

# SASM newsletter

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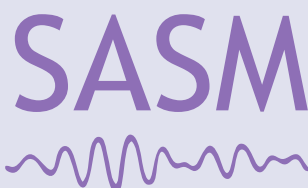
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## Message from the President

**Dennis Auckley, MD**

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Dear SASM members,

I would like to thank you for entrusting me with the responsibility and honor of stepping into the role of President of SASM for 2019-2020. I take this job with great respect for those who have held this position before me, as that list includes many of the thought leaders who have helped to shape this relatively nascent field of truly collaborative medicine. I am humbled by the hard work and dedication shown by the past SASM leadership that took this society from an idea on paper at a gathering of 30 or so individuals to what it is today – a respected leader in the field of perioperative care encompassing the disciplines of Anesthesia and Sleep Medicine, and that is now more than 1,300 members strong! The upcoming year promises to be an exciting one as we prepare for our 10th Annual Meeting to be held in Washington D.C. in October. Before I get to SASM's upcoming plans, I would like to review some of the accomplishments of the past year that took place under the steady guidance of our immediate past-president Dr. Stavros Memtsoudis.

The 9<sup>th</sup> Annual SASM Meeting, held in Orlando, was another successful meeting. Drs. Krish Ramachandran, Christine Won and Stephen Haskins organized another stellar line-up of speakers and educational sessions that were very well received. The meeting kicked off Thursday afternoon with two workshops - Perioperative Ultrasound and Perioperative Airway Assessment and Management. Drs. Stephen Haskins and Mandeep Singh oversaw the workshops and made sure that participants were provided with ample hands-on time to gain experience with a variety of tools useful in perioperative care, including sleep apnea assessment and treatment. Participation in the workshops doubled from last year, and the feedback from attendees was excellent. The full SASM meeting then took place on Friday and is reviewed in more detail elsewhere in this newsletter. Suffice it to say, an excellent panel of internationally recognized speakers spent the day discussing a wide range of topics germane to all of our practices, as well provided plenty of thought provoking discussion regarding future directions in the field. Drs. Toby Weingarten and Malin Fagerlund once again supervised the research abstracts and presented awards to the top 3 abstracts from the nearly 40 abstracts that were presented at the meeting. And new at this year's meeting, Dr. Stavros Memtsoudis presented special awards at the general assembly luncheon to two deserving members of SASM. The first award was a Lifetime Achievement Award that went to Dr. Frances Chung. Her extensive research and educational efforts have shaped this field and moved it forward at a rapid pace. The second award was the Presidential Award, that went to Dr. Crispiana



*Dr. Frances Chung*

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Cozowicz for her hard work and dedication to the field, as well as her ongoing involvement in SASM activities.

Aside from the meeting, additional highlights of the year include work of the Clinical Committee, under the leadership of Drs. Bhargavi Gali and Melanie Lyons (new co—chair), that updated and revised guidelines for perioperative care of patients with OSA, as well as developed and posted a new slide set on the website addressing opioids and respiratory depression.

The Narcolepsy Perioperative Task Force published a white paper, highlighting that SASM is not just about OSA. Two newsletters were written and circulated by Drs. Jean Wong and Mahesh Nagappa, and quarterly scientific updates were posted on the website under the guidance of Drs. Susana Vacas and Crispiana Cozowicz. And finally, the Pediatrics Subcommittee, led by Dr. Rajeev Subramaniam, and the OB Subcommittee, led by Dr. Jennifer Dominguez, have begun work on guidelines in their respective areas with hopes to finalize these in 2020. These excellent and informative resources developed by the society for our members, and the broader discipline, are substantial undertakings, and the SASM leadership truly appreciates all the hard work and dedication of the members bringing these endeavors to fruition.

SASM continues to work with societies with shared interests, and we have plans for further outreach in the future. Our ongoing affiliation with International Anesthesia Research Society, and their journal *Anesthesia and Analgesia (A & A)*, continues to be productive. After years of outstanding leadership as the editor of the Sleep Section of *A & A*, Dr. David Hillman has stepped down and Dr. Toby Weingarten has assumed the role of editor of this section. A special dedicated issue on Sleep is planned in the next year, which will further raise awareness of Sleep in perioperative medicine as well as put SASM at the forefront. In addition, a SASM panel was presented at the American College of Chest Physicians (ACCP) meeting this year, and further networking with the ACCP and American Academy of Sleep Medicine are planned for this year.

The year in review would not be complete without acknowledging the publication of the Postoperative Vascular Complications in Unrecognized Obstructive Sleep Apnea (POSA) Study in



*Dr. Crispiana Cozowicz receives the Presidential Scholar Award.*

JAMA in May of 2019. Though not a product of SASM per se, this important study involved many SASM members and leaders, and was the first large multicenter prospective study to examine the risk of postoperative cardiac complications in patients with unrecognized severe OSA. The study is reviewed in detail in a later section of the newsletter. The authors deserve congratulations on completing and publishing this landmark study.

While it has been an exciting year for SASM, we now need to look towards addressing the challenges and opportunities in the upcoming year. First and foremost amongst these is that the society must continue to grow and evolve. Our membership, while substantial, needs to grow and attract new and enthusiastic members. The issues that our society deals with are ubiquitous in modern medicine, and SASM should become established as a recognized leader and “go-to” resource to those providing perioperative care to patients around the world. However, in a sense, SASM remains “under the radar.” The leadership plans to address this with more aggressive marketing of the society, including the establishment of a Communications Committee to enhance SASM’s presence on social media. We also ask that the membership participate in generating interest in the society by signing up for departmental memberships, encouraging those in training to join, and recognizing SASM and all it has to offer whenever engaging in educational outreach. Second, we need to strengthen relationships with our sponsors who have mutual interests in this field. Working together, we can ensure SASM stays on the forefront of technologic and pharmacologic advances, and continue to pursue our mission of education and research. Third, SASM needs to work towards establishing better communication within the society to enhance academic and research opportunities amongst our membership. And finally, our society needs to more aggressively take advantage of opportunities that arise to promote SASM and all we have to offer. To that end, we are hoping to make the 2020 SASM meeting an exciting and attractive conference reaching beyond our typical medical discussions to include innovative and hot topics, including policy discussions, that are afforded by having the meeting being hosted in Washington D.C.

SASM is a society we can all be proud of, but to make it function optimally, we need full engagement of the membership. Opportunities are aplenty, so think about how you would like to help and get the most out of your membership. The leadership is always open to feedback and ideas, so please do not hesitate to contact any of us on the Board of Directors.

I want to thank all of you at SASM for providing me with the opportunity to serve you. I look forward to working with all of you as we continue to pursue our mission.

*With deep gratitude,*  
**Dennis Auckley, MD**

# Editors' File

## **Jean Wong, MD, FRCPC**

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Happy New Year and welcome to the January edition of the SASM Newsletter! As we reflect upon the past year, SASM has achieved many successes and we are approaching our 10<sup>th</sup> anniversary. Under the leadership of past President, Stavros Memtsoudis, MD, the past year has seen exciting new collaboration with other societies such as the American Society of Regional Anesthesia (ASRA). At the same time, there are many plans for the upcoming year. Incoming President, Dennis Auckley, MD, whose dedication and enthusiasm is already well known to our society's members, will ensure that we will continue to succeed in advancing our society's goals to promote collaboration between anesthesiology and sleep medicine to improve perioperative management of patients with sleep-disordered breathing.

The 2019 Annual Meeting in Orlando, Florida was another success, with a wide variety of topics and an ultrasound workshop that was well-received. Rabail Chaudhry, MD, provides a summary of the 9th SASM Annual Meeting.

Patients with obstructive sleep apnea (OSA) are at increased risk for perioperative complications. Whether there is any benefit of regional anesthesia vs. general anesthesia for reducing risks in patients with OSA is controversial. In this issue of the newsletter, Crispiana Cosowicz, MD, reviews the evidence supporting the utilization of regional anesthesia over general anesthesia. She also discusses the use of multimodal analgesics and advantages of avoiding of general anesthesia in patients with OSA.

Sleep disordered breathing is common in hospitalized patients. Lauren Tobias, MD discusses the accumulating evidence for testing hospitalized patients for sleep disordered breathing. She reviews the potential advantages of in-hospital screening, testing and sleep programs and some of the practical challenges with establishing these programs.

Many patients with OSA are not diagnosed prior to surgery. Although evidence from large administrative databases suggests that patients with unrecognized OSA are at increased risk for postoperative cardiovascular complications, there has been a lack of prospective trials addressing this area. In this issue, Yamini Subramani, MBBS summarizes a large, multi-center, prospective trial led by Frances Chung, MBBS that was published in JAMA last year. She showed that patients with severe unrecognized OSA had increased risk for 30-day postoperative cardiovascular complications after major non-cardiac surgery.

Susana Vacas, MD, Chair of the SASM Scientific Updates Subcommittee provides a summary of the featured article for this issue.

Opioids are commonly administered during and after surgery but can be associated with both short-term and long-term adverse effects. This issue also features a testimony from a patient who received opioid-free anesthesia during her recent surgery and a commentary by David Samuels, MD and Enrico Camporesi, MD about the advantages of opioid-free anesthesia.

We thank all of the contributors to this issue of the newsletter. We encourage and always welcome submissions for newsletter articles from all members of the society on current controversies or challenges in clinical practice, current advances in anesthesia and sleep medicine – including basic science research, and clinical management of difficult cases from the real world. Please contact us if you would like to join the Newsletter Committee or submit an article.

# Summary of SASM 2019 Annual Meeting

**Rabail Chaudhry, MD, MSc**

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The Society of Anesthesia and Sleep Medicine's 9<sup>th</sup> Annual Meeting was held in Orlando, Florida on October 17-18, 2019. The theme of this year's meeting was "State of the Art technologies, Pharmacology & Pathology". This year, the scientific program featured a range of topics that may not be as well known as sleep apnea, but are important to anesthesiologists; sleep medicine specialists and other health care professionals and scientists caring for surgical patients with sleep disordered breathing. The meeting provided updates and identified areas for future research. The program on October 17, 2019 consisted of two hands-on workshops. The first workshop "Point of Care Ultrasound for the OSA Patient Workshop" was led by Stephen Haskins, MD and was aimed at focused cardiac, lung and gastric ultrasound techniques. The second workshop "Airway Ultrasound and Positive Airway Pressure Workshop" was led by Dennis Auckley, MD and Mandeep Singh, MD, MSc and was aimed at teaching diagnostic and procedural airway ultrasound as well as ultrasound guided regional blocks and positive airway pressure.

The main program began on October 18, 2019 with a welcome address by Stavros Memtsoudis, MD PhD, the President of SASM. The first session, which was moderated by Stephen Haskins, MD, featured several talks on unique challenges of acute and chronic pain management in patients with sleep disordered breathing, regional anesthesia for OSA patients, and the opioid epidemic in context of sleep disorders. This session was followed by a discussion on pain management in patients with sleep-disordered breathing.

The second session which was moderated by Krish Ramachandran, MD, MBBS began with the keynote address delivered by Nate Watson, MD, MSc, who spoke about Artificial Intelligence and Sleep. This session continued the theme of 'state-of-the-art technologies' by featuring several talks on emerging technologies in sleep and anesthesia, wearable and interactive devices for post-discharge follow-up, and the impact of big data analytics on personalized care and patient outcomes in patients with sleep disordered

breathing. This session was followed by a panel discussion on the use of current and emerging technologies for both diagnostic and follow-up purposes.

The Annual General Meeting was held followed by the Best Abstract Awards Luncheon. A Lifetime Achievement Award was also presented to Frances Chung, MD for her academic contributions to sleep medicine and SASM. The 2019 Annual Meeting Abstract Awards were presented to the top 3 abstracts of the meeting. The first-place award was given to Eva Christensson, MD for her abstract "The Effect of CPAP Treatment in Patients with Obstructive Sleep Apnea on the Global Gene Expression Profile in the Whole Blood". The second-place award went to Gincy Lukachan, MD for her abstract "Describing the Trends in Neck, Leg and Total Fluid Volumes in Patients Undergoing Non-Cardiac Surgery in the Perioperative Period in Surgical Patients – A Prospective Cohort Study". The third-place award was awarded to Rabail Chaudhry, MD for her abstract "Risk of Major Cardiovascular and Cerebrovascular Complications after Elective Surgery in Patients with Sleep Disordered Breathing".

The third session of the meeting, Keynote speaker Rebecca Aslakson, MD, FCCM, FAAHPM presented "Postoperative Sleep as a Patient-Centered Outcome After Hospital Discharge



*Eva Christensson receives the First Place Abstract Award from Sub Abstract Committee Chair, Dr. Toby Weingarten.*

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– Implications for QOL and Safety” and this session was moderated by Dennis Auckley, MD. This session included multiple informative talks on pharmacologies including sleep and alertness promoting agents, delirium and sleep after cardiac surgery, and the associations of respiratory depression and use of gabapentinoids.

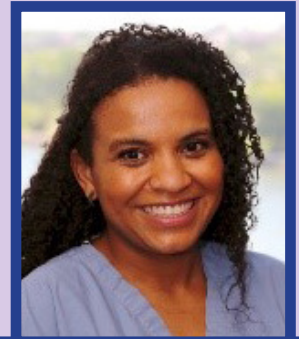
The Annual Meeting concluded with the last session on “Disease Mechanisms and Pathways” moderated by Christine Won, MD, MSc. This session featured interesting talks on In-hospital sleep programs, post-operative central sleep apnea, and high-risk obstetrics in patients with sleep disordered breathing.

The unique challenges in post-operative acute pain management of patients with sleep-disordered breathing were highlighted including technologies for obtaining live data from patients post-discharge and the impact of these technologies on patient follow-up and care. The anesthetic risks for neuraxial opioids in parturients with sleep-disordered breathing undergoing labor epidural and/or cesarean section, as well as for parenteral opioids in non-obstetrical surgery in the obstetric patient were also discussed. Other interesting topics including the use of big data in postoperative monitoring for patients and the current challenges with using this data to support personalized care.

The next SASM Annual Meeting will be held in Washington D.C. on October 1-2, 2020.



# Regional Anesthesia for the OSA Patient: Is There a Benefit and When Should We Use It?



**Crispiana Cozowicz, MD**

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A growing body of evidence has shown that in the perioperative setting, OSA presents a significant risk factor for serious adverse events and worsened outcome, which may include cardiopulmonary complications and respiratory failure, neurocognitive complications, critical care requirement and increased length of hospitalization.<sup>1-4</sup> Apart from the inevitable surgical trauma which induces a detrimental systemic catabolic stress response, anesthesia technique is increasingly recognized as a critical driver of postoperative outcome.<sup>5,6</sup>

Given the distinct features of OSA, as a sleep related breathing disorder, inherent properties of anesthetic medications and their desired interference with alertness, pain perception, respiratory drive, and sleep, can concurrently pose a significant postoperative threat due to the underlying deterioration in airway function.<sup>7,8</sup> Thus, the increasing prevalence of OSA and the consistent rise in surgical volume, demand the investigation and implementation of best anesthesia practice to assure perioperative risk reduction and quality improvement for this patient population.

In the general population increasing evidence indicates improved outcomes with the utilization of regional anesthesia as an adjunct or substitute to general anesthesia.<sup>5,6</sup> However, evidence as it relates to the comparative effectiveness of various anesthesia techniques specifically in OSA is scarce. Nevertheless, regional anesthesia and multimodal pain management strategies are increasingly recommended, given their commonly established benefits in rendering the sparing of opioids and anesthetic medications.<sup>9,10</sup>

A few retrospective cohort studies of comparative effectiveness with regards to general versus regional anesthesia in OSA patients have been provided. The largest national population based analysis by

Memtsoudis et al.<sup>11</sup> showed that among 30,024 OSA patients undergoing major orthopedic surgery, neuraxial anesthesia was associated with lower odds for pulmonary, gastrointestinal, infectious and renal complications, as well as blood transfusions, postoperative mechanical ventilation, critical care requirement, prolonged hospitalization and increased cost when compared to the use of general anesthesia. Moreover, peripheral nerve block use was independently associated with decreased odds for mechanical ventilation, critical care admission and prolonged hospitalization.<sup>11</sup> Similarly in major orthopedic surgery, Naqvi et al.<sup>12</sup> showed that general anesthesia was associated with increased risk for pulmonary, cardiac, gastrointestinal and wound complications, shock, acute hemorrhagic anemia and even mortality, in comparison to neuraxial anesthesia. This notion was also confirmed by other studies,<sup>13,14</sup> while general anesthesia was demonstrated to put patients with OSA at risk for postoperative hypoxemia and respiratory events requiring intervention, even in the presence of postoperative continuous supplemental oxygen administration.<sup>15</sup>

A number of OSA related factors support the notion of improved outcome with regional or multimodal analgesia in the context of reducing narcotics and anesthetic medication, while improving pain management.

It is known that in the postoperative period patients with OSA commonly experience a deterioration in sleep disordered breathing. This is marked by an increased apnea hypopnea index with subsequently exacerbated nocturnal hypoxia and hypercapnia as well as changes in sleep architecture and worsened sleep efficiency.<sup>16</sup> This evident worsening reaches

its peak on postoperative night 3 with recovery to baseline only after 7 days.<sup>16</sup> In this context Chung et al.<sup>17</sup> identified that general anesthesia and cumulative 72h opioid dosage pose significant drivers of the postoperative aggravation of central apnea and the apnea hypopnea index.<sup>17,18</sup>

With regards to airway management in OSA, current evidence and practice guidelines recommend the anticipation of a difficult airway in this patient population, while preparation and execution should be mastered according to the current practice guidelines for the management of the difficult airway.<sup>9,10</sup> In this context, a recent meta-analysis by Nagappa et al.<sup>19</sup> demonstrated that the odds for encountering difficult intubation, difficult mask ventilation or both is increased by three to four-fold in OSA, compared to the general population. Importantly, critical airway events should also be anticipated postoperatively after general anesthesia, as unplanned intubation may be necessary and potentially difficult due to the underlying pharyngeal airway obstruction.<sup>20</sup>

Moreover, recent evidence also indicates that patients with OSA receiving neuromuscular blocking agents may be at increased risk for postoperative residual neuromuscular blockade with subsequent hypoxemia and respiratory failure.<sup>21,22</sup> For instance, Xara et al.<sup>23</sup> showed that postoperative inability to breathe deeply and postoperative residual neuromuscular blockade was more common in OSA versus non OSA patients. Thus, residual neuromuscular blockade could pose a significant driver of the common postoperative respiratory complications in OSA.

Numerous studies have established how anesthetic, sedative and narcotic drugs can worsen upper airway collapsibility

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dose dependently and confer the depression of central respiratory activity with diminished or delayed ventilatory response and depression of peripheral output to reflex pathways of upper airway muscles in response to hypercarbia and hypoxia.<sup>24-27</sup>

The depression of ventilatory response due to anesthetic drug agents is particularly critical in OSA patients, who during nighttime typically experience cycling scores of apnea and hypopnea with recurrent hypoxia and hypercarbia due to impaired upper airway control during sleep. Once a certain threshold in hypercarbia and hypoxia is reached, these cycles are terminated by an arousal response which confers the reopening of the airway. However, anesthetic, sedative and narcotic drug agents can severely delay the arousal response and potentially induce precipitous cerebral hypoxemia, which can further lead to central arousal failure and sudden death.<sup>28</sup>

In this context, it is also noteworthy, that inherent OSA features may alter pain perception and opioid sensitivity.<sup>29</sup> While chronic, intermittent hypoxia as well as sleep fragmentation appear to enhance pain perception, hypoxia seems to concurrently confer augmented opioid potency.<sup>30-33</sup> These findings imply that opioid and analgesic requirements could be substantially lower in some OSA, thus requiring careful titration.<sup>34</sup>

A growing body of literature has provided evidence on the occurrence of postoperative, critical, life-threatening or fatal events in patients with OSA.<sup>4,35-38</sup> Notably, OSA patients experiencing these events often share a common postoperative course, including postoperative adequate alertness and favorable sedation levels, preceding of high pain scores and consumption of narcotics and sedatives in typical or less than typical dosages, and after going to bed, found in critical condition or dead due to cardiorespiratory failure.<sup>28</sup> Retrospectively these events are often deemed as preventable with lapses in monitoring are commonly implicated.<sup>36</sup> Moreover, critical postoperative complications in OSA are increasingly recognized in the legal arena.<sup>4</sup>

The perioperative anesthetic and analgesic management of patients with OSA is therefore of utmost importance and strategies of postoperative risk reduction should be further investigated. Overall, current evidence and practice guidelines concur in support of the utilization of regional anesthesia and the implementation of a multimodal pain management strategies whenever feasible to ensure high anesthesia quality with sparing of narcotics and anesthetic drug medications and adequate patient monitoring.<sup>9,10</sup>

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# Considerations for Developing an In-Hospital Sleep Program

**Lauren Tobias, MD**

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Yale School of Medicine



Sleep-disordered breathing is very common in hospitalized patients, with studies estimating 40% of patients qualify as “high risk” of having obstructive sleep apnea (OSA) on formal testing.<sup>1</sup> Inpatients’ elevated risk of sleep apnea relative to the general population is in part due to higher rates of associated comorbidities including obesity, hypertension and cardiovascular disease. While the majority of sleep testing occurs in the outpatient setting, mounting evidence should prompt consideration of inpatient screening, testing, and treatment programs for OSA.

Several factors suggest we should concern ourselves with diagnosing OSA among inpatients. The presence of OSA has been linked to adverse outcomes among admitted patients, including increased hospital length of stay.<sup>2</sup> Nonadherence with PAP therapy is associated with higher rapid response rates during hospitalization as well as increased 30-day rates of readmission.<sup>2,3</sup> The hospital therefore represents a unique setting in which to introduce positive airway pressure (PAP) therapy and potentially improve CPAP adherence rates and thereby outcomes.

What are the potential advantages to establishing an inpatient screening and testing program for OSA? First, testing inpatients can expedite diagnosis and therefore treatment, which is particularly important given the delays patients often experience while waiting to receive PAP devices. Inpatient testing also offers convenience – inpatients are a captive audience in whom testing can often occur the same day it is ordered. Additionally, inpatient testing may facilitate a smoother transition to the outpatient setting, reducing the common problem of loss to follow-up. Testing and treating inpatients for sleep-disordered breathing affords an opportunity for inpatient education

about sleep disorders and healthy sleep. Finally, sleep apnea patients are becoming increasingly medically complex,<sup>4</sup> suggesting they may benefit from hospital resources such as additional nursing and respiratory therapy support during sleep testing.

In developing a testing program, potential challenges to in-hospital sleep testing must be anticipated as well. Inpatients commonly suffer from poor sleep quality<sup>5</sup> and factors associated with acute illness (such as pulmonary edema or opiate medications) may influence test results such that they are less reflective of typical sleep at a patient’s baseline. Relatedly, patients may mistrust results as poorly representative of their normal sleep. Many patients will require repeat testing after their clinical condition stabilizes. From a cost standpoint, inpatient testing is not typically reimbursable to the full extent possible with outpatient testing; in the United States, only the professional fee may be charged, not the procedure itself or technical fee.

Accounting for these advantages and challenges, inpatient sleep testing programs will be impactful when targeting populations at high risk for OSA. These include patients admitted with acute exacerbations of heart failure, post-stroke patients, those undergoing inpatient EEG monitoring to evaluate for seizures<sup>6</sup>, and perioperative patients. As the most common cause of hospital admissions and readmissions in the US, heart failure has received particular attention as a potential target for sleep testing.<sup>7</sup> Studies find that approximately 40-70% of people with heart failure have sleep-disordered breathing on polysomnography.<sup>8</sup> One study found that patients who were diagnosed with sleep apnea, promptly treated, and adherent with PAP had significantly lower rates of

hospital readmission at 30 days<sup>9</sup> (Figure 1). Since there is clear evidence linking sleep apnea to stroke,<sup>10</sup> early recognition of sleep apnea has been identified as a potentially modifiable risk factor to prevent subsequent strokes. Since 2014, the American Heart Association and American Stroke Associations have recommended considering screening for OSA as part of secondary stroke prevention. Although the evidence is mixed regarding CPAP’s impact on stroke severity scores, some data indicates earlier treatment may lead to improved functional outcomes.<sup>11</sup>

There are several practical considerations for designing an inpatient sleep testing program, including:

1. *How will patients be identified and who will be able to order sleep testing?* Will an electronic reminder prompt a primary medical or surgical team to order testing on all patients with a given admission diagnosis such as heart failure or stroke? Or on those patients with a certain degree of obesity (eg. BMI > 30 kg/m<sup>2</sup>)?
2. *What equipment will be used, and where will the study occur?* Most inpatient testing programs use ambulatory sleep testing equipment, but some have mobile carts with full polysomnograph, the ability to transport patients to a sleep lab for the night of testing, or employ simple nocturnal oximetry for which there is supportive data.<sup>12</sup>
3. *How will staff be trained to administer testing?* It may be most practical to identify a core group of respiratory therapists (RTs) who receive specialized training in sleep testing.
4. *What will sleep testing protocols look like?* When during the admission will testing be administered? How will the

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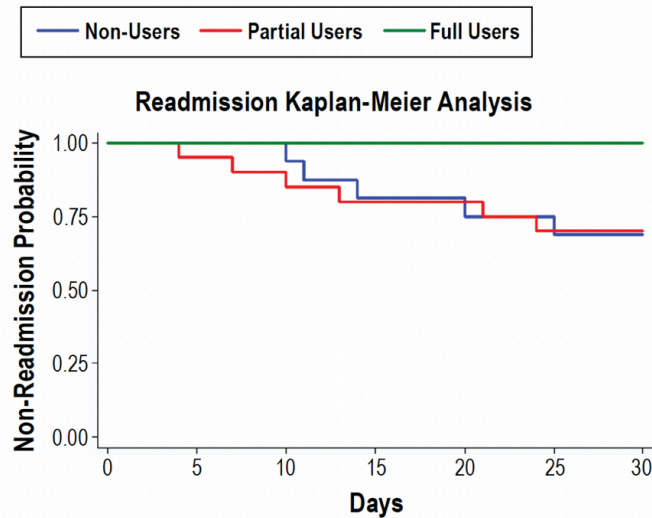


Figure 1. In a study of cardiac inpatients who underwent inpatient sleep testing and received auto-titrating positive airway pressure upon discharge, PAP usages was associated with a reduced rate of hospital readmission within 30 days of discharge.

Kauta SR et al. 2014. *J Clin Sleep Med*; 10(10):1051.

inevitable interruptions in the hospital setting – eg. vital signs checks, glucose measurement, etc. – be handled in patients undergoing testing?

5. *How will prompt study interpretation be coordinated?* Workflow design must designate staff members to upload and interpret study results, and a physician to interpret the test. Ideally, turnaround time is short so that results are actionable and to avoid delaying the hospital discharge.
6. *Who will facilitate communication with medical equipment companies?* This may be handled by an inpatient care coordinator or the outpatient sleep center where the patient will ultimately receive long-term care.
7. *How will transition to the outpatient sleep clinic occur?* It is crucial that there be a clear pathway establishing outpatient follow-up after discharge.

In summary, it is worthwhile to consider whether implementing an inpatient sleep apnea screening, testing, and treatment program is right for your institution. If you move forward in developing an inpatient sleep program, consider your hospital's perspective. Both financial

and mission-based incentives may prove influential. For example, sleep testing in patients with heart failure can have the potential to reduce financial penalties by preventing readmissions, but can also bolster the patient-centered mission of a heart failure program seeking to provide comprehensive care. Finally, it is critical to communicate your program's existence to key parties in the hospital: broadcast your plans to other providers, nurses, and trainees whose "buy-in" is essential and whose participation will facilitate successful implementation.

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# Summary of 'Association of Unrecognized Obstructive Sleep Apnea with Postoperative Cardiovascular Events in Patients Undergoing Major Noncardiac Surgery' Published in JAMA by Matthew T. V. Chan et al.

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## Introduction:

Obstructive sleep apnea (OSA) is the most common type of sleep-disordered breathing and is characterized by cyclical alterations between pharyngeal collapse and arousals during sleep.<sup>1</sup> It may be exacerbated by general anesthetics, sedatives, and postoperative analgesics, predisposing patients to postoperative cardiovascular complications. But the current literature poses great uncertainty whether unrecognized OSA adversely affects postoperative outcomes. Hence, the Postoperative Vascular Complications in Unrecognized OSA (POSA) study was designed to determine the association between OSA and a composite of cardiac death, myocardial injury, heart failure, thromboembolism, atrial fibrillation, and stroke within 30 days of noncardiac surgery.

## Methods:

### Study Design and Participants:

This was a multicenter, prospective cohort study of adult patients over 45 years from 8 hospitals in 5 countries undergoing major non-cardiac surgery (intraperitoneal, major orthopedic, or vascular). Patients were eligible for the study if they had one or more risk factors for postoperative cardiovascular events (i.e, history of coronary artery disease, heart failure, stroke or transient ischemic attack, diabetes requiring treatment and renal impairment with preoperative plasma creatinine concentration >1.98 mg/dl). Patients with prior diagnosis of obstructive sleep apnea or undergoing corrective surgery for OSA or anticipated to require prolonged (>2 days) mechanical lung ventilation after surgery were excluded.

## Procedures:

Patients underwent a preoperative overnight sleep study using a portable sleep monitoring device (ApneaLink Plus; ResMed).<sup>2</sup> Respiratory event index (REI) was calculated as the number of these events per hour of recording. Mild OSA was diagnosed when REI was 5 to 14.9, moderate OSA when REI was 15 to 30, and severe OSA when REI was greater than 30.<sup>18,19</sup> Oxygen desaturation index (ODI) was defined as the number of events (duration >10 seconds) per hour when there was a decrease in oxyhemoglobin saturation of 4% or more from baseline.<sup>3</sup> After surgery, electrocardiograms and venous blood samples (for measuring plasma cardiac troponin concentrations) were collected at 6 to 12 hours and then daily during the first 3 days after surgery.

During the first 3 postoperative nights, oxyhemoglobin saturation was recorded using the PULSOX-300i device. All patients were followed up regularly up to 30 days after surgery through a structured telephone interview.

## Outcomes:

The primary outcome was a composite of myocardial injury, cardiac death, congestive heart failure, thromboembolism, new atrial fibrillation and stroke within 30 days of surgery. The secondary outcomes were unplanned tracheal intubation or postoperative lung ventilation, readmission to the intensive care unit (ICU) and infections. A sample size of 1200 patients was required to ensure a stable regression model with an anticipated primary event rate of 4%.<sup>4</sup>

## Results:

A total of 1218 patients who completed a preoperative sleep study and had undergone major non-cardiac surgery

were included in the analyses. Among these patients, 67.6% had unrecognized OSA (REI  $\geq 5$ ), 30.5% had at least moderate OSA (REI  $\geq 15$ ), and 11.2% had severe OSA (REI >30). The primary outcome occurred in 235 patients (19.3%) within 30 days of surgery (30.1% (41/136) for patients with severe OSA, 22.1% (52/235) for patients with moderate OSA, 19.0% (86/452) for patients with mild OSA, and 14.2% (56/395) for patients with no OSA). Compared with patients without OSA, OSA was associated with higher risk for the primary outcome [adjusted HR, 1.49 (95% CI, 1.19- 2.01); P = 0.01]. However, the association was only significant among patients with severe OSA (adjusted HR, 2.23 [95% CI, 1.49-3.34]; P = 0.001) and not among those with moderate OSA or mild OSA. OSA was also associated with infective outcomes, unplanned tracheal intubation, or postoperative lung ventilation and readmission to the ICU. In patients without OSA, there was a significant increase in ODI, whereas it was reduced during the first 2 nights and returned to baseline on the third night after surgery in patients with OSA. This was associated with supplemental oxygen administration (P = 0.009 for general linear model). The mean cumulative duration of oxyhemoglobin desaturation less than 80% during the first 3 postoperative nights for patients with cardiovascular complications [23.1 (95%CI, 15.5-27.7) minutes] was longer than for patients with no cardiovascular complications [10.2 (95% CI, 7.8-10.9) minutes, (P < 0.001)].

## Summary:

This study demonstrated that severe unrecognized OSA was associated with increased risk of 30-day postoperative cardiovascular complications among at-risk adults undergoing major non-cardiac surgery. Supplemental oxygen

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did not modify the association between OSA and postoperative cardiovascular event, despite a substantial decrease in ODI. Given that these events were associated with longer duration of severe oxyhemoglobin desaturation (<80%), more aggressive interventions may be required. In contrast to the current guideline recommendations<sup>5</sup>, regional analgesia or avoidance of postoperative opioids were not associated with better outcome. Further research would be needed to assess whether interventions can modify this risk.

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## Shared Neural Substrate by Anesthetics and Sleep: Featured Article

### Susana Vacas, MD, PhD

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### A Common Neuroendocrine Substrate for Diverse General Anesthetics and Sleep.

Jiang-Xie LF, Yin L, Zhao S, Prevosto V, Han BX, Dzirasa K, Wang F  
*Neuron*. 2019 Jun 5;102(5):1053-1065

<https://www.ncbi.nlm.nih.gov/pubmed/31006556>

How general anesthesia induces loss of consciousness remains unclear, and whether diverse anesthetic drugs and sleep share a common neural pathway is unknown. Jiang-Xie and colleagues just published a brilliant work on how anesthesia-activated neurons (AAN) represent a common neural substrate for general anesthesia and sleep, and function to main-

tain or prolong the unconscious or sleep state. The most surprising discovery is that most of AANs are peptide-releasing neuroendocrine cells in the supraoptic nucleus. It turns out that these cells not only release peptide hormones into the circulation through their projections to the posterior pituitary, they also release large amounts of peptides through massive den-

drinic release into the hypothalamus and to the cerebrospinal fluid. These findings identify a common neural substrate underlying diverse general anesthesia drugs and natural sleep and reveal a crucial role of the neuroendocrine system in regulating global brain states.

# A Patient Perspective on a Non-Opioid Anesthesia and Pain Management

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### Elizabeth Markies' (Patient) Perspective:

Non-opioid anesthesia coupled with a non-opioid postoperative approach allowed my body to heal at an accelerated pace.

I experienced non-opioid anesthesia administered by Dr. David Samuels when I was undergoing thyroid cancer surgery in Tampa. When I was informed of this alternate approach I felt an immediate sense of relief. Having had major surgery just four months prior, I was well aware of the lingering side effects of conventional anesthesiology practice. In prior medical situations, the influence of opioids had caused me to feel physically, emotionally, and intellectually compromised. Specifically, I had experienced digestive discomfort and elimination challenges for several days and would also randomly start crying. Additionally, I was unable to focus and find clarity for several weeks post-surgery. I did not experience these side effects following non-opioid anesthesia.

Stress levels add a complexity to the surgical process. The diagnosis of cancer and the idea of undergoing surgery, coupled with everyday life circumstances contributed to my stress level. I felt nervous, apprehensive and frightened. To reduce my response to this threat, Dr. Samuels added an additional level of assurance. He skillfully led me through a process to increase my mindfulness to further reduce my body's stress response, activate my parasympathetic nervous system and reduce my anxiety. He prepared me to do this exercise as he administered the anesthesia by first having me experience this process in pre-op. He had me focus on my breath, taking slower and deeper breaths, while at the same time thinking of a future outcome that brought about an emotion of appreciation and gratitude. His goal was to activate the vagus nerve and reduce my threat response.

As I became conscious following surgery the nurse immediately inquired about the level of pain I may have been experiencing. I informed the nurse that it was close to an eight. I was immediately attended to with two tablets of magnesium. Almost instantaneously I experienced a reduction in pain and within approximately two minutes the pain had subsided. Believe it or not, the next pain reliever I was given was a popsicle. The popsicle not only helped to relieve my sore throat but served to provide an impressive psychological reward as well. I could not help but smile at the idea of having a popsicle as an adult in the recovery area, as well as benefit from the positive memories the experience created. The popsicle served to shift my attention away from discomfort and created new chemistry in my body

that served to reduce stress and accelerate the healing process.

Post-surgery I continued to use cold compresses, magnesium and an anti-inflammatory to manage my discomfort. Minus the influence of opioids, in comparison to prior surgical experiences, my mental, emotional and physical well-being was less compromised and therefore enhanced my body's ability to recover in a way that it is designed to heal.

As a result of my experience with a non-opioid practice, I felt that I received exceptional care and genuine concern about my surgical and pain management process. I have shared this positive experience and information with many others and should I require anesthesia in the future, I will choose an anesthesiologist, and surgeon, that supports this method.

In summary, while there is well-deserved focus on the opioid crisis and addiction, I suggest that consideration for eliminating opioids to support the body's healing process to be strongly considered.

### Dr. Samuels' Perspective:

Listen to your patients! I am a non-opioid anesthesiologist. The last time I administered an opioid during anesthesia was the day before I heard Dr. Jan Mulier's talk at the October 2015 SASM conference. More than 4000 of my patients have received no intraoperative opioids. By utilizing non-opioid anesthesia and postoperative analgesia, I do not initiate the first dose of opioids in most of our surgical patients. This eliminates opioid tolerance that often leads to iatrogenic opioid dependence after surgery. In these past four years, I have realized the following points, which are consistent with Elizabeth's words:

- Patients are often thankful for not receiving opioids
- Many patients and their family members have had an adverse experience with opioids
- With guidance, patients can utilize their internal parasympathetic "pharmacy" to overcome the anxiety induced sympathetic output
- Non-opioid analgesics are effective to treat postoperative pain

My formal anesthesia training led me to the bias that opioids are an integral part of general anesthesia. This preconceived bias proves

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difficult to overcome by my anesthesia colleagues. Search the internet for “Max Baker opioid overdose” and you will read a chilling story of a 23-year old former addict who begged his anesthesiologist not to give him an opioid during surgery. The anesthesiologist felt that he should not be treated any differently than other patients and administered a dose of fentanyl during surgery. One month later, Max overdosed. That small fentanyl dose during surgery initiated a cascade with a devastating outcome.

This past July, the state of Florida passed legislation that requires all physicians to discuss non-opioid alternatives before prescribing or administering opioid therapy. Have this discussion! It is simple and leads to patient empowerment with outstanding results.

### Dr. Camporesi’s Perspective:

In summary, there is an increasing number of undesirable side effects of opioids such as respiratory depression, sedation, nausea/vomiting, constipation, and ileus. These issues can lead to significant morbidity and mortality. Furthermore, short-acting opioids used during an anesthetic may lead to acute opioid-induced tolerance and hyperalgesia.

We reported that exposure to even marginal amounts of opioids intraoperatively increases the need for opioids in the postoperative course.<sup>1</sup> Moreover, patients recovering from opioid-free anesthesia were more promptly waking up from their surgery, with pain well-controlled by other means, and had “clearer heads”.<sup>2</sup>

In conclusion, non-opioid anesthesia provides a reduced requirement of

opioids in the recovery room with patients experiencing less nausea and vomiting and experiencing shorter recovery room stays. In all cases, the anesthesiologist must learn alternate methods for anesthesia and postoperative pain control in order to comply with patients’ requests for the avoidance of opioids!<sup>3</sup>

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