IMPLEMENTING THE STOP-BANG ASSESSMENT TOOL TO IMPACT PERCEIVED STRESS AMONG CLINICAL STAFF

A DOCTOR OF NURSING PRACTICE PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF NURSING PRACTICE

NURSING DEPARTMENT

HAWAI'I PACIFIC UNIVERSITY

HONOLULU, HAWAI'I

SPRING 2025

By
MARINO ROBINSON

Advisors:

Chairperson: Dr. Gabriel Beam, DNP, RN
Content Expert: Dr. Jose Tumulak DNP, CRNA, ARNP, FAANA

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This DNP Dissertation Project by Marino Robinson has been approved by the committee members below, who recommend it be accepted by the faculty of Hawaii Pacific University in partial fulfillment of requirements for the degree of Doctor of Nursing Practice.

Approved: April 30, 2025

Gabriel Beam DNP RN

Dr. Gabriel Beam DNP, RN, Doctor of Nursing Practice - Project Chairperson

Mary A. Smith

Dr. Mary Smith, PhD, DNP, PMHNP-C, FNP-BC, FAANP, Doctor of Nursing Practice – MSN to DNP Track Coordinator

Edna R. Magpantay-Monroe

Dr. Edna Magpantay-Monroe, Ed.D., APRN, CMDC, Dean of the School of Nursing

Abstract

Anesthesia-related airway emergencies, particularly those involving failed intubation or ventilation, are a significant concern and contribute to poor patient outcomes. Obstructive sleep apnea (OSA) increases the risk of difficult airway events, further compromising patient safety. Despite its predictive value, the STOP-BANG questionnaire is not currently used to screen for OSA risk in the endoscopy lab of an urban outpatient gastrointestinal clinic in Chicago, Illinois. This gap in practice can lead to procedural delays and safety concerns due to unanticipated equipment needs, insufficient staff readiness, and lack of postoperative awareness. This quality improvement project aimed to determine the impact of implementing the STOP-BANG questionnaire compared to the current practice on stress perception among outpatient gastrointestinal (GI) clinic staff over 8 weeks. The Knowledge to Action (KTA) framework was used as a guide to facilitate this project. A pre- and post-implementation Perceived Stress Survey-10 (PSS-10) was administered to clinical staff (n =10). Also, the STOP-BANG questionnaire was used to evaluate patients for possible undiagnosed OSA prior to anesthesia (n =103). Results showed that the mean pre-intervention score for PSS-10 was lower (M = 13.9, SD = 5.72) than the post-PSS-10 survey mean score (M = 16.8, SD = 4.32). However, implementing the STOP-BANG questionnaire categorically changed perceived stress levels from low to moderate among clinical staff at a low rate (n = 2; 20%). Nevertheless, perceived stress levels did not improve. STOP-BANG scores for colonoscopy patients were at an average of 3.66, whereas the average STOP-BANG scores for patients undergoing an esophagogastroduodenoscopy (EGD) were 3.06. Airway maneuvers were needed for 40.98% of patients who had a colonoscopy and 37.93% of patients who had an EGD.

Keywords: Perceived stress, STOP-BANG, and Obstructive Sleep Apnea

Acknowledgment

I thank God for blessing my heart, head, and hands daily and allowing me to accomplish many of my goals. As an example of hard work and obtaining goals in higher education, my mom, Cindy Montgomery, has been the strength and light in my life that keeps me pushing and reaching my goals. She has accomplished much through her many challenges and has had an impressive nursing career. I thank her for the shining example. I also want to acknowledge my husband, Kapil Sharma, for his patience and support throughout this educational process. He supported and cared for me during some challenging phases in this academic journey. He showed nothing but love. My daughter, Victoria Robinson, and my granddaughter, Sianna Perry-Robinson, have been loving, supportive, and understanding of my limited time. I hope to be the example for them that my mom was for me.

Hawaii Pacific University (HPU) has allowed me to earn the Doctor of Nursing Practice distinction. I will honor this opportunity by being the best professional and educator I can be. I thank Dr. Beam for his patience and expertise. He was instrumental in keeping me on track and helping me mentally get through this Doctor of Nursing Practice project. I also want to acknowledge the other nursing instructors and professors who helped me during my educational journey at HPU. Finally, I want to thank Dr. Chua for supporting my DNP project and all of the professional opportunities that he has given me.

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Chapter 1

Introduction to the Project

Clinical Inquiry

Patients with undiagnosed obstructive sleep apnea (OSA) are challenging for anesthesia providers due to an increased risk of having problems with airway management, postoperative adverse airway events, and cardiovascular complications (Carr et al., 2020). Consequently, hypoxemia as a complication of OSA can lead to adverse outcomes and increase costs due to extended stay in the recovery room and the need for critical care coverage (Deslate et al., 2021; Jones et al., 2020; Wang et al., 2022). Unrecognized OSA can lead to poor patient outcomes, especially for individuals undergoing anesthesia administration.

The STOP-BANG questionnaire is an airway assessment tool used to assess patients for signs of OSA based on snoring, tiredness, observed apnea, high blood pressure, body mass index (BMI) greater than 35, age greater than 50, neck circumference greater than 40 centimeters (cm), and male gender (Deslate et al., 2021). The STOP-BANG questionnaire is a validated tool that screens for mild, moderate, and severe OSA (Carr et al., 2020). The sensitivity of the STOP-BANG questionnaire ranges from 84% to 96% (Carr et al., 2020). Moreover, the American Society of Perianesthesia Nurses (ASPAN) and the American Society of Anesthesiologists (ASA) recommend screening patients for OSA before the administration of anesthesia (ASA, 2010; Carr et al., 2020).

The STOP-BANG questionnaire was not used to predict OSA in an endoscopy center in urban Chicago. Not having the STOP-BANG questionnaire can cause delays in procedure start times and perpetuate patient safety concerns due to poor staff awareness of postoperative apnea (Deslate et al., 2021). Poor awareness further places patients at risk because airway resuscitation equipment is not readily available, and clinical staff lack heightened preparedness. The absence of an assessment tool for undiagnosed OSA patients creates uncertainty in the workflow of the endoscopy lab. This negative emotion among healthcare workers is related to increased perceived stress and is directly associated with high uncertainty in clinical situations (Younas & Khanum, 2024). Also, there was no standard plan or protocol in the endoscopy lab to ensure that anesthesia providers and clinical staff work together to ensure safety related to adverse airway events. Evidence shows that a lack of team support increases team members' stress during emergencies (Younas & Khanum, 2024).

Implementing the STOP-BANG questionnaire is instrumental in supporting a safe clinical environment for patients. Staff are alerted to high-risk patients and able to respond appropriately as a team. Mitigating stress among staff and ensuring patient safety by implementing the STOP-BANG questionnaire were the goals of this evidence-based Doctor of Nursing Practice (DNP) project.

Background & Significance of the Problem

Anesthesia-related airway emergencies that involve the inability to intubate or ventilate comprise nearly 25% of anesthesia-related deaths (Bilge et al., 2022). Obstructive sleep apnea is a sleep-related breathing disorder caused by an anatomical airway obstruction that causes apneic episodes and hypoxemia lasting more than 10 seconds (Deslate et al., 2021). Patients with OSA are at a higher risk of having an emergency airway event during the perioperative period (Bilge et al., 2022). This disorder places a surgical patient at higher risk for postoperative cardiac and neurological complications (Wang et al., 2022). Patel et al. (2022) described that OSA is a prevalent sleep disorder and is often associated with diabetes, obesity, and cardiovascular disease. Moreover, obstructive sleep apnea has become a world health issue affecting approximately 400 million people (Patel et al., 2022).

Approximately 75% to 80% of patients with OSA have not been diagnosed, with males having a higher prevalence (Bray & Knapp, 2021). Bray & Knapp (2021) reported that approximately 24% of men and 9% of women in the United States test positive for OSA when tested using polysomnography (PSG) in a sleep lab. However, performing PSG testing before an outpatient endoscopic procedure is expensive and impractical (Jones et al., 2022). The STOP-BANG questionnaire is convenient, requires minimal resources, and can be administered on the day of surgery or procedure (Jones et al., 2022).

The endoscopy center located in urban Chicago experiences similar trends in patient epidemiology. Hunag (2021) estimated that obesity rates in Chicago have increased to approximately 30% in two decades, where obese adults represent 61% of the population in the metropolitan area. Overall, high obesity rates in the United States have led to an increase in chronic diseases such as cardiovascular diseases. Also, obesity with a BMI over 35kg/m^2 has a direct correlation with the increased incidence of OSA, leading to airway obstruction and hypoxemia (Jones et al., 2022).

This DNP project site is a stand-alone outpatient procedure center. External emergency services must be dispatched for assistance if an emergency requires advanced cardiac life support (ACLS). The endoscopy center leadership recognized the need to stay current with the ASA's standards of care and expressed the need to prevent any future adverse airway events related to OSA. The endoscopy center's goals were teamwork and clinical staff understanding of difficult airways. However, time constraints and productivity pressure were vital leadership concerns. Questions did arise regarding the STOP-BANG questionnaire’s impact on patient preparation and case turnover, alongside leadership's hesitancy to add another form for staff. The hybrid charting system of electronic health records (EHRs) and paper records, combined with a culture of underreporting near misses or adverse airway events, has led to gaps in tracking. The lack of formal quality improvement infrastructure limits information collection on airway incidents. Despite these barriers, the leadership staff was willing to support the evidence-based practice (EBP) DNP project due to the potential positive impact on patient outcomes and information concerning stress that can give an insight into perceived stress among staff.

The Perceived Stress Scale (PSS-10) survey measures how a person perceives life events contributing to uncontrollable, unpredictable, and overwhelming situations (Bastianon et al., 2020). Healthcare workers experience stress at a rate of 27%-87.4% (Catapano et al., 2023). Therefore, stress can negatively affect work performance, leading to poor or unsafe patient care (Catapano et al., 2023). Coping measures by healthcare workers are challenged when they cannot care for patients due to a lack of knowledge or inability to function correctly (Catapano et al., 2023). This assessment tool offered the ability to quantify stress and determine if an evidence based intervention was impactful.

Operational Definitions

The following terms were used throughout the project and are defined as follows:

Airway maneuvers include jaw thrust, head tilt, chin lift, oropharyngeal airway insertion, nasopharyngeal airway, mask/bag ventilation or positive pressure, and endotracheal intubation (Deslate et al., 2021).

Apnea is the inability to breathe or an extended pause in breathing requiring clinical interventions (Deslate et al., 2021).

Endoscopy Clinical Staff are individuals such as Certified Registered Nurse Anesthetists (CRNAs), Registered Nurses (RNs), Medical Assistants (MAs), Certified Nurse Assistants (CNAs), and Gastroenterology (GI) technicians.

Obstructive sleep apnea (OSA) is a sleep-related breathing disorder caused by an anatomical airway obstruction that causes apneic episodes and hypoxemia (Wang et al., 2022).

Perceived stress- The feelings a person has about how much stress they are experiencing (Tsegaye et al., 2022).

Clinical Question

As there is a need to comply with current standards of care set by the ASA and to address the practice sites clinical need, this evidence-based project poses the following question:

In outpatient GI clinic staff, what is the impact of implementing the STOP-BANG questionnaire compared to current practice on stress perception over 8 weeks?

Summary

As obesity continues to be a growing concern, comorbidities like OSA must be addressed. An evidence-based tool, such as the STOP-BANG questionnaire, has proven cost-effective and increased productivity. The STOP-BANG questionnaire's application is substantial for a free-standing endoscopy center with a limited budget and resources. Also, a strategy for difficult airway mitigation will be a start for looking into other ways to improve teamwork and stress among staff. Moreover, the next chapter will discuss the evidence and best practices gathered from the comprehensive literature review.

Chapter 2

Literature Review

Introduction

This chapter discusses the methods used to review the literature for this evidence-based practice (EBP) Doctor of Nursing Practice (DNP) project and critical appraisal of the supporting evidence. The theoretical framework used to guide the EBP will also be addressed. Moreover, the literature on assessment for undiagnosed obstructive sleep apnea (OSA) before anesthesia was comprehensive and extensive. Common themes emerged from the literature review, including perceived stress, work-related stress, and evidence-based practice. Some subthemes appeared: stress response, coping strategies, stress level, Perceived Stress Scale (PSS), STOP-BANG questionnaire, procedural safety, airway management, and OSA prediction. Furthermore, the evidence supported using the STOP-BANG questionnaire before an anesthetic to measure a patient's risk for airway compromise during the perioperative period. This synthesis of evidence appraised the strengths, weaknesses, gaps, and limitations while addressing the theoretical foundations that will support this DNP project.

Evidence Search

A thorough literature and information search was conducted using computer-based databases. Boolean combinations included undiagnosed obstructive sleep apnea, STOP-BANG, preoperative STOP-BANG questionnaire, emergency airway prevention, sedation, airway obstruction, airway emergencies, provider stress, perceived stress, perceived stress survey-10, and perceived stress among healthcare providers. Hawaii Pacific University (HPU) Library databases and database systems were used for the evidence search. These databases included Medline, PubMed, CINAHL, PsycNet, and Cochrane Systematic Review Registry. External and internal evidence was evaluated for this DNP project. Both external and internal evidence were narrowed and focused on STOP-BANG questionnaire and perceived stress, respectively. Also, internal evidence was narrowed down and focused on STOP-BANG questionnaire concerning anesthesia and surgical procedures. Search parameters included the years 2020 through 2024.

External Evidence

Perceived and work-related stress have evidence or research which is strongly supported externally. Although stress is defined differently depending on the person and setting, work-related and perceived stress have been linked to the intensity of the work involved and the unpredictability and helplessness related to the situation (Bastian et al., 2020; Lukan et al., 2022). Mitigating perceived and work-related stress is generally discussed in the evidence by using mindfulness or relaxation techniques, having management and team support, and having predictability during hours of work (Catapano et al., 2023; Singh et al., 2021). Moreover, this DNP project focuses on healthcare workers, and the external evidence supports creating a work environment that adds predictability and support (Catapano et al., 2023). Adding the STOP-BANG questionnaire to the workflow and emergency airway teaching is vital to adding support and predictability. Also, the PSS-10 has been used to measure perceived stress internationally and is a valid tool in varied settings (Engelbrecht, 2022; Mozumder et al., 2022; Tsegaye et al., 2022).

External evidence from STOP-BANG questionnaire articles provided contemporary evidence on sleep disorders and tools for diagnosing sleep disorders such as obstructive sleep apnea. Dr. Frances Chung, a professor of anesthesiology, originally developed the STOP-BANG questionnaire. Dr. Chung's work has inspired using the STOP-BANG questionnaire to predict undiagnosed OSA. Additionally, this tool is valuable due to the ability to be administered quickly in a preoperative setting without invasive monitors (Deslate et al., 2021; Jones et al., 2022; Patel et al., 2022). Studies have illustrated the reliability and validity of the STOP-BANG questionnaire and compared its effectiveness to more definitive diagnostic tools such as polysomnography, which is considered the gold standard for diagnosing sleep disorders (Butris et al., 2023; Carr et al., 2020; Hwang et al., 2022; Wang et al., 2022). Evidence demonstrates polysomnography to have sensitivity rate of approximately 96%; the STOP-BANG questionnaire has proven to be a reliable tool for noting undiagnosed OSA and preventing perioperative adverse airway events (Bilge et al., 2022; Carr et al., 2020; Jones et al., 2022). Studies continue to show the effectiveness of the STOP-BANG questionnaire as a practical and effective tool for perioperative clinical settings (Arslan et al., 2020; Bray & Knapp, 2021). The external evidence supports the need to implement the STOP-BANG questionnaire for this DNP evidence-based project.

Internal Evidence

The Centers for Medicare and Medicaid Services (CMS) support diagnostic measures to detect OSA and continuous positive airway pressure (CPAP) before surgery (CMS, 2009). The organization also supports using polysomnography as a diagnostic study for OSA. However, there is no specific guidance or mention of STOP-BANG questionnaire as an assessment tool for detecting OSA during the perioperative period (CMS, 2009). CMS guidelines are directed toward CPAP and overall health benefits and preventative measures for decreasing morbidity and mortality related to OSA (CMS, 2009).

Obstructive sleep apnea is a common sleep disorder, and the American Academy of Sleep Medicine (AASM) stresses the importance of diagnosing and managing (Durate et al., 2023). The AASM completed a cross-sectional study to compare OSA assessment tools to its 2017 OSA screening criteria (Duarte et al., 2023). Findings suggested that STOP-BANG questionnaire was versatile in many clinical areas and had a high sensitivity of around 89.6% for detecting OSA compared to AASM criteria, with a sensitivity of 40.6% (Duarte et al., 2023). STOP-BANG was recommended over AASM to assess OSA (Duarte et al., 2023). However, no parameters in this study singled out the STOP-BANG questionnaire, particularly for surgical patients (Duarte et al., 2023).

The American Society of Anesthesiologists (ASA) has no current standard of care for assessing OSA before surgery or procedures (ASA, 2010). However, there are basic standards of care for performing an airway assessment before anesthesia (ASA, 2020). Also, the ASA issued a newsletter evaluating and supporting the research done by Dr. Frances Chung on STOP-BANG questionnaire. This newsletter referred to Dr. Chung's findings and suggestions for screening patients before procedures for OSA using the STOP-BANG questionnaire (Chung et al., 2008).

Jones et al. (2022) conducted a quasi-experimental quality improvement project that focused on using STOP-BANG questionnaire with a high-flow nasal cannula at 70 L/min for suspected OSA patients who scored greater than or equal to five in an endoscopy lab. The evidence demonstrated that STOP-BANG questionnaire was instrumental in detecting which patients needed further support during sedation and that adding or implementing high-flow oxygen decreases the need for airway maneuvers (Jones et al., 2020). Relevant to this DNP project, the evidence supported the need for STOP-BANG questionnaire as an assessment tool before clinical intervention or treatment plan (Jones et al., 2022).

The Occupational Safety and Health Administration (OSHA) notes the need to recognize work stress and individual safety related to stress (OSHA, 2024). The organization provides guidelines for companies to detect and mitigate work stress as needed (OSHA, 2024). Despite no discussion of how healthcare workers experienced stress, the American Psychological Association (APA) published and presented survey results on work and well-being (APA, 2021). The results indicated 40% of service and healthcare workers intended to leave their jobs due to stress (APA, 2021). The survey also correlated a lack of decision-making with work-related stress; 48% of healthcare professionals surveyed agreed that a lack of decision-making is a significant work-related stressor (APA, 2021). Ongoing and unrelenting stress has the potential to significantly impact healthcare institutions and the delivery of patient care.

A hospital-based cross-sectional study with a survey design measured perceived stress among nursing staff and discovered that 40% of nurses experienced a high level of stress (Antczak-Komoterska et al., 2023). The study also revealed that nurses in surgical settings were more likely to use psychoactive substances to cope with stress (Antczak-Komoterska et al., 2023). Furthermore, studies show that longer work hours and demanding work account for a high perceived stress scale score (PSS-10) among healthcare workers. This stress level was evident during the COVID-19 pandemic when virus rates and infection risk were high (Li et al., 2021). Job stress can be created by a lack of teamwork, clarity in the role, and lack of uncertainty (Younas & Khanum, 2024). The internal evidence added clarity to the understanding of perceived stress and STOP-BANG questionnaire. This evidence in relation to the clinical area brings forth best practices pertinent to this EBP DNP project.

Methodology

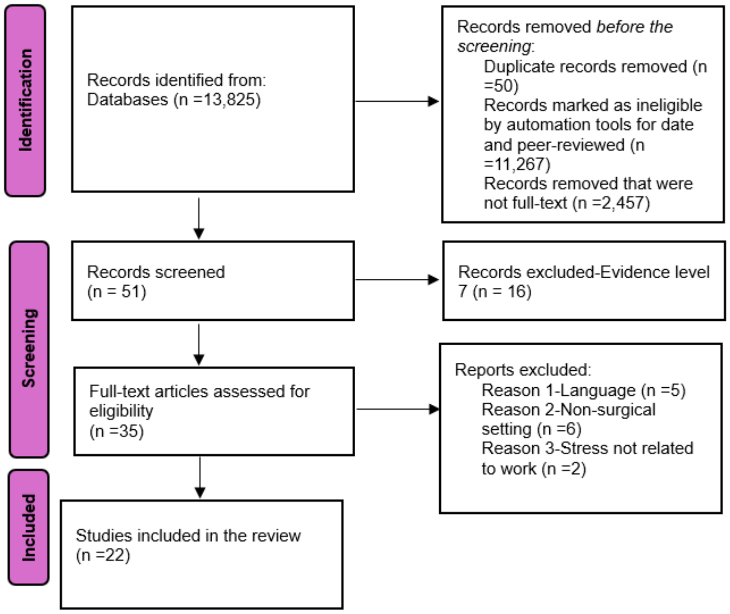
The literature review was comprehensive and detailed to search for contemporary information to solve the clinical gap at the practice site. A total of 13,825 articles were retrieved during the search using the previously mentioned Boolean combinations. The PRISMA guidelines were used for this literature review to guarantee transparency and reproducibility.

Parameters to narrow the search included dates between January 2020 and the current year of 2025, full-text articles, peer-reviewed journals, and English. Research methods that included randomized controlled trials, clinical trials, meta-analysis, cross-sectional studies, and systematic reviews were included in the literature review. Further inclusion criteria for STOP-BANG questionnaire literature were clinical-based, and articles focused on assessing patients and implementing STOP-BANG questionnaire in a clinical setting. Inclusion criteria for literature that represented perceived stress included using the perceived stress scale-10, studies focused on work-related stress, and articles focused on work-related stress for healthcare workers. Also, the Johns Hopkins Nursing EBP Research Evidence Appraisal Tool was utilized to assign a level of evidence to the literature (See Appendix A).

Exclusion criteria for the STOP-BANG questionnaire literature included articles that did not focus on clinical areas or interventions that used CPAP, surgical procedures, or medications. Exclusion criteria for literature on perceived stress included articles that focused mainly on individual stress in a home environment or perceived stress related to personal relationships. Moreover, after the inclusion and exclusion parameters were set, 22 articles were found to be fit for review. Figure 1 illustrates the PRISMA guidelines.

Figure 1

PRISMA diagram of literature search



Note: A summary of the literature and research articles retrieved and included in the literature review.

Synthesis of Evidence

Two major themes were evident in the literature. The first theme is perceived stress and work-related stress. The subthemes under perceived and work-related stress were stress response, coping strategies, stress level, and perceived stress scale. The second central theme found in the literature was evidence-based practice. The subthemes for evidence-based practice were STOP-BANG questionnaire, procedural safety, airway management, and OSA. These themes collectively illustrate the complexity of the challenges and opportunities in nursing care for patients undergoing endoscopic procedures and stress in the work environment.

Perceived Stress and Work-related Stress

The literature's central theme was perceived and work-related stress, which presented an overall understanding of stress relatable to healthcare workers, the central population in this DNP project. Perceived stress is measured and identified using the perceived stress survey (PSS-10), which measures a person's perception of how their life situations induce stress (Engelbrecht, 2022). Stress levels can be attributed to the frequency and significance of a person's challenges in life or work (Younas & Khanum, 2024). Stress response concerning work-related stress is evident in work performance and symptoms like depression and anxiety (Li et al., 2023). Coping strategies are essential for those with significant perceived stress and work-related stress levels and include actions of self-help and mindfulness (Li et al., 2023)

Stress Response. Stress response was a subtheme evident in the evidence, as studies showed a strong relationship between stress and cardiovascular disorders, mental acuity, and overall job performance and satisfaction (Antczak-Komoterska et al., 2023; Catapano et al., 2023; Lukan et al., 2022). Antczak-Komoterska et al., (2023) presented a cross-sectional study that measured stress levels among nursing staff using the perceived stress survey-10. The population that this study focuses on is like the population for this DNP project. Therefore, the insight into the methods and implementation in this study was helpful for this DNP project. However, the weakness of this study was that it was conducted in only two hospital departments, and the sample size was small. A strength of the research is that the PSS-10 tool demonstrates appropriate good reliability and validity.

Catapano et al., (2023) conducted a systematic review to reveal interventions for managing work-related stress. This systematic review focused on healthcare workers, similar to the population of this DNP project. The strength of this article is the evidence that was assessed and reviewed about stress exposure in the work environment. The internal validity was strong, and the study has good generalizability. The study's weakness is present because the investigators decided to use only correlational analysis, which did not give a complete understanding of all the data received (Lukan et al., 2022).

Coping Strategies. The evidence presented coping strategies as tools to combat or alleviate stress. Examples include meditation, direction from leadership, and feeling useful at work (Antczak-Komoterska et al., 2023). Moreover, preventing or mitigating stress can lead to a more productive worker and work environment (Antczak-Komoterska et al., 2023; Catapano et al., 2023). Best practices suggest that interventions to mitigate stress among workers include team support, mindfulness, support from leadership, and predictability in the workplace (Li et al., 2023; Younas & Khanum, 2024; Lukan et al., 2022). Younas and Khanum (2024) examined the role of stress concerning teamwork and decision-making. This study connects with this EBP DNP project because the project's development is based on teamwork as a defense against stress. The strength of the article is that the assessment tool used was the PSS-10, which has been demonstrated to have established validity and reliability metrics. One limitation mentioned in the study was its lack of generalizability due to the focus on a narrow population of physicians (Younas & Khanum, 2024). Antczak-Komoterska et al (2023) examined coping strategies among nursing staff experiencing stress. The strength of this study lies in its use of the Brief-COPE questionnaire, which has great validity. This study gives the investigator of this DNP project a good understanding of stress and stress mitigation.

Stress levels. The literature revealed stress levels are measured based on the individual's interpretation of stress (Singh et al., 2021). Stress is a subjective feeling and can come from daily interactions in or outside the work environment (Singh et al., 2021). The PSS-10 is used in literature to measure stress. Singh et al. (2021) measured stress levels in home health nurses. The information in this study is helpful because measuring perceived stress among nurses correlates with the information needed to implement this DNP project. Excellent internal reliability, as evidenced by the tools used to measure perceived stress and burnout, is the strength of this study (Singh et al., 2021). The study lacks generalizability due to focusing on only home health nurses, which can be a limitation.

Perceived Stress Scale Survey. The PSS-10 has been proven to be a valid and reliable instrument for measuring perceived stress and an adaptable tool in different languages and cultures (Bastianon et al., 2020; Engelbrecht, 2022). Furthermore, assessing perceived stress using the PSS-10 survey gives an understanding of the level of stress that a person is experiencing (Antczak-Komoterska et al., 2023). Bastianon et al., 2020 conducted a study to test the validity of the PSS-10 for the German population and migrants in Germany. The study is significant for this DNP project because it tests the validity of the PSS-10 and shows that the validity remains the same even when translated into a different language (Bastianon et al., 2020). The article mentioned the study’s sample size as a strength while discussing sample bias toward 1st generation German migrants due to their better understanding of the German language as known weakness (Bastian et al., 2020).

Engelbrecht, (2022) conducted a cross-sectional study examining the construct validity and reliability of the PSS-10 for nursing students in South Africa. This study is significant to the DNP project because it also tests the validity of the PSS-10 and is evidence that it is a strong tool to use to measure perceived stress. The study's strength is its large sample size; however, the setting is restricted to one university, which does not lend itself to generalizability (Engelbrecht, 2022). Furthermore, no studies looked at perceived stress among staff and patient airway integrity during the perioperative period. Therefore, this DNP project provides insight into these issues.

Evidence-Based Practice

The central theme of evidence-based practice (EBP) was discussed in the literature. Using the STOP-BANG questionnaire as a tool and provider awareness emerged as a combined subtheme in the literature as studies used evidence in the clinical area to use a valid tool to assess for undiagnosed OSA. Procedural safety is tied to EBP in the literature as a subtheme because most studies focused on improving procedural safety during the perioperative period. Airway management was a common subtheme discussed in the literature and ties in with EBP because researchers used interventions to correct or prevent airway obstruction or hypoxia. Obstructive sleep apnea prediction is a subtheme that applies to EBP because the evidence-based STOP-BANG tool was used in the studies to predict the possibility of airway obstruction in undiagnosed OSA patients.

STOP-BANG questionnaire. The evidence stressed the need to be aware of undiagnosed OSA and the need for a valid screening tool such as STOP-BANG (Bray & Knapp, 2021). Bray and Knapp (2021) conducted a retrospective study to see if the STOP-BANG questionnaire could predict airway complications during endoscopy procedures. This study ties in perfectly with the goals of this DNP project because this DNP project implemented the STOP-BANG protocol in an endoscopy center to improve patient care. The strength of this article is its internal validity and control over medical records. However, its weakness was that it was a retrospective study focusing on one clinical site in one patient care area.

Arslan et al., 2020 performed a cross-sectional study examining OSA screening tools and found that STOP-BANG questionnaire had a high sensitivity rating. This aids in giving validity to using the STOP-BANG questionnaire in this DNP project. The strength of this study is the large sample size. However, the study focused on patients admitted to the sleep clinic, which can represent diminished internal validity and lack of generalizability (Arslan et al., 2020). Moreover, more research was needed on the use of STOP-BANG in outpatient endoscopy centers

Procedural Safety. The literature stressed safety during the perioperative period and discussed OSA contributing to morbidity and mortality in surgical patients (Butris et al., 2023). Procedural safety is a major component of this DNP project and the reason for implementing the STOP-BANG questionnaire. Butris et al. (2023) performed a systematic review and meta-analysis to study risk factors of surgical sleep disturbances in surgical patients. The study found that the incidence of sleep disturbance was greater in surgical patients at about 60% over the general population (Butris et al., 2023). Also, the study revealed that postoperative sleep disturbance was higher among patients with a history of sleep disturbance (Butris et al., 2023). The research methods were the strength of this study, and the sample size was adequate. However, the study limitations were due to the use of only the Pittsburgh sleep quality index and did not include any other assessment tools (Butris et al., 2023). Also, the study limitations were due to the lack of variety in the surgical procedures that the patients had (Butris et al., 2023).

Airway Management. The literature stressed airway maneuvers, supplemental oxygen, emergency preparedness, and staff awareness as tools for airway management (Deslate et al., 2021; Jones et al., 2020). The subtheme of airway management correlates with the DNP project because the healthcare staff at the endoscopy center will be taught concepts in airway management to mitigate adverse airway events. Deslate et al. (2021) examined the STOP-BANG questionnaire as a preprocedural risk assessment tool to predict intraprocedural adverse events and the use of airway maneuvers. This was an experimental quality improvement project with a small sample size, which was a limiting factor for this type of evidence. However, this study's strength came from using the reliable STOP-BANG questionnaire as an assessment tool for OSA and the ability of the quality improvement project to be reproducible in a clinical area (Deslate et al., 2021). Jones et al., 2020 completed an experimental quality improvement project to decrease the incidence of hypoxia and airway maneuvers during endoscopy procedures. This project can also be reproducible as a quality improvement project. However, the limitations of the study are the small sample size due to the rise in COVID-19 patients and the inability to use high-flow oxygen once the incidence of COVID-19 started to increase (Jones et al., 2020).

Obstructive Sleep Apnea. The studies that support the STOP-BANG questionnaire often mention using an accessible, effective, and easy tool for OSA prediction (Bilge et al., 2022; Bray & Knapp, 2021). Bilge et al. (2022) completed a study using STOP-BANG questionnaire and other difficult airway determinants to predict difficult airways. This study supports the DNP project because predicting airway difficulty is important for patient safety, and finding a strong process and tool is essential. The strength of this study is its population and demographics. There were almost equal numbers of men and women represented in the study. However, the study's internal validity is challenged by the experience of anesthesia staff at only three years. There was an assumption of skill level rather than an attempt to measure skill level prior to participating in the research study. Bray and Knapp (2021) completed a retrospective study using a chart review method to identify predictors of airway complications during conscious sedation procedures. This study is useful for this DNP project because conscious sedation is given to the population of patients represented in this DNP project. The study's strength is found through utilizing the STOP-BANG questionnaire, which is a valid tool. The study's limitations were due to the lack of generalizability and the researchers did not account for comorbidities.

Theoretical Framework

Implementation science is the follow-through portion of an evidence-based project or research process (Presseau et al., 2022). The Knowledge-to-Action (KTA) framework was developed in 2006 by Dr. Ian Graham and associates and was created to help facilitate the transformation of knowledge into action (Graham et al., 2006). The KTA framework has two phases or cycles. The first phase is knowledge creation, which consists of knowledge inquiry, synthesis, and the products and tools needed to create knowledge. The second phase of the KTA framework is the action cycle (Xu et al., 2020). This phase comprises seven dynamic parts that may overlap: The first part is identifying the problem or determining the gap, which is comprised of finding a valid problem or research question. The second part is adapting knowledge, which means tailoring the knowledge to the current situation or circumstance. Thirdly, barriers to knowledge use are assessed, such as barriers that hinder knowledge uptake, so they can be dealt with early on. The fourth phase is selecting and implementing interventions. This phase is about promoting awareness about the implementation of knowledge. The fifth phase is the monitoring knowledge use phase. This phase is for deciding what is done with the knowledge and how it's going to be used. The sixth phase is evaluating outcomes to measure the impact of the knowledge. The seventh phase is sustaining knowledge use. This phase evaluates the knowledge's impact on the problem and assesses if more initial action is needed. (Graham et al., 2006; Presseau et al., 2022; Xu et al., 2020). Overall, the KTA framework is adaptable and flexible to use in most fields (Field et al., 2014)

The KTA framework was appropriate for this DNP project because the model provided guidance, organization, and an action plan for proper implementation. This DNP project aimed to measure perceived stress among healthcare workers in the endoscopy lab and implement the

STOP-BANG questionnaire to mitigate work-related stressors by improving patient safety. Each step of the KTA cycle was reflected in the DNP project.

KTA Action Cycle

Identifying the problem as the investigator for this DNP project led to the need to evaluate patients for undiagnosed OSA, improve teamwork, and decrease stress related to difficult airways. Adapting knowledge to the local field has led the investigator of this DNP project to an in-depth literature review to find evidence-based knowledge on STOP-BANG questionnaire and perceived stress that supported the needs of the endoscopy center. The barriers to the knowledge phase in this DNP project were identified as the staff's varied professional and educational levels. In addition, time was a barrier to knowledge use because the endoscopy center has limited time to process patients. The fourth or implementation phase was nine weeks long; the first week included the PSS-10 collection, emergency airway teaching, and the STOP-BANG questionnaire instruction.

During the monitoring phase, the investigator constantly monitored the staff and was available for questions or instruction. This was an effective way of monitoring knowledge, as represented by phase five in the KTA framework. As represented by phase six of the KTA framework, outcome evaluation used statistical methods and debriefing meetings with the staff to evaluate the outcomes. Lastly, knowledge sustainment was achieved by updating literature and best practices and continuing to evaluate if more action is needed.

Implementation

The evidence suggests that the STOP-BANG questionnaire is the best tool to assess undiagnosed OSA in the outpatient clinical area on the day of surgery (Butris et al., 2023). This DNP project used the STOP-BANG questionnaire before administering anesthesia to gather a risk assessment for possible perioperative airway compromise. The literature also suggests that high-flow oxygen decreases the need for airway maneuvers (Hung et al., 2022). However, the GI center cannot administer high-flow oxygen to patients. As a result, airway maneuvers were taught to the perioperative staff for use when the patient obstructs when the anesthesia provider is unavailable to assist.

The perceived stress survey-10 is adaptable to multiple settings in the clinical area (Bastionon et al., 2020). Therefore, the PSS-10 was integrated as a pre-and post-survey to measure the perceived stress among staff. Current literature suggests that other stress assessment tools should be used to assess stress, that stress levels can change within a given timeframe, and that a person can experience stress outside of the given time frame that was internally assessed. However, this DNP project had limited time and focused on determining perceived stress levels during the implementation phase.

Summary

This literature review examined the STOP-BANG questionnaire and perceived stress in depth. The information and evidence gathered in the literature search supported the DNP project. Primary themes and subthemes related to the mission of this DNP project and provided guidance for implementation. Furthermore, the next chapter will discuss the methods used for this DNP project.

Chapter 3

Methods

Introduction

The primary purpose of this evidence-based practice (EBP) project was to implement the STOP-BANG questionnaire to identify undiagnosed obstructive sleep apnea (OSA) patients who were present at the endoscopy center for a procedure. Furthermore, the aim of this project was to prepare for potential airway emergencies related to OSA patients, therefore decreasing the perceived stress levels of the clinical staff. The independent variable is the implementation of the STOP-BANG questionnaire, and the dependent variable is perceived stress. Moreover, this chapter will discuss the project's methods, study design, procedures, and instruments used to complete the project and maintain validity throughout the process.

PICOT Question

In outpatient gastrointestinal (GI) clinic staff, what is the impact of implementing the STOP-BANG questionnaire compared to current practice on stress perception over 8 weeks?

Study Design

This Doctor of Nursing (DNP) project is a single-site quantitative study with a pre- and post-intervention survey. One qualitative open-ended question was added to gain in-depth insight into the clinical staff’s thoughts prior to the project’s implementation phase and post-implementation. This study design was selected to provide a baseline of perceived stress and to analyze data to see if the implementation of the STOP-BANG questionnaire impacted perceived stress.

Participants

The inclusion criteria for this Doctor of Nursing Practice (DNP) project include adults 18 or older and South Loop Endoscopy and Wellness Center staff members. The exclusion criteria include staff members who do not wish to participate in the project. The staff population of the practice site comprises four medical assistants (MAs), five registered nurses (RNs), four gastroenterology lab technicians, and four certified registered nurse anesthetists (CRNAs). The total size of the population of the clinical staff is approximately seventeen staff members. The population is also comprised of full-time, part-time, and contracted staff on an as-needed basis. The STOP-BANG questionnaire will be administered by the nursing staff or medical assistants to every patient having a procedure. The principal investigator proactively recruited participants and secured informed consent before implementation. The recruitment strategy included in-person outreach, asking each staff member personally for their cooperation in the project after giving staff members information on the importance of recognizing undiagnosed OSA.

The primary investigator for this EBP DNP project obtained certification in biomedical research integrity from the Collaborative Institutional Training Initiative (CITI Program). The endoscopy center in the Urban Chicago area signed a memorandum of understanding (MOU) approving the project's implementation at the facility. The practice site had no internal review board (IRB) process. Therefore, IRB approval was obtained from Hawai'i Pacific University (HPU) (See Appendix B).

Data Collection Procedures

This EBP DNP project assessed and analyzed the perceived stress of clinical staff in response to implementing the STOP-BANG questionnaire (See Appendix C) and emergency airway instruction in a Chicago Urban area endoscopy center. Quantitative and qualitative data were obtained before and after implementing the STOP-BANG questionnaire to measure perceived stress among clinical staff and to gather information on the number of undiagnosed OSA patients identified using the STOP-BANG questionnaire. The implementation phase of this project lasted nine weeks, the time allotted for the DNP project. Major components of the implementation phase included consenting, educating the clinical staff on the STOP-BANG questionnaire, emergency airway instruction, a pre-implementation Perceived Stress Survey (PSS-10) (See Appendix D), implementing the STOP-BANG questionnaire, a post-implementation PSS-10, and debriefing sessions. During week one, clinical staff received a one-hour classroom session on using the STOP-BANG questionnaire, including a live patient assessment and evaluation demonstration. To help increase awareness, staff were instructed on the mechanics of airway obstruction related to sedation and obstructive sleep apnea. One-on-one instruction was offered to staff unable to attend group meetings or those requesting additional education.

The principal investigator reviewed each STOP-BANG assessment category and provided details on how to interview the patients. Staff was reminded to obtain numeric data, such as weight and hypertension data, from the history and physical located in the chart to decrease assessment time. Also, a volunteer staff member was used as a model to do a mock STOP-BANG assessment. Handouts and reference tools were provided to enhance and facilitate the instruction on airway maneuvers used to support patients' airways during the perioperative period (Day, 2022) (See Appendix E). Furthermore, perceived stress was measured before implementing the STOP-BANG questionnaire using the PSS-10.

The STOP-BANG questionnaire was used to guide the staff and alert the anesthesia staff of a potential patient who might be at risk for airway compromise due to possible obstructive sleep apnea (OSA) (Jones et al., 2022). Moreover, the registered nurses (RNs) and medical assistants (MAs) assessed each patient. Staff obtained a STOP-BANG score, with 0-2 being low risk, 3-4 being intermediate risk, and 5-8 being high risk for OSA (Deslate et al., 2021). A patient identification code, a confidential patient identifier, and the date were written on the top left-hand corner of the STOP-BANG questionnaire form. After being alerted to the possibility of an adverse airway event, the anesthesia staff ensured that the patient was appropriate for outpatient sedation, assessed the patient before entering the procedure room, and ensured that emergency airway equipment was readily available.

Initial and post-implementation surveys from the PSS-10 and STOP-BANG were placed in assigned locked drop boxes and collected weekly. Each staff member underwent an initial evaluation on the first day of implementation to ensure compliance and accuracy with the STOP-BANG questionnaire form, with additional instructions for collaborative assessments. The formative evaluation included reviewing the STOP-BANG questionnaire and patients' interviews to ensure that questions were asked and directed appropriately. A check-in and competency assessment was done during week four to determine if staff used the STOP-BANG questionnaire correctly. Staff were given a telephone number and email address, and could ask questions and give suggestions when the principal investigator was not onsite. Table 1 highlights the project timeline.

Table 1

Project Timeline

Component	Projected Completion Date
Poster Presentation/Project Proposal Defense	September 2024
Memorandum of Understanding Signed by Facility	October 2024
Request IRB Approval	November 2024
Recruitment/Education/Pre-PSS-10	January 2025-First Week
STOP-BANG Implementation/Data Collection	January 2025-February2025
Post-PSS-10/Debriefing	February 2025-Last day
Data Analysis	February 2025
Manuscript Development	October 2025-April 2025
Project Presentation & Defense	May 2025

The PSS-10 survey was administered to clinical staff to measure the extent to which life events are perceived as uncontrollable, unpredictable, and overwhelming. (Bastian et al., 2020). The PSS has been frequently tested and validated and is adaptable to different occupations, languages, and cultures (Mozumder, 2022). Literature has demonstrated Cronbach alpha score between 0.74-0.91, strengthening its reliability and validity (Bastianon et al., 2020).

STOP-BANG is a readily available and widely used preoperative obstructive sleep apnea (OSA) tool that has been proven to predict difficult bag-mask ventilation in patients with scores in the high-risk range (Bilge et al., 2022). The sensitivity of the STOP-BANG questionnaire ranges from 84% to 96% (Carr et al., 2020). Furthermore, STOP-BANG is preferred over other OSA assessment tools because this metric is easy to apply to patients and gathers information promptly (Bilge et al., 2022).

Statistical Analysis Plan

Data was collected at the beginning of the project using a brief, anonymous demographic questionnaire distributed alongside the initial administration of the Perceived Stress Scale (PSS-10). Participation in the demographic survey was voluntary, and all responses were kept confidential. Basic demographics such as job title, age, gender, and education level were sought after.

Data from staff and patient information was securely stored in the manager's office with double-lock protection, including a lock on the door and a lock on the Dropbox. Raw electronic data was encrypted on a flash drive and securely locked away. Participant confidentiality was maintained as direct identifying information was not collected.

Inferential statistics were used to give meaning to the final data. The Excel program was used to organize and analyze demographic data from the surveys and questionnaires. Due to the anticipated small clinical staff sample size in this EBP project, the Wilcoxon Signed-Rank test, a nonparametric test, was used to compare nonparametric or ranked data received from the two dependent samples of the pre- and post-implementation PSS-10 surveys (Lee, 2022). Qualitative data were received by asking an open-ended question on the STOP-BANG questionnaire, which was answered by the discharge nurse concerning the patients' perioperative course and possible interventions needed for airway support during the perioperative period. Furthermore, common themes were derived from qualitative data.

Possible Barriers to Implementation

Lack of motivation from the staff was a possible barrier. This was mitigated by stressing the importance of maintaining patient safety standards. Concerns about confidentiality were a possible barrier due to the collection of personal information from the clinical staff about their stress levels. However, during each project phase, the staff were assured that the surveys would be locked and secured without direct identifiers. Clinical staff used their mother's maiden name, initials, and last four digits of their phone numbers for the PSS-10 to ensure confidentiality.

Time constraints and production pressure were evident in the daily work environment in the endoscopy lab. The primary investigator assisted with the initial STOP-BANG questionnaires for the first few days until proficiency was reached. However, to prevent gaps in education, a superuser was identified to educate staff on the use of the STOP-BANG questionnaire in the absence of the primary investigator. The superuser will provide a continuum in the quality of the assessment that staff members are expected to perform. Furthermore, the varying skill levels of clinical staff were mitigated by spending extra time with staff who needed it.

Sustainment

Sustainment was evident by the endoscopy center's administration's complete buy-in. Data from the EBP project, which demonstrated the need to assess undiagnosed OSA patients to ensure patient safety, was used to influence sustainment among the clinical staff. This EBP project is cost-effective, and the STOP-BANG questionnaire can be converted to digital form for the electronic health record (EHR). Also, the administration was informed that the American Society of Anesthesiologists follows the standard of care for assessing for undiagnosed OSA (Wang et al., 2022). In addition, the STOP-BANG questionnaire is also quick and cost-effective, which is ideal for an endoscopy center with a limited budget (Bray & Knapp, 2021).

Resources

For the successful implementation of this DNP project, minimal resources were needed. The principal investigator provided printing paper, office materials, and software needed to produce the questionnaires and surveys. Equipment related to measurable data needed to complete the STOP-BANG questionnaire is already part of the inventory in the endoscopy center.

Summary

This chapter describes the methodology and processes used in this evidence-based practice Doctor of Nursing Practice (DNP) project. A single-site quantitative study with a pre- and post-survey design was the research method used to implement the STOP-BANG questionnaire and evaluate perceived stress among the staff. The Wilcoxon Signed-Rank test and Excel were the statistical tools used to describe and compare the data retrieved from the pre- and post-PSS-10 surveys. The following chapter will discuss the findings, results, and implications derived from the statistical analysis.

Chapter 4

Results

Introduction

The purpose of this Doctor of Nursing Practice (DNP) evidence-based project was to determine if participants' perceived stress improved post-implementation of the STOP-BANG questionnaire. The STOP-BANG questionnaire was defined as a tool used to screen and assess patients for undiagnosed obstructive sleep apnea (OSA), while perceived stress was described as an individual staff member's feeling of daily life stressors and measured by the Perceived Stress Scale (PSS-10). The clinical question aimed to investigate the relationship between the STOP-BANG questionnaire and perceived stress among staff at an endoscopy lab in an urban area in Chicago, Illinois. Additionally, this chapter presents the DNP project's results, utilizing inferential and descriptive statistics, which were organized and calculated using Excel software.

Description of Sample

This DNP project was implemented at a small endoscopy center in urban Chicago, Illinois. The participant group included 17 healthcare providers. Medical assistants (MAs) made up the largest group (n = 7; 40%), followed by technicians (n = 5; 30%), registered nurses (RNs) (n = 3; 20%), and certified registered nurse anesthetists (CRNAs) (n = 1; 10%). The majority of the staff completed the pre-PSS-10 survey (n = 11; 64.7%). The participant group experienced attrition, losing one staff member, and the post-PSS-10 surveys totaled 10 participants (n=10; 58.8%). All staff members participated in administering the STOP-BANG questionnaires and receiving instructions on airway maneuvers. Participants ranged in age from 22 to 60 years (M = 36.8). Overall, the group was predominantly female (n = 6; 60%), while males were considered a minority (n =4; 40%). The racial breakdown reveals an equal representation of Asians and

Hispanics, with both racial groups at (*n* =4; 40%) each, and Black or African American participants at (*n* = 2; 20%).

Staff who directly participated in patient care during the perioperative period were recruited for this DNP project. Each participant was presented with a brief explanation of the project's aim and purpose. Participants completed an informed consent form and voluntarily participated in the assessment of perceived stress and the implementation of the STOP-BANG questionnaire.

The response rate for completing the post-PSS-10 survey was 90.0%. One out of 11 participants did not complete the post-PSS-10 survey. This was due to one participant terminating their contract with the facility and their limited involvement in the project's implementation phase.

Patient Counts, Procedures, and STOP-BANG Questionnaires

The STOP-BANG questionnaire was administered to each patient having a procedure. 103 patients were assessed for undiagnosed obstructive sleep apnea (OSA) using the STOP-BANG questionnaire. There were approximately 171 cases during the eight-week implementation period. The rate of completion for the STOP-BANG questionnaires was 60%. STOP-BANG questionnaires were returned for 61 patients undergoing colonoscopies and 58 patients undergoing esophagogastroduodenoscopy (EGD). All staff were encouraged to complete the STOP-BANG questionnaire for each patient. Formative evaluation included point-of-care correction and explanation of the STOP-BANG assessment, as well as weekly audits of the STOP-BANG questionnaires.

Findings for STOP-BANG Questionnaires

Data obtained from the STOP-BANG questionnaire was analyzed using Excel. As shown in Table 2, the descriptive statistics indicated that the average STOP-BANG score for patients who underwent colonoscopy was 3.66, and the average body mass index (BMI) was 30.45. The average STOP-BANG score for EGD patients was 3.06, and the average BMI for EGD patients was 29.02. Airway management during the perioperative period was indicated by a yes for patients requiring a jaw thrust or chin lift. For patients with a colonoscopy, 40.98% (n = 25) required an airway maneuver, and 37.93% (n = 22) of EGD patients required an airway maneuver.

Table 2

Average BMI, Average STOP-BANG, and % of Airway Maneuvers Needed

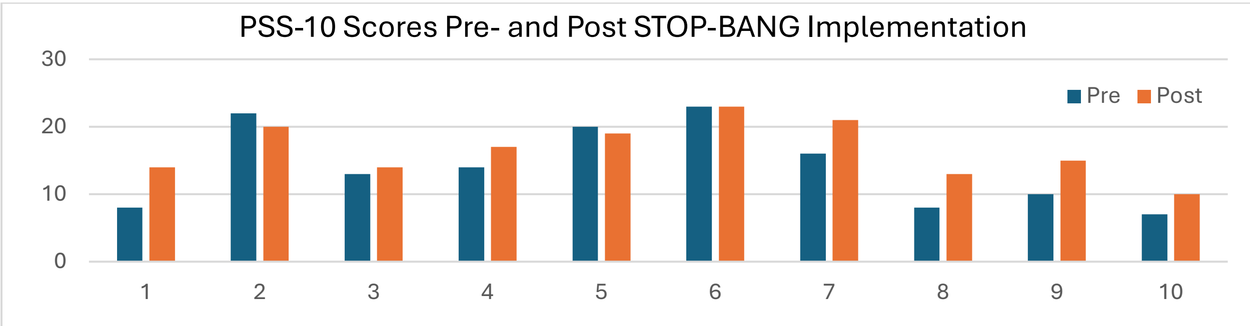
	Average BMI	Average STOP-BANG Score	% Airway Manuver Needed
EGD	29.02	3.06	37.93
Colonoscopy	30.45	3.66	40.98

Findings for PSS-10 Pre- and Post-Surveys

Data obtained from the pre- and post-PSS-10 surveys were compared and analyzed to determine whether there were significant changes in perceived stress after the implementation of the STOP-BANG questionnaire. Excel was used to apply descriptive statistics to the demographic data of subjects who participated in the pre- and post-PSS-10 surveys. Figure 1 illustrates pre- and post-PSS-10 scores. Most participants had increased PSS-10 scores based on ordinal data (n =7; 70%).

Figure 1

Perceived Stress After STOP-BANG Implementation



Note: Bar graph illustrates PSS-10 scores pre and post-implementation of STOP-BANG.

Categorical changes in stress levels (0- 13 = low stress; 14- 26 = moderate stress; 27- 40 = high perceived stress) were seen only among RNs and MAs. Implementing the STOP-BANG questionnaire led to two staff members having categorical increases in stress. Both staff members increased from low stress to moderate stress. All other staff positions had no categorical movement in any direction of perceived stress. Table 3 illustrates PSS-10 categorical changes.

Table 3

Demographics of Staff and Perceived Stress Survey-10 Results

Position	% of Staff	Category of Stress by Group	Number of Staff Moving from Low to Moderate Stress
RN	20	Low/Moderate Stress	1
CRNA	10	Moderate Stress	0
MA	40	Low/Moderate Stress	1
TECH	30	Moderate Stress	0

Descriptive analysis showed that the mean pre-intervention score was lower (M = 13.9, SD = 5.72) than the post-survey mean score (M = 16.8, SD = 4.32). The Wilcoxon ranking test was used to compare the pre- and post-PSS-10 data due to nonparametric data with a small sample size (Lee, 2022). The QI Macros program was used to run the Wilcoxon ranking test. Wilcoxon Sign-Rank Test indicated that the mean post-survey ranks for the PSS-10 were statistically significantly higher than the pre-survey ranks ($W = 1.5$, $Z = -2.49$, $p = 0.012$). Notably, the results indicated increased perceived stress levels as represented by ordinal data. However, stress levels changed categorically at a low rate (n=2; 20%). Table 4 details the results of the Wilcoxon Signed-Rank test.

Table 4

Wilcoxon Signed-Rank Test (n = 10)

Descriptive Statistics

Group	N	Mean Score	Standard Deviation	Min	Max	25th Percentile	75th Percentile
Pre-Survey	10	13.90	5.72	7	23	8.50	19.00
Post-Survey	10	16.80	4.32	10	23	14.00	20.50

Ranks

	N	Mean Rank	Sum of Ranks
Negative Ranks	1a	4.0	1.0
Positive Ranks	8b	7.0	36.0
Ties	1c		

a. Posttest < Pretest

b. Posttest > Pretest

c. Posttest = Pretest

Test Statistics

Post test - Pretest	
Z (Critical Value)	-2.49
Asymptotic Significance (2-tailed)	0.012

Qualitative Data

An open-ended question was asked to assess staff members' thoughts on emergency airway preparedness in the endoscopy lab. Respondents were allowed to answer the question before and after implementing the STOP-BANG questionnaire. The question was, “How do you feel about emergency airway preparedness in the endoscopy lab?" This question aimed to understand the level of emergency airway preparedness and link the qualitative data with the quantitative PSS-10 scores. There were seven out of ten answers (*n* = 7; 70%) to the qualitative question before implementation, and three out of ten (*n=3*, 30%) responses to the qualitative question after implementation. The following themes were recognized:

Theme 1: “We are prepared”

Theme 2: “Training is needed and important”

Theme 1: We are prepared

The pre-PSS-10 survey revealed that the CRNA felt “confident and prepared” regarding airway emergency preparedness; however, the CRNA did not mention any aspects of team preparedness. This could be due to the training and knowledge of the CRNA about airway management. One nurse responded to the open-ended question during pre-implementation of STOP-BANG and stated, “In regard to our center and current employees, I feel that we all have been trained and have the correct instruments and materials to be prepared in an emergency airway situation.” Additionally, one technician responded to the open-ended question before the STOP-BANG implementation and stated, “I feel that the staff is prepared mentally and physically in the endoscopy lab, based on a past procedure that went well due to being prepared.” There were no technicians who responded to the qualitative question post-implementation of the STOP-BANG questionnaire.

Theme 2: Training is needed and important

All medical assistants responded to the qualitative question prior to the implementation of the STOP-BANG questionnaire at a 100% response rate. The statements from the medical assistants are as follows: “It’s always good to have something ready, just in case of an emergency,” and “Emergency airway preparedness in the endoscopy lab is very essential.” Having the right tools and trained staff ready to quickly respond is important to prevent complications.” Also, “at our clinic, it would be extremely important, especially since the matter would be life or death.” One technician only responded in one word, “good.” The response rate among medical assistants to the qualitative question following the implementation of the STOP-BANG questionnaire was 75%. Those respondents stated that, “it is very important to be prepared to avoid disasters that cause multiple problems,” and that, “this is important to make sure that the patient is the most safe during their procedure. Having the right equipment and training on how to prepare is essential.” In addition, one medical assistant gave a two-word answer that stated, “needed that.”

Summary

Descriptive and inferential statistics were collected to assess the pre- and post-implementation of the STOP-BANG questionnaire. The quantitative and qualitative data from the PSS-10 survey indicated an increase in perceived stress-10 scores among most participants. Mean stress scores were higher post-implementation, suggesting a potential relationship between the screening process and increased awareness of airway risks. Chapter 5 will provide further analysis and a summary of the entire quality improvement project, discuss implications, and propose recommendations.

Chapter 5

Discussion

Introduction

This evidence-based project (EBP) investigated the perceived stress among endoscopy lab staff regarding airway management and identifying undiagnosed obstructive sleep apnea (OSA) patients during the perioperative period. Evidence found in the literature review suggests patients with moderate to severe OSA are undiagnosed at a rate of 80% and have a three to five-fold increase in morbidity and mortality (Deslate et al., 2021). Moreover, this chapter will discuss the results of this project, as well as its implications, strengths, limitations, and recommendations. The Knowledge to Action (KTA) framework was used to discuss the findings of this project.

The project aimed to decrease perceived stress among staff members by implementing the STOP-BANG questionnaire to identify patients with undiagnosed OSA and improve confidence in airway management during the perioperative period. The findings did not support the project's intended outcome of decreased stress levels. Rather, ordinal data represented increased stress levels with a pre-implementation mean score of 13.9 and a post-implementation PSS-10 mean score of 16.8. 70% of staff had no categorical change in perceived stress levels.

Implications of Findings

This project aimed to measure the degree to which the implementation of the STOP-BANG questionnaire impacts perceived stress among staff. Airway maneuver instruction and the implementation of the STOP-BANG questionnaire did not have a positive impact on decreasing staff's perceived stress. The findings regarding the need for airway maneuvers in patients with a score of three or higher were consistent with the existing literature (Deslate et al., 2021). The average STOP-BANG score for the patients in this project was greater than 3.0, and airway maneuver requirements were approximately 40% (*n* = 41).

The STOP-BANG questionnaire sheds light on the number of possible undiagnosed OSA patients and the need to use airway maneuvers to facilitate patent airways during the perioperative period. These findings enhance patient safety by adding a component to the airway assessment, preventing adverse events. Along with improved patient safety measures, the STOP-BANG questionnaire can reduce costs by helping improve patient satisfaction by limiting adverse events and preventing malpractice lawsuits.

Increased awareness of at-risk patients and airway emergencies may lead to high perceived risk, which translates to increased perceived stress scores due to enhanced knowledge (Singh et al., 2021). This could be due to the lack of a tool that measures perceived stress concerning the work environment. The PSS-10 measures stressful life events, and the survey questions are not directly related to work events but general life events (Mozumder, 2022). However, the qualitative question regarding staff members' views on airway management before and after STOP-BANG implementation indicated that they had a favorable view of the topic and considered it essential to learn.

KTA Framework

The KTA Framework guided this Doctor of Nursing Practice (DNP) project and was utilized to maintain organization and momentum throughout the project. Beginning with the knowledge creation process, the literature review highlighted the need to identify undiagnosed OSA supporting knowledge inquiry (Bilge et al., 2022; Bray & Knapp, 2021). Knowledge synthesis was supported by implementing the STOP-BANG questionnaire, addressing the need to identify undiagnosed OSA patients, and measuring perceived stress levels among staff. Furthermore, knowledge tools included instruction on airway maneuvers and STOP-BANG (Chung et al., 2008). Instruction did not have the intended impact on perceived stress due to the clinic's scheduling processes for procedures, resulting in informal education sessions to capture participants.

The action cycle of the KTA Framework was a key component that significantly impacted the results. The lack of full-time staff and limited time to complete tasks during the implementation phase could have led to perceived stress levels traversing in an undesired direction rather than demonstrating improvement through increased teamwork, as discovered in the literature (Younas & Khanum, 2024). Further studies with a targeted questionnaire are needed to evaluate if the rate of required airway maneuvers correlates with staff stress levels.

Limitations and Strengths

Threats to internal validity in this study were due to confounding variables. These variables included general life stressors that the subjects could have experienced during the pre- and post-PSS-10 surveys, lack of full-time staff, resignation of staff, and limited time for work-related tasks. There is a possibility that the PSS-10 survey results are not directly connected to implementing the STOP-BANG questionnaire. The PSS-10 measures life stressors in general and does not distinguish stressful events. As a result, the PSS-10 pre- and post-scores in this project reflect perceived stress in general and cannot deduce the root cause of the stressors. Additionally, the STOP-BANG questionnaires and PSS-10 were administered on paper and collected by hand. Therefore, the lack of electronic data collection from subjects created room for attrition and calculation errors. The small sample size and specialty area of medicine limited the project's generalizability to other outpatient facilities. However, no studies were found during the literature search that studied perceived stress among staff in an endoscopy center setting, which can be seen as a strength of this study. This unique, evidence-based project can be referenced and duplicated to improve patient safety and analyze perceived stress at other outpatient endoscopy centers.

Moreover, this study's strengths were related to using two validated tools. The STOP-BANG questionnaire and the PSS-10 are validated tools with documented validity and reliability. Additionally, a strength of the study was the sample size of patients screened for undiagnosed OSA (n = 102). This sample size strengthens the internal validity of the data related to the STOP-BANG questionnaire. This evidence-based intervention could improve clinical decision-making by recognizing undiagnosed OSA patients and empowering staff members to make critical decisions on patient safety. Staff members were kept engaged in this project through periodic face-to-face questions and answering sessions with the primary investigator. Engagement was supported by real-time demonstration of airway maneuvers when patients required the intervention. Continued application of the STOP-BANG questionnaire will be encouraged by disseminating the information from this project, presenting the data that shows that a significant number of patients required airway maneuvers, and describing how continuing to identify high-risk patients will improve safety. The principal investigator will also assist with developing the STOP-BANG protocol and integrating the STOP-BANG questionnaire into the electronic medical record.

External Threats to Validity

The small sample size for staff participants (n =10) does not reflect the broader population of medical staff, causing result bias and limiting generalizability (Engelbrecht, 2022). Participant awareness of being studied may have altered typical behaviors, as demonstrated by the Hawthorne effect. Treatment variation could threaten external validity because the project did not consider whether the anesthesia provider gave additional pain meds or sedatives other than propofol during the procedure, which can lead to a more profound sedation and central apnea (Deslate et al., 2021). Also, the time limitation for this project decreased generalizability and would be more applicable to the population if the project were extended.

Recommendations for Implementation

The KTA framework was instrumental in implementing this DNP project and is a valuable framework for guiding the implementation of the STOP-BANG questionnaire in general practice within the endoscopy lab. The KTA framework should guide future implementation, and understanding knowledge creation should include collecting data via surveys with a quick response (QR) code or by using an electronic service like Survey Monkey. This will facilitate data collection and statistical computation accuracy and promote ease of use for participants. The adaptation of knowledge is also an area that could be improved with future implementation. Adapting to the need for clinical education in the endoscopy lab should include formal education classes outside of procedural hours. Staff members can focus on educational material and learn as a group.

Cost Benefits

Work-related stress can negatively impact performance, decreasing productivity and ultimately increasing employer costs (Catapano et al., 2023). The reduction of adverse events, improved staff morale, education as a low-cost intervention, and enhanced skills that anticipate airway emergencies are cost-saving benefits of implementing and maintaining the STOP-BANG questionnaire as part of the typical workflow.

Barriers

Staff resistance to change was a barrier to this project, reducing the ability to learn new concepts. This barrier was managed by reaffirming the need for new strategies to improve patient safety. The lack of education time was also a significant barrier, making it challenging to teach uniformly and collectively. Mitigating the lack of education time included reinforcing STOP-BANG and airway maneuvers before the start of procedures and during procedures. A perceived increase in workload was a barrier that hindered progress during the implementation phase because staff members would focus on tasks that were already a part of the standard workflow and not fill out the STOP-BANG questionnaire. The principal investigator assisted staff members with tasks such as intravenous line (IV) insertion to decrease the workload. The principal investigator regularly assisted staff members with filling out the questionnaire and with interpreting the data received from the data to guide their practice and identification of undiagnosed OSA patients.

Facilitators

The facilitator for this project was the primary investigator. The primary investigator facilitated the implementation of the project by reinforcing the importance of identifying possible undiagnosed DNP patients. The primary investigator also instructed staff on using the STOP-BANG questionnaire by explaining the questionnaire and providing examples of how to conduct patient interviews to quickly and accurately retrieve information pertinent to the STOP-BANG questionnaire. Moreover, the change champion supported the project by supporting it and conveying to the staff his desire to implement the STOP-BANG questionnaire. However, complete staff compliance with the STOP-BANG questionnaire improved with staff members who are daily champions of STOP-BANG and its advantages for patient safety and staff awareness.

Recommendations for Future Practice, Policy, Education, and Research

This DNP project played a crucial role in raising awareness of workplace stress and the importance of airway management during the perioperative period. Patient safety and staff well-being were examined during this DNP project. Although there were no clear connections between the implementation of the STOP-BANG questionnaire and improvements in perceived stress in this study, it is known that work-related stress is prevalent among individuals who lack the knowledge to perform their jobs effectively (Catapano et al., 2023). Several recommendations are proposed for developing a more confident staff concerning airway management and identifying undiagnosed OSA.

Practice & Policy

Enhancing the work environment on a micro level can be achieved through increased education and knowledge among individual staff members. A motivated and engaged staff has the potential to contribute significantly to the development of a high-quality center that promotes evidence-based practice. At the meso level, introducing the STOP-BANG questionnaire is recommended as a practice change to improve the healthcare team's ability to identify high-risk patients. On a macro level, reductions in adverse events, improvements in safety measures, and increased patient and staff satisfaction are expected to result in overall cost savings for the institution.

Education

A quarterly or yearly skill assessment and skill development course should be implemented on a micro level, incorporating airway maneuvers. This will be a valuable tool to enhance staff knowledge, support teamwork, and boost staff confidence. On a meso-level, monthly staff meetings or newsletters can help facilitate education by evaluating and discussing newly implemented policies, such as the STOP-BANG assessment tool, and by using convenient computer-aided educational technology for staff to complete at any time.

Research

Further research is needed on a micro level to evaluate precisely the correlation between stress levels and airway events in the endoscopy center. Individual nurses can implement a quality improvement project focusing on a particular OSA or work-related stress aspect. After implementing the STOP-BANG questionnaire, additional research is needed at the meso level to identify the potential correlation between patient safety and staff retention. This could potentially support future projects that impact patient safety. Furthermore, macro-level research recommendations involve analyzing the relationship between primary care and the gastroenterologist to evaluate STOP-BANG before scheduling patients for an endoscopy. This research can explore the benefits of using STOP-BANG to encourage patients to get a formal sleep study to confirm or rule out a diagnosis of sleep apnea prior to their elective endoscopy procedure.

Summary

This DNP project was the first for this facility and is expected to catalyze future evidence-based projects. Patient safety and staff wellness were addressed with this project, highlighting the need to acknowledge that patient safety can impact staff members' wellness. Furthermore, this project yielded evidence that correlated evidence-based OSA screening and education on airway management to higher levels of perceived stress among staff. However, the implementation of the STOP-BANG questionnaire identified high-risk undiagnosed OSA patients, which is an avenue towards improving patient safety. These findings underscore the need for further research and attention to this subject matter. This DNP project and its findings will be disseminated to stakeholders at the endoscopy center. The primary investigator plans to disseminate these findings through oral and poster presentations at the midyear assembly for the Chicago Society of Gastroenterology Nurses and Associates.

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Appendix A

Johns Hopkins Nursing EBP Research Evidence Appraisal Tool

Evidence Table Synthesis of the Literature				
Article number	Author(s), date	Evidence Type	Findings that help answer the EBP question	Evidence level and quality
1	Antczak-Komoterska et al., 2023	Hospital Based Cross-Sectional Study	Stress-related analysis	IV
2	Arslan et al., 2020	Cross-Sectional Study	Finding the best screening questionnaires	IV
3	Bastionon et al., 2020	Cohort Study	Validity of the PSS-10	IV
4	Bilge et al., 2022	Randomized Control Trial	Difficult airway prediction	I
5	Bray & Knapp	Retrospective Cohort Study	Difficult airway prediction	IV
6	Butris et al., 2023	Systematic review & meta-analysis	Risk factors in sleep disturbance for surgical patients	I
7	Carr et al., 2020	Cohort Study	Using STOP-BANG as a pre-anesthetic tool	IV
8	Catapano et al., 2023	Systematic review	Interventions for managing work-related stress	I
9	Deslate et al., 2021	Experimental Quality Improvement Project	STOP-BANG as a pre-procedure risk assessment tool	V
10	Durate et al., 2023	Case-Control study	American Academy of Sleep Medicine criteria related to STOP-BANG	IV
11	Engelbrecht, 2022	Cross-Sectional study	Validity & Reliability of PSS-10	IV
12	Hung et al., 2022	Systematic review & meta-analysis	Interventions for OSA patients with high STOP-BANG scores in the endoscopy lab	I
13	Hwang et al., 2022	Systematic review & meta-analysis	Validation of STOP-BANG	I

14	Jones et al., 202	Experimental Quality Improvement Project	Decreasing the incidence of hypoxia during endoscopic procedures	V
15	Li et al., 2023	Randomized Control Trial	Work-related stress interventions	I
16	Lukan et al., 2022	Systematic review	Risk factors for stress in the work environment	I
17	Mozumder, 2022	Cohort study	Reliability & validity of PSS-10	IV
18	Patel et al., 2022	Systematic review	Validation of STOP-BANG for different populations	I
19	Singh et al., 2021	Cross-sectional study	Job satisfaction and perceived stress	IV
20	Tsegaye	Cross-sectional study	Construct validity and reliability of PSS-10	IV
21	Wang et al., 2022	Systematic review	Complications and screening of OSA patients	I
22	Younas & Khanum, 2024	Cross-sectional study	Understanding stress, uncertainty, and team support	IV

Appendix B

Institutional Review Board Approval

Hawai'i Pacific University
Institutional Review Board
Project Application

Please complete and submit the form to the IRB chair via email: to irbchair@hpu.edu

Study title: Implementing the STOP-BANG Assessment Tool to Impact Perceived Stress Among Clinical Staff

Investigator:

Name: Marino Robinson
(Please check one)
· Faculty ✓ Student · Outside Investigator

Phone: 312-536-9667

Email: mrobinson14@my.hpu.edu

Sponsoring HPU Faculty Member: Dr. Gabriel Beam, DNP, RN

~~**(if Investigator is not an HPU faculty member)**~~

Please attach a brief summary of the project. This should include an explicit statement of methods, data collection, and how confidentially of subjects/data will be protected including consent form.

Category for Review:

Check one level of review (Exempt, Expedited, Full) for which you believe the project qualifies, and each criterion that your project meets.

✓ **Expedited review (minor risk study)**

✓ Research and data collection methods are unlikely to elicit strong emotion and deception is not involved.

____ Research involves only noninvasive, painless, and non-disfiguring collection of physical samples, such as hair, sweat, excreta.

✓ No use of vulnerable subjects (children, prisoners, pregnant women, mentally ill, disabled, etc.).

____ Data are recorded using noninvasive, painless, and non-disfiguring sensors or equipment, such as EKG, weighing scales, voice/video recording.

____ Research involves only moderate levels of exercise in healthy volunteers.

✓ Research does not involve ingestion of drugs or use of hazardous devices.

✓ If existing data, documents, records, or specimens with identifiers are used, procedures are in place to ensure confidentiality.

✓ Informed consent process will be done (attach copy of informed consent form).

✓ Data will be kept confidential and not reported in identifiable fashion.

____ **Full review required (more than minor risk)**
Attach a statement that describes the use of vulnerable subjects or the study procedures and conditions that place subjects at risk. Describe the precautions that will be taken to minimize these risks. Attach a copy of the informed consent form that will be used.

Certification by Principal Investigator: The above represents a fair estimate of risks to human subjects.

Name/ Title/ Date Marino Robinson, MS, CRNA, APRN 10/31/2024

FOR IRB USE ONLY

Certification by IRB Chair: I have read this application and believe this research qualifies as:

____ Exempt from IRB review
X Appropriate for expedited review, and
  X approved
  ____ disapproved
____ Appropriate for review by the full IRB

11.27.2024

IRB Chair Date

#96042021 70

Appendix C

STOP-BANG Questionnaire

STOP BANG Questionnaire

Procedure: EGD Colonoscopy Flex Sig. EGD/Colonoscopy

Emergency Airway Intervention Needed? YES NO

Snoring: Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?

☐ Yes ☐ No

Tired: Do you often feel tired, fatigued, or sleepy during the day?

☐ Yes ☐ No

Observed: Has anyone observed that you stop breathing during your sleep?

☐ Yes ☐ No

Blood **p**ressure: Do you have or are you being treated for high blood pressure?

☐ Yes ☐ No

BMI more than 35 kg/m^2?

☐ Yes ☐ No

Age over 50 years?

☐ Yes ☐ No

Neck circumference greater than 40 cm?

☐ Yes ☐ No

Gender, male?

☐ Yes ☐ No

High risk of obstructive sleep apnea = answering "yes" to 3 or more questions
Low risk of obstructive sleep apnea = answering "yes" to less than 3 questions

Adapted from:
STOP Questionnaire: *A Tool to Screen Patients for Obstructive Sleep Apnea*
Frances Chung, F.R.C.P.C., Balaji Yegneswaran, M.B.B.S., Pu Liao, M.D., Sharon A. Chung, Ph.D., Santhira Vairavanthan, M.B.B.S., Sazzadul Islam, M.Sc., Ali Khajehdehi, M.D., Colin M. Shapiro, F.R.C.P.C.
Anesthesiology 2008; 108:812-21

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Appendix D

Perceived Stress Survey-10

PERCEIVED STRESS SCALE

The questions in this scale ask you about your feelings and thoughts during the last month. **In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.**

Date:________________

Initals of Mom's name & Last 4 of Telephone number:____________________(Use exact combination for the second survey)

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. In the last month, how often have you felt that things were going your way?	0	1	2	3	4
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
8. In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
9. In the last month, how often have you been angered because of things that were outside of your control?	0	1	2	3	4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

Appendix E

Airway Maneuvers Handout

Treatment for Airway Obstruction

- Awake patient
  - Elevate the head of the bed
  - Suction
  - Supplemental oxygen/monitor pulse ox
- Sedated patient
  - Head-tilt/chin-lift
  - Jaw thrust
  - Call for help/notify anesthesia provider if pulse ox does not improve
  - Follow BLS & ACLS protocols (Bag valve mask ventilation).

Airway Assessment (Obstructive Breathing)

- Chest Movement
  - Obstructive movement pattern “see-saw”
- Listen
  - High-pitch sound (Wheezing of laryngospasm)
  - Gurgling
  - No sound
  - Patient able to talk
- Tactile assessment
  - Feel for air movement by the nose and mouth

Airway Maneuvers

Day, K. (2022)

Appendix F

American Association of Colleges of Nursing Doctor of Nursing Practice Essentials

AACN DNP Essential	**Connection to the DNP Project**
1. Scientific Underpinning for Practice	Evidence on undiagnosed obstructive sleep apnea (OSA) supported the need for improved teamwork in airway management.
2. Organizational and Systems Leadership for Quality Improvement and System Thinking	Evaluation of the system's needs led to the development of the DNP quality improvement project, which implemented STOP-BANF to improve patient safety and teamwork.
3. Clinical Scholarship and Analytical Methods for Evidence-Based Practice	Statistical methods and tests were used to evaluate quantitative data from the perceived stress survey and STOP-BANG questionnaire.
4. Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Healthcare	Excel was used to run descriptive statistics and organize data retrieved from the STOP-BANG questionnaires and PSS-10.
5. Healthcare Policy for Advocacy in Healthcare	The implementation of the STOP-BANG questionnaire and instruction on airway maneuvers promoted advocacy for patient safety. Stakeholders were lobbied to change policy to incorporate STOP-BANG into the standard workflow.
6. Interprofessional Collaboration for Improving Patient and Population Health Outcomes	Each level of healthcare professionals was involved in the DNP project.
7. Clinical Prevention and Population Health for Improving the Nation’s Health	The DNP project focused on identifying possible undiagnosed OSA patients to improve patient safety.
8. Advanced Nursing Practice	The DNP student assessed the facility needs and developed the plan for the DNP project using the KTA framework. Additionally, the STOP-BANG questionnaire was implemented, and the PSS-10 was used to assess staff members' perceived stress.