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The importance of the STOP- BANG questionnaire as a preoperative assessment tool for the elderly population

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ABSTRACT

Undiagnosed obstructive sleep apnea (OSA) may adversely impact surgical patients and can lead to increased morbidity and mortality during the perioperative period, especially among the geriatric patient population (Chung et al. 2008, 2012, 2014; McDonald et al., 2018; Zietlow et al., 2018; Singh et al., 2012). The setting of this quality improvement project was a preoperative anesthesia and geriatric evaluation clinic housed within a 957-bed tertiary academic affiliated hospital. The sample included 45 patients who met the criteria established for surgery and OSA screening preoperatively. Nine patients (20.0%) were assessed as low risk (Stop-bang [SB] score </=2) for OSA, and 36 patients (80.0%) had a prior diagnosis from an ICD-9/10 code or a SB score >/= 3 indicative of high-risk for OSA. The retrospective utilization of a modified SB screening on charts that did not receive a clinical OSA evaluation ($n = 52$) detected 23 (44.2%) patients who were considered high-risk for OSA but were not identified prior to surgery. The SB questionnaire is underutilized, and patients' OSA is often unidentified prior to surgery.

Introduction

Obstructive sleep apnea (OSA), a type of sleep-disordered breathing, is a medical condition in which the pharyngeal walls may become completely or partially obstructed repeatedly during sleep.[1,2] This results in hypoxia, hypercarbia, fragmented sleep, and medical complications including: hypertension, diabetes mellitus, obesity, stroke, myocardial infarction, cancer, congestive heart failure, and suicide.[3,4] The prevalence of OSA is increasing with the growth of at-risk and undiagnosed populations, such as the elderly.[3,5]

Background and significance

Undiagnosed OSA is a public health concern that is associated with poor patient outcomes and increased medical costs.[6,7] Undiagnosed OSA can adversely impact surgical patients and lead to increased morbidity and mortality during the perioperative period, especially among the geriatric patient population.[1,2,8–10] The perioperative period places patients with undiagnosed OSA at a higher risk of experiencing apneic episodes from sedatives, narcotics, and general anesthesia.[3] Patients at risk for OSA are susceptible to perioperative complications of hypoxemia, respiratory failure, muscle weakness, difficult intubation, delayed extubation, new onset atrial fibrillation, myocardial infarction, hemodynamic instability, cardiac arrest, delirium, sudden death, and cerebral microvascular damage in elderly patients.[1,2,13–16]

One third of elective surgical procedures occur in the geriatric patient population, making preoperative screening for OSA clinically significant in this population.[9,10] Aging increases the severity of OSA in elderly patients.[11] Geriatric specific identification of OSA can lead to proper resource allocation and risk mitigation in the development of post-surgical sequalae.[7,10]

The American Society of Anesthesiologists (ASA), in their updated practice guideline recommends routine preoperative screening for OSA to identify potential complications for patients.[12] Two-third of healthcare institutions in the United States do not have policies regarding perioperative care for patients with OSA.[3] Complications are compounded in the geriatric population, thus identification of OSA is critical.

The STOP-BANG (SB) questionnaire, a validated preoperative assessment tool for OSA includes 8 patient related-items (snoring,

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tiredness, observed apnea, blood pressure, body mass index [BMI], age, neck circumference, and gender) with possible scores ranging from 0 to 8.[1,2] A 2012 study used a SB score to determine the risk of OSA. Chung and colleagues found that a score of 0–2 was associated with a 46% predicted probability of OSA, a score of 3 is associated with a 72% predicted probability of OSA, and a score >/= 7 is associated with an 86% predicted probability of OSA.[2] The SB questionnaire has a high sensitivity for the detection of OSA.[1]

Preoperative assessment is critical for the identification of patients with OSA and those at high-risk for OSA.[6] Despite the recommendation for screening, SB scores are not routinely documented preoperatively for surgical patients.[6,12] Patients with a SB score >/= 5 have a five-fold increased risk of developing intra-operative and postoperative complications and a patient with a SB score of 6 or more is five times more likely to have an unplanned admission to the intensive care unit compared to a patient with a SB score of 2.[13,16]

The goal of this project was to determine the rates of both OSA and the rates of postoperative cognitive dysfunction in geriatric patients undergoing colorectal or abdominal surgery. Patients aged 65 years or older were scheduled for a preoperative anesthesia evaluation in the geriatric clinic upon the surgeon's request. Assessment of OSA risk and baseline mental cognition were considered an essential part of the pre-anesthesia testing to be completed by the clinic providers, which include APRNs, prior to the day of surgery.

Material and methods

Design and sample

This was one component of a larger quality improvement project of patients who were 65 years of age or older, scheduled for colorectal or abdominal surgery, and were scheduled to undergo a geriatric anesthesia evaluation with risk assessment for OSA preoperatively.

Organization setting

The setting was a preoperative anesthesia and geriatric evaluation clinic housed within a 957-bed tertiary academic affiliated hospital. The project was granted IRB approval.

Data collection

Charts were selected of all patients who were 65 years of age or older, scheduled for colorectal or abdominal surgery, and were scheduled to undergo pre-anesthesia evaluation including risk assessment for OSA preoperatively in the site's a geriatric anesthesia clinic. Demographic statistics included age, gender, weight (kg), BMI (kg/m^2), and the ASA physical status classification. Outcome data included determination of the presence of OSA via an International Classification of Diseases (ICD)-9 code or ICD-10 code. For those without a preexisting OSA diagnosis, a SB score was recorded in the preanesthetic note at the time of screening. Other preoperative variables of interest included comorbidities such as: hypertension, diabetes mellitus, history of myocardial infarction, coronary artery disease, history of or current malignant cancer, history of or current atrial fibrillation, history of cerebrovascular accident, and obesity. Baseline cognitive function was recorded on admission by means of the St. Louis University Mental Status (SLUMS) Exam or Montreal Cognitive Assessment (MOCA) in the preanesthetic clinic.

Results

The sample included 45 patients who met the criteria established for surgery and OSA screening preoperatively. Nine patients (20.0%) were low-risk for OSA (Stop-bang score </=2), and 36 (80.0%) had either a prior diagnosis for OSA or a SB score indicative of high-risk (SB score >/= 3). There was a diagnosis of OSA present in the patients' medical history for 17 patients (37.8%), and 19 (42.2%) were categorized as at risk for OSA (Fig. 1). Descriptive statistics of the sample are presented in Table 1. The overall mean age was 77.6 years, the mean BMI was 29.1 kg/m^2, and the mean number of comorbid conditions was 2.6, with 91% (n = 41) of the sample considered ASA 3 or greater. The most prevalent comorbid conditions were hypertension (n = 33, 73.3%) and cancer (n = 35, 77.8%). Patients in the low risk group as determined by a SB score of 0–2 were female, mean age was 80.3 years, and the mean BMI was 24.9 kg/m^2. Patients diagnosed with OSA or in the high-risk group were male (n = 23, 63.9%), had a mean age of 76.9 years and a mean BMI of 30.2 kg/m^2 (see Table 1).

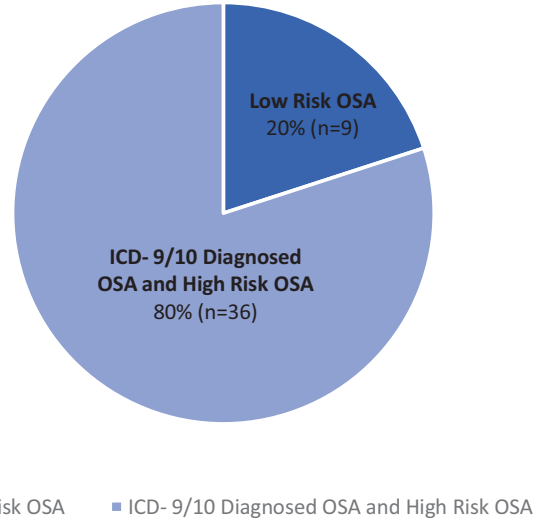

Fig. 1. The rate of OSA among patients among geriatric patients undergoing colorectal or abdominal surgery.

The charts of the patients scheduled for colorectal of abdominal surgery who did not receive a complete OSA assessment were reviewed (n = 52). Twenty-three (44%) additional patients were found to have a SB score greater than 3 and may be considered high-risk for OSA. These patients were not identified prior to surgery (see Fig. 2).

Discussion

Preoperative anesthesia screening provides an opportunity for APRNs to assess geriatric patients for conditions that increase their perioperative risk such as OSA. Findings of this project emphasize the importance of preoperative screening for OSA using the SB questionnaire to reduce morbidity, mortality, and perioperative complications among the geriatric surgical patient population. The SB questionnaire can be readily incorporated in the preoperative testing setting due to its' 8-question format and SB scores. In this study, 80.0% (n = 36) of the patient sample had either a prior diagnosis for OSA or a SB score indicative of high-risk. Of these 36 patients, 52.8% (n = 19) were at risk for OSA and would have been unidentified and susceptible to poor surgical outcomes perioperatively if there was a lapse in preoperative screening for OSA.

An additional 52 patients were scheduled for colorectal or abdominal surgery but did not receive a SB assessment preoperatively in the clinic. This project sought to further investigate the likelihood of an undiagnosed population by incorporating a modified SB Questionnaire for the patients who lacked either an OSA diagnosis or preoperative SB score in the chart. A modified SB assessment was completed utilizing the objective SB criteria (age >50, BMI, and hypertension

Table 1
Descriptive statistics of patients >/= 65 years of age undergoing colorectal or abdominal surgery.

	Total (*N* = 45) Mean (SD)	Low Risk OSA (*N* = 9) Mean (SD)	ICD- 9/10 Diagnosed OSA and High-Risk OSA (*N* = 36)
Age (years)	77.6 (5.8)	80.3 (6.4)	76.9 (5.5)
BMI Value (kg/m^2)	29.1 (5.5)	24.9 (3.0)	30.2 (5.5)
Comorbid conditions	2.6 (11.5)	0 (2.6)	2.1 (9.0)
	N (%)	*N* (%)	*N* (%)
Gender			
Male	23 (51.1)	0 (0.0)	23 (63.9)
Female	22 (48.9)	9 (100)	13 (36.1)
ASA Physical Status			
1	0 (0.0)	0 (0.0)	0 (0.0)
2	4 (8.9)	1 (11.1)	3 (8.3)
3	39 (86.7)	8 (88.9)	31 (86.1)
4	2 (4.4)	0 (0.0)	2 (5.6)
5	0 (0.0)	0 (0.0)	0 (0.0)
Obesity BMI>30 kg/m^2			
No	27 (60.0)	9 (100.0)	18 (50.0)
Yes	18 (40.0)	0 (0.0)	18 (50.0)
Comorbidity by ICD-9 or ICD-10			
Hypertension			
No	12 (26.7)	3 (33.3)	9 (25.0)
Yes	33 (73.3)	6 (66.7)	27 (75.0)
Type 2 Diabetes Mellitus			
No	35 (77.8)	8 (88.9)	27 (75.0)
Yes	10 (22.2)	1 (11.1)	9 (25.0)
Myocardial Ischemia			
No	40 (88.9)	8 (88.9)	32 (88.9)
Yes	5 (11.1)	1 (11.1)	4 (11.1)
Coronary Artery Disease			
No	33 (73.3)	8 (88.9)	25 (69.4)
Yes	12 (26.7)	1 (11.1)	11 (30.6)
Congestive Heart Failure			
No	42 (93.3)	9 (100.0)	33 (91.7)
Yes	3 (6.7)	0 (0.0)	3 (8.3)
Stroke			
No	36 (80.0)	6 (66.7)	30 (83.3)
Yes	9 (20.0)	3 (9)	6 (16.7)
Cancer			
No	10 (22.2)	2 (22.2)	8 (22.2)
Yes	35 (77.8)	7 (77.8)	28 (77.8)
Atrial Fibrillation			
No	35 (77.8)	7 (77.8)	28 (77.8)
Yes	10 (22.2)	2 (22.2)	8 (22.2)
Abnormal Preoperative Cognition			
No	10 (22.2)	1 (11.1)	9 (25.0)
Yes	35 (77.8)	8 (88.9)	27 (75.0)
History of Post-Operative Delirium			
No	39 (68.7)	8 (88.9)	31 (86.1)
Yes	6 (13.3)	1 (11.1)	13.9 (36)

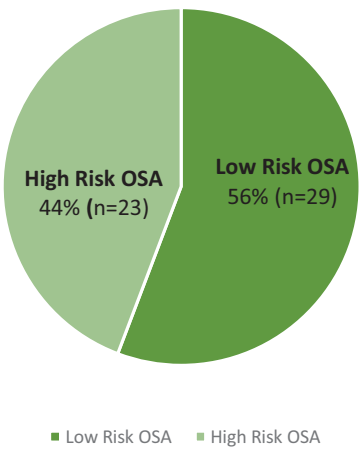

Fig. 2. Rates of OSA among patients >/= 65 years undergoing colorectal or abdominal surgery identified by a modified STOP-BANG questionnaire.

diagnosis). This modified sample yielded an additional 23 patients identified as high-risk for OSA with SB scores >/= 3.

One-third of elective surgical procedures occur in the geriatric patient population emphasizing the need to make OSA screening routine.[9,10] Geriatric patients are more susceptible to the numerous risks associated with OSA perioperatively.[6,11] This project highlights the degree to which patients receive inconsistent preoperative screening, and therefore may be unidentified.

Without an OSA screening, the geriatric surgical population presents a safety concern as these patients are vulnerable to perioperative complications.[1,2] Rates of postoperative complications were 3.9 times higher among high-risk OSA patients compared to low-risk patients and cardiopulmonary complications increased two to three-fold in patients with OSA undergoing noncardiac surgery.[17] The SB assessment continues to be underutilized and surgical patients remain unidentified. Singh reported the identification of patients with moderate to severe OSA was missed by 60% of anesthetists and by 93% of surgeons.[18] Subjective identification of patients with OSA is ineffective and emphasizes the importance of validated tools like the

SB questionnaire as a preanesthetic screening for OSA.[1,2,18] A multidisciplinary, geriatric focused approach has been recommended and shown to be effective in reducing morbidity and mortality perioperatively and may aid in the preoperative identification of OSA.[9,10]

Screening patients for OSA may reduce perioperative complications, mitigate risks, and improve resource utilization.[1,2,17,19] High SB scores can be used to practice perioperative precautions such as preparing for difficult intubations, using short acting anesthetics, administering adequate neuromuscular blocker reversal, and utilizing continuous positive airway pressure after surgery.[20] Preoperative screening and knowledge of pathologies related to OSA may improve patient safety as there is a significant difference in 1-year mortality between low-risk and high-risk for OSA groups.[20]

Wortham et al., examined the implementation of an OSA protocol in a post-anesthesia care unit (PACU).[19] Protocols addressing the perioperative care of patients high-risk for OSA, and screening not only mitigates perioperative risks, but appropriates resource utilization.[19] An established protocol to address the perioperative care of patients high-risk for OSA warrants consideration, especially for those who remain unidentified.

Conclusion

Undiagnosed OSA is a concern for the patients and healthcare providers due to health risks and associated medical costs.[6] Undiagnosed OSA adversely impacts surgical patients leading to an increased morbidity and mortality during the perioperative period, especially in the geriatric patient population.[1,2,8–10,18] As the role of APRNs in the preoperative setting continues to grow, it is important for APRNs to be familiar with screening tools to identify surgical patients at risk of OSA. The SB questionnaire is an easily adapted preoperative assessment tool. The use of the SB questionnaire can identify high-risk patients, stratify risk, and enhance patient safety among geriatric patients undergoing surgery.

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