

**Education, Screening, and Follow Up to Reduce Obstructive Sleep Apnea
in a Prison Reentry Residential Community**

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Quality Improvement Project

Site of Project: Restoration Destination

Abstract

Obstructive sleep apnea affects an estimated 936 million people worldwide (Pivetta, 2021). Untreated OSA can lead to adverse metabolic, cardiovascular, and neurocognitive consequences, possibly reducing one's lifespan. Education and screening can spread awareness among a community which typically has limited access to resources and may promote early recognition and treatment.

In a Christian-based prison reentry residential community, a pre-test survey was provided to a total sample of 19 participants to measure baseline knowledge of OSA. After administration of the pre-survey, education was provided in a group setting, using a detailed brochure the DNP student created. After participants read through the material and questions were answered, the post-survey was administered to measure if knowledge regarding OSA increased. Screening using the STOP-Bang questionnaire occurred after the post-surveys. The DNP student followed up with participants found to be at high risk for OSA patients over a 3-month period. A 37% of participants scored high risk for OSA, 37% scored intermediate risk, and 26% scored low risk. The p-value calculated to measure pre-and-post OSA knowledge using the survey total score was statistically significant ($< .001$). Of the seven total participants who scored high risk, two were newly diagnosed with OSA after referral to a PCP for a sleep study with the help of the telephonic phone sessions. Education and screening demonstrated to be beneficial, resulting in positive outcomes. Project partakers were successfully able to define OSA, list risk factors, and describe how to diagnose and treat the condition. Participants who were newly diagnosed, previously diagnosed, or refused the sleep study managed to adjust modifiable risk factors over the summer such as weight loss, diet, and management of chronic conditions.

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Background/Significance

Obstructive sleep apnea (OSA) is the most common sleep-related disorder, affecting males more than females. There are an estimated 936 million people between the ages of 30 and 69 years old worldwide diagnosed with mild to severe OSA, and 425 million people who suffer from moderate to severe OSA (Pivetta, 2021). The estimated prevalence in the United States is 22 million and 34% of Hispanic/Latino men are diagnosed with this sleeping disorder (Wu et al., 2022). Untreated OSA can lead to serious adverse medical consequences such as hypertension, coronary artery disease (CAD), stroke, neurocognitive dysfunction, and metabolic syndrome (Arslan et al., 2020). The American Academy of Sleep Medicine describes OSA as a sleeping disorder that involves a decrease or complete cessation of airflow despite an ongoing effort to breathe. This cessation is due to the relaxed muscles during sleep causing soft tissue in the back of the throat to collapse and block the upper airway (American Academy of Sleep, 2008).

Previous studies have revealed that 80% of patients with moderate-to-severe OSA may remain undiagnosed for many years left without treatment (Arslan et al., 2020). Considering the adverse consequences and growing prevalence of OSA, it is imperative to identify high-risk patients and initiate treatment as soon as possible. Black, Hispanic, and Native American populations have a higher prevalence of OSA compared with White persons. Evidence suggests that there are also higher rates of obesity, asthma, and tobacco use among these groups placing them at increased risk for developing OSA (US Preventative Services Task Force, 2022).

Moreover, 87 million American adults have low health literacy costing up to \$238 billion annually, which can lead to worsened chronic health conditions, particularly in underserved groups such as those seen in this project's target population (Leuck, 2017). The 2003 National Assessment of Adult Literacy revealed that 58% of African Americans had basic or below basic

health literacy when compared with 28% of non-Hispanic Whites (Muvuka et al., 2020).

Approximately 13.6% of the U.S. population is Black (United States Census Bureau, n.d.). Black individuals are more likely to confront social and economic challenges that adversely impact health, including a higher rate of poverty and food insecurity (Ndugga & Artiga, 2023). An estimated 87 million American adults have low health literacy costing up to \$238 billion annually. The 2003 National Assessment of Adult Literacy revealed that 58% of African Americans had basic or below basic health literacy when compared with 28% of non-Hispanic Whites (Muvuka et al., 2020). However, Hispanic adults have the lowest average health literacy of all ethnic groups, with 41% considered at “below basic” level (Cool & Associates, n.d.). Having low health literacy rates can dramatically impact health outcomes by increasing risk of disease and increase hospitalizations rates.

Problem Statement

Untreated OSA insidiously leads to the worsening of chronic conditions such as diabetes, hypertension, and obesity and may shorten patient life spans. Education and screening among a rural community may decrease incidence of OSA and educate patients to take the necessary steps to better their health. Acknowledging the potential language barriers, health literacy, and lack of resources within a rural community help to guide this project. The community of interest was Restoration Destination in Pahokee, Florida. Pahokee is one of four towns comprising the Glades region. In 2019, the entire Glades Region recorded a population of 37,584, with 58% of the population comprising of Black Residents and 30% Hispanic residents (HCSEF, 2022). The average median earnings for workers in the Glade Region was \$21,000. In 2020, the leading cause of death included cardiovascular diseases, cancer, nutritional and metabolic diseases, and respiratory diseases (HCSEF, 2022). In the most poverty-stricken town of Belle Glade, only

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approximately 31.6% of residents have obtained a high school diploma or equivalent (HCSEF, 2022).

To compound these disparities, the prison reentry population confronts several barriers such as employment, housing, rebuilding relationships, stigmas, health issues, and financial struggles (Russ et al., 2021). Inadequate resources lead to worsening of health conditions, thus making this population at increased risk of developing OSA. Performing education and screening to this community can promote early recognition of untreated OSA, making patients more aware of the symptoms and potential complications.

Practice-based Question

In a prison reentry community, how does education, screening, and follow up impact OSA knowledge and health behaviors?

Literature Review and Synthesis

A literature review of the past five years in the CINAHL and PubMed data bases was conducted to analyze and compare data regarding OSA screening. Unfortunately, there is limited data regarding screening within a prison reentry community. A study done by Nicholas et al. explored the main themes emerged among a prison reentry community (2021). The themes defined focused on substance use and recovery, suggesting the impact of previous incarceration exacerbating the nature of substance use among these individuals (Lindsey et al., 2021). A study completed by Durnescu on the pains of prison reentry revealed that this population may have health associated with their previous prison regimen such as breathing issues from poor ventilation or tuberculosis exposure, dental problems, digestive issues from unhealthy foods, and aggravated chronic conditions such as heart disease from lack of ongoing care (2019). This population encounters issues finding employment, thus unable to apply for insurance nor afford

health care. Furthermore, a study completed by Arslan et al. questioned which screening questionnaire would best predict OSA while considering age, gender, and comorbidities (2020). The STOP-Bang survey reports having the greatest sensitivity in both males and females at 99.1 and 94.8 respectively, with sensitivity at 97.3 for age groups above the age of 45 and 99.2% for 65 years and older (Arslan et al, 2020). Sensitivity among the groups of patients with hypertension, diabetes mellitus, coronary artery disease, chronic obstructive pulmonary disease, and asthma, was 99.5%, 100%, 99.5%, 100%, and 97.4% correspondingly (Arslan et al, 2020). A systematic review and meta-analysis completed by Pivetta and colleagues revealed the diagnostic accuracy of STOP-Bang was superior in triaging patients with suspected OSA with a sensitivity that exceeded 90% (Pivetta et al., 2021). A study by Wu et al. (2022), researched identifying OSA phenotypes among middle-aged Hispanic males to facilitate better-personalized care, inform suitable treatment choices, and ultimately improve clinical outcomes (Wu et al., 2022). Insomnia OSA, asymptomatic OSA, and symptomatic OSA were identified with varying degrees of cardiovascular and sociodemographic qualities which point to the need for assessing multidimensional risk within ethnic groups. Moreover, the US preventative Services Task Force revealed risk factors of OSA which include male sex, ages 40-70 years, high BMI, having craniofacial abnormalities, and being of African American, Hispanic, or Native American ethnicity placed you at a much higher risk (USPSTF, 2022). The USPSTF also disclosed that most primary clinicians do not typically screen for OSA as patients do not typically discuss sleep-related symptoms during their visit (USPSTF, 2022). Other researchers showed that only 20% of patients with sleep-related symptoms reported them to their primary care providers (USPSTF, 2022). Showalter & O'Keefe revealed that screening for OSA in the primary care setting using the STOP-Bang questionnaire was a superior screening tool among patients who

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have hypertension. Among those within this study who scored intermediate or high risk for OSA and completed a sleep study, 100% of those patients were diagnosed with OSA (Showalter & O'Keefe, 2019). A separate study revealed that African Americans hold perceptions of OSA as a type of insomnia or related to aging, making them less likely to follow through on recommendations for a sleep study (Dudley & Patel, 2017). Additionally, African American partners revealed that they were more accepting of snoring when compared to White persons, delaying diagnosis and treatment (Dudley & Patel, 2017). A colorectal screening in a rural community study completed by Lee et al., revealed the challenges of limited access to medical care, barriers to transportation, and poverty negatively affect the health outcomes of this population (2022). An underserved population was screened in a study by Henry et al., reflected that the lack of sleep medicine care for uninsured patients and scarcity of sleep specialists necessitated volunteer programs and partnerships with providers to screen, diagnose, and treat these patients (2022). It is clear based on the given data research that screening for OSA reveals significant results within a rural community and the STOP-Bang questionnaire is a superior tool that is utilized in a variety of clinical settings.

Organization Assessment

This Qualitative Improvement project was focused on “the Glades” a rural, underserved, and underrepresented population comprised of four towns: Belle Glade, Pahokee, South Bay, and Canal Point. The targeted community were the residents of Restoration Destination located in Pahokee FL. Restoration Destination is a prison reentry residential community. This residential community is Christ-centered and offers residents the physical and spiritual needs with many resources. Pastor Mike Henderson is the main pastor who leads the residents in their walk with Christ to have a smooth transition back into a normal life. The point of contact and program

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Financial Operations Director was Casimir Griglik, who helped schedule educational and screening sessions. Gatekeepers included Stakeholders, such as the faith-based leaders, program manager of Pelican Lake, and the Healthier Glades Project Director, who is sponsored by Palm Health Care Foundation. The community advisory committee who provided initial guidance for this project included the Faith Health Educators, created by Dr. Lisa Wiese during her NIH-funded work, and which is chaired by the Healthier Glades Project Director. This group is comprised of 20 local ministry staff, teachers, social workers, nurses, regional hospital outreach coordinators, and coordinators for the local chapter of the American Heart Association of Lake Okeechobee Rural Health Network, and residents within the Belle Glade and Pahokee areas are major stakeholders as well. The overall Aim of this Quality Improvement project was to strengthen education and awareness of OSA within the community.

Based on previous education and screening rates by Wiese et al., (2020) in the target community, the project goals were that 90% of invited participants at risk will:

Goal 1: a) complete OSA screening and b) knowledge survey measures.

Goal 2: Identify a minimum of three OSA risk factors after an OSA-focused educational intervention.

Goal 3: Identify a minimum of four signs or symptoms of OSA

Goal 4: At least 75% of participants of participants will show significant increases in post-intervention knowledge as compared to pre-intervention knowledge survey scores.

Goal 5: At least 50% of participants who are at risk after screening will follow up with a PCP for OSA intervention.

The objectives are as follows:

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Objective 1: Measure baseline a) OSA knowledge, and b) risk for OSA, using the Obstructive Sleep Apnea Knowledge Assessment Post-Survey and STOP-Bang assessment.

Objective: Provide OSA brief, culturally relevant education to residents of Belle Glade through visual pamphlets and in-person presentations.

Objective 3: To measure pre-post rates of a) OSA knowledge, and b) provider visits to discuss OSA risks.

Objective 4: Provide feedback to residents regarding findings.

Purpose of the Project

The purpose of this project was to advocate for OSA education, screening, and follow up within an undeserved and underrepresented prison reentry community that faces language barriers, limited access to resources, and unreliable transportation for specialty care, social stigma, and discrimination due to their past. Reaching out to this community with ethical and cultural considerations was imperative to obtaining a successful engagement with participants. The immediate goal was to provide an opportunity for participants of this study to increase OSA awareness, and consequently motivate project partakers to engage with their PCPs and adhere to treatments plans. The long-range goal is to provide evidence for future studies in this underserved population that, illustrate decreased OSA incidence and associated chronic morbidity/mortality associated with long term undiagnosed OSA. Dr. Wiese has been conducting programs and research within the prison reentry community, which has further empowered health access and education. This community has asked to be a part of more health promotion programs.

Conceptual/Theoretical Framework

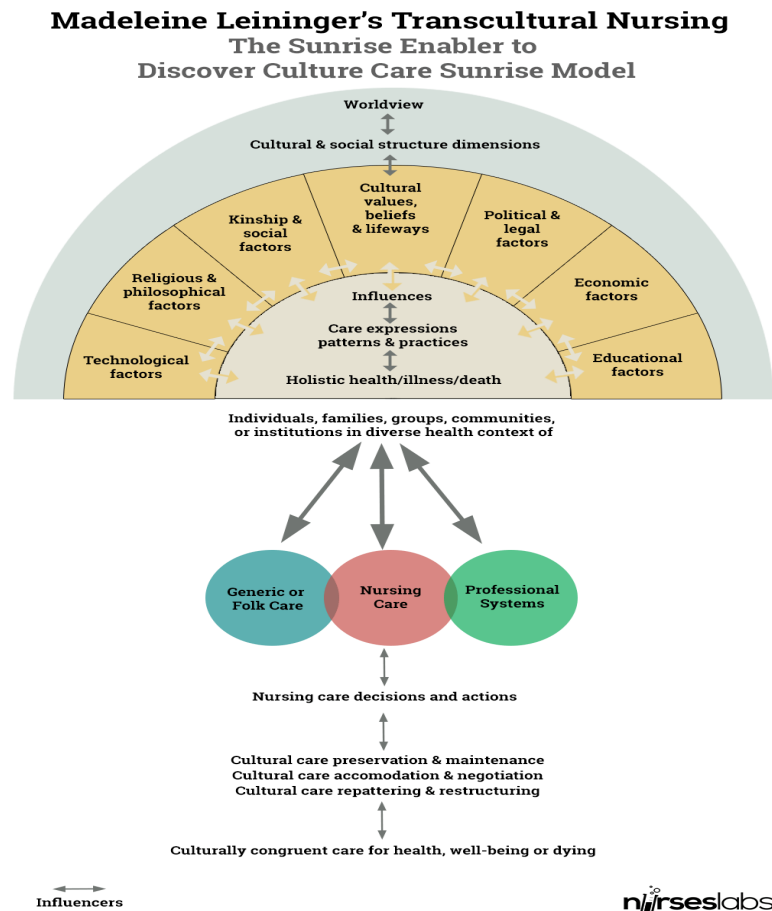
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This project was guided by Madeleine Leininger's Culture Care theory. This theory identifies three decisions and actions that should take place to achieve culturally sensitive care: Cultural preservation or maintenance, cultural care accommodation or negotiation, and cultural care repatterning or restructuring (Smith & Parker, 2015). Applying this theory helped guide the direction of the project and decreased the incidence of any cultural barriers. Cultural preservation was respected during the course of the project by providing diet recommendations that were culturally sensitive. Cultural negotiation occurred during times of teaching when patients expressed their general exercise and diet routines. Through all of this, cultural repatterning manifested as the educational sessions over the phone with the high-risk patients was considered when developing a plan of care that was sensitive to their needs. Furthermore, the DNP student guided the participants to make healthier choices and encourage following up with a PCP, by applying Barrett's theory of power as knowing participation in change. This theory considers awareness choices, freedom to act intentionally, and involvement in creating change which defines power as freedom and power as control (Barrett, 2003). Establishing an understanding of health patterning helped define ways in which the DNP student could influence participants to use their power-as-freedom to participate knowingly in creating changes voluntarily (Smith & Parker, 2015). Initiating a dialogue of meaning and asking project partakers to identify what they want to accomplish helped influence productive change.

Figure 1

Madeleine Leininger's Culture Care Theory

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Note. Gonzalo, A. (2023, July 2). *Madeleine Leininger: Transcultural nursing.*

Nurseslabs. <https://nurseslabs.com/madeleine-leininger-transcultural-nursing-theory/>

Methodology

The setting of this quality improvement project was at Restoration Destination. The program's Financial Operations Director, Casimir Griglik, coordinated a Pastor's breakfast on Saturday, June 10th, in which educational and screening meetings throughout the day were offered, from 8am till 1pm. The DNP student led the screening, education, and follow up with participants. The DNP student's previous experience as a Registered Nurse for over five years, within the field such as ICU, outpatient surgery, PACU, regenerative medicine, and primary

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care, allowed for a smooth implementation process. This project leader's clinical experience as a Nurse Practitioner student of over 1000 hours, with several of those hours at a community health center treating uncontrolled chronic conditions, aided in the success of this project. Dr. Lisa Wiese, the project faculty advisor has received state and federal funding for investigating the needs of the Glades residents and has published over 20 articles. The focus of Dr. Wiese's research is increasing the understanding, early detection, and prevention of Alzheimer's disease in rural populations. Dr. Debra Hain is dual ANCC board certified as adult and gerontological nurse practitioner who has practice experience within nephrology nursing, memory disorder clinic and hospice care. Dr. Hain's scholarly endeavors have focused on improving health outcomes of older adults with chronic kidney disease and those with cognitive impairment.

Sample Population

The sample population was a total of 20 participants; however, one participant did have to withdraw during the pre-survey process due to personal circumstances. Participants had the right to choose to participate or withdraw from the project and completion of the pre-and-post surveys at any time. A consent form and sign-up sheet was provided before project implementation. The protection of human rights and their private health information was a priority. All project partakers received a specific number that allowed the project leader to privately identify who they were after reviewing their assisted demographics form, pre-and-post Obstructive Sleep Apnea Knowledge Assessment Surveys and STOP-Bang questionnaire. All details and phases of the project were discussed throughout the implementation phase. After collecting this information, educational sessions occurred during the entire implementation process after post-surveys were distributed to assess if knowledge on OSA increased after reviewing the educational brochure the DNP student created and handed out. The brochure was

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given out after they had completed the pre-survey and was retracted before the post-survey was administered. After completion of the post-survey, the DNP then screened each participant with the STOP-bang questionnaire to assess if any participants scored within the high-risk range. The DNP student had a total of seven high-risk for OSA participants. Six out of the seven project partakers followed up with the project leader three separate scheduled dates on 7/23/23, 8/21/23, and 9/17/23 via the phone. The DNP student encouraged these participants to follow up with their PCP to receive a sleep study for a definitive diagnosis.

Program Evaluation

The EBP model utilized is the Institute for Healthcare Improvement (IHI) Model for Improvement. The model has two parts which include three fundamental questions and the Plan-Do-Study-Act cycle to test changes and determine if there is improvement. The three questions focus on the aim, measures, and changes (IHI, n.d.). An appropriate aim focuses on the issue and determines if it is specific, measurable, and addresses the main points. Measures should question if a known change is an improvement, and provide results for defining the outcome, process, and balancing measures. The final question about changes should inquire what changes can be made that will result in improvement, and develop this answer with critical thinking, benchmarking, using technology, creative thinking, and change concepts. The PDSA cycle includes a plan for collecting data, piloting the test on a small scale, setting aside time to analyze the data and study the results, and refining the change based on what was learned from the test. (IHI, n.d.). Results of the program were evaluated to assess if goals of improved outcomes have been met. This model guided the execution of the OSA project.

Intervention

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All steps of the project were followed using the (IHI) Model for Improvement as a mode of guidance. Evidence-based practice changes are warranted within this community due to the lack of health education and resources available. After collecting demographics and medical history from our participants, the top three most common health issues within this community were identified. The three most common comorbidities were hypertension, hypercholesteremia, and obesity. The team consisted of the Restoration Destination Financial Operations Director, Casimir Griglik, faculty leader Dr. Lisa Wiese, and the DNP student as the project leader. After participants had provided consent and filled out the sign-in sheet, the demographic survey and detailed health history was obtained. The Obstructive Sleep Apnea Knowledge Assessment pre-survey was then administered. Next, information was presented, including an educational brochure regarding OSA risks, prevention, and treatment. The DNP student allowed the participants to take their time with the brochure and answered any questions they had. After they thoroughly read through the material, the DNP student collected the brochure back and administered a post-survey. After completion of the post-survey, the brochures were handed back to them as a resource of information and then each participant was screened with the STOP-Bang questionnaire. The DNP student followed-up with five out of seven project partakers who were identified as being at high-risk for OSA and maintained contact with these residents throughout the summer via telephone calls. One of the high-risk participants declined followed up from the beginning of the study and did not wish to provide a contact number. Another participant provided information for follow-up, however, did not answer any calls or messages after multiple attempts. Interventions such as weight loss, managing of comorbidities, increased exercise, improved diet, and sleeping with the head of the bed were all evaluated as the DNP student encouraged them to visit their PCP for a sleep study.

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Data Collection/Measurement Tools

The project was executed using a pre-and-post design. Data collection strictly occurred with the use of the assisted demographics survey, pre-and-post Obstructive Sleep Apnea Knowledge Assessment surveys and the STOP-Bang questionnaire. The assisted demographics survey provided information on the participant's race, ethnicity, highest degree earned, family history, medical history, social habit history, and current medications. The Obstructive Sleep Apnea Knowledge Assessment survey is a 20 question pre-and-post survey tool the DNP student developed to assess baseline knowledge. The educational material provided was a colorful brochure that defined OSA, listed the important risk factors, the long-term consequences if left untreated, notable signs and symptoms, diagnosis, and the appropriate treatment. The STOP-Bang questionnaire is a commonly used assessment tool in clinical practice to help predict OSA severity. The questions on the tool inquire about snoring, feeling tired during the daytime, if anyone has observed you stop breathing or choking during sleep, if you're being treated for high blood pressure, if BMI is greater than 35, if your age is above 50, if neck circumference is larger than 16 inches, and if you are of male sex.

Data Analysis

Data analysis was executed using a paired t-test with a working sample size of 19 participants, to test if the educational material improved participant's knowledge on OSA. Sociodemographic data was analyzed, as well as the health behaviors pre-and-post educational sessions, with those who scored high risk on the STOP-Bang questionnaire, to compare whether changes developed. Those who were high risk were encouraged to visit with their PCP and provide the score of their STOP-Bang assessment. All project partakers were provided education during each session over the phone regardless of if a sleep study was ordered by their provider.

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Discussing comorbidities, lifestyle modification, weight loss, medication management, and CPAP usage were all considered during these telephone sessions.

Findings

Foremost, the analysis of the demographic data revealed that the sample population was 63% White, 27% Hispanic, 5% Black, and 5% Asian. English was the primary spoken language among the participants with 84%, while Spanish was the primary language among 16% of the project partakers. The project leader also reported participant’s current living situation which reflected 47% living with a relative/friend, 26% living in a group home, 16% living with a spouse/partner, and 11% living alone.

Table 1

Demographics

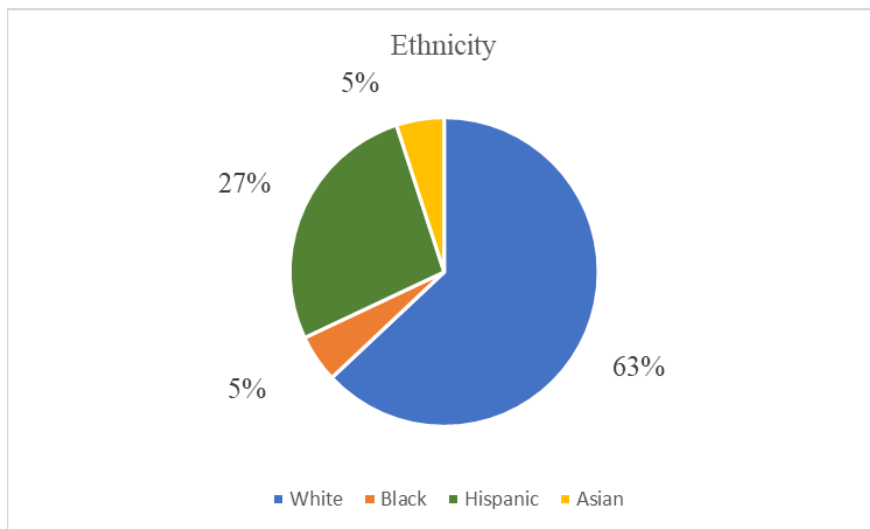


Table 2

Primary Language

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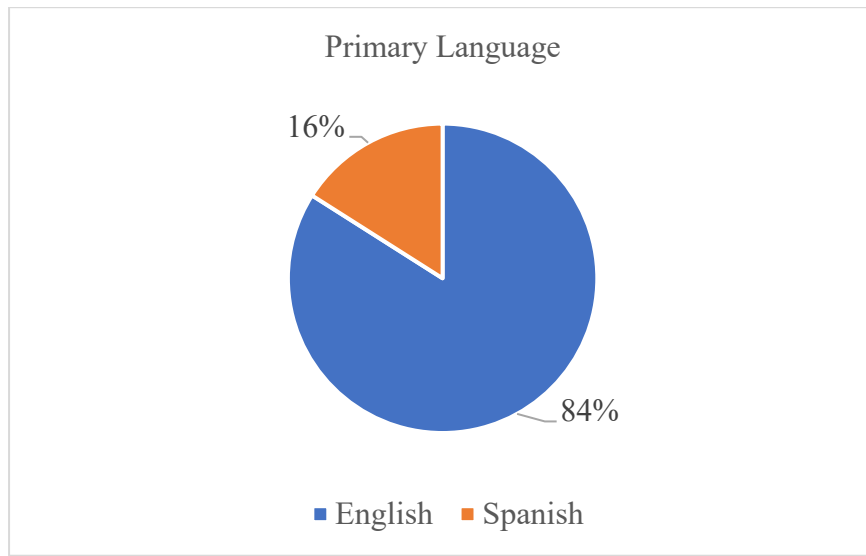
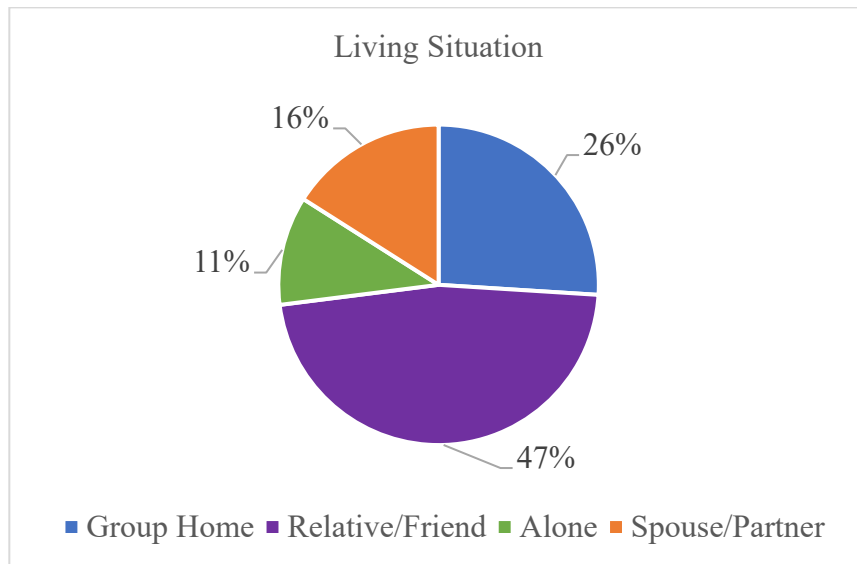


Table 3

Living Situation



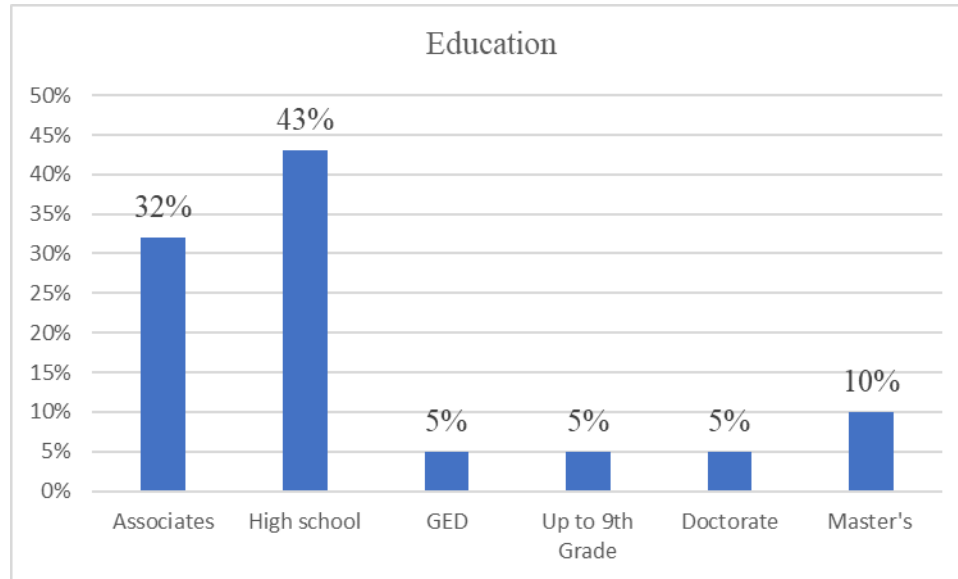
Approximately 95% of the population reported male sex at birth, with 5% reporting female sex.

An interesting statistic of the sample population was their highest degree earned: Almost half (43%) had graduated High School, another 5% earned a GED, but only an additional 5% completed up to the 9th grade. However, 32% earned an Associate's degree, 10% earned a Master's degree, and 5% earned a Doctorate.

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Table 4

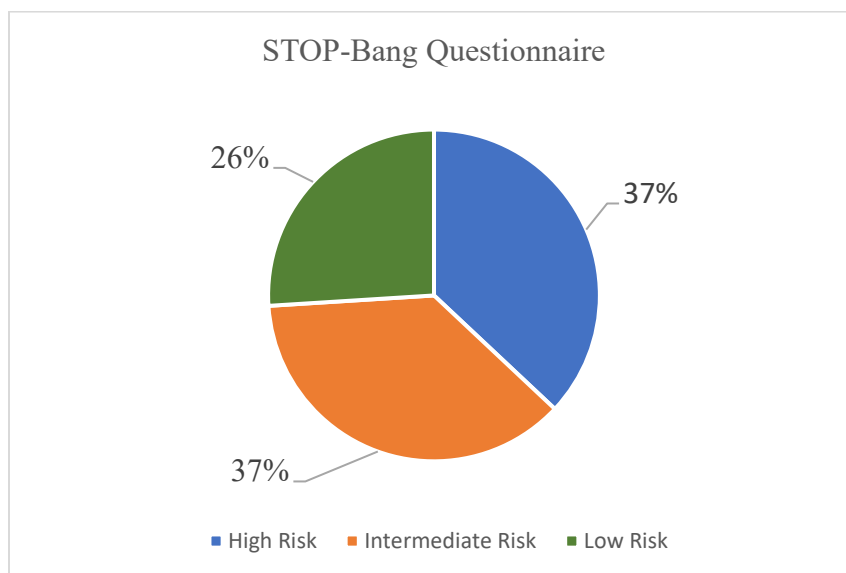
Level of Education



The interpretation of the STOP-Bang screening tool identified 37% of the participants scores fell within the high-risk range, 37% scored intermediate-risk, and 26% scored low-risk.

Table 5

STOP-Bang Questionnaire Screening Tool Results



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After administration of the pre-test and subsequently, the educational material, post-test scores observed considerable improvement after running a paired two sample t-test for means. The p-value was .000000517, which is $< .001$, demonstrating statistical significance.

Table 6

T-Test: Paired Two Sample for Means

t-Test: Paired Two Sample for Means		
	Pre-Test Score	Post-Test Score
Mean	0.821052632	0.965789474
Variance	0.009809942	0.001681287
Observations	19	19
Pearson Correlation	0.563383549	
Hypothesized Mean Difference	0	
df	18	
t Stat	-7.586708083	
P(T<=t) one-tail	2.58634E-07	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	5.17268E-07	
t Critical two-tail	2.10092204	

The questions that most participants answered incorrectly was question five, “What percentage of adults are estimated to have OSA?” and question 13, “What is the most common symptom of OSA?”. Eleven of 19 participants answered question five incorrectly, and seven out of the 19 participants answered question 13 wrong in the pre-test. The post-test scores improved substantially, with most questions being answered correctly after reading the educational material provided. The question with the highest number of participants answering incorrectly during the post-test was question nine, “Snoring must mean I have OSA? True or False?” with four out of 19 participants answering incorrectly post-educational material provided.

Table 7

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Pre-Test Survey Scores Before Administration of Education

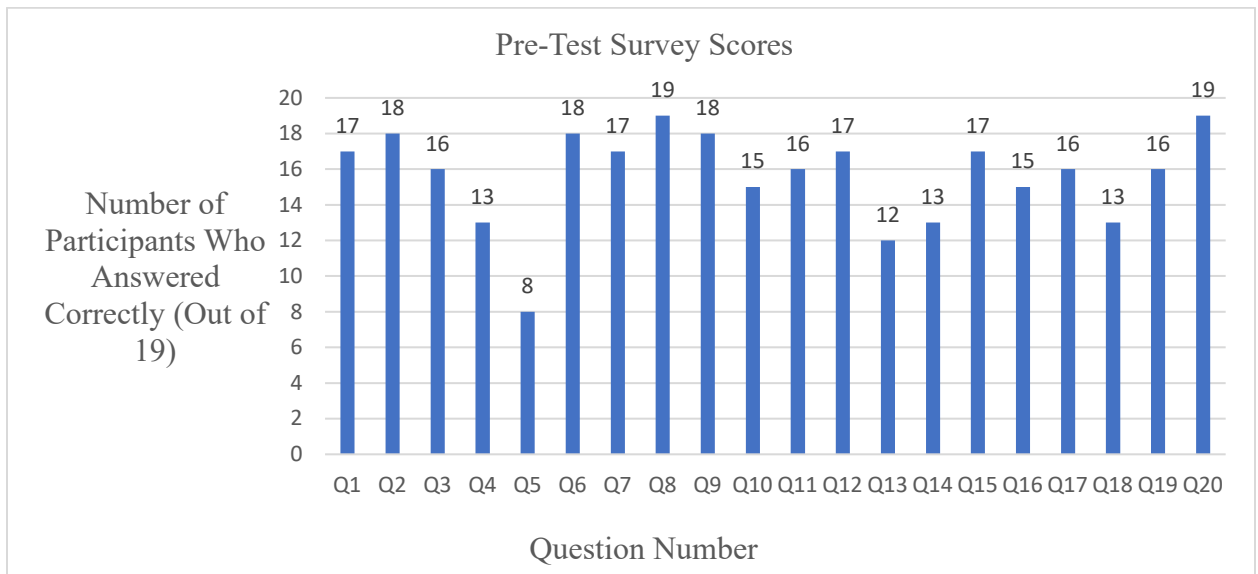
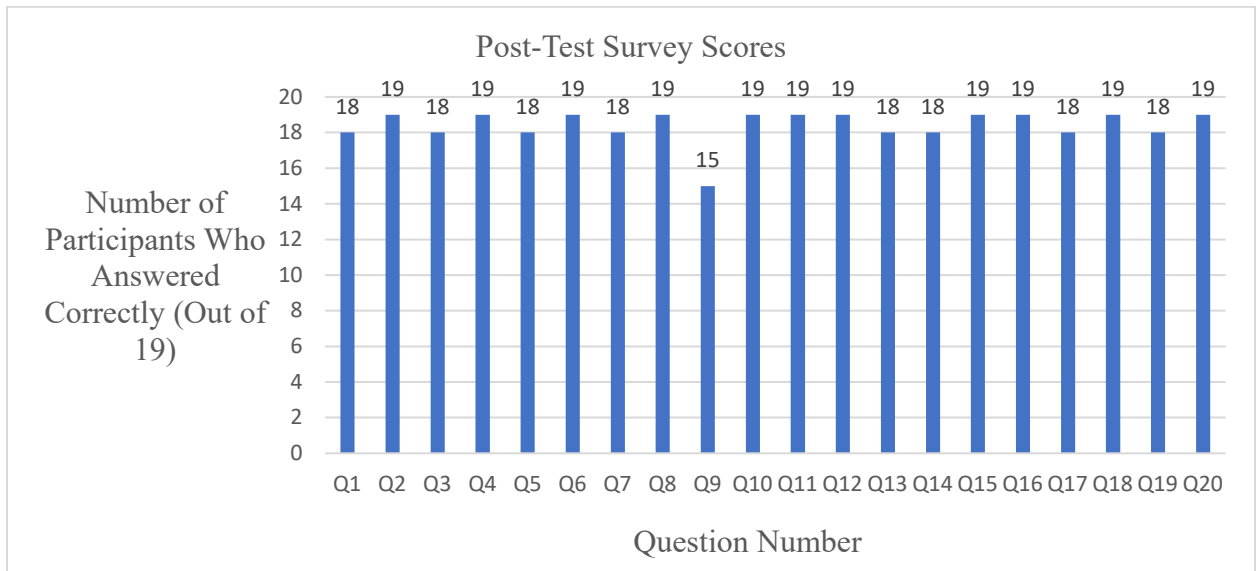


Table 8

Post-Test Survey Scores After Administration of Education



Two of the seven participants that scored high-risk for OSA had been previously diagnosed with OSA. One of the two refused follow-up, and two of the participants followed through with a sleep study order from their PCP with a diagnosis of OSA. Two other patients

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chose to not discuss their STOP-Bang results with their PCP and wanted to focus on their present comorbidities. Lastly, one patient chose to not answer calls or messages to be evaluated for follow-up. An apparent challenge of this project was difficulty with communication over the phone, as participants may have chosen to not follow-up with a PCP or answer their calls in general. Some project partakers felt they unlikely had OSA and chose to not seek advice from their PCP, but instead focused on their present chronic conditions.

Table 9

Outcomes of High Risk for OSA Participants

High Risk Participants	
Participants	Outcome
2	Previously diagnosed with OSA (1 of which who refused telephone sessions)
2	Diagnosed after screening and education provided
2	Refused sleep study
1	Opted out of telephone sessions

Sustainability Plan

Dissemination of findings involved sharing knowledge with other nurses, colleagues, stakeholders, the Faith Health Educators, and the public. Findings were presented to the FAU Health Equity Scholarship program director, Dr. Christine Toledo and fellow scholars, as well as to the program director of Restoration Destination, Mr. Graglik.

In summary, performing education and screening to a prison reentry program can promote early recognition of untreated OSA, decrease worsening of chronic conditions, and enhance OSA education among a community with limited resources. Ensuring that the findings of the quality improvement project are available to a broad audience of nursing professional and healthcare stakeholders is imperative to improve clinical practice and increase awareness.

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Sustainability was an overarching challenge hindering successful completion of the project as some participants opted to not answer or follow through with meeting with their PCP.

Recommendations for the site include practical strategies to support planning and organization at the very beginning before project implementation. Sharing thorough details of the purpose of the project, as well as results of the project with the participants, may perhaps increase involvement in future studies. The total cost of the project was \$279.10. Ten-dollar gift cards were provided to each participant who completed the pre-and-post surveys, read the brochure, and were screened at the end (\$190). The cost to print the colorful brochures at FedEx was \$74.10.

Granola bars were also provided to the participants which cost \$15. This was a relatively low-cost project to implement, as follow-up occurred strictly via telephone and did not necessitate transportation.

Discussion

Before all else, this Christ-based community was an absolute pleasure to work with and already had some basic knowledge and understanding of OSA. Almost half of the 47% of the participants had earned a college degree. The DNP student was afraid the educational brochure may have been challenging for the participants to understand, however 47% of the participants demonstrated a college reading level, while 53% had a high school reading level. The participants were very receptive to learning and understanding OSA as they demonstrated clear interest. Selected findings included that 47% of participants answered question 20, "Do you have OSA?" as "I would like to find out." 8. A majority (84%) of the participants scored at least an 80% or above on the pre-survey. After administering the carefully constructed educational material to the participants, 47% scored a 100% on the post-survey. There was a definitive statistical significance among the pre-and-post survey scores evidencing the strength and success

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of the OSA education provided to the project partakers on site. A total of four participants were diagnosed with OSA, two of which had been previously diagnosed before the implementation of the study, while the other two were eager to do a sleep study after scoring high on the STOP-Bang questionnaire. The two participants who were diagnosed with an at home sleep study were grateful to have participated in the screening. Both participants also had similar comorbidities of hypertension and obesity. The project leader followed up with both participants three times over the summer to assess lifestyle modification, weight loss, and use of CPAP. Both participants successfully lost over 20 pounds over the summer, altered their diet, increased exercise, and attempted to use the CPAP. One participant struggled heavily with the CPAP and mentioned he would throw it off by the end of the night. However, both participants managed to be weaned off at least one blood pressure medication and expressed improvement in OSA symptoms with weight loss and increased activity. The other two participants that scored high-risk but chose to not mention their screening score to their PCP also followed through with the three educational telephone sessions. Although they did not do a sleep study, both patients demonstrated improvement in weight loss and managing their chronic conditions. One participant reported that he now walks every morning and night, which has resulted in also a 15-pound weight loss over the summer and improved diet. The other participant struggles mostly with diabetes and disclosed he was weaned off his insulin after swimming multiple times a week, weightlifting, and a consuming healthy diet. He also reported losing over 35 pounds over the summer and a controlled HbA1c.

Table 10

High Risk for OSA Participants and Details of their Follow-Up Telephonic Sessions

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High Risk for OSA Participants Whom I Followed Up With					
Participant Number	Reported Chronic Conditions	Reported Weightloss (Over 3 Month Span)	Reported CPAP Usage (If Applicable)	Reported Management of Chronic Conditions	Telephonic Sessions Completed
Participant #2	Hypertension, Obesity, Newly Diagnosed with OSA	> 20 lbs	Yes	Maintains BP < 130/80, weaned off one BP med	3/3
Participant #4*	OSA, Hypertension, High Cholesterol	N/A	N/A	N/A	0/3
Participant #5	Previously Diagnosed with OSA, Diabetes, Hypertension, High Cholesterol	> 30 lbs	Sometimes, improved sleep with weightloss	Maintains BP < 130/80, HbA1c < 7	3/3
Participant #10*	Hypertension, High Cholesterol	N/A	N/A	N/A	0/3
Participant #15	Obesity	> 15 lbs	Refused Sleep Study	Reports better sleep with some weightloss	3/3
Participant #19	Hypertension, Newly Diagnosed with OSA, High Cholesterol, Obesity	> 20 lbs	Sometimes	Maintains BP < 130/80, weaned off one BP med	3/3
Participant #20	Hypertension, High Cholesterol, Obesity, Diabetes	> 35 lbs	Refused Sleep Study	Weaned off insulin and one BP med, HbA1c < 8	3/3

* Opted Out of Telephonic Sessions
 BP = Blood Pressure
 HbA1c = Glycated Hemoglobin, a marker for diabetes

The medical encouragement and guidance offered over the phone to the participants allowed for better management of their chronic conditions. Improvements in these conditions were a result of not just project implementation, but also a strong sense of compliance and interest in bettering their health among the project partakers themselves. This detail indicates Barrett’s theory of power as knowing participation in change as a successful mode of guidance within project partakers who exhibited interest in optimization of health in accepting education. A challenge noted within the project is accepting the participants who had willfully chosen to not follow-up with a PCP for a sleep study, however we can concur that a negative clearly turned into a positive when participants found other means of change within their own modes of healthcare by participating in physical activity and better medication management. Depending on the participants to be excellent historians and to accurately report their outcomes is an inevitable limitation of this study. The DNP student identified that the educational sessions over the phone

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could have perhaps been better perceived if executed in-person rather than over the phone. It's possible that better results from this study with in-person visits and counseling could have been received. Lastly, had there been funding, conceivably, portable OSA sleep study machines would have been purchased which could have potentially eliminated the likelihood of participants choosing not to follow-up with a PCP.

Implications

The implications for practice from this project help provide recommendations for providers to perform more OSA screening in not just the primary care setting, but in all clinical settings. However, dealing with a prison reentry population means understanding this specific type of population will not have health insurance or possible means to see a provider. Collaborating with prison reentry program directors to perform more health screening and evaluations in the community setting can improve prevention, recognition, diagnosis, and treatment for OSA. Participants shared perceptions of enthusiasm for health promotion to potentially reduce risk factors for OSA, improve sleep quality, and better manage present chronic conditions. The project initiative was successfully able to identify those who were high-risk and encourage strategies to improve their health outcomes. It is paramount to understand health disparities within this community, as any of them may not have insurance or lack the financial resources to pay a deductible or out of pocket cost for a sleep study. The telephonic calls proved to be beneficial for some project partakers, but not all as there were a few who opted out of answering the phone or visiting a PCP. Reliable transportation to a healthcare facility proved to be a barrier for some participants, making it difficult to access a PCP when needed. Utilizing mobile providers to visit patients in the comfort of their own home may be beneficial to this community. Future collaborative research could perhaps consider evaluating the long-term

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outcomes of OSA treatment and potential reduction in cardiovascular and metabolic complications within a community that suffers from health disparities. It is also important to organize appropriate evaluation in quality of life with lifestyle modifications to enhance better outcomes.

Policy Implications

This project reveals there is little to no support for prison reentry communities, thus implementing health screening fairs and quality improvement projects as this are imperative to the progression of their health and overall longevity of life. Collaborating with a health system and engaging the legislators of the area to increase funding can allow a grander hiring of staff, purchase service vehicles, and create new facilities (Lee et al., 2022). Reaching out to communities that are in rural parts of the state such as Pahokee would benefit from the use of telemedicine. Scheduling periodic health fairs within this community does help address the disparities, but this doesn't replace the lack of healthcare resources to the area. Continuing education and further outreach by utilizing university students and staff as well as contacting the senators and house of representatives of our state to understand the long-term benefits of improving health of all rural residents regardless of prior lifestyles, could potentially influence better management of funds and resources to the communities in desperate need.

Conclusion

The purpose of this DNP project was to design commodious quality improvement within a prison reentry community while respecting cultural sensitivity and health disparities. Participants were able to define OSA, list OSA signs and symptoms, identify OSA risk factors, delineate the long-term effects of OSA, and describe how to ultimately treat OSA. Implementation of this project yielded positive results by reflecting an increase in OSA

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knowledge, and successful screening, definitive diagnosis, and improvement of comorbidities, thus decreasing OSA risk factors and providing valuable insight. All (100%) of participants demonstrated a 50% improvement or more within their post-surveys. OSA screening and consequential diagnosis are a crucial part of an initial assessment; however, the process needs to be modified to reduce foreseeable limitations within this community. Expanding this project for use within the community without resource constraints could provide substantial benefits increasing education, screening, diagnosis, and treatment of OSA on a grander scale. Ultimately, acting as a provider means considering all fundamental components that effect health with a bold understanding of the progression of life and uncontrolled circumstances. Focusing on nonpharmacological modalities may prevent worsening of chronic conditions but may not always be the most effective form of treatment in those with severely uncontrolled chronic conditions. Careful consideration of all dimensions of health will guide providers and researchers to make decisions to develop a plan of care that is inclusive, all-encompassing, yielded by evidence-based practice, and effective in increasing health promotion and longevity of life.

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Appendix A: Site Letter of Permission



March 28, 2023

To the Florida Atlantic University C.E. Lynn College of Nursing,

The purpose of this letter is to express our support to serve as a host site for Amanda Lazcano's nurse practitioner (doctoral level) quality improvement project focusing on persons at risk for or experiencing sleep apnea.

We understand that this project will assist the investigators, which includes our community members as advisors, in identifying factors that increase risk of sleep deprivation and apnea in our community. Specifically, our role will include supporting research recruitment and education efforts that will be offered in our Pahokee, FL community.

As the Financial Operations Director of Restoration Destination, Inc., I represent our collaborative agreement that we agree to participate with Amanda's project, overseen by the faculty leader, Dr. Lisa Wiese, in the above-mentioned manner. We understand that this project will be carried out following sound ethical principles. We also understand that participant involvement in this research study is strictly voluntary and provides confidentiality of any project data.

Sincerely,

Casimir Griglik
Financial Operations Director
Restoration Destination, Inc.
(Cell) (561) 268-8895
casgriglik@restorationdestination.org

restorationdestination.org

Appendix B: Sign Up Sheet

OBSTRUCTIVE SLEEP APNEA EDUCATION AND SCREENING

ORGANIZATION	TIME	EVENT DATE	LOCATION
Florida Atlantic University	8AM- 1PM	6/10/2023	Restoration Destination

NO	NAME	PHONE	EMAIL	HAVE YOU PARTICIPATED IN A FAU EVENT BFORE? YES OR NO
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

NO	NAME	PHONE	EMAIL	HAVE YOU PARTICIPATED IN A FAU EVENT BFORE? YES OR NO
14				
15				
16				
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21				
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30				

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Appendix C: Assisted Demographics Survey

Participant ID: _____

Visit Date: _____

**Doctor of Nursing Practice Quality Improvement Project: OSA Education, Screening, and Follow-up
Florida Atlantic University**

To be completed by PARTICIPANT:

Participant Name: _____

Phone: _____ **E-Mail:** _____

Date of Birth: _____ **Current Age:** _____

Place of Participant's Birth: _____

Gender (circle one): Male Female

Participant's Race: White _____ Black or African American _____ Asian _____

American Indian/Alaskan _____ Native Hawaiian/Pacific Islander _____ Two or More Races _____

Hispanic/Latino Ethnicity (Circle One): Yes No

If Yes, choose region of family origin (Circle one): Mexican Puerto Rican Cuban Dominican
Central American South American Other: _____

Primary Language: _____ English _____ Spanish _____ Other: _____

Completed Highest Degree Earned: _____

Current Living Situation: _____ Lives alone _____ Lives with Relative/Friend
_____ Lives with spouse/partner _____ Lives in Group Home/Facility
_____ Lives with Child _____ Other: _____

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Participant ID: _____

Visit Date: _____

REVIEW OF PARTICIPANT'S FAMILY HISTORY

Is there family history of the following? If YES, who was affected and their age when problem started:

Obstructive Sleep Apnea	Yes	No	
Obesity	Yes	No	
High Blood Pressure	Yes	No	
Heart Disease	Yes	No	
Diabetes	Yes	No	
Cancer	Yes	No	

GLOBAL HEALTH RATINGS

Please circle the **one best answer** for each question

How would you rate your overall physical health?

Poor Fair Good Excellent

How would you rate your overall sleep?

Poor Fair Good Excellent

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Participant ID: _____

Rater: _____

REVIEW OF MEDICAL HISTORY

Visit Date: _____

ILLNESS	YES	NO
Diabetes Diet controlled only, no medication _____ No end organ <u>damage</u> _____ End organ damage (retinopathy, neuropathy, nephropathy, etc.) _____		
Hypertension (High Blood Pressure)		
Heart Disease (If yes, please check which are applicable) ____Heart attack ____Valve disease ____Atrial Fibrillation ____Congestive Heart Failure		
Pacemaker		
Peripheral Vascular Disease/Circulation Problems		
High Cholesterol		
Chronic Lung Disease (Bronchitis, Asthma, COPD, Emphysema)		
Liver Disease (Gall bladder, Hepatitis, Cirrhosis, etc.)		
Kidney Disease (Renal Failure, Kidney Stones, etc.) <i>Dialysis? (Circle)</i>	Y N	
Thyroid Disease (Hypothyroidism, etc.)		

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Participant ID: _____

Rater: _____

Visit Date: _____

SOCIAL HABIT HISTORY

HABIT	Never	In Past	Current
Tobacco Use (cigarettes, cigars, pipes, vaping) Number of Years Smoked _____ Number of Packs Per Day _____ If quit, how long ago (in years): _____			
Alcohol Use Number of Years Drinking _____ Number of Drinks Per Day _____ If quit, how long ago (in years): _____			
Substance Use (marijuana, cocaine, IV drugs, etc) Specify type: _____ Number of Years using: _____ How frequent: _____ If quit, how long ago (in years): _____			

Other medical conditions not covered above

Condition

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Participant ID: _____

Rater: _____

Visit Date: _____

CURRENT MEDICATIONS: PRESCRIPTION AND OVER-THE-COUNTER

MEDICATIONS: Please include prescription, <u>over-the-counter</u>, vitamins, herbals, and supplements (Attach additional sheet if necessary)	DOSAGE	HOW OFTEN TAKEN

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Appendix D: Pre-Survey

Obstructive Sleep Apnea Knowledge Assessment Pre-Survey

1. What does OSA stand for?

- A. Obstructive Sleep Apnea
- B. Obstructive Snoring Anomaly
- C. Obsessive Sleep Anxiety

2. What is OSA?

- A. A form of insomnia
- B. A sleep disorder characterized by breathing interruptions during sleep
- C. A condition that causes excessive daytime sleepiness

3. What are the common symptoms of OSA?

- A. Snoring and fatigue
- B. Chest pain and shortness of breath
- C. Headache and nausea

4. What are the risk factors for developing OSA?

- A. High blood pressure, obesity, and large neck circumference
- B. Thyroid disease and depression
- C. Asthma and anxiety

5. What percentage of adults are estimated to have OSA?

- A. 5-10%
- B. 20-35%
- C. 40-50%
- D. 60-75%

6. How is OSA diagnosed?

- A. Blood test and urine test
- B. Physical examination only
- C. Sleep study or polysomnography

7. OSA is more common in women than men? True or False

- A. True
- B. False

8. Alcohol at bedtime can improve OSA? True or False

- A. True
- B. False

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9. Snoring must mean I have OSA? True or False

- A. True
- B. False

10. The loss of upper airway muscle tone during sleep contributes to obstructive sleep apnea? True or False

- A. True
- B. False

11. Long-term untreated OSA can shorten your lifespan? True or False

- A. True
- B. False

12. What lifestyle changes can help manage OSA symptoms?

- A. Eating a healthy diet and avoiding alcohol and sedatives
- B. Quitting smoking
- C. Both A and B

13. What is the most common symptom of OSA?

- A. Insomnia
- B. Daytime sleepiness
- C. Nightmares
- D. Excessive hunger

14. Which of the following is a treatment option for OSA?

- A. Losing weight
- B. Surgery
- C. Continuous positive airway pressure (CPAP) therapy
- D. All of the above

15. Can OSA lead to other health problems?

- A. Yes, such as high blood pressure and heart disease
- B. No, OSA is not associated with any other health problems
- C. OSA only affects sleep and does not impact overall health

16. What is the primary cause of OSA?

- A. Psychological stress
- B. Physical obstruction of the airway
- C. Lack of exercise

17. What is a sleep study?

- A. A test that measures the amount of glucose in the blood

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- B. A test that measures brain activity during sleep
- C. A test that measures stress to the heart

18. What is CPAP therapy?

- A. A form of medication for OSA
- B. A surgical procedure to remove the obstructive tissue in the airway
- C. A treatment that uses a device to deliver pressurized air to keep the airway open during sleep

19. Untreated OSA can lead to?

- A. Memory problems
- B. Weight gain
- C. Depression
- D. All of the above

20. Do you have OSA?

- A. Yes, I've been diagnosed by a provider.
- B. No, I do not have OSA nor have any of the symptoms.
- C. I'm not sure, but would like to find out.

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Appendix E: OSA Educational Material/Brochure

Signs and Symptoms of OSA

- 01. Excessive daytime sleepiness
- 02. Loud and chronic snoring
- 03. Breathing cessation during sleep
- 04. Restless sleep and frequent awakenings
- 05. Morning headaches
- 06. Dry mouth or sore throat upon awakening
- 07. Memory problems or difficulty concentrating
- 08. Depression, irritability, and mood swings

Diagnosis and Treatment of OSA

Diagnosis necessitates a provider to review medical history, sleep patterns, symptoms, and underlying health conditions. Screening tools such as the STOP-Bang questionnaire can help assess risk factors of OSA. The gold standard for diagnosing OSA is through a sleep study (Polysomnography). These studies can be done at a sleep lab or at home with a portable device.

Treatment options include lifestyle modification such as weight loss, exercise, avoiding alcohol and sedatives, and maintaining a consistent sleep schedule.

Continuous Positive Airway Pressure (CPAP) is a highly effective treatment that involves wearing a mask over the nose or mouth during sleep that delivers a continuous mild flow of air to keep the airway open.

Oral appliances that are custom fit devices worn during sleep can also help reposition the jaw and tongue to avoid closure of the airway.

Surgery is also another option for those with severe OSA to remove or reposition excess tissue and widen the airway.



Amanda Lazzano MSN, RN



Education on Obstructive Sleep Apnea

What is OSA?

OSA stands for Obstructive Sleep Apnea. It is a sleep disorder that is characterized by repeated episodes of partial or complete blockage of the upper airway during sleep. These blockages can lead to pauses in breathing, causing apnea, resulting in disrupted sleep patterns.

During sleep, the muscles in the throat and tongue relax. In individuals with OSA, these muscles relax too much, causing the airway to close completely. When this occurs, oxygen levels in the blood decrease, and the brain briefly awakes from sleep to restore normal breathing. These arousals can occur multiple times throughout the night, disrupting the sleep cycle and causing symptoms such as excessive daytime sleepiness, loud snoring, and morning headaches.

20-35% of American Adults are estimated to have OSA.



Risk Factors of OSA

- 01. Obesity
- 02. Large neck circumference
- 03. Narrow airway or large tonsils
- 04. Family History
- 05. Being male
- 06. Use of alcohol or sedatives
- 07. Smoking
- 08. Medical conditions such as high blood pressure and type 2 diabetes

Untreated OSA can lead to several long-term consequences such as:

-Cardiovascular problems

Which include high blood pressure, irregular heart rhythms, coronary artery disease, heart failure, and increased risk of stroke.

-Daytime fatigue and decreased quality of life

This can affect cognitive function, memory, mood, decreased productivity, and increased risk of accidents.

-Metabolic and endocrine issues

OSA has been linked to insulin resistance, glucose intolerance, and disruption of the hormones that control appetite and metabolism.

-Weight gain and obesity

The hormonal changes can increase appetite and promote weight gain. However, obesity can also worsen the condition due to the excess fat deposits in the neck and upper airway.

-Cognitive decline and dementia

There is evidence suggesting a link between untreated OSA and cognitive decline as well as the possible development of Alzheimer's disease.

-Increased risk of accidents

Daytime sleepiness and impaired alertness caused by OSA can increase the risk of motor vehicle accidents, workplace accidents, and other incidents due to impaired concentration and slower reaction time.



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Appendix F: Post-Survey

Obstructive Sleep Apnea Knowledge Assessment Post-Survey

1. What does OSA stand for?

- A. Obstructive Sleep Apnea
- B. Obstructive Snoring Anomaly
- C. Obsessive Sleep Anxiety

2. What is OSA?

- A. A form of insomnia
- B. A sleep disorder characterized by breathing interruptions during sleep
- C. A condition that causes excessive daytime sleepiness

3. What are the common symptoms of OSA?

- A. Snoring and fatigue
- B. Chest pain and shortness of breath
- C. Headache and nausea

4. What are the risk factors for developing OSA?

- A. High blood pressure, obesity, and large neck circumference
- B. Thyroid disease and depression
- C. Asthma and anxiety

5. What percentage of adults are estimated to have OSA?

- A. 5-10%
- B. 20-35%
- C. 40-50%
- D. 60-75%

6. How is OSA diagnosed?

- A. Blood test and urine test
- B. Physical examination only
- C. Sleep study or polysomnography

7. OSA is more common in women than men? True or False

- A. True
- B. False

8. Alcohol at bedtime can improve OSA? True or False

- A. True
- B. False

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9. Snoring must mean I have OSA? True or False

- A. True
- B. False

10. The loss of upper airway muscle tone during sleep contributes to obstructive sleep apnea? True or False

- A. True
- B. False

11. Long-term untreated OSA can shorten your lifespan? True or False

- A. True
- B. False

12. What lifestyle changes can help manage OSA symptoms?

- A. Eating a healthy diet and avoiding alcohol and sedatives
- B. Quitting smoking
- C. Both A and B

13. What is the most common symptom of OSA?

- A. Insomnia
- B. Daytime sleepiness
- C. Nightmares
- D. Excessive hunger

14. Which of the following is a treatment option for OSA?

- A. Losing weight
- B. Surgery
- C. Continuous positive airway pressure (CPAP) therapy
- D. All of the above

15. Can OSA lead to other health problems?

- A. Yes, such as high blood pressure and heart disease
- B. No, OSA is not associated with any other health problems
- C. OSA only affects sleep and does not impact overall health

16. What is the primary cause of OSA?

- A. Psychological stress
- B. Physical obstruction of the airway
- C. Lack of exercise

17. What is a sleep study?

- A. A test that measures the amount of glucose in the blood

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- B. A test that measures brain activity during sleep
- C. A test that measures stress to the heart

18. What is CPAP therapy?

- A. A form of medication for OSA
- B. A surgical procedure to remove the obstructive tissue in the airway
- C. A treatment that uses a device to deliver pressurized air to keep the airway open during sleep

19. Untreated OSA can lead to?

- A. Memory problems
- B. Weight gain
- C. Depression
- D. All of the above

20. Do you have OSA?

- A. Yes, I've been diagnosed by a provider.
- B. No, I do not have OSA nor have any of the symptoms.
- C. I'm not sure, but would like to find out.

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Appendix G: STOP-Bang Questionnaire

+ STOP-Bang questionnaire		
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Snoring? Do you snore loudly (loud enough to be heard through closed doors, or your bed partner elbows you for snoring at night)?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Tired? Do you often feel tired, fatigued, or sleepy during the daytime (such as falling asleep during driving)?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Observed? Has anyone observed you stop breathing or choking/gasping during your sleep?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Pressure? Do you have or are you being treated for high blood pressure ?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Body mass index more than 35 kg/m²?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Age older than 50 years old?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Neck size large (measured around Adam's apple)? Is your shirt collar 16 inches or larger?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Gender (biologic sex) = Male?
Scoring criteria:		
Low risk of OSA: Yes to 0 to 2 questions		
Intermediate risk of OSA: Yes to 3 to 4 questions		
High risk of OSA: Yes to 5 to 8 questions		

OSA: obstructive sleep apnea.