Compliance in Patients with Mild OSA.

Brief Description of Project:

To implement a change of practice intervention to improve therapy compliance for patients with a diagnosis of mild obstructive sleep apnea. RN will use a tool kit developed to be utilized with video appointments and outcomes will be measured by survey.

A) Aim Statement:

To increase patient satisfaction and therapy compliance by implementing video appointments with rural veterans in Washington state who have newly diagnosed mild obstructive sleep apnea using an evidence-based toolkit 10% by August 2021.

B) Description of Intervention:

Design and implement a structured process for video appointments with newly diagnosed patients with mild OSA. Video appointments will be designed to counsel the patients on their therapy options based on current evidence and recommendations from interdisciplinary stakeholders.

Video appointment will be approximately 20-30 minutes to educate about their sleep test results, treatment options, and elicit their choice of care (no treatment, CPAP, dental appliance, sleep provider eval to discuss more).

C) How will this intervention change practice?

Currently patients receive a letter in the mail with their sleep study results and are asked to contact the CPAP clinic to set up equipment for therapy. Patients are not educated on alternative therapies available. CPAP is the first line therapy, however it is costly and has poor compliance. The change in practice consist of a one on one patient video visit with an RN to review results and educate them on alternative therapy which may increase

therapy compliance.

D) Outcome measurements:

Patient satisfaction with appointment to be assessed by patient survey

Therapy compliance to be assessed via usage reports, BMI and patient self-reports.

Pre and post-intervention reimbursement to determine ongoing feasibility

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:

<http://answers.hhs.gov/ohrp/categories/1569>

This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST *

Instructions: Answer YES or NO to each of the following statements:

Project Title:	YES	NO
The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	x	
The specific aim is to improve performance on a specific service or program and is a part of usual care . ALL participants will receive standard of care.	x	
The project is NOT designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does NOT follow a protocol that overrides clinical decision-making.	x	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does NOT develop paradigms or untested methods or new untested standards.	x	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does NOT seek to test an	x	



intervention that is beyond current science and experience.		
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	x	
The project has NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	x	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	x	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: <i>"This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board."</i>	x	

ANSWER KEY: If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. **IRB review is not required. Keep a copy of this checklist in your files.** If the answer to ANY of these questions is **NO**, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

STUDENT NAME (Please print): Tracy Partington

Signature of Student:

DATE 06/15/2020

SUPERVISING FACULTY MEMBER (CHAIR) NAME (Please print):

Elena Capella

Signature of Supervising Faculty Member (Chair):

Date 07/15/2020