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Referral Policy for Moderate to High-Risk Obstructive Sleep Apnea Patients Identified by the STOP-Bang Questionnaire: A Quality Improvement Project

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REFERRAL POLICY FOR MODERATE TO HIGH-RISK OBSTRUCTIVE SLEEP APNEA PATIENTS IDENTIFIED BY THE STOP-BANG QUESTIONNAIRE: A QUALITY IMPROVEMENT PROJECT

by

Martha Kate Goforth and Price Roberts

A Doctoral Project
Submitted to the Graduate School,
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at The University of Southern Mississippi
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Approved by:

Dr. Nina McLain, Committee Chair
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ABSTRACT

BACKGROUND: An increase in the prevalence of Obstructive Sleep Apnea is as high as 70% in the surgical population. OSA is associated with a higher incidence of complications in the perioperative setting showing the increased need for proper identification of moderate to high-risk patients for referral to local sleep clinics. Identifying and treating OSA is an important step to improve management of chronic diseases, decrease complications both inside and outside the perioperative setting, and reduce healthcare spending.

METHODS: The purpose of this project was to create an OSA referral program for patients undergoing general anesthesia at a hospital in Mississippi. The recommended OSA referral policy was a quality improvement project to improve the OSA referral process through policy development. The Modified Prisma 2009 Checklist of systematic review evaluation tool for quality in literature was used to analyze the recommendations in the creation of a recommended OSA referral policy. The referral program aimed to identify patients with a moderate to high-risk for OSA and refer them to local sleep medicine specialists for diagnostic testing. This project utilized a hospital located in Mississippi home to 400 inpatient beds, 18 operating rooms, and is a level II trauma center. The only accredited sleep disorder center in the State of Mississippi is located within the hospital. The sleep disorder center offers both inpatient and outpatient assessments as well as contains certified staff experts in sleep disorder medicine.

INTERVENTION: A systematic review of best practices was performed to recommend the creation of a policy for the referral of patients to local sleep clinics based on preoperative STOP-Bang Questionnaire scores. With the creation of a policy,

undiagnosed OSA patients are more likely to be identified and properly treated with referral to local sleep clinics.

CONCLUSIONS: With the use of the STOP-Bang Questionnaire in place at a hospital in Mississippi, a coinciding referral policy does not currently exist for patients scoring ≥ 3 for referral to an accredited sleep center. The increased perioperative risks associated with undiagnosed and untreated OSA raises concern to support a referral policy. The increase in the referral of patients with moderate to high-risk for OSA can aid in decreasing perioperative risk and increasing the overall health status of patients.

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS

AHI	Apnea-Hypopnea Index
BMI	Body Mass Index
CPAP	Continuous Positive Airway Pressure
DNP	Doctor of Nursing Practice
OSA	Obstructive Sleep Apnea
PAP	Positive Airway Pressure

CHAPTER I – INTRODUCTION

Problem Description

The surgical population has shown an increase in the prevalence of Obstructive Sleep Apnea (OSA), as high as 70%. OSA is associated with a higher incidence of complications in the perioperative setting showing the increased need for proper identification of moderate to high-risk patients for referral to local sleep clinics for proper evaluation, diagnosis, and treatment. Some of the risks threatening undiagnosed OSA patients in the perioperative period are hypoxia, hypertension, myocardial infarction, cardiac arrhythmias, as well as increased risk for difficult intubation (Nagappa et al., 2015). OSA patients have decreased chemoreceptor sensitivity to hypoxia and hypercarbia. Thus, many of the medications that CRNAs administer can compound the pathology already present in patients with OSA. In addition, the results could have deleterious effects if the anesthesia provider or as the patient is unaware that they have OSA. These considerations highlight the importance of identifying and treating OSA as an important step to improve management of chronic diseases, decrease complications, and reduce healthcare spending (Henrichs & Walsh, 2012).

Available Evidence

A literature search was performed to analyze best practice guidelines for an OSA referral program. A secondary search was done to explore the complications and health risks associated with undiagnosed sleep apnea. Several databases including CINAHL, Medline, Cochrane, Google Scholar, and PubMed were used to find relevant articles. The following search terms were used: *OSA, STOP-Bang, anesthesia, polysomnogram, and policy development.* The initial search had limitations of publication dates between

2013 and 2018. This search resulted in 138 articles of which 12 were selected based on their strong correlation to this project.

Obstructive Sleep Apnea

Obstructive Sleep Apnea is the cessation of breathing for more than 10 seconds during sleep due to an upper airway obstruction. The pharyngeal dilator muscles maintain pharyngeal patency. With sleep, these muscles relax causing the pharynx to close which in turn blocks airflow into the lungs (Hall, 2016; Hines & Marschall, 2017; Nagappa et al., 2015; Park, Ramar, & Olson, 2011). Loud snoring results due to the presence of respiratory effort with no airflow. Patients with OSA can have frequent episodes of apnea and hypopnea with sleep. Hypopnea is defined as the decrease in the quantity and size of breaths compared with normal ventilation in addition to some degree of arterial desaturation. Apnea is defined as the absence of spontaneous breathing due to pharyngeal airway collapse. The periods of apnea cause respiratory stimulation and sudden attempts to breath due to a decrease in the partial pressure of oxygen and an increase in the partial pressure of carbon dioxide. Periods of apnea commonly occur repeatedly throughout the night resulting in fragmented, restless sleep. The chronic sleep disturbances result in daytime somnolence and fatigue negatively affects the quality of life of a patient (Hall, 2016; Hines & Marschall, 2017). OSA is one of the most common types of sleep breathing disorders with the prevalence expected to increase due to a rise in the prevalence of obesity. It is estimated that 80-90% of patients with moderate to severe sleep apnea remain undiagnosed and without documentation at the time of surgery (Stundner, Opperer, & Memtsoudis, 2015).

Adverse Conditions with OSA

OSA is associated with comorbidities such as cardiovascular disease, hypertension, diabetes, cerebrovascular disease, congestive heart failure, stroke, gastroesophageal reflux disease, and neurocognitive changes (Hines & Marschall, 2017; Park et al., 2011). According to Park et al. (2011), the landmark study published in 2000 revealed OSA as an independent risk factor for hypertension. A group that investigated the effects of nocturnal continuous positive airway pressure in OSA patients had remarkable success in a 2009 landmark study. Remarkably, their evidence showed improved blood pressure control, even in the patients that presented with resistant hypertension. Another 10-year prospective landmark study that focused on untreated, moderate to severe OSA found that the odds of fatal and nonfatal cardiovascular events increased by 2.87 and 3.17, respectively (Park et al., 2011).

Undiagnosed OSA, as well as noncompliance with an OSA treatment regimen, has been recognized as one of the primary causes of hypoxemia and hypercarbia. The homeostatic imbalance of oxygen and carbon dioxide in addition to inefficient compensatory mechanisms poses many health risks. The low oxygen and high carbon dioxide concentrations lead to arousal through stimulation of the autonomic nervous system. Repeated, unnecessary stimulation of the autonomic nervous system has severe consequences. They include systemic hypertension, cardiac dysrhythmias, myocardial ischemia, pulmonary hypertension, and congestive heart failure. Additionally, prolonged alveolar hypoxia due to OSA hypoventilation and ventilation-perfusion mismatching leads to irreversible vasoconstriction and pulmonary hypertension (Hines & Marschall, 2017; Park et al., 2011).

Today, untreated OSA is recognized as an independent risk factor for the development of numerous comorbidities and an increased mortality rate. Park et al. (2011) emphasized that emerging data is now showing a positive correlation between OSA and stroke. Additionally, more supporting data has come to light regarding the effects of OSA on cognitive impairment, hypersomnolence, and fatigue. The development of diabetes and insulin resistance has also been shown to be two such comorbidities of which OSA is an independent risk factor for (Park et al., 2011; Stundner et al., 2015).

Measures to Evaluate OSA

The STOP-Bang Questionnaire is a quick, reliable, concise, and easy screening tool for OSA. The questionnaire has a high sensitivity and predictive probability for patients with moderate to severe OSA. Predictive probability means the patient who receives a positive result from the screening tool would also receive a positive diagnosis at a future analysis. Therefore, the higher the STOP-Bang score, the higher the likelihood of OSA. Sensitivity is the percentage of patients who have a positive STOP-Bang score and have a positive OSA diagnosis (Nagappa et al., 2015). The STOP-Bang Questionnaire gathers both qualitative and quantitative data from the patient through a series of eight questions. The questions are related to clinical features associated with sleep apnea such as snoring, tiredness, observed apnea, high blood pressure, BMI >35kg/m^2, age >50 years, neck circumference >40cm, and male gender. For each question, the patient states "yes" to they would receive one point and with each "no" zero points would be given. Patients scoring 0-2 are unlikely to have moderate to severe OSA. Patients receiving a score of 3-8 have a high probability of having moderate to

severe OSA (Chung, Abdullah, & Liao, 2016). The STOP-Bang Questionnaire is an easy tool for identifying high-risk OSA patients and can facilitate efficient allocation of high-risk category patients to sleep clinics for further diagnostic testing such as a polysomnogram (PSG) (Chung et al., 2016). A PSG is the gold standard diagnostic test for OSA (Kapur et al., 2017; Nagappa et al., 2015). The PSG is a direct measurement of sleep-disordered breathing and requires the recording of electroencephalogram, electrooculogram, chin electromyogram, nasal or oral airflow, oxygen saturation, respiratory effort, electrocardiogram, body position, and limb movement (Epstein et al., 2009). The frequency of obstructive events is reported as an apnea + hypopnea (AHI) index. The AHI index is the sum of apneas and hypopneas per hour of sleep. Apnea is defined as the absence of airflow for ≥10 seconds. Hypopnea is defined as decreased respiratory effort with a >4% oxygen desaturation. Diagnosis of OSA is confirmed by an AHI of >15 events/hour or >5 events/hour with the patient reporting daytime somnolence, waking up gasping for air or choking, fatigue, insomnia, and loud snoring with breathing interruptions. PSG had a sensitivity of 80% and a specificity of 97% in patients with an AHI greater than 15 (Epstein et al., 2009; Kapur et al., 2017).

Treatment of OSA

A number of front-line therapies are used in the treatment of OSA. These consist of positive airway pressure, surgery, mandibular advancement splints, positional therapy, weight loss, and hypoglossal nerve stimulation. One feature imperative to treatment is that OSA is the consequence of the interaction of several key qualities of upper airway anatomy and neuromuscular control. These qualities contribute to the fluctuating severity within individuals; however, each form of treatment currently available primarily targets

one trait. The first-line gold standard of treatment for OSA is a device that is capable of delivering continuous positive airway pressure (CPAP). This method of therapy is the only one that has been proven to effectively eliminate apnea as well as showing improvement with the many cardiovascular and metabolic consequences of OSA. First described by Sullivan in 1981, positive airway pressure (PAP) provides a so-called splint to the upper airway and thus contributes to a reduction in the AHI, promotes more continuous breathing and sleep (Epstein et al., 2009, Henrichs & Walsh, 2012; Hines & Marschall, 2017). Deacon, Jen, Li, and Malhotra (2016) described a study that demonstrated in patients with OSA, long-term use of prophylactic nasal CPAP following cardiac surgery improved arterial oxygenation and decreased the incidence of pneumonia, reintubation, and readmission to the intensive care unit postoperatively.

According to Epstein et al. (2009), OSA should be approached as a chronic disease requiring long-term, multidisciplinary management. The patient with OSA should be an active participant in the type of therapy selected as well as in the management of his or her comorbidities. One of the most effective behavioral treatment options is weight loss. Ideally, a reduction in BMI to 25 kg/m^2 has been shown to be the most beneficial amount of weight loss regarding OSA treatment options. Successful dietary weight loss in the obese patient can significantly improve their AHI score. Additionally, the new standard of first-line adjunct treatment strategies for OSA should be weight loss. Many sources agree that weight loss therapy alone is not an effective treatment for OSA (Deacon et al., 2016).

Several surgical procedures can relieve the physical obstruction, which is part of the naming scheme with this disease. One such surgical specialty is

uvulopalatopharyngoplasty, which is performed in adults. Another, which is performed on pediatric OSA patients is called adenotonsillectomy. Several methods of drug control intended to be used solely as an adjunctive therapy are useful in the treatment of OSA. According to Nagelhout and Plaus (2014), drug therapy is utilized to reduce daytime sleepiness, reduce cardiovascular complications, strengthen pharyngeal musculature, and increase REM (rapid eye movement) sleep, among other effects (Deacon et al., 2016; Nagelhout & Plaus, 2014).

Anesthetic Considerations of OSA

OSA is associated with an increased incidence of adverse perioperative outcomes with postoperative complications being a significant problem. Patients are at an increased risk of complications with anesthesia due to the negative physiologic effects of OSA as well as the effects of anesthetic agents and techniques (Henrichs & Walsh, 2012). OSA is an independent risk factor for difficult bag mask ventilation. OSA is linked with abnormal airway anatomy predisposing the patient to difficult laryngoscopy and bask mask ventilation. The pharyngeal dilator muscles in patients with OSA are more easily collapsible due to fat deposition around the pharynx and torso. The increased collapsibility causes the dilator muscles to be more susceptible to the depressing effects of anesthetic agents (Opperer et al., 2016). With all anesthetic agents diminishing pharyngeal dilator muscle tone, patients with OSA are at an increased risk for upper airway collapse and obstruction leading to hypoxemia, hypercapnia, respiratory failure, and possible inadvertent reintubation (Subramani et al., 2017; (Stundner et al., 2015). According to Nagappa, et al. (2017) and Opperer, et al. (2016), high-risk OSA patients are four times more likely to develop postoperative respiratory failure and are two to

three times more likely to experience postoperative cardiovascular complications such as cardiac arrhythmias, cardiac arrest, and shock. Patients with OSA have decreased arousal during emergence from anesthesia due to decreased chemoreceptor sensitivity to increased carbon dioxide levels. Therefore, higher carbon dioxide levels are required to stimulate respiratory effort. OSA is linked with an increased duration of hospitalization, with an average of a two day longer period of time, and inadvertent ICU admission due to perioperative adverse events (Opperer et al., 2016; Stundner et al., 2015; Subramani et al., 2017).

Rationale

With the increasing prevalence of undiagnosed OSA in the surgical population, implementation of OSA screening programs has been a focus of many recent OSA studies. The use of the STOP-Bang Questionnaire in the perioperative setting has shown to be beneficial in the identification of moderate to high-risk OSA. Patients scoring ≥3 on the STOP-Bang Questionnaire are deemed moderate to high-risk for OSA and anesthesia personnel must take proper precautions in order to minimize the risk of perioperative morbidity and mortality. With the proper identification of patients with undiagnosed OSA, anesthesia providers can better develop anesthesia and postoperative care plans to decrease the risk of complications and improve perioperative care. Another beneficial outcome of the identification of undiagnosed, moderate to high-risk OSA patients is the ability for anesthesia providers to refer suspected OSA patients to local sleep clinics postoperatively (Williams, Williams, Stanton, & Spence, 2017). In Williams et al. (2017), an OSA screening program was successfully implemented in an overseas military hospital in which an increased proportion of patients with moderate to

high-risk of OSA were identified in comparison to when the screening tool was not used in practice. From this study came a practice recommendation for anesthesia personnel to refer patients to sleep medicine specialists preoperatively or postoperatively to confirm the OSA diagnosis in order for the patient to initiate proper treatment (Williams et al., 2017).

Specific Aims

The purpose of this project was to create an OSA referral program for patients undergoing general anesthesia at a hospital in Mississippi. The referral program aimed to identify patients with a moderate to high-risk for OSA and refer them to local sleep medicine specialists for diagnostic testing. These patients are being identified from the implementation of the STOP-Bang Questionnaire. The STOP-Bang Questionnaire has been proven as an effective tool to identify patients that present with increased perioperative risks due to undiagnosed OSA (Chung et al., 2016; Williams et al., 2017). Patients with a STOP-Bang score ≥3 are at a moderate to high-risk for increased incidence of perioperative complications associated with OSA. After proper identification of patients with moderate to high-risk for OSA using the STOP-Bang Questionnaire, patients would be referred to a local sleep clinic for proper diagnostic testing. Untreated and undiagnosed OSA comes with a multitude of systemic effects which affect both quality of life and anesthesia care. Proper diagnosis with sleep studies and treatment of OSA would increase patient quality of life, overall health status, and decrease perioperative risks (Williams et al., 2017).

Summary

With the high prevalence of undiagnosed OSA and increased incidence of complications in the perioperative setting, identifying and treating OSA is crucial in order to improve the care of undiagnosed patients. The literature search outlined the best practice guidelines for an OSA referral program. Identifying moderate to high-risk OSA patients in the perioperative setting, with the use of the STOP-Bang Questionnaire, was shown to be advantageous. Patients scoring ≥3 on the STOP-Bang Questionnaire are deemed moderate to high-risk for OSA. Not only does the proper identification of undiagnosed patients allow anesthesia personnel to take the proper precautions to minimize perioperative complications but also allows the personnel to refer patients to local sleep clinics for diagnostic testing.

CHAPTER II – METHODS

Context

A hospital located in Mississippi is home to 400 inpatient beds, 18 operating rooms, and is a level II trauma center. The hospital is one of the largest medical systems and a major employer in the state of Mississippi. The hospital provides a multitude of surgical services such as abdominal, cancer, cardiovascular which includes open heart surgery, ENT, general, gynecological, gastrointestinal, orthopedic, laparoscopic, plastic, thoracic, urologic, pediatric, vascular, interventional radiology, and opthalmology. The only accredited sleep disorder center in the State of Mississippi is located within the hospital. The sleep disorder center offers both inpatient and outpatient assessments as well as contains certified staff experts in sleep disorder medicine.

Intervention

Elegantly crafted policies and procedures (P&P) are vital to the realization of a successful program. A key quality of all fruitful program policies is a clear and concise outline documenting ideal structure, necessary processes, and expected outcomes of the program. A common misnomer is that P&P are put in place solely to set boundaries and rules. However, ensuring compliance and managing risks is only a small piece of the pie. Thus, we recommend that a major theme during the policy creation process be directed towards evidence-based protocols and procedures that drive improvement. In effect, the creation of a policy model templated on the recommended best practice guidelines would ensure that the staff workers are amply qualified and capable of providing quality care and consistent good outcomes (Curley & Vitale, 2016).

A systematic review of best practices was performed to recommend the creation of a policy for the referral of patients to local sleep clinics based on preoperative STOP-Bang Questionnaire scores. The evidence supports undiagnosed OSA patients are at increased risk for the development of numerous comorbidities and at greater risk for complications from anesthesia perioperatively; therefore, proper identification and treatment is imperative. With the creation of a policy, undiagnosed OSA patients would be more likely to be identified and properly treated with referral to local sleep clinics.

Team members that must be involved with policy development are the preoperative and postoperative care unit nurse managers, the director of a local sleep clinic, a board-certified sleep medicine physician, anesthesia provider, discharge coordinator, and the information technology manager. In services must be provided for all personnel that would be affected by the implementation of the policy. Information given during the in-services should be compiled from the synthesis of literature performed. Preoperative and postoperative personnel must be educated on OSA, risks associated with undiagnosed OSA, STOP-Bang Questionnaire, and discharge instructions for patients receiving a referral to a local sleep clinic. In Appendix A, a form of the STOP-Bang Questionnaire can be found to utilize as the screening tool used by the preoperative nurses for identification of potential OSA patients. Any anesthesia provider requiring additional education on OSA can contact the chief nurse anesthetists or continuing education director for information. The information technology team must be educated on the chart changes that would be required with the implementation of the policy such as the STOP-Bang Questionnaire incorporated in the pre-operative assessment for pre-operative Registered Nurses, task created for anesthesia personnel if

patient receives a STOP-Bang score of 3 or more, order for a referral to local sleep clinic, and incorporation of discharge education in the required documentation for post-anesthesia care unit registered nurses. The discharge coordinator would require education on the information that needs to be added to discharge instructions and the proper tasks that must be fulfilled prior to successful discharge of the patient.

The policy must have directions and protocols for providers that are incorporated in the care of surgical patients. Preoperative registered nurses would perform the STOP-Bang Questionnaire and if the patient scores 3 or more on the questionnaire, the chart would be flagged. An anesthesia personnel must review the score and make a referral for sleep consultation or sleep studies at a local sleep clinic. Once the referral is made, post-anesthesia care unit registered nurses must educate the patient prior to discharge. Verbal education must be included in the discharge education and instructions. Printed materials must be provided to the patient about OSA, the risks involved with undiagnosed OSA, and instructions to contact the local sleep clinic which include the name of the board-certified sleep medicine physician, phone number, and location of the sleep clinic. Once verbal education and printed materials have been given to the patient, the nurse would document this in the patients' chart. Three days post-referral, a staff member from the local sleep clinic would contact the patient to inquire about scheduling an appointment for a sleep consultation or sleep studies if the patient has not been previously evaluated.

Measures

The recommended OSA referral policy was a quality improvement project to improve the OSA referral process through policy development. The impact of this project would be based on the adoption of methods stated above for successful creation of

the recommended OSA referral policy at a hospital in Mississippi. An executive summary of recommendations for the creation of the policy was presented to key stakeholders who could incorporate the suggested findings into the policy. A set of best practice guidelines for the facility's OSA referral policy was constructed after a thorough review of the evidence. If adopted, the recommended policy can be reviewed to inquire about how much of the information provided in this study was used, which would establish whether the recommendations stated above were incorporated in the policy created by the hospital in Mississippi.

Once implemented, an evaluation of outcomes of the recommended OSA referral policy in a 30 day, 6 month, and 1-year time frame should be performed. Such an evaluation would allow information to be gathered on whether the recommended OSA referral policy was successful in both the referral and identification of patients with OSA. Patient data should be collected based on the number of people referred and how many of the patients' referred completed a sleep consultation or study with the local sleep clinic. Data should also be collected on how many positive diagnoses of OSA versus how many negative diagnoses of OSA from the population of the surgical patients who were referred and completed the sleep consultation or studies.

All team members involved in the policy implementation should be interviewed post-implementation of the OSA referral policy in a 30-day, 6 months, and 1-year time frame. A questionnaire or survey should be administered in order to ensure staff happiness with the policy as well as if the staff has any recommendations for change to the policy. An evaluation form can be found in Appendix B for the evaluation of the outcomes and staff satisfaction of the recommended OSA referral policy. Dissemination

was delivering the recommended policy and executive summary documents to the anesthesia director at a hospital in Mississippi. Presentation of the project occurred at The University of Southern Mississippi Doctor in Nursing Practice (DNP) Scholarship Day in Fall 2018.

Analysis

The Modified Prisma 2009 Checklist of systematic review evaluation tool for quality in literature was used to analyze the recommendations in the creation of the recommended OSA referral policy at a hospital in Mississippi. The recommended policy underwent review using the PRISMA and evaluation by a panel of experts with experience in policy, administration, and patient care services using the survey in Appendix B. After the necessary changes to the recommended policy found during review and evaluation are made, the executive summary for the recommended policy was submitted.

Ethical Considerations

Current data suggests that upwards of 60-70% of patients with OSA remain undiagnosed. In order to receive a proper diagnosis, one must be referred to a diagnostic sleep lab where they would undergo polysomnography testing. As previously mentioned, all surgical patients presenting for operative services would receive screening for OSA in the form of the STOP-Bang questionnaire. An ethical consideration of this project is if we know how many patients remain undiagnosed as well as knowing the deleterious complications that can arise without treatment, then why do the non-surgical patients at the hospital not receive the same screening?

DNP Essentials

The Doctorate in Nursing Practice (DNP) Essentials outline the competencies that are central for all advanced nursing practice roles. With any doctorate level nursing project, the DNP Essentials must be met. A table located in Appendix C details how this project met the DNP Essentials.

Summary

The only accredited sleep disorder center in the State of Mississippi is located within the aforementioned hospital. However, the success of a quality referral program depends on more than just having a sleep clinic nearby. Elegantly crafted policies and procedures (P&P) are vital to the realization of a successful program. The recommended OSA referral policy was a quality improvement project to improve the OSA referral process through policy development. The evidence supports undiagnosed OSA patients are at increased risk for the development of numerous comorbidities and at greater risk for complications from anesthesia perioperatively; therefore, proper identification and treatment is imperative.

CHAPTER III - DISCUSSION

Summary

This project has shown an increased prevalence of OSA triggering the need for referral to an accredited sleep center for diagnostic testing and treatment. An example of the referral policy can be found in Appendix D. With the use of the STOP-BANG in place at a hospital in Mississippi, a coinciding referral policy currently does not exist for patients scoring ≥ 3 for referral to an accredited sleep center. The increased perioperative risks associated with undiagnosed and untreated OSA raises concern to support a referral policy. Not only would the increase in the referral of patients with moderate to high-risk for OSA aid in decreasing perioperative risk, but, also, increase the overall health status of the patient. As found in the evidence, undiagnosed and untreated OSA is associated with a multitude of significant comorbidities that are detrimental to a patients' overall health status.

A key strength to the project was the hospital in Mississippi houses the only accredited sleep disordered clinic in the State of Mississippi, which allowed an increase in the probability of positive outcomes with the creation of the recommended policy. In addition, this project fulfilled the recommendations of a referral policy made by multiple STOP-Bang Questionnaire studies as shown in the literature review. Furthermore, this project directly addressed the increasing population of undiagnosed and untreated OSA patients at high-risk for significant comorbidities that have an effect on and outside the perioperative period.

Interpretation

As the prevalence of undiagnosed OSA continues to increase with currently 60-70% of surgical patients remaining undiagnosed, the creation of a referral policy increases the number of patients referred to sleep centers which in turn leads to an increase in the diagnosis of OSA through sleep studies and a decrease in the prevalence of patients with undiagnosed OSA. With proper diagnosis comes proper treatment methods and an increase in the overall health status of patients. An increase in diagnosis and proper treatment also coincides with a decrease in the incidence of adverse perioperative outcomes, especially within the postoperative period. Patients with undiagnosed OSA are four to five times more likely to develop postoperative respiratory failure which can lead to inadvertent reintubation and ICU admission. Proper notification of diagnosis or high-risk for OSA allows the anesthesia personnel to alter the plan of care for the patient in order to provide preventative measures for adverse outcomes such as postoperative respiratory failure.

The creation of a referral policy impacts registered nurses in the pre-operative and post-operative settings, anesthesia personnel, and patients. Both preoperative and postoperative nurses would have a slight increase in paperwork requirements altering the preparation of the patient for surgery and discharge. With a positive STOP-Bang score, anesthesia personnel would alter the pre-operative assessment and have a slight increase in charting due to placing the order for referral to the local sleep clinic. The referral policy would aid in decreasing excessive recovery room times, decrease in the incidence of postoperative respiratory failure and, in turn, decrease in inadvertent reintubations, decrease in ICU admissions, and decrease in unexpected hospital admissions for

outpatient care. The local sleep center would have an increase in the number of patients due to a possible increase in the number of patients referred to the centers for testing.

Many costs and strategic trade-offs are associated with the recommended policy discussed in this paper. According to our current government administration, one of their highest priorities is quality health care. Additionally, emphasis is placed on quality by the Department of Health and Human Services (HHS) and the Centers for Medicare and Medicaid Services (CMS). The quality initiatives have been implemented by CMS to guarantee quality health care for Medicare Beneficiaries, which is accomplished through accountability that is reinforced by public disclosure. One such cost associated with OSA patient complications in the perioperative period is the additional use of oral airways in the operating room as well as the PACU. Additionally, these particular patients are requiring a nurse to patient ratio of 1:1, which inevitably causes increased spending as well as delays in care and/or a decline in the quality of said care. Evidence has shown that the implementation of the STOP-Bang Questionnaire in the perioperative period leads to improvement and easier access to quality-based healthcare programs. Thus, in a day and age where CMS reimbursement is becoming based on the quality, and not the quantity, of care, healthcare facilities literally cannot afford to ignore the evidence of OSA screening and referral to local sleep centers implementation that is discussed in this paper.

Limitations

With every new process or policy comes limitations. First, lack of buy-in by hospital administration and personnel due to the slight increase in workload for employees must be accounted for. With the knowledge of the increase in the work of

both registered nurses and anesthesia personnel, the paperwork and processes can be kept to a minimum. The utilization of leaders from both groups in the making of the processes would aid in positive buy-in by staff. Lack of patient or family involvement due to possible lack of referral follow up with the sleep clinic would be an obstacle that must be overcome in order for success of the policy. Within the recommended policy, a process to overcome this limitation involves a member from the local sleep clinic to contact the referred patient 3-4 days post-op to schedule an appointment for a sleep study. If an appointment is made, a phone call or text reminding the patient of the appointment should be made 24 hours prior. Relying on others for the success of the policy was a crucial limitation that must be addressed. This policy relies on the involvement of multiple staff members, including preoperative nursing staff, postoperative nursing staff, and anesthesia personnel, for success. After implementation, a member from the policy committee should conduct an evaluation in a 30 day, 6 month, and 1 year time period using the policy evaluation form that can be found in Appendix B. The evaluation should be completed to ensure staff satisfaction and assess for any adjustments to the policy that needs to be made. While only a minor limitation, time is still one to consider. This limitation must be accounted for in staffing budgets as well as leadership and in-service commitments, which must be available for a successful policy unveil. The time it takes to perform the questionnaire and referral must be factored into the perioperative period, so the additional time is not interpreted as a delay in care, but rather as a small price to pay for a significant increase in the quality of care.

Conclusions

When considering the current guidelines and reimbursement policies, the work explained in this paper is very useful and valuable, if implemented. The use of the STOP-Bang Questionnaire in the perioperative setting has been shown to be beneficial in the identification of moderate to high-risk OSA. Accordingly, proper identification of patients with undiagnosed OSA allows anesthesia providers to better develop perioperative care plans to decrease the risk of complications and improve perioperative care as well as refer suspected OSA patients to local sleep clinics postoperatively. With successful implementation of the referral policy within the perioperative setting, the consideration for implementation of both the STOP-Bang Questionnaire and OSA referral policy recommended in this project for all patient admissions should be made. The widespread use of these processes would further aid in decreasing the prevalence of patients with undiagnosed OSA in all patient settings. A potential for further study based on this project is to assess the number of patients referred and tested positive or negative for OSA based on the STOP-Bang Questionnaire. Not only would the study aid in assessing the success of the OSA referral policy, but also would assess the validity of the STOP-Bang Questionnaire as a method to properly identify patients with OSA. Another area for future study would be the writing of the referral policy based on the framework provided in this project along with the success of the implementation. After this project has been reviewed, a follow up on the implementation of the recommended referral policy should be made. After successful implementation, we suggest the application of the STOP-Bang Questionnaire and OSA referral policy for all patients admitted to the hospital.

STOP-Bang Questionnaire

- **S**noring ☐ YES ☐ NO
- **T**ired (Somnolence) ☐ YES ☐ NO
- **O**bserved Apnea ☐ YES ☐ NO
- **P**ressure (HTN) ☐ YES ☐ NO
- **B**MI (>35kg/m^2) ☐ YES ☐ NO
- **A**ge (>50 yrs old) ☐ YES ☐ NO
- **N**eck size (>40 cm/15.75in) ☐ YES ☐ NO
- **G**ender (Male?) ☐ YES ☐ NO

APPENDIX B – Policy Evaluation Form

Obstructive Sleep Apnea Referral Policy Evaluation Form

Date: _____

Position: _____

Department: _____

To what extent did the policy represent the following features:	Yes	Needs Work	No	Comments
Organized and easy to follow.				
Success in the referral of OSA patients.				
Success in the identification of OSA patients.				
Staff happiness with policy (increase in workload? Ease of administration? Any recommendations to better the policy?)				
Technology adequate and up to date with policy (any changes need to be made in charting system?)				
Overall improvement of the patient referral process				
Patient awareness and satisfaction (any improvements in patient safety?)				

APPENDIX C – Doctor of Nursing Practice Essentials

Doctor or Nursing Essentials	How the Essential is Achieved
I. Scientific Underpinning for Practice	This project employs current evidenced-based research concerning the STOP-Bang questionnaire and authenticates it through multiple studies.
II. Organizational and Systems Leadership for Quality Improvement and Systems Thinking	The objective of this project is to develop quality improvement policies for the OSA patient referral process.
III. Clinical Scholarship and Analytical Methods for Evidence-Based Practice	This essential was met by a synthesis of the literature. Investigative methods were used to incorporate desirable data as well as the elimination of undesirable data.
IV. Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care	The aim of this project is a practice change in CRNAs developed from a quality improvement project to improve the OSA patient referral process via complete policy development.
V. Health Care Policy for Advocacy in Health Care	This project has the potential to lead to better patient outcomes in surgical patients, as well as non-surgical patients if future projects aimed to expand upon our data and evidence.
VI. Interprofessional Collaboration for Improving Patient and Population Health Outcomes	This project takes advantage of effective communication and seamless patient transition between specialties in order to provide improved patient outcomes.
VII. Clinical Prevention and Population Health for Improving the Nation's Health	It was paramount during this project that patients with moderate to high-risk OSA be identified prior to receiving general anesthesia, in order to alleviate additional risks and poor outcomes associated with the current standards of care.
VIII. Advanced Nursing Practice	The advanced practice nurse is expected to complete a thorough analysis of the evidence as well as current standards. This project meets this essential through the presentation of the synthesized data.

APPENDIX D – OSA Referral Policy Example

Affected Departments

Anesthesia
Sleep Center
Same Day Surgery
Post-Anesthesia Care Unit

Purpose

The purpose of the policy is to refer patients to the sleep center who are at moderate to high-risk for Obstructive Sleep Apnea (OSA) based on the STOP-Bang Questionnaire assessment.

Policy

It is the policy to follow the below procedures for proper referral of patients to the sleep center within the surgical setting.

Procedure

A. The pre-operative evaluation of the patient by a Registered Nurse in Same Day Surgery or pre-operative holding area with appropriate documentation of the STOP-Bang Questionnaire and patients current knowledge of OSA.
B. With a score of ≥3 on the STOP-Bang Questionnaire, the pre-operative Registered Nurse must contact an anesthesia provider and document the anesthesia provider has been notified.
C. Upon notification, the anesthesia provider must review the chart, assess the patient, and make a referral for sleep consultation or sleep studies at the sleep center prior to the patient leaving same day surgery or the pre-operative holding area.
D. Once the referral has been made, the post-anesthesia care registered nurses must provide printed materials to the patient about OSA, the risks involved with undiagnosed OSA, and instructions to contact the local sleep clinic which include the name of the board-certified sleep medicine physician, phone number, and location of the sleep clinic.
E. Post-Anesthesia Care Unit registered nurses must document the proper education has been completed prior to discharge.
F. Three days post-referral, a staff member from the local sleep clinic must contact the patient to inquire about scheduling an appointment for a sleep consultation or sleep studies if the patient has not been previously evaluated.

Please Note:

The guidelines, procedures, or policies herein do not represent the only medically or legally acceptable approach, but rather are presented with the recognition that acceptable approaches exist. Deviations under appropriate circumstances do not represent a breach of medical standard of care.

APPENDIX E – IRB Approval Letter

ORI | Office of Research Integrity

THE UNIVERSITY OF SOUTHERN MISSISSIPPI.

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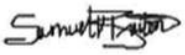
May 12, 2018

To Whom It May Concern,

I have reviewed the IRB Application of Price Roberts and Martha Kate Goforth ("Referral Policy for Moderate to High Risk Obstructive Sleep Apnea (OSA) Patients identified by the STOP-Bang Questionnaire: A Policy Analysis"), and I have determined that IRB review and approval of this project is not required, given the nature of the data to be used.

If you have question about this, please contact me.

Sincerely,



Sam Bruton, Director

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