Spring 4-13-2021

Implementation of a Perioperative Pathway for Individuals with or at High Risk for Obstructive Sleep Apnea

Kimberly Claude
kimberly.claude001@umb.edu

Implementation of a Perioperative Pathway for Individuals with or at High Risk for Obstructive Sleep Apnea

Kimberly R. Claude MSN, ANP-BC

College of Nursing and Health Science, University of Massachusetts Boston

April 13, 2021

Submitted in Partial Fulfillment of the Requirements for the Doctor of Nursing Practice Degree

Project Advisors

Faculty Advisor: Eileen Stuart-Shor PhD, ANP-BC, FAHA, FAAN

Site Advisor: Jessica Shanahan MD

Second Reader: Linda Curtin PhD, RN, CCRN

Abstract

Background Untreated obstructive sleep apnea (OSA) in the perioperative setting, especially in conjunction with medication that depresses respiratory drive, can lead to death. At the Veterans Affairs Boston, pre-operative screening for obstructive sleep apnea using the STOP-Bang questionnaire and referral to pulmonary service for those who fail screening is not reliably completed. For patients who have been identified as having OSA or are at high risk for OSA, advice on how to reduce postoperative risk may not be adequately communicated through the perioperative process. To provide safe, efficient and evidence-based care for our nation's veterans, implementing a perioperative clinical pathway for surgical patients with suspected or verified OSA is imperative. The project aim is to construct and implement a perioperative clinical pathway to ensure that all patients with OSA or suspected OSA receive evidence-based care through the perioperative period.

Methods The setting is a government healthcare facility which performs over 4900 surgeries per year. The intervention for this quality improvement project was an evidence-based perioperative clinical pathway which includes STOP-Bang screening and sleep study consult for high-risk individuals preoperatively with supportive care. The evaluation of the perioperative clinical pathway was via Plan-Do-Study-Act. Items measured included utilization of the perioperative pathway, preoperative referrals to pulmonary service, and improved communication throughout the perioperative services. Data was obtained from chart review, consult tracking and provider survey. Analysis included descriptive statistics. Ethics review included assurance that this was quality improvement and not human subjects research.

Results Four hundred thirty-seven surgical patients were included in this project. Post implementation of the OSA pathway, the majority of surgical patients were evaluated for OSA (84.4%) exceeding the benchmark of 80%. When compared to pre-implementation data, sleep study referrals doubled with the implementation of the perioperative pathway. Staff reported satisfaction with feasibility, value of care, self-efficacy, and interdisciplinary communication.

Conclusion Implementation of the perioperative OSA pathway increased screening of patients with OSA and at risk for OSA. Utilization of the perioperative pathway led to guideline concordant OSA care across the perioperative care trajectory, increased preoperative referrals to pulmonary, and improvement in communication between services. Clinician satisfaction with the perioperative pathway was high.

Keywords: obstructive sleep apnea, perioperative screening

Implementation of a Perioperative Pathway for Individuals with or at High Risk for Obstructive Sleep Apnea

Introduction

Problem Description

The Veteran Affairs (VA) Boston provides care to patients with complex medical conditions. For patients requiring surgery, there are several individual and systems level factors that impact the trajectory of care. It is currently recommended that patients undergoing surgery should be screened for obstructive sleep apnea (OSA) by assessing Snoring, Tiredness, Observed apnea, high blood Pressure-Body mass index, Age, Neck circumference, and Gender (STOP-BANG) (Legler, 2018). Patients are then risk stratified as low, intermediate or high risk for OSA. Patients who are stratified as high risk for OSA should be referred to outpatient pulmonary service for a sleep study in order to be diagnosed. Patients with a diagnosis of OSA and at risk for OSA (STOP-BANG score $\geq$ 5) require attention across the perioperative care trajectory to prevent adverse outcomes.

There has been inconsistent use of the STOP-BANG screening tool and subsequent consultation to the Pulmonary service at the VA Boston. The patient's OSA status is not communicated, nor easily identified through the perioperative process. Additionally, if a patient is identified as having OSA, there is no pathway for addressing the care of patients with OSA during the perioperative period; which raises the question "*Why screen surgical patients for OSA if there will not be a change in care*?" The variability of STOP-BANG screening compounded with a lack of protocol for managing surgical patients at high risk for OSA and/or with an existing diagnosis of OSA at the VA Boston was concerning. The National Heart, Lung and

Blood Institute (NHLBI, n.d.) warns that untreated OSA can result in death. To provide safe, efficient and evidence-based care for our nation's veterans, implementing a perioperative clinical pathway for surgical patients with OSA and at risk for OSA was imperative.

Available Knowledge

Obstructive sleep apnea (OSA) is a common sleep disorder which is characterized by multiple temporary cessations in breathing while sleeping due to occlusion of the airway (Mathangi, Mathrews & Mathangi, 2018). People with OSA may experience symptoms that include snoring, daytime sleepiness, forgetfulness, depression and anxiety (NHLBI, n.d.). Untreated OSA can cause health conditions such as hypertension, stroke, cardiovascular disease and death (NHLBI, n.d.).

About twenty-three million patients in the United States have OSA (Legler, 2018). Although OSA is a common medical condition, it is often underdiagnosed. In the United States, it is estimated that over eighteen million patients live with undiagnosed OSA (Lee, Daugherty & Burkard, 2016). Preoperatively, 60% of surgical patients with moderate to severe OSA are not diagnosed (Chung, Abdullah, Liao, 2016). Veterans have been reported to have a higher prevalence of OSA than the civilian population, perhaps due to the fact the veteran population consists of mostly males over the age of 50 with multiple chronic medical conditions (Bazemore, Baker, Morgan & Goode, 2019).

Surgical patients with OSA have an increased risk of postoperative complications including cardiovascular and respiratory events (Bazemore et al., 2019; Williams, Williams, Stanton & Spence, 2017). Higher rates of post-operative complications for patients undergoing an elective outpatient procedure are often associated with the need for hospitalization after

surgery. Additionally, inpatient surgical patients could experience a prolonged length of stay during hospitalization.

Polysomnography (sleep study) is used to diagnose patients with OSA. During a sleep study, the severity of OSA is determined by measuring episodes of apnea-hypopnea per hour (Gross et al., 2014); also known as the apnea-hypopnea index (AHI). For adults, less than five on the apnea-hypopnea index does not indicate OSA; apnea-hypopnea index between six and twenty is defined as mild OSA; between twenty-one and forty is defined as moderate OSA and an apnea-hypopnea index of over forty classifies patients as having severe OSA (Gross et al., 2014). Polysomnography testing is often difficult to obtain prior to surgery due to limited resources, scheduling and cost (Williams et al., 2017). Since polysomnography is not convenient in some cases other methods must be explored to identify patients with sleep apnea prior to surgery. Identifying patients with OSA will help guide optimal perioperative care. Patients should have a polysomnography for a definitive diagnosis of obstructive sleep apnea and treatment (Williams et al., 2017).

STOP-BANG is a commonly used, validated screening tool to identify patients preoperatively who are at risk for OSA (Nagappa, et al., 2015). The STOP-BANG questionnaire is a straightforward, reliable and cost-effective way to assess for OSA (Hardy-Tabet & Lopez-Bushnell, 2018). A STOP-BANG score of 3 or higher indicates the patient is at risk for OSA. The STOP-BANG score can be further stratified as low risk (score <3), intermediate risk (STOP-BANG score 3-4) or high risk (STOP-Bang score $\geq$5).

The Epworth Sleepiness Scale (ESS) is a self-reported questionnaire that assess daytime sleepiness which is a salient symptom of OSA (Crook, et al., 2019). ESS rates eight situations where a patient may fall asleep. Scoring for each category is between 0-3 (0 = would never doze,

1 = slight dozing, 2 = moderate chance of dozing and 3 = high chance of dozing (Saxena, et al., 2018) and the total score range is between 0 and 24. A score of 0-10 is a considered normal. A score of 11-24 indicates excessive daytime sleepiness (Saxena, et al., 2018).

Studies have shown preoperative screening with STOP-BANG (score > 4) followed by ESS (score > 8) is key to identifying patients at risk for moderate to severe OSA (Isaac, et al., 2017; Senaratna, et al., 2019 & Saxena, et al., 2018). The combination of both screening tools increases the sensitivity of predicting moderate to severe OSA (Isaac, et al., 2017). Using both STOP-BANG and ESS questionnaires the positive predictive value of over 97% for screening for OSA (Wu & Zhou, 2019). Combining these tools in the pre-operative area will increase the detection of patients at risk for OSA (Wu & Zhou, 2019).

Adult surgical patients at risk for OSA was the targeted population. After establishing the patients' risk for OSA, the outcome of interest was reducing postoperative adverse events by using nonsurgical interventions. Taken together, the evidence supports the use of STOP-BANG and the ESS as effective screening tools for detecting individuals at high risk for OSA but who have no formal diagnosis. Furthermore, the evidence supports specific interventions in the immediate post-operative period to decrease the risk of adverse event. This evidence, in the context of the needs of OSA patients at the VA Boston, served as the framework for the OSA Perioperative Pathway designed and implemented as part of this improvement project.

There are multiple treatment strategies for mitigating the increased perioperative risk posed by OSA. Continuous positive airway pressure (CPAP) is considered the gold standard of treatment of OSA. Several studies have found CPAP use to be a beneficial intervention for surgical patients with OSA in the immediate post-extubation setting (Hardy-Tabet et al, 2018; Lee et al, 2016; Nazareno et al., 2018). In addition to use as part of an OSA perioperative

treatment pathway, patients were educated preoperatively to encourage CPAP compliance prior to surgery and to continue use after surgery to decrease postoperative complications, which were ($p < 0.05$) statistically significant (Nazareno et al., 2018).

Other interventions used to mitigate postoperative events for patients at risk for OSA and those with known OSA include the use of supplemental oxygen, body positioning after surgery, and choice of analgesics. The use of supplemental oxygen postoperatively showed a decrease in apnea-hypopnea index (Liao et al., 2017; Abdullah & Chung, 2014). The head of the bed should be elevated to at least 30 degrees to reduce pressure on the diaphragm, thus reducing the risk for hypopneas (de Barros Souza et al., 2017). Postoperatively, non-opioid analgesics such as nonsteroidal anti-inflammatory drugs (NSAIDs) and acetaminophen should be used (Abdullah & Chung, 2014). The use of narcotics increases the risk of hypoxia and reintubation (Jungquist et al., 2018). If a patient does not receive pain control with alternative pain medications, then short-acting opioids may be acceptable (Lee et al., 2016).

Surgical patients at risk for OSA and those with known OSA have an increased risk for postoperative adverse events. Some of these adverse events include hypoxia, reintubation, and delayed hospital discharge. For patients undergoing noncardiac surgery, thirty percent of patients with severe OSA had an adverse event of myocardial injury, cardiac death, heart failure and stroke within thirty days postoperatively (Chan et al., 2019). Patients with OSA are more prone to complications on postoperative day three (Nazareno et al., 2018).

A systematic review of the literature (Appendix A) was used to identify studies that could determine which strategies would be most effective for detecting patients with OSA preoperatively.

Rationale

Lewin's Change Management Model guided the development, implementation and evaluation of this quality improvement project. Lewin's model has three phases. The first phase is unfreeze, in which one determines the needs, ensures there is strong leadership support, creates the need for change, and manages doubts and concerns. The second phase is change. Communication should happen often in the second phase and it is important to dispel rumors, empower action and involve people in the process. The final stage is refreeze which anchors change into the culture, develops ways to sustain change, provides support, training and celebrates success (MindTools, n.d.).

Project Goal and Specific Aims

The overall goal of this quality improvement project is to improve the care at VA Boston across the perioperative period for patients with OSA or at high risk for OSA in order to reduce postoperative adverse events and increase referrals to outpatient Pulmonary service for patients identified at high risk.

Specific aims are:

1. To construct and implement an OSA perioperative pathway that allows all patients who are having surgery to be screened for OSA.
2. To integrate evidence-based care strategies into the OSA perioperative pathway for those identified as high risk for OSA (STOP-BANG score $\geq$5) and patients with known OSA.
3. To increase postoperative pulmonary service referrals for patients at high risk for OSA

Methods

Continuous cycles (Plan, Do, Study, Act; [PDSA]) of improvement was utilized (Institute Healthcare Improvement, 2021).

Context

The VA Boston Healthcare System, a government teaching hospital in a metropolitan area was the setting for this OSA perioperative pathway quality improvement project. The VA Boston provides care to individuals from urban and rural parts of New England. A substantial number of patients travel from VAs in Central Massachusetts (MA), Bedford, MA, Providence, RI, White River Junction, VT, Togus, ME, and Manchester, NH to have surgery at the VA Boston. The VA Boston has two surgical campuses. Ambulatory cases are done at the Jamaica Plain Campus and complex cases are performed at the West Roxbury Campus. In fiscal year 2019 the VA Boston completed 4984 surgeries.

Once the decision for surgery has been made, patients are seen at the Pre-Admission Testing Clinic (PATC). PATC is staffed by one health technician, one social worker, two licensed practical nurses, a physician assistant, three nurse practitioners, a rotating anesthesiologist and an anesthesia nurse practitioner. The Pre-Admission Testing Clinic offers multiple services during the pre-admission testing visit including laboratory work, diagnostics such as an electrocardiogram or chest x-ray, and vital signs. Patients are also evaluated by the anesthesia service which determines if the patient's surgery location is appropriate given the procedure and the patients' medical problems. A history and physical is completed by the surgical service who will be performing the surgery. Patients also have a nursing assessment and receive pre-op teaching. STOP-BANG was included in the nursing assessment although prior to

this improvement project completion and documentation of the screening was inconsistent. If the STOP-BANG score was $\geq$ 5 patients were supposed to be referred to pulmonary service for further evaluation although adherence to this standard was inconsistent. There was no perioperative pathway in place for patients at risk for OSA or for patients with OSA. After the patient is cleared for surgery from the PATC visit, the patient is next seen the day of surgery. If surgical patients are not cleared, they are referred back to the surgical service that was performing the surgery for further work up. The specific healthcare needs and improvement ideas for surgical patients at the VA Boston is illustrated in the Microsystem Map (Appendix B).

The US Department of Veterans Affairs (2020) states the "VA Boston Healthcare System exists to serve the veteran through the delivery of timely quality care by staff who demonstrate outstanding customer service, the advancement of health care through research, and the education of tomorrow's health care providers". Applying the VA's mission helped drive the change for the quality improvement project as employees strived to provide the best care to our nation's veterans.

Originally, the quality improvement project was intended to be implemented at the Jamaica Plain campus due to feasibility and adoption concerns. The staff at Jamaica Plain campus was smaller compared to the West Roxbury campus. However, once all aspects of staffing were considered, it was ultimately concluded that using one campus over the other would have been a barrier for the projects' success. Although the nursing staff was constant, the surgeons and anesthesiologists transfer back and forth to both campuses. For consistency and to align with Lewin's change model to involve people in the process, the project was implemented at both campuses.

The factors associated with low rates of screening and treatment of OSA in the perioperative period were examined using a cause-and-effect diagram (Fishbone, Appendix C). If the patient was identified at risk for obstructive sleep apnea in the Pre-Admission Testing Clinic and this was documented in the medical record, this information was still not recognized throughout the perioperative process. It is possible that the nursing assessment note was not reviewed by the perioperative staff. For patients requiring respiratory support or Continuous Positive Airway Pressure (CPAP) after surgery; respiratory therapists were only available at the West Roxbury Campus and not at Jamaica Plain Campus. Postoperatively, patients that are referred to the Pulmonary service are noncompliant with follow up.

The OSA perioperative clinical pathway address several components from the Fishbone diagram (Appendix C). Prior to implementation, in-services were held for the perioperative staff to highlight the importance of OSA treatment for surgical patients and provided guidelines to follow. Additionally, prior to implementation, the availability of at high-risk OSA patients being seen in pulmonary clinic prior to surgery was limited. With the implementation of the OSA perioperative clinical pathway an electronic consult to be placed to the pulmonary service for at high-risk for OSA to expedite evaluation for these surgical patients. This project also addresses the patients possible lack of knowledge of OSA by having the perioperative staff provide patient education.

Project Intervention

Plan

The essential resources needed to develop and implement this perioperative pathway for OSA surgical patients included: the perioperative staff, anesthesia service, pulmonary service,

leadership, quality improvement management analyst and the electronic medical record. Utilizing Lewin's change model as a guide, unfreezing and determining the factors associated with suboptimal perioperative care for OSA patients is the first step in the process. Initially, a thorough review of current practices of surgical patients with OSA and at high risk for OSA was conducted. Information was obtained by speaking with the perioperative staff including nurse practitioners, physician assistants, nurses, anesthesiologists, surgeons, and administrative staff. Additionally, data regarding patients with OSA and STOP-Bang utilization (January 3rd - March 1st, 2019) from the PATC was obtained from the quality improvement (QI) analyst. A manual chart review was completed to see if these patients were referred or seen previously by pulmonary service or have a documented sleep study. The data established a baseline for the project and informed the implementation strategy using Lewin's change model.

OSA pathway and checklist

The second category of Lewin's change model is change. Active involvement of staff was integrated in the change process at this phase. An interdisciplinary team was formed to review current practices and review the information gathered from the chart review. Then, a draft of the OSA perioperative pathway (Appendix E) was created; with a beta-draft used to accelerate the process. The draft consisted of a screening and treatment algorithm and a computerized checklist of pathway activities in the Preoperative Screening Note (Appendix F). All surgical patients seen in the pre-admission clinic were evaluated, triaged and treated according to the OSA perioperative pathway. The OSA perioperative algorithm included a pathway for patients without a diagnosis of OSA and for those with known OSA. Patients without a diagnosis for OSA were screened with the STOP-BANG and categorized as low risk (STOP-BANG score <3), intermediate risk (STOP-BANG score 3-4) or high risk (STOP-Bang score $\geq$5). The STOP-

BANG score was documented in the Pre-Operative Screening note in the electronic medical record. Clinicians also documented the ESS if the STOP-Bang score is over 5. An ESS score can range between 0 and 24. A score of 0-10 is a considered normal. A score of 11 to 24 is considered excessive daytime sleepiness is score.

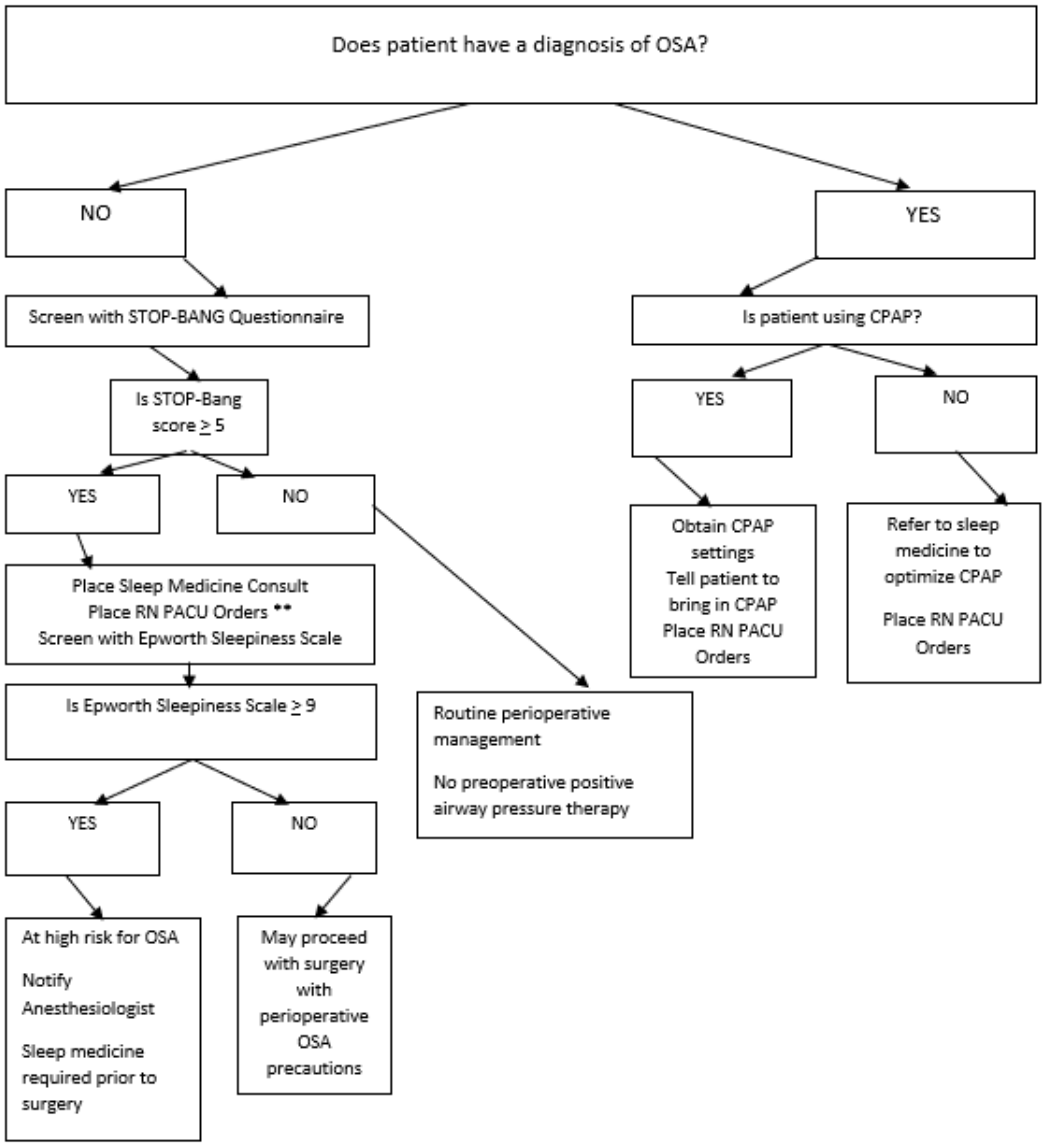
As noted on the OSA Perioperative Pathway (Figure 1), patients who were identified at low risk or intermediate risk for OSA based on their STOP-BANG Score <5 proceeded to surgery with routine perioperative management. Patients triaged into the high-risk category (STOP-BANG ≥5; ESS >9), who were not having major elective surgery and who do not have significant comorbidities were referred to pulmonary service for a sleep study to be completed and followed the perioperative OSA precautions checklist.

High risk patients who were having major elective surgery and who had significant comorbidities were assessed by the Pre-Admission Testing Clinic anesthesiologist and it was determined if the patient needs to see pulmonary prior to surgery or if the patient was stable enough to wait until after surgery. If they were determined to be stable, the perioperative OSA checklist was followed.

For patients with known OSA, a chart review for STOP-Bang score and review of the prior sleep study results were documented. Surgical patients were advised to take all OSA precautions as previously discussed. Patients with a diagnosis of mild OSA (apnea-hypopnea index 5-15) received the usual perioperative treatment (Appendix E).

Figure 1

OSA Perioperative Clinical Pathway



*Perioperative OSA precaution:
Preoperative: Place RN PACU orders; *Known OSA:* obtain CPAP settings, have CPAP machine stand by
Interoperative: Anesthesiologist transfers OSA/high risk OSA with O2 non-rebreathing mask (exception ENT)
Postoperative: Head of the bed >30 degrees; Connect to CPAP; educate patient/family to continue home CPAP
Seet, Sleep Medicine Clinic, 2013.Weinberg, BMJ, 2013.

Surgical patients with a diagnosis of moderate/severe OSA (apnea-hypopnea index >15), were encouraged to use CPAP therapy prior to surgery and staff followed the perioperative OSA

checklist (Appendix E). Patients with known moderate/severe OSA who were noncompliant with CPAP were referred to pulmonary service for assessment and management.

For ease of use, the OSA Perioperative Pathway was formatted as a computerized checklist implemented pre-surgery and during the perioperative period (Appendix E). The checklist was embedded in the Preoperative Screening note in the electronic medical record (EMR). The checklist was completed by the staff in the Pre-Admission Testing Clinic. The pre-admission testing staff documented the STOP-BANG score for patients identified at high risk in the Pre-Operative Screening note in the electronic medical record. For patients with known OSA, the CPAP settings was documented, and patients were advised to bring their machine on the day of surgery. The PATC staff also placed RN OSA PACU orders for patients with a STOP-BANG score of $\geq$ 5 or for patients with a diagnosis of obstructive sleep apnea. A sleep study referral was placed for patients who are non-compliant with CPAP or for those patients with a STOP-BANG score of $\geq$ 5.

The ambulatory surgery (AMB SURG) and medical surgical day unit (MSDU) nurses reviewed the patient's obstructive sleep apnea status from the pre-operative screening note. The nurses then certified that they reviewed the pre-operative screening note in the MSDU/AMB SURG NURSING NOTE (D), see Appendix H. The nurses clicked yes/no with an area to free text. MSDU/AMB SURG nursing staff communicated with the post-anesthesia care unit (PACU) staff to have a continuous positive airway pressure (CPAP) machine available for patients at high risk for OSA. Intraoperatively, the operating room (OR) nurse contacted the PACU to have a CPAP machine on standby.

The nursing orders for patients at high risk OSA or with OSA diagnosis included: CPAP machine on standby, observing for hypoventilation, using supplemental oxygen if oxygen saturation was less than ninety percent and raising the head of the bed over thirty degrees to reduce soft palate collapse.

The nurses also educated the patient and family regarding home CPAP use. Disposition for patients who were admitted to the hospital was determined by the type of procedure, the type of anesthesia received, opioid use, and severity of OSA.

Once the development of the OSA perioperative algorithm and checklist was finalized, training of staff to utilize the pathway commenced. A series of in-service training occurred at both campuses multiple times in order to capture staff from each shift. A PowerPoint presentation was performed and distributed to the perioperative staff. An email was sent to persons who did not attend the in-service. Training was completed within a month of finalizing the pathway. The start of this quality improvement project was October 1, 2020.

Measures

Rapid cycle change (Plan Do Study Act) was used to guide the implementation, evaluation and re-visioning of the project (Institute Healthcare Improvement, 2021). The outputs and expected outcomes are listed below and are outlined in the Logic Model (Appendix D), Measures Table (Appendix I) and Survey Questions (Appendix J):

- Utilization of OSA perioperative clinical pathway: a) algorithm and checklist for perioperative OSA patients b) all patients having surgery was optimized the OSA perioperative pathway. Information about compliance with utilization was obtained via chart review post implementation.

- Increased patient referrals to Pulmonary service for patients identified at high risk for OSA: utilization of OSA perioperative pathway. It was expected that all patients with a STOP-Bang score of $\geq$5 combined with an ESS score > 9 will be referred to pulmonary service. Consults was tracked post implementation.
- Improved communication throughout the multidisciplinary perioperative services: self-report for each clinical person per section via survey. The survey was done post-implementation after approval from American Federation of Government Employees (Appendix K) which measured utilization/adoption of OSA perioperative pathway and communication. The concepts measured were feasibility, value of care, self-efficacy and interdisciplinary communication. The dimensions from Lewin's change model includes creating need for change, communication, involving people in the process and anchoring changes into culture.

Analysis

The utilization of the OSA perioperative clinical pathway was analyzed by the monthly frequency and proportion of patients screened for OSA and percent improvement in these parameters.

To evaluate whether more patients identified as having high risk for OSA are referred to pulmonary service, data was compared pre-implementation and post implementation. Frequency and proportion of consults to pulmonary from PATC was analyzed.

Improved communication was analyzed using the survey results. Survey questions utilized a 5-point Likert scale: strongly agree, agree, neutral, disagree and strongly disagree. The categories for strongly agree/agree were collapsed into one category as were the categories for

strongly disagree/disagree leaving three categories. The frequency and proportion of respondents who chose one of the three categories was used to describe staff perceptions of the OSA perioperative clinical pathway post implementation.

Ethical Considerations

Veterans can be considered a vulnerable population. A determination of human subjects versus quality improvement checklists was completed, reviewed and approved at both the University of Massachusetts Boston and Veterans Affairs institutional review boards (IRB).

The project implemented is quality improvement and does not meet the definition of human subjects research because it is not designed to generate generalizable findings but rather to provide immediate and continuous improvement feedback in the local setting in which the project is carried out. The University of Massachusetts Boston IRB has determined that quality improvement projects do not need to be reviewed by the IRB.

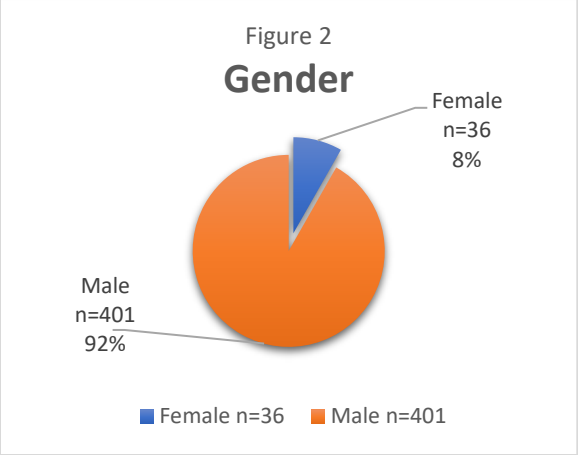
Results

As noted in Figure 1, the pathway called for all surgical patients seen in the PATC to be screened with the STOP- BANG questionnaire. Those with scores of ≥ 5 were further screened with ESS and an electronic consult for the pulmonary service was placed for further evaluation. A RN PACU order set (Appendix G) was also placed by the screening provider which were numbered (1. CPAP on standby, 2. Position head of bed > 30 degrees, 3. 2 liters of O2 to maintain oxygen saturation > 92%, 4. Educate patient to continue home CPAP used during sleep); see Appendix G. For those patients who had a diagnosis of OSA an e-consult for sleep medicine was placed if the patient was non-compliant with CPAP. RN PACU orders were placed for patients with OSA diagnosis (See Figure 1).

Incorporating Lewin's Change Model, in the change phase included involving people in the process and communicating often. It was identified during this phase that RN PACU order set needed to be modified. The numbers on the RN PACU orders were modified by the ordering provider due to patient's status which caused the orders to be mis-numbered; therefore, the numbers on the order set was removed.

Project Population

This quality improvement project included 437 patients seen in the PATC between October 1st and December 1st, 2020. Participants were largely male (Figure 2). The mean age was 63.4 years (range 21 to 96 years). All patients were screened either face to face or virtually by the PATC staff. The surgical specialty services included in this study were bariatric (n=17), cardiology (n=15), dental (n=1), otolaryngology (n=51), general (n=69), gynecology (n=11), neurology (n=19), orthopedic (n=89), plastic surgery (n=4), podiatry (n=21), thoracic (n=24), urology (n=98) and vascular (n=18).



Utilization of Pathway

Among the 437 surgical patients who were evaluated by PATC staff, (Figure 3) the STOP-BANG questionnaire the mean completion rate was 84.4% (n=369); which exceeded the goal benchmark (80%). Of the 369 patients with a completed STOP-BANG questionnaire, the majority (75%) did not have a documented diagnosis of OSA prior to being seen in pre-admission testing PATC.

Figure 3

STOP-BANG SCREENING

	October (n=185/217)	November (n=166/201)	December (n=18/19)
Benchmark	80%	80.00%	80%
Mean	84.40%	84.40%	84.40%
Percent screened	85%	83%	95%

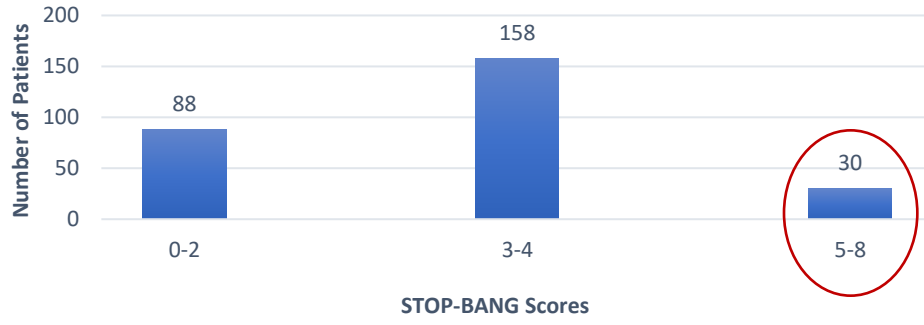
Period of Implemetation

12% Percent change improvement from the start of project to completion

Of these 276 patients, their STOP-BANG scores ranged from 0-7. Most of the patients (89%) scored less than 5, while 11% scored greater than 5 (see figure 4). Of those with a score of greater than 5, 73% were further screened with the Epworth sleepiness scale. In surgical patients who met criteria, postoperative nursing orders were placed correctly 77% of the time. Nurses reviewed the preoperative screening note 75% of the time.

Figure 4

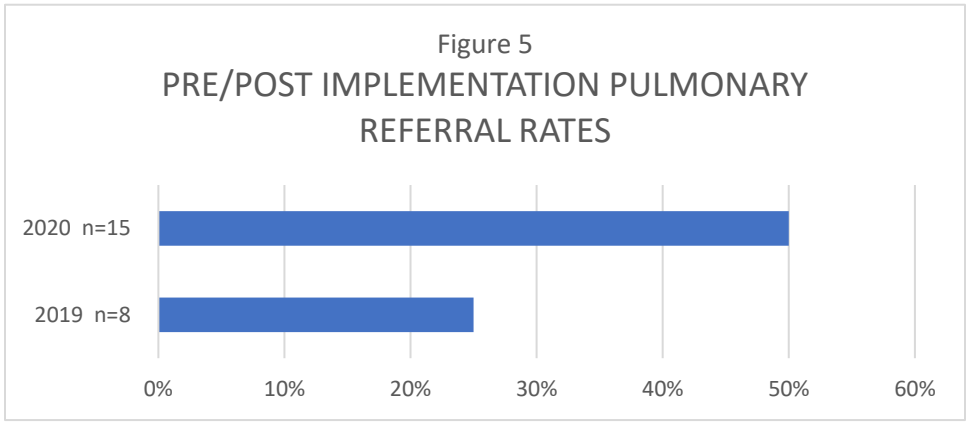
STOP-BANG Scores



Referrals to Pulmonary Service

Of the 30 patients who met criteria for referral for Pulmonary service (STOP-Bang >5), 50% (n=15) were referred for work-up (Figure 5). Prior to the intervention, over a three-month

period (January-March 2019) only 25% of patients who met criteria were referred to Pulmonary service for a sleep study. The number of referrals doubled as a result of this intervention. An additional nine patients with a pre-existing diagnosis of OSA were referred to Pulmonary service due to non-compliance with their CPAP.



Survey

At the conclusion of the project an anonymous survey was sent to the perioperative staff (n=56) via Survey Monkey. The staff surveyed included licensed practical nurses (LPNs), registered nurses (RNs), nurse practitioners (NPs) and physician assistants (PAs). The domains addressed in this survey were feasibility, value of care, self-efficacy and interdisciplinary communication (see table 1). The electronic survey was sent to staff one-week post-implementation via email. A reminder email sent one month after the initial email. The overall response rate was 32% (n=18).

For feasibility most staff (72%) strongly agreed or agreed that the perioperative pathway was easy to use (Table 1). Over 88% felt that the preoperative screening note in the EMR was easy to understand. It was felt by most (83%) that the perioperative pathway added value to the care of patients with OSA. The majority (77%) intend to continue to use the perioperative pathway after the quality improvement project is completed. Lastly, communication was addressed in several questions. Almost all staff (83%) felt there was an improvement in

communication between the preoperative staff and attending anesthesiologist. Further, 62% felt that interdisciplinary communication has also improved. Additionally, 72% of the perioperative staff felt patients identified at high-risk were referred to the Pulmonary service.

Table 1 **Perioperative Pathway Survey** n=18

Question	**Strongly Agree/Agree**	**Neither Agree nor Disagree**	**Disagree/Strongly Disagree**	**N/A**
1. The perioperative pathway for OSA patients is easy to use	Proportion: 72.22% (n=13)	Proportion: 11.11% (n=2)	Proportion: 11.11% (n=2)	Proportion: 5.56% (n=1)
2. The perioperative OSA pathway enhances OSA focused communication between pre-op staff and the attending anesthesiologist	83.33% (n=15)	11.11% (n=2)	5.56% (n=1)	0% (n=0)
3. Pre-op patients identified at risk for OSA are referred to pulmonary	72.22% (n=13)	16.67% (n=3)	11.11% (n=2)	0% (n=0)
4. The PRE OPERATIVE SCREENING note in CPRS is easy to understand	88.88% (n=16)	5.56% (n=1)	0% (n=0)	5.56% (n=1)
5. The perioperative pathway adds value to the care of perioperative patients with OSA	83.33% (n=15)	16.67% (n=3)	0% (n=0)	0% (n=0)
6. Interdisciplinary communication about OSA focused care has improved since implementation of the pathway	66.67% (n=12)	33.33% (n=6)	0% (n=0)	0% (n=0)
7. I intend to continue to use the OSA perioperative pathway once the QI project is completed	77.78% (n=14)	22.22% (n=4)	0% (n=0)	0% (n=0)

Missing Data

Although names were obtained from the pre-admission testing clinic database from October 1st- December 1st, 2020 there were fourteen patients included in this study who were virtually screened after December 1st up until December 12th. There were no face-to-face patients screened with perioperative pathway after December 1st. An assumption can be made that there were more patients screened with the perioperative pathway than indicated in this study. Meaning, if names were on the database prior to October 1st and screened during the implementation period those patients' data would have been missed.

Discussion

Summary

The purpose of this quality improvement project was to implement a perioperative pathway for surgical patients with OSA and at high risk OSA. The quality improvement was able to identify surgical patients with OSA and at risk for OSA and ensured evidence-based interventions were followed throughout the perioperative period. A strength of this study was the algorithm which was created for staff to perform on all surgical patients thus improving the ability of the staff to optimize high risk patients prior to surgery. Another strength of this study was that the screening tool, sleep study and RN PACU order set were integrated into the EMR and linked to the Preoperative Screening note.

Interpretation

The benchmark for utilization of the OSA perioperative pathway was set at 80%. The project exceeded the benchmark with an average utilization of 84.4%. Improvement in screening rates was noted over time (85%, 83%, 95% respectively) which represents a 12% improvement

in STOP-Bang screening from the start of this QI project to the completion. This quality improvement project results are similar to the literature which reported that integrating the screening tool in the electronic medical record can increase STOP-Bang screening rates (Stubberud et al, 2019).

Implementation of the pathway was successful across the perioperative period. The PACU RN orders were placed by the pre-admission screening staff 77% of the time and the MSDU/AMB SURG nurses reviewed the STOP-Bang screening note and documented recognition 75% of the time; which was consistent with the literature which reported that staff were aware of patients OSA status which allowed evidence-based interventions to be executed (Stubberud et al., 2019).

Additionally, the project was also successful in increasing the number of high-risk patients who were referred to sleep medicine (baseline 25%, post-implementation 50%). Another goal of this quality improvement project was to improve communication among services. The nursing staff reported that this QI project enhanced communication with the anesthesiologists. The quality improvement project was also felt to improve interdisciplinary communication.

The survey also examined the staff's opinion whether pre-operative patients who are identified at high risk for OSA were being referred to pulmonary service 72% of staff strongly agreed and agreed with this statement. Whereas, in Erwin et al. (2019) 19% of the staff agreed/strongly agreed. The increase of referrals in this study may correlate with the sleep study consult being embedded in the order set of the Pre-Operative Screening note which auto populates when the patient is identified at high risk for OSA. Which can further explain the 72% of staff who agreed/strongly agreed the ease of use of the perioperative pathway.

Lewin's change management model was used to guide the quality improvement project. Refreezing involves anchoring the changes into the culture. Seventy-seven percent of the staff who participated in the quality improvement project and completed the survey indicated that they intended to continue using the OSA perioperative pathway after the completion of the project.

Limitations

Several limitations were identified in the quality improvement project. The first limitation involved the Pre-Operative Screening note. It would have been beneficial to have a check box to indicate the patient already had a diagnosis of OSA; the clinical staff free texted this information in the electronic medical record which impacted ease of use and tracking. Secondly, the screening by the pre-admission testing clinic staff did not follow the OSA perioperative pathway algorithm as intended for all patients. Additionally, Pulmonary service referrals were often declined by patients when offered. Lastly, although the survey results were overall positive; the survey response rate for staff who participated in this project was low.

Conclusion

Overall, this quality improvement project helped reduce a gap in perioperative care at the VA Boston. The OSA perioperative clinical pathway aided in identifying veterans with OSA and at high risk OSA prior to their surgical procedure who may have gone unrecognized before implementation. The pathway optimized OSA-focused care of veterans. Veterans received safe, efficient, and evidence-based multidisciplinary care throughout the perioperative period and a referral to Pulmonary service when appropriate. By having the OSA perioperative clinical pathway integrated into the electronic medical record which improved the infrastructure at the VA Boston and increased awareness of at high-risk OSA/OSA patients. Additionally, the OSA

perioperative clinical pathway was widely accepted by the perioperative staff. For sustainability, it is recommended that the OSA perioperative clinical pathway become a standard of practice at the VA Boston for continued safety of veterans with OSA and at high-risk for OSA.

References

Abdullah, H. R., & Chung, F. (2013). Perioperative management of obstructive sleep apnea. *Current Anesthesiology Reports, 4*, 19-27.

Bazemore, K. E., Barker, M., Morgan, B. T., & Goode, V. (2019). Utilization of the STOP-Bang questionnaire as a standardized screening tool for obstructive sleep apnea in Veteran Administration surgical patients. *Journal of PeriAnesthesia Nursing*, *34*(1), 60–65. https://doi.org/10.1016/j.jopan.2017.11.006

Chan, M. T. V., Wang, C. Y., Seet, E., Tam, S., Lai, H. Y., Chew, E. F. F., …Chung, F. (2019). Association of unrecognized obstructive sleep apnea with postoperative cardiovascular events in patients undergoing major noncardiac surgery. *Journal of the American Medical Association, 321*(18), 1788-1798.

Chung, F., Abdullah, H. R., Liao, P. (2016). STOP-Bang questionnaire: A practical approach to screen for obstructive sleep apnea. *Chest, 149*(3), 631-638.

Crook, S., Sievi, N. A., Bloch, K. E., Stradling, J.R., Frei, A., Puhan, M. A., & Kohler, M. (2019). Minimum important difference of the Epworth sleepiness scale in obstructive sleep apnoea: estimation from three randomized controlled trials. *Thorax,* 74, 390-396

de Barros Souza, F. J. F., Genta, P. R., de Souza Filho, A. J., Wellman, A., & Lorenzi-Filho, G. (2017). The influence of head-of-bed elevation in patients with obstructive sleep apnea. *Sleep Breath,* 21, 815-820.

Erwin, A., Nobel, K. A., Marshall, J., & Cooper, S. (2019). Perianesthesia nurses' survey of their knowledge and practice with obstructive sleep apnea. *Journal of PeriAnesthesia Nursing,* 34(1). 39-50.

Gross, J.B., Apfelbaum, J.F., Caplan, R. A., Connis, R.T., Cote, C.J., Nickinovich, D. G., …Ydens, L. (2014). Practice guidelines for the perioperative management of patients with obstructive sleep apnea: An updated report by the American society of anesthesiologists take force on perioperative management of patients with obstructive sleep apnea. *Anesthesiology,* 120, 268-86.

Hardy Tabet, C., & Lopez-Bushnell, K. (2018). Sleep, snoring, and surgery: OSA screening matters. *Journal of PeriAnesthesia Nursing*, *33*(6), 790–800. https://doi.org/10.1016/j.jopan.2017.01.009

Institute Healthcare Improvement (2021). *Changes for Improvement.* Retrieved from: http://www.ihi.org/resources/Pages/Changes/default.aspx

Isaac, B. T., Clarke, S. E., Islam, M. S., & Samuel, J. T. (2017). Screening for obstructive sleep apnoea the STOPBANG questionnaire and the Epwoth sleepiness score in patients admitted on the unselected acute medical take in a UK hospital. *Clinical Medicine, Journal of the Royal College of Physicians of London, 17*(6), 499-503.

Jungquist, C. R, Card, E., Charchaflieb, J., Gali, B., & Yilmaz, M. (2018). Preventing opiod-induced respiratory depression in the hospitalized patient with obstructive sleep apnea. *Journal of PeriAnesthesia Nursing, 33*(5), 601-607.

Lee, E., Daugherty, J., & Burkard, J. (2016). Correlational study of sleep apnea patient characteristics with discharge locations. *Journal of PeriAnesthesia Nursing, 31*(5), 381–391. https://doi.org/10.1016/j.jopan.2014.09.005

Legler, C. D. (2018). STOP-Bang assessment and postoperative outcomes. *Journal of PeriAnesthesia Nursing, 33*(3), 330–337. https://doi.org/10.1016/j.jopan.2015.06.004

Liao, P., Wong, J., Singh, M., Wong, D. T., Islam, S., Andrawes, M., … Chung, F. (2017). Postoperative oxygen therapy in patients with OSA: A randomized controlled trial. *Chest,* 151(3), 597-611. https://doi.org/10.1016/j.chest.2016.12.005

Mathangi, K., Mathews, J., Mathangi, C. D. (2018). Assessment of perioperative difficult airway among undiagnosed obstructive sleep apnoea patients undergoing elective surgery: A prospective cohort study. *Indian Journal of Anesthesia, 62*(7), 538-544

MindTools. (n.d.). *Lewin's change management model: Understanding the three stages of change.* Retrieved from: https://www.mindtools.com/pages/article/newPPM_94.htm

Nagappa, M., Liao, P., Wong, J., Auckley, D., Ramachandran, S. K., Memtsoudis, S., …Chung, F. (2015). Validation of the STOP-Bang questionnaire as a screening tool for obstructive sleep apnea among different populations: A systematic review and meta-analysis. *Public Library of Science, 10*(25), 1-21.

National Heart, Lung, and Blood Institute (NHLBI). (n.d.). Sleep Apnea. Retrieved April 26, 2019, from https://www.nhlbi.nih.gov/health-topics/sleep-apnea

Nazareno, A., Newsom, C., Lee, E., & Burkard, J. (2018). Obstructive sleep apnea: Emphasis on discharge education after surgery. *Journal of PeriAnesthesia Nursing, 33*(1), 28–36. https://doi.org/10.1016/j.jopan.2016.08.002

Saxena, M., Gothi, D., Sah, R., Ojha, U. C., Gahlot., T. (2018). Utility of combining Epworth sleepiness scale, STOP-BANG and perioperative sleep apnea prediction score for predicting absence of obstructive sleep apnea. *Indian Journal of Sleep Medicine, 13*(4), 62-66. https://doi.org/10.5005/jp-journals-10069-0028.

Seet, E., Han, T. L., Chung, F. (2013). Perioperative clinical pathways to manage sleep-disordered breathing. *Sleep Medicine Clinics 8,* 105-120.

Senaratna, C.V., Perret, J. L., Lowe, A., Bowatte, G., Abramson, M. J., Thompson, B., …Dharmage, S. C. (2019). Detecting sleep apnoea syndrome in primary care with screening questionnaires and the Epworth sleepiness scale. *Medical Journal of Australia*, *221*(2), 65-70. https:// doi.org/10.5694/mja2.50145

Stubberud, A. B., Moon, R. E., Morgan, B. T., & Goode, V. M. (2019). Using the electronic medical record to improve preoperative identification of patients at risk for obstructive sleep apnea. *Journal of PeriAnesthesia Nursing, 34*(1), 51–59. https://doi.org/10.1016/j.jopan.2018.04.002

United States Department of Veterans Affairs (2020). *VA Boston Healthcare System.* Retrieved from: https://www.boston.va.gov/about/index.asp

Weinberg, L., Tay, S., Lai, C. F., & Barnes, M. (2013). Perioperative risk stratification for a patient with severe sleep apnoea undergoing laparoscopic banding surgery. *British Medical Journal.* https://doi.org/10.1136/bcr-2012-008336

Williams, R., Williams, M., Stanton, M. P., & Spence, C. A. P. T. D. (2017). Implementation of an obstructive sleep apnea screening program at an overseas military hospital. *American Association of Nurse Anesthetists Journal, 85*(1), 42–48.

Wu, H. & Zhou, J. R. (2019). Predictive value of STOP-Bang questionnaire combined with Epworth sleepiness scale for OSA. *Journal of Clinical Otorhinolaryngology, Head and Neck Surgery, 33*(4), 319-321. doi: 10.13201/j.issn.1001-1781.2019.04.008.

Appendix A

Evidence Table

Author	Research Design	Level of Evidence	Setting	Instrument	Sample	Significant Findings
Abdullah et al., 2013	Meta-Analysis	Level I Quality A	Surgical setting	STOP-Bang Berlin ARES	10% men severe OSA ages 30-49 17% 50-70 men 3% woman 39-49 9% women 50-70	Preoperative, Intraoperative and postoperative management for OSA patients
Bazemore et al., 2019	Pre-Post implementation	Level II Quality B	VA Medical Center Southeast US	STOP-Bang	N= 400 Male (n=385) Female (n=15)	-STOP-Bang identified patients at risk for OSA -STOP-Bang score > 4
Chan, et al., 2019	Prospective cohort	Level II Quality B	8 hospitals, 5 countries	Postoperative monitoring: nocturnal pulse oximetry and measurement of Cardiac Troponin	N= 1364 F= 490 M= 874	30 days after surgery 30% of patients with OSA had an outcome of myocardial injury, cardiac death, heart failure, afib, stroke

De Barros Souza et al., 2017	Pre-Post Implementation	Level II Quality B	Brazil	Baseline PSG Then repeat PSG with head of bed elevated	N= 52	Patients with HOB elevated had a decrease in apnea-hypopnea index
Hardy Tabet et al., 2017	Prospective descriptive study	Level III Quality B	University of New Hospital	STOP-Bang	N= 1118 Male (n=530) Female (n=588)	-Males greater risk -Known OSA, CPAP day of surgery -STOP-Bang score >5
Lee et al., 2016	Correlational research design	Level III Quality B	Urban, academic medical center	STOP-Bang	N=153 Male (n=100) Female (n=53)	-63% diagnosed with OSA before surgery -62% no therapy for OSA -CPAP day of surgery
Leger et al., 2016	Retrospective chart analysis	Level III Quality B	Washington Hospital Center	STOP-Bang	N=150 Male (n=63) Female (n=82)	-STOP-Bang score >3 -79% had postoperative complications -Identified with wrist band

Liao, et al., 2017	Randomized Control Trial	Level I Quality B	Toronto Western Hospital	Polysomnography	N=123 Male (n=61) Female (n=18)	-Oxygen (O2) group had significantly decreased apnea-hypopnea index from preop to hospital day 3 -STOP-Bang score >3
Nazarenzo et al., 2016	Pre-post implementation	Level II Quality B	Southern California	Apnea Knowledge Test (AKT) Epworth Sleepiness Scale Discharge education	N=66 Male (n=39) Female (n=28)	-CPAP use after surgery -CPAP use is poor -Patient education increases CPAP utilization
Stubberud, et al., 2018	Pre-post implementation	Level II Quality B	Pre-op clinic Phone screening	STOP- Bang EMR	N=250 Male (n=134) Female (n=116)	-STOP- Bang score >4 -EMR useful in flagging pts -EMR helps improve workflow

Williams et al., 2017	Pre-post implementation	Level II Quality C	US Naval Hospital Okinawa, Japan	STOP-Bang	N=200 Male (n=70) Female (n=30)	-STOP-Bang score >3 -educating nurses helped identify patients with OSA

Appendix B

Microsystem Map

Clinical Microsystem: Perioperative Section

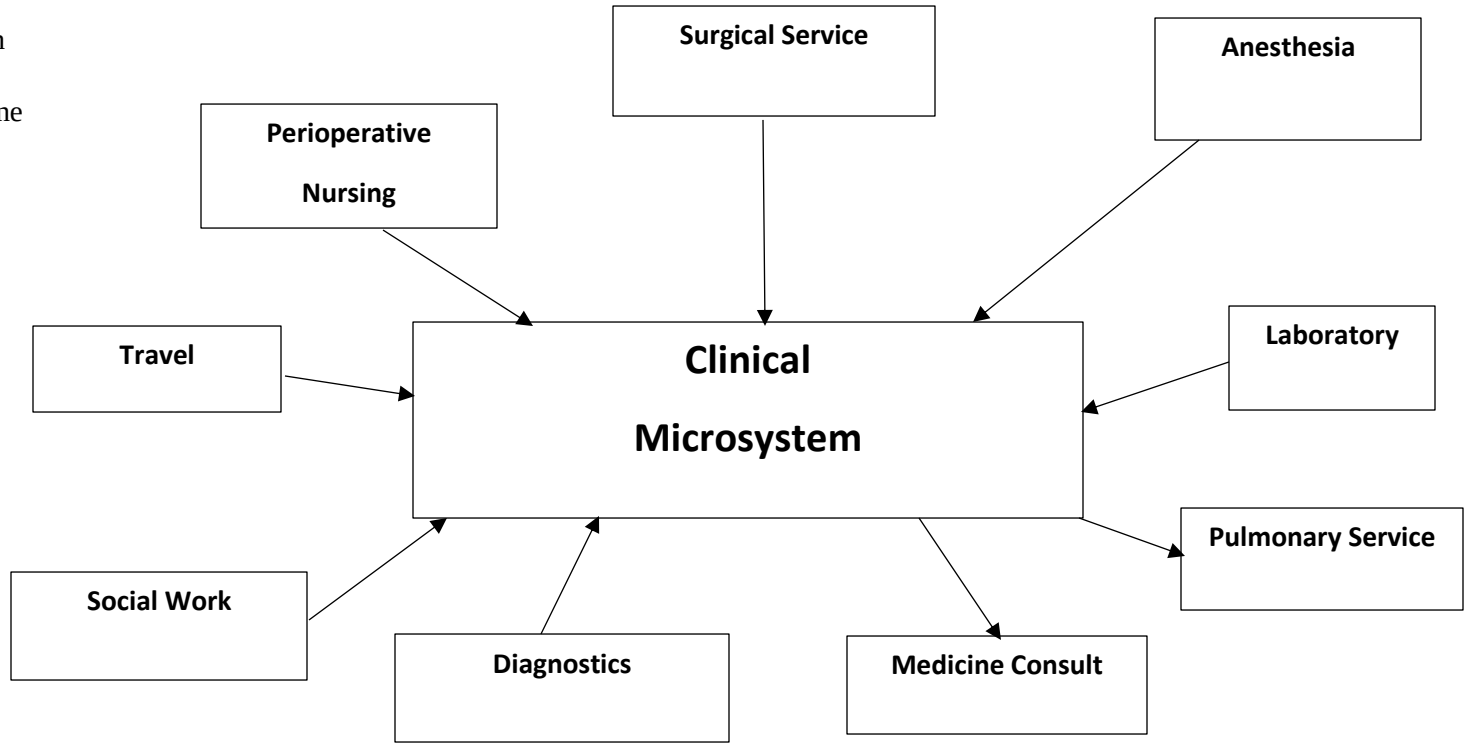
Subpopulation: Surgical Patients

Specific Healthcare needs

- Education regarding surgery
- Screening for substance abuse
- Screening for OSA
- Goals of care
- Medication reconciliation
- Transportation
- Virtual health/telemedicine

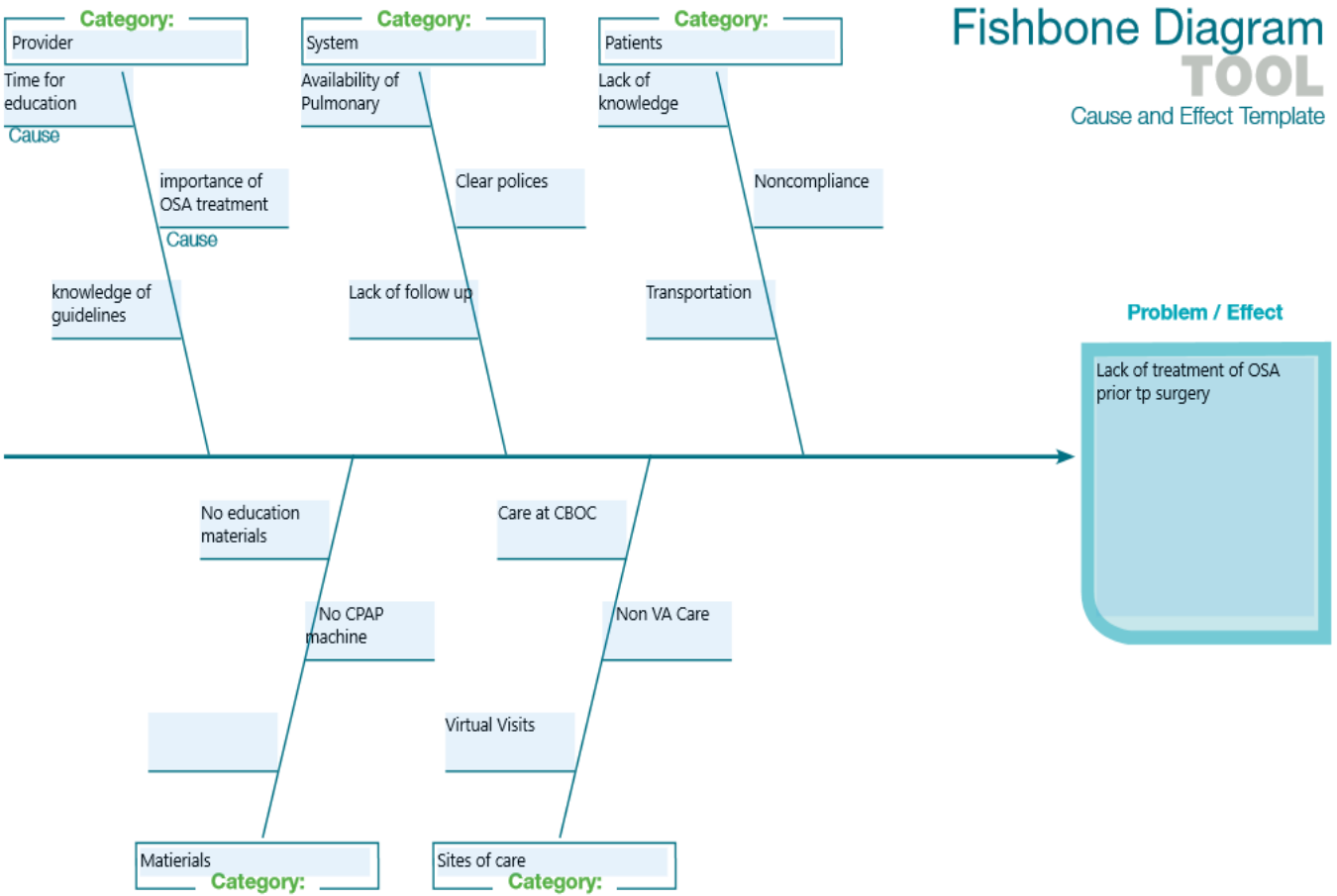
Improvement ideas:

- Perioperative Pathway
- Improve communication
- Consult tracking
- Time management



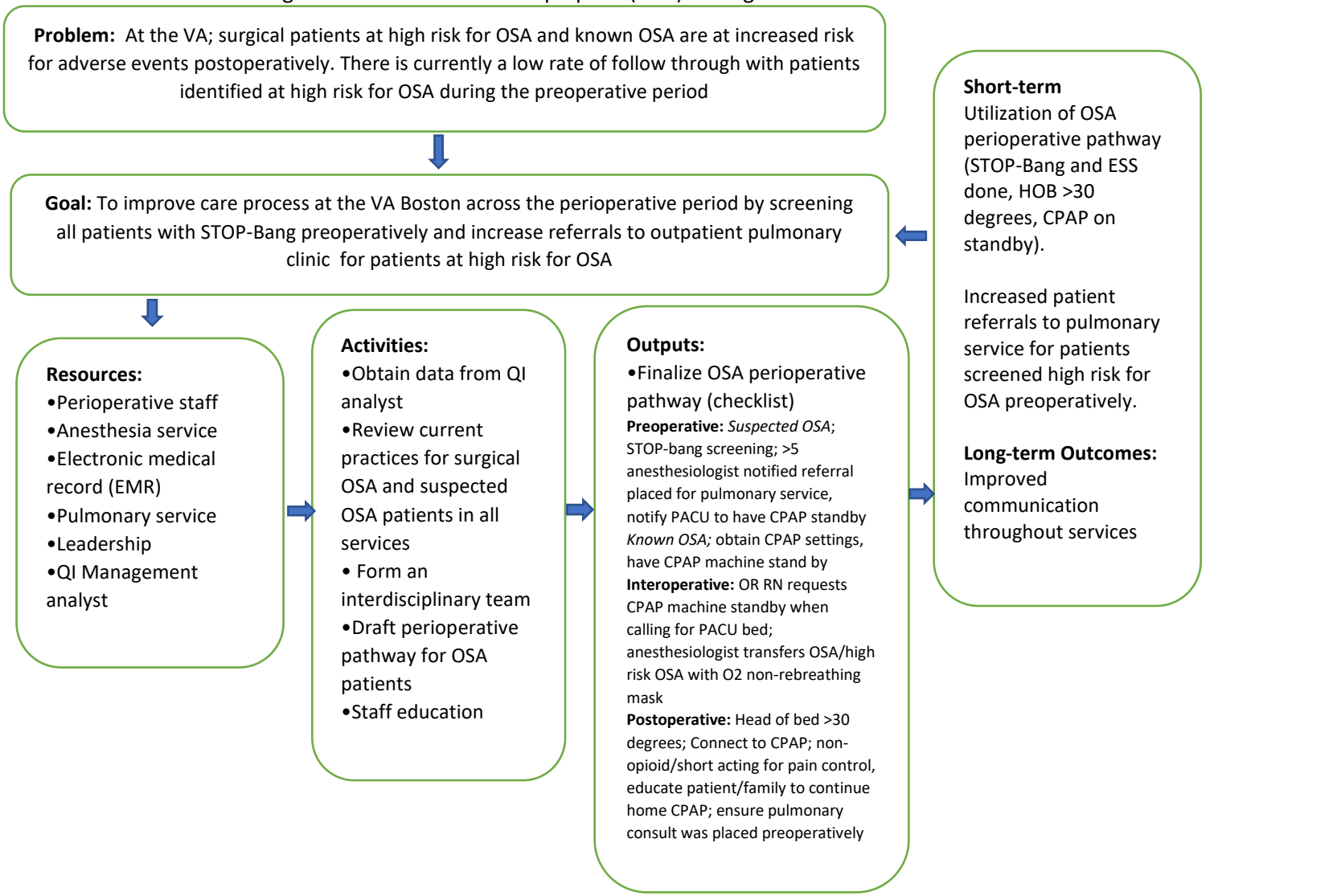
Appendix C

Fishbone



Appendix D
Logic Model

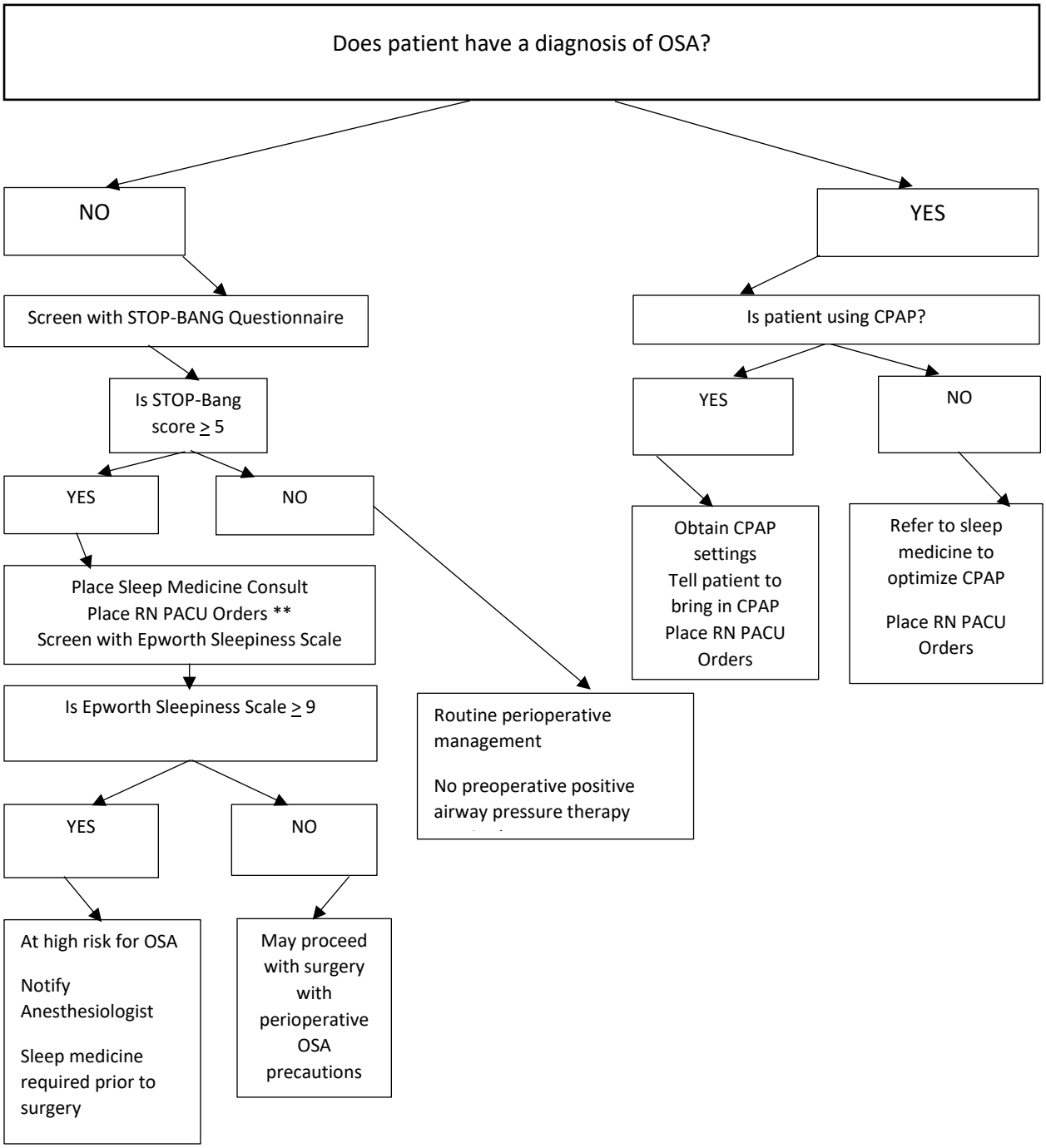
Logic Model: Obstructive Sleep Apnea (OSA) in Surgical Patients at the VA Boston



Rationales and Assumptions:
•Patients with suspected OSA/known OSA are at increased risk for postoperative adverse events.
•Implementing a perioperative clinical pathway will help identify patients at risk for OSA. This will also increase referrals to pulmonary service (suspected OSA/noncompliant CPAP users) which will help reduce adverse postoperative events.

Appendix E

OSA Perioperative Clinical Pathway



*Perioperative OSA precaution:

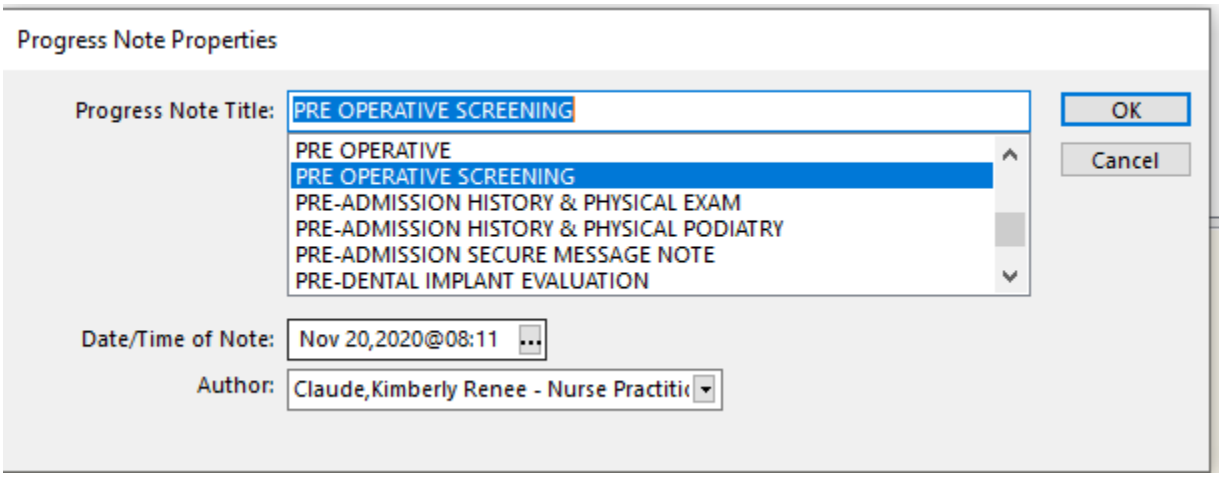
Preoperative: Place RN PACU orders; *Known OSA:* obtain CPAP settings, have CPAP machine stand by

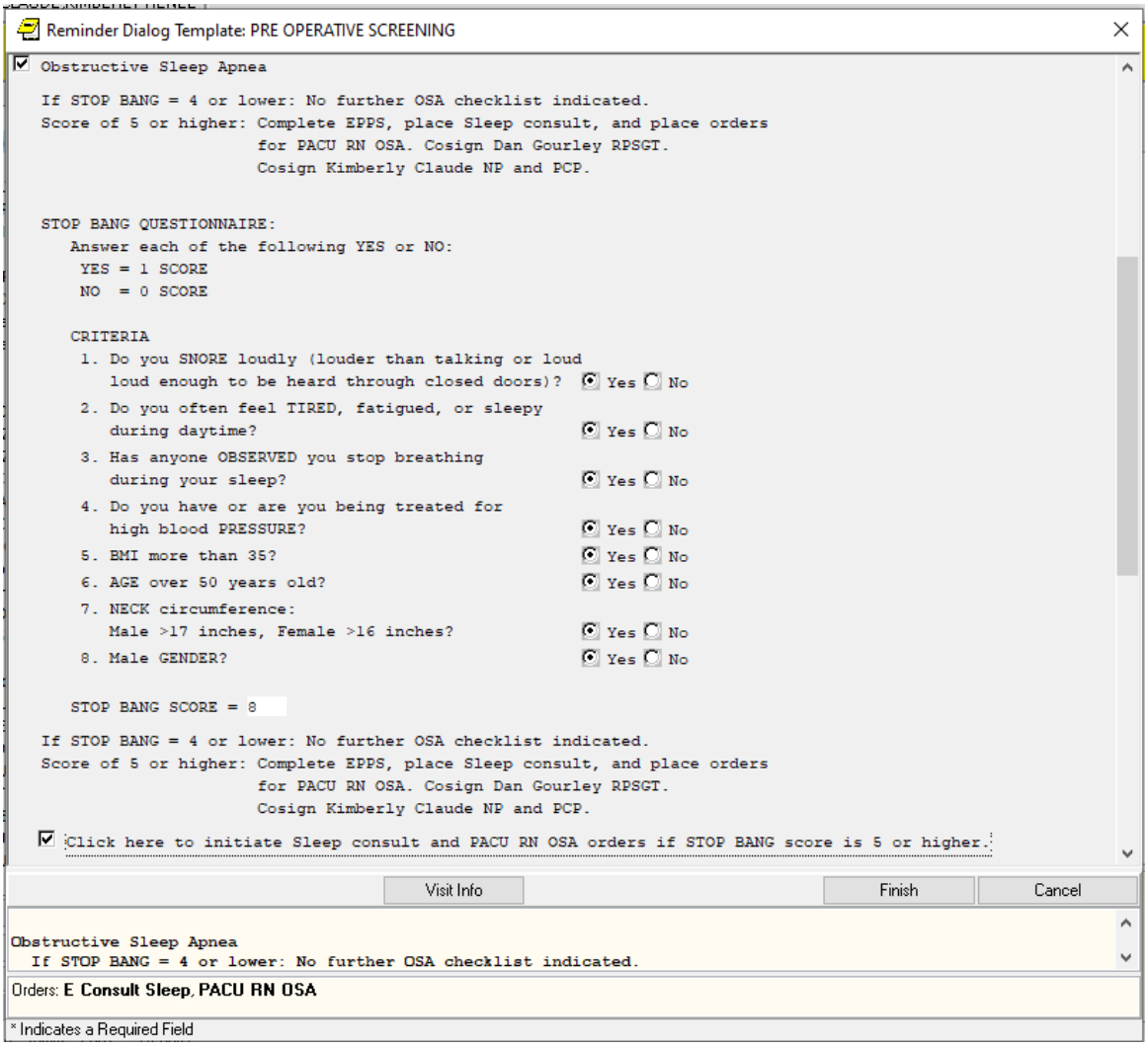
Interoperative: Anesthesiologist transfers OSA/high risk OSA with O2 non-rebreathing mask (exception ENT)

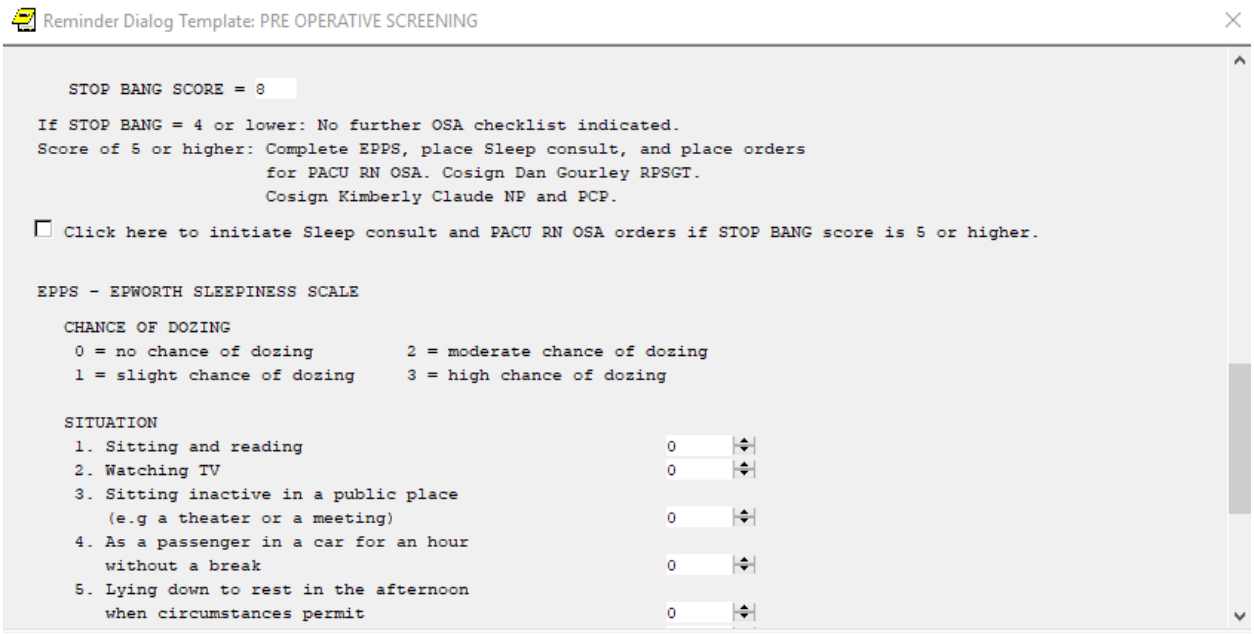
Postoperative: Head of the bed >30 degrees; Connect to CPAP; educate patient/family to continue home CPAP

Seet, Sleep Medicine Clinic, 2013.Weinberg, BMJ, 2013.

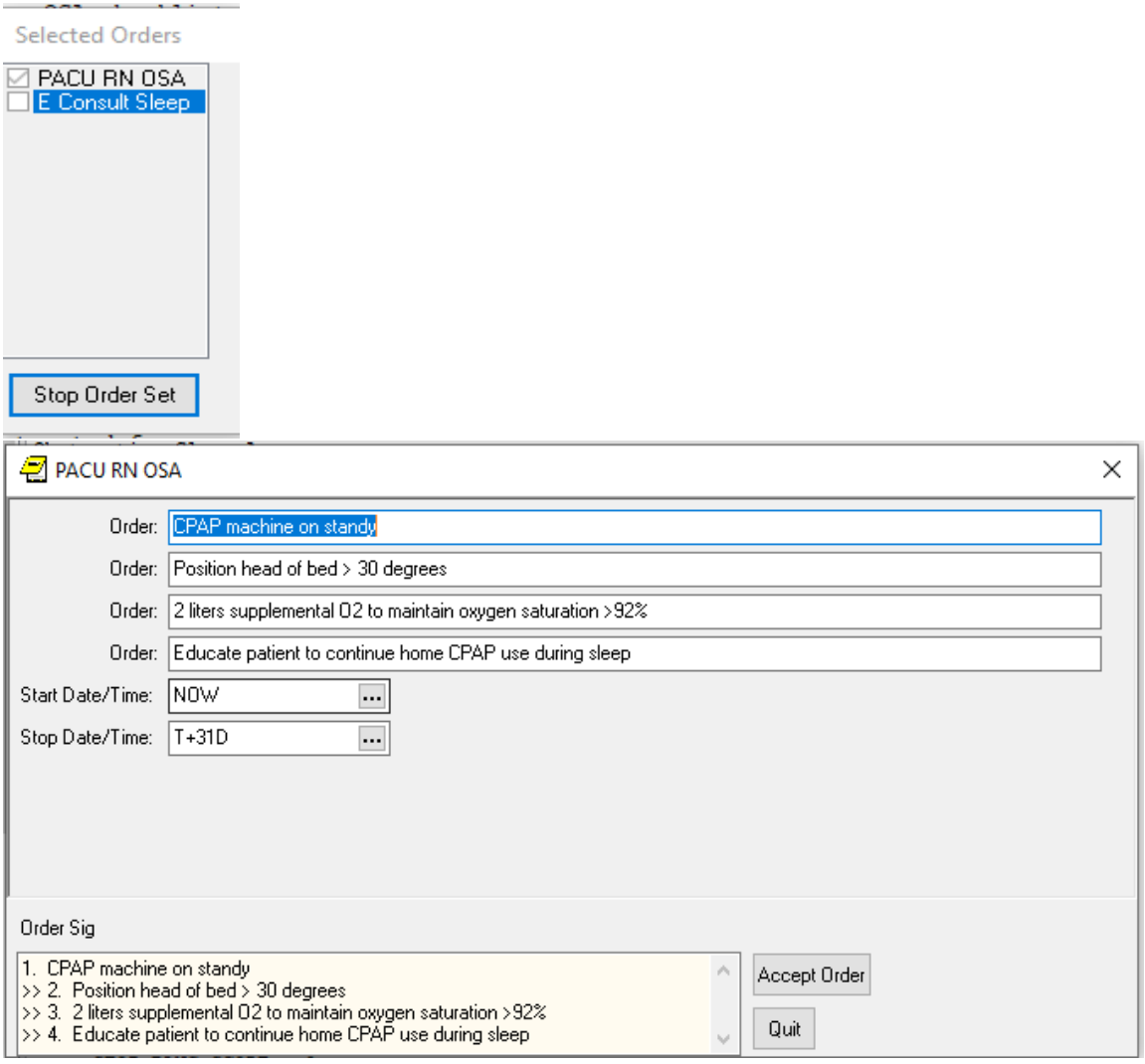
Appendix F Preoperative Screening Note

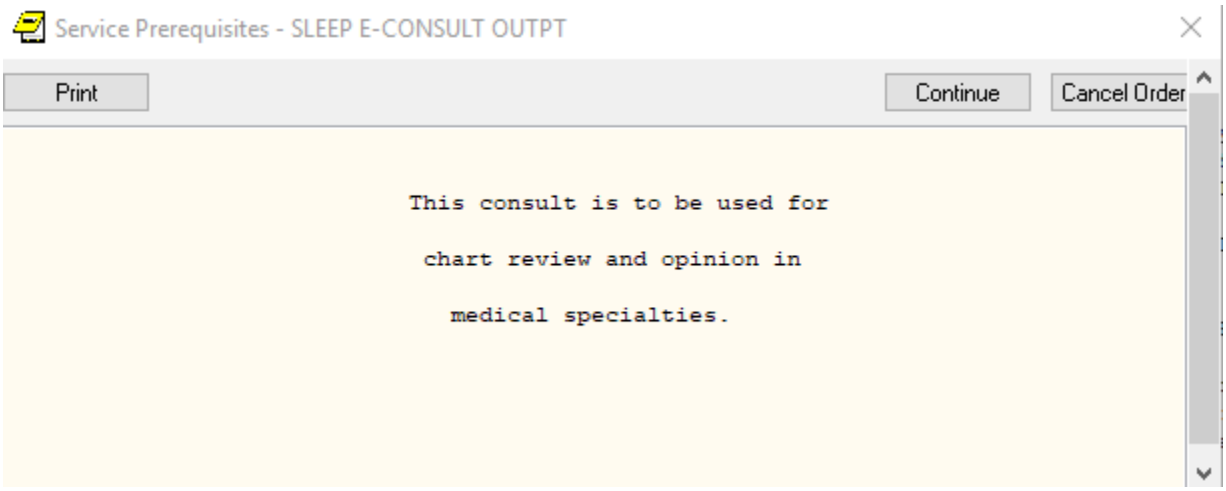




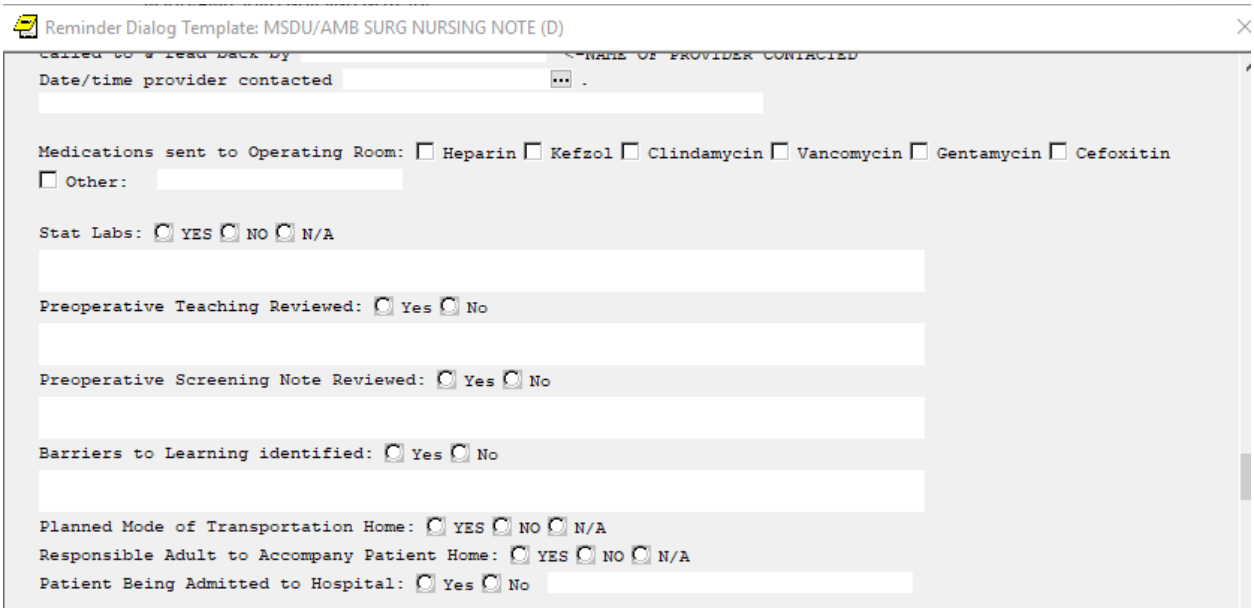

Reminder Dialog Template: PRE OPERATIVE SCREENING
STOP BANG SCORE = 8
If STOP BANG = 4 or lower: No further OSA checklist indicated.
Score of 5 or higher: Complete EPPS, place Sleep consult, and place orders
for PACU RN OSA. Cosign Dan Gourley RPSGT.
Cosign Kimberly Claude NP and PCP.
Click here to initiate Sleep consult and PACU RN OSA orders if STOP BANG score is 5 or higher.
EPPS - EPWORTH SLEEPINESS SCALE
CHANCE OF DOZING
0 = no chance of dozing
1 = slight chance of dozing
2 = moderate chance of dozing
3 = high chance of dozing
SITUATION
1. Sitting and reading 0
2. Watching TV 0
3. Sitting inactive in a public place
(e.g a theater or a meeting) 0
4. As a passenger in a car for an hour
without a break 0
5. Lying down to rest in the afternoon
when circumstances permit 0

Appendix G PACU RN ORDERS and Pulmonary Electronic Consult




Service Prerequisites - SLEEP E-CONSULT OUTPT
Print
Continue
Cancel Order
This consult is to be used for
chart review and opinion in
medical specialties.

Appendix H MSDU/AMB SURG NURSING NOTE (D)



Appendix I

Measures Table

What is the overall goal of the project? **1. Reduce postoperative adverse events for patients with obstructive sleep apnea (OSA) and at high risk for OSA 2. Improve referrals to pulmonary service for patients identified at high risk for OSA**

What is your project PICO question? **Among preoperative patients having surgery at Veterans Affairs in Boston; who are identified at high risk for OSA (STOP-Bang score >5) and known OSA, will implementation of a clinical pathway through the perioperative period reduce postoperative adverse events and improve referrals to the outpatient pulmonary service?**

What are your Specific Aim(s) (can be called objectives); **1. To construct and implement an OSA perioperative pathway that allows all patients who are having surgery to be screened for OSA 2. To integrate evidence-based care strategies into the OSA perioperative pathway for those identified as high risk for OSA (STOP-BANG score ≥5) and patients with known OSA 3. To increase postoperative pulmonary service referrals for patients at high risk for OSA**

Expected Outcome(s)*	How will you operationalize/measure the outcome	Where will you get the information	Will you have a Comparison Group?	Analysis
Utilization of OSA perioperative clinical pathway	Algorithm and checklist for perioperative OSA patients All patients having surgery was optimized the OSA perioperative pathway; with a benchmark of 80%	Chart review	Post implementation	Monthly frequency and proportion of patients screened for OSA % change improvement
Increased patient referrals to pulmonary service for patients identified at high risk for OSA	Utilization of clinical pathway It was expected that all patients with a STOP-BANG score of ≥5 combined with an ESS score of 9 will be referred to pulmonary service	Chart review- consult tracking	Pre-post implementation	Frequency and proportion of consults to pulmonary from preadmission testing clinic
Improved communication throughout the multidisciplinary perioperative services	Self-report for each clinical person per section via survey	Survey	Post Implementation	Survey results Mean score

Appendix J

Survey Questions

Domains: Feasibility, value of care, self-efficacy, interdisciplinary communication

Answers: Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

1. The perioperative pathway for obstructive sleep apnea (OSA) patients is easy to use.
2. The perioperative OSA pathway enhances OSA focused communication between pre-op staff and the attending anesthesiologist
3. Pre-op patients identified at risk for OSA are referred to Pulmonary
4. The PRE OPERATIVE SCREENING note in computerized patient record system (CPRS) is easy to understand
5. The perioperative pathway adds value to the care of perioperative patients with obstructive sleep apnea
6. Interdisciplinary communication about OSA focused care has improved since implementation of the pathway
7. I intend to continue to use the OSA perioperative pathway once the QI project is completed

Appendix K

American Federation of Government Employees Approval

That is fine with me

On Mon, Nov 30, 2020 at 12:53 PM Claude, Kimberly R. <Kimberly.Claude@va.gov> wrote:

Hello-

My name is Kimberly Claude, I am a nurse practitioner at the VA Boston in surgical services. I am also a Doctorate of Nursing Practice student at UMass Boston.

I am writing you this email because earlier this fall I implemented a quality improvement project at the VA Boston; a perioperative pathway for obstructive sleep apnea patients.

I am requesting permission to survey the perioperative nursing staff as well as the providers (PA/NPs/RN/LPNs) in the pre admission testing clinic. This will be an anonymous electronic survey.

The domains I will be focusing on in this survey are feasibility, value of care, and self-efficacy and interdisciplinary communication in regards to this project. I have attached my abstract as well as my survey questions.

Please let me know if you require any further information or documents.

Thank you for your time.

Best,

Kim

Kimberly R. Claude MSN, ANP-BC

Otolaryngology Nurse Practitioner

VA Boston Healthcare System

Jacquelyn Rose RN MSN

President NAGE R1-187

VA Boston Healthcare System

Appendix L

CLINICAL QUALITY IMPROVEMENT CHECKLIST

Date: 12/10/19	**Project Leader: Kimberly Claude**
Project Title: Implementation of a Perioperative Pathway for Individuals With or at High Risk for Obstructive Sleep Apnea	
Institution where the project will be conducted: VA Boston	

Instructions: Answer YES or NO to each of the following statements about QI projects.	**YES**	**NO**
The specific aim is to improve the process or deliver of care with established/ accepted practice standards, or to implement change according to mandates of the health facilities' Quality Improvement programs. There is no intention of using the data for research purposes.	**x**	
The project is **NOT** designed to answer a research question or test a hypothesis and is **NOT** intended to develop or contribute to generalizable knowledge.	**x**	
The project does **NOT** follow a research design (e.g. hypothesis testing or group comparison [randomization, control groups, prospective comparison groups, cross-sectional, case control]). The project does **NOT** follow a protocol that over-rides clinical decision-making.	**x**	
The project involves implementation of established and tested practice standards (evidence based practice) and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **NOT** develop paradigms or untested methods or new untested standards.	**x**	
The project involves implementation or care practices and interventions that are consensus-based or evidence-based. The project does **NOT** seek to test an intervention that is beyond current science and experience.	**x**	
The project has been discussed with the QA/QI department where the project will be conducted and involves staff who are working at, or patients/clients/individuals who are seen at the facility where the project will be carried out.	**x**	
The project has **NO** funding from federal agencies or research-focused organizations, and is not receiving funding for implementation research**.**	**x**	
The clinical practice unit (hospital, clinic, division, or care group) agrees that this is a QI project that will be implemented to improve the process or delivery of care.	**x**	
The project leader/DNP student has discussed and reviewed the checklist with the project Course Faculty. The project leader/DNP student will **NOT** refer to the project as research in any written or oral presentations or publications.	**x**	

ANSWER KEY: If the answer to **ALL** of these questions is **YES**, the activity can be considered a Clinical Quality Improvement activity that does not meet the definition of human research. **UMB IRB review is not required**. **Keep a dated copy of the checklist in your files.** If the answer to ANY of these questions is NO, the project must be submitted to the IRB for review.

Checklist for Students Conducting Academic Projects Within VA Boston HCS	
Project Title	**Implementation of a Perioperative Pathway for Individuals With or at High Risk for Obstructive Sleep Apnea**
Name	**Kimberly Claude**
Position	**NP**
Unit/Service Line	**Surgical Services**
Nurse Manager / Immediate Supervisor	**Dr. John Gooey**
University	**UMass Boston**
University Advisor	**Dr. Eileen Stuart-Shor**
VA Boston HCS Preceptor and VA Nurse Scientist	

I am conducting an academic project (e.g. Capstone project, etc.) in partial fulfillment of the following degree:

☐ MSN
x☐ DNP
☐ PhD
-----Other. Please specify: _____

Anticipated graduation date: May 2021

When do you plan to conduct your project? Summer 2020

Key Stakeholders: Please provide units/care areas where you plan to conduct the project.

Unit/Care Area	Nurse Manager	Service Line/ Associate Chief Nurse	Other (Please specify Position)
1.Dr. Shanahan		Anesthesia Service	PATC medical director
2.Andrea Braham		Nursing Service	
3. Anna Pham		Surgical Service	PATC manager
4. Dr. Gottlieb		Pulmonary Service	Director
Project Proposal Information **Instructions:**			

1. All students conducting an academic project at VA Boston HCS **will be required to complete a Project Proposal.** **2. If your project involves data collection & analysis, include a detailed description of your data collection and security plan in your Project Proposal.** **3. Submit your Project Proposal to the ACNS/Academic Affiliations** **4. Contact other key stakeholders as directed and include additional information as specified in the instructions below.**			
NO	**YES**	**Project Plan**	**Instructions**
☐	X☐	**a. Does the University have an Affiliation Agreement with VA Boston?** You may not conduct a school related project at VA Boston without an Academic Affiliation Agreement.	Contact the ACNS/Academic Affiliations for verification.
☐	X☐	**b. Will you be utilizing the VISN 1 Library services for this project?**	If yes, contact VISN 1 Library Services for more information.
☐	X☐	**c. Does your project involve education for staff?** **If yes, does your project involve a pre-test/post-test component?** ☐ Yes ☐ X No	If yes, include a detailed **Staff Teaching Plan** (Attachment B) and the pre/post test (if applicable) with your project proposal.
X ☐	☐	**d. Does your project involve education for patients?**	If yes, Include a detailed **Patient Teaching Plan** (Attachment C) with your proposal.
☐	☐x	**e. Does your project involve a nursing practice or process change?**	If yes, attach relevant policies or procedures to your project proposal.
X	☐	**f. Does your project involve an administrative practice or process change?**	If yes, attach the relevant policies to your proposal.
X ☐	☐	**g. Does your project involve a secondary analysis of current practice or processes?**	If yes, provide a complete description of the secondary analysis plan in your project proposal.

☐	☐X	**h. Does your project involve conducting a staff survey?**	If yes, provide a copy of the survey and a description of your plan to conduct the survey.
NO	**YES**	**Project Plan**	**Instructions**
☐	X☐	**i. Does your project require AFGE notification?**	If yes, provide verification of notification with your proposal.
☐	X☐	**j. Does your project involve the presentation or collection of any data (patient, staff or organization level data)?**	If yes, a formal VA Boston IRB Quality Assurance(QA)/Quality Improvement (QI) determination is required prior to starting the project. Refer to the **QA/QI Determination Submission Instructions** (Attachment D). The QA/QI determination will establish if your project is QA/QI or research. The IRB Chair or designee will notify you of your project status determination. Please allow 4-6 weeks for a QA/QI determination. See the QA/QI Determination Flowchart below. 1. If your project is determined to be QA/QI, you will need approval to conduct the project from key VA Boston stakeholders, including the unit/care area Nurse Manager(s), Associate Chief Nurse(s), including Academic Affiliations and VA Boston HCS Nurse Scientist listed in the table on the first page. Other approvals may be required based on the scope of the project 2. If the project is determined to be research, IRB and R&D approval are required before you can conduct the project. Do not start the research study until you receive a letter from the ACOS R&D indicating that you have permission to conduct the study. This letter is required before you can conduct an academic project within VA Boston that is determined to be research.

Yes	No	Dissemination Plan	Instructions
X ☐	☐	**k. Permission to disseminate project results outside VA Boston has been obtained from 1) your immediate supervisor; 2) VA Boston HCS Institutional Review Board (IRB) 3) Associate Chief of Nursing or Service Line Chief and 3) Director's Office**	**NOTE:** Permission to disseminate project results outside VA Boston is required through the Director's Office as outlined in VA Handbook 1058.05 and VA Memorandum LD-077 VHA OPERATIONS ACTIVITIES AND RESEARCH. This includes dissemination in the form of oral presentations and/or manuscripts submitted to your academic institution. Please allow 3-4 weeks to obtain the necessary signatures required for dissemination.

Timeline

Choose committee	early February 2020
Develop Proposal	January 2020-February 2020
Determine if IRB required	Summer 2020
Proposal Hearing	Summer 2020
Carry Out Project	
Training staff	September 2020
Start of project	October 2020
Evaluation/Analysis	throughout project October 2020- January 2021
Writing paper	January 2021- February 2021
Present outcomes	February 2021