Perianesthesia Nurses' Survey of Their Knowledge and Practice With Obstructive Sleep Apnea

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Purpose: *Anesthesia, sedation, and analgesia can negatively impact adult patients with obstructive sleep apnea (OSA). Despite known risks, current evidence, and practice guidelines, insufficient evidence exists that standardization and clinical application of OSA screening tools, problem identification, and perioperative nursing intervention and management strategies are consistently implemented for OSA patients across perianesthesia settings. The purpose of this study was to conduct a knowledge and practice assessment of perianesthesia nurses who care for adult patients with diagnosed or undiagnosed OSA.*
Design: *An anonymous descriptive study was used to survey perianesthesia nurses who care for adult patients with OSA who present for elective surgical procedures.*
Methods: *A total of 1,222 participants completed an expert-developed 27-question online survey.*
Findings: *The findings indicate the need for more education and research across all perianesthesia settings.*
Conclusions: *Next steps also include policy development and an interprofessional collaborative infrastructure nurses need to translate evidence-based screening and management strategies into their clinical practice.*

Keywords: *perianesthesia, nursing, obstructive sleep apnea, OSA.*

ANESTHESIA, SEDATION, AND ANALGESIA can negatively impact adult patients with obstructive sleep apnea (OSA). Increased morbidity and mortality throughout the preoperative, intraoperative, and postoperative phases of the perioperative experience have been associated with the management of adult patients diagnosed with OSA. Adverse outcomes may be related to respiratory depression or arrest after the administration of opioid or sedative medications, difficult intubation or inability to intubate, and respiratory obstruction after extubation.[1]

Despite known risks, current evidence, and practice guidelines from the American Society of Anesthesiologists[2] and from the American Society of PeriAnesthesia Nurses (ASPAN),[3] insufficient evidence exists[4] that standardization and clinical application of OSA screening tools, problem identification, and perioperative nursing intervention and management strategies are consistently implemented for OSA patients across settings where nurses deliver care. In

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Conflict of interest: None to report.
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1089-9472/$36.00
https://doi.org/10.1016/j.jopan.2018.01.008

addition, conflicting reports exist regarding the validity and reliability of OSA screening and assessment measures, but evidence suggests that the STOP-BANG questionnaire is most sensitive in identifying patients at risk for OSA.[5-7] Adult patients at risk for OSA without a formal diagnosis present a great challenge for perianesthesia nurses, who must be knowledgeable of risk factors in this population and carefully manage these OSA patients across perianesthesia settings to avoid adverse outcomes.[8]

Background

Although much evidence in the medical literature exists regarding screening, assessment, and perioperative and periprocedural management of OSA, little definitive work has focused on evidence-based nursing interventions and care for these patients in response to identification of patients with OSA. Although most perioperative nurses have a basic knowledge of OSA, the degree of understanding and patient management is varied. Because approximately 1% to 5% of the general population is affected by sleep apnea and up to 85% of patients with OSA are undiagnosed,[9-13] perioperative nurses must understand the pathophysiology of OSA and identify and manage these patients appropriately to avoid adverse postanesthesia outcomes.

Kaw et al[14] conducted a meta-analysis of the association between OSA and postoperative outcomes from reviews of studies that included 6,247 records and 3,942 patients. These investigators reported a higher incidence of respiratory desaturation and failure, postoperative cardiac events, including cardiac arrest, myocardial infarction, and unspecified cardiac arrhythmias, and critical care admission in patients with OSA.

Mutter et al[15] conducted a matched cohort study of postoperative outcomes in patients with OSA and reported increased risks for postoperative complications in patients with OSA. These investigators compared postanesthesia outcomes for OSA patients receiving continuous positive airway pressure therapy to matched controls from the general population who had undergone the same procedures. In addition, they identified relevant comorbidities that affected postanesthesia outcomes, including chronic obstructive pulmonary disease, ischemic cardiac disease, stroke, renal disease, and diabetes. These investigators found that patients with OSA, both diagnosed and undiagnosed, had a "two-fold increased risk of respiratory complications," greater risk of respiratory failure, and acute respiratory distress syndrome, particularly after abdominal and cardiovascular surgeries. Brousseau et al[16] studied a total of 86 patients during a 6-month study and concluded that postanesthesia care unit (PACU) length of stay was significantly longer in patients where the PACU nurse indicated OSA had affected the postoperative course of treatment. Symptomatic OSA patients increased PACU demands with an increased length of stay and increased use of hospital resources.

Although the American College of Physicians,[17] the American Society of Anesthesiologists,[2] and the American Academy of Sleep Medicine[18] have published clinical practice guidelines with evidence-based screening, diagnosis, and medical management strategies, ASPAN published the only available evidence-based practice recommendation to inform and direct nurses in identifying and caring for these OSA patients.[3] Currently, most recommendations and guidelines are vague and include interventions that could be used, but insufficient evidence remains to provide clear direction for bedside nurses regarding best practices and specific interventions. In addition, without clear practice recommendations regarding nursing strategies for monitoring and management, little support exists for nurses and nurse leaders to purchase additional monitoring equipment, such as capnography for PACUs, and provide the capability to continuously monitor pulse oximetry and/or capnography on inpatient postsurgical units. Many hospitals and surgery settings are competing for limited financial resources and need best practice recommendations to justify budget expenditures.

Screening

Preprocedure and presedation screening is a common practice in today's clinical settings. Several screening tools are available, each with its own positive aspects and limitations. Three commonly used screening tools are the STOP-BANG Questionnaire, the Berlin Questionnaire, and the ASA checklist.[5-7] One study compared all three tools and concluded that additional research is needed

to adequately compare and contrast these tools, but that the STOP-BANG tool has been used to evaluate the largest number and broadest population of surgical patients.[19] Selecting a screening tool can prove challenging for clinicians. Although these three tools may similarly predict OSA risk, not all tools are equally predictive of OSA severity and impact on surgical outcomes.[19] Health care providers continue to struggle with patient management after the screening is completed and the identification of an OSA diagnosis or risk for OSA. Approximately 90% of patients at risk for OSA currently go undiagnosed.[20] Shear et al[21] found that two of five patients aged 50 years or older were at high risk for OSA. In many instances, sleep studies are recommended but are not completed because of limited access to sleep laboratories, cost of conducting the study, and the short timeframe between diagnoses of risk and the scheduled surgery.[22]

Williams et al[23] recognized the challenges imposed by lack of identifying and properly managing patients with OSA, and the importance of preoperative nurses' roles in identifying patients at risk. Educating perioperative nurses and incorporating the STOP-BANG Questionnaire into their preoperative assessment process resulted in a 16% improvement in identification of OSA and a 21% increase in nurses requesting anesthesia consultation.[23] When reviewing the completed OSA screening tool, physicians and advanced practice providers should take into consideration the knowledge level and understanding of patient risks by the nurses completing the assessment tool. Examples include measuring neck circumference in a consistent manner and actual versus stated patient weight used to calculate body mass index.[23] Communication of OSA diagnosis and risk during caregiver handoff reports is an important aspect in caring for this population.

Monitoring and Management

American Society of PeriAnesthesia Nursing Standards Practice Recommendation 2 for initial and ongoing vital signs assessment during Phase I and Phase II PACUs includes oxygen saturation monitoring.[24] However, continuous postoperative monitoring with pulse oximetry in the Phase II PACU or on inpatient units may not be consistently implemented across all practice settings. Many settings perform spot checks that have limitations including the intervention requiring the health care provider to enter the patient area and apply the device. This may awaken the patient and not allow nurses to get a true value for the patient when resting and unstimulated.

Capnography is another effective tool for monitoring patients at risk for or diagnosed with OSA. Waugh et al[25] conducted a meta-analysis of five studies published between 1995 and 2009 and concluded that end-tidal carbon dioxide monitoring during procedural sedation and analgesia is an important addition in detecting respiratory depression. These investigators also found that cases of respiratory depression were 17.6 times more likely to be detected if monitored by capnography than cases not monitored by capnography. In the perioperative setting, capnography use is common intraoperatively, but not widely used in Phase I or Phase II PACUs or other inpatient settings where patients are at risk for respiratory depression and obstruction. In a known high-risk group such as patients with OSA, capnography can be a very useful tool for nurses to promote safe care for this population.

The perioperative care team must manage these patients, minimize adverse outcomes, and provide safe care. Postoperative management is varied for patients who are at risk for or diagnosed with OSA and many times, is solely reliant on the nurse's clinical judgment. For patients who use continuous positive airway pressure at home, pulse oximetry is the gold standard in Phase I PACUs, but is not consistently used in Phase II areas or inpatient noncritical care areas.

Although the ASA Practice Guidelines for Perioperative Management of Patients with OSA found insufficient evidence to evaluate the effects of postoperative supplemental oxygen therapy in OSA patients, Liao et al[26] conducted a randomized controlled trial in 123 postoperative OSA patients receiving opioids and concluded that supplemental oxygen improved oxygenation and decreased the apnea-hypopnea index without increasing OSA patients' $P_{tc}CO_2$ levels or apnea-hypopnea events.

Pain Management

Identifying patients at risk for or diagnosed with OSA is important to developing an appropriate anesthesia plan, which includes postoperative monitoring and pain control.[27] Perioperative opioid-based pain management for OSA patients presents challenges because of concerns regarding potential respiratory compromise.[27] Opioid-based pain management may alter both pain processing and sensitivity to opioid effect.[28] Because of these concerns, postoperative pain is often undertreated in patients with OSA and morbid obesity, so analgesic combinations that act by differing mechanisms and add to analgesic efficacy rather than produce adverse effects should be used. Patient-controlled analgesia (PCA) is routinely used in most hospital settings for postoperative pain management. Patients achieve and maintain safe and effective pain management when PCAs are prescribed and monitored appropriately.[29] PCA should only be used when risk factors have been evaluated and benefits outweigh the risks. Factors associated with an increased risk for respiratory events include use of PCA basal rates.[30] In a meta-analysis of 14 randomized control trials, George et al[31] determined the risk for respiratory depression to be 4.68 times greater with the use of a basal rate versus demand dosing without a basal rate. The Institute for Safe Medication Practices recommends avoiding continuous basal rates in patients with or at risk for OSA.[32] In addition, the "American Society for Pain Management Nursing Guidelines for Opioid-Induced Sedation and Respiratory Depression" provide extensive guidance for nurses regarding assessment, monitoring, and management of patients with OSA.[33]

Significance of the Problem

Diagnosed and undiagnosed OSA places patients at risk for perianesthesia complications that may present monitoring and management challenges for interprofessional team members. Although evidence-based screening tools and practice recommendations are in place, consistent implementation across settings is an essential aspect of preventing complications and providing safe care for this patient population.[1-3,14]

Purpose

The purpose of this study was to conduct a knowledge and practice assessment of perianesthesia nurses who care for adult patients with diagnosed or undiagnosed OSA.

Design and Methods

An anonymous descriptive study was used to survey perianesthesia nurses who care for adult patients with diagnosed or undiagnosed OSA who present for elective surgical procedures. Data were collected relating to the nurse's perceptions of patient screening and management of OSA. Study approval was received from the Institutional Review Board from the Texas Christian University and the Board of Directors of the ASPAN. A 27-question survey was developed in consultation with a perianesthesia expert and an invitation to participate was distributed to ASPAN members, caring for adult patients throughout the preoperative, intraoperative, and postoperative phases of the perioperative experience. Potential participants received an email invitation to participate containing a link to consent and then to the survey. A total of 1,319 participants consented to participate. One thousand two hundred twenty-two participants were used for final data analysis with the elimination of missing data.

Data Analyses

The survey results were analyzed using descriptive statistics via the analysis program, SPSS version 23.0 (IBM, Armonk, NY). Each survey response set was randomly assigned a survey response number by the electronic survey tool (Qualtrics, Provo, UT). Coded data without any personal identifiers were downloaded to an Excel (Microsoft Corporation, Redmond, WA) spreadsheet, which the principal investigator used to complete the data analysis.

Findings

The mean age of the 1,222 participants was 52.9 years. The number of years in nursing ranged between 1 and 50 years, with a mean of 28.4 years, whereas the number of years working in perianesthesia nursing ranged between 1 and 46 years, with a mean of 16.6 years. The participants reported practicing in a variety of areas of

perianesthesia nursing with Phase I PACU (32.1%) and preassessment or preadmission testing (5.8%) as the most commonly reported. Forty-five percent of participants reported they worked in more than one area of perianesthesia nursing. Most participants worked in an acute-care inpatient facility (43.7%), held bachelor's degrees in nursing (53.4%), held a specialty nursing certification (61.7%), were employed full time (68.9%), and were a member of the ASPAN (85.5%). Although an invitation to participate was distributed only to ASPAN members, this interesting finding of ASPAN membership may reflect that this question was either not answered (12.6%) or the survey link may have been shared with practicing perianesthesia colleagues, but non-ASPAN members (1.9%) (Table 1). Thirty percent of participants prefer a hybrid of face-to-face and online method of completing continuing education (Table 2).

Most participants (81.2%) reported that they currently use *ASPAN Standards, Practice Recommendations and Interpretive Statements* in their work area and that they are familiar with *Practice Recommendation 10: The Care of the Patient with Obstructive Sleep Apnea* (63.3%). Correlation between the familiarity with Practice Recommendation 10 and using it to assess and screen preoperative patients identified as high risk for OSA was significantly weak ($r = 0.26$, $P < .01$) (Table 3).

Nursing Confidence

More than 80% of participants reported that they strongly agree or agree with the statement that they are confident with the use of their knowledge for the identification of the risk factors and symptoms for OSA. Sixty percent or less of participants reported that they strongly agree or agree with the statement that their facility has a process or policy or uses an evidence-based tool for the preoperative screening and management of patients for OSA. Only 36% of participants reported that they strongly agree or agree with the statement that their facility uses an efficient and policy-driven perioperative process for diagnosing preoperative patients suspected of having OSA (Table 4).

Screening

Less than half of the participants indicated they were involved in OSA patient screening, whereas

Table 1. OSA Assessment Participant Characteristics

Demographic Characteristics				
	Range	**Mean**	**SD**	
Age	24-72 y	52.89	9.148	
Years in nursing	1-50 y	28.45	10.64	
Years in perianesthesia nursing	1-46 y	16.59	9.84	
Education and Employment Characteristics				
Specialty certification,* n (%)	CAPA	CPAN	Other	None
	224 (16.2)	393 (28.4)	92 (6.7)	370 (26.8)
Employment status, n (%)	Full time	Part time	Weekends	Call Only
	953 (68.9)	258 (18.7)	2 (0.1)	5 (0.4)
ASPAN Characteristics				
ASPAN member, n (%)	Member	Nonmember		
	1,183 (85.5)	26 (1.9)		
Current use of ASPAN standards, n (%)	Yes	No		
	1,123 (81.2)	48 (3.5)		
Familiarity with ASPAN standard #10, n (%)	Yes	No	Unknown	
	876 (63.3)	271 (19.6)	64 (4.6)	

ASPAN, American Society of PeriAnesthesia Nurses; CAPA, Certified Post Anesthesia Nurse; CPAN, Certified Ambulatory Perianesthesia Nurse.

*Reported data included participant listing of multiple certifications.

Table 2. Education Level and Preferred Learning

Educational Preparation						
Highest education	Diploma	Associate	Bachelors	Masters	Doctoral	
	98 (7.1%)	179 (12.9%)	726 (52.5%)	200 (14.5%)	16 (1.2%)	
Highest nursing	ADN	BSN	MSN	Post-Masters	DNP	PhD
	231 (17%)	738 (53%)	149 (11%)	9 (0.9%)	6 (0.4%)	5 (0.4)
Highest non-nursing	AD	BA/BS	MA/MS	Post-Masters	PhD	
	111 (8%)	BA: 47 (3.4%)	MA: 23 (0.7%)	2 (0.1%)	7 (0.5%)	
		BS: 112 (8%)	MS: 37 (2.7%)			
Preferred Method of Completing Continuing Education						
Face-to-face (F2F)	Written + test	Online		Hybrid (F2F + online)		
327 (23.6%)	76 (5.5%)	402 (29.1%)		412 (29.8%)		

82% indicated OSA screening was completed by either the anesthesiologist (50%) or an Advanced Practice Nurse (32%) (Table 5).

Monitoring and Management

Forty-five percent of nurses discuss preoperative screening results with the attending anesthesiologist and only 20% of those patients identified as at risk for OSA were referred for additional testing. Forty-six percent of at-risk patients were instructed to follow up with their general or internal medicine practitioner (Table 6).

Seventy percent of participants reported that they strongly agree or agree with the statement that patients with a preoperative diagnosis of OSA are instructed to bring their positive pressure devices to the hospital the day of surgery; however, less than half of participants reported that patients use their own positive pressure devices and settings in the Phase I PACU. Fifty-two percent of participants reported that they strongly disagree or disagree with the statement that positive pressure devices are not used in the Phase I PACU.

Less than 40% of participants reported that they strongly agree or agree with the statement that the intraoperative management of a patient diagnosed with OSA are prescribed a positive pressure device by a pulmonologist (10.6%) and that positive pressure devices are provided for patients previously diagnosed with OSA by the health system and managed by respiratory therapy in the Phase I PACU (38.8%).

Forty-six percent of participants reported that they strongly disagree or disagree with the statement that end-tidal carbon dioxide is routinely used for postoperative monitoring in patients previously diagnosed or at risk for OSA. Seventy-two percent of participants reported that they strongly agree or agree with the statement that continuous pulse oximetry is routinely used for postoperative monitoring in patients previously diagnosed or at risk for OSA (Table 6).

Table 3. Correlation Between Familiarity With Practice Recommendation 10 and Use in Practice

Correlations		**Familiar With ASPAN Practice Recommendation 10**	**Assessment/Screening Based on ASPAN Practice Recommendation 10**
Familiar with ASPAN Practice Recommendation 10	Pearson correlation	1	0.265*
Assessment/screening based on ASPAN Practice Recommendation 10	Pearson correlation	0.265*	1

*Correlation coefficient is significant at the 0.01 level (2-tailed).

Table 4. Nursing Confidence Assessment Questions

Assessment Question	Strongly Agree (1) n (%)	Agree (2) n (%)	Neutral (3) n (%)	Disagree (4) n (%)	Strongly Disagree (5) n (%)
I am confident with my knowledge of the risk factors for OSA	551 (39.8)	574 (41.5)	66 (4.8)	16 (1.2)	3 (0.2)
I am confident with my knowledge of the symptoms for OSA	570 (41.2)	569 (41.1)	50 (3.6)	11 (0.8)	3 (0.2)
There is a Pre-op screening process/ policy for OSA	473 (34.2)	359 (26.0)	116 (8.4)	141 (10.2)	43 (3.1)
An EBP screening tool is used for Pre-op screening of OSA	452 (32.7)	261 (18.9)	158 (11.4)	198 (14.3)	61 (4.4)
There is a process/policy for Pre-op Mgt of OSA Pt	300 (21.7)	321 (23.2)	212 (15.3)	218 (15.8)	72 (5.2)
The perioperative Dx process of OSA Pt is efficient and is policy driven	189 (13.7)	305 (22.1)	262 (18.9)	255 (18.4)	111 (8.0)

Dx, diagnostic; EBP, evidence-based practice; Mgt, management; OSA, obstructive sleep apnea; Pre-op, preoperative; Pt, patient.

Pain Management

Forty-one percent of participants use an opioid-sparing multimodal approach for patients diagnosed with OSA; however, less than 40% use a multimodal approach for all patients. Forty-five percent of participants reported that they strongly disagree/disagree with the statement that PCA with a basal or continuous rate may be used for patients previously diagnosed or at risk for OSA; however, 38% reported that they strongly agree/agree with the statement that PCA may be used for patients previously diagnosed or at risk for OSA (Table 6).

Standards-Based Care

Thirty-nine percent of participants reported that they strongly agree/agree with the statement that the patient assessment and preoperative screening they use to identify preoperative patients at risk for OSA are based on Practice Recommendation 10 of ASPAN *Standards, Practice Recommendations and Interpretive Statements*. Thirty-six percent of participants reported that they strongly agree/agree with the statement that patients at risk or previously diagnosed with OSA are placed in a supine position as soon as they are physiologically stable (Table 7).

Table 5. OSA Screening Assessment Questions

Assessment Question	Strongly Agree (1) n (%)	Agree (2) n (%)	Neutral (3) n (%)	Disagree (4) n (%)	Strongly Disagree (5) n (%)
Pre-op RNs complete the initial OSA screening of Pre-op Pt	384 (27.8)	296 (21.4)	149 (10.8)	224 (16.2)	77 (5.6)
Pre-op AA complete the initial OSA screening of Pre-op Pt	315 (22.8)	379 (27.4)	197 (14.2)	150 (10.8)	82 (5.9)
Pre-op APNs complete the initial OSA screening of Pre-op Pt	163 (11.8)	274 (19.8)	163 (11.8)	274 (19.8)	163 (11.8)

AA, Attending Anesthesiologists; APNs, Advanced Practice Nurses; OSA, obstructive sleep apnea; Pre-op, preoperative; Pt, patient; RNs, registered nurses.

Table 6. OSA Management Assessment Questions

Assessment Question	Strongly Agree (1) n (%)	Agree (2) n (%)	Neutral (3) n (%)	Disagree (4) n (%)	Strongly Disagree (5) n (%)
Pre-op RNs discuss Pre-op screenings with AA	276 (20.0)	340 (24.6)	224 (16.2)	211 (15.3)	75 (5.4)
Pre-op Pt identified as at risk for OSA is referred for testing	103 (7.4)	172 (12.4)	289 (20.9)	414 (29.9)	139 (10.1)
F/U for Pt identified at risk for OSA F/U with HP	202 (14.6)	433 (31.3)	234 (16.9)	183 (13.2)	68 (4.9)
Devices					
Pt with Pre-op Dx of OSA are to bring their PPD to the hospital DOS	630 (45.6)	351 (25.4)	47 (3.4)	58 (4.2)	38 (2.7)
In-op Mgt of Pt Dx with OSA are prescribed PPD by a pulmonologist	58 (4.2)	89 (6.4)	238 (17.2)	457 (33.0)	278 (20.1)
Pt previously Dx with OSA use own PPD and settings in Phase I PACU	287 (20.8)	373 (27.0)	146 (10.6)	225 (16.3)	80 (5.8)
PPD provided for Pt with Dx of OSA by HS and managed by RT in Phase I PACU	189 (13.7)	347 (25.1)	168 (12.1)	264 (19.1)	144 (10.4)
PPD are not used in Phase I PACU	70 (5.1)	167 (12.1)	161 (11.6)	419 (30.3)	295 (21.3)
$ETCO_2$ is used for Post-op monitoring in Pt Dx/risk for OSA	110 (8.0)	137 (9.9)	162 (11.7)	395 (28.6)	240 (17.4)
CP is used for Post-op monitoring in Pt Dx/risk for OSA	720 (52.1)	276 (20.0)	26 (1.9)	20 (1.4)	8 (0.6)
Pain management					
An opioid-sparing, multimodal approach to pain Mgt is used for Pt previously Dx OSA	189 (13.7)	375 (27.1)	259 (18.7)	239 (17.3)	50 (3.6)
An opioid-sparing, multimodal approach to pain Mgt is used for all Pt	134 (9.7)	369 (26.7)	236 (17.1)	308 (22.3)	62 (4.5)
PCA may be used for Pt Dx/risk for OSA	118 (8.5)	403 (29.1)	295 (21.3)	144 (10.4)	86 (6.2)
PCA with a basal/continuous rate used for Pt Dx/risk for OSA	38 (2.7)	125 (9.0)	253 (18.3)	352 (25.5)	274 (19.8)

AA, Attending Anesthesiologists; CP, continuous pulse oximetry; DOS, day of surgery; Dx, diagnosis; $ETCO_2$, end-tidal carbon dioxide monitoring; F/U, follow-up; HP, Health care Practitioner; HS, health system; In-op, intraoperative; Mgt, management; OSA, obstructive sleep apnea; PCA, patient-controlled analgesia; PPD, positive pressure device; Pre-op, preoperative; Pt, patient; RNs, registered nurses; RT, respiratory therapy.

Perianesthesia Nurse Perception

Forty-nine percent of participants reported that they strongly agree/agree with the statement that patients with suspected OSA have increased length of stay in the Phase I PACU. Thirty percent of participants reported that they strongly agree/agree with the statement that patients with suspected OSA have increased complication rates in the Phase I PACU (Table 8).

Discussion

Nursing Confidence

Most perianesthesia nurses indicated a basic knowledge of OSA. As supported by the literature, most participants reported confidence with the identification of the risk factors and symptoms for OSA. On the basis of the study findings, efficient evidence-based processes or

policies for the preoperative screening and management of patients for OSA are warranted. The findings indicated that a disconnect exists as participants were familiar with Practice Recommendation 10 of the ASPAN standards (63.3%) but failed to incorporate the standards into their practice (41%). Participants also reported a lack of established policies to provide a clear roadmap for the management of the patient suspected to have OSA (36.3%), which uncovered an interprofessional administrative process gap. Employers have a duty to ensure that processes/policies are in place to create the infrastructure nurses need to apply their knowledge. More research is needed to describe the current practice in screening.

Screening

Evidence-based screening tools may be used in practice (51.6%) but may not be used consistently. Fifty percent of the participants reported that the initial OSA screening of preoperative patients was completed by attending anesthesiologists (50%), advanced practice nurses (32%), or preoperative nurses (49%). The findings support the conclusion that the participants are unsure who completes the initial OSA screening of preoperative patients. Again, suggesting policy is needed and further research could be used to articulate this further. Interprofessional collaboration is essential in providing safe patient-centered care.

Monitoring and Management

This patient population experiences a higher incidence of respiratory complications, postoperative cardiac events, longer lengths of stay, and critical care admissions.[14-16] Less than half of the participants reported that they discuss preoperative screenings with the attending anesthesiologist (45%), that preoperative patients identified as at risk for OSA are referred for additional testing (20%), and patients identified at risk for OSA are instructed to follow up with their general or internal medicine practitioner (46%). A stronger direction for bedside nurses regarding best practices and specific interventions to manage this population is warranted. In addition, adequate, evidence-based resources including interprofessional collaboration, equipment, staffing, staff education, processes/policies, and patient follow-up are essential to provide safe quality care.

Most participants reported that patients with a preoperative diagnosis of OSA are instructed to bring their positive pressure devices to the hospital the day of surgery. As supported by the literature, postoperative management is varied for patients who are at risk for or diagnosed with OSA. Organizations should consider the use of monitoring equipment such as continuous postoperative monitoring with pulse oximetry and capnography. Again, suggesting policy and further research is needed to articulate this further.

Pain Management

Despite strong recommendations in the literature for multimodal and opioid-sparing approaches for the postoperative management of pain,[2,3,33] only 36% of perianesthesia participants surveyed reported the use of this approach. Less than 50% (41%) of nurses surveyed reported the use of these strategies in patients previously diagnosed with OSA. Postoperative opioid administration increases the risk for pulmonary complications because of the direct respiratory center suppression and dampened response to increases in carbon dioxide (CO_2).[33] The *ASPAN Standards, Practice Recommendations and Interpretive Statements* provide empirically based recommendations for postoperative pain management in *Practice Recommendation 10: Obstructive Sleep Apnea in the Adult Patient* and in *Practice Recommendation 11: The Prevention of Unwanted Sedation in the Adult Patient*.[35] Jarzyna et al[33] advocate for the establishment of policies and procedures for assessment, monitoring, and the communication of patient findings in patients at increased risk for pulmonary compromise with the administration of opioids. They also advocate for the provision of educational opportunities for prescribers and nurses working in the clinical setting with the pharmacodynamics of opioids and the use of adjunct agents for postoperative pain management.

Standards-Based Care

Less than 40% of participants reported that they use Practice Recommendation 10 of ASPAN

Table 7. ASPAN Standard Use Assessment Questions

Assessment Question	Strongly Agree (1) n (%)	Agree (2) n (%)	Neutral (3) n (%)	Disagree (4) n (%)	Strongly Disagree (5) n (%)
Pt Assessment and Pre-op screening used to identify Pre-op Pt at risk for OSA based on PR10 ASPAN Standards	215 (15.5)	325 (23.5)	335 (24.2)	171 (12.4)	61 (4.4)
ASA stable, Pt Dx/risk with OSA are placed in a supine position	153 (11.1)	350 (25.3)	249 (18.0)	206 (14.9)	79 (5.7)

ASA, American Society of Anesthesiologists; ASPAN, American Society of PeriAnesthesia Nurses; Dx, Diagnosis; OSA, obstructive sleep apnea; Pre-op, preoperative; PR10, Practice Recommendation 10; Pt, patient; Standards, Standards, Practice Recommendations and Interpretive Statements.

Standards, Practice Recommendations and Interpretive Statements ("Standards") to screen and assess preoperative patients at risk for OSA. The remaining participants either were not familiar with the practice recommendation or did not implement it in their practice. This finding supports the need to further educate perianesthesia nurses on the ASPAN Standards and to implement into clinical practice the American College of Physicians,[17] the American Society of Anesthesiologists,[2] American Academy of Sleep Medicine,[18] and ASPAN[3] guidelines. Education methodology should be tailored to meet the needs of perianesthesia nurses. Thirty percent of participants preferred a hybrid of face-to-face and online method of completing continuing education. More than simply providing education, policies should include the Standards within an organizational infrastructure to ensure that they are consistently being implemented. Only ASPAN members have access to the Standards. Therefore, if not purchased by their organization and readily available at the point of care, nurses may not be implementing the Standards on a consistent basis.

Perianesthesia Nurse Perception

Although increased morbidity and mortality throughout all phases of the perioperative experience have been associated with the management of adult OSA patients, less than 50% of the participants believed that patients with suspected OSA have increased length of stay or increased complication rates in the Phase I PACU. This finding may be related to their reported confidence with the use of their knowledge for the identification of the risk factors and symptoms for OSA. The disconnect between their perception and their practice of the screening/management of the OSA patient may result in unnecessary cost expenditures and resource use, increased lengths of stay and complications, and increased mortality rates.

Limitations

This study has several limitations. Although the survey was developed in consultation with practice content expertise and a perianesthesia expert, the survey did not undergo formal pilot

Table 8. Perianesthesia Nurse Perception Assessment Questions

Assessment Question	Strongly Agree (1) n (%)	Agree (2) n (%)	Neutral (3) n (%)	Disagree (4) n (%)	Strongly Disagree (5) n (%)
Pt with suspected OSA ↑ LOS in Phase I PACU	198 (14.3)	477 (34.5)	231 (16.7)	119 (8.6)	22 (1.6)
Pt with suspected OSA ↑ CR in the Phase I PACU	94 (6.8)	326 (23.6)	379 (27.4)	216 (15.6)	28 (2.0)

CR, complication rate; LOS, length of stay; OSA, obstructive sleep apnea; Pt, patient; ↑, increased.

testing. A convenience sample of ASPAN members may be subject to selection bias, assuming that ASPAN members and those members who hold a specialty nursing certification may be different than the general perianesthesia nursing population and those participating may be more interested in education and practice interventions. The sample may include participants who are more familiar with the *ASPAN Standards, Practice Recommendations and Interpretive Statements* than the general perianesthesia nursing population. Collecting data via the ASPAN membership distribution list, however, provided a convenience sample and an adequate sample size to improve the generalizability of the study findings. Results are subject to social desirability bias as perianesthesia nurses may have been inclined to present their facility favorably. Despite these limitations, the study findings provide an assessment of perianesthesia nurses who care for adult patients with diagnosed or undiagnosed OSA as a platform to consider education and practice interventions.

Research and Practice Implications

The purpose of this study was to conduct a knowledge and practice assessment of perianesthesia nurses who care for adult patients with diagnosed or undiagnosed OSA. Insufficient evidence exists[4] that standardization and clinical application of OSA screening tools, problem identification, and nursing intervention and management strategies are consistently implemented for these patients across perianesthesia settings. Nurses must move beyond the screening phase to implement the ASPAN Standards into their clinical practice. Currently, most recommendations and guidelines are vague and include interventions that could be used, but insufficient evidence regarding best practices and specific interventions remains to provide clear direction for bedside nurses. Health care providers continue to struggle with patient management after the screening is completed and the identification of an OSA diagnosis or risk for OSA. The findings of this study indicate the need for more education and research across all perianesthesia settings. Next steps also include policy development and the need for an interprofessional collaborative infrastructure nurses need to translate evidence-based screening and management strategies into their clinical practice.

Conclusions

OSA patients are largely undiagnosed[20,34] and at significant risk for perianesthesia complications.[1] Formal testing to confirm patients' OSA diagnoses is not always practical, so nurses must incorporate screening practices into their preanesthesia assessment processes. Nurses play key roles in identifying these patients, managing their care throughout their stay, and providing postdischarge phone follow-up.

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