Implementation of a Simulation-Based Educational Module to Reduce Perioperative Complications in Obese Patients: OSA Screening Using the STOP-Bang Questionnaire

Andrew J. Hornick

School of Nursing, Cedar Crest College

Author Note

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DNP Project Chair: Donna Martonik, DNP, ANP, AGACNP, Cedar Crest College

DNP Project Mentor: Bernard J. Gilligan III, DNP, CRNA, CHSE, Cedar Crest College

Correspondence concerning this paper should be addressed to Andrew Hornick, Cedar Crest College, 100 College Dr, Allentown, PA 18104. Email: AJHornic@cedarcrest.edu

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Abstract

Obesity is a major health care problem in the U.S. and is associated with a multitude of disease processes, including obstructive sleep apnea (OSA). Surgical patients with OSA are at increased risk of perioperative complications, but due to lack of symptom awareness and screening protocols, about 80% of OSA patients are undiagnosed. The STOP-Bang Questionnaire is the most validated OSA screening tool; however, a needs assessment revealed many anesthesia providers do not incorporate routine screening into clinical practice, thus increasing perioperative complications for high risk patients. The purpose of this project was to educate anesthesia providers on OSA and the STOP-Bang Questionnaire through an online simulation-based educational module. Key aims were to increase provider knowledge of OSA in obese patients and to elicit a practice change to incorporate preoperative OSA screening with the STOP-Bang Questionnaire among participants. Lewin's 3-Step Model of unfreezing, moving, and refreezing was used as the theoretical framework to translate evidence into practice. Implementation occurred over a three week period in which participants completed a pre-test of knowledge-based OSA questions; viewed the educational module; then completed a post-test to evaluate an increase in knowledge and participants' willingness to change practice. Results showed an increase in post-test scores of 38%, which was statistically significant according to a paired t-test. Also, 95% of participants indicated willingness to change practice, demonstrating clinical significance to incorporate best practice recommendations for patients with suspected OSA. This project has the opportunity to transform clinical practice by enhancing patient safety and improving outcomes.

Keywords: obesity, obstructive sleep apnea, STOP-Bang Questionnaire, educational module, 3-step model, anesthesia providers

Implementation of a Simulation-Based Educational Module to Reduce Perioperative Complications in Obese Patients: OSA Screening Using the STOP-Bang Questionnaire

Obesity rates continue to rise in the United States and contributes to several medical problems, particularly obstructive sleep apnea (OSA). OSA is the most common sleep-related respiratory disorder in obese patients and is characterized by complete or partial obstruction of the upper airway (Chung, Memtsoudis, et al., 2016). OSA is present in over 50% of patients with a body mass index (BMI) over 30 kg/m^2, and in patients with a BMI over 40 kg/m^2, prevalence of OSA increases to over 90% (Nousseir, 2019). OSA affects one in every four patients undergoing elective surgery, and due to lack of symptom awareness and screening protocols, approximately 80% of patients are undiagnosed prior to surgery (Scully et al., 2020).

OSA is associated with numerous postoperative complications, such as hypoxemia, acute respiratory failure, prolonged post-anesthesia care unit (PACU) length of stay, unexpected intensive care unit (ICU) admission, and increased hospital length of stay (Lakdawala et al., 2018; Stubberud et al., 2019). OSA is also associated with several disease processes, such as hypertension, cerebrovascular disease, diabetes, coronary artery disease, arrhythmias, gastroesophageal reflux, cognitive impairment, and sudden death (Chung, Abdullah, et al., 2016; Scully et al., 2020). The economic impact of untreated OSA is estimated to be billions of dollars per year in the United States alone (Watson, 2016). In an effort to combat this crisis, multiple OSA screening tools have been developed, with the STOP-Bang Questionnaire as the most validated tool. The key aim of this project was to provide education to anesthesia practitioners via an online simulation-based educational module to identify surgical patients at high risk for moderate to severe OSA by preoperative screening utilizing the STOP-Bang Questionnaire. Goals of this project were to increase anesthesia providers' knowledge of this disease and to

elicit a practice change among providers. Preoperative screening can alert anesthesia providers to patients with possible undiagnosed OSA, and allows planning for appropriate interventions to best care for these patients.

Chapter One: Introduction and Overview of the Problem of Interest

Background and Significance

Obesity is global problem for health care providers. Prevalence of obesity continues to rise, with a 27.5% increase in U.S. adults from 1980 to 2013 (Tsai & Schumann, 2016). It is associated with several cardiac, pulmonary, vascular, and metabolic disorders, which plague the health care system and economy (Romero-Corral et al., 2010). Specifically, there is a direct correlation between obesity and OSA, which has troubling consequences for the general population and surgical patients (Jehan et al., 2017).

OSA is a serious chronic condition and occurs due to recurrent episodes of complete or partial obstruction of the upper airway with periods of breathing cessation occurring for more than ten seconds (Chung, Memtsoudis, et al., 2016). In obese patients, fat deposits narrow the upper respiratory tract and decrease muscle activity in the retropalatal and retroglossal regions of the oropharynx, leading to hypoxic and apneic episodes (Jehan et al., 2017). Repeated obstruction leads to arterial hypoxemia and hypercarbia, which causes activation of the sympathetic nervous system (Chung, Memtsoudis, et al., 2016). Sympathetic activation from nocturnal events also occur during the daytime, thus OSA patients have increased heart rates, less heart rate variability, higher blood pressures, and increased arterial stiffness in comparison to healthy subjects (Knauert et al., 2015). These repeated episodes of obstruction and sympathetic activation can lead to numerous health concerns, including hypertension, coronary artery disease, arrhythmias, congestive heart failure, cerebrovascular disease, diabetes, depression, cognitive impairment, and sudden death (Chung, Memtsoudis, et al., 2016; Scully et al., 2020).

OSA requires prompt diagnosis and treatment to avoid long-term health effects.

The gold standard of diagnosis is an overnight polysomnogram, which tallies the number of apnea or hypopnea episodes per hour, known as the apnea-hypopnea index (AHI) (Chung, Memtsoudis, et al., 2016). Mild OSA is diagnosed when the AHI is between 5 and 14 events per hour; moderate OSA occurs when the AHI is between 15 and 30 events per hour; and severe OSA can be diagnosed when the AHI is greater than 30 events per hour (Chung, Memtsoudis et al., 2016).

Patients with OSA also experience excessive daytime sleepiness, which increases the risk for cognitive impairment, accidents, and decreased quality of life (Knauert et al., 2015). Additionally, depression is estimated to be close to 50% in patients with untreated OSA (Knauert et al., 2015). Lastly, risk factors for OSA include obesity (BMI >35 kg/m^2), increased neck circumference, male sex, advanced age, tonsillar and adenoidal hypertrophy, macroglossia, smoking, alcohol consumption, craniofacial abnormalities, congestive heart failure, atrial fibrillation, nasal congestion, menopause, and family history (Chung, Memtsoudis, et al., 2016; The Joint Commission, 2015). Untreated OSA is a major problem; left unaddressed, it will substantially contribute to the growing health care crisis that faces the nation.

System and Population Impact

The prevalence of OSA in the United States is estimated to be between 9%-25% of the general adult population (Nagappa et al., 2017). 5.9 million American adults are currently diagnosed with OSA; however, there are an additional 80% who remain undiagnosed, raising the actual number of people with this disease estimated to be 29.4 million (AASM, 2016; Knauert et al., 2015; Nagappa et al., 2015). Additionally, the prevalence among surgical patients is higher than that of the general population, with rates as high as 70% for bariatric surgical patients (Chung, Abdullah, et al., 2016). OSA is present in over 50% of patients with a body mass index

(BMI) over 30 kg/m^2, and in patients with a BMI over 40 kg/m^2, prevalence of OSA increases to over 90% (Nousseir, 2019). As with those in the general population, the majority of surgical patients with OSA are undiagnosed at the time of surgery (Chung, Abdullah, et al., 2016). Lastly, the prevalence of OSA will continue to rise due to an aging population and increasing rates of obesity, further contributing to the economic impact of this disease (Chung, Memtsoudis, et al., 2016).

Increasing prevalence of OSA remains a burden to the United States economy. OSA is linked to several comorbidities, including hypertension, cardiovascular disease, cerebrovascular disease, diabetes, asthma, insomnia, depression, and anxiety (AASM, 2016). Costs associated with these comorbidities include "increased medical expenses, emergency room visits, hospital inpatient visits, medication use, and mortality rates" (AASM, 2016, p. 7). The cost to treat these conditions among undiagnosed OSA patients was approximately $30 billion in 2015 (AASM, 2016). Additionally, patients with undiagnosed OSA have greater medical costs per year estimated to be between $1,950 and $3,899 higher than patients without OSA (Knauert et al., 2015). Lastly, patients who are diagnosed with OSA but remain untreated carry additional cost estimated to be between $2,700 to $5,200 more per year in medical costs than patients with OSA who are appropriately managed (Knauert et al., 2015).

In terms of quality of life, OSA is linked to decreased productivity, increased motor vehicle and workplace accidents (AASM, 2016). In 2015, patients with OSA were ten times more likely to have workplace incapacity, with untreated OSA resulting in $86.9 billion in lost productivity due to absenteeism and workplace disability as the leading factors (AASM, 2016; Knauert et al., 2015). Untreated OSA causes excessive daytime tiredness. Undiagnosed and untreated OSA are contributing factors in many motor vehicle accidents, and costs were

estimated at $26.2 billion in 2015 (AASM, 2016). Workplace accidents due to undiagnosed and untreated OSA cost $6.5 billion in 2015 (AASM, 2016). In total, the financial burden of undiagnosed and untreated OSA in 2015 was estimated to cost the United States about $149.6 billion (AASM, 2016). The cost to diagnose and treat every American with OSA is estimated at $49.5 billion; however, this would produce a net savings of $100.1 billion (AASM, 2016).

Among surgical patients, OSA is associated with several intraoperative and postoperative complications. OSA is linked to atypical airway anatomy and is a significant predictor of difficult mask ventilation and laryngoscopy (Opperer et al., 2016). In the postoperative phase, patients with OSA are more likely to experience oxygen desaturation and respiratory failure, leading to emergent intubation and mechanical ventilation, especially within the first 24 hours (Opperer et al., 2016). Patients with OSA are more likely to experience arrhythmias, myocardial infarctions, ICU admission, laryngospasm, bronchospasm, and acute pulmonary edema (Nagappa et al., 2017). Furthermore, patients labeled as high risk for OSA had a length of stay two days longer in comparison to patients labeled as low risk for OSA (Nagappa et al., 2017). Perioperative complications may be due to the effects of sedatives and opioids (Nagappa et al., 2017). These medications may blunt the chemoreceptor responses to hypoxia and hypercarbia, which hinders the protective arousal reflex that is normally triggered (Nagappa et al., 2017). These drugs also decrease pharyngeal muscle tone, increase upper airway collapsibility, and exacerbate existing OSA (Nagappa et al., 2017).

Purpose

Undiagnosed and untreated OSA are problems for millions of Americans. Approximately 80% are undiagnosed, which poses a problem for those requiring surgery and for the long-term health of these individuals. The lack of clear guidelines is challenging for

healthcare providers. Unfortunately, polysomnography can be time-consuming, labor-intensive, and costly; these factors emphasize the need for simple screening tools (Chung, Memtsoudis, et al., 2016). Several OSA screening tools are available, such as the Epworth Sleepiness Scale (ESS), STOP-Bang Questionnaire, Apnea Risk Evaluation System (ARES), OSA50, and Berlin Questionnaire (The Joint Commission, 2015). However, these screening tools are not routinely incorporated into practice, thus placing many patients at risk for perioperative complications.

The Joint Commission (2015) cites diagnosed or suspected OSA as a contributing factor to patient harm. The Joint Commission (2015) cites several concerns regarding OSA, which include: (1) insufficient training to screen and identify OSA; (2) failure to assess for OSA; (3) lack of guidelines for the care and treatment of those with diagnosed and/or suspected OSA; (4) inappropriate monitoring for suspected OSA; (5) lack of communication among healthcare providers regarding patients with OSA or suspected OSA; and (6) lack of postoperative assessment and treatment of OSA. The Joint Commission and Society of Anesthesia and Sleep Medicine recommend to screen and identify patients suspected of having OSA to minimize OSA-related complications (Chung, Memtsoudis, et al., 2016; The Joint Commission, 2015).

PICO Question Guiding Inquiry

The original project was focused on screening patients preoperatively using the STOP-Bang Questionnaire to appropriately stratify patients from low to high risk, but due to the COVID-19 pandemic, this was no longer possible. Particularly in these times of increased stress and demands on anesthesia care providers, disseminating evidence-based information that can decrease complications can ensure that best practices are continued even in unconventional times. A group of senior nurse anesthesia students worked together to create a module that would incorporate education on multiple topics, yet could be delivered in a convenient, online

format in a short amount of time. This approach has the potential to actually increase the number of participants, since it is not limited by geography or clinical site, thus reflecting a true population-based intervention. The educational module is intended for anesthesia providers to increase knowledge related to the impact of undiagnosed OSA in the perioperative area. Additionally, this project is designed to influence a practice change in which providers will begin screening patients for OSA and referring high risk patients for definitive evaluation and treatment. The PICO question is as follows: Among anesthesia providers, does an online simulation-based educational intervention increase knowledge of risk reduction strategies using standardized assessments or multimodal pain management in obese patients? Ultimately, anesthesia providers will understand the importance of communicating the STOP-Bang score throughout the perioperative period to minimize complications, and upon discharge, patients labeled as high risk can be referred to a sleep medicine clinic for proper diagnosis and treatment.

"Gap" Analysis

A literature search identified OSA as a prevalent issue among surgical patients. Recommendations include preoperative screening using a validated screening tool, such as the STOP-Bang Questionnaire, to appropriately risk-stratify patients from low to high risk. Discussions with anesthesiologists, Certified Registered Nurse Anesthetists (CRNAs), and preoperative nurses at a local hospital revealed that routine OSA screening does not occur. The Joint Commission (2015) currently recommends to preoperatively screen patients for OSA to reduce the number of undiagnosed patients presenting for surgery. While diagnosing OSA via polysomnography may not be possible for every patient prior to surgery, screening tools, such as the STOP-Bang Questionnaire, can be used to risk stratify patients on the day of surgery. The prevalence of OSA is higher in surgical patients in comparison to the general population, thus

preoperative OSA screening is critical to diminish perioperative complications (Chung, Memtsoudis, et al., 2016). Possible barriers to implementation include lack of education, training, and resources, unit/hospital culture, perception of increased workload, and lack of nursing leadership support (Scully et al., 2020).

Objectives

The two key goals of this project were to (1) educate anesthesia providers regarding OSA screening to reduce perioperative complications via a simulation-based educational module and (2) encourage a practice change among anesthesia providers. After viewing the educational module, participants will have increased knowledge regarding OSA screening as evidenced by improved post-test scores from baseline by 20% upon completion of the project. Additionally, at least 50% of participants will indicate via survey that they are more likely to change their practice after viewing the educational module. Ultimately, anesthesia providers will screen patients preoperatively for OSA and identify those at high risk in an effort to reduce perioperative complications.

Chapter Two: Review of the Evidence/Literature

Search Methodology

A thorough literature search was completed to fully answer the PICOT question. Multiple databases, such as EBSCOhost, Google Scholar, ScienceDirect, Ovid, SpringerLink, PubMed, and Wiley Online Library were used to search for relevant literature. Search terms included obstructive sleep apnea, screening, preoperative, surgical patients, questionnaire, tool, risk, comparison, complications, and education. Exclusion criteria included patients under the age of 18, pregnancy, patients undergoing emergent surgery, and articles prior to 2015. In total, 1,186 articles were identified. After reading titles and abstracts, this number was pared to 115 articles. After a thorough review of each article, 10 articles were selected to represent the evidence review.

Findings

Comparison of Screening Tools

Multiple screening tools exist to detect risk of OSA. Common screening tools among surgical patients include the Berlin Questionnaire (BQ), American Society of Anesthesiologists (ASA) Checklist, OSA50 questionnaire, Epworth Sleepiness Scale (ESS), and STOP-Bang Questionnaire. Selected studies will compare the efficacy of these screening tools.

Chiu et al. (2017) conducted a bivariate meta-analysis and identified 108 studies that included a total of 47,989 participants. The researchers analyzed the performance levels of the BQ, STOP-Bang Questionnaire, STOP, and ESS. The STOP questionnaire was excluded in this proposal because the SBQ is an updated version of the STOP questionnaire. Chiu et al. (2017) compared these screening tools to detect mild, moderate, and severe OSA in relation to each tool's sensitivity, specificity, and diagnostic odds ratio (DOR). The STOP-Bang Questionnaire

had significantly greater sensitivities and DORs for mild, moderate, and severe OSA, but the ESS had the best specificity (Chiu et al., 2017). Overall, Chiu et al. (2017) concluded the STOP-Bang Questionnaire was a more accurate predictor of OSA in comparison to other screening tools.

Kee et al. (2018) conducted a prospective cohort study of 758 patients that analyzed sensitivities, specificities, positive predictive values (PPVs), and negative predictive values (NPVs) of the BQ, STOP-Bang ≥ 3, and OSA50. The results were compared to detect mild, moderate, and severe OSA for each screening tool. The STOP-Bang Questionnaire displayed higher sensitivities, NPVs, and 95% confidence intervals for detecting any form of OSA, but the BQ displayed greater specificity. The study did not evaluate the ESS. Each questionnaire had its limitations, but the STOP-Bang Questionnaire was superior to detect OSA (Kee et al., 2018).

Predictive Value of the STOP-Bang Questionnaire and Perioperative Complications

Diagnosed OSA can lead to a variety of perioperative complications, and the literature was searched to ascertain the association between the STOP-Bang score and complications. Dimitrov and Macavei (2016) conducted a systematic review of experimental and observational studies to evaluate the ability of the STOP-Bang Questionnaire to predict postoperative complications. Eight studies comprising over 9,000 surgical patients were analyzed. Patients labeled as high risk for OSA had a greater occurrence of difficult intubation and difficult mask ventilation (Dimitrov & Macavei, 2016). High risk patients were also more likely to experience cardiac and respiratory complications, mild/moderate postoperative hypoxemia, higher risk of admission to critical care, and longer length of stay (Dimitrov & Macavei, 2016). Cutoffs for high risk varied, with some studies categorizing a STOP-Bang score of five or greater as high risk while others labeled a score of three or greater as high risk (Dimitrov & Macavei, 2016).

Elkouny et al. (2020) performed a cross-sectional observational study of 845 adult surgical patients. Patients with STOP-Bang scores of 0-2 were considered low risk; 3-4 were considered intermediate risk; and patients scoring 5-8 were considered high risk (Elkouny et al., 2020). Patients with intermediate and high risk for OSA had higher frequencies of difficult mask ventilation and difficult intubation (Elkouny et al., 2020). Intermediate and high risk patients were also more likely to experience oxygen desaturation to less than 90% in PACU (Elkouny et al., 2020). Furthermore, increased risk of OSA was associated with a significantly increased PACU length of stay (Elkouny et al., 2020). Elkouny et al. (2020) found the STOP-Bang score to be a reliable tool to properly risk stratify surgical patients.

Nagappa et al. (2017) conducted a systematic review to assess the differences in postoperative complications in high risk vs. low risk patients. Nagappa et al. (2017) analyzed ten cohort studies comprising 23,609 patients for various postoperative complications, including arrhythmias, reintubation due to respiratory failure, hypoxia, or pneumonia, myocardial infarction, ICU admission, laryngospasm, bronchospasm, congestive heart failure, and hospital length of stay. High risk patients were four times more likely to experience a postoperative complication; high risk patients also had an average hospital length of stay 2.1 days longer than low risk patients (Nagappa et al., 2017). The definition of high and low risk, however, was unclear (Nagappa et al., 2017). Postoperative complications were not analyzed individually, so it was unclear which complications had greater frequencies in high risk patients (Nagappa et al., 2017).

Selection of STOP-Bang Questionnaire

The STOP-Bang Questionnaire is the superior screening tool in comparison to the BQ, OSA50, and ESS, but these studies did not analyze the STOP-Bang Questionnaire among

surgical patients (Chiu et al., 2017; Kee et al., 2018). Nagappa et al. (2015) conducted a systematic review of the STOP-Bang Questionnaire and compared it among different populations, including 1,004 surgical patients, 3,175 sleep clinic patients, and 4,770 patients in the general population. The prevalence of moderate-to-severe OSA was greater in the surgical population in comparison to the general population (39% vs. 12.7%) (Nagappa et al., 2015). Sensitivity and specificity were also comparable between surgical patients and the general population (Nagappa et al., 2015). Among surgical patients, the probability of moderate and severe OSA increased as the STOP-Bang score incrementally increased from three to eight (Nagappa et al., 2015). STOP-Bang scores ≥ 5 were more closely associated with severe OSA in comparison to moderate OSA (Nagappa et al., 2015). Nagappa et al. (2015) recommended screening surgical patients preoperatively so patients can be risk stratified for OSA severity.

The Society of Anesthesia and Sleep Medicine (SASM) created clinical practice guidelines, which focus on preoperative screening and preparation of adult patients scheduled for elective surgery (Chung, Memtsoudis, et al., 2016). First, patients with diagnosed OSA should be deemed as high risk for postoperative complications (Chung, Memtsoudis, et al., 2016). Second, patients at risk for OSA should be recognized prior to surgery (Chung, Memtsoudis, et al., 2016). Third, screening tools, such as the STOP-Bang, can be used to identify patients with presumed OSA (Chung, Memtsoudis, et al., 2016). Additionally, the authors state that the STOP-Bang is the most validated screening tool among surgical patients (Chung, Memtsoudis, et al., 2016). Fourth, members of the health care team should be notified of a patient's STOP-Bang score due to the association of OSA and postoperative morbidity (Chung, Memtsoudis, et al., 2016). Finally, patients should notify their primary care provider if found to be at high risk for OSA so appropriate referral can be initiated (Chung, Memtsoudis, et al., 2016).

Simulation-Based Education

Simulation is increasingly utilized to provide education to health care workers. Within anesthesiology, simulation has been useful for education regarding airway management, regional and neuraxial techniques, and obstetric anesthesia (Green et al., 2016). Simulation has shown to increase skill attainment, enhance skill retention, improve self-confidence, increase knowledge, and improve clinical performance; however, few studies have linked simulation training to better patient outcomes (Green et al., 2016). Knowing the complications of undiagnosed and untreated OSA, it can be surmised that increasing provider knowledge and confidence can facilitate greater awareness of this disease process.

Distance education using screen-based simulation (SBS) is gaining popularity due to the COVID-19 pandemic (Swerdlow et al., 2020). SBS is desirable because of its ability to reach a large audience, enables flexible scheduling among its participants, and allows for social distancing (Swerdlow et al., 2020). In contrast, no published literature exists regarding the use of SBS in anesthesia distance education (Swerdlow et al., 2020). Despite the paucity of relevant literature, distance education utilizing SBS is anticipated to be a vital component of anesthesia education due to the COVID-19 pandemic (Swerdlow et al., 2020).

Limitations

There are several limitations present within the literature. Patient populations differed between studies, with some investigating the general population (Chiu et al., 2017; Kee et al., 2018; Nagappa et al., 2015), sleep clinic patients (Nagappa et al., 2015), and/or surgical patients (Dimitrov & Macavei, 2016; Elkouny et al., 2020; Nagappa et al., 2015). Studies were not limited to the United States, but included research from Taiwan, Canada, Saudi Arabia, Australia, and the United Kingdom. Several studies also reported substantial heterogeneity

between high risk and low risk groups (Chiu et al., 2017; Dimitrov & Macavei, 2016; Nagappa et al., 2015; Nagappa et al., 2017). Possible explanations for the increased heterogeneity could be related to different prevalence rates of OSA between populations, and patients found to be at high risk, on average, have a greater number of comorbid conditions.

Additionally, there was not a clear consensus on the definition of high risk. The cutoff score for high risk varied greatly, with most studies reporting a STOP-Bang score ≥ 3 as high risk while others defined high risk as a score ≥ 5. To reduce confusion, Dr. Frances Chung, the creator of STOP-Bang, produced an updated algorithm (Appendix A) to risk stratify patients (Chung, Abdullah, et al., 2016). A STOP-Bang score of three or higher was sensitive to detect any form of OSA while scores five or higher were more sensitive to detect moderate to severe OSA (Chung, Abdullah, et al., 2016). The items within STOP-Bang are not weighted equally to predict OSA, with BMI greater than 35 kg/m^2, neck circumference greater than 40 centimeters, and male gender being more predictive of OSA than age over 50 (Chung, Abdullah, et al., 2016). Patients are considered low risk if STOP-Bang scores are between zero and two; patients are intermediate risk if scores are three to four; and patients at high risk have scores of five to eight (Chung, Abdullah, et al., 2016).

Conclusions

OSA is a clear problem among surgical patients and the general population. The majority of patients are undiagnosed prior to surgery, and this can be a challenge for health care providers throughout the perioperative period. The SBQ is not a replacement for diagnosis of OSA, but it represents the best screening tool available (Chiu et al., 2017; Elkouny et al., 2020; Kee et al., 2018). The SBQ includes four questions within *STOP* and four demographic questions within *Bang*, for a total of eight questions related to features of sleep apnea, which include snoring,

tiredness, witnessed apneas, hypertension, BMI, age, neck circumference, and gender (Chung, Abdullah, et al., 2016). For each positive response, one point is added to the total score, with a minimum score of zero and maximum score of eight.

Despite differences among methodology and patient characteristics, consistent recommendations exist for preoperative screening of OSA in undiagnosed patients. The SBQ is a succinct, effective, and reliable screening tool to risk stratify patients. The STOP-Bang score is directly proportional to the probability of moderate to severe OSA in surgical patients (Chung, Abdullah, et al., 2016). Anesthesia providers, surgeons, and nurses need education regarding increased risk of perioperative complications in patients with diagnosed and suspected OSA (Chung, Memtsoudis, et al., 2016). Additionally, preoperative risk stratification using the SBQ will allow health care providers to plan for potential complications, which will ultimately improve quality of care (Chung, Memtsoudis, et al., 2016). Despite the lack of existing literature regarding the use of SBS in distance anesthesia education, its benefits far exceed the risks and represents a viable alternative to education during the COVID-19 pandemic.

Chapter Three: Organizational Framework or Theory

Conceptual Definitions of Theory

The concept of evidence-based practice has been increasing for the past two decades in an effort to promote quality care and improve patient outcomes (Manchester et al., 2014). Despite these efforts, poor knowledge translation of research findings has significantly hindered the successful implementation of many evidence-based practices within the clinical setting (Manchester et al., 2014). Theoretical frameworks have been shown to facilitate successful implementation, and the guiding theoretical framework used throughout this project was Kurt Lewin's change model (Abd el-shafy et al., 2019; Manchester et al., 2014).

Kurt Lewin was a social scientist whose aim was to resolve social conflicts of minority and disadvantaged people (Burnes, 2004). He believed that the resolution of conflict could improve the human condition and stressed group behavior, versus individual behavior, should be the main focus of change; however, Lewin noted that group change was transient, and permanency was a more a desirable objective (Burnes, 2004). Lewin incorporated his Field Theory, Group Dynamics, and Action Research into a 3-Step model to facilitate change at group, organizational, and societal levels (Burnes, 2004).

Lewin's theory of change is comprised of three stages: unfreezing, moving, and refreezing (Shirey, 2013). Lewin believed that human behavior was balanced by driving and restraining forces, and for change to occur, the equilibrium needed to be unfrozen before new behaviors can be implemented (Burnes, 2004). Lewin's model was also adopted in nursing theory. Unfreezing may involve a nurse leader who identifies a problem and acknowledges a need for change (Shirey, 2013). Nurse leaders must challenge the status quo and create a sense of urgency among stakeholders (Hussain et al., 2018; Shirey, 2013). Additionally, the forces

advocating for change must be greater than resistant forces in order for change to occur (Hussain et al., 2018).

The second stage is moving. Lewin aimed to account for all forces against change, and through a cycle of research, action, and more research, this enabled groups and individuals to move to a more desirable set of behaviors (Burnes, 2004). In regards to nursing theory, this stage involves employees making the change and striving for a new status quo. It is the inner movement that occurs within individuals in response to change, which necessitates unfreezing to move in a new direction (Shirey, 2013). This stage encourages people to perform the proposed change, with attitudes becoming more favorable towards the change while resistance decreases (Manchester et al., 2014).

The third stage is refreezing. Lewin viewed successful change as a group process because if the group failed to change the norm or routine, then changes to individual behavior would not be sustained (Burnes, 2004). This stage ensures that change becomes rooted into the existing system to produce a new status quo (Shirey, 2013). Reinforcing the change is critical to its sustainability over time (Shirey, 2013). If the change is not adopted as part of the new normal, the organization will return to the status quo (Manchester et al., 2014). It was imperative to design this project using Lewin's change theory in order to maximize its success.

Relationship of Theory to Scholarly Project

Lewin's 3-Step model was used as a guide throughout this project. To promote unfreezing, a needs assessment determined routine OSA screening does not occur. A simulation-based educational module was presented to anesthesia providers to highlight the significance of preoperative OSA screening and use of multimodal analgesic techniques, specifically ketamine, in the obese population. The dangers of undiagnosed and untreated OSA in obese surgical

patients were discussed in addition to the deleterious effects of opioids in this population. A scenario of a preoperative assessment, which explained OSA screening using the STOP-Bang Questionnaire, was presented to participants as part of the educational module. A second scenario highlighting the benefits of sub-anesthetic doses of ketamine to high risk patients was also presented to participants. Additionally, a pre- and post-test was created to measure provider knowledge of these topics.

After presenting and identifying the problem to anesthesia providers, the educational module was designed to promote movement or change as described by Lewin. Due to the COVID-19 pandemic, measuring this could not be done within the clinical setting. In compliance with social distancing protocols to help limit the spread of COVID-19, participants were able to view the online module regarding OSA screening and ketamine usage. Participants were then inquired about implementing a practice change to incorporate OSA screening and sub-anesthetic ketamine infusions into every day practice.

Reinforcement to facilitate sustainability was the main goal to promote Lewin's stage of refreezing. The educational module will remain accessible and free of charge to all anesthesia providers who wish to view it. This project has been presented to providers at various clinical sites, with goals to educate, increase awareness, and facilitate a practice change among anesthesia personnel. The COVID-19 pandemic created uncertainty for continuing education among health care professionals, but the utilization of online learning plus Lewin's 3-Step model helped meet the educational needs of anesthesia providers during this health care crisis.

Chapter 4: Project Design

Institutional Review Board (IRB) Approval

IRB approval (Appendix B) was obtained from Cedar Crest College on August 28, 2020. Additionally, informed consent (Appendix C) and a research description supplement (Appendix D) were approved by the IRB committee and were distributed to participants prior to viewing the educational module.

Implementation Plan

A literature search identified undiagnosed OSA as a prevalent issue among surgical patients. Recommendations included preoperative screening using a validated screening tool, such as the STOP-Bang Questionnaire, to appropriately risk stratify patients. Discussions with anesthesiologists, Certified Registered Nurse Anesthetists (CRNAs), and preoperative nurses at St. Luke's University Hospital – Allentown Campus revealed that routine OSA screening does not occur. Bariatric surgery is commonly performed at this facility, thus obese patients represent a large demographic of the overall surgical population in this region. Additionally, many patients are elderly and/or diagnosed with hypertension, which are independent risk factors for OSA. The prevalence of OSA is higher in surgical patients in comparison to the general population, thus preoperative OSA screening is critical to reduce perioperative complications (Chung, Memtsoudis, et al., 2016).

Prior to the COVID-19 pandemic, the aim of this project was to implement the STOP-Bang Questionnaire into anesthesia providers' preoperative assessments, and if the patient was deemed to be at high risk of OSA, a referral to a local sleep clinic would be initiated. Unfortunately, this could not be accomplished due to the pandemic, thus an educational module was created to highlight the significance of diagnosed and/or suspected OSA among surgical

patients. The target audience for this module was CRNAs and student registered nurse anesthetists (SRNA) involved in direct patient care. The educational module included background information on obesity, OSA, pathophysiology, anesthesia considerations for patients with diagnosed or suspected OSA, and the STOP-Bang Questionnaire. A simulation-based scenario was also incorporated into the module to demonstrate proper utilization of the STOP-Bang Questionnaire during the preoperative assessment. This module was stored within a student-designed website and was delivered to potential participants using personal or college-affiliated e-mail addresses. An invitation email, which included a link to the website, was sent to potential participants. Participants were able to view the informed consent, research description, educational videos, and complete the pre- and post-tests within the website.

Data Collection and Tools

Prior to viewing the educational module, participants were instructed to complete a pre-test (Appendix E) of three knowledge-based questions on OSA, one demographic question ascertaining type of anesthesia provider and years of experience, and one question to assess participants' current practice of OSA screening. After completion of the module, participants were then instructed to complete a post-test (Appendix F) of the same three knowledge-based questions plus two Likert questions assessing the likelihood of incorporating the STOP-Bang Questionnaire into clinical practice and perceived increase of knowledge following completion of the module. Survey Monkey™ was utilized to allow for storage of the questions in addition to gathering statistical information related to each question.

The pre- and post-test questions were approved by the Cedar Crest College IRB and members of the DNP Project team. The pre- and post-test questions were determined to be valid to adequately assess participants' knowledge from viewing the educational module. The post-

test also captured anesthesia providers' likelihood to integrate OSA screening into everyday practice.

Resources Needed

Creation of the educational module was accomplished using a laptop with internet access, Microsoft Office 365™, Screencast-O-Matic™, Wix.com, Inc. website builder, a Panasonic™ camera and tripod, SD card, Rhode Shotgun™ microphone, and DaVinci Resolve 16™ editing software. Additionally, access to Cedar Crest College's simulation room was utilized to film the simulation-based scenario. This required access to the simulation room, hospital bed, obesity simulation suit, bed linen, pillow, and clipboard. The Nursing Simulation Center manager also assisted with scheduling and development of the simulation-based scenario. Survey Monkey™ was used to collect data, and Microsoft Excel™ was used for data analysis.

Budget Justification

A budget (Appendix G) was employed to oversee the needed resources and cost to implement this project. Many of the resources needed to create and implement this project had to be purchased. These included an HP Envy™ laptop with Microsoft Office 365™, Wix.com, Inc. website builder, camera, microphone, SD card, and tripod. Tuition to Cedar Crest College was required to access the Simulation Lab and the online library for research purposes. Screencast-O-Matic™ was utilized to create a voiceover PowerPoint presentation but was a free software. DaVinci Resolve 16™ was also freeware used to edit the educational module, and Survey Monkey™ was used for data collection.

No monetary benefits were gained from the creation or participation in this project. Potential benefits included increased provider knowledge and awareness of OSA and its screening methods. Subsequently, participants could incorporate OSA screening into every day

practice to reduce perioperative complications in obese patients. Anesthesia providers who identify patients as high risk for moderate to severe OSA could employ interventions as discussed in the module to increase patient safety, reduce perioperative risks, and improve patient outcomes.

Chapter Five: Implementation Procedures and Processes

Implementation of the DNP project was accomplished by two Cedar Crest College doctoral students via an online educational module on perioperative risk reduction strategies of obese patients. Topics included OSA, the STOP-Bang Questionnaire, anesthetic considerations in patients with diagnosed and suspected OSA, and sub-anesthetic ketamine infusions. Education was provided via voiceover PowerPoint and a simulation-based video. Creation of the educational module was accomplished using a laptop with internet access, Microsoft Office 365™, Screencast-O-Matic™, Wix.com, Inc. website creator, a Panasonic™ video camera and tripod, SD card, and DaVinci Resolve 16™ editing software. Additionally, access to Cedar Crest College's simulation rooms were utilized to film the simulation-based scenarios. This required access to the simulation rooms, hospital bed, pillow, linen, obesity simulation suit, and clipboard. The Nursing Simulation Center manager also assisted with scheduling and development of the simulation-based scenario.

Participants consisted of CRNAs and SRNAs from various clinical sites and accredited nurse anesthesia programs in Pennsylvania. Participants were recruited via convenience sampling via text messages and personal email addresses and were invited to complete the education voluntarily and anonymously. The recruitment email (Appendix H) contained a description of the research, a hyperlink to the educational module, and contact information of the principal investigators. Participants were informed that their involvement in the project was voluntary and anonymous with the right to withdraw from participation at any time. A student-designed website was created through Wix.com, Inc. to house the module. Participants were directed to the website and educational module, which contained informed consent and research description. Completion of the module was self-paced according to the individual participant.

The videos could be viewed multiple times, but the pre- and post-tests could only be completed once each throughout the implementation period from February 13, 2021 to March 6, 2021.

To measure baseline knowledge, participants were instructed to complete a pre-test of six knowledge-based questions regarding OSA and ketamine prior to viewing the educational videos. The pre-test also evaluated current practice regarding preoperative OSA screening and intraoperative sub-anesthetic ketamine infusions. Participants then viewed the 30-minute educational module, which consisted of two 12-minute videos covering the risk reduction strategies of preoperative OSA screening using the STOP-Bang Questionnaire and multimodal analgesia with sub-anesthetic ketamine infusions. In addition, a 6-minute simulation scenario demonstrated the practicality of these evidence-based interventions. Following the videos, participants were instructed to complete the post-test, which consisted of the same six knowledge-based questions from the pre-test to demonstrate increased knowledge of the topics. Additional post-test questions inquired about the likelihood of participants to implement a personal change in clinical practice supportive of the education found in the module.

Data was collected and analyzed using Survey Monkey™ and Microsoft Excel™. Each paired knowledge-based question was analyzed using the McNemar test due to the nominal nature of each question and non-normal distribution pattern (Adedokun & Burgess, 2012). A paired t-test was then used to analyze all knowledge-based questions collectively. These statistical tests were chosen to identify if knowledge increased after participants viewed the module. Upon completion of the post-test, participants were able to maintain access to the website as a reference. The website also provided links to the research utilized to formulate this evidence-based practice project.

Chapter Six: Evaluation and Outcomes

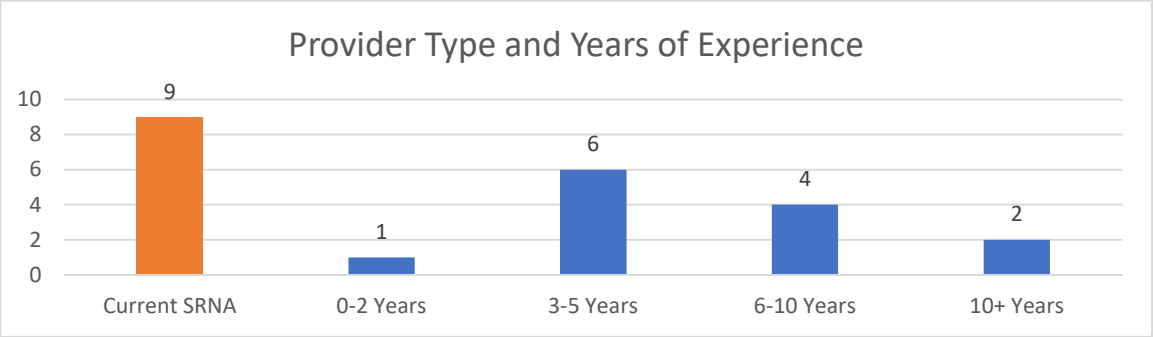
The implementation phase of this project took place over a three week period. During this period, participants were able to view the student-created website, take the pre-test, view the educational modules, and take the post-test. The modules were able to be viewed multiple times for reference and additional understanding. Data was collected and analyzed using Survey Monkey™ and Microsoft Excel™.

Demographics

A convenience sample 45 anesthesia professionals were recruited to participate, with a response rate of 48.89% (n = 22). The sample included 9 SRNAs and 13 CRNAs with various years of clinical experience (Figure 1).

Figure 1

Anesthesia Provider Type and Years of Experience



Evaluation

The pre-test consisted of six knowledge-based questions on OSA and sub-anesthetic ketamine infusions plus two survey questions pertaining to participants' current practice of OSA screening and ketamine usage. The pre- and post-test knowledge questions were identical, and each pair of questions were analyzed using the McNemar test to determine if marginal

frequencies were similar between pre- and post-tests (Adedokun & Burgess, 2012). The alpha level was set at 0.05 to determine statistical significance.

OSA Knowledge Question 1

What percentage of OSA patients remain undiagnosed? For question 1, participants demonstrated an increase in post-test scores by 68%. Results were analyzed with the McNemar test (Table 1), with a p-value calculated to be 0.000275, which was less than the alpha level of 0.05, thus demonstrating statistical significance.

Table 1

OSA Knowledge Question 1

	Test 2 positive:	Test 2 negative:	
Test 1 positive:	5	1	6
Test 1 negative:	16	0	16
	21	1	22

Note: McNemar chi-squared statistic was 13.235294; Corresponding p-value was 0.000275

OSA Knowledge Question 2

High risk of moderate to severe OSA is indicated by a STOP-Bang score greater than or equal to which number? Participants demonstrated an increase in post-test scores by 59% for question 2. The McNemar test (Table 2) was used to analyze frequency of responses. The p-value was calculated to be 0.000874, which was less than the set alpha level of 0.05, thus demonstrating statistical significance.

OSA Knowledge Question 3

The prevalence of OSA among bariatric patients is as high as what percentage? Participants demonstrated an increase in post-test scores by 36% for question 3. Frequency of

Table 2

OSA Knowledge Question 2

	Test 2 positive:	Test 2 negative:	
Test 1 positive:	9	0	9
Test 1 negative:	13	0	13
	22	0	22

Note: McNemar chi-squared statistic was 11.076923; Corresponding p-value was 0.000874

responses were measured with the McNemar test (Table 3). The p-value was calculated to be 0.011412, which was less than the set alpha level of 0.05, thus demonstrating statistical significance.

Table 3

OSA Knowledge Question 3

	Test 2 positive:	Test 2 negative:	
Test 1 positive:	9	1	10
Test 1 negative:	9	3	12
	18	4	22

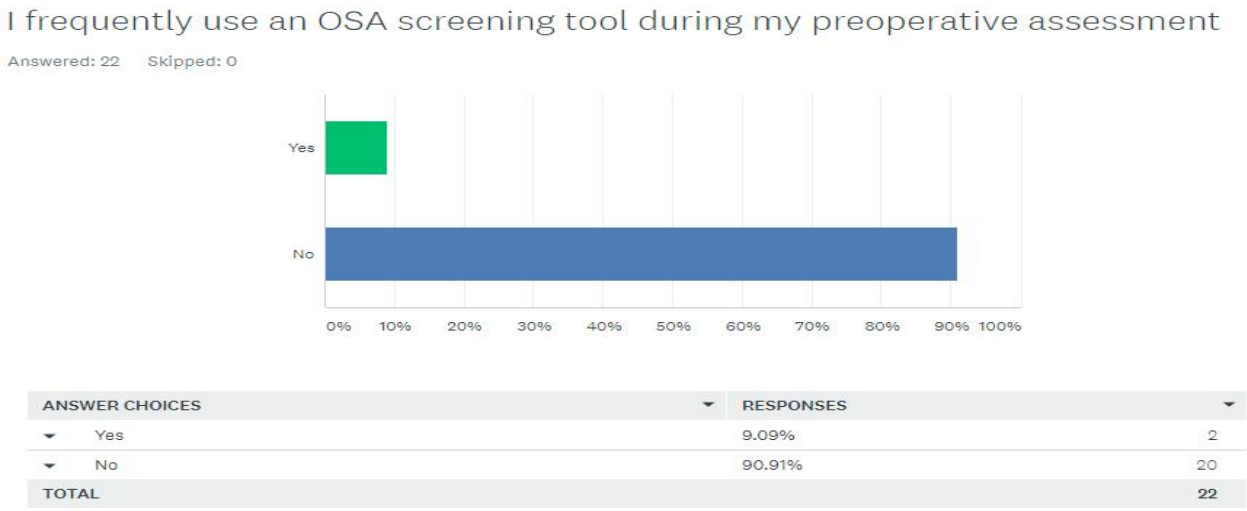
Note: McNemar chi-squared statistic is 6.400000; Corresponding p-value is 0.011412

Current Practice Question

I frequently use an OSA screening tool during my preoperative assessment. Answer choices were *yes* or *no*, and 90.91% (n = 20) indicated they currently do not frequently use an OSA screening tool while 9.09% (n = 2) indicated they frequently use a tool to screen for OSA (Figure 2).

Figure 2

Assessment of Current Practice



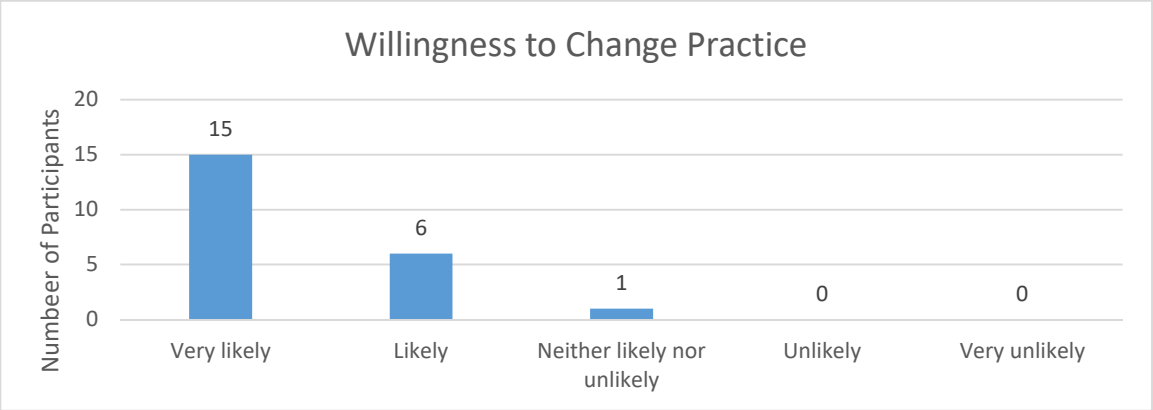
ANSWER CHOICES	RESPONSES	
Yes	9.09%	2
No	90.91%	20
TOTAL		22

Willingness to Change Practice

I plan on integrating the STOP-Bang Questionnaire into my preoperative assessment. After viewing the module, participants were asked if they would be willing to consider a practice change (Figure 3). 68.18% (n = 15) indicated they were *very likely*, 27.17% (n = 6) answered *likely*, and 4.55% (n = 1) responded *neither likely nor unlikely*. No participants answered *unlikely* or *very unlikely*.

Figure 3

Willingness to Change Practice

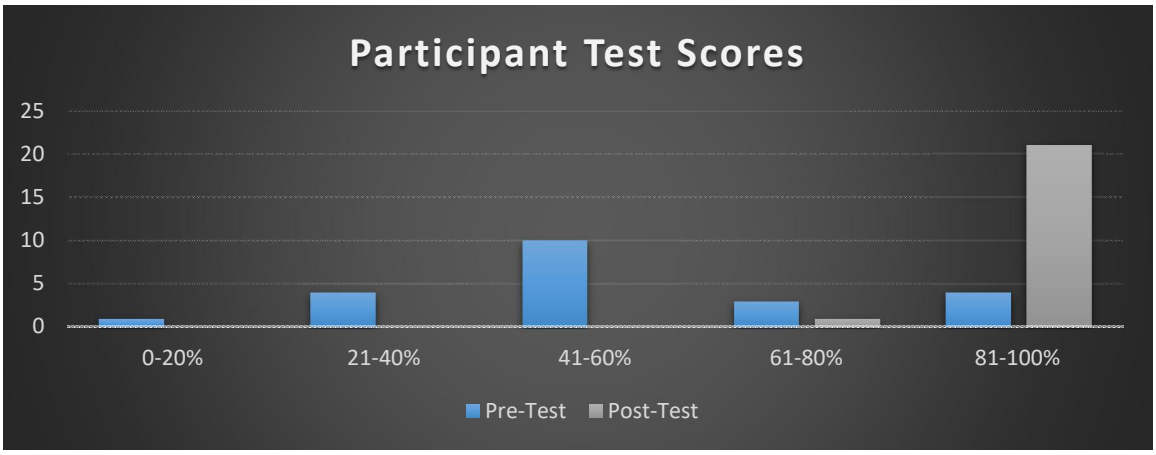


Outcomes

The two key goals of this project were to (1) educate anesthesia providers regarding OSA screening to reduce perioperative complications via a simulation-based educational module and (2) encourage a practice change among anesthesia providers. Pre-test data related to the domain "OSA and sub-anesthetic ketamine infusions" revealed a mean score of 56%; after viewing the module, the mean post-test score for the combined domains increased to 94% (Figure 4). A paired t-test (Table 4) was utilized to compare collective pre- and post-test scores. The objective for this project was to increase post-test scores by 20% from pre-test scores, and this was achieved as evidenced by a mean increase of 38% with a subsequent p-value of 0.00000011.

Figure 4

OSA and Ketamine Knowledge Questions



Note: Collective pre-test mean = 56%; collective post-test mean = 94%

Additionally, 21 of 22 participants (95.45%) indicated that they were *very likely* or *likely* to change their practice after viewing the educational module (Figure 5), clearing the objective of at least 50%. Furthermore, all participants indicated that knowledge of the subject material improved (Figure 5) following the educational module.

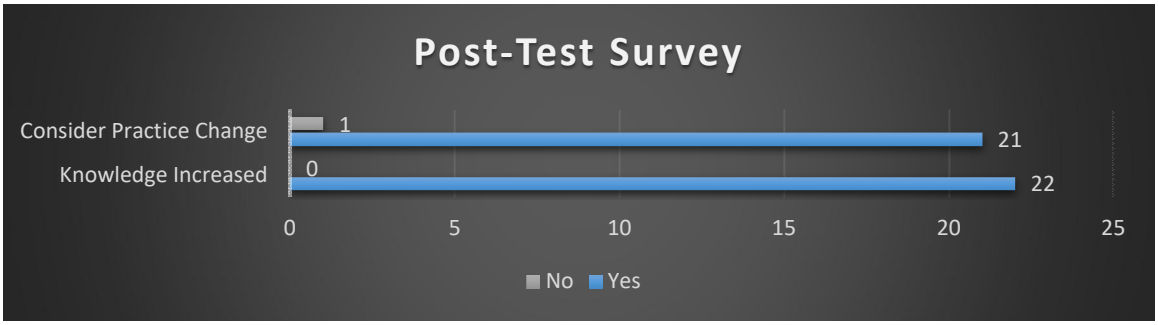
Table 4

Paired t-test Comparing Pre- and Post-test OSA and Ketamine Knowledge Questions

	Pre-Test	*Post-Test*
Mean	**55.84409**	**94.15455**
Variance	620.1687	71.14039
Observations	22	22
Pearson Correlation	0.286055	
Hypothesized Mean Difference	0	
df	21	
t Stat	-7.51895	
P(T<=t) one-tail	**1.1E-07**	
t Critical one-tail	1.720743	
P(T<=t) two-tail	2.19E-07	
t Critical two-tail	2.079614	

Figure 5

Willingness to Change Practice and Perceived Increase in Knowledge



Discussion

The COVID-19 pandemic forced a transition from clinical-based to education-based projects. Obese patients commonly present for surgery with undiagnosed OSA, and anesthesia can significantly exacerbate these symptoms. OSA is a significant topic within anesthesia, and the initial needs assessment demonstrated that an intervention was necessary. Education is a

critical component of nursing, and the pandemic presented a unique opportunity to reach an audience via a virtual platform.

Overall, 22 anesthesia providers participated in the project over a three week period. Each OSA knowledge-based question had a statistically significant increase in scores as calculated by McNemar tests. OSA and ketamine test scores improved by 38% after participants viewed the educational module. A paired t-test demonstrated statistical significance of the combined increased test scores as well. With increased test scores, participants were clearly engaged with the module, and it can be concluded that this project also increased anesthesia providers' awareness of undiagnosed OSA in obese patients. Most importantly, 21 of 22 participants indicated that they were *likely* or *very likely* to integrate the STOP-Bang Questionnaire into their clinical practice. This was significant because online education may provide a viable alternative to in-person education in an effort to translate evidence into practice. While it may be unrealistic to expect the vast majority of anesthesia providers to change their clinical practice after viewing the educational module, it represents a positive step that promotes awareness of this disease process and highlights the receptiveness of anesthesia providers to follow evidence-based practice. The clinical significance this project demonstrated will be more valuable to anesthesia practice and patient outcomes in the future. Increased knowledge may be a channel to meaningful change, and with additional education that can occur post-pandemic, it is possible that preoperative OSA screening can become a standard of care.

The Joint Commission (2015) currently recommends to preoperatively screen patients for OSA to reduce the number of undiagnosed patients presenting for surgery. While diagnosing OSA may not be possible for every patient prior to surgery, screening tools, such as the STOP-Bang Questionnaire, can be used to risk stratify patients on the day of surgery. Initial

discussions with anesthesia providers from multiple clinical sites revealed that preoperative OSA screening is not routine, and the pre-test confirmed that over 90% of participants do not frequently use a preoperative OSA screening tool. This project educated anesthesia providers on the importance of screening surgical patients for possible undiagnosed OSA. The education focused on OSA and obesity; prevalence rates; associated intraoperative and postoperative complications; risk factors; pathophysiology; the STOP-Bang Questionnaire; Society of Anesthesia and Sleep Medicine guidelines; and anesthetic considerations. The perioperative consequences of undiagnosed OSA were a clear emphasis of this education, and the topics presented also signified an educational need among providers. The increased knowledge and awareness this project delivered will have a positive impact on patient care through the use of the STOP-Bang preoperatively. This will allow anesthesia providers to risk stratify patients based on the STOP-Bang score, and if deemed high risk, providers can take appropriate measures to ensure patient safety throughout the perioperative period.

Chapter Seven: Implications for Nursing Practice

OSA poses an increased risk for surgical patients. The prevalence of OSA will continue to increase as the population ages and rates of obesity rise (Chung, Memtsoudis, et al., 2016). Alarmingly, 80% of Americans living with OSA are undiagnosed and untreated, which increases the risk of respiratory and cardiovascular complications during the perioperative period (AASM, 2016; Knauert et al., 2015; Nagappa et al., 2015). While preoperative diagnosis of every patient with suspected OSA is impractical, the STOP-Bang Questionnaire presents an alternative approach to ensure patient safety for high risk patients.

Implications for Practice

The STOP-Bang Questionnaire is the most validated screening tool in surgical patients and demonstrates superiority in comparison to other screening tools (Chiu et al., 2017; Chung, Memtsoudis, et al., 2016; Kee et al., 2018). It is a reliable tool to detect OSA due to its high sensitivity and predictive ability (Nagappa et al., 2015). Preoperative screening for OSA is advantageous due to increased patient safety, enhanced awareness of potential complications, and improved discharge planning. Surgical patients with undiagnosed and untreated OSA have a higher risk of complications in comparison to those on continuous positive airway pressure (CPAP) therapy due to greater risk of respiratory obstruction (Nagappa et al., 2017). Anesthesia providers can mitigate these risks by implementing appropriate interventions in those with a positive OSA diagnosis as well as patients with suspected OSA.

The goals of this project were to increase knowledge of undiagnosed OSA in obese surgical patients and to elicit a practice change among anesthesia providers. The online educational module was designed by two SRNAs in an effort to reduce perioperative complications in obese patients through OSA screening and multimodal analgesia with sub-

anesthetic ketamine infusions. Participants completed a pre- and post-test of knowledge-based questions regarding these domains. Post-test scores increased by 38% following the educational module. Additionally, over 90% of participants indicated they currently do not use a preoperative OSA screening tool, meaning many patients with undiagnosed OSA are not identified prior to surgery. The STOP-Bang Questionnaire can alert an anesthesia provider to a patient with suspected OSA, and appropriate interventions can then be utilized. Preoperative and intraoperative anesthetic considerations for patients with diagnosed or suspected OSA include minimal or no preoperative sedation; preparation for difficult mask ventilation and airway; use of CPAP and 25-degree head elevation during pre-oxygenation; use of short-acting agents; utilization of multimodal analgesia, such as nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, tramadol, ketamine, dexmedetomidine, gabapentin, pregabalin, and dexamethasone; use of propofol for maintenance of anesthesia; and use of insoluble anesthetic agents, such as sevoflurane or desflurane (Krogh, 2018). Postoperatively, interventions include judicious use of opioids; use of CPAP and supplemental oxygen; and end-tidal carbon dioxide monitoring (Krogh, 2018).

Translating evidence into practice constitutes a major component of the doctoral-prepared nurse. After viewing the educational module, participants were asked to consider a practice change to incorporate the STOP-Bang Questionnaire as part of their preoperative assessments, with 95% of participants indicating they were *likely* or *very likely* to integrate the screening tool into practice. Participants gained knowledge and awareness related to the consequences of undiagnosed OSA in obese surgical patients. Participants can utilize the STOP-Bang tool to screen patients and, if deemed high risk, can take appropriate measures to ensure patient safety throughout the perioperative period. Education to reduce perioperative complications in those

with undiagnosed OSA has the potential to enhance patient outcomes and improve patient safety.

Strengths

This project featured several notable strengths. The online format allowed anesthesia providers to participate in this project while adhering to social distancing protocols. Participants were also able to view the student-designed website and videos multiple times for reference to key topics. The website can also be shared with anesthesia providers even after completion of the project. Additionally, the module contained a scenario of an anesthesia provider performing the STOP-Bang during a preoperative assessment to reinforce the relative ease and succinctness of its application. The website displayed reference lists, which were provided to participants for greater transparency of information. The pre- and post-tests were designed to be completed once per IP address to eliminate multiple attempts.

Limitations

Despite the project's success, there were limitations. The sample size was small with 22 participants, and due to the design and limited sample size, results may not be generalizable to a broader population. Participants were recruited via convenience sampling from hospitals and nurse anesthesia programs in Pennsylvania only. Many participants were employed by the same hospital where OSA screening does not routinely occur, thus potentially skewing those responses. The pre- and post-test knowledge questions were identical, so participants may have selectively sought answers within the module to raise post-test scores. The data collection tool was used to evaluate participants' likelihood to adopt the STOP-Bang Questionnaire into clinical practice, but the project did not follow up with participants to assess an actual change in practice.

The goal of the doctoral-prepared nurse is to make a positive impact on patient care by bridging the research-practice gap. Unfortunately, the COVID-19 pandemic prevented this

project from being implemented in a clinical-based setting, thus limiting the target audience to CRNAs and SRNAs. While the project was successful, changes could have been made to reach a wider audience. For instance, incentivizing participation through continuing education credits may have increased the sample size. Additionally, the use of an email listserv through the American Association of Nurse Anesthetists (AANA) could have distributed the participation email to CRNAs and SRNAs throughout the country. These changes would have been costly and outside the proposed budget, but the number of participants could have drastically increased. An additional change could have been to include participants in a discussion about administering anesthesia to obese patients. While social distancing is paramount during this time, participants could have been invited to attend a virtual meeting to discuss OSA and its screening methods, barriers to implementing the screening tool into practice, and review of the evidence to best care for obese patients during the perioperative period. This meeting could have provided valuable feedback and insight on future steps to promote evidence-based practice.

Linkage to DNP Essentials

The DNP Essentials are the foundational competencies that are central to all advanced nursing practices, including the nurse anesthetist. The American Association of Colleges of Nursing (AACN) created eight DNP Essentials in accordance with contemporary health care systems and complex patient needs. The project must address each DNP Essential (Appendix I) in order for nurses to meet the demands and expectations of a health care environment focused on evidence-based practice.

While each DNP Essential was met, two were consistent themes through this project: Essentials IV and VI. Essential IV is the use of information systems/technology and patient care technology for the improvement and transformation of health care. The pandemic created a

unique opportunity to reach an audience through a virtual platform. A website, educational content, and data collection tools were created using web-based software. Data analysis was done using Survey Monkey™ and Microsoft Exel™. Participants were recruited via email and were given a hyperlink to student-designed website. Participants were educated on best practice recommendations for obese patients exclusively online. Results showed the online education was effective at increasing knowledge, and participants showed a willingness to change their anesthetic practice.

Essential VI is interprofessional collaboration for improving patient and population health outcomes. This essential was met through an initial needs assessment, which revealed that most anesthesia providers do not use a preoperative OSA screening tool. Best practice recommendations were shared with participants through an online educational module. Results of the project were disseminated to faculty members of Cedar Crest College.

Chapter Eight: Summary of Project

Summary and Conclusions

OSA affects one in every four patients undergoing elective surgery, with rates as high as 70% for bariatric surgical patients. OSA is associated with several long-term health complications, such as hypertension, coronary artery disease, diabetes, congestive heart failure, and cerebrovascular disease. Furthermore, OSA is linked to numerous intraoperative and postoperative complications, leading to cardiopulmonary issues, prolonged hospital length of stay, and increased health care costs.

It is estimated that 80% of patients have undiagnosed OSA prior to surgery due to lack of symptom awareness and routine screening. Upon exposure to anesthesia, sedatives, and opioids, patients can experience exacerbation of OSA symptoms, which can lead to respiratory and cardiac complications. The Joint Commission (2015) cites diagnosed or suspected OSA as a contributing factor to patient harm. The Joint Commission and Society of Anesthesia and Sleep Medicine recommend to screen and identify patients suspected of having OSA to minimize OSA-related complications (Chung, Memtsoudis, et al., 2016; The Joint Commission, 2015).

A literature search revealed the STOP-Bang Questionnaire as a reliable screening tool for OSA. The STOP-Bang score is directly proportional to the probability of moderate to severe OSA in surgical patients, with a STOP-Bang score greater than or equal to five deemed as high risk for OSA (Chung, Abdullah, et al., 2016). A needs assessment revealed that anesthesia providers need education regarding increased risk of perioperative complications in patients with diagnosed or suspected OSA (Chung, Memtsoudis, et al., 2016). Additionally, preoperative risk stratification using the STOP-Bang score will allow health care providers to plan for potential complications, which will ultimately improve quality of care (Chung, Memtsoudis, et al., 2016).

Despite the lack of existing literature regarding the use of screen-based education in anesthesia, its benefits far exceed the risks and represents a viable alternative to education during the COVID-19 pandemic.

Implementation of the project was accomplished through a student-designed Wix.com, Inc. website. Topics related to OSA, STOP-Bang, and anesthetic considerations related to OSA were included in a 30-minute presentation to participants. Participants were recruited via convenience sampling from various clinical sites in Pennsylvania. Participants were instructed to complete a pre-test of knowledge-based questions on OSA and current practice related to OSA screening. After viewing the educational module, participants were then instructed to complete a post-test of identical knowledge-based questions. Participants were also asked if the module influenced a practice change to preoperatively screen patients for OSA.

The two key goals of this project were to (1) educate anesthesia providers regarding OSA screening to reduce perioperative complications via a simulation-based educational module and (2) encourage a practice change among anesthesia providers. The objective for this project was to increase post-test scores by 20% from pre-test scores, and this was achieved as evidenced by a mean increase of 38%. Additionally, 21 of 22 participants (95.45%) indicated that they were more likely to change their practice after viewing the educational module, clearing the objective of at least 50%. Furthermore, all participants indicated knowledge of the subject material improved following the educational module.

The STOP-Bang Questionnaire is a concise, reliable tool to screen for OSA. Patients with a STOP-Bang score of five to eight are considered high risk for moderate-to-severe OSA. Proper identification of OSA with the STOP-Bang score can alert the provider to alter the anesthetic plan and take appropriate measures to ensure patient safety and minimize adverse

outcomes. This project increased providers' knowledge of OSA and brought awareness to the dangers of this disease among obese surgical patients. Participants were provided with strategies to minimize perioperative complications in patients with diagnosed or suspected OSA. Anesthesia providers were receptive to the educational module, with 95% indicating they plan on integrating the STOP-Bang Questionnaire into clinical practice. This project has the opportunity to transform clinical practice by enhancing patient safety and improving outcomes.

Dissemination Plans

This doctoral project has been presented to faculty at Cedar Crest College. This project will also be presented to anesthesia providers at St. Luke's University Hospital's Allentown Campus. Additionally, this project will be presented at the St. Luke's Pulmonary Critical Care Symposium in October 2021.

Future Ideas

The COVID-19 pandemic required a transition from a hospital-based project to an online educational module. The original project was aimed at implementing the STOP-Bang Questionnaire into the preoperative assessments of anesthesia providers at a local hospital. Over 90% of participants indicated they do not currently use a preoperative OSA screening tool, meaning many patients with OSA are unrecognized. Implementation of the STOP-Bang Questionnaire into clinical practice would have a direct effect on patient care via risk stratification. Anesthesia providers would be able to utilize appropriate interventions to reduce perioperative complications and improve patient outcomes.

Many hospitals employ an electronic medical record (EMR). It is possible to incorporate the STOP-Bang into the EMR to streamline OSA screening. Incorporation of the STOP-Bang Questionnaire into the EMR could act as a reminder and facilitate the process of screening for

OSA. All members of the healthcare team would be able to see each patient's score as well, leading to improved communication of each patient's risk of OSA.

The economic burden of OSA has been discussed in this paper. It has been documented about 80% of patients with OSA are undiagnosed, leaving millions of people with this untreated disease. A final idea to expand on this project could be to initiate a referral program for all surgical patients who are deemed high risk. A score of five or greater could trigger a referral to a certified sleep clinic for polysomnography, which would be included in the discharge instructions. A sleep clinic referral could lead to many patients having a definitive diagnosis with treatment options in an effort to reduce health care costs and improve population health.

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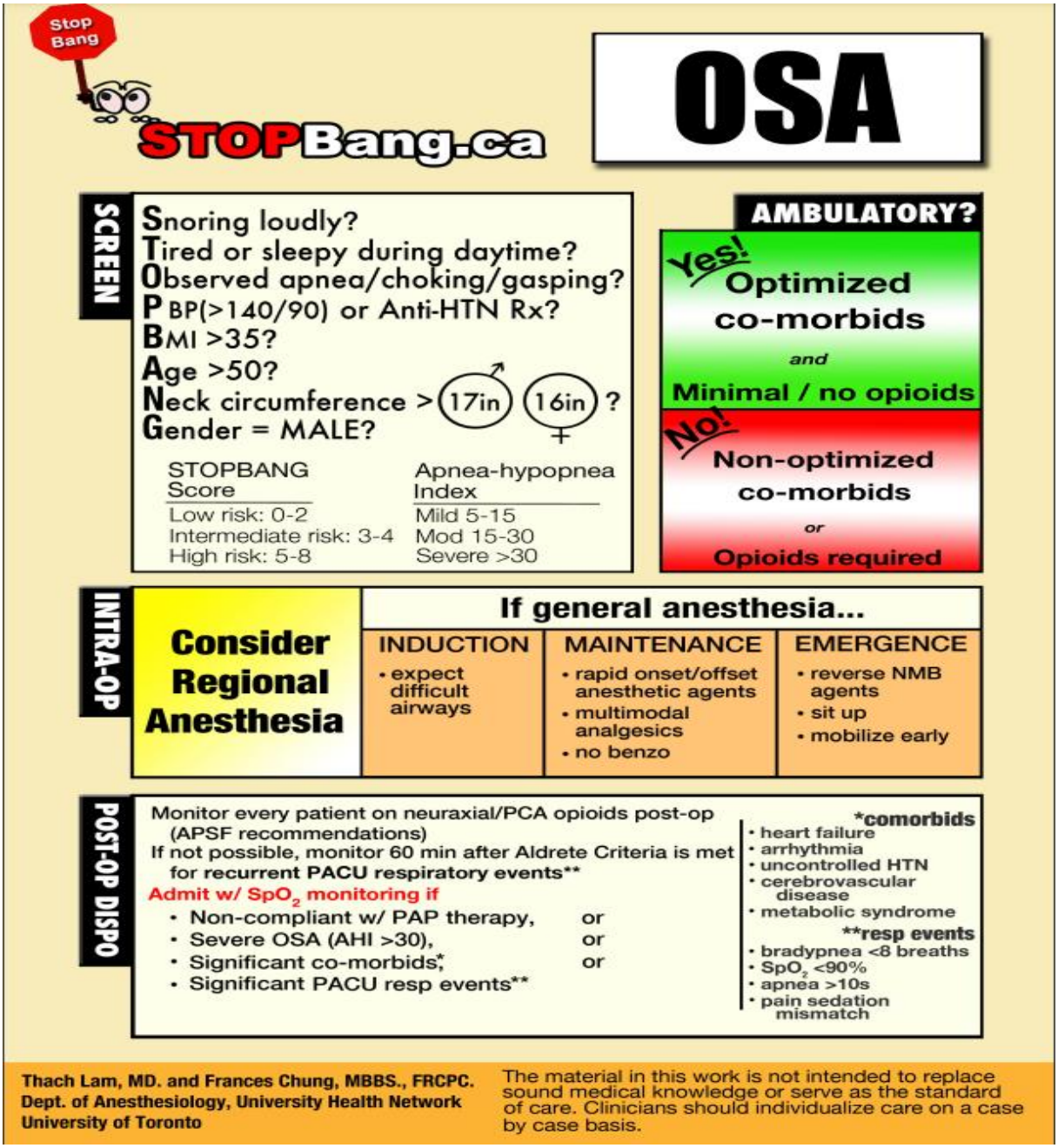
Appendix A

STOP-Bang Questionnaire

This figure explains the components of the STOP-Bang Questionnaire as well as intraoperative and postoperative considerations for patients with diagnosed or suspected OSA (Lam & Chung, n.d.).



Appendix B

IRB Approval

IRB Committee Response - Proposal Number 2020-293

M

mycedarcrest@cedarcrest.edu
Fri 8/28/2020 11:24 PM

To: Joel Butala
Cc: Catherine Zurawski; Andrew Hornick

The IRB Committee has reviewed your proposal and has made the following response:

Proposal Name:	Implementation of a Simulation Based Educational Module to Increase Knowledge to Reduce Perioperative Complications in Obese Patients
Lead Researcher:	Joel Butala
Project Advisor:	Catherine Zurawski
Additional Researcher(s)	Andrew Hornick
Committee Response:	Approved with recommendations
Comments:	8/15/2020: Thank you for your submission. There are a few revisions needed: (1) Research Supplement: a) for procedures, this is framed like the informed consent - do not say "you" but rather "Participants will be asked to..."; b) On-line survey - you imply you are using one but attached a paper document, please clarify (if an online survey is being used provide the URL in both your research supplement and informed consent form for review); c) in Assurance of Anonymity and Confidentiality - do not refer to paper documents if you are using an online survey process: d) refer to the Cedar Crest College School of Nursing vs "graduate studies department"; (2) informed consent - a) State the other researchers associated with the project vs. just two - be consistent with the research supplement; b) you imply again an on-line pre- and -post test survey - refer/include to the URL for access; c) remove this language: "but you may share some personal or confidential information by chance. However, we do not wish for this to happen"; (3) survey - implied as online, so provide URL's for a pre- and then post-test version for each set of questions, Ketamine and Sleep Apnea related (Survey Monkey, other) and modify the question sequence so implied informed consent is #1 and answering "yes" is required for participants to answer any other questions (demographics for #2 and 3, then module topic questions after - being clear in both research supplement and informed consent forms that participants will complete a survey twice for pre- and then -post test questions - arguably two surveys) - including a question after #1 asking for participants to provide a code supporting anonymity for linking pre- and -post test (suggestions here for clarity and procedure). We look forward to your follow-up. 8/28/2020: Thank you for your follow-up. Your study is approved with one recommendation for the informed consent form to also refer to the chair of IRB (name and title) for follow-up questions. The surveys look appropriate and refer to implied informed consent though. Thank you for your revisions and best to your team with the project!

Appendix C

Informed Consent

You are invited to participate in a research study to simulate risk reduction strategies in the perioperative care of obese patients. You were selected as a possible participant based on your potential involvement providing anesthesia care to this patient population. We ask that you read this form prior to participating in the study. You must be 18 years of age or older in order to participate**.**

This study is being conducted by the following Cedar Crest College SRNA's:

- Joel Butala; RN, BSN, CCRN
- Andrew Hornick; RN, BSN, CCRN

Background Information

The purpose of this study is to increase knowledge and awareness of perioperative risk reduction strategies of obesity and Obstructive Sleep Apnea (OSA) which is increasing in prevalence in the United States (U.S.). In the U.S., up to 80% of patients with OSA remain undiagnosed, and nearly 70% of all obese patients also exhibit OSA symptoms. Perioperative complications are significantly increased in OSA, which include increased risk of oxygen desaturation, respiratory failure, emergent intubation, mechanical ventilation, and ICU admission. In this population, the use of opioids can further exacerbate symptoms of OSA due to blunting of chemoreceptor responses to hypoxemia and hypercarbia. These drugs also decrease pharyngeal muscle tone, increase upper airway collapsibility, and exacerbate existing OSA. It is imperative to provide an educational module for anesthesia providers to consider adopting current evidence-based interventions in the management of perioperative obese patients. Information gained will serve to further facilitate online modules for risk reduction in obese patients. Participants in this study will be recruited through convenience sampling of Cedar Crest College SRNA's, fellow Pennsylvania CRNA programs and CRNA's from Lehigh Valley, Reading Hospital, St Luke's, and Penn Medicine via email. Potential participants will be contacted via email to participate in an online based simulation education module. A detailed summary of the proposed educational module with indication of voluntary and anonymous completion will be provided.

Procedures

If you agree to be in this study, we will ask you to participate in an online educational module regarding risk reducing strategies in perioperative obese patients. You will be asked to complete a pre and post survey regarding your knowledge of the subject materials covered and the likelihood of integrating this information into your anesthesia plan of care. The entire study should take no more than 90 minutes.

Risks and Benefits

There are no anticipated risks, but you may share some personal or confidential information by chance. However, we do not wish for this to happen. You do not have to answer any question or take part in the discussion/interview/survey if you feel the question(s) are too personal or if talking about them makes you uncomfortable. The intent of this module is to increase the anesthesia provider's knowledge in risk reduction strategies in caring for common complications found in perioperative obese patients.

Confidentiality

Responses to all questionnaire items are anonymous, and all physical and non-electronic media data (e.g., video or audio tape) collected in this study will be stored in a secure location in the simulation lab within the **Cedar Crest College Graduate Department**, specifically, under the supervision of the Cedar Crest College Nurse Anesthesia Program. All electronic data will be stored in password protected computers and/or files

where the passwords are known only to the researchers. Data will be stored for a period of three years, and shall be shredded, erased, or otherwise destroyed on or after **5/1/2023.** Learner specific tracking identifiers will not be utilized in the data collection of this DNP project. Participation in this research is voluntary with the ability to withdraw at any time without penalty. The completion of this education offers no financial compensation and is not affiliated with any course work or grades awarded.

Right to Withdraw
If you decide to participate, you are free to withdraw at any time. Your decision whether or not to participate will not affect your current or future relations with Cedar Crest College.

Statement of Approval
This research was approved by Cedar Crest College's Institutional Review Board.

Proposal # 2020-293 Date: 08/28/2020

Contacts and Questions
The supervising researchers conducting this study are listed below

Joel Butala; RN, BSN, CCRN, jdbutala@cedarcrest.edu
- Chair: Bernard Gilligan, CRNA, DNP
    - Email: Bernard.gilligan@cedarcrest.edu

Andrew Hornick; RN, BSN, CCRN, ajhornic@cedarcrest.edu
- Chair: Donna Martonik, DNP, ANP, AGACNP,
    - Email: Donna.martonik@cedarcrest.edu
- Mentor: Bernard Gilligan, C
    - Email: Bernard.Gilligan@cedarcrest.edu

Appendix D

Research Description Supplement

Title of Research: **Implementation of a Simulation Based Educational Module to Increase Knowledge to Reduce Perioperative Complications in Obese Patients**

a. Objective(s) of Research: The purpose of this study is to increase knowledge and awareness of perioperative risk reduction strategies of obesity and Obstructive Sleep Apnea (OSA) which is increasing in prevalence in the United States (U.S.). In the U.S., up to 80% of patients with OSA remain undiagnosed, and nearly 70% of all obese patients also exhibit OSA symptoms. Perioperative complications are significantly increased in OSA, which include increased risk of oxygen desaturation, respiratory failure, emergent intubation, mechanical ventilation, and ICU admission. In this population, the use of opioids can further exacerbate symptoms of OSA due to blunting of chemoreceptor responses to hypoxemia and hypercarbia. These drugs also decrease pharyngeal muscle tone, increase upper airway collapsibility, and exacerbate existing OSA. The goal of this research is to provide an educational module for anesthesia providers to consider adopting current evidence-based interventions in the management of perioperative obese patients. Information gained will serve to further facilitate online modules for risk reduction in obese patients.

b. Researcher(s) Qualifications: This research is being carried out by the following:

Joel Butala; RN, BSN, CCRN, SRNA, jdbutala@cedarcrest.edu
- Chair: Bernard Gilligan CRNA, DNP
  - Email: Bernard.gilligan@cedarcrest.edu

Andrew Hornick; RN, BSN, CCRN, SRNA, ajhornic@cedarcrest.edu
- Chair: Donna Martonik, DNP, ANP, AGACNP,
  - Email: Donna.martonik@cedarcrest.edu
- Mentor: Bernard Gilligan, CRNA, DNP
  - Email: Bernard.Gilligan@cedarcrest.edu

-Each researcher is in satisfactory academic standing along with Citi Training certification of completion for evidence-based research as well as all DNP prerequisite course work as establish by Cedar Crest College DNP Graduate Faculty.

c. Methods to be Used:

- **Participants**: Participants will be Cedar Crest College student registered nurse anesthetists (SRNA) and Lehigh Valley, Reading Hospital, St Luke's, and Penn Medicine certified registered nurse anesthetists (CRNA) who agree to voluntarily participate in the research. The purpose of the research will be explained to SRNA's and CRNA's and they will be asked to participate with the provision that they are free to withdraw at any time without penalty.
- **Procedures**: If participants agree to be in this study, they will be asked to participate in an online educational module regarding risk reducing strategies in perioperative obese patients. Participants will be asked to complete an online module with an estimated duration of 90 minutes. Participants will be asked to complete a pre and post survey regarding knowledge of the subject materials covered and the likelihood of integrating this information into your anesthesia plan of care.

- **Online Surveys:**
- https://www.surveymonkey.com/r/Q9WHG7Q (Pre-Test)
- https://www.surveymonkey.com/r/Q22TRLW (Post-Test)

d. Recruitment Procedures:

Participants in this study will be recruited through convenience sampling of Cedar Crest College SRNA's, fellow Pennsylvania CRNA programs and CRNA's from Lehigh Valley, Reading Hospital, St Luke's, and Penn Medicine via email. Potential participants will be contacted via email to participate in an online based simulation education module. A detailed summary of the proposed educational module with indication of voluntary and anonymous completion will be provided.

e. Requirements for Participation:

Participants must be greater than 18 years of age and enrolled in a nurse anesthesia program or actively practicing. Before completion, participants must also consent to anonymous surveys present throughout the educational modules.

f. Possible Risks and Benefits:

(Non-sensitive) It is anticipated that participants will be at no physical, psychological, or emotional risk at any time during the research. Nor is it anticipated that participation in the research will place the participants at any risk of criminal or civil liability or damage the participants' financial standing or employability. The intent of this module is to increase knowledge and awareness of perioperative risk reduction strategies in obese patients.

g. Assurance of Anonymity and Confidentiality:

Participants will be informed of the voluntary and confidential nature of the research verbally and/or via instructions on the data collection instruments. Participants will also be instructed not to put their name or any identifying information on the submitted form. When using an identification number for coding purposes, the number associated with a participant will not be linked to the participant by name. Any collected electronic data will be placed on a password protected computer where the password is known only to the researcher and faculty sponsor. All copies of the raw electronic data will be encrypted with a similar password. Any audio or video media will be stored in a locked drawer under the control of either the researcher or the faculty sponsor when not in use. The raw data will only be accessible to **Joel Butala, Andrew Hornick, Bernard Gilligan, and Donna Martonik**. In the event that any information provided by a participant should become known outside the research, it is unlikely that any harm would come to the participant.

h. Security of Data and Data Destruction. All physical and non-electronic media data (e.g., video, audio tape) collected in this study will be stored in a secure location within the **Cedar Crest College School of Nursing** and all electronic data (e.g., MP4 files) will be stored in password protected computers and/or files where the

passwords are known only to the researchers**.** Data will be stored for a period of three years, and shall be shredded, erased or otherwise destroyed on or after **5/1/2023.**

Appendix E

Pre-Test

1. How many years of experience do you have as an anesthesia provider?

a. SRNA
b. 0-2
c. 3-5
d. 6-10
e. 10+

2. What percentage of OSA patients remain undiagnosed?

a. Up to 50%
b. Up to 60%
c. Up to 70%
d. Up to 80%

3. High risk of moderate to severe OSA is indicated by a STOP-Bang score greater than or equal to which number?

a. 3
b. 4
c. 5
d. 6

4. The prevalence of OSA among bariatric patients is as high as…

a. 40%
b. 50%
c. 60%
d. 70%

5. I frequently use an OSA screening tool during my preoperative assessment.

a. Yes
b. No

6. How often do you utilize sub-anesthetic ketamine infusions for perioperative pain control and opioid reduction?

a. Always
b. Usually
c. Sometimes
d. Rarely
e. Never

7. Ketamine is a noncompetitive…

a. NMDA receptor antagonist
b. NMDA receptor agonist
c. NMDA receptor agonist-antagonist
d. does not work at the NMDA receptor

8. Opioid-induced hyperalgesia (OIH) is caused by (select two):

a. stimulation of the NMDA receptor
b. blocking of the NMDA receptor
c. ketamine
d. repeated high dose administration of narcotics

9. The utilization of perioperative sub-anesthetic ketamine infusions have been proven to reduce perioperative opioid consumption and decrease postoperative pain scores with few adverse side effects.

a. True
b. False

Appendix F

Post-Test

1. What percentage of OSA patients remain undiagnosed?

a. Up to 50%
b. Up to 60%
c. Up to 70%
d. Up to 80%

2. High risk of moderate to severe OSA is indicated by a STOP-Bang score greater than or equal to which number?

a. 3
b. 4
c. 5
d. 6

3. The prevalence of OSA among bariatric patients is as high as…

a. 40%
b. 50%
c. 60%
d. 70%

4. I plan on integrating the STOP-Bang Questionnaire into my preoperative assessment.

a. Very likely
b. Likely
c. Neither likely nor unlikely
d. Unlikely
e. Very unlikely

5. My knowledge of OSA and its screening methods have significantly improved following this learning module.

a. Strongly agree
b. Agree
c. Somewhat agree
d. Neither agree nor disagree
e. Somewhat disagree
f. Disagree
g. Strong disagree

6. Ketamine is a noncompetitive…

a. NMDA receptor antagonist
b. NMDA receptor agonist

c. NMDA receptor agonist-antagonist
d. does not work at the NMDA receptor

7. Opioid-induced hyperalgesia (OIH) is caused by (select two):

a. stimulation of the NMDA receptor
b. blocking of the NMDA receptor
c. ketamine
d. repeated high dose administration of narcotics

8. The utilization of perioperative sub-anesthetic ketamine infusions have been proven to reduce perioperative opioid consumption and decrease postoperative pain scores with few adverse side effects.

a. True
b. False

9. Did the information provided in this presentation about sub-anesthetic ketamine encourage you to reconsider your current anesthesia practices regarding perioperative pain control?

a. Yes
b. No

10. My knowledge of sub-anesthetic ketamine infusions has significantly improved following this educational module.

a. Strongly agree
b. Agree
c. Neither agree nor disagree
d. Disagree
e. Strongly disagree

Appendix G

Budget

Resource	Cost
Cedar Crest College Simulation Lab	Included in cost of tuition
32 GB SD Card	$29.99
Rhode Shotgun™ Microphone	$129.99
Panasonic™ Video Camera	$225.00
Camera Tripod	$50.00
Wix,com, Inc. Website Builder	$120.00
Screencast-O-Matic™	Free Version
DaVinci Resolve 16™	Free Version
Survey Monkey™	Free Version
HP Envy 16™ Laptop	$1,200.00
Microsoft Office 365™	Included in cost of laptop
Total	**$1,754.98**

Appendix H

Recruitment Email

Dear Participant,
You are invited to participate in a doctoral project designed by two students in the Cedar Crest College Nurse Anesthesia Program. The project's key aims are to increase knowledge and elicit a practice change among student registered nurse anesthetists and certified registered nurse anesthetists through an online educational module on **perioperative risk reduction strategies in obese patients**. The main topics include obstructive sleep apnea (OSA) screening and multimodal analgesia, with a specific emphasis on sub-anesthetic ketamine infusions. This project was transitioned from a hospital-based setting to an online setting due to the coronavirus pandemic. As education around the world has shifted to a virtual platform, we feel strongly that the online educational module we have created will have a positive impact on students and experienced nurse anesthetists.

Participation in this project is entirely voluntary. If you decide to participate, we invite you to visit our website. Upon entering the website, you will find informed consent and research description supplement documents. Next, we ask that you complete our pre-test on OSA and ketamine. Then, you will view three educational videos on risk reduction strategies in obese patients, which include individual presentations on OSA and sub-anesthetic ketamine infusions in addition to a simulation where the information will be applied to a clinical scenario. Finally, you will take the post-test. Completion of the pre- and post-tests indicates your consent to participate in this project.

Completion of the module will take approximately 30 minutes. We understand that your time is extremely valuable, but we feel this educational module is important for future and current nurse anesthetists. A key goal of the DNP-prepared nurse is to bridge the research-practice gap, and by creating this educational module, we hope that you incorporate this evidence into your clinical practice. A link to our website can be found below. We greatly appreciate your participation. Please contact us if you have any comments, concerns, or questions. Thank you!

Website Link: https://butalajoel.wixsite.com/osaandketamine

Warm Regards,
Joel Butala, BSN, RN, CCRN, SRNA
Email: jdbutala@cedarcrest.edu
Phone: 570-578-9367
Andrew Hornick, BSN, RN, CCRN, SRNA
Email: ajhornic@cedarcrest.edu
Phone: 610-844-1509

Appendix I

Linkage to DNP Essentials

DNP Essential	Clinical Implications
I. Scientific Underpinnings for Practice	The project employs current evidence-based practice via preoperative use the STOP-Bang Questionnaire. Its effectiveness is validated through multiple high quality studies. Lewin's 3-Step Model was used as a guide for implementation and dissemination
II. Organizational and Systems Leadership for Quality Improvement	Needs assessment conducted at local hospital revealing no preoperative OSA screening. Project's goal was to elicit a practice change and increase knowledge regarding undiagnosed OSA in obese surgical patients.
III. Clinical Scholarship and Analytical Methods for Evidence-Based Practice	A comprehensive literature review was conducted to educate anesthesia providers on best practices through an online educational module. IRB submission, implementation, data collection, and data analysis all contributed in meeting this Essential.
IV. Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care	This project was implemented through a student-designed website to educate anesthesia providers on topics to improve outcomes in obese surgical patients
V. Health Care Policy for Advocacy in Health Care	This project advocated for the standardization of preoperative OSA screening using the SBQ as recommended by the Joint Commission. Recommendations are supported by high quality literature.
VI. Interprofessional Collaboration for Improving Patient and Population Health Outcomes	Needs assessment conducted in collaboration with anesthesia providers. Target audience was anesthesia providers who were educated via an online educational module on OSA screening to reduce perioperative complications
VII. Clinical Prevention and Population Health for Improving the Nation's Health	The STOP-Bang tool can alert an anesthesia provider to a patient deemed high risk for OSA and subsequent measures for patient safety can occur. Long-term goals of this project are to refer high risk (STOP-Bang ≥ 5) patients for polysomnography for definitive diagnosis and treatment
VIII. Advanced Nursing Practice	Met through initial needs assessment, evidence and literature review,

	implementation, data collection and analysis, and dissemination of results