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SASM



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SASM newsletter

Message from the President

Babak Mokhlesi, MD, MSc

University of Chicago
Chicago, IL



These are exciting times for the Society of Anesthesia and Sleep Medicine (SASM). We are now in our seventh year and it is my great honor to have been nominated by the Board and elected by the membership to serve as your fifth president. I am grateful to our past presidents (Drs. David Hillman, Frances Chung, Peter Gay and Girish Joshi) for setting a vision for our young, yet influential and vibrant Society. My goal is to serve SASM to the best of my ability to ensure advancing its vision. I will continue to rely on our past leaders' collective wisdom and counsel to chart our society through another year of success.

It is important to take a moment and reflect on our overarching mission. SASM was founded to promote education and scientific inquiry in two areas of medicine that share significant common ground: Anesthesiology and Sleep Medicine. Our mission is to advance standards of care for clinical problems shared by Anesthesiology and Sleep Medicine and to promote interdisciplinary communication, education and research in matters common to both fields. As we continue to grow as a society, let us not forget the pillars on which SASM was founded:

- Promote the cross fertilization of ideas between anesthesiology and sleep medicine.
- Stimulate interest in research examining the relationships in respiratory, neurophysiological, neuropsychological and neuropharmacological function between anesthesia and sleep.
- Promote studies of the mechanisms of anesthesia and sleep and the consequences of anesthesia and sleep on brain and other organ functions.
- Promote clinical and epidemiological studies determining the associations between sleep disordered breathing and perioperative risk.
- Examine methods of minimizing perioperative risk of upper airway obstruction or ventilatory insufficiency in predisposed individuals.
- Explore the use of various therapies (including, but not limited to non-invasive positive airway pressure therapies) to prevent and treat perioperative upper airway obstruction or hypoventilation.

I am proud to report that we have remained true to our mission of promoting education and scientific inquiry. SASM has successfully organized seven annual meetings for our membership. These meetings have provided a platform for exchange of ideas, introducing pathways to improve clinical care of perioperative patients with sleep disorders, and planning of future research collaborations. Dr. Stavros Mentsoudis and I were honored to chair the 2017 Annual Meeting. We were pleased that 32 abstracts were submitted to the annual meeting. This task was successfully chaired by Drs. Malin Jonsson-Fa-

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gerlund and Toby Weingarten and we look forward to their future contributions. I look forward in working with Drs. Tom Cloward and Krish Ramachandran who are the chairs of our 2018 Annual Meeting in San Francisco. I am confident they will assemble an outstanding scientific program and workshops that will attract a large audience of clinicians and researchers interested in perioperative medicine.

Under the leadership of Frances Chung, SASM successfully assembled an international team of experts in areas of anesthesiology, sleep medicine, pulmonary and critical care medicine to develop a clinical practice guideline on preoperative screening and assessment of adult patients with obstructive sleep apnea. This clinical practice guideline was published in *Anesthesia and Analgesia* in August 2016. I am proud to inform our Society that it has been cited 40 times in 2017. This is a tremendous milestone for our young society and I congratulate all of my colleagues who were involved in this monumental task.

I am also excited to report that our Society continues to work actively on several other guidelines. A guideline on intraoperative management of patients with sleep apnea is being developed under the leadership of Drs. Stavros Memtsoudis and Frances

Chung. Drs. Dennis Auckley, Rahul Kakkar and their team are working on developing a guideline on perioperative management of patients with narcolepsy. I am confident that these guidelines will become instrumental for clinicians so that they can provide better care to patients with sleep disorders during the perioperative period.

Our Clinical Committee, co-chaired by Bhargavi Gali and Dennis Auckley, has been extremely active. They have developed several valuable educational resources for clinicians and have made them available on the SASM website to the public. Dr. Jean Wong has been chairing our Newsletter subcommittee that leads to three newsletters annually. These newsletters are important to keep our membership informed about new developments in our Society and the field. Dr. Susana Vacas has also been working tirelessly on the Scientific Updates. In her role as the chair of the Scientific Update Subcommittee, her team has developed literature updates that are extremely useful for busy clinicians who are interested in staying up to date in the field of sleep and perioperative medicine. I am very grateful to Dr. Michael Pilla who over the years has been working diligently to improve the SASM website in his role as the Communication Subcommittee chair. It

is our website that allows us to promote our vision and to share with our members various educational resources, our newsletters and literature updates.

In closing, our Society includes a large group of talented, dedicated and devoted members. Many of our members are thought leaders in the field of Anesthesiology and/or Sleep Medicine. We are grateful to have them actively contributing to our Society. It goes without saying that our success is in great part due to the drive and eagerness of our members. Your input as a member is most valuable and I want to encourage you to share your thoughts with me. I would like to invite SASM members who want to volunteer and contribute to the Society to contact me directly. Only working together as a group we can continue to promote our agenda as a Society. I look forward to working with the Board, Committee Chairs, and all members of SASM. Our collective expertise and enthusiasm continues to be a catalyst for promoting patient safety and improved outcomes in the context of perioperative care of patients with sleep disorders. I wish all of you a productive year that will culminate in our annual meeting in October 2018 in San Francisco.



Save the Date **SASM**

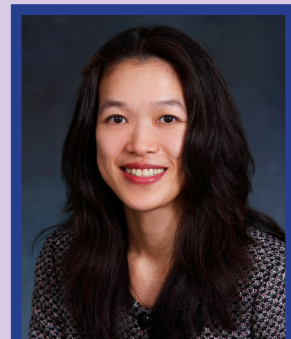
SASM 8th Annual Meeting
October 12, 2018
San Francisco, California

The graphic features a background image of the San Francisco skyline at sunset, with the Transamerica Pyramid prominently visible on the left. The text is overlaid in white, with 'Save the Date' and 'SASM' in large, bold, sans-serif fonts. Below 'SASM' is a white ECG-style waveform. The meeting details are listed in a smaller, bold, sans-serif font at the bottom.

Editor's File

Jean Wong, MD, FRCPC

Associate Professor, Department of Anesthesia, University of Toronto
Staff Anesthesiologist, Toronto Western Hospital
University Health Network



I would like to take this opportunity to wish everyone a healthy and happy new year! Our past President, Girish Joshi, MB, BS, MD, FFARCSI has provided outstanding leadership and vision over the past year. Incoming President, Babak Mohklesi, MD, MSc, will ensure that our society continues to promote the goals of encouraging collaboration amongst anesthesiologists, sleep medicine specialists, surgeons, and other health care providers to promote education and research to improve perioperative management of patients with sleep-disordered breathing.

Recently, one of the founding members of our society, Frances Chung, MBBS, FRCPC, was recognized for her publication: "High STOP-Bang score indicates a high probability of obstructive sleep apnea" This paper was published in 2012 in the British Journal of Anaesthesia. On 2017 World Anesthesia Day, the British Journal of Anaesthesia highlighted the top 25 key papers in the journal over the years of major importance to the field of anesthesia. The papers were selected based on their novelty, significance, impact and contribution to the practice of anesthesia, critical care and pain medicine. https://academic.oup.com/bja/pages/world_anaesthesia_day_2017.

Dr. Chung's paper was chosen as one of the top 25 articles *indicating the importance of recognizing sleep apnea for surgical patients*.

In addition to this success, members of our society are currently actively working on

many other fronts, including educational resources, and developing guidelines that will be valuable tools for clinicians caring for surgical patients with sleep disordered breathing.

I would like to thank Mandeep Singh, MBBS, MD, MSc, FRCPC, for serving as the previous Co-Chair of the newsletter. I welcome Mahesh Nagappa, MD as the new Co-Chair of the Newsletter Committee and look forward to working with Mahesh to bring readers 3 annual newsletters.

This issue of the newsletter features a summary from Susana Vacas, MD, PhD, of the five most important reviews on perioperative sleep medicine that were published in 2016/2017. These reviews provide important summaries of the literature to date on many areas of particular interest to members of the society, and point to areas of future research.

Enhanced Recovery After Surgery (ERAS) protocols were introduced into clinical practice to improve surgical outcomes in general surgical patients about ten years ago. In this issue, the Pros and Cons of ERAS protocols, and how they can be applied for patients with OSA are debated by Ellen M. Soffin, MD, PhD and Meltem Yilmaz, MD. Some of the existing challenges with implementation, and a lack of evidence for the use of ERAS protocols in OSA patients are discussed.

This issue also features a summary of an important systematic review and meta-analysis by Mahesh Nagappa, MD, et al.

The STOP-Bang Questionnaire has been validated in the surgical population and other populations to screen patients for OSA, however, this meta-analysis shows that the STOP-Bang questionnaire can be used to risk stratify patients to predict postoperative complications.

Sakura Kinjo, MD, examines recent evidence suggesting that sleep apnea may be a risk factor for postoperative delirium. She describes a recent systematic review published by Lam et al. explaining some of the evidence supporting possible mechanisms for an association of sleep apnea with postoperative delirium.

Finally, Mandeep Singh, MBBS, MD, MSc, FRCPC, provides a summary of the 2017 Annual Meeting in Boston, Massachusetts. This meeting was another success, with presentations and discussions of challenging and controversial topics in perioperative and sleep medicine.

The articles in this issue highlight some of the exciting areas of previous and ongoing research in perioperative management of patients with sleep disordered breathing. We encourage and welcome submissions for newsletter articles from all members of the society on all areas of perioperative management of patients with sleep disordered breathing. Please contact me (jean.wong@uhn.ca) if you are interested in contributing an article or joining the Newsletter committee.

Five Important Reviews in Perioperative Sleep Medicine Published 2016/2017



Susana Vacas MD, PhD

University of California, Los Angeles

Does Obstructive Sleep Apnea Influence Perioperative Outcome? A Qualitative Systematic Review for the Society of Anesthesia and Sleep Medicine Task Force on Preoperative Preparation of Patients with Sleep-Disordered Breathing

Mathias Opperer, Crispiana Cozowicz, Dario Bugada, Babak Mokhlesi, Roop Kaw, Dennis Auckley, Frances Chung, Stavros G. Memtsoudis

The objective of this systematic review was to evaluate whether the diagnosis of OSA has an impact on postoperative outcomes. The authors identified 61 studies pertinent to this review with 50 studies investigating patients undergoing surgery with general or neuraxial anesthesia and 11 studies reporting on procedures under sedation.

Overall, the included studies reported on 413,304 OSA and 8,556,279 control patients. The majority reported worse outcomes for a number of events, including pulmonary and combined complications, among patients with OSA versus the reference group. The association between OSA and in-hospital mortality varied among studies; 9 studies showed no impact of OSA on mortality, 3 studies suggested a decrease in mortality, and 1 study reported increased mortality. In summary, the majority of studies suggest that the presence of OSA is associated with an increased risk of postoperative complications.

<https://www.ncbi.nlm.nih.gov/pubmed/27101493>

Perioperative Complications in Obstructive Sleep Apnea Patients Undergoing Surgery: A Review of the Legal Literature

Nick Fouladpour, Rajinish Jesudoss, Norman Bolden, Ziad Shaman, Dennis Auckley

This study was undertaken to assess the legal consequences associated with poor outcomes related to OSA in the perioperative setting.

Twenty-four cases met the inclusion criteria. The use of opioids and general anesthetics was believed to play a role in 38% and 58% of cases, respectively. Verdicts favored the plaintiffs in 58% of cases. In cases favoring the plaintiff, the average financial penalty was \$2.5 million.

In summary, perioperative complications related to OSA are increasingly being reported as the central contention of malpractice suits. These cases can be associated with severe financial penalties. These data likely underestimate the actual medicolegal burden, given that most such cases are settled out of court and are not accounted for in the legal literature.

<https://www.ncbi.nlm.nih.gov/pubmed/26111263>

Association of STOP-Bang Questionnaire as a Screening Tool for Sleep Apnea and Postoperative Complications: A Systematic Review and Bayesian Meta-analysis of Prospective and Retrospective Cohort Studies

Mahesh Nagappa, Jayadeep Patra, Jean Wong, Yamini Subramani, Mandeep Singh, George Ho, David T. Wong, Frances Chung

The aim of this systematic review and meta-analysis was to determine the association of postoperative complications in patients screened as HR-OSA versus low-risk OSA (LR-OSA). From the ten 10 cohort studies included (23,609 patients, HR-OSA, 7877; LR-OSA, 15,732) the authors suggest that HR-OSA is related with higher risk of postoperative adverse events and longer length of hospital stay when compared with LR-OSA patients, supporting the implementation of the STOP-Bang screening tool for perioperative risk stratification.

<https://www.ncbi.nlm.nih.gov/pubmed/28817421>

CPAP in the Perioperative Setting. Evidence of Support

Frances Chung, Mahesh Nagappa, Mandeep Singh, Babak Mokhlesi

This review examines the evidence regarding the use of CPAP in the preoperative and postoperative periods in surgical patients with diagnosed and undiagnosed OSA.

In conclusion, diagnosing OSA and using perioperative CPAP therapy may be effective interventions to reduce the incidence of postoperative adverse outcomes in patients with OSA undergoing surgery.

<https://www.ncbi.nlm.nih.gov/pubmed/26469321>

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Understanding Phenotypes of Obstructive Sleep Apnea: Applications in Anesthesia, Surgery, and Perioperative Medicine

Subramani Y, Singh M, Wong J, Kushida CA, Malhotra A, Chung F

The pathophysiology of OSA varies between individuals and is composed of different underlying mechanisms. Several components including the upper airway anatomy, effectiveness of the upper airway

dilator muscles such as the genioglossus, arousal threshold of the individual, and inherent stability of the respiratory control system determine the pathogenesis of OSA. Their recognition may have implications for the perioperative health care team.

This review describes the clinically relevant endotypes and phenotypes of OSA. Continuous positive airway pressure (CPAP) therapy is the treatment of choice for most patients with OSA but tolerance

and adherence can be a problem. Patient-centered individualized approaches to OSA management will be the focus of future research into developing potential treatment options that will help decrease the disease burden and improve treatment effectiveness.

<https://www.ncbi.nlm.nih.gov/pubmed/27861433>

ERAS for Sleep Disordered Breathing – Pro!

Ellen M. Soffin, MD, PhD

Assistant Attending Anesthesiologist, Associate Director of Clinical Research, Department of Anesthesiology, Hospital for Special Surgery



Enhanced Recovery After Surgery (ERAS) represents a leading example of pathway-based perioperative care. ERAS is consistently associated with improved outcomes, fewer complications, and higher patient satisfaction in a range of surgical subspecialties.¹ ERAS is predominately organized along surgical service lines and components of care are directed toward mediating major surgical and anesthetic-related complications. A by-product of this organization is that individual patient co-morbidities are not necessarily addressed within the structure of the pathways. Given the success of ERAS for improving overall care and outcomes, it follows that similar gains may be achieved by applying ERAS principles to individual disease states. Specifically, outcomes for surgical patients with sleep disordered breathing (SDB) may be positively influenced by ERAS pathways, irrespective of the surgical indication. To date, there is no evidence in the literature addressing this question. However, there are three main arguments which can be advanced that ERAS should benefit surgical patients with SDB.

The first argument is a mechanistic one. A fundamental goal of ERAS is to ensure patients receive care based on the highest level(s) of evidence for benefit. Indeed, the ERAS community advocates that “... *the immediate challenge to improving the quality of care is not discovering new knowledge, but rather how to integrate what we already know into practice.*”² By auditing and linking pathway compliance with outcomes, ERAS provides a framework to implement and deliver care.

For patients with SDB, ERAS may facilitate the implementation of society and evidence-based recommendations. For example, multimodal analgesia (MMA) is endorsed by several pain and anesthetic societies to optimize pain control and minimize opioid use and -related side effects.³⁻⁴ This is a parallel goal in care of the surgical patient with SDB, and the *SASM Practice Guidelines for the Perioperative Management of Patients with Obstructive Sleep Apnea* make a similar recommendation.⁵ However, large population-based studies indicate low rates of uptake, and wide variation in the use of MMA and regional anesthesia / analgesia techniques.

Nationally, the mean probability of receiving 2 or more analgesic agents after surgery is just 54%.⁶ Likewise, only 20% of elective total knee arthroplasty (TKA) is performed under neuraxial anesthesia and just 25% feature peripheral nerve block for postoperative analgesia.⁷ This is particularly striking considering TKA is commonly performed in a population with a high estimated prevalence of SDB. Fortunately, reports are starting to demonstrate that ERAS increases adherence with best practice recommendations. In a study of open hepatectomy, an ERAS protocol featuring MMA was associated with significantly lower opioid consumption up to 72 hours post-surgery. Pain scores were lower up to 24 hours, and 72% of patients received epidural analgesia under the new protocol.⁸

The second argument in favor of ERAS for patients with SDB is a biochemical one. The basis for ERAS efficacy is modulation of the surgical stress response: Surgery is associated with predictable changes in physiology, including release of inflammatory mediators, sympathetic surge, and insulin resistance.⁹ Obstructive sleep

>> ERAS for Sleep continues on next page

apnea (OSA) may be viewed as a similar state, and high levels of circulating cytokines, adipokines, CRP and homocysteine often accompany OSA. Likewise, OSA is associated with obesity, insulin resistance, metabolic syndrome and cardiovascular disease. By modulating the inflammatory response to surgery, ERAS may be particularly beneficial for patients with OSA. Although there is not yet evidence to support the latter hypothesis, ERAS itself is associated with improved insulin resistance¹⁰ and more favorable inflammatory profiles after surgery.¹¹

Given that reports of ERAS targeted to patients with SDB are not yet in evidence, the final argument considers whether ERAS benefits surgical populations with a high prevalence of OSA. One series estimates the overall prevalence of OSA in patients presenting for bariatric surgery at over 70%, rising to 95% with BMI >60.¹² In this population, there are 2 meta-analyses associating ERAS with shorter length of hospital stay and no increase in readmission rates or overall complications.¹³⁻¹⁴ Retrospective studies also support early discharge after bariatric surgery (post-operative day 1) without increased complications, readmission, or post-discharge resource use, although BMI >50 predicts a longer length of stay.¹⁵ Interestingly, full consensus guidelines for ERAS-Bariatric-Surgery have been published, and include recommendations for patients with and without OSA.¹⁶

The benefits of ERAS on peri-operative care and outcomes are now firmly established. In contrast, there is little, if any data, linking individual disease states to outcomes within ERAS pathways. There are several lines of evidence suggesting that ERAS may be particularly beneficial

to surgical patients with SDB, including ERAS as a framework to ensure delivery of best practice; ERAS as a plausible biological substrate to improve physiology; and data from surgical cohorts with a high probability of SDB showing benefits of ERAS. Common goals link ERAS with the care of patients with SDB. Rather than a one-size-fits-all approach to surgical care, ERAS should also begin to incorporate interventions targeted to superior outcomes for individual disease states.

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CON: Enhanced Recovery After Surgery (ERAS) for Patients with Obstructive Sleep Apnea (OSA)/ Sleep Disordered Breathing (SDB)



Meltem Yilmaz, MD

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The argument against Enhanced Recovery After Surgery (ERAS) for patients with obstructive sleep apnea can be summed up with the following six points.

First argument is the title: “Enhanced recovery *after* surgery” does not describe the intended purpose. It implies that enhancement is happening after surgery. It also implies only surgeons and nurses are involved and that the perioperative events are not included. More importantly, it implies a surgeon driven process as opposed to a multidisciplinary approach. “Enhanced recovery program (ERP) is more fitting and for the remainder of this discussion will refer to it as such.

Second point, is that the complexity of implementing an ERP is colossal. It involves;

1. Multiple medical specialties such as anesthesiologists, sleep medicine (pulmonologists, neurologists, anesthesiologists), surgeons, hospitalists.
2. Multiple level of providers such as physicians including attendings, residents, and medical students; nursing such as preoperative, operative room, postoperative care unit, intensive care unit, perioperative floor nurses and nurse anesthetists, nurse practitioners; physician assistants, respiratory therapists, pharmacists and physical therapists, and nutritionists.
3. Administrative staff including hospital administrators, physician champions representing the different specialties, resource coordinators, and representatives from quality improvement and risk management, throughput coordinators, and patient representatives.
4. Information technology teams for electronic medical records, order set creation, protocol checklist to follow adherence, pop-up reminders to follow the protocol etc.

5. Educators for patients and their family members and for all perioperative staff members involved in the care of these patients.

6. Team leaders in charge of creating protocols and following adherence to their specific areas

The enormity and complexity of coordinating these groups is daunting! It is extremely difficult to achieve without adequate resources, the buy-in from all of the parties involved and most importantly administrative and financial support. In an era of cost cutting, this may be the major factor in rejecting the implementation of such a protocol.

The complexity in instituting an ERP for the OSA patient becomes even more challenging in that these patients may be having a multitude of different surgeries for various parts of their body making it difficult to have one specific protocol. Complicating this further, is that patients may not have been identified as having OSA when they present for their surgery.

Third argument, is the fact that despite all the reported benefits of ERPs, reports of challenges and failures abound. These publications are by institutions that have implemented ERPs which have not yielded the expected results, despite robust systems in place.¹⁻⁸

This may be due to my fourth argument, which is compliance and adherence to ERPs. Studies have identified a direct correlation between compliance to ERPs and outcomes. For an ERP to succeed, a compliance of greater than 70% is needed.^{1,8} Most studies however, document compliance to be less than 65%.⁹ Even when the desired adherence rates are achieved, patients still fail early discharge which is the

primary outcome measure for majority of ERPs.⁹

Pearsall and colleagues from University of Toronto, listed the barriers to compliance as: lack of education for patients and family members as well as medical staff; lack of available resources such as not having enough nurses to help with postoperative ambulation; not enough financial support. Most importantly, inadequate buy-in from members of the perioperative team. The reasons stated were resistance to change due to rigid guidelines which were not all evidence based, poor communication and lack of collaboration between team members.⁷

The fifth argument, is the financial burden on the system in implementing such a program. In 2016, Stone and colleagues from Johns Hopkins used a model that was designed to analyze the net impact of a hospital implementing an ERP for colorectal surgery. Per their calculations, the cost for a hospital that performs 100 cases a year starts at US \$117,875 in the first year. The cost for each consecutive year remains at US \$108,000.¹⁰ Despite the savings, which are based on early discharge of patients, there needs to be a large sum that needs to be dedicated to this process yearly. In another study from the same institution assessing 30-day readmissions in patients in an ERP compared to patients in non-ERP, found that hospital length of stay (LOS) was in fact shorter for patients in the ERP group. However, when they compared the total number of hospital days including the 30-day readmissions, the composite LOS did not differ between the two groups.¹¹

Lastly, the sixth argument is that there is absolutely no evidence in the literature that supports the benefit of having an enhanced recovery program for OSA/SDB.

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In summary, ERP for OSA is not feasible due to the six points made above.

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STOP-Bang Questionnaire: A Screening Tool to Predict Postoperative Complications

Mahesh Nagappa, MD

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Obstructive Sleep Apnea (OSA) OSA has a variable prevalence in the surgical population, with as high as 70% in the bariatric surgical population.¹ The presence of OSA is associated with higher postoperative adverse outcomes² which poses an economic burden by increasing the duration of hospital stay and health care expenditures.³ A majority of OSA patients are undiagnosed and untreated during the perioperative period.⁴ The STOP-Bang is a validated screening tool to identify high-risk OSA (HR-OSA) patients (STOP-Bang ≥ 3) in the perioperative period.^{5,6} The 8 dichotomous items are snoring, tiredness, observed apnea, high blood pressure, body mass index (BMI) > 35 kg/m², age (> 50 years), neck circumference (male > 43 cm; female > 41 cm), and male sex. Screening for OSA allows preoperative risk stratification and optimum perioperative management with risk minimization, and appropriate perioperative anesthetic management. Several studies in the literature

have used the STOP-Bang tool to classify patients as HR-OSA and low-risk OSA (LR-OSA) and shown a linear association between increasing postoperative complications with higher scores.⁷

We published a systematic review and meta-analysis of 10 studies with a total of 23,609 patients (7877 HR-OSA versus 15,732 LR-OSA) undergoing a variety of surgical procedures: head and neck, thoracic, abdominal, vascular, genitourinary, and orthopedic surgeries. Of these, 8 studies were prospective⁸⁻¹⁵ and 2 were retrospective in nature.^{7,16}

Overall, postoperative complications were almost 4-fold higher in HR-OSA versus LR-OSA patients [pooled OR, 3.93; 95% confidence interval (CI), 1.85-7.77, $P = 0.003$; Figure A]. The duration of the hospital stay was 2 days longer in HR-OSA versus LR-OSA patients (5.0 ± 4.2 vs 3.4

± 2.8 days; pooled mean difference 2.01; 95% CI, 0.77-3.24; $P = 0.005$; Figure B). Metaregression and sensitivity analysis on various confounding factors and subgroups did not impact the final inference or results of postoperative complications for HR-OSA versus LR-OSA groups.

Despite advancements in anesthetic and perioperative care, postoperative complications are still a significant problem in OSA surgical patients.² Two respective meta-analyses on 13 and 17 studies found that adverse cardiopulmonary events were increased by 2- to 3-fold in OSA versus non-OSA patients after noncardiac surgical procedures.² The American Society of Anesthesia's (ASA) Guidelines recommended preoperative identification of patients with OSA.¹⁷ The recent Guidelines on the Preoperative Screening and Assessment of OSA patients by the Society of Anesthesia

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and Sleep Medicine also recommended screening for HR-OSA patients in the pre-operative period.¹⁸ Our meta-analysis provides evidence to support the implementation of the STOP-Bang tool to identify the HR-OSA patients in the perioperative period to ensure risk stratification for HR-OSA patients. Patients with OSA may experience perioperative complications due to sedatives and opioids², which inhibit the protective arousal reflex and reduce pharyngeal muscle tone, increasing upper airway collapsibility, and worsening the existing OSA. Age, sex, BMI, and hypertension are components of the STOP-Bang scores, while diabetes mellitus, ischemic heart disease, and cerebrovascular disease are some of the accepted comorbidities of OSA. These components along with the other associated comorbidities like smoking and chronic obstructive pulmonary disease contributes to higher prevalence of these diseases in HR-OSA compared with

the LR-OSA group resulting in the inherent differences between the groups. Fifty-two percent of the HR-OSA patients in our analysis were ASA physical status III or greater. HR-OSA patients had a higher prevalence of cardiovascular risk factors than LR-OSA patients. Hence identifying and treating HR-OSA is an important step to improve perioperative outcomes.

The STOP-Bang score 3 or greater has the best balance between sensitivity and specificity.⁶ Depending on the prevalence of OSA in the surgical population, the cut-off of STOP-Bang score can be increased to detect moderate to severe OSA with a higher accuracy.

Limited data are available on the perioperative management of HR-OSA patients. There is evidence that CPAP can be beneficial in the perioperative setting.¹⁹ A recent meta-analysis found that the AHI was

reduced by 25 events/h and the duration of hospital stay was 0.4 days less in treated versus untreated OSA patients.²⁰

Our meta-analysis has some limitations: it included clinically and methodologically diverse studies, some of the important comorbidities like coronary artery disease, IHD, and CHF were not reported by many of the studies. These unreported comorbidities and other unknown confounding factors may have introduced some bias into our mean estimate. Despite these limitations, our meta-analysis offers a comprehensive analysis of the available evidence on the association of perioperative complications in HR-OSA patients undergoing surgical procedures. In conclusion, our meta-regression analysis suggests that patients with HR-OSA had almost a 4-fold higher risk of postoperative complications. The duration of hospital stay was longer in HR-OSA versus LR-OSA patients. This

Figure

>> STOP-Bang Questionnaire continued on next page

A Postoperative Complications

Study	STOP-BANG SCORE GROUP		Events	Total	Weight	Odds Ratio	95% CI
	High	Low					
Chudeau2016	3	104	1	85	7.1%	2.50	[0.25, 24.43]
Gokay 2016	2	48	0	78	5.1%	8.44	[0.40, 179.65]
Seet2015	131	485	272	4947	13.9%	6.36	[5.03, 8.04]
Xara2015	3	59	2	59	8.7%	1.53	[0.25, 9.49]
Acar2014	4	83	2	117	9.1%	2.91	[0.52, 16.28]
Carso 2014	41	455	72	2997	13.6%	4.02	[2.70, 5.98]
Proczko2014	17	182	4	412	11.4%	10.51	[3.48, 31.70]
Lockhart2013	324	6226	372	6797	14.0%	0.95	[0.81, 1.10]
Pereira 2013	5	179	2	161	9.3%	2.28	[0.44, 11.94]
Vasu 2010	11	56	1	79	7.8%	19.07	[2.38, 152.58]
Total	541	7877	728	15732	100.0%		

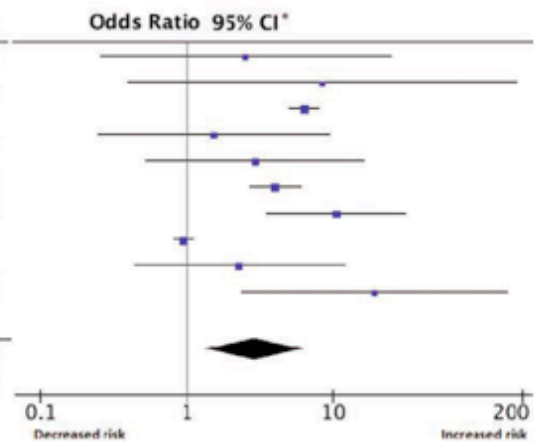
Bayesian Random-Effects with MCMC, 95% Credible Interval **3.93 [1.85, 7.77]**

D-L Random-Effects **3.75 [1.57, 8.95]**

Heterogeneity: Tau² = 1.40; Chi² = 213.57, df = 9 (P < 0.00001); I² = 96%

Test for overall effect: Z = 2.98 (P = 0.003)

* ORs are presented in a logarithmic scale on X-axis



B Length of Hospital Stay

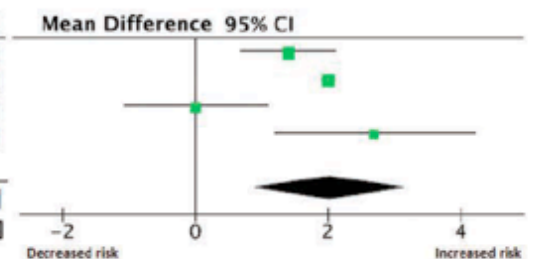
Study	STOP-BANG SCORE GROUP		Mean	SD	Total	Weight	Mean Difference	95% CI
	High	Low						
Pereira 2013	5	4.5	182	3.6	3	412	27.5%	1.40 [0.68, 2.12]
Proczko2014	4.5	0.5	179	2.5	0.6	161	34.0%	2.00 [1.88, 2.12]
Xara2015	3.6	3	59	3.6	3	59	22.0%	0.00 [-1.08, 1.08]
Chudeau2016	7	6.7	104	4.3	3.7	85	16.5%	2.70 [1.19, 4.21]
Total			524			717	100.0%	

Bayesian Random-Effects with MCMC, 95% Credible Interval **2.01 [0.77, 3.24]**

D-L Random-Effects **1.51 [0.66, 2.36]**

Heterogeneity: Tau² = 0.55; Chi² = 16.30, df = 3 (P = 0.0010); I² = 82%

Test for overall effect: Z = 3.48 (P = 0.0005)



>> STOP-Bang Questionnaire continued from previous page

analysis supports the implementation of the STOP-Bang questionnaire as a perioperative risk stratification tool to identify the HR-OSA patients.

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Postoperative Delirium and Sleep Apnea

Sakura Kinjo, MD

Clinical Professor, Anesthesia Medical Director, UCSF Orthopaedic Institute
Anesthesia and Perioperative Care, University of California, San Francisco



Post-operative delirium (POD)

Delirium is defined as a sudden change in mental function. Symptoms of delirium may fluctuate during the course of a day and include attention deficit, disorganized thinking or an altered level of consciousness. It is one of the most common post-operative complications in older adults undergoing major surgery. POD has significant health and economic impacts; it is associated with increased morbidity and mortality, prolongs hospital stay and increases costs of care.^{1,2}

Is sleep apnea a risk factor for POD?

Sleep apnea is attracting attention as one of the causes of POD. The recent review article by Lam et al³ identified two relevant prospective observational studies.^{4,5}

A clinical study by Flink et al,⁴ investigated patients who are ≥ 65 years old, who underwent elective total knee arthroplasty. Among 106 patients, 27 Patients (25%) developed POD. Incidence of delirium was higher in OSA group than the non-OSA group (53% vs 20%). Roggenbach et al⁵ investigated the incidence of POD in patients who underwent cardiac surgery. In their study, overall incidence of delirium was 48%. They concluded that patients with a higher preoperative Apnea Hypopnea Index (AHI) of 19 or higher showed an almost 6-fold increased risk of POD (odds ratio 6.4; confidence interval, 2.6 to 15.4; $p < 0.001$).

POD in Sleep Apnea Patients

There are some possible mechanisms of POD in sleep apnea patients.

1. Perioperative sleep fragmentation, deprivation/hypoxia

Although the mechanism of POD has not been well established, there are multiple risk factors associated with

POD, including sleep fragmentation and hypoxia. In patients with sleep apnea, the risk of POD may be higher due to the patient having pre-existing sleep-disordered breathing.

2. Pre-existing cognitive impairment/low cognitive reserve

Patients with OSA are at risk of neuropsychological problems including memory deficits, cognitive decline, and mood disorders. Animal studies indicate that chronic continuous and/or intermittent hypoxia causes hippocampal impairment;⁶ the region important for learning and memory. In fact, recent imaging studies indicate that sleep apnea causes structural brain changes in multiple brain regions.^{7, 8} A recent meta-analysis of population studies suggests that individuals with sleep disordered breathing are 26% more likely to develop cognitive impairment.⁹ Untreated sleep apnea may make these patients vulnerable to developing POD, or increasing the severity of POD.

3. Hormonal changes

Hypoxic stress and a fragmentation of sleep cause altered cortisol levels by affecting the hypothalamic-pituitary-adrenal axis.¹⁰ Cortisol is an important hormone for cognitive function by binding to various brain receptors. High cortisol levels are associated with cognitive impairment.¹¹

4. Neuro-inflammation

A recent study¹² suggests that neuro-inflammation induced by surgery is associated with cognitive changes. Sleep apnea patients may be in a pro/hyper-inflammatory state due to sleep-disordered breathing. In addition, sleep apnea patients often have

co-morbidities (diabetes, obesity, metabolic syndrome) which may increase the risk of developing a hyper-inflammatory state. The combination of surgery induced neuro-inflammation and a baseline pro/hyper-inflammatory state may therefore possibly increase the risk of delirium.

The Effect of Continuous Positive Airway Pressure (CPAP) on Cognition

The review article Lam et al³ also identified several studies on the effect of CPAP on cognition. Long term use of CPAP helps to improve cognition. These studies are typically conducted with at least 3 months of CPAP treatment. Therefore, the effect on POD of shorter CPAP treatment has not been well investigated. In addition, CPAP therapy seems to have the favorable effect of reducing night time cortisol levels.¹⁰

Does CPAP Prevent or Mitigate POD?

If sleep apnea increases the risk of developing POD, then whether or not perioperative use of a CPAP preventing delirium or mitigating the severity of delirium is an important question. Nadler and colleagues¹³ studied 114 patients who underwent joint replacement surgery. Patients at risk for sleep apnea (preoperative STOP-Bang Score ≥ 3) were enrolled in the study. Patients were randomized (CPAP therapy vs. routine perioperative care). In the CPAP group, CPAP was used before, and at least one night after surgery. Higher preoperative AHI was associated with POD. However, perioperative use of CPAP did not change the incidence or severity of POD. The effect of perioperative use (short course) of CPAP on POD needs further research.

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Clinical Implication

Sleep apnea is prevalent in older people, and many with this condition are not diagnosed. Given an increasing geriatric population, as well as the increasing number of patients with sleep apnea, the number of patients with POD is expected to increase. There is growing evidence that sleep apnea is an independent risk factor for POD. If confirmed in larger controlled trials, sleep apnea may represent a modifiable risk factor for reducing the incidence of POD. Screening for both cognitive decline and sleep apnea prior to surgery may improve the care of this vulnerable population.

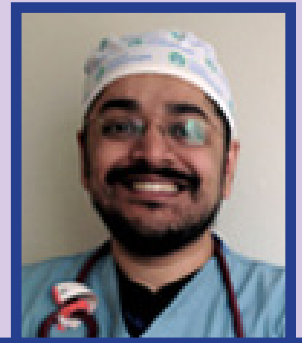
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Summary of SASM 2017 Annual Meeting



Mandeep Singh, MD, FRCPC

Assistant Professor, University of Toronto, Department of Anesthesia,
Toronto Western Hospital, University Health Network

The Society of Anesthesia and Sleep Medicine's 7th Annual Meeting was held in Boston, MA on October 19-20, 2017. The theme of this year's meeting was "Perioperative and Sleep Medicine: Controversies and Challenges". From the conception of the theme, to design of the program to its implementation, the scientific meeting was a great success. Following on from previous meetings, the program targeted audience from multiple disciplines such as sleep medicine, anesthesiology, ENT surgery, nursing and respiratory therapy.

The program began on October 19, 2017 with informative presentations on "Research in Perioperative Sleep Medicine" which was moderated by Babak Mokhlesi, MD, MSc. The first presentation was by Susana Vacas, MD, PhD, on "Most Influential Publications in Perioperative Sleep Medicine", followed by an excellent presentation on "Designing Clinical Trials in Perioperative Sleep Medicine: A Rationale and Pragmatic Approach", by Daniel Gottlieb, MD, MPH. It was emphasized that more research is needed to evaluate the impact of diagnosing sleep-disordered breathing in the perioperative period and the challenges in conducting research were highlighted.



Following from the discussion on challenges in conducting research, the next session dealt with "Challenges in the Practice of Sleep Medicine:", and was moderated by Peter Gay, MD. A Pro-Con session on "Sleep Labs are Obsolete for Perioperative Assessment of Sleep-Disordered Breathing" was well received by the audience, where Dr. Laurence Epstien (Pro), and Dr. Susheel Patil (Con) presented their cases with presentation of published literature, and some light humor. Satya Krishna Ramachandran MD, MBBS, later talked about "Postoperative Monitoring for Patients with Sleep Apnea: The Good, The Bad and the Useless", including his own published and unpublished work.

The Welcome Reception and Dinner on the opening night of the meeting was hosted by the SASM President, Girish Joshi MBBS, MD, FFARCSI. The evening was graced by a very thoughtful talk by Koby Sheffy on "Novel Ways of Diagnosing Sleep-Disordered Breathing", where the history of development of sleep diagnostic devices was discussed and the current technological advances and newest devices were highlighted.

The second day of the meeting was highlighted by the first Keynote speaker, Chad Brum-



met MD, who presented "The Opioid Epidemic, Chronic Pain Syndromes and the Patient with Sleep-Disordered Breathing", followed by the next Keynote Speaker, Dean Hess PhD, RRT, who talked about "Traditional and Novel Ways to Monitor Patients in the Post-Operative Period". Several important topics related to sleep-disordered breathing were presented by world experts, including interaction of opioids and pain perception; postoperative delirium; hypercapnic respiratory failure; influence on postoperative recovery; legal implications in the perioperative period.

The SASM Guidelines Committee presented the work conducted over the last year, and this session was chaired by Frances Chung, MBBS, FRCPC. Dennis Auckley, MD talked about "Perioperative Management of the Patient with Narcolepsy". This was followed by presentation of findings of the "Intraoperative Management of Patient with Sleep Apnea" by Mahesh Nagappa MD (Airway Management), Jean Wong MD (Drug Responses), and Crispiana Cozowicz, MD (Anesthesia Techniques).

In addition to the outstanding scientific program, many interesting research

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abstracts were presented. Vidya Raman MD, presented her 2016 SASM Research Grant winning abstract titled, “Using Questionnaire Tools to Predict Pediatric OSA Outcomes.” The Abstract Awards were presented and the first place award for the best Abstract went to Talha Mubashir, MD for his abstract “Continuous Positive Pressure Therapy Improves Symptoms of Depression in Elderly Patients with Obstructive Sleep Apnea: A Systematic Review and Meta-analysis of 11 RCTs”. The second place award went to Lukas Pichler MD, for the abstract, “The Perioperative Impact of Sleep Apnea in a High-Volume Specialty Practice with Focus on Regional Anesthesia”, and third place award went to Crispiana Cozowicz MD, for “Multimodal Analgesia and Opioid Prescription Levels in Sleep Apnea Patients Undergoing Total Hip and Knee Arthroplasties - A Population Based Study”.

The next SASM Annual Meeting will be held in San Francisco, CA on October 12, 2018.



2017 Annual Meeting Abstract Winners



1st Place – Jayadeep Patra, PhD

Abstract: Continuous Positive Pressure Therapy Improves Symptoms of Depression in Elderly Patients with Obstructive Sleep Apnea: A Systematic Review and Meta-analysis of 11 RCTs



2nd Place – Lukas Pichler, MD

Abstract: The Perioperative Impact of Sleep Apnea in a High-Volume Specialty Practice with Focus on Regional Anesthesia



3rd Place – Crispiana Cozowicz, MD

Abstract: Multimodal Analgesia and Opioid Prescription Levels in Sleep Apnea Patients Undergoing Total Hip and Knee Arthroplasties - A Population Based Study

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The mission of SASM is to advance standards of care for clinical challenges shared by Anesthesiology and Sleep Medicine, including perioperative management of sleep disordered breathing, as well as to promote interdisciplinary communication, education and research in matters common to anesthesia and sleep.

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 - Non-physicians and non-scientists, without voting rights.
- ▶ **Educational Member - \$65**
 - Fellows, residents, medical students and other undergraduates, without voting rights.

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You can also mail a check to our office:

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