The Laryngoscope

The Early Postoperative Course of Surgical Sleep Apnea Patients

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Objectives/Hypothesis: Recent guidelines from the American Society of Anesthesiologists recommended postoperative monitoring for most patients undergoing surgery for obstructive sleep apnea (OSA). These guidelines, however, are largely based on retrospective literature and expert opinion. The appropriate level of postoperative monitoring remains controversial. Our objective was to prospectively document the early postoperative course of patients undergoing OSA surgery.

Study Design: Prospective cohort study.

Methods: One hundred twenty-one patients (age 43.9 ± 13.5 years, 79.8% male) with sleep-study proven OSA (apnea-hypopnea index 31.9 ± 22.7) who were undergoing surgery for OSA at our tertiary care center were recruited from 2007 to 2009. Outcome measures were: 1) incidence of respiratory complications requiring nursing intervention, 2) level of postoperative blood oxygen saturation divided into three groups: mean oxygen saturation in recovery room ($SpO2_{recovery}$), mean oxygen saturation in step-up unit ($SpO2_{step\text{-}up}$), and lowest oxygen saturation over the 24 hour period ($SpO2_{minimum}$). These results were then compared to the benchmark literature.

Results: The overall incidence of nursing intervention in response to a respiratory complication (3.4%) was significantly less than expected ($P < .002$). Mean $SpO2_{recovery}$ was 92.9 ± 3.2%, $SpO2_{step\text{-}up}$ was 95.9 ± 1.6%, and $SpO2_{minimum}$ was 92.8 ± 3.1%. No variables were identified as being predictive of any of the outcome measures.

Conclusions: The incidence of respiratory events requiring intervention in the early postoperative course of OSA patients was low (3.4%). Routine postoperative inpatient monitoring may not be required in many cases.

Key Words: Obstructive sleep apnea, postoperative care, septoplasty, uvuloplatopharyngoplasty, continuous positive airway pressure, intensive care unit.

Level of Evidence: 1b

***Laryngoscope,* 120:1063–1068, 2010**

INTRODUCTION

The National Commission on Sleep Disorders Research estimates that approximately 5% to 10% of Americans are affected by obstructive sleep apnea (OSA)[1]. Although continuous positive airway pressure (CPAP) is considered the gold standard of OSA therapy, it is hampered by a low long-term adherence rate.[2] Consequently, many patients undergo various forms of surgical intervention to correct their OSA. One of the decisions the surgeon must make is that of the level of postoperative patient monitoring after OSA surgery to safeguard against the theoretically severe respiratory complications that can arise after OSA surgery. In earlier years OSA surgery was carried out with planned postoperative intensive care monitoring[3]; however, more recently several retrospective studies have suggested that OSA surgery can be done safely either as nonmonitored inpatient or even potentially as outpatient procedures.[3–5] The topic remains highly controversial, but the answer carries significant implications for patient management and hospital resource allocation.

The American Society of Anesthesiologists (ASA) recently published practice guidelines regarding the perioperative management of patients with OSA, suggesting that the available evidence mandated most cases of patients undergoing OSA surgery be admitted to the hospital postoperatively for observation and respiratory monitoring.[6] This stands in contrast to the current trend in most medical centers of moving toward outpatient-based procedures. Interestingly, the ASA guidelines are based on evidence derived mostly from retrospective research and expert opinion. Few if any prospective studies exist providing data with regard to

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Editor's Note: This Manuscript was accepted for publication January 28, 2010.

This project was supported by a grant from the Academic Development Fund, University of Western Ontario. The authors have no other funding, financial relationships, or conflicts of interest to disclose.

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DOI: 10.1002/lary.20889

postoperative monitoring after OSA surgery. Consequently, the guidelines' authors explicitly recognize that the current literature is "insufficient to examine the impact of monitored postoperative settings (e.g., step-up or intensive care unit),…the appropriate duration of postoperative respiratory monitoring…" and that the current literature is insufficient to "offer guidance regarding which patients with OSA can be safely managed on an outpatients as opposed to an inpatient basis, and the appropriate time for discharge of these patients from the surgical facility."[7]

The missing piece of scientific literature is that of a prospective description of the early postoperative course of patients undergoing surgery for OSA, which is necessary to determine the actual incidence of respiratory complications requiring medical intervention. Therefore, the purpose of our study is to describe this early postoperative course, in a non-intensive care unit (ICU) setting, of patients undergoing OSA surgery. To our knowledge this is the first study to document this particular data in a prospective fashion.

MATERIALS AND METHODS

A prospective observational cohort study was conducted of consecutive patients undergoing OSA surgery at St. Joseph's Health Centre (London, Ontario), a tertiary care academic teaching center. This study was conducted from September 2007 to May 2009. Study participation was voluntary, and no remuneration was offered. This project received ethical approval from the Research Ethics Board at the University of Western Ontario (REB #13453E). All patients were operated on by the same surgeon. Any patient undergoing surgery specifically to treat OSA was eligible for study inclusion except patients requiring a tracheotomy. This incorporated patients undergoing surgery both as a primary modality for OSA correction as well as patients having surgery for situations of CPAP nonadherence with ongoing symptomatic OSA. The types of surgeries fell into three general categories: 1) nasal surgery (septoplasty ± turbinoplasty) to facilitate CPAP use, 2) palatal surgery with or without tonsillectomy (e.g., uvulopalatopharyngoplasty, uvulopalatal flap, or expansion sphincteroplasty), and 3) radiofrequency tongue-base ablation. The surgeries were done individually or in combination depending on the needs of the particular patient. All included patients must have had a preoperative sleep study demonstrating at least mild sleep apnea within 6 months prior to surgery, as well as a preoperative Epworth Sleepiness Scale measurement of at least 10 (indicative of significant daytime somnolence). Patients were excluded if they were <18 or >80 years of age, or had a coexisting medical condition that could interfere with normal blood oxygen saturation at room air.

Our institution's policy is that all patients undergoing surgery for OSA must be monitored in a special step-up care unit by nursing staff trained in recognizing the respiratory complications of OSA and initiating appropriate intervention. Following surgery, patients were first observed in the recovery room for 4 hours, after which they were transferred to the aforementioned step-up unit for another 20 hours of monitoring; thus, each study patient was monitored for a full 24 hours after surgery. All study patients received routine postoperative care in all aspects. Pain and nausea medication usage was standardized in terms of which medications were used (morphine, codeine, acetaminophen, dimenhydrinate, metoclopramide), but patients were allowed individual medication levels as required for comfort. Postoperative oxygen saturation was recorded continuously during the 24-hour study period, and the monitor (Nellcor N200, Nellcor N600, and Nellcor Puritan Bennett NTB290; Covidien-Nellcor, Boulder, CO) was set to alarm if the saturation level dipped below 90%. Once the full 24-hour monitoring period was completed patients were discharged home.

Postoperative CPAP and/or oxygen administration were initiated if required by defined study criteria. CPAP was initiated if witnessed apneic episodes were occurring in association with prolonged desaturations of >10 seconds without patient self-correction. Oxygen was administered via nasal prongs or facemask if desaturation of $l<90\%$ was prolonged without self-correction. Neither oxygen nor CPAP were otherwise given routinely postoperatively.

To define our two primary outcome measures, we first developed a series of Nursing Intervention Codes (NIC) in conjunction with the specialty nursing team. These codes reflect the spectrum of actions that could be potentially taken by the step-up unit nurse in response to a patient having an adverse respiratory event after OSA surgery. The NICs are listed in Table I. One of our primary outcome measures was therefore the incidence of each NIC over the study time period. The second primary outcome measure was the level of postoperative blood oxygen saturation during 24 hours of continuous postoperative monitoring. Three categories of oxygen saturation were recorded: 1) mean oxygen saturation per patient recorded in the recovery room ($SpO2_{recovery}$), 2) mean oxygen saturation per patient recorded in the step-up unit ($SpO2_{step\text{-}up}$), and 3) the lowest oxygen saturation per patient recorded over the full 24 hour monitoring period ($SpO2_{minimum}$). The first two categories were divided as such because the literature indicates that respiratory complications after OSA surgery are likelier to happen in recovery room than at any other time after surgery.[5] Other data collected from the patients' charts included: demographics, body mass index (BMI), medical comorbidities, alcohol usage, family history, sleep study results, intraoperative medication dosages, postoperative narcotic and sedative dosages, duration of anesthesia and postanesthesia care unit stay, type of OSA surgery, intraoperative complications, and postoperative complications.

Statistical analysis was performed using SPSS version 17 (SPSS Inc., Chicago, IL). The binomial test was used to determine if any NIC category had incidences that were different from a theoretical referent proportion of 0.1 (i.e., a 10% incidence of any NIC). It was decided that 0.1 would be used as this is near the upper end of the range of incidence of adverse respiratory events reported in the literature following surgical treatments of OSA (ranging from 4%–11%)[2–8]; in other words, this value would enable us to study a worst case scenario of high incidence of respiratory complications. A sample size calculation was performed using Sample Power version 2.0 (SPSS Inc.); for the binomial test to be significant 95% of the time when results differ from a referent proportion of positive events of 0.1, a sample size of 60 patients would be needed to power the study sufficiently to assess significance. When tests of means were necessary the independent t test was conducted. When determining the association between continuous variables a Pearson correlation was conducted. Logistic regression was used to determine associations when predicting NIC group membership. Crosstabulations were conducted when determining the association between dichotomous variables; significance here was determined by the χ^2 test. An a priori significance level was set at $P < .05$. All values were reported with 95% confidence intervals.

RESULTS

A total of 121 consecutive patients who met inclusion criteria presented for OSA surgery over the study

TABLE I.
Nursing Intervention Codes Performed by the Trained Nurse in the Step-Up Unit in Response to the Complications of OSA.

Code	Action
0	No nursing actions outside of normal care
1	Noise from monitor woke up patient
2	RN woke up patient (e.g., verbally, physically)
3	Called RT due to respiratory problems
4	Called MD due to respiratory problems
5	Required supplemental oxygen (e.g., nasal prongs, face mask)
6	Required supplemental CPAP
7	Required oral/nasal airway insertion
8	Required bag mask ventilation
9	Required intubation
10	Required transfer to higher level care (e.g., ICU)
11	Hypertension requiring intravenous medications
12	Cardiac arrhythmia requiring intervention (e.g., called MD, called ECG, intravenous medication, defibrillated, called code blue. Please specify:_____)
13	Other (please specify:_____)

Nursing intervention code variables were the primary outcome measure of the study.

RN = registered nurse; RT = respiration therapist; MD = medical doctor; CPAP = continuous positive airway pressure; ICU = intensive care unit; ECG = electrocardiogram.

duration. Two patients were excluded because they had a coexisting medical condition that could interfere with normal blood oxygen saturation (sickle cell anemia, pulmonary edema), bringing the study population to 119. All included patients had sleep-study confirmed OSA with a mean preoperative apnea-hypopnea index (AHI) of 31.6 ± 22.7. There were 95 males (ages 43.7 ± 12.5 years) and 24 females (ages 44.7 ± 16.9 years). The mean BMI was 30.9 ± 5.9, with a mean neck circumference of 39.6 ± 3.4 cm. Forty-seven patients were current CPAP users; the remainder were either CPAP nonadherent patients with ongoing symptomatic OSA, or patients who had never used CPAP and were undergoing surgery for OSA as their primary treatment modality. Table II displays the demographic data for our study population.

Surgeries performed included 47 septoplasties ± turbinoplasties, 58 tonsillectomies, 61 palatal procedures, and 30 tongue-base radiofrequency ablations. Fifty-seven of the patients underwent multilevel surgery (meaning more than one sleep apnea procedure at the same time). No surgical complications occurred in any of the patients.

The binomial test for proportions showed that no NIC grouping approximated the 0.1 (or 10%) referent proportion expected from the literature (Table III). In other words, the incidence of NIC initiation in response to a respiratory complication of OSA surgery was significantly less than expected in all NIC categories ($P < .002$). Only four patients (3.4%) had any NIC whatsoever ($P < .001$). These four patients were given CPAP; all were preoperative CPAP users already, hence CPAP was not a new treatment for them. Three (2.5%) of these

TABLE II.
Demographic Data of the Study Population.

Age, yr (mean ± standard deviation)	43.9±13.5
Male gender, no. (%)	95 (79.8)
AHI (mean±standard deviation)	31.9±22.7
BMI (mean±standard deviation)	30.9±5.9
Neck circumference, cm (mean±standard deviation)	39.6±3.5
Type of surgery	
Septoplasty	47
Tonsillectomy	58
Palatal procedure	61
Tongue-base radiofrequency ablation	30
Multilevel surgery (>1 procedure)	57

AHI = apnea-hypopnea index; BMI = body mass index.

patients were woken up by the nurse because of repeated apneas ($P < .002$) prior to CPAP administration. Only one patient (0.9%) met postoperative criteria

TABLE III.
The Binomial Test for Proportions.

Nursing Intervention Category	No. of Subjects With Events in Each Category (%)	*P* Value
No nursing actions outside of normal care	115 (96.6)	<.002
Noise from monitor woke up patient	0 (0)	<.001
RN woke up patient (e.g., verbally, physically)	3 (2.5)	<.002
Called RT due to respiratory problems	0 (0)	<.001
Called MD due to respiratory problems	0 (0)	<.001
Required supplemental oxygen (e.g., nasal prongs, face mask)	1 (0.9)	<.001
Required supplemental CPAP	4 (3.4)	<.001
Required oral/nasal airway insertion	0 (0)	<.001
Required bag mask ventilation	0 (0)	<.001
Required intubation	0 (0)	<.001
Required transfer to higher level care (e.g., ICU)	0 (0)	<.001
Hypertension requiring intravenous medications	0 (0)	<.001
Cardiac arrhythmia requiring intervention (e.g., called MD, called ECG, intravenous medication, defibrillated, called code blue)	0 (0)	<.001
Other (please specify):_____	0 (0)	<.001

The binomial test for proportions showed that the patients had an incidence of adverse respiratory events that were significantly less than the 10% suggested by previous literature. The number of patients and percentage in each nursing intervention category are indicated.

Significance was set at $P < .05$.

RN = registered nurse; RT = respiration therapist; MD = medical doctor; CPAP = continuous positive airway pressure; ICU = intensive care unit; ECG = electrocardiogram.

TABLE IV.
Pearson Correlations Between Continuous Variables of Interest.

	$SpO2_{step\text{-}up}$	$SpO2_{minimum}$	$SpO2_{recovery}$
BMI	−.278,* n=117	−.413,† n=118	−.339,* n=103
Neck circumference	−.410, n=11	−.599, n=11	−.365, n=11
AHI	−.271,‡ n=77	−.139, n=78	−.323, n=69
Total opiates	−.083, n=112	−.140, n=113	−.172, n=98
OR duration	−.056, n=118	−.118, n=118	−.176, n=103

*Significance at 0.01 level.
†Significance at 0.001 level.
‡Significance at 0.05 level.
BMI = body mass index; AHI = apnea-hypopnea index; OR = operating room.

for oxygen initiation because of continual desaturations <90% despite repeated nursing-initiated awakenings ($P < .001$). Among these four patients, three of them had multilevel surgeries. The first patient had a septoplasty ± turbinoplasty, tonsillectomy, palatal procedure, and tongue-base radiofrequency ablation. The second patient had a tonsillectomy, palatal procedure, and tongue-base radiofrequency ablation. The third patient had a septoplasty ± turbinoplasty, tonsillectomy, palatal procedure. The last patient had only a septoplasty ± turbinoplasty. No other respiratory events requiring nursing intervention were identified in any patient in the study. The majority of patients (96.6%) did not require any respiratory-specific nursing care.

In the postoperative setting, the mean oxygen saturation recorded in the recovery room ($SpO2_{recovery}$) was 92.9 ± 3.2%, the mean oxygen saturation recorded in the step-up unit ($SpO2_{step\text{-}up}$) was 95.9 ± 1.6%, and the mean of the lowest oxygen saturation recorded over the full 24-hour monitoring ($SpO2_{minimum}$) was 92.8 ± 7.1%.

Significant correlations were observed for BMI with $SpO2_{step\text{-}up}$, $SpO2_{minimum}$, and $SpO2_{recovery}$. AHI significantly correlated with $SpO2_{step\text{-}up}$ and $SpO2_{recovery}$. Total narcotic use, neck circumference, and operating room (OR) duration did not significantly correlate with the SpO2 variables (Table IV).

Mean differences between any NIC on age, AHI, BMI, total narcotic use, and OR duration was compared using the independent t test. There were no significant differences observed for all variables ($t = 0.245$–1.667, P = not significant) except for total narcotic use ($t = 2.376$, $P = .019$). Values were higher for those with a nursing intervention required (39.3 ± 19.2 in equivalent doses of morphine) compared to those with no intervention required (17.4 ± 15.8 in equivalent doses of morphine). It should be noted that due to the small number of patients in these categories (n = 4) rejecting the null hypothesis was less likely.

Cross-tabulations with the χ^2 test of significance between any NIC group and nasal surgery, tonsillectomy, palatal surgery, and tongue-base reduction showed no significant associations for all tests ($\chi^2_{(1)} = 0.29$–2.80, P = not significant). Means were also compared for whether or not a patient had nasal surgery, tonsillectomy, palatal surgery, and tongue-base reduction on the SpO2 variables. Means were significantly different for those receiving nasal surgery with respect to mean $SpO2_{step\text{-}up}$ ($t = 2.178$, $P = .031$) but not for any other surgery type with respect to SpO2 measures ($t = 0.054$–1.695).

Binomial logistic regressions were carried out to attempt to predict which NIC group a patient might belong to. Potentially predictive variables studied included age, BMI, AHI, all three SpO2 variables separately, total narcotic use, preoperative CPAP usage, or surgery type performed. None of these independent variables were significantly predictive, but this may be due to the unexpectedly small number of positive NIC codes encountered in our patient population.

DISCUSSION

Current otolaryngology textbooks state that most patients undergoing surgery for OSA need close monitoring in the ICU or monitored bed for at least 24 hours.[2] The reason is that in the infancy of OSA surgery, reports of airway obstruction causing deaths, postobstructive pulmonary edema (POPE), postoperative cardiac arrhythmia, and postoperative hemorrhage, were common in the surgical community.[8] However, as surgical and anesthetic techniques have evolved and the rate of complications decreased, the appropriate level of monitoring has remained contentious. Most of the scientific data on this issue is retrospective in methodology. Our study is, to the best of our knowledge, the first of its kind to prospectively document the 24-hour postoperative course of patients in a non-ICU setting after they have undergone surgery for OSA. In our patient population of those undergoing a wide range of surgical techniques, our data indicate that the respiratory complication rate in the immediate postoperative period was far lower than current thinking dictates. The majority of these patients could have potentially been operated on safely under an appropriately constructed outpatient surgical algorithm, without the need for any extra postoperative monitoring whatsoever.

A literature review on the indications on hospital admission after OSA surgery shows that thinking had shifted over the years. Esclamado et al. retrospectively reviewed 135 postoperative OSA patients and found a major complication rate of 13%.[9] A similarly high figure was found by Haavisto and Suonpaa, who

retrospectively reviewed 101 postoperative OSA patients and found a complication rate of 25%.[10] In general, risk factors for perioperative complications included low preoperative lowest oxygen saturation by polysomnography, high respiratory disturbance index, high body weight, intraoperative use of narcotics, and a history of cardiac disease.

More recent studies, however, have shown that this level of postoperative monitoring may be unnecessary in selected patients. Multiple retrospective patient reviews have been conducted by various authors in an attempt to ascertain the complication rate after OSA surgery. The identified data showed much lower complication rates, ranging from 4% to 5.5%.[11–14] The airway complication rate ranged from 0% to 1.4%, and there were no deaths.[11,13] General findings included that complications were higher with multiple simultaneous procedures, for example, multiple nasal procedures performed simultaneously with uvulopalatopharyngoplasty. To identify patients with these complications, Busaba recommended that OSA patients be monitored with continuous pulse oximetry, vital signs every 4 hours, and a 23-hour postoperative observation; however, this study was still retrospective in nature and subject to substantial bias.[14]

Only one other prospective study exists in the literature regarding postoperative monitoring for patients undergoing OSA surgery. Ulnick and Debo conducted a small, prospective, nonrandomized study of 38 patients who underwent surgery for OSA.[15] All patients were monitored in the ICU setting, and no complications were observed within 72 hours of surgery. They concluded that uncomplicated OSA patients without any significant comorbid factors can be treated in a safe and prudent fashion outside of an intensive care unit. Our prospective study is different from their study is several ways. First, our sample size is almost triple their size. Second, they used the ICU setting and demonstrated that the ICU is not always necessary, whereas we built on this study to show that patients monitored in a step-up unit also did not have any significant complications. Third, since the Ulnick and Dedo study that was published eight years ago, there have been advances in anesthetic and surgical techniques over the ensuing years, making our study more reflective of the contemporary situation.

More recent studies have shown that OSA surgery can even be potentially done as an outpatient with same-day discharge.[3–5] Kieff and Busaba discharged patients home on the following postoperative criteria: sustained oxygen saturation of 94% or greater on room air while asleep, no history of cardiopulmonary disease or diabetes mellitus, adequate oral analgesia and oral intake, hemostasis, and normal vital signs.[4] There were no postoperative complications and no readmissions. Hathaway and Johnson admitted 20 (18%) patients and discharged 90 (82%) patients on the same day after OSA surgery.[3] Their reasons for admission were: limited oral intake (eight patients), transportation issues (five patients), desaturations (three patients), nausea (three patients), and anticoagulation (one patient). No patients were admitted to the ICU, and there were no major respiratory complications in this study.

The American Society of Anesthesiologists Task Force on Perioperative Management of Patients With Obstructive Sleep Apnea published practice guidelines for the perioperative management of patients with obstructive sleep apnea in 2006.[6] These guidelines were based on a review of the published evidence; expert opinion of a panel of consultants, including anesthesiologists and nonanesthesiologist physicians; and a consensus within the community of practitioners.[6] The guidelines recommended that OSA patients should have continuous pulse oximetry monitoring after discharge from the recovery room. Continuous monitoring may be provided in a critical care or step-down unit; by telemetry on a hospital ward; or by a dedicated, appropriately trained, professional observer in the patient's room.[6] The guidelines recognize that the literature is insufficient in several areas, such as the impact of a monitored postoperative settings versus routine hospital wards, the appropriate duration of postoperative respiratory monitoring, outpatients versus inpatient management, and the appropriate time for discharge from a surgical facility.[7] Our results showed that the incidence of respiratory events requiring medical intervention in the early postoperative course of patients after OSA surgery was extremely low—only 3.4%. There was a total absence of any serious complications (e.g., airway obstruction, ICU admission, intubation). The majority of our patients (96.6%) did not require any nursing intervention outside of normal care. It could therefore be argued that in our population the majority of patients did not require postoperative inpatient monitoring.

The four patients in our study who had a respiratory event requiring nursing intervention also had oxygen desaturation in the recovery room shortly after surgery. This is consistent with the findings by Terris et al.[12] and Spiegel et al.,[5] who both showed that complications generally emerge within 2 hours after surgery; thus, the decision can be made after a monitoring period of 2 to 3 hours in the recovery room on the level of postoperative monitoring required.[5,12] The mean oxygen saturation recorded in the recovery room ($SpO2_{recovery}$) in our study, however, was not significantly associated with a respiratory event requiring nursing intervention. Thus, we cannot comment on factors predicting an adverse respiratory outcome. This area warrants further investigation.

Previous studies used oxygen saturation levels as an outcome measure. Some papers defined desaturation below a predetermined level and others used a 4% drop in oxygen saturation; however, not every oxygen desaturation is clinically significant. In designing our study, we chose a clinically significant outcome measure—respiratory events requiring nursing intervention. We defined our desaturation level based on that used in the ASA guidelines,[6] which was our main comparator for the study.

Our study showed that BMI and AHI were negatively correlated with postoperative oxygen saturation level. However, when we examined the more clinically significant outcome of respiratory event requiring nursing intervention, there was no difference in BMI and

AHI between those patients who required a nursing intervention and those who did not. There was a significant difference in total narcotic use. Patients who required a nursing intervention consumed more narcotics. Due to the low number of patients in this group, a causal relationship cannot be concluded from this result, but this does suggestion caution in regards to oversedating postoperative OSA patients with narcotics. There was a significant difference in mean oxygen level saturation for those receiving nasal surgery, but not for other surgery types. However, when we examined the more clinically significant outcome of respiratory events requiring nursing intervention, there was no significant difference between the NIC group and type of surgery.

There are several limitations to this study. First, the results may not be generalizable to OSA patients undergoing surgery for indications other than OSA, as this study focused strictly on patients having surgery for their OSA. Second, our main outcome measure was respiratory events requiring nursing intervention, as opposed to a strict absolute desaturation level. Even though this is a more clinically relevant definition, it does limit our ability to compare our data to that of previous studies. Finally, when binomial logistic regression was conducted to attempt to predict which NIC group a patient might belong to, no predictive variables were identified. However, our study was designed specifically to explore the incidence of respiratory complications in the early postoperative setting, and was not powered sufficiently to develop a set of predictors. Despite the doubling of our original calculated sample size from 60 to 119 (thus increasing our ability to detect a complication), these numbers were still too small to be able to predict an event. This is an area for further exploration and study.

CONCLUSION

To the best of our knowledge, this was the first study to prospectively document the 24-hour, non-ICU setting, postoperative course of a cohort of patients undergoing OSA surgery. We identified that in our population the incidence of respiratory events requiring nursing intervention was very low, and that the majority of our patients did not actually require postoperative inpatient monitoring. This data can be used to aid in deciding on the appropriate level of postoperative monitoring after OSA surgery. Future research should be considered that focuses on the predictive variables of respiratory complications requiring nursing intervention and that develops safe same-day discharge criteria for OSA patients.

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