Examining Knowledge and Knowledge Retention in Nurse Practitioners after the Implementation of an Online Educational Module on Obstructive Sleep Apnea

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Significance and Problem Statement

Obstructive Sleep Apnea (OSA) is a highly prevalent, under-recognized, and critical health concern characterized by repeated episodes of upper airway obstruction during sleep, causing intermittent hypoxemia and sleep fragmentation (Bonsignore, 2017; Chung et al., 2016; Ononye et al., 2019). It is estimated that about 15-30% of males and 15% of females between the ages of 30 to 69 have moderate to severe OSA in the United States, with 936 million individuals suffering from OSA worldwide (Kline, 2022; Wickwire, 2021). The prevalence of OSA is high and continues to rise due to the epidemic problem of obesity, which is the major predisposing risk factor of OSA (Morsy et al., 2019). When OSA is not recognized or left untreated, it can lead to several life-threatening comorbidities such as cardiovascular disease, hypertension, stroke, metabolic disorders (i.e., diabetes), cardiac arrhythmias, myocardial infarction, and depression, which can ultimately lead to death (American Academy of Sleep Medicine, 2016; Ononye et al., 2019; Osman et al., 2018; Rebelo-Marques et al., 2018; Semelka et al., 2016; Senaratna et al., 2019). It is estimated that about 75-90% of individuals with moderate to severe OSA remain undiagnosed and untreated (Aurora and Quan, 2016; Bonsignore, 2017; Nagappa et al., 2015; Ononye et al., 2019; Pivetta et al., 2021).

The amount of time spent on sleep education in clinical programs is very limited. Mindell et al. (2011) found that after sending surveys to 409 medical schools across 12 countries, including the United States, the average time spent on sleep education was under 2.5 hours, with 27% of medical schools reporting that there is no sleep education in their curriculum. The medical schools also reported that the lack of education is due to insufficient time, lack of qualified staff, and having a low priority for inclusion of sleep education in the curriculum (Mindell et al., 2011). Nurse educators have also reported limited sleep education in

undergraduate and advanced nursing programs (1.97 hours) (Valerio & Heaton, 2014). Due to the lack of emphasis on sleep education, many providers have insufficient knowledge on how to identify individuals with OSA, do not recognize OSA symptoms, and are unable to link disease-associated comorbidities or behaviors to an individual's quality of sleep (American Academy of Sleep Medicine, 2016; Chai-Coetzer et al., 2021; Ononye et al., 2019).

To help improve awareness and knowledge of OSA, a small number of educational interventions have been implemented, such as continuing medical education modules, PowerPoint presentations, in-service meetings, and narrated videos (Al-Mezeini, 2017; Johnson et al., 2015; Ononye et al., 2019; Valerio & Heaton, 2014). After implementing an online educational program for nurse practitioners (NPs) using a 53-minute narrated PowerPoint, Valerio and Heaton (2014) found that NPs who completed the entire program had significant improvement in the knowledge of OSA, demonstrated through the use of a pre-test and a post-test ($p<.001$, $t(37=-5.024)$. As a result, 97.4% of participating NPs also indicated that they were "very likely" or "likely" to evaluate their adult patients for OSA after the educational session (Valerio & Heaton, 2014). However, retention of this knowledge is unknown.

Educational interventions along with how to screen patients for OSA using the STOP-BANG Questionnaire has also been implemented in a small number of studies. The STOP-BANG questionnaire is a reliable and validated screening tool with a sensitivity consistently shown to be greater than 85%, and a specificity ranging between 25-85% (Semelka et al., 2016). In a meta-analysis, the STOP-BANG questionnaire was superior in detecting mild, moderate, and severe OSA when compared to other screening tools (Showalter & O'Keefe, 2019). The questionnaire is also very easy to use and can be administered in about 1-2 minutes (Chung et al., 2016). Ononye et al. (2019) found that after implementing an in-service session for three NPs

and one physician in a primary care setting on OSA and the STOP-BANG questionnaire, OSA screening rates jumped from 3% to 43% while referral rates to sleep specialists went from 0% to 39%.

Primary care providers (i.e., NPs) are often the first to offer medical care to patients and the value of screening for OSA in a primary care setting could significantly help reduce the frequency of undiagnosed cases of OSA while improving the quality of life and health outcomes for these individuals (Aurora & Quan, 2016). Increasing provider awareness on OSA in a primary care setting is crucial to detect intermediate or high-risk individuals so they can be seen by a sleep specialist to help decrease morbidity and mortality rates. The purpose of this study is to investigate provider knowledge and knowledge retention on OSA after an in-service, as a method to examine current OSA assessment practices in a primary care setting.

Methodology

Setting and Participants

Two sets of outpatient clinics were selected for this study. The first consisted of multiple clinics from a large teaching hospital in the Western Region of Indiana. The second consisted of four nurse practitioner led Federally Qualified Health Centers in rural Indiana. The study was implemented in a virtual format and took place during one of the mandatory, quarterly APP meetings for NPs. Each clinic had separate APP meetings which occurred approximately one week apart in the first quarter of 2022. NPs were recruited primarily from attendance at their respective mandatory APP quarterly meeting. An email was distributed to participants prior to the meeting stating the exact time and date of the meeting along with an agenda. On the day of the meeting and prior to its start, NPs received an email with an anonymous link to Qualtrics to

complete a pre-test. Prior to starting the pre-test, a consent form and study information sheet appeared stating there are no risks involved in completing this test and results will remain anonymous. The participants selected "agree to participate" to proceed with the pre-test. The same consent form and study information sheet was presented prior to completing the post-test and the subsequent follow-up test. Pre-test, post-test, and follow-up test data was de-identified automatically by Qualtrics. Participants had access to the mandatory meeting through their personal computer or electronic device. Only NPs were included as participants in the study. Providers excluded from the study included physicians (MD, DO) and physician assistants (PA).

Study Design

Upon Institutional Review Board (IRB) approval from Purdue University, a quasi-experimental pre-test/post-test design was used to assess NP knowledge of obstructive sleep apnea (OSA). The study evaluated current NP knowledge on OSA by completing a 23-item pre-test administered through Qualtrics. Once the results were obtained, NPs were presented with an educational module (i.e., PowerPoint) on OSA. The PowerPoint was presented by the project leader. Important information on OSA and how to utilize the STOP-BANG questionnaire was included in the educational module. Immediately after the presentation, NPs completed a 23-item post-test to assess change in knowledge. Five weeks after the initiation of the intervention, a 25-item follow-up test was sent to NPs to assess knowledge retention. An incentive was distributed to participants who completed all three surveys.

Intervention

A PowerPoint presentation was developed and used as the educational intervention in this study. The PowerPoint was created based on information presented in the textbooks titled

"Principles and Practice of Sleep Medicine" (Kryger et al., 2016) and "Management of Obstructive Sleep Apnea: An Evidence-Based, Multidisciplinary Textbook" (Kim et al., 2021). Peer-reviewed articles also supplemented the educational intervention (American Academy of Sleep Medicine, 2016; Ding and Kryger, 2020; Epstein et al., 2009; Gottlieb and Punjabi, 2020; Ononye et al., 2019; Semelka et al., 2016). The intervention was incorporated at the mandatory Advanced Practice Provider (APP) quarterly meeting and was implemented once. The PowerPoint was sent out to NPs after completion of the follow-up test for future reference. The PowerPoint was voiced over and included speaker notes for additional information. The PowerPoint consisted of a total of 16 slides (Table 1).

Table 1

Outline of Educational Module Content

Slide 1	Title page
Slide 2	Objectives of educational module
Slide 3	What is obstructive sleep apnea (OSA)?
Slide 4	Epidemiology of OSA
Slide 5	Economic Impact of OSA
Slide 6	Pathophysiology of OSA
Slide 7	Health consequences of OSA
Slide 8	Risk factors for OSA
Slide 9	OSA Symptoms
Slide 10	How to clinically evaluate for OSA
Slide 11	Mallampati score
Slide 12	How to use the STOP-BANG Questionnaire
Slide 13	Case study on mock patient
Slide 14	When to refer patient to sleep specialist- patient education
Slide 15	Resources on OSA for providers
Slide 16	Reference Page

Measures

To assess NP knowledge, awareness, and the effectiveness of the educational module on OSA, a 23-item pre-test and post-test consisting of 22 identical questions was administered. NP knowledge was examined using different question formats such as multiple choice, select-all-that-apply, and Likert scale questions. The surveys addressed important concepts from the educational module, current thoughts on OSA screening, as well as six questions relating to demographics such as type of provider (i.e., APRN, MD/DO, PA), current practice area, number of years in NP practice, highest education obtained (i.e., Master or Doctoral Degree), type of certification obtained (i.e., FNP, AGPCNP, WHNP etc.), and if sleep disorder education was part of the graduate school curriculum. The post-test included a question assessing changes in the perception of barriers to screening, instead of what barriers to OSA screening exist (pre-test). Five weeks after the educational intervention, a follow-up test was sent to NPs to assess knowledge retention which consisted of 25 items. The same knowledge assessment questions listed in the pre-test and post-test were presented in the follow-up test, in addition to the three questions assessing barriers to screening, and if screening practices were changing from the post-test. Two additional fill-in-the-blank questions allowed participants to acknowledge continuing barriers to OSA screening and provide feedback on the OSA presentation. A $5 incentive e-gift card to Amazon was distributed to participants who completed all three surveys. The survey questions are outlined in Table 2.

Table 2

Itemized Survey Question Content Outline

Concept	Number of Questions		
	Pre-Test	Post-Test	Follow-Up Test
Demographics	*6*	*6*	*6*
Education level	1	1	1
Type of Provider	1	1	1
Years of experience	1	1	1
Practice area	1	1	1
Certification type	1	1	1
Sleep disorder education	1	1	1
OSA Knowledge	*14*	*14*	*14*
OSA definition	1	1	1
Signs/Symptoms	4	4	4
Risk factors	2	2	2
Assessment	3	3	3
Health consequences	4	4	4
Practice Beliefs	*3*	*3*	*5*
Screening importance	1	1	1
Screening frequency	1	1	1
Barriers to screening	1	1	2
Feedback	0	0	1
Total	23	23	25

Data Analysis

Data for the three surveys (Pre-Test, Post-Test, and Follow-Up Test) was extracted from Qualtrics online survey software and analyzed using the Statistical Package for Social Sciences (SPSS) version 28. Descriptive statistics were calculated for respondent demographic data and all survey responses to characterize the sample. Hypothesis testing was done using the Wilcoxen Signed Rank Test and Paired T-Tests. OSA knowledge assessment multiple choice questions met the necessary assumptions (dependent and normally distributed) for the use of Paired T-Tests to compare responses between survey respondents over time. OSA knowledge assessment select-all-that-apply question responses did not follow a normal distribution and were instead evaluated

using the non-parametric Wilcoxen Signed Rank Test as the alternative to the Paired T-Test (Scheff, 2016). All Likert scale questions regarding OSA screening and barriers were also assessed using the Wilcoxen Signed Rank Test since Likert scale questions are categorical in nature (Scheff, 2016). Comparisons between groups utilized two-tailed results for either test, with statistical significance set at $\alpha = .05$.

An outlier was identified in the follow-up test data due to an extremely low total score, partially due to an incomplete survey where questions were skipped. The participant's multiple choice question score was less than half their pre and post-test score, and their follow-up total score was close to 4 standard deviations away from the mean participant total score data. Due to this large discrepancy from the population mean and previous survey scores, this participant was eliminated from the data analysis.

Results

Demographics

Data was collected for a total of 40 respondents for the pre/post-test, and 36 respondents for the follow-up test. Matched data between all surveys was available for 31 (77.5%) respondents, and after elimination of outliers, 30 (75%) respondents remained in the study. Responses assessing specific barriers to OSA screening included all participants since data analysis was not dependent on matched results. Demographic characteristics are outlined in Table 3.

Table 3

Demographic Characteristics of Nurse Practitioners Participating in the OSA Educational Module with Matched Survey Responses (N=30)

Demographic Characteristic	N	%
Highest Level of education		
Master (MS, MSN, MPH)	29	96.7
Doctoral (DNP, PHD, MD, DO, PharmD)	1	3.3
Number of years in Advanced Practice Provider Role		
Less than 1 year	1	3.3
2-4 years	11	36.7
5-10 years	10	33.3
>10 years	8	26.7
Primary Practice Area		
Primary Care	25	83.3
Urgent Care	4	13.3
Specialty Care	1	3.3
Certifications		
Adult Gerontology Primary Care NP	2	6.7
Family NP	28	93.3
Received Sleep disorder education		
Yes	18	60.0
No	12	40.0

Knowledge Assessment

While there were no statistically significant differences between tests for the multiple choice OSA knowledge assessment questions, but there was a clear trend in the mean score (Table 4). The mean multiple choice score increased from pre ($\bar{x} = 8.00$) to post-test ($\bar{x} = 8.53$), then decreased back down to just above pre-test levels for the follow-up test ($\bar{x} = 8.13$).

There was a statistically significant difference between the pre and post-test for the select-all-that-apply OSA knowledge assessment questions ($p = .013$), as shown in Table 4. Similar to the multiple choice questions, the mean select-all-that-apply score increased from pre

($\bar{x}$ = 5.48) to post-test ($\bar{x}$ = 5.72), then decreased back down to above pre-test levels for the follow-up test ($\bar{x}$ = 5.58).

The total score mean followed the same trend as both question types where the total score increased from pre ($\bar{x}$ = 13.48) to post-test ($\bar{x}$ = 14.26), then decreased back down to above pre-test levels for the follow-up test ($\bar{x}$ = 13.71). A statistically significant increase in total score was seen after the educational module (p = .047), just like the select-all-that apply questions.

An increase in knowledge score was demonstrated after implementation of the educational module, and a decrease in knowledge is demonstrated over time in the follow-up test, but the mean remained above pre-test levels, which indicated some long term learning. The follow-up test knowledge levels were not statistically significant from either the pre or post-test, so there was some retention, but it not enough to differentiate it from either pre or post-test scores.

Table 4

OSA Knowledge Question Scores Between Surveys

OSA Knowledge Assessment		Mean Score	*p*		
			Pre-Test	Post-Test	Follow-Up Test
Multiple Choice Questions	Pre-Test	8.00	-	0.118*	0.693*
	Post-Test	8.53		-	0.246*
	Follow-Up Test	8.13			-
Select-All-That-Apply Questions	Pre-Test	5.48	-	0.013**	0.393**
	Post-Test	5.72		-	0.085**
	Follow-Up Test	5.58			-
Total Score	Pre-Test	13.48	-	0.047*	0.533*
	Post-Test	14.26		-	0.118*
	Follow-Up Test	13.71			-

*Paired Samples Test Sig. (2-tailed)

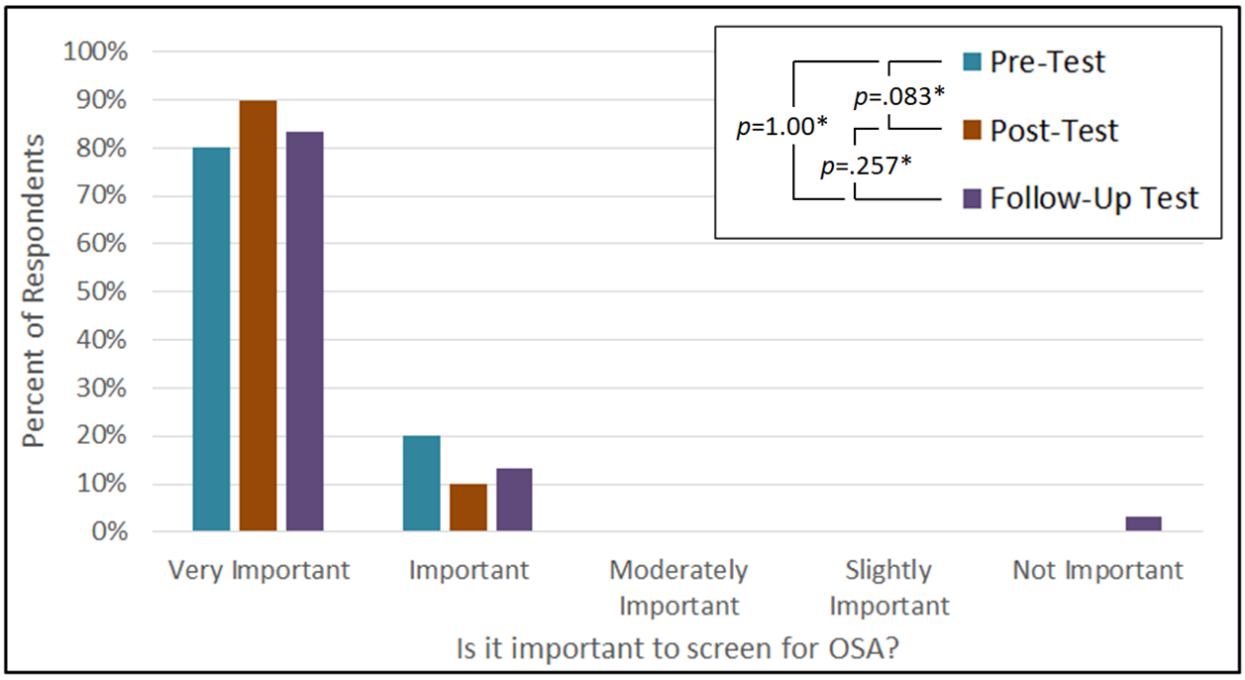
**Wilcoxon Signed Ranks Test Asymp. Sig. (2-tailed)

Screening

The importance of screening for OSA remains as "Very Important" for respondents between surveys, and there was no statistically significant difference between them (Figure 1). This indicates that NPs already understood the importance of screening for OSA before the educational module, and there was little change in sentiment after the educational module or over time in the follow-up test.

Figure 1

Screening Importance of OSA Between Surveys



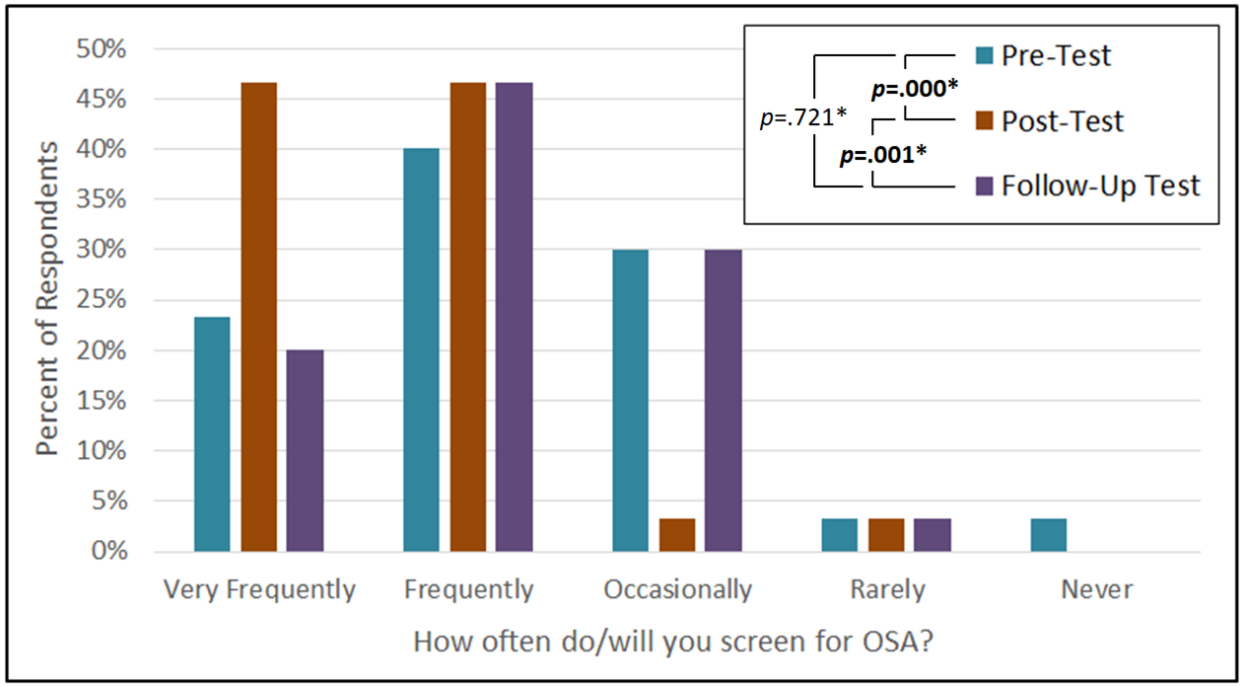
*Wilcoxon Signed Ranks Test Asymp. Sig. (2-tailed)

There was a statistically significant difference between the pre-test and post-test (p = .000), and between the post-test and follow-up test (p = .001) regarding how often NPs screen for OSA (Figure 2). The post-test showed a large increase in the number of NPs who planned to screen very frequently after the educational module, but the follow-up test showed a significant

shift back toward pre-test levels. This indicates that the need for screening was demonstrated and the value of screening for OSA was communicated.

Figure 2

OSA Screening Frequency Between Surveys



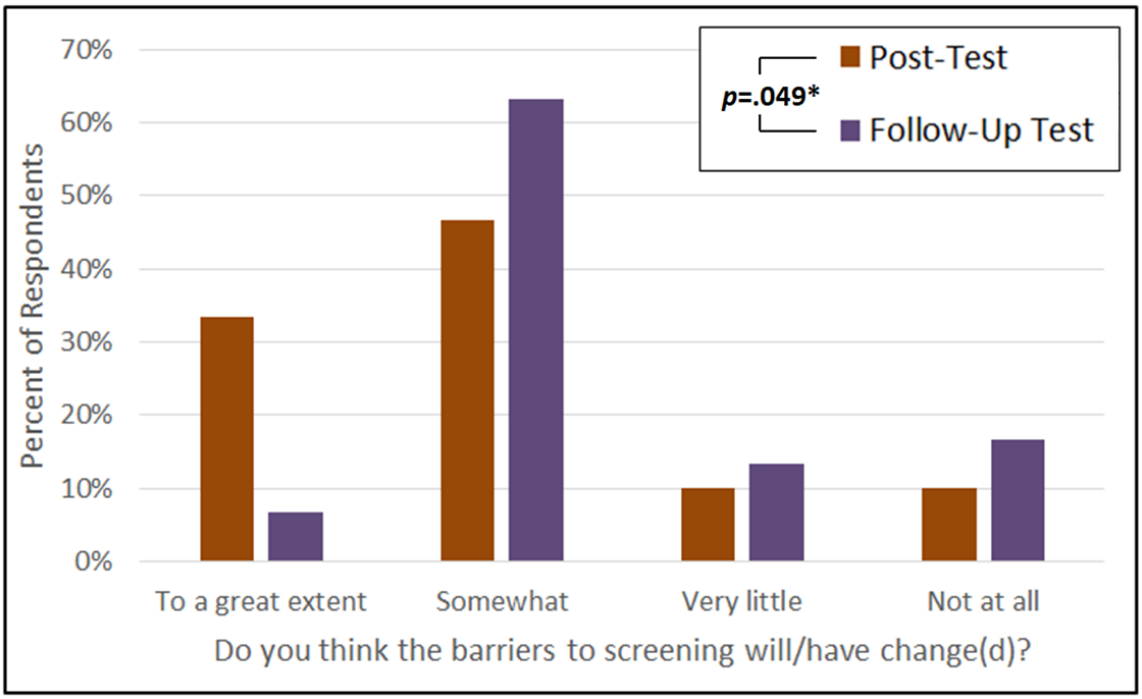
*Wilcoxon Signed Ranks Test Asymp. Sig. (2-tailed)

Barriers

A marginally statistically significant difference existed between the post-test and follow-up test (p = .049) regarding whether NPs believed that barriers to screening have decreased (Figure 3). In the post-test, many NPs believed that barriers will decrease to a great extent, but the follow-up test shows a shift in the trend towards a "Somewhat" decrease in barriers.

Figure 3

Perceived Decrease in OSA Screening Barriers Between Surveys



*Wilcoxon Signed Ranks Test Asymp. Sig. (2-tailed)

The primary barriers to screening identified in the pre-test were lack of time (53.8%), OSA screening not in the EMR (33.3%), and not knowing what screening tool to use (25.6%) (Table 5). Approximately 23.1% of respondents selected that no barriers exist, while 17.9% of respondents mentioned that lack of resources and knowledge on OSA is a barrier to screening (Table 5). This indicates that time is the primary factor preventing screening for most NPs.

The follow-up test shows that the primary barrier to screening remains as Time (50.0%) (Table 6). Knowledge on OSA only came up in 2.9% of responses, and is lower than the pre-test results (Table 6). Newly identified barriers to screening include the Pandemic (5.9%), Lack of Insurance (2.9%), and Patient pushback (2.9%) (Table 6). These results indicate that knowledge and tools are much less of a barrier to screening after implementation of the educational module.

Table 5

Pre-Test Barriers to OSA Screening

Barrier	Percentage of Respondents
Lack of time to screen for OSA	53.8%
OSA screening is not in our EMR	33.3%
Not knowing what screening tool to use	25.6%
No barriers exist	23.1%
Lack of knowledge on OSA	17.9%
Lack of resources to screening	17.9%
Not knowing what questions to ask a patient	15.4%
Not knowing how to assess for OSA	15.4%
Lack of resources to treatment	10.3%

*Multiple responses per participant

Table 6

Follow-Up Test Barriers to OSA Screening

Barrier	Percentage of Respondents
Time	50.0%
None or N/A	17.6%
No response	14.7%
Lack of Screening Tools	5.9%
Pandemic	5.9%
Staffing	2.9%
Lack of Insurance	2.9%
OSA Screening not in EMR	2.9%
Lack of knowledge on OSA	2.9%
Patient pushback	2.9%

*Multiple responses per participant

Discussion

It was hypothesized that NPs would report higher levels of OSA knowledge, report greater importance and incidence of OSA screening, and would see a decrease in practice barriers to screening after being exposed to a real-time in service (i.e., mandatory APP meeting)

educational module. In the multiple-choice questions, the means showed a trend that indicated learning after the educational module, and a retention of knowledge in the follow-up, but results were not statistically significant indicating that differences in scores may not have been due to the intervention. The select-all-that-apply question scores from pre-test to post-test were statistically significant, indicating that measurable learning occurred after the educational module for that set of questions. Total scores followed the same trend in mean as the multiple-choice and select-all-that-apply questions, and showed a statistically significant increase in knowledge after the educational module, signifying learning. The trend demonstrated by the mean scores of the OSA knowledge assessment matches what was hypothesized. The total scores did not change significantly from post-test to follow-up, or between follow-up and pre-test. This combined with the trend in means indicates that there could be some knowledge retention since there is no statistically significant difference from either pre or post-test.

The importance of OSA screening remained very high across all surveys with minimal difference indicating that NPs already understood the importance of screening even before their participation in the study. This remained consistent throughout all three surveys, indicating that the educational module did not change their perspective.

The intent to screen for OSA was higher for the post-test, with statistically significant results from pre-test to post-test, and a decrease from post-test to follow-up test. This indicates that the educational module increased NP intent to screen for OSA, but the drop back down to pre-test levels suggests significant barriers to screening are still prevalent.

In the post-test, there was a large perceived decrease in barriers after viewing the educational module, but the decrease was significantly less in the follow-up test. Immediately

following the educational module the NPs believed that barriers would be reduced to a great extent, but over time the decrease was shown to be less significant than expected. Knowledge-related barriers were reduced by the educational module; however, NPs may have overestimated the level to which knowledge related barriers affected screening in the post-test. Knowledge was not identified as a primary barrier to screening, so the follow-up test responses show less overall change since barriers such as time, and OSA screening not being in the EMR were not addressed.

The results of this study, although not all statistically significant, support the hypothesis and demonstrate that the education did have an effect on NP OSA knowledge, screening rates, and perceived barriers to screening, however, significant barriers to OSA screening still exist which were not addressed by the educational module. The findings of this study are consistent with previous research on educational interventions to improve OSA knowledge in NPs specifically (Valerio & Heaton, 2014). While no studies discussed knowledge retention over time, this study demonstrated increased knowledge assessment scores in the follow-up test which were higher than the pre-test scores, but the difference was not found to be statistically significant.

Contrary to previous research on educational interventions (Ononye et al., 2019; Showalter & O'Keefe, 2019), this study did not audit patient charts to determine the OSA screening rates of adult patients, the number of patients sent to sleep specialists, or the number of patients diagnosed with OSA. Future studies could investigate these results by implementing longitudinal studies to determine long term effectiveness of OSA education on screening rates, referral rates, and the percent of patients diagnosed with OSA.

Limitations to this study are mostly related to sample size, time, and an uncontrolled environment. Future studies should consider a larger sample size with multi-site locations. This study utilized two sites with small sample sizes. A total of 10 participants were eliminated from the study due to a lack of matching data between surveys or they were considered an outlier which further reduced the sample size. Due to the short time frame to implement this project, changing provider practice beliefs and initiating change in practice can be difficult to measure. Future studies would ideally be implemented for a longer period to assess a change in screening practices. Lastly, the educational module was implemented at the end of the workday during a mandatory APP meeting for NPs. End of workday fatigue may have impacted the way NPs answered their knowledge-based questions after implementation of the educational module. Furthermore, there was no control group in this study, so it is impossible to rule out the effect of time on knowledge and knowledge retention since any change may not be the result of only the intervention. With no control group, the results are due to the effect of time and not only the intervention. Other limitations include the barrier to screening question in the follow-up survey which was opened ended (i.e., fill-in-the-blank). This made it difficult to compare barriers before and after the intervention directly for statistical significance. Time and the STOP-BANG questionnaire not being in the EMR were identified as primary barriers and should get more prominent focus in future studies to see how removing these barriers affects screening rates since knowledge and tools were not as prominent of a barrier.

Implications

Economics

The economic burden of undiagnosed OSA is substantial and continues to increase health care utilization (HCU) and costs, especially in adults between the ages of 30-70 (American

Academy of Sleep Medicine, 2016; Ding and Kryger, 2020; Wickwire et al., 2020). In 2015, costs associated with undiagnosed OSA in the United States reached approximately $150 billion, where about $30 billion was spent on medications, HCU, and costs related to comorbidities associated with OSA (i.e., emergency department visits, inpatient/outpatient services) (American Academy of Sleep Medicine, 2016; Wickwire et al., 2020). Being able to diagnose and manage OSA is a significant investment. In 2015, about $12 billion was spent on diagnosing and treating OSA, however, the costs are significantly lower than the costs associated with leaving OSA untreated (American Academy of Sleep Medicine, 2016). It is important to invest in provider sleep training and educational programs to learn what OSA is and how to appropriately detect, screen and assess at risk individuals (American Academy of Sleep Medicine, 2016; Ding and Kryger, 2020). Training should extend to providers practicing in a primary care setting to aid in early diagnosis that would not only improve the quality of life in adults, but would also help decrease HCU and costs associated with OSA related comorbidities due to early treatment (AlMezeini, 2021; American Academy of Sleep Medicine, 2016; Ding and Kryger, 2020). A retrospective study of 650 newly diagnosed OSA adults determined that HCU costs decreased significantly (non-sleep total healthcare utilization -27.4%; non-sleep outpatient clinic encounters -32.8%; ordered laboratory tests -16.4%; total prescribed medications -10.4%) after diagnosis was made and treatment was initiated when comparing HCU 12 months prior to diagnosis (Walter et al., 2017). While the rates of undiagnosed OSA will continue to rise, investing in provider education and screening is an essential, long-term benefit to decrease unnecessary HCU and costs that impacts patients, employers, and payors (American Academy of Sleep Medicine, 2016).

Systems

The electronic medical record (EMR) has the potential to provide valuable benefits to providers, patients, and clinical practice. Not only can the EMR provide improved workflow and efficiency in a rapidly evolving healthcare system, but it can also improve patient care, communication, and safety. In this study, multiple NPs stated that the STOP-BANG Questionnaire screening tool was not in their EMR. NPs stated they need to print each screening tool, which impacts their workflow and time. Time and having no access to the screening tool were the two major barriers to screening patients for OSA reported by NP participants. The integration of the STOP-BANG Questionnaire in the EMR would allow providers to screen patients for OSA more efficiently, ultimately increasing screening rates. Programming the EMR to automatically calculate the risk for OSA after completing the questionnaire would also save time relative to paper based screening tools and simplifies documentation.

Stubberud et al. (2019) implemented the STOP-BANG Questionnaire into the EMR at a pre-anesthesia testing clinic, along with staff education on OSA, at a large academic medical center to help improve the identification of high-risk patients for OSA prior to going into surgery. After implementing the initiative, screening rates doubled (33.3% to 66.1%) and 46.3% of patients were scored to be at a high risk for OSA when compared to the pre-implementation group (18.5%) (Stubberud et al., 2019). Alterations made to the EMR can help maximize compliance and screening rates of OSA. A universal screening tool, such as the STOP-BANG Questionnaire, would provide a more effective method for identifying high risk patients for OSA. Integrated reminders in the EMR would also increase provider awareness and facilitate patient-provider communication on OSA and the health risks associated with the condition.

Policy

Untreated OSA in adults is a safety concern. Providers must recognize that there are health consequences associated with undiagnosed and untreated OSA. Currently, there is a lack of policies to increase screening of OSA. In May 2014, a sleep apnea screening bill, H.R. 4695, was introduced and endorsed by the American Academy of Sleep Medicine to add screening for OSA to the initial preventive physical examination covered under the Medicare program (American Academy of Sleep Medicine, 2014). Unfortunately, there has been no additional action on this bill since 2014. With the growing aging population and obesity rates trending upwards, diagnosing, and treating OSA in adults is essential for successful chronic disease management which are costly and common complications of OSA. When OSA is diagnosed, the most effective treatment is positive airway pressure therapy (CPAP therapy), and studies have shown that CPAP therapy can reduce the risk of heart attack by 49%, and stroke by 31%, ultimately reducing overall healthcare utilization (American Academy of Sleep Medicine, 2014). Furthermore, while the US Preventative Services Task Force (USPSTF) concluded that there is insufficient evidence to assess the benefits and harms of OSA screening in asymptomatic adults, the American College of Physicians recommends screening and conducting sleep studies for patients with unexplained daytime sleepiness and the American Academy of Sleep Medicine recommends that routine health evaluations include questions about OSA and evaluate risk factors such as obesity and hypertension (Bibbins-Domingo et al., 2017). Lastly, costs associated with OSA screening and treatment is a concern to providers as well as patients, however, The Affordable Care Act, various private insurance policies, and Medicare will provide coverage on OSA treatments and testing, depending on one's specific insurance policy (Kirkland, 2022). Some insurance and Medicare policies may require certain conditions to be met first before extending coverage, such as requiring patients to remain compliant with CPAP therapy through

monitored usage during a CPAP trial (Kirkland, 2022). Patient costs will include a deductible and co-pay as designated in their insurance plans (Advanced Sleep Services, 2022). CPAP compliance is vital and has shown to significantly reduce the prevalence of ischemic heart disease, hypertension, heart failure, diabetes, and has helped lower overall acute care visits, decreasing healthcare utilization (Kirsch et al., 2019). Future policy recommendations regarding this project include supporting standardized OSA screening protocols/treatments, integrating sleep education into clinical practice, and promoting awareness of OSA in the prevention of chronic health conditions.

Practice

Initiating change into practice can be difficult, especially if there is a lack of knowledge on the specific topic, lack of resources, and lack of time. Translating a change into practice can be done efficiently with education, teamwork/collaboration, and accessible resources. Prior to initiating the educational module on OSA, many NPs in this study acknowledged having a lack of knowledge on OSA, not knowing how to assess patients for OSA, not knowing what screening tools to use, and lack of resources to screening. When considering implementation of OSA screening in a primary care setting, it is necessary to include standard education on OSA and how to screen for the condition. Web-based training (WBT) modules on OSA can help expand provider knowledge on the topic by completing modules based on specific sub-topics of OSA such as risk factors, common symptoms, complications, questions to ask during assessment, how to perform a physical assessment and how to use the STOP-BANG Questionnaire screening tool. The modules would also contain short quizzes to assess knowledge. Education that is broken down into sections can make information more easily retainable.

Many NPs also stressed the lack of time they have to screen patients for OSA, and as mentioned previously, many do not have an accessible screening tool in the EMR, requiring the screening tool to be printed. To eliminate time as a barrier to OSA screening, OSA screening tool education can be expanded to other members of the interdisciplinary team, such as nurses or medical assistants. These individuals can also complete WBT on how to complete the STOP-BANG Questionnaire, with a quiz testing their knowledge in the end. The questionnaire can be printed beforehand for distribution. This change in practice would save the provider valuable practice time and improve workflow.

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