Educating patients with Atrial Fibrillation (AF) on screening for Obstructive Sleep Apnea (OSA) with the STOP-Bang Questionnaire (SBQ): A Quality Improvement Project

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Abstract

Background: Obstructive Sleep Apnea (OSA) is a condition defined by the blockage of airway during sleep consequentially producing changes in respiration and oxygen levels. Individuals with Atrial Fibrillation (AF) and undiagnosed OSA have an increase in the recurrence of AF and incidence for Cardiovascular Accidents (CVA). OSA is largely undiagnosed and screening questionnaires, such as the STOP-Bang Questionnaire (SBQ), to assess the risk of OSA in an individual are underutilized. **Purpose**: This study aims to educate individuals with AF on topics related to AF, OSA, and concurrent diagnosis, as well as the likelihood of requesting SBQ as a screening tool for OSA. **Participants**: 15 individuals with a known diagnosis of AF enrolled in a South Florida Medicare Advantage Plan. **Methodology**: A quasi-experimental, Interrupted Time Series (ITS) study was conducted enrolling individuals with AF in a pre-post educational intervention. **Results**: Findings were measured by knowledge and likelihood. A significant improvement (t=5.05) in clinical knowledge was appreciated while findings suggest an insignificant change (t=1.521) in likelihood to request SBQ screening for OSA. **Discussion**: This Quality Improvement (QI) project found that an individual's knowledge on clinical topics can be improved through an educational intervention. However, the lack of behavioral modification may be multi-factorial and warrant further research amongst larger sample sizes and cultural backgrounds. In conclusion, an individual with AF can improve their knowledge on concomitant diagnosis of OSA and screening measures, however knowledge is not the driver for behavioral modification promoting proactive health measures such as SBQ screening for OSA.

Keywords: obstructive sleep apnea, atrial fibrillation, screening, and stop-bang questionnaire.

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Section I: Introduction/Problem Statement/Significance

Obstructive Sleep Apnea (OSA) is a multi-faceted, clinical syndrome characterized by obstruction of airflow during sleep. While OSA is not an acute or life-threatening disease, the disruptions in oxygen flow, saturation, and pulmonary pressures result in long-term, chronic health conditions. In the setting of OSA, chronic disease, such as metabolic syndrome, depression, chronic obstructive pulmonary disease (COPD), diabetes mellitus, liver disease, and cardiovascular disease (CVD), are associated with poorer health outcomes. More specifically, high risk groups for OSA include individuals with Atrial Fibrillation (AF), a common arrythmia with complications of which can be potentially life threatening (Morsy et al., 2019).

AF is a significant disease affecting 2.5 million individuals living within the United States. The pathophysiology of AF includes quivering of the atrial chambers of the heart resulting in pooling of blood and potential clot formation. This clot formation places any individual with a diagnosis of AF at five times the risk for developing a Cardiovascular Accident (CVA), or stroke. An individual with concomitant diagnosis of AF and OSA carries a greater risk for onset and persistence of AF when compared to common, established risks factors for OSA including age, gender, body mass index (BMI) and elevated blood pressure (Heart Rhythm Society, 2015). Multiple risks factors and prevention strategies have been identified for AF, with OSA being a modifiable secondary prevention (Tietjens et al., 2018). Therefore, diagnosing and managing OSA in individuals with AF is crucial to improve patient outcomes, such as decreasing recurrence of AF and ultimately decreasing the risk of CVA (Morsy et al., 2019).

A current clinical problem identified in the primary care setting is the lack of screening for OSA, specifically in patients with established AF. Eighty-five percent of individuals suffering with OSA go undiagnosed of OSA (Heart Rhythm Society, 2015). This is a national

issue calling for an initiative to educate individuals on the correlation amongst OSA and AF, as well as the tools available to better screen and ultimately tailor patient care. Gold standard diagnosis for OSA is known as a nocturnal Polysomnography (PSG). A PSG is an overnight sleep study measuring multiple variables of sleep. A precursor to PSG includes screening questionnaires. The STOP-Bang Questionnaire (SBQ) is an eight-item screening assessment that places an individual in a risk category based on their responses. The higher the risk, the more likely an individual suffers from OSA and should be sent for PSG (Amra et al., 2018). Ultimately, individuals with a diagnosis of AF should be clinically aware of its association with OSA and the opportunity for screening with the SBQ.

Section II: Summary of the Literature

A review of the literature shows a strong correlation between AF and OSA clinically. While the etiology is unknown, the correlation is suspected to be due to the increasing intra-thoracic pressure during apneic episodes in OSA causing fluctuation in electrical conduction of the cardiac cycle and potential physical changes of the atrium if OSA is left unmanaged (Khan et al., 2019). Based on this evidence, a call to action is warranted to screen all individuals with AF for OSA to improve patient outcomes. Screening questionnaires have been established to assess individuals at risk for OSA, which include increased BMI, anatomical abnormalities of the neck or naso-oropharyngeal region, male gender, and smoking (Tietjens et al., 2018). The SBQ is a valid and brief screening tool for OSA, administered by a healthcare worker or independently read and completed by the individual. A final score equal to or greater than three out of eight components is considered a positive screening and indicates that an individual is at increased risk of OSA, prompting further investigation (Chang et al., 2023). Ultimately, individuals with a

diagnosis of AF should be clinically aware of its association with OSA and the opportunity for screening with the SBQ.

Literature Search

A comprehensive, electronic database search strategy was utilized for this literature search. More specifically, ScienceDirect, Journal of Clinical Sleep Medicine, Cochrane, Florida International University (FIU) Library, and PubMed were the databases exploited to search for articles relating to the research question. To condense the search for online journals, filters were applied to include full-text publications between 2017 and 2024 in a peer-reviewed journal. A 5-7 year timeline was utilized to achieve an optimal and adequate search of literature. A numerous amount of abstracts for full-text articles were evaluated to identify studies that provided evidence on the clinical correlation amongst AF and OSA, as well as effective screening methods of OSA.

The search strategy was conducted with the use of the following keywords:

- "obstructive sleep apnea" and "atrial fibrillation": returned 6,738 articles.
- "obstructive sleep apnea," "atrial fibrillation," and "screening": returned 2,264 articles
- "obstructive sleep apnea," "atrial fibrillation," and "STOP-Bang": returned 336 articles

Inclusion and Exclusion Criteria

Based on the search strategy, the first 200 abstracts were reviewed. Any article deemed relevant to the research question and literature search was bookmarked in the search engine. Of all the bookmarked articles, approximately 50 articles were left after the removal of duplicates. Of the 50 remaining articles, inclusion of systematic review, meta-analysis, and experimental studies were included, while all others were excluded. Nine articles of Level I and II evidence were selected for inclusion.

Synthesis of the Literature

Clinical Correlation amongst OSA and AF

OSA is a common sleep disorder generally associated with poor health and economic outcomes. OSA is characterized as obstruction of airway during sleep resulting in termination of brain arousal and outflow of the sympathetic nervous system. The pathophysiology of OSA includes lack of appropriate oxygen and carbon dioxide exchange, fragmented sleep and repeated apneic episodes (Abumuamar et al., 2018). Since the cardiac and pulmonary system work congruently, these pauses in respiration and change in oxygenation during sleep places an individual at high risk for CVD, including AF. More specifically, several studies have concluded that OSA is an independent risk factor for onset and recurrence of AF (Morsy et al., 2019).

AF is a highly prevalent disease associated with potentially life-threatening complications if not appropriately managed. “Atrial fibrillation is a risk factor for ischemic stroke, systemic embolism, heart failure and premature death” (Hendrikx et al., 2017, p. 2). AF is diagnosed with electrocardiogram (ECG) or with the use of a cardiac Holter Monitor. Upon diagnosis, AF can be characterized as paroxysmal or persistent. Paroxysmal Atrial Fibrillation (PAF) is defined as the spontaneous termination of AF within seven days of onset, whereas persistent AF is the continuation of AF for more than seven days. Management options for AF include anti-arrhythmic medications, cardiac ablation, or electrical cardioversion (Xu et al., 2020). A strong predictor for AF recurrence post-ablation or cardioversion intervention is moderate to severe OSA (Abumuamar et al., 2018). To strengthen this evidence, Xu et al. (2020) found that more severe forms of OSA were present in individuals AF compared to those in normal sinus cardiac rhythm.

A sample population recruited by Bazan et al. (2020) consisted of individuals referred to Electrophysiology for new onset of AF. This population was found with an 82% prevalence of undiagnosed OSA prompting the need for overnight management. The lack of diagnosis and management jeopardizes the outcomes of rhythm-restoring interventions for individuals with AF (Bazan et al., 2020). "At present, most cases of OSA remain undiagnosed and the rate of OSA further increases with age and obesity" (Xu et al., 2020, p. 9). All studies highlighted in this literature review call for further experimental research and analysis on the correlation amongst OSA and AF, with assessment and management of OSA related to the outcomes of AF.

Screening for OSA using the STOP-Bang Questionnaire (SBQ)

According to the United States Preventative Services Task Force (USPSTF), screening for OSA in adults over the age of 18 is recommended as a Grade I statement. Based on this grading level, there is no universal agreement for or against screening patients for OSA (Mangione et al, 2022, p. 1945). Despite this Grade I recommendation, the American Academy of Sleep Medicine (AASM) recommends screening for OSA in high-risk patients, such as those with a diagnosis and recurrence of AF (Khan et al., 2019). The gold standard diagnosis for OSA is the PSG, which is an expensive, overnight sleep study. A PSG is not an ideal study for most individuals, which is why other modalities have been explored (Delesie et al., 2021). Two prospective studies performed by Delesie et al. (2021) and Mohammadieh et al. (2021) aimed to validate commonly used screening tools for OSA. Both studies recruited individuals with a diagnosis of AF. Each participant underwent OSA screening tools and an overnight PSG as a reference point for diagnostic accuracy.

Study conclusions noted low specificity from all screening questionnaires, with only a few resulting with high sensitivity (Delesie et al., 2021). "The SBQ had the highest sensitivity for

the prediction of mild and severe OSA (97.55% and 98.7%, respectively)" (Amra et al., 2018). A study by Bazan et al. (2020) noted a superiority with the use of the SBQ, due to its focus on more important OSA risk factors, such as obesity, neck circumference, blood pressure, and age, rather than clinical consequences, such as snoring and daytime sleepiness. Moreover, Mohammadieh et al. (2021) reported a fair diagnostic accuracy for moderate to severe OSA when utilizing the SBQ, while a meta-analysis by Amra et al. (2018) concluded the SBQ to be an appropriate tool in sleep clinic patients. Screening methods are necessary due to the underdiagnosis and highly prevalent correlation amongst OSA and AF. In conclusion, the SBQ can be used as the initial OSA screening protocol for individuals with AF before sending more expensive and extensive testing such as PSG.

Section III: Purpose

According to the Heart Rhythm Society (2015), eighty-five percent of individuals suffering from OSA are undiagnosed. The rationale for underdiagnosis is unknown, but it is speculated to be due to poor clinical knowledge and understanding of OSA. Understanding OSA is crucial for it is highly associated with AF, a chronic, cardiovascular arrhythmia prevalent amongst the general population. Multiple risks factors and prevention strategies have been identified for AF, with OSA being a modifiable secondary prevention (Tietjens et al., 2018). Diagnosing and treating OSA in individuals with AF is essential to improve patient outcomes, such as decreasing the risk of stroke (Morsy et al., 2019). The goal for this DNP project is to prioritize patient education on the correlation between OSA and AF to ignite autonomy for individuals with AF to request OSA screening. A quick, valid, and readily accessible screening tool is the SBQ which an individual can request at their upcoming clinical visit. By improving

screening, we can promote prevention strategies and eliminate the underdiagnosis of OSA to improve quality of care and outcomes for individuals with AF.

PICO Clinical Question

OSA is a chronic sleep disorder identified as a modifiable risk factor for AF. Based on the known correlation, this project is focused on improving patient health literacy and education to promote patient advocacy for OSA screening. The proposed project of this Doctor of Nursing Practice (DNP) is to educate patients with an established diagnosis of AF on OSA and concomitant diagnosis to improve clinical knowledge and confidence in requesting OSA screening using the SBQ at their next clinical care visit in a Medicare Advantage Clinic. The PICO question is as follows:

Individuals with Atrial fibrillation (AF) will undergo an educational intervention improve Obstructive Sleep Apnea (OSA) knowledge and promote likelihood to request screening utilizing the STOP-Bang Questionnaire (SBQ)?

- **Population**: individuals with an established diagnosis of AF
- **Intervention:** administering a pre-educational intervention survey aimed at understanding a participant's baseline knowledge on Quality Improvement (QI) target diagnoses and their likelihood to request SBQ screening for OSA at their upcoming clinical visit, followed by a 2-minute educational intervention.
- **Comparison**: administering a post-survey to assess a participant's knowledge of QI target diagnoses and their likelihood of requesting screening for OSA using the SBQ in individuals with an established diagnosis of AF.
- **Outcome**: Improved clinical knowledge and likelihood to request OSA screening using the SBQ at their next primary care visit in a Medicare Advantage Clinic.

SMART Objectives

Creating an action plan and establishing objectives is critical in any QI project focused on bridging lessons learned with clinical practice. “An established model for developing actionable learning goals is the ‘SMART’ framework. These goals are Specific, Measurable, Attainable, Realistic, and Time-bound" (Aghera et al., 2018, p. 113). Establishing goals lays out concrete tasks that improve knowledge, outcomes, and guidelines through implementation. For the purpose of this DNP QI project, the following SMART objective have been identified:

- Identifying patients with a diagnosis of AF knowledge and likelihood to request the SBQ for OSA screening through the utilization of a pre-educational intervention questionnaire issued to enrolled participants by July 30, 2024.
- Execute a post-educational intervention survey evaluating the knowledge of enrolled participants on the relationship amongst OSA and AF, with emphasis on the likelihood in which the enrolled participant would request a SBQ at their next clinical visit utilizing the SBQ by July 30, 2024.

Section IV: Definition of Terms

1. Atrial Fibrillation (AF) is an arrhythmia of the heart characterized by chaotic electrical signals causing the upper chambers of the heart (the atriums) to quiver as opposed to contracting properly (Heart Rhythm Society, 2015).
2. Obstructive Sleep Apnea (OSA) is the recurrent obstruction of the upper airway during sleep which causes apneic episodes despite continuous respiratory drive (Abumuamar et al., 2017).
3. STOP-Bang Questionnaire (SBQ) a valid screening tool assessing eight items commonly remembered with the acronyms STOP (Snoring, Tiredness, Obstruction, or witnessed

apneic episodes, and Pressure, or arterial hypertension) and BANG (Body mass index, Age, Neck circumference, and Gender), which place an individual at risk for OSA (Delesie et al., 2021).

Section V: Conceptual Underpinning and Theoretical Framework

The use of a theoretical framework is crucial when proposing change to established practices in organizations, communities, clinicals practices, and patient behaviors. The theoretical framework for this DNP project is The Theoretical Domains Framework (TDF). Initially constructed to identify influences on clinicians' behaviors related to evidence-based practice (EBP), TDF is a framework that does not propose a testable relationship between variables, but rather provides a lens in which researchers can view influences on health behavior. TDF has been used to theoretically analyze organizational, clinical, and patient behaviors. Examples of how TDF has been used to change patient behaviors include: increasing physical activity in stroke survivors or in children with a disability in motor skills. A benefit to using TDF includes increased researcher confidence, providing a guide to understand problem implementation and solution through a theoretical lens (Atkins et al., 2017).

TDF Overview

With the collaboration of behavioral scientists and implementation researchers, TDF was synthesized from 128 theoretical constructs found within 33 theories. This interdisciplinary group established 14 domains that guide the TDF. Atkins et al. (2017) identified and summarizes the domains:

1. Knowledge: an individual's awareness that something exists.
2. Skills: an ability or competency developed through practice.

3. Social/Professional role and identity: an individual's set of behaviors and personal qualities displayed in an environmental setting.
4. Beliefs about capabilities: accepting one's own reality, truth, and talent.
5. Optimism: having confidence that optimal outcomes will be achieved.
6. Beliefs about consequences: accepting the reality and truth about outcomes in a particular situation.
7. Reinforcement: improving the probability of a response by arranging a contingent variable
8. Intentions: an informed decision to perform a behavior.
9. Goals: a state of outcomes and individual pursues.
10. Memory, attention, and decision process: an individual's ability to understand and retain information, while focusing on aspects in their environment that they can change.
11. Environment, context, and resources: any circumstance an individual may encounter that will discourage their abilities.
12. Social influences: interpersonal processes that may alter an individual's thoughts, feelings, and behaviors.
13. Emotions: a multi-faced reaction towards an event that involves experimental, physiological, and behavioral components.
14. Behavioral regulation: any intention to manage or change an action.

Clinical Fit of TDF

The TDF and its 14 domains are crucial in the implementation of a research purpose focused on changing patient behavior to request OSA screening using the SBQ in individuals with a diagnosis of AF. The domain of knowledge is demonstrated in the assessments of an

individual's awareness on the correlation and outcomes associated with a concomitant diagnosis of OSA and AF. To increase knowledge, an educational intervention is implemented, in hopes the individual will develop the skill or ability to request OSA screening and exercise the domain of memory, attention, and decision making. The individual will also be given the opportunity of autonomy to fulfill their capabilities and serve in the role of active participant in the interdisciplinary healthcare team. Optimism is the idea that improved outcomes of AF are a consequence of implementing prevention strategies, such as screening for OSA, while understanding the outcome or consequence of screening may result in a new, chronic diagnosis. Reinforcing the improved management of AF if OSA is diagnosed and managed is crucial for participation and increasing awareness. This will generate an intention to improve quality of care and increase prevention strategies for individuals diagnosed with chronic diseases; an intention and goal to be more active in the patient-provider relationship. Creating a comfortable, open environment within the setting of a clinical visit encourages an individual to exercise their behavioral regulation to request prevention measures. Lastly, an individual's set of emotions and social influences may guide their decision to request OSA screening.

Section VI: Methodology

Methodology is the backbone of any QI project, serving as a bridge between theory and practice. Methodology is integral to any project's success and efficacy. In the context of healthcare, methodology provides a structured framework to implement interventions, assess the influence, and consequently drive positive change that improve quality of care and health outcomes (Miller et al., 2020). For this QI project, a quasi-experimental study design of pre-post educational intervention survey without randomization will be employed.

An Interrupted Times Series (ITS) is a form of quasi-experimental design with no control group. For this QI initiative, a non-equivalent control group will not be relied on (Miller et a., 2020). Instead, repeated data collection of pre-post educational intervention survey will be used to determine an improvement in knowledge and likelihood that a participant with a diagnosis of AF requests OSA screening using the SBQ. Measures chosen within the pre-post educational intervention survey are appropriate. Together with clinical faculty, Samantha C. Leon, DNP, APRN, FNP-C, ENP-C, an established Advanced Practice Registered Nurse (APRN) at the practice site, execution of this methodology was taken place.

Setting and Participants

The practice site is a Medicare Advantage Clinic in South Florida. This company serves a diverse Hispanic background, with the primary languages of English and Spanish spoken within the clinic. The patient population includes individuals carrying Medicare or Medicaid insurance with the majority ranging over the age of 65. Most patients enrolled are retired living in the low-to-middle income population, while those who continue working fall within the middle-income bracket. Health literacy is an essential component within this population for it serves as a strength to improve overall well-being and participation within the interdisciplinary healthcare team centered around the patient.

The practice site strives to provide holistic healthcare at a clinic that fulfills all an individual's needs. With eight clinics in the South Florida Region, an individual is registered to a home clinic, which offers Primary Care Services, Specialist Services, Therapy Programs, Urgent Care Services, Healthy Living Centers, and more under one roof. All clinicians and healthcare providers work through EPIC, an Electronic Medical Record (EMR). This allows for all patient data to be available upon entry into an individual's chart. In this quasi-experimental study with

an ITS design, individuals will express interest in enrolling into the study and be screened for inclusion criteria: a diagnosis of AF. Smaller sample sizes are a challenge for reliability and validity; recruiting at least 10 participants is recommended (Atkins et al., 2017). Together with the facility mentor, Samantha C. Leon, DNP, APRN, FNP-C, ENP-C, the recruitment of 15 participants was accomplished over a 4-month period.

Procedures

The QI project is a quasi-experimental design where individuals will be enlisted with a recruitment letter posted in the checkout desk of the practice sites Urgent Care. The recruitment letter, as shown in Appendix A, will outline the DNP project topic, purpose, and goals. DNP student credentials will be displayed on the letter of recruitment. If an individual expresses interest in being a participant, the DNP student will be alerted to proceed with assessment of inclusion criteria, a diagnosis of AF. Once inclusion criteria is met, the individual will be handed the informed consent, as depicted in Appendix B. Upon completion of the informed consent, a QR code, as depicted in Appendix C, will be utilized to access survey participation. The survey will be conducted via Qualtrics, which is password protected website only accessible by the DNP student. Once an individual scans the QR code, they will enter the survey, depicted in Appendix D, and be prompted to fill out demographic information including gender, age, and race/ethnicity. This will assess the potential for generalization based on data analysis and results.

The design of this intervention, depicted in Appendix D, is formatted as a pre-post educational intervention survey. With high rates of undiagnosed OSA and lack of screening using the SBQ, the first five questions of the survey is geared to understanding participant knowledge of AF, OSA, risks of concomitant diagnosis, and the use of SBQ as a screening tool for OSA. The final question is formatted as a Likert scale geared to assess a variable of interest before and

after an educational intervention is conducted. For this QI project, the variable of interest is a participant's likelihood to request OSA screening using the SBQ at their upcoming clinical visit. Once the pre-educational interventions survey is complete, the participant will be prompted to watch a 3.5-minute video geared to providing education of OSA on AF with SBQ screening tools. This video will be loaded and ready to play by the DNP student conducting the research. After the educational intervention, the participant will repeat the questionnaire formatted as the post-educational intervention survey. An overview of the quasi-experimental design can be seen in Figure 1.

Collection of data was managed and prompted by the DNP student. Raw quantitative data, including true or false answers and the Likert scale, were collected, stored, and analyzed through graphs, tables, and cross tabulation in Qualtrics. All data is quantitative, with true or false questions aiding in the assessment of a patient's knowledge on their diagnosis of AF, OSA, concomitant diagnosis, and prevention strategies, such as screening for OSA. Moreover, the five-point Likert scale is the variable of interest that measure behavioral modification, the likelihood to request the SBQ as a preventative measure. According to Sullivan & Artino (2013), the Likert scale is crucial in medical education research allowing for the calculation of a mean and standard deviation. All data collected for this project will be destroyed in three years from the QI project's completion.

Protection of Human Subjects

The Institutional Review Board (IRB), under the United States Food and Drug Administration (U.S. FDA) (2019), is a group of individuals formally appointed to review and monitor all biomedical research that involves human subjects. The IRB is responsible for protecting human rights and welfare in the research setting. The IRB uses processes to review

protocols and materials, e.g. informed consent and methodology, related to the proposed biomedical research project (U.S. FDA, 2019). An IRB approval letter, depicted in Appendix E, been obtained for this QI project. Prior to enrollment, individuals will complete an informed consent, formatted with a template from FIU, depicted in Appendix B. Those completing informed consent will be made aware of the opportunity to decline or withdraw from the study at any time. Identity of the participant may be associated to the study through informed consent, which will require the participant's signature. Otherwise, participants will only be asked to provide their gender, age, and ethnicity to assess variability in data analysis. Participants are not expected to experience any harms, discomfort, or risks, including physical, psychological, social, legal, and economic, through participation in this project.

Section VII: Results

The purpose of this QI project is to evaluate the effectiveness of an educational intervention on the knowledge of clinical OSA as it related to AF and likelihood in which an individual with AF would request screening for OSA using the SBQ at their upcoming clinical visit. Fifteen individuals with AF participated in this study and all individuals (n=15) completed the pre-educational intervention survey, educational intervention, and the post-educational intervention survey. Of the participants, 8 (53%) were male and 7 (47%) were female. All participants were over the age of 70, with 9 (60%) being 70-80 years old and the other 6 (40%) being over 80 years old. The sample included 14 (93%) Hispanic or Latino participants with 1 (7%) white participant.

Pre- and Post- Educational Intervention Results

Knowledge

Pre-Educational Intervention. The initial five questions of the survey were created to understand a participant's baseline knowledge on the topics being studied. The questions were formatted in a True or False format. A total of 15 participants answered all items. 13 (86%) participants answered True to the first item that asks if AF is an arrhythmia of the heart, where 2 (13%) participants answered False. A total of 10 (66%) participants agreed that OSA causes changes through obstruction in breathing at night by selecting True, where 5 (33%) participants selected False. When assessing the understanding of the clinical correlation between OSA and AF, a total of 8 (53%) participants answered True that obstruction of the airway at night causes changes in respiratory and cardiac function, where the other 7 (46%) participants answered False. Additionally, 6 (40%) participants selected True in understanding that individuals with AF and undiagnosed OSA are at a higher risk for stroke, where the other 9 (60%) answered False. For the fifth item of the initial 5 questions, a total of 2 (13%) participants selected True for knowing there is an eight-item questionnaire, known as SBQ, which assesses if an individual is at risk for OSA, where the other 13 (86%) participants answered False.

Post-Educational Intervention. Following the educational intervention video, a total of 15 participants answered all items. 14 (93%) participants answered True to the first item that asks if AF is an arrhythmia of the heart, where 1 (7%) participant answered False. A total of 14 (93%) participants agreed that OSA causes changes through obstruction in breathing at night by selecting True, where 1 (7%) participant selected False. When assessing the understanding of clinical correlation between OSA and AF, a total of 14 (93%) participants answered True that obstruction of the airway at night causes changes in respiratory and cardiac function, where 1 (7%) participant answered False. Additionally, 14 (93%) participants selected True in understanding that individuals with AF and undiagnosed OSA are at a higher risk for stroke,

where 1 (7%) participant answered False. For the fifth item of the initial 5 questions, a total of 14 (93%) participants selected True for knowing there is an eight-item questionnaire, known as SBQ, which assess an individual's risk for OSA, where 1 (7%) participant answered False.

Table 1

Participants knowledge on AF, OSA, clinical correlation, and OSA screening methods

Question	Pre-Intervention Survey (n=15)	Post-Intervention Survey (n=15)	% of Change
Atrial Fibrillation is an arrhythmia of the heart?			
True *	13 (86%)	14 (93%)	7.69% (increase)
False	2 (13%)	1 (7%)	50.00% (decrease)
Obstructive Sleep Apnea (OSA) causes changes in the way you breath at night, specifically obstruction of the airway.			
True *	10 (66%)	14 (93%)	40.00% (increase)
False	5 (33%)	1 (7%)	80.00% (decrease)
Obstruction of the airway during sleep causes changes in respiratory and cardiac function.			
True *	8 (53%)	14 (93%)	75.00% (increase)
False	7 (46%)	1 (7%)	85.71% (decrease)
Individuals with Atrial Fibrillation (AF) and undiagnosed Obstructive Sleep Apnea (OSA) are at a higher risk for stroke.			
True *	6 (40%)	14 (93%)	133.33% (increase)
False	9 (60%)	1 (7%)	88.89% (decrease)
You can answer an eight-item questionnaire, known as the STOP Bang Questionnaire (SBQ), and see if you're at risk for Obstructive Sleep Apnea (OSA)			
True *	2 (13%)	14 (93%)	600.00% (increase)
False	13 (86%)	1 (7%)	92.31% (decrease)

Note: *= correct answer

Knowledge Paired Sample t-Test

A two tailed-paired sample t-test was used to determine if the mean difference of knowledge from the pre- and post-educational intervention was significant. Using a t-distribution table, the level of significant (alpha) of 0.05 is desired indicating a critical t-value of 2.145. The results of the two-tailed paired sample t-test noted statistical significance for the t-value was 5.05 as depicted in Table 2. Therefore, if the sample test t-score is greater or equal to the critical t-value, 2.145, then the results are noted to be statistically significant. In summary, the educational intervention noted a statistically significant change in knowledge amongst all topics surveyed.

Table 2
Knowledge paired t-Test results

	Pre-Post Intervention Survey
Mean Difference	2.07
SD	1.58
T statistic	5.05

Likelihood

Pre-Educational Intervention. The final question of the pre-educational intervention survey was formatted as a Likert scale, measuring a participant's likelihood in requesting the SBQ to screen for OSA at their upcoming clinical visit. Of the 15 participants, 10 (66%) selecting neither likely nor unlikely, 2 (13%) selecting somewhat unlikely, and 3 (20%) selecting extremely unlikely.

Post-Educational Intervention. Following the educational intervention video, participant was once again measured on their likelihood in requesting the SBQ to screen for OSA at their upcoming clinical visit using a Likert scale. Of the 15 participants, 5 (33%) selecting somewhat likely, 6 (40%) selecting neither likely nor unlikely, 1 (7%) selecting somewhat unlikely, and 3 (20%) selecting extremely unlikely.

Table 3

Participants likelihood in requesting the STOP-Bang Questionnaire (SBQ)

Question	Pre-Intervention Survey (n=15)	Post-Intervention Survey (n=15)	% of Change
In view of your diagnosis of Atrial Fibrillation (AF), how likely are you to ask your provider for the STOP-Bang Questionnaire (SBQ) to screen for Obstructive Sleep Apnea (OSA) at your next visit?			
Extremely Likely *	0 (0%)	0 (0%)	0
Somewhat Likely	0 (0%)	5 (33%)	500% (increase)
Neither Likely nor Unlikely	10 (66%)	6 (40%)	40% (decrease)
Somewhat Unlikely	2 (13%)	1 (7%)	50% (decrease)
Extremely Unlikely	3 (20%)	3 (20%)	0

Note: *= correct answer

Likelihood Paired Sample t-Test.

A two tailed- paired sample t-test was used to determine if the mean difference of likelihood from the pre- and post-educational intervention was significant. Using a t-distribution table, the level of significant (alpha) of 0.05 is desired indicating a critical t-value of 2.145. The results of the two-tailed paired sample t-test noted no statistical significance for the t-value was 1.521 as depicted in Table 4. Therefore, if the sample test t-score is less than or equal to the critical t-value, 2.145, then the results are noted to not be statistically significant. In summary, the likelihood of individuals with AF to request screening for OSA using the SBQ was insignificant.

Table 4

Likelihood paired t-Test results

	Pre-Post Intervention Survey
Mean Difference	0.4
SD	0.985
T statistic	1.521

Section VIII: Discussion

The purpose of this QI Project was to evaluate the effectiveness of an educational intervention in increasing knowledge on OSA and AF, as well as assessing the likelihood in which an individual with AF would request the SBQ at their next clinical visit. The pre-post educational intervention notes a significant increase in an individual's knowledge and understanding of topics related to OSA and AF. This was apparent due to correct responses to questions regarding topics related to OSA and AF in the post-education intervention survey as compared to the pre-educational intervention survey. Specifically, an improvement of 53% to 93% was seen when participants correctly responded that obstruction of the airway in OSA at night can cause changes in both respiratory and cardiac function. An increase of 133% was seen in the knowledge that individuals with concomitant diagnosis of AF and OSA are at increased risk for CVA, or stroke. Most significantly, knowledge regarding SBQ as a screening tool for OSA increased 600% amongst participants. The results of the paired sample t-test ($t = 5.05$) confirmed that the educational intervention was effective in significantly enhancing an individual with a diagnosis of AF knowledge on the related topics.

Despite noteworthy improvement in participant's knowledge, the findings suggest no clinical significance in an individual with AF's likelihood to request screening using the SBQ at their upcoming clinical visit. This was apparent due to the lack of change in response to the Likert scale in the post-education intervention survey as compared to the pre-educational intervention survey. The pre-educational intervention data showed a majority of participants (66%) were neither likely nor unlikely or (33%) somewhat/extremely unlikely to requesting the SBQ. Once the educational intervention was complete, the post survey indicated a minor shift of 5 out of 15 (33%) participants reporting they were somewhat likely to request the SBQ. These findings did not attain statistical significance ($t = 1.521$) suggesting that, while knowledge

improved, a participant's behavioral intentions regarding screening were not sufficiently influenced by the educational intervention.

Limitations

Limitations of this QI project includes a small sample size (n=15), largely consistent of the Hispanic population over the age of 70. A lack of diversity and small sample size affect generalizability of the findings obtained. Additionally, older adults may have different motivations and health goals compared to individuals of a younger population. To enhance behavioral outcomes, such as likelihood to request SBQ screening, recruiting a larger and diverse population expanding over multiple age groups would improve participant knowledge and likelihood.

Implications for Advanced Practice Nursing

An educational intervention effectively promotes increased knowledge on topics related to OSA and AF. By promoting health literacy, the likelihood to request screening for OSA using the SBQ is expected to maintain the same or hopefully improve if generalizability is better studied. This study has proven that knowledge alone may not be sufficient to encourage proactive health measures in a sample group consisting of older aged adults largely within the Hispanic community. Motivating factors or studies not limited to small sample sizes may enhance this QI projects findings. Ultimately, if a comprehensive plan prioritizing education, close follow-ups, and clinical protocols is developed, improved screening and awareness may reduce prevalence of complications related to concomitant diagnosis of OSA and AF. Additionally, collaborative participation of clinicians and clinical staff to enact change is required to improve patient outcomes, proactivity, and overall patient well-being.

Conclusions

Poor management of AF can be linked to high rates of unmanaged OSA, a multi-faceted disease that remains largely undiagnosed within the general population. This QI project implemented a quasi-experimental ITS design at a Medicare Advantage Company in South Florida to evaluate improvement in knowledge and likelihood of an educational intervention for individuals with a diagnosis of AF. The findings demonstrated improvement in clinical knowledge on topics related to OSA, AF, concomitant diagnosis, and opportunities for screening measures. However, behavioral modifications to promote proactive care through OSA screening utilizing the SBQ was not achieved. Future projects geared to this topic should consider studying a larger sample size of diverse age groups and cultural backgrounds. By improving generalizability, limitations may be reduced and behavioral modifications can impact patient outcomes by producing a healthcare system of proactivity to improve overall well-being.

Diagrams and Tables

Table 1

Participants knowledge on AF, OSA, clinical correlation, and OSA screening methods

Question	Pre-Intervention Survey (n=15)	Post-Intervention Survey (n=15)	% of Change
Atrial Fibrillation is an arrhythmia of the heart?			
True *	13 (86%)	14 (93%)	7.69% (increase)
False	2 (13%)	1 (7%)	50.00% (decrease)
Obstructive Sleep Apnea (OSA) causes changes in the way you breath at night, specifically obstruction of the airway.			
True *	10 (66%)	14 (93%)	40.00% (increase)
False	5 (33%)	1 (7%)	80.00% (decrease)
Obstruction of the airway during sleep causes changes in respiratory and cardiac function.			
True *	8 (53%)	14 (93%)	75.00% (increase)
False	7 (46%)	1 (7%)	85.71% (decrease)
Individuals with Atrial Fibrillation (AF) and undiagnosed Obstructive Sleep Apnea (OSA) are at a higher risk for stroke.			
True *	6 (40%)	14 (93%)	133.33% (increase)
False	9 (60%)	1 (7%)	88.89% (decrease)
You can answer an eight-item questionnaire, known as the STOP Bang Questionnaire (SBQ), and see if you're at risk for Obstructive Sleep Apnea (OSA)			
True *	2 (13%)	14 (93%)	600.00% (increase)
False	13 (86%)	1 (7%)	92.31% (decrease)

Note: *= correct answer

Table 2

Knowledge paired t-Test results

	Pre-Post Intervention Survey

Mean Difference	2.07
SD	1.58
T statistic	5.05

Table 3

Participants likelihood in requesting the STOP-Bang Questionnaire (SBQ)

Question	Pre-Intervention Survey (n=15)	Post-Intervention Survey (n=15)	% of Change
In view of your diagnosis of Atrial Fibrillation (AF), how likely are you to ask your provider for the STOP-Bang Questionnaire (SBQ) to screen for Obstructive Sleep Apnea (OSA) at your next visit?			
Extremely Likely *	0 (0%)	0 (0%)	0
Somewhat Likely	0 (0%)	5 (33%)	500% (increase)
Neither Likely nor Unlikely	10 (66%)	6 (40%)	40% (decrease)
Somewhat Unlikely	2 (13%)	1 (7%)	50% (decrease)
Extremely Unlikely	3 (20%)	3 (20%)	0

Note: *= correct answer

Table 4

Likelihood paired t-Test results

	Pre-Post Intervention Survey
Mean Difference	0.4
SD	0.985
T statistic	1.521

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Appendix

Appendix A: Recruitment Letter

Recruitment Letter for Educating patients with Atrial Fibrillation (AF) on screening for Obstructive Sleep Apnea (OSA) with the STOP-Bang Questionnaire (SBQ): A quality improvement project

Dear individual,

My name is Jessica A. Hernandez and I am a student from the Graduate Nursing Department at Florida International University. I am inviting you to participate in my quality improvement project. The goal of this project is to improve clinical knowledge on the correlation of Atrial Fibrillation (AF) and Obstructive Sleep Apnea (OSA), as well as the availability of the STOP Bang Questionnaire (SBQ) as a screening tool for OSA. Inclusion criteria for this quality improvement project is an established diagnosis of AF. If you meet this criteria, you are eligible to partake in this project.

If you decide to participate in this project, you will be asked to complete an informed consent for participation. You will complete a pre-educational intervention survey, which is expected to take approximately 5 to 10 minutes. Then you will be prompted to watch a 3.5 minute prerecorded educational intervention video. After watching the video, you will be asked to complete the post-educational intervention survey, which is expected to take approximately 5 to 10 minutes. No compensation will be provided.

Remember, this is completely voluntary. You can choose to be in the study or not. If you'd like to participate, please advise your Urgent Care provider. If you have any questions about the study, please e-mail or contact me at jhern512@fiu.edu or 305-389-9721.

Thank you very much.

Sincerely,

Jessica A. Hernandez

Appendix B: Informed Consent

ADULT CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Educating patients with Atrial Fibrillation (AF) on screening for Obstructive Sleep Apnea (OSA) with the STOP-BANG questionnaire: A Quality Improvement Project

Hello, my name is _____.

You have been chosen to be participate in a quality improvement project for Florida International University.

PURPOSE OF THE STUDY

The purpose of this study is to investigate the impact of an educational intervention geared to improving patient knowledge on clinical OSA as it relates to AF and resources relevant to screening.

NUMBER OF STUDY PARTICIPANTS

If you decide to be in this study, you will be one of 15 to 30 individuals in this research study.

DURATION OF THE STUDY

Your participation will involve 5 to 7 minutes of your time.

PROCEDURES

If you agree to be in the study, we will ask you to do the following things:

1. Complete a six-question pre-educational intervention questionnaire on your mobile device.
2. Watch a 2-minute educational intervention.
3. Complete a single item post-educational intervention survey.

RISKS AND/OR DISCOMFORTS

There is no foreseeable physical, psychological, economic, or social risk associated with study participation. Participation will not interfere or impede on your normal clinical visits.

BENEFITS

The study has the following possible benefits to you: improvement of knowledge and confidence to request secondary prevention strategies of OSA screening tools. It is anticipated that this project will improve health literacy and healthcare outcomes if a diagnosis of OSA is suspected.

ALTERNATIVES

There are no known alternatives available to you other than not taking part in this study. Any significant new findings developed during the course of the research which may relate to your willingness to continue participation will be provided to you.

CONFIDENTIALITY

The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report we might publish, we will not include any information that will make it possible to identify you. Research records will be stored securely, and only the researcher team, clinical faculty (Dr. Dana Sherman, DNP, APRN, ANP-BC, FNP-BC) and practice site mentor (Samantha C. Leon, DNP, APRN) will have access to the records. However, your records may be inspected by authorized University or other agents who will also keep the information confidential.

USE OF YOUR INFORMATION

Your information collected as part of the research will not be used or distributed for future research studies even if identifiers are removed.

COMPENSATION & COSTS

There are no costs to you for participating in this study.

RIGHT TO DECLINE OR WITHDRAW

Your participation in this study is voluntary. You are free to participate in the study or withdraw your consent at any time during the study. You will not lose any benefits if you decide not to participate or if you quit the study early. The investigator reserves the right to remove you without your consent at such time that he/she feels it is in the best interest.

RESEARCHER CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Jessica Hernandez APRN, FNP-BC at (305) 389 – 9721, jhern512@fiu.edu , or Dr. Dana Sherman, DNP, APRN, ANP-BC, FNP-BC, (305) 348 – 4227, dsherman@fiu.edu

IRB CONTACT INFORMATION

If you would like to talk with someone about your rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. I understand that I will be given a copy of this form for my records.

_____ _____

Signature of Participant Date

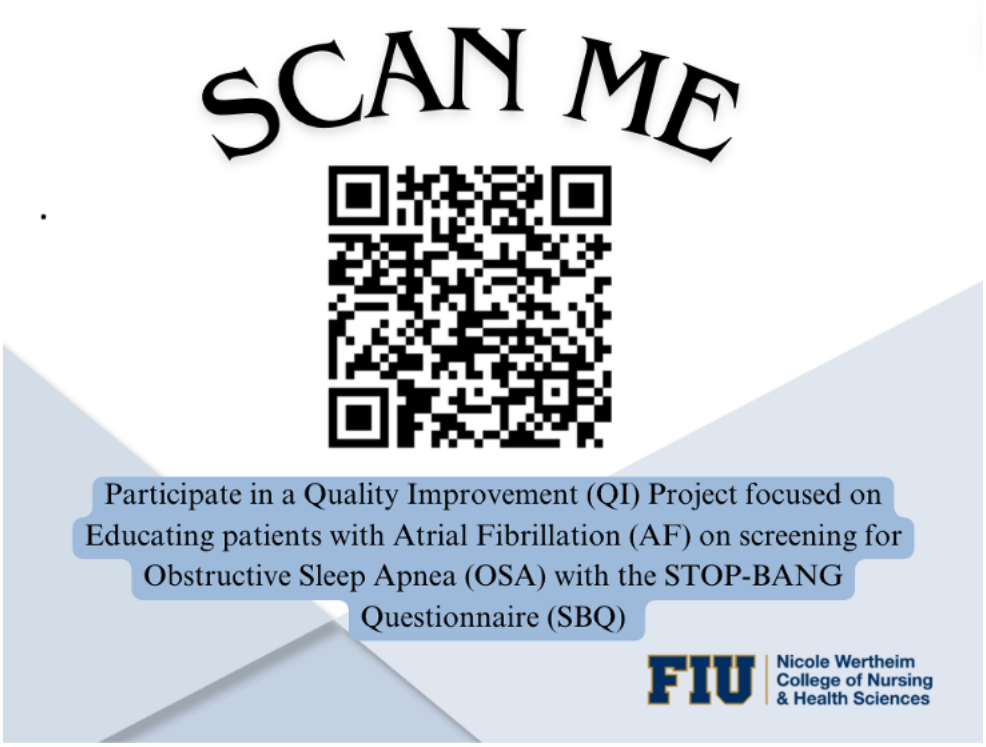
_____

Printed Name of Participant

_____ _____

Signature of Person Obtaining Consent Date

Appendix C: Code for Pre- and Post-Educational Intervention Survey



Appendix D: Pre- and Post- Educational Intervention Survey

PRETEST-POSTTEST

Educating patients with Atrial Fibrillation (AF) on screening for Obstructive Sleep Apnea (OSA) with the STOP-Bang Questionnaire (SBQ): A Quality Improvement Project

Introduction:

This questionnaire is an essential part of a quality improvement project aiming to educate patients with Atrial Fibrillation (AF) on screening for Obstructive Sleep Apnea (OSA) with the STOP-Bang Questionnaire (SBQ).

Please, answer to the best of your knowledge. Your response will help to understand gaps in knowledge and confidence to request screening at upcoming clinical visit. The questions are structured to assess your understanding of AF, OSA, and SBQ screening tool.

- ***Please do not write your name or other personal information on this questionnaire.***
- ***Your answers are anonymous and will be kept confidential.***
- ***Your participation is voluntary and will not have any bearing on your clinical care.***

Demographic:

Gender: Female _____ Male _____ Prefer no to say _____

Age: <50 yrs. _____ 50-60 yrs. _____ 60-70 yrs. ____ 70-80 yrs. _____ >80 yrs. _____

Race/Ethnicity: White _____ Black _____ Hispanic/Latino _____ American Indian _____

Asian _____ Non-Hispanic _____ Other _____

Questionnaire:

1. Atrial Fibrillation (AF) is an arrhythmia of the heart?
   True _____ False _____
2. Obstructive Sleep Apnea (OSA) causes changes in the way you breath at night, specifically obstruction of the airway.
   True _____ False _____

3. Obstruction of the airway during sleep causes changes in respiratory and cardiac function.

   True _____ False _____

4. Individuals with Atrial Fibrillation and undiagnosed Obstructive Sleep Apnea (OSA) at a higher risk for stroke.

   True _____ False _____

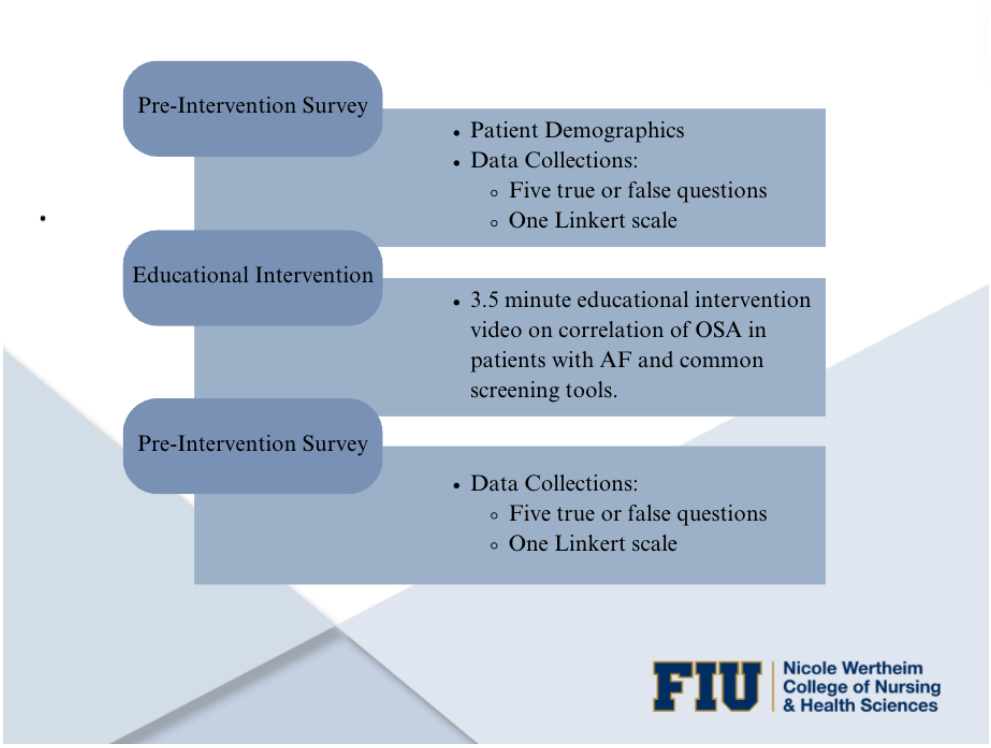
5. You can answer an eight-item questionnaire, known as STOP-Bang Questionnaire (SBQ), and see if you're at risk for Obstructive Sleep Apnea (OSA).

   True _____ False _____

6. In view of your diagnosis with Atrial Fibrillation, how likely are you to ask your provider for the STOP-Bang Questionnaire to screen for Obstructive Sleep Apnea (OSA) at your next visit?

   Extremely Likely _____ Somewhat Likely _____ Neither likely nor unlikely _____ Somewhat Unlikely _____ Extremely Unlikely _____

Figure 1: Quasi-experimental design



Appendix E: IRB Approval Letter

FIU | FLORIDA INTERNATIONAL UNIVERSITY

Office of Research Integrity
Research Compliance, MARC 430

MEMORANDUM

To:	Dr. Dana Sherman
CC:	Jessica Hernandez
From:	Kourtney Wilson, MS, IRB Coordinator KMW
Date:	July 3, 2024
Protocol Title:	"Educating patients with Atrial Fibrillation (AF) on screening for Obstructive Sleep Apnea (OSA) with the STOP-BANG questionnaire: A Quality Improvement Project"

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt via the **Exempt Review** process.

IRB Protocol Exemption #:	IRB-24-0336	**IRB Exemption Date:**	07/03/24
TOPAZ Reference #:	114618		

As a requirement of IRB Exemption you are required to:

1) Submit an IRB Exempt Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved prior to implementation.
2) Promptly submit an IRB Exempt Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.
3) Submit an IRB Exempt Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

KMW