First of all, I want to thank the Nomination Committee and the membership for the opportunity to serve as the President of SASM. It is an honor and a privilege, and I know I have big shoes to fill, but I want to assure you that I will give my very best effort to further the objectives of SASM and add to its success. Although the activities of SASM can be time consuming, they are gratifying and allow personal growth.

The SASM was formed to promote cross-fertilization between anesthesiology and sleep medicine to improve patient care and safety. It is clear from the rapid growth in our membership that SASM fills a void by providing interactions between several disciplines including anesthesiologists, sleep physicians, surgeons, emergency physicians, hospitalists, and basic scientists. I am pleased to report that in a very short period, SASM has developed multiple avenues to achieve its goals including the annual meeting, a newsletter, and web-based education such as white papers and review of recent literature, to mention a few. Also, SASM provides a discussion forum that represents another avenue for sharing clinical and research ideas relevant to anesthesia and sleep medicine. In addition, SASM recently published guidelines for preoperative screening and assessment of patients with obstructive sleep apnea.

I want to emphasize that SASM plans to address not just the clinical challenges posed by patients with obstructive sleep apnea, but also other conditions related to sleep-disordered breathing. This is evident from the theme of the 2016 Annual Conference “Perioperative-Sleep Disordered Breathing: It is not Just Sleep Apnea.” This successful conference discussed continued on page 3
I would like to wish everyone a Happy New Year! As we reflect upon the past year and take stock of all of SASM’s achievements, our society has certainly made great strides. Under the leadership of past President, Peter Gay, MD, the past year has seen exciting accomplishments including the publication of SASM’s guidelines for preoperative screening and assessment of patients with obstructive sleep apnea, and the establishment of the Obstructive Sleep Apnea Death and Near Miss Registry. At the same time, there are many plans for the upcoming year. Incoming President, Girish Joshi, MBBS, MD, FFARCSI, whose energy and enthusiasm is already well known to our society’s members, will ensure that we will continue to succeed in development and advancement of our society’s goals to promote collaboration between anesthesiology and sleep medicine to improve perioperative management of patients with sleep-disordered breathing.

I would like to thank Satya Krishna Ramachandran, MD, FRCA for serving as the previous editor of the newsletter. I look forward to serving as the editor of the newsletter and to working with Mandeep Singh, MD, FRCPC, Co-Chair of the Newsletter.

The 2016 Annual Meeting in Chicago, Illinois was another success, with a wide variety of topics extending beyond obstructive sleep apnea to include perioperative management of narcolepsy, restless leg syndrome, and insomnia. This newsletter features articles that reflect the wide scope of topics relevant to members of this society.

This issue of the newsletter features a summary from Dennis Auckley, MD, of the recommendations of the SASM Guidelines on preoperative screening and assessment of patients with obstructive sleep apnea. The multi-disciplinary, international task force included members from both academic, and non-academic settings – and highlights the interdisciplinary nature of our society. This summary of the recommendations are the culmination of the SASM task force’s work on forming evidence-based, practical guidelines that can be used to guide clinicians caring for patients with obstructive sleep apnea during the perioperative period.

Another exciting initiative of SASM featured in this issue and led by Dennis Auckley, MD, and Frances Chung, MBBS, FRCPC, is the formation of the Narcolepsy Perioperative Working Group. This group represents a collaboration between SASM and medical leaders from the Narcolepsy Network. The group is planning a white paper to review the current knowledge on narcolepsy and perioperative management, areas for further research and hopes to develop recommendations for the best practice for narcolepsy patients undergoing surgery and anesthesia.

Sarah S. McConville, MD, and Mandeep Singh, MD, FRCPC review considerations that are relevant for perioperative physicians caring for individuals with Restless Legs Syndrome in the perioperative period. Ellen Lockhart, MD explores the challenges of screening for gestational sleep apnea, and discusses some new components that have been proposed for pregnancy-specific screening tools. This is an area for research that may have a significant impact on maternal-fetal outcomes.

This issue also features a report by Pedro Gambus, MD, PhD on the importance of accurate monitoring of respiratory function during sedation. He examines some of the available monitors of respiratory function – advantages and disadvantages of various monitors, and discusses mathematical modeling of respiratory depressant effects.

The authors who have contributed to this issue highlight some of the challenges and many opportunities for further research in different areas of perioperative management of patients with sleep-disordered breathing. We encourage and 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.
topics such as perioperative care patients with narcolepsy, restless leg syndrome, insomnia, and obesity hypoventilation syndrome to name a few.

We have been able to achieve this progress because of significant enthusiasm and hard work by our members. There is enough talent within our membership to further expand our activities. Thus, although much has been achieved, lots need to be done. We are in the process of developing best practices for perioperative care of patients with obstructive sleep apnea. A multidisciplinary task force is preparing a white paper for perioperative care of patients with narcolepsy. Another multidisciplinary task force is preparing a document on preoperative care of children scheduled for tonsillectomy. The education committee is planning to prepare several white papers that should improve perioperative care of patients with sleep-disordered breathing. All these projects show that SASM creates an environment where ideas and information is being exchanged and clinical standards and scientific enquiry is being enhanced.

There is emerging opportunity for SASM to advance perioperative care of patients with sleep-disordered breathing and enhance patient safety worldwide. Of note, the satellite meeting of the Asian SASM held immediately before the World Congress of Anesthesiology was a great success. This shows that there is a tremendous opportunity for SASM to expand throughout the world. In fact, during the October 2016 SASM Annual Meeting held in Chicago, IL a group of anesthesiologists and sleep medicine physicians planned to start a European SASM. Thus, the future for SASM is bright.

With significant progress and plans for further expansion of our activities, it was necessary to revisit our organizational structure. The committee and subcommittee structure has been modified to include new committees and subcommittees such as the Obstetric Subcommittee and Sleep Medicine Clinical Practice Subcommittee (please see the chart below). We have also created a Past President’s Council that will play a major advisory role and guide us through our rapid growth. The modification in the organizational structure was approved by the Board, but will require some changes in our bylaws and approval by our membership.

continued on next page
I would like to thank the members that have taken time from their busy lives and worked enthusiastically and purposefully to make SASM successful. I know that the caliber of members joining us will ensure further success. This is your Society, so please let us know how you would like it shaped. We love to hear from you with any suggestions, no matter how trivial. I strongly encourage all the members to participate and contribute with the ultimate aim of advancing patient care and safety. I believe that whenever possible it is important to participate in committee activities. If you are interested in contributing to SASM activities, please review the SASM organizational structure to determine the committee/subcommittee of your interest, and email your request to the SASM Office.

Also, please encourage your friends and colleagues to join SASM, a rapidly expanding international multispecialty society that offers an opportunity to promote interdisciplinary communication, education and research in matters common to anesthesia and sleep. We would welcome their involvement and hope to see our membership continue to grow as more become aware of us and of the fascinating and compelling issues that interest and concern us all.

Finally, I believe that SASM is the premier group that could contribute to education and science in the fields common to anesthesia and sleep medicine. We have enough expertise amongst our membership to guide healthcare providers as well as provide insight to pharmaceutical and device manufacturers with the aim to improve patient safety and reduce healthcare costs related to management of patients with sleep-disordered breathing.

2016 Annual Meeting Photos

1st Place Abstract Winner - Shinichi Nakamura, MD
2nd Place Abstract Winner - Norbert Seidler, PhD
The Society of Anesthesia and Sleep Medicine’s 6th Annual Meeting was held in Chicago, Illinois on October 20-21, 2016. The theme of this year’s meeting was “Perioperative Sleep-Disordered Breathing: It’s Not Just Sleep Apnea”. 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 began on October 20, 2016 with a welcome address by Girish P. Joshi, the Program Chair and President-Elect. The first session, which was moderated by Roop Kaw, MD, featured several talks on new devices for management of sleep-disordered breathing, including alternative treatments to positive airway pressure therapy and new, non-invasive treatments such as helmet ventilation. This session was followed by a discussion on what is new for monitoring patients with sleep-disordered breathing.

The Welcome Reception and Dinner featured two speakers including Joe Kiani, Founder, Chairman, and CEO of Masimo Corporation, who spoke about The Patient Safety Movement Foundation – and the goal towards zero preventable deaths by 2020. This goal aligns well with SASM’s goals to promote research and methods to minimize perioperative risks in patients with sleep-disordered breathing. The second speaker, Tim Morgenthaler, MD, discussed Sleep and Patient Safety.

On the second day of the meeting, Keynote speakers including Phyllis C. Zee, MD, PhD presented “Sleep-Disordered Breathing and Safety in Hospitalized Patients” and Babak Mokhlesi, MD, presented, an update on Obesity Hypoventilation Syndrome.

The unique challenges in the management of sleep-disordered breathing during pregnancy were highlighted including a lack of an appropriate screening tool for parturients. 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 discussed.

Other interesting topics including the special challenges in perioperative management of restless leg syndrome, narcolepsy and insomnia were discussed. In addition, European perspectives in perioperative management of sleep-disordered breathing were presented.

Over 40 thought-provoking research abstracts were presented. The 2016 Annual Meeting Abstract Awards were presented to the top 3 abstracts of the meeting. The first place award was given to Shinichi Nakamura, MD for his abstract “Counterintuitively, Higher Continuous Infusion Rate of Dexmedetomidine Shows the Tendency to Retain Both Hypoglossal and Phrenic Nerve Activities Compared to Lower Rate in Anesthetized Rabbits”. The second place award went to Matthew Strope, DO Candidate for his abstract “Role of an Ancestral Protein in the Mechanism of Restorative Sleep”. The third place award was given to Edwin Seet, MBBS, MMED for his abstract “Mobile Phone Appbased Novel Oximetry System”.

The 2016 Annual Meeting Research Grant Winner was Vidya T. Raman, MD for her project “Post-operative Outcomes from Obstructive Sleep Apnea (OSA) Screening Questions with BMI and Neck Circumference.” The recipient of the 2015 Research Grant – Mandeep Singh, MD, MSc presented his preliminary research findings on his project “The Contribution of Rostral Shift of Fluid to Postoperative Worsening of Obstructive Sleep Apnea Severity in Surgical Patients – A Prospective Cohort Study.

The next SASM annual meeting will be held in Boston, Massachusetts on October 19-20, 2017.
The management of patients with known or suspected OSA is an evolving field. Practice guidelines have been published though most are consensus-based and limited by issues such as failing to objectively establish OSA as a perioperative risk factor, not addressing how to identify OSA patients preoperatively, and making recommendations that may be difficult to implement and cost prohibitive for clinical practice.

As such, SASM formed a task force to develop a more evidence-based and cost effective approach to preoperative work up of patient with known or suspected OSA. The task force was comprised of 28 members of SASM, including 12 anesthesiologists, 9 sleep medicine specialists, 2 hospitalists, 1 otolaryngologist, 2 research assistants, a research librarian and a clinical epidemiologist. Members represented both academic and non-academic settings in various parts of the United States, Canada, Europe, Australia and South America. The task force performed a literature review from 1946 through June of 2014, analyzed the relevant literature, and developed recommendations with the goal of finding a practical balance between minimizing postoperative complications and the efficient use of healthcare resources.

A summary of the recommendations is as follows:

1. OSA patients undergoing procedures under anesthesia are at increased risk for perioperative complications compared to patients without the disease diagnosis. Identifying patients at high risk for OSA prior to surgery for targeted perioperative precautions and interventions may help to reduce perioperative patient complications.

2. Screening tools may help to risk stratify patients with suspected OSA with reasonable accuracy. Practice groups should consider making OSA screening part of standard pre-anesthetic evaluation.

3. There is insufficient evidence in the current literature to support canceling or delaying surgery for a formal diagnosis (laboratory or home polysomnography) in patients with suspected OSA, unless there is evidence of uncontrolled systemic disease.

4. The patient and the health care team should be aware that known, treated, partially treated and untreated OSA as well as suspected OSA may be associated with increased postoperative morbidity.

5. Consideration should be given to obtaining the results of the sleep study and the recommended Positive Airway Pressure (PAP) setting before surgery.

6. If resources allow, facilities should consider having PAP equipment for perioperative use, or have patients bring their own PAP equipment with them to the surgical facility.

7. Additional evaluation for preoperative cardiopulmonary optimization should be considered in patients with known, partially treated/untreated and suspected OSA.

---

**Summary of Society of Anesthesia and Sleep Medicine Guideline on Preoperative Screening and Assessment of Patients with Obstructive Sleep Apnea**

**Authors:** Frances Chung, Stavros Memtsoudis, Satya Krishna Ramachandran, Mahesh Nagappa, Mathias Opperer, Crispiana Cozowicz, Sara Parawala, David Lam, Anjana Kumar, Girish Joshi, John Fleetham, Najib Ayas, Nancy Collop, Anthony G Doufas, Matthias Eikermann, Marie Englesakis, Bhargavi Gali, Peter Gay, Adrian Hernandez, Roop Kaw, Eric Kezirian, Atul Malhotra, Babak Mokhlesi, Sairam Parthasarathy, Tracey Stierer, Frank Wappler, David Hillman, Dennis Auckley

**Contributors:** Dennis Auckley

**Published:** Anesthesia and Analgesia, 2016 Aug 123(2):452-73. doi: 10.1213/ANE.0000000000001416.
Summary of SASM Guideline continued from previous page

who have uncontrolled systemic conditions e.g. i) hypoventilation syndromes, ii) severe pulmonary hypertension, and iii) resting hypoxemia in the absence of other cardiopulmonary disease.

8. Patients with known OSA, partially treated/untreated and suspected OSA with optimized co-morbid conditions may proceed to surgery provided strategies for mitigation of postoperative complications are implemented.

9. The risks and benefits of the decision should include consultation and discussion with the surgeon and the patient.

10. The use of PAP therapy in previously undiagnosed but suspected OSA patients should be considered case by case. Due to the lack of evidence from randomized controlled trials, we cannot recommend its routine use.

11. Continued use of PAP therapy at previously prescribed settings is recommended during periods of sleep while hospitalized, both preoperatively and postoperatively. Adjustments may need to be made to the settings to account for perioperative changes such as facial swelling, fluid shifts, recent pharmacotherapy, and pulmonary function.

The primary goal of this SASM guideline is to ensure optimal preoperative evaluation of patients with known or suspected OSA in order to improve patient safety. It is hoped that the recommendations from this guideline will influence clinical practice as well as stimulate additional research to address the questions for which there is currently insufficient evidence to support recommendations.

If you are interested in becoming more involved in the Society of Anesthesia and Sleep Medicine, please send your C.V. to the SASM administrative office by emailing: info@sasmhq.org

For more information on committees, please visit: www.sasmhq.org/current-committee-membership
Narcolepsy: A New Frontier in Perioperative Medicine?

The Society of Anesthesia and Sleep Medicine (SASM) was formed 7 years ago based on a shared interest between Anesthesiology and Sleep Medicine in the evaluation and management of patients with known or suspected obstructive sleep apnea (OSA) undergoing surgery and anesthesia. While this interaction proved to be a solid basis for the foundation of SASM, it quickly became apparent that there was significant common ground overlapping anesthesia and sleep. Initial joint efforts explored such topics as the links between the sleep neurobiology and anesthesia induce sleep-like states, the bidirectional relationships of pain and sleep and the role of sleep in postoperative delirium. Over time, collaborations between the two specialties of Anesthesiology and Sleep Medicine has grown under the auspices of SASM and new interests have emerged.

Most recently, there has been an increasing focus on sleep disorders beyond OSA and their role in the perioperative setting. One such condition that SASM has directed its attention to is narcolepsy and how this may impact perioperative outcomes. In collaboration with medical leaders from the Narcolepsy Network, a not-for-profit support group for individuals with narcolepsy, SASM has undertaken a series of projects to better understand the interaction of the perioperative environment with narcolepsy, as well as the medications used to treat the condition. This new initiative, called the Narcolepsy Perioperative Working Group, is hoping to develop recommendations for the best practices for narcolepsy patients subject to surgery and anesthesia.

It has long been speculated that patients with narcolepsy may be at increased risk for perioperative complications.1-3 Some reports raise concerns about the increased risk for postoperative respiratory failure and apneas, perhaps through the association of narcolepsy and concomitant unrecognized OSA.1 Additional case reports and case series have suggested that patients with narcolepsy may be more sensitive to the effects of anesthetic agents, which could lead to delays in emergence from anesthesia.4 And most recently there has been increasing recognition of the cardiac autonomic dysfunction in patients with narcolepsy, which could be highly relevant to perioperative care.5

Patients with narcolepsy are typically treated with stimulants in order to maintain wakefulness, and some may also receive gamma hydroxyl butyrate (GHB), a CNS depressant, for management of cataplexy. How these medications may interact with anesthetic agents and what impact they may have on perioperative outcomes has not been well-studied. In order to establish the present level of understanding about the relationship between narcolepsy and perioperative outcomes, the Narcolepsy Perioperative Working Group has performed a systemic review of the literature of this topic, led by Dr. Frances Chung and Dr. Mandeep Singh, and presented these findings at the 2016 Annual SASM conference.

Of equal importance to consider is how the perioperative environment may affect narcolepsy and its associated symptomatology. Aside from delayed emergence from anesthesia, worsening of underlying hypersomnolence could be a real concern for the patient with narcolepsy. This may be aggravated by the withholding of stimulant therapy following surgery due to the provider’s uncertainty about the appropriate timing of resuming these medications postoperatively. There are a number of case series also reporting on perioperative status cataplecticus,6-8 which could be problematic for providers not familiar with cataplexy, and highly bothersome to patients. The perioperative withholding of GHB increases the risk of developing this condition. In addition to the

continued on next page
literature review mentioned earlier, the Narcolepsy Perioperative Working Group has also completed a survey of Narcolepsy Network patients to assess their personal experiences with surgery, anesthesia and postoperative care. Data from this survey were presented at the 2016 Annual SASM conference.

The data gathered from the two current projects have led to a whole host of new questions that will require thoughtful future study in order to determine how best to manage these patients perioperatively. Examples of questions brought to mind include what is the true prevalence of perioperative complications in patients with narcolepsy and is this increased compared to the general population? Should patients with narcolepsy have their medications temporarily held in the perioperative setting? What is the understanding, and the role, of perioperative providers in managing narcolepsy and when should a sleep specialist be involved? What should patients be counseled to expect with regards to their narcolepsy symptoms in the perioperative time period? The Narcolepsy Perioperative Working Group is planning a white paper to review the current state of knowledge regarding narcolepsy in the perioperative setting and to discuss these areas in need of future research, with the ultimate goal of providing safe passage for patients with narcolepsy through the surgical experience.

References:
Restless Legs Syndrome in the Perioperative Period

Restless legs syndrome (RLS), also known as Willis-Ekbom disease, is a disorder frequently encountered by sleep specialists. The condition was first described by Sir Thomas Willis in the 17th century and later by Dr. Karl-Axel Ekbom who used the term “restless legs.”1-3 RLS is estimated to affect approximately 5-10% of adults in Europe and North America, with 2-3% of adults experiencing moderate to severe symptoms.4,5 Although the term “restless legs syndrome” may be considered a misnomer—some people experience symptoms in their arms or other body parts, and the term may carry a negative connotation—it remains commonly employed today. Patients often report unpleasant—but not necessarily painful—sensations that may lead to insomnia, insufficient sleep or impaired ability to participate in work or social engagements. RLS has been associated with poorer quality of life as well as increased mortality.6-8 Diagnostic criteria have been established by the International Restless Legs Syndrome Study Group (IRLSSG), and were revised in 2012 (Figure 1).9

Although the pathophysiology of RLS may not be fully understood, genetics seem to play a role in many cases. Several genome wide association studies have identified allele variants that carry a strong association with RLS.10 Other factors implicated in the pathophysiology of RLS include reduced serum or CSF ferritin levels, iron deficiency anemia and abnormalities with dopamine signaling. Conditions that increase the risk of RLS include pregnancy and uremia secondary to renal failure.11,12 Treatment options approved by the FDA include the dopamine agonists pramipexole, ropinirole and rotigotine, as well as gabapentin enacarbil (Table 1). Treatment guidelines also include the use of pregabalin, opioids and benzodiazepines.13 Other therapies include iron replacement, particularly if serum ferritin is less than 75 mcg/mL, and optimization of sleep hygiene.14 A recent review article summarizes the issues pertinent to patients with RLS in the hospitalized or perioperative setting.15 Prolonged immobilization, altered sleep-wake patterns, medications, interruption of a patient's home medication regimen and anemia with decreased iron levels all may worsen or even unmask symptoms of RLS (Figure 2). Consequences of symptom exacerbation can include sleep deprivation or disruption, which may affect a patient's recovery and length of hospital stay. Disruption of incision or vascular puncture sites due to excessive movement may also result in complications.16 Post-surgical patients may

International Restless Legs Society Study Group (IRLSSG) consensus diagnostic criteria for restless legs syndrome / Willis-Ekbom disease

Essential diagnostic criteria:

- An urge to move the legs usually, but not always accompanied by, or felt to be caused by uncomfortable or unpleasant sensations in the legs.
- The urge to move the legs and any accompanying unpleasant sensations begin or worsen during periods of rest or inactivity such as lying down or sitting.
- The urge to move the legs and any accompanying unpleasant sensations are partially or totally relieved by movement, such as walking or stretching, as long as the activity continues.
- The urge to move the legs and any accompanying unpleasant sensations during rest or inactivity only occur or are worse during the evening or night than during the day.
- The occurrence of the above features is not solely accounted for as symptoms primary to another medical or behavioral condition (i.e. myalgia, venous stasis, leg edema, arthritis, leg cramps, positional discomfort, habitual foot tapping).

Figure 1. IRLSSG consensus diagnostic criteria for RLS/WED. Reprinted from: Sleep Medicine, 15(8), Allen, R.P., et al., “Restless Legs Syndrome/Willis-Ekbom Disease diagnostic criteria: updated International Restless Legs Syndrome Study Group (IRLSSG) consensus criteria—history, rationale, description, and significance”; p. 860-873, 2014, with permission from Elsevier.
experience prolonged immobilization due to illness or be required to maintain a specific body position (ex: supine) to minimize complications from specific procedures, such as femoral arterial puncture after cardiac catheterization or vascular surgery. Immobility has been shown to exacerbate both the sensory and motor components of RLS in the general population, and potentially in the post-surgical population. Another problem is an abnormal sleep-wake pattern and the effects of partial sleep deprivation. Hospitalized patients often achieve a significant portion of their total sleep during daylight hours. Given the circadian pattern of RLS symptoms, patients may experience more noticeable or severe symptoms if they are awake particularly in the late night and early morning hours. A perioperative physician not aware of the pathophysiology or treatment options may not be able to treat this condition effectively, or initiate therapy in a timely manner.

With regard to anesthetic technique, studies evaluating spinal anesthesia have been inconsistent. One proposed mechanism is a change in spinal sensorimotor integration after spinal anesthesia. While one group reported new onset, transient RLS in approximately 9% of patients, another did not show a similar result. One source of variability may be use of medications that have the potential to unmask or worsen symptoms as well as medications such as opioids, which can be used to treat symptoms of RLS.

Medication administration may be a more easily modifiable factor in many instances. Dopamine antagonists such as droperidol, metoclopramide or prochlorperazine are commonly administered as anti-emetics and may worsen symptoms. Haloperidol, which is often used to treat delirium or nausea, may also be a culprit. Other medications such as anti-histamines and serotonergic anti-depressants can also worsen symptoms.

So what should be taken into consideration when formulating an anesthetic or perioperative plan? Increased awareness on the part of the anesthesia provider and perioperative care team will be an important component of successful therapy. Informing a patient of the potential for their symptoms to worsen due to the aforementioned factors is reasonable, particularly if

---

**Table 1. Medications with FDA approval for the treatment of RLS/WED.**

From: www.accessdata.fda.gov

<table>
<thead>
<tr>
<th>Medication</th>
<th>Daily Dosage(^a^)</th>
<th>Side effects(^c^)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pramipexole</td>
<td>0.125 – 0.5 mg</td>
<td>Orthostatic hypotension, insomnia, worsening of RLS symptoms (augmentation), somnolence, nausea/vomiting, impulse control disorders</td>
</tr>
<tr>
<td>Ropinirole</td>
<td>0.25 – 4 mg</td>
<td>Dizziness, drowsiness, nausea/vomiting, augmentation of RLS symptoms, impulse control disorders</td>
</tr>
<tr>
<td>Rotigotine</td>
<td>1 – 3 mg transdermal</td>
<td>Headache, insomnia, nausea/vomiting, application site reaction, somnolence</td>
</tr>
<tr>
<td>Gabapentin enacarbil</td>
<td>600 mg</td>
<td>Drowsiness, sedation, dizziness, headache</td>
</tr>
</tbody>
</table>

\(^a^\) FDA-approved for treatment of RLS.
\(^b^\) Start at lowest recommended dose; up-titrate based upon manufacturer’s recommendations to effective dose. Discontinuation may require tapering.
\(^c^\) List of commonly reported side effects. Other side effects have been reported.

---

![Figure 2. Factors that may worsen RLS in the perioperative setting.](image-url)
they have more severe RLS. And if a patient takes medication for RLS at home, a preoperative plan for maintaining or resuming their medication regimen would be ideal. While surgical scheduling is often complex and sometimes unpredictable, morning time procedures or surgeries may allow for resumption of oral medication intake by afternoon or evening. In instances where “nothing by mouth” (NPO) status is expected to be lengthy or to interfere with oral medication administration, or perhaps in cases of severe RLS where excessive movements may increase risk of post-surgical complications, use of transdermal rotigotine may be considered to avoid prolonged lapses in therapy. Avoidance of medications known to worsen RLS may also help minimize this risk. Although sleep deprivation and sleep disruption can be difficult to treat in the hospitalized setting, educating patients and family members about the relationship between disrupted sleep and RLS symptoms may allow the patient and their caretakers to optimize their sleep-wake schedule in the best way possible.

Given the vast number of surgeries and procedures requiring anesthesia each year, perioperative physicians will no doubt take care of patients with restless legs syndrome. Talking with our patients about their RLS symptoms and management will help frame a discussion about potential post-operative changes in symptom burden, and allows us to identify and discuss strategies to reduce the risk of symptom exacerbation pre-emptively.

References:
1. Willis, T. De Anima Brutorum. 1672.
2. Willis, T. The London Practice of Physick. 1685.
Screening for Gestational Sleep Apnea

OSA is characterized by inflammation, sympathetic activation and oxidative stress. All of these factors in conjunction with the physiologic demands of pregnancy are thought to be responsible for the increased perinatal and maternal morbidity seen in affected pregnancies. Maternal obstructive sleep apnea (OSA) is associated with increased rates of maternal and perinatal morbidity, including hypertension and pre-eclampsia, diabetes, asthma, pre-term birth, fetal growth restriction, and cesarean delivery.  

Currently, very few pregnant women are referred for formal sleep evaluation, although snoring, which is a prominent symptom of OSA, is much more common in pregnant women than in non-pregnant women. Given that OSA is a risk factor for maternal and perinatal morbidity, the identification of patients at risk who require further evaluation and possible intervention is an important clinical need. However, it is very likely that OSA and other types of sleep disordered breathing are under diagnosed during pregnancy.

There are many screening tools that are highly sensitive and specific for the identification of non-pregnant patients at risk for OSA. None of these are validated in the obstetric population and in general do not perform well in this setting. Several studies have attempted to validate questionnaires against PSG or home sleep study. The Berlin and Epworth Sleepiness Scale (ESS) have been shown to be poorly predictive of OSA during pregnancy as well as associated with high false-referral rates. Lockhart et al investigated 243 patients in the third trimester with questionnaires in addition to the home sleep monitors (HSM). Our work demonstrated that none of the investigated screening tools were able to reliably identify patients with an apnea-hypopnea index (AHI) > 5.

There are several factors that contribute to the poor application of these screening tools. Many rely on symptomatology such as snoring and daytime fatigue. These are very common complaints during pregnancy and their significance is unclear. Male gender and age greater than 50 are clearly not applicable, although the inclusion of age may well be relevant as it is a risk factor for OSA in the 3rd trimester. Obesity is clearly associated with OSA in pregnancy and most screening tools take this into account. It remains to be determined whether the most important body mass index (BMI) measurement is pre-pregnancy baseline or at delivery. Total weight gained during pregnancy may also be an important factor. Most screening tools use BMI of 30 or 35 kg/m² and more investigation is warranted to identify the appropriate number for this population.

Another critical aspect of screening for OSA during pregnancy is the issue of timing. If the goal is to identify and treat OSA with the aim of preventing morbidity, then early testing would seem to be preferable. However, early testing might miss patients as OSA most likely develops as pregnancy progresses. Testing at term can be useful in identifying those at risk for perioperative complications and for anesthetic planning and monitoring. The incidence of OSA is higher in the 3rd trimester than in the 1st. In order to better describe this syndrome, Karan and Ginosar call for a new diagnosis of “gestational sleep apnea”. This reflects the transient and progressive nature of symptomatology and mirrors other pregnancy related disorders such as gestational hypertension and gestational diabetes.

Tantrakul et al screened 72 patients in a high-risk OB clinic using the STOP-BANG and Berlin questionnaires followed by HSM. Both questionnaires performed poorly in the first trimester and were “acceptable” particularly in the second trimester. Multivariate regression analysis further demonstrated that that
Gestational Sleep Apnea continued from previous page

factors associated with OSA were different in each trimester.

Several investigators have proposed new components for pregnancy-specific screening tools. Facco et al (6) found that self-reported frequent snoring, chronic hypertension, BMI, and age more accurately predicts sleep apnea in pregnancy. Similarly, Lockhart et al (7) found that BMI>35, falling asleep while talking to someone, and treatment for HTN were predictors of third-trimester OSA. None of these have been validated in large populations and it would be difficult at this point to recommend a particular screening tool. It is likely that symptoms alone are not sufficient, and that knowledge of relevant comorbidities may be just as important. This may explain why questionnaires such as STOP-BANG have slightly better performance (7). It may be that screening tools should be different for each stage of pregnancy.

In conclusion, many questions remain and there is much opportunity for research in this field. Well designed and appropriately timed screening tools to identify pregnant patients at risk for OSA could significantly impact maternal-fetal outcomes. ❖

References:


2016 Annual Meeting Photos

Members of the SASM Board and Past Presidents.
To Breathe or not to Breathe (and How to Measure It)

Although cardiac function is essential to pump blood to all body economy it is also true that if blood does not carry sufficient concentration of oxygen, cells will not be able to work and maintain physiologic systems ready for normal life. The ability to inspire oxygen in air and exhale carbon dioxide produced by the cells, respiratory function, is an essential mechanism to maintain life in many organisms including man.

Respiratory function is a highly complex and sophisticated mechanism. It is controlled at many different levels by centers that are sensitive to subtle changes in blood pH, carbon dioxide (CO₂) and oxygen (O₂) levels. There is also a conscious, voluntary control of respiration. An efficient respiratory function keeps O₂, CO₂ and pH levels within physiologic limits and whatever the change, minimal sometimes, it is compensated as hyperventilation or hypoventilation. Adequate respiration requires that both frequency and tidal volume must be at physiological levels.

This delicate balance must be kept under control even in subjects undergoing procedures requiring sedation. To induce the sedative level required for most procedures we need to administer powerful drugs that are also used in general anesthesia. Most of them induce a very intense, dose dependent depression of respiratory function. Propofol and remifentanil, alone or in combination, are the most widely used drugs to induce and maintain sedation and analgesia. Propofol decreases the expected increase in ventilation per unit of pCO₂ while remifentanil shifts the trigger level of pCO₂ at which minute ventilation increases in response to CO₂. When combined their effects are at both levels inducing a much less intense increase in minute ventilation and doing that at higher trigger levels of pCO₂. Intensity of propofol and remifentanil induced respiratory depression should be balanced with the intensity of noxious stimulations done to the patient. Examples of noxious stimulation can be the introduction of the upper or lower gastrointestinal endoscopy tube, a bone marrow biopsy at the iliac bone, a fiberoptic intubation. The stress response induced by nociception usually increases respiratory rate. Dexmedetomidine has also been used for procedural sedation and has been considered as a safer drug from a respiratory perspective. It has been recently shown that the respiratory effects of dexmedetomidine are similar to those observed in the same volunteers for propofol.

As opposed to general anesthesia where once the airway is secured control of respiration is relatively easy, in sedation there is no secured airway and there is always a potential risk of airway obstruction. Besides that sometimes patient position prevents easy access to the airway during the procedural sedation.

We as anesthesiologists have technology that allows us to assess respiratory function at different levels. Even though when it is not used or not correctly used, it can have a significant impact in patients undergoing sedation. Although there are not many definitive epidemiologic studies in sedation, a closed claims review from Bhananker et al showed that respiratory events are the main cause of claims derived from procedural sedation and around 80% of them had a consequence of serious morbidity or death. In most cases respiratory monitoring was suboptimal or absent and half of them were judged as preventable with adequate respiratory monitorin. It is then really important to be very careful in measuring the respiratory effects of sedation since it might be the source for potentially irreversible serious complications.

There is no single monitoring system that covers all ideal aspects continued on next page
of adequate respiratory monitoring so we are not yet at the level of the “ideal” respiratory function monitor. Table 1 describes the most commonly available methods, their

advantages and disadvantages.

A different approach to the understanding of, or perhaps an aid in, the prevention of respiratory depression under sedation and analgesia has been generating predictive mathematical models of such relations. There are at least four recent approaches to modeling the effects of propofol and remifentanil on respiratory depression. The common conclusion from all authors is that there is a powerful synergy for the respiratory depressant effects between propofol and remifentanil, the agents responsible for most of the sedation conducted nowadays. Predictive mathematical models allow the study of the respiratory depressant effects, ahead of time, under different drug concentrations and combinations of propofol and remifentanil so from given patient characteristics (weight, height, age, ...) and drug input it is possible estimating the level of respiratory depression. A summary of the most relevant models recently published are in Table 2. Prediction models could be helpful in warning of possible intolerable respiratory depression as an additional alert system. They could potentially be used for training purposes since their estimations are obtained from models generated from volunteers or real patient data.

Besides all the considerations done it must also be taken into account the medical condition of patients. Aging, frailty and disease states might increase the risk of complications derived from the administration of propofol and/or remifentanil. Just as an example, hypotonia induced by the administration of propofol can contribute to the collapse of the airway which would be especially critical in patients suffering from Obstructive Sleep Apnea. Identification of patients prone to obstruction would very important and proper monitoring of respiratory function to be more careful in drug titration is essential to avoid related complications.

It is obvious: to breathe is important under any condition. Under sedation it is important to continuously evaluate how effectively the patient is breathing. There are several ways to evaluate, measure and quantitate. Respiratory rate in itself is not sufficient. Capnography, although accurate, might not be enough. We are not yet in front of an ideal respiratory monitoring system.

Table 1. Available methods to quantify adequacy of respiratory function in subjects under pharmacologic sedation

<table>
<thead>
<tr>
<th>Technique</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>O₂ input</td>
<td>Pulse oximeter</td>
<td>Evidence of O₂ arriving in tissues</td>
</tr>
<tr>
<td>CO₂ output</td>
<td>Capnography</td>
<td>Easy to implement</td>
</tr>
<tr>
<td>CO₂ output</td>
<td>Transcutaneous Sensor for blood CO₂ measurement</td>
<td>Accurate on CO₂ levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>Thoracic impedance</td>
<td>EKG electrodes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breath sounds</td>
<td>Noninvasive proprietary sensor</td>
</tr>
<tr>
<td></td>
<td>Exhaled H₂O</td>
<td>Specific sensor at mouthpiece</td>
</tr>
<tr>
<td></td>
<td>Analysis Plethysmographic wave</td>
<td>Easy to place, like pulse oximeter sensor</td>
</tr>
<tr>
<td>Respiratory Rate AND Tidal Volume</td>
<td>Thoracic impedance</td>
<td>Respiratory Rate AND Tidal Volume</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Predictive models of respiratory depression induced by propofol and remifentanil

<table>
<thead>
<tr>
<th>Endpoint used</th>
<th>Population</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dahan et al</td>
<td>Predefined sampling points pCO₂ arterial</td>
<td>Volunteers (1)</td>
</tr>
<tr>
<td>Bouillon et al</td>
<td>Predefined sampling points pCO₂ arterial</td>
<td>Volunteers (4)</td>
</tr>
<tr>
<td>Lapierre et al</td>
<td>Clinical endpoints capnography</td>
<td>Volunteers (5)</td>
</tr>
<tr>
<td>Borrat et al</td>
<td>Continuous Transcutaneous pCO₂</td>
<td>Patients (6)</td>
</tr>
</tbody>
</table>
under sedation. Perhaps combining measurements and understanding will help the anesthesiologist to anticipate any undesirable effect towards respiratory depression and to adopt the necessary measures to avoid it. Preventing such undesirable effects is a significant step forward towards patient safety in sedation as a significant expanding part of anesthesia.

References

SASM Membership Benefits at a Glance…

These are exciting times for SASM. While we are a new and growing organization, we feel our collaborative efforts will give rise to unlimited opportunities. You have the ability to make an impact from the very start. Please consider joining SASM today!

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.

Benefits of SASM Membership include:

- Significantly Reduced Registration Fees at SASM Sponsored Scientific Meetings
- SASM Newsletter
- "Full Voting Rights in Electing SASM Board of Directors and SASM Officers (dependent on membership category)"
- Regular Receipt of "Literature Updates" and "Featured Articles," Allowing All Members to Stay Current on New Developments in the Area
- Enhances Your Network of Regional, National and International Colleagues
- Learn of Collaborative Research Projects
- Educational Material Posted on SASM Website for Members
- Access to a "Discussion Forum" to Evaluate and Discuss the Latest Research, Education and Clinical Practices Pertaining to OSA and Patients with Other Sleep-Disordered Breathing
- Get Advice and Counsel from Other Members Regarding Various Practice Paradigms

The easiest and quickest route to join as a member of SASM is to visit our website, www.SASMhq.org, and pay by credit card by clicking on the Membership Information tab. You can also mail check payment to our office at the address provided below.

SASM Classes of Membership:

- **Gold Patron Member** - $250
  - Showing special support for SASM
  - This donation is inclusive of annual membership and available for all classes of membership.

- **Active Member** - $100
  - Physicians and Scientists. Active Members have voting rights, can hold office and serve on the Board of Directors.

- **Associate Member** - $50
  - Non-Physicians and Non-Scientists. Associate Members do NOT have voting rights.

- **Educational Member** - $50
  - Fellows, Residents, Medical Students or other undergraduates.
  - Educational Members do NOT have voting rights.

Please consider joining as a “Gold Patron” for 2017-18

The additional donation beyond general membership will be used to promote scholarly activity in the area of anesthesia and sleep medicine and promote patient care programs in areas common to anesthesia and sleep medicine. Gold Patrons will be recognized on our website for their extraordinary support of SASM efforts and will be invited to special events highlighting the programs made possible with their donations, including a keynote speaker dinner at the Annual Meeting.

SASM
6737 W Washington Street, Suite 4210
Milwaukee, Wisconsin 53214

SASM is a 501(C)(3) non-profit organization. Membership dues may be deductible as a business expense. SASM Tax ID number is 27-4613034