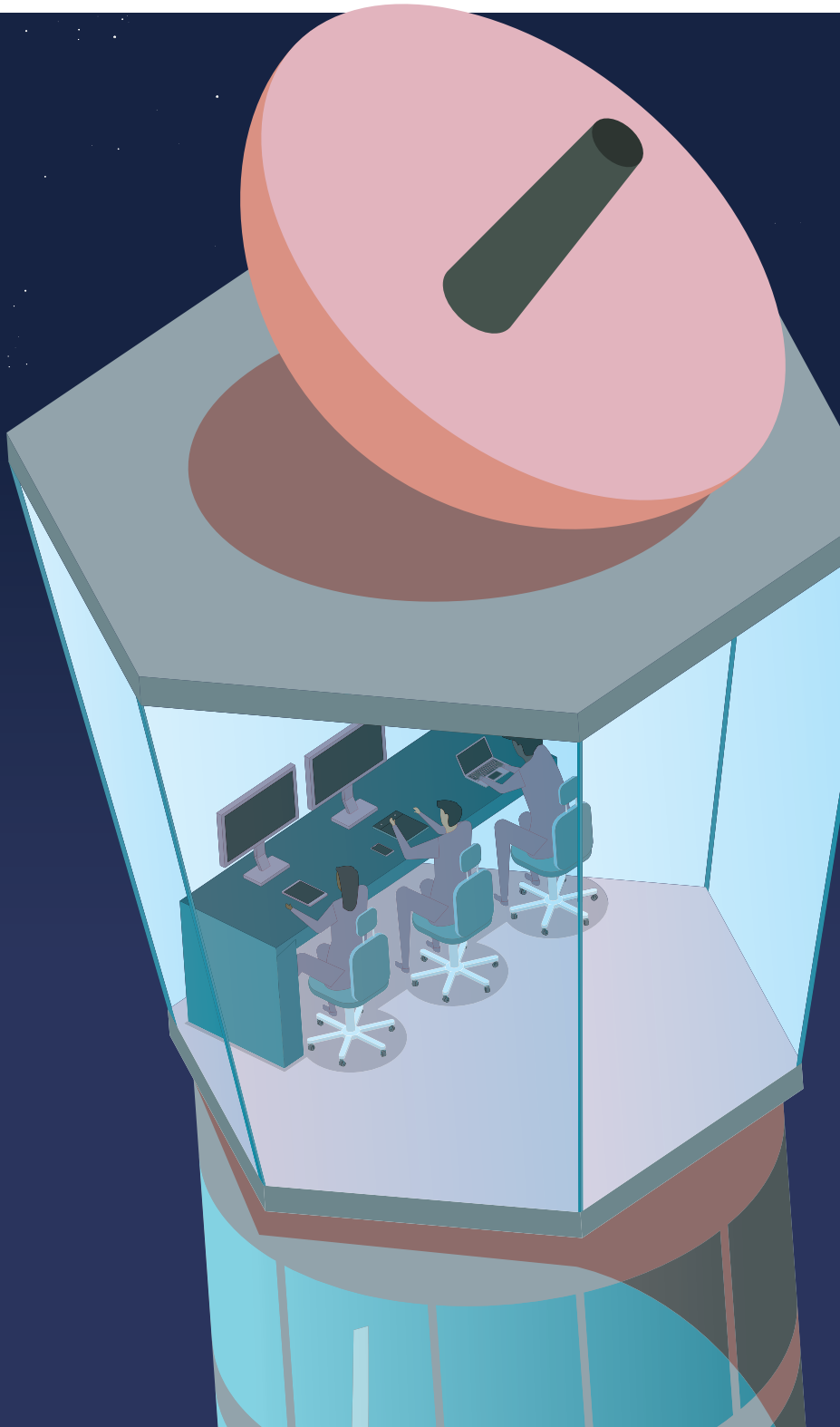
2025 - VOL. 10 NO. 1

50th AASM American Academy of SLEEP MEDICINE

# MONTAGE

A quarterly magazine published by the American Academy of Sleep Medicine



# SLEEP 2025

## Mark Your Calendars!

## Join us in

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**SLEEP 2025 is back, and it promises to be an unforgettable experience filled with knowledge, innovation, and connection.**

## What Awaits You?

- **Plenary Session:** Hear from industry-leading speakers who are paving the way for future breakthroughs.
- **State of the Art Symposia:** Dive into emerging trends in sleep and circadian biology that are shaping our understanding and practice.
- **Dynamic Exhibit Hall:** Discover the latest technologies, treatments, and innovations that will transform the field.
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- Health professionals committed to improving sleep health

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Uniting Minds, Inspiring Future

This issue of Montage brings you fresh perspectives, compelling updates and stories from the heart of the sleep medicine community.

As we enter our 10th year of publication, it's a moment to reflect on how Montage has grown while staying true to its mission. Since our first issue, Montage has been a composite of diverse features that highlight member achievements, share expert insights and explore key issues in sleep medicine. Your stories and successes are at the heart of our work — so please, send us your news!

This year, we also commemorate the 50th anniversary of the AASM. Over the past five decades, the AASM has evolved from a pioneering vision into a thriving community that continues to shape the future of sleep medicine. In this issue, we celebrate this milestone with a look back at the 1970s and the origins of our organization to honor trailblazers like Dr. Thomas Roth, the second AASM president.

This issue features a range of insights, from Dr. David Brodner's guidance on navigating the nexus letter process for veterans with sleep disorders to Dr. Eric Davis's advice for launching a new fellowship program. You'll also learn about Dr. Michael Russo's journey from a military career to running a practice in Hawaii, and how a chance meeting at SLEEP 2015 led to marrying his wife, Nataliya.

Additionally, we delve into topics like fatigue in aviation, featuring findings from an FAA panel on mitigating fatigue risks in controller operations. Drs. Chenlu Gao and Michael Scullin share research linking mild sleep loss during the daylight saving time transition to medical malpractice incidents, while the Emerging Technology Committee explores actigraphy devices for sleep/wake monitoring.

We also introduce Sleep Apnea Squad, a new educational initiative from Project Sleep, and debut *Sleep Team Talk*, a column that will unpack questions from sleep team members. Our *Coding Quarterly* provides practical guidance on phrenic nerve stimulation CPT codes.

We hope this issue inspires you to reflect, connect and continue shaping the future of our field.

—The Montage Team

## We want to hear from you!

Share your experience in sleep medicine with your fellow members. Submit content to **montage@aasm.org** for it to be considered for publication in an upcoming issue of Montage!


To see current and archived issues of Montage, visit **aasm.org/montage**.

50th AASM American Academy of SLEEP MEDICINE

Montage is a quarterly magazine published by the American Academy of Sleep Medicine. It offers a unique opportunity to recognize our membership and highlight changes in the field by featuring member profiles, exclusive interviews, research advances, and the latest developments impacting patient care.

# Demystifying the nexus letter process for veterans with sleep disorders | *By David C. Brodner, MD*

A veteran who has a disease caused or aggravated during active duty may be entitled to compensation. In order to collect this benefit, the veteran must establish the relationship between the medical condition and military service, known as a "service connection." A veteran may also be entitled to service connection for a disability that develops secondary to another, already service-connected condition.

The U.S. Department of Veterans Affairs (VA) will consider several pieces of evidence when adjudicating these claims, including disability benefits questionnaires, compensation and pension examinations, private medical records, federal medical records and lay statements. An additional piece of information that is vital for a successful claim is known as a "nexus letter."

- **Disability benefits questionnaire:** This VA form collects the necessary medical information to demonstrate the disability.
- **Compensation and pension examination:** The VA may require this medical examination if inadequate documentation is available within the medical records to support the disability.
- **Lay statement:** This is a formal account of details supporting the disability claim written by the veteran, an eligible family member or another veteran (often known as a "buddy statement").
- **Nexus letter:** This is an opinion formulated by a qualified medical professional establishing the interconnection between the veteran's disability and military service.

Navigating the "nexus letter" process can be a daunting task, so veterans often seek assistance from various nonprofit veterans' organizations, specialized private firms or attorneys. For the past seven years, I have been privileged to work closely with one such resource, MedConnectVA, in helping hundreds of veterans obtain deserved VA disability benefits using my expertise in sleep medicine and otolaryngology.

The prevalence of sleep disorders in U.S. veterans is higher than in the civilian population, so I write several nexus letters every month for the many veterans currently seeking service connection for sleep-related ailments. First, I review the veteran's entire "C-File" (medical record), military service history and lay statements. I also interview each veteran by phone to perform my own history and ensure it correlates with the VA file. I then formulate my "nexus opinion" and write a 20-to-25-page report.

**"Given the vast number of veterans seeking assistance with the bureaucratic process, there is ample opportunity for other sleep medicine specialists to join the effort."**

The VA is more likely to issue a favorable rating decision granting disability benefits if the nexus opinion is proffered by a board-certified medical specialist. Additionally, a robust opinion supports its medical rationale with published scientific data and states the opinion in clear language reaching the legal standard of '*as likely as not.*'

I am both proud and honored to employ my 27 years of sleep medicine education and experience in assisting our veterans to obtain the benefits they have earned. Given the vast number of veterans seeking assistance with the bureaucratic process, there is ample opportunity for other sleep medicine specialists to join the effort.

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*David C. Brodner, MD, is double board-certified in sleep medicine and otolaryngology – head and neck surgery. He has been in private practice in Boynton Beach, Florida, since 2001 and has been performing disability examinations and writing nexus letters for U.S. veterans since 2015.*

# The hidden costs of daylight saving time: Medical malpractice payments

*By Chenlu Gao, PhD, and Michael K. Scullin, PhD*

Most Americans observe daylight saving time (DST) with biannual adjustments in clocks. While DST was initially introduced to save energy and provide more evening light, its unintended negative effects have been increasingly recognized. For example, the spring transitions into DST disrupt natural sleep patterns, often causing mild sleep loss and circadian misalignment.

Sleep deprivation and circadian misalignment have been linked to compromised psychosocial and cognitive functioning, leading to increased workplace errors and altered judgments. In 2019, an experiment conducted by our colleague Stacy Nguyen, MD, revealed that mild sleep loss alters people's perceptions of the severity of medical malpractice incidents. Nearly all surgeons and approximately half of physicians face malpractice lawsuits at some point in their careers, and understanding the factors that contribute to risk for these incidents and subsequent malpractice litigation decisions has legal, economic and health implications.

Inspired by Nguyen's findings, we saw DST as an opportunity to investigate whether mild sleep loss and circadian disruptions were associated with medical malpractice incidents and perceptions of their severity, on a generalizable scale. We specifically tested four research questions:

1. Are malpractice incidents perceived as more severe following the spring DST transition?
2. Do medical professionals make more severe errors following the spring DST transition?
3. Are malpractice incidents perceived as more severe during DST months compared to standard time months?
4. Do medical professionals make more severe errors during DST months than during standard time months?

To answer these questions, we analyzed three decades of malpractice data from the National Practitioner Data Bank, including 288,432 claims. We tested both the acute effects of the spring DST transition and the chronic effects of DST months on malpractice incidents and judgments. To measure severity, we used claim payment amounts, with higher payments indicating greater malpractice severity. Additionally, we compared states observing DST to those that did not, assuming that both seasonal effects (e.g., changes in photoperiod and disease prevalence) and DST-specific effects influenced DST-observing states, whereas only seasonal effects impacted non-observing states.

We found that relative to non-observing states, the transition into DST was associated with a relative increase in malpractice claim payments, indicating that mistakes were perceived as more severe following mild sleep loss. These findings converged with Nguyen et al.'s laboratory experiment. Fortunately, there was no evidence of medical professionals making more severe mistakes following the spring DST transition.

> **"The data show that malpractice claim payments and incident severity during DST months were higher and more severe on average than those during standard time months."**

Next, we cross-sectionally examined malpractice claim payments and incident severities during the seven to eight months of DST versus the four to five months of standard time. The data show that malpractice claim payments and incident severity during DST months were higher and more severe on average than those during standard time months.

These findings have implications for health policy and medical practice. Even minor sleep disruptions can increase malpractice claim payment decisions, potentially reflecting a lower tolerance for medical errors during periods of mild sleep loss. This finding aligns with research in criminal justice, in which judges delivered harsher sentences following the spring DST transition, likely due to reduced empathy or altered socioemotional processing under mild sleep restriction. Sleep deprivation may also influence negotiations, making patients and families less willing to settle with lower compensations. Furthermore, during the seven to eight DST months, biological clocks become mildly and chronically misaligned with social clocks, which has the potential of subtly impairing cognitive performance and shaping socioemotional decision-making.

This study also adds to the broader conversation on DST's effects on health and safety. With growing evidence of its short-term and long-term adverse effects, our study reinforces the advocacy of sleep and medical organizations, including the American Academy of Sleep Medicine, to abolish DST in favor of permanent standard time.

*Chenlu Gao, PhD, is a postdoctoral researcher in the department of anesthesia, critical care and pain medicine at Massachusetts General Hospital and research fellow in the division of sleep medicine at Harvard Medical School.*

*Michael Scullin, PhD, is an assistant professor of psychology and neuroscience at Baylor University.*

# Taking steps toward safer skies

*By Kate Robards, senior writer*

Every day, more than 45,000 flights transport 2.9 million passengers to their destinations. Behind the scenes, over 14,000 air traffic controllers work in 520 control towers, ensuring safe takeoffs, landings and flight paths across the U.S.

However, air traffic control is a high-stakes job, often requiring operators to work through irregular schedules, long shifts and unpredictable hours. These working conditions, combined with disrupted circadian rhythms and insufficient rest, create fatigue — a significant threat to safety, performance and health.

Studies show that causes of fatigue in aviation include insufficient sleep, disturbed sleep during layovers and extended periods of wakefulness. Disrupted circadian rhythms and jet lag further impair alertness, reduce performance and present long-term health risks for aviation professionals.

## FATIGUE AND AIR TRAFFIC ACCIDENTS

The danger of fatigue has played a tragic role in aviation history. In 2010, Air India Express Flight 812 crashed during landing in Mangalore, killing 158 of the 166 occupants. The investigation cited the captain's prolonged sleep and sleep inertia — grogginess upon waking — as contributing factors to the accident. The report even recorded the captain's snoring on the cockpit voice recorder, marking the first such incident noted by the National Transportation Safety Board (NTSB).

Fatigue is not a rare occurrence. A 2021 review noted that fatigue was cited as a probable cause in 21%-23% of major aviation accident investigations over the past two decades.

Aviation legend Capt. Chesley "Sully" Sullenberger, who successfully landed U.S. Airways Flight 1549 in New York's Hudson River after both engines failed due to bird strikes, emphasized the importance of rest: "I'm convinced that had we been tired, had we not gotten sufficient rest the night before, we could not have performed at the same level... I may not have been able to perform as well," Sully told ABC News.

## THE FAA FATIGUE PANEL AND KEY FINDINGS

To tackle fatigue in air traffic control, the Federal Aviation Administration (FAA) convened a panel of experts in December 2023. Led by Dr. Mark Rosekind, former NTSB member and safety and sleep/fatigue expert, the panel also comprised Dr. Charles Czeisler, chief and senior physician in the division of sleep and circadian disorders and departments of medicine and neurology at Brigham and Women's Hospital, and Dr. Erin Flynn-Evans, head of the NASA Ames Research Center Fatigue Countermeasures Laboratory.

The panel was charged with exploring how sleep science could shape policies to mitigate fatigue in air traffic operations. They examined scheduling practices, working conditions and existing policies. Over the course of the project, the panel reviewed 120 documents, conducted 25 meetings and interviews with FAA staff and external individuals, and visited four air traffic operations facilities. They analyzed data from more than 700,000 work hours and days off logged by over 10,000 controllers in January 2024.

The final report identified four critical opportunities for reform:

1. Unify a fatigue management system: Integrate prescriptive policies with a fatigue management system to centralize resources and ensure all relevant materials are easily accessible.
2. Monitor schedule violations: Identify and monitor instances where schedules exceed established limits and develop strategies to prevent future violations.
3. Eliminate the 2-2-1 shift pattern: Abolish the counterclockwise rotating 2-2-1 schedule — where controllers rotate from two afternoon shifts to two morning shifts, followed by an overnight shift — replacing it with schedules aligned with sleep and circadian principles.
4. Update rest policies: Ensure adequate time off between shifts, recommending 10-12 hours of off-duty rest to account for circadian rhythms.

In total, the report identified 58 opportunities to reduce or mitigate fatigue risks in controller operations, including 11 opportunities for near-term attention and 43 opportunities for ongoing efforts.

## FAA AND NATCA PARTNERSHIP

In April 2024, FAA administrator Mike Whitaker announced that the agency would extend rest periods for air traffic controllers as part of efforts to address fatigue. This decision was reinforced in July 2024 when the FAA reached an agreement with the National Air Traffic Controllers Association (NATCA) to implement long-term opportunities identified by the panel.

Under the new agreement, controllers are now guaranteed:

- 10 hours off between shifts and 12 hours off before and after midnight shifts.
- Limitations on consecutive overtime assignments to ensure sufficient recovery time.
- Procedures for improved recuperative breaks during shifts, along with workforce education on how to maximize the benefits of these breaks.

The FAA and NATCA also agreed to form a collaborative workgroup and expand the FAA's Fatigue Risk Management System Fatigue Safety Steering Committee to develop recommendations addressing the findings from the
expert panel.

In a press release from the FAA, the panel members said, "We commend the FAA and NATCA for taking these actions that reflect the Scientific Expert Panel findings and will significantly address air traffic controller fatigue risks including the four priority opportunities identified, and improve the safety of the National Airspace System."

When asked about potential obstacles the FAA might face in implementing changes, Dr. Flynn-Evans clarified that the panel did not make formal recommendations but instead identified opportunities for the FAA to consider in its efforts to mitigate fatigue risks.

"Any schedule change requires input from different stakeholders," Dr. Flynn-Evans said. "The FAA will need to consider both the operational needs and employee needs to determine the best ways to design schedules that mitigate fatigue."

## PUBLIC SAFETY COMMITTEE APPLAUDS THE CHANGES

The FAA's efforts have earned praise from the AASM's Public Safety Committee. In a letter published in the *Journal of Clinical Sleep Medicine* (JCSM), the committee expressed strong support for the new shift requirements, applauding FAA administrator Mike Whitaker for "offering prompt directives to address public safety."

This isn't the first time public safety experts have weighed in on fatigue issues in the aviation industry. In 2021, the committee submitted comments on flight attendant rest requirements. They have also described research on managing fatigue in aviation, and in 2022, they drafted an AASM position statement calling for better diagnosis and treatment of obstructive sleep apnea across the transportation industry to promote public safety.

**"By adopting evidence-based strategies to reduce fatigue, the FAA is taking crucial steps to safeguard passengers and improve the well-being of air traffic controllers."**

## FATIGUE IN THE FUTURE

As the aviation industry embraces these reforms, the FAA must remain vigilant. Implementing and monitoring new policies will require sustained cooperation with NATCA and scientific experts.

Emerging technologies may play a crucial role in helping the FAA monitor fatigue in real time.

"Implementing policies that minimize fatigue should help improve controller performance in general, though there are also technological solutions that could help controllers maximize fatigue risk," the panel noted in its report. The report specifically highlighted the Terminal Flight Data Manager, an automated system to improve air traffic operations, which is scheduled to be fully deployed in 2028.

By adopting evidence-based strategies to reduce fatigue, the FAA is taking crucial steps to safeguard passengers and improve the well-being of air traffic controllers. As the skies grow busier and flight demands increase, the industry's commitment to mitigating fatigue will be essential to maintaining safety and performance.

# INSIDE THE SLEEP APNEA SQUAD: A Q&A WITH EMMA COOKSEY

**We sat down with Emma Cooksey, sleep apnea program manager at Project Sleep, to learn more about Sleep Apnea Squad and her work empowering people with sleep apnea through education, advocacy and community connection.**

### Could you introduce yourself?

First and foremost, I am a patient advocate and received my diagnosis of obstructive sleep apnea at the age of 30 after more than a decade of unexplained health issues. During the pandemic, I launched a weekly podcast, "Sleep Apnea Stories," to challenge sleep apnea stereotypes while raising awareness of symptoms and treatment options. I had always felt alone and isolated while dealing with sleep apnea, and I wanted to connect with other people living with the condition and positively serve the community.

Last year, I took on the role of sleep apnea program manager at Project Sleep to run their new program. In this role, I develop and implement awareness and educational initiatives, events and activities designed to empower people with sleep apnea to seek a diagnosis, support and care.

### What is Sleep Apnea Squad?

Sleep Apnea Squad is an educational series covering various topics to help people living with sleep apnea navigate both the medical journey and the social experience. Through my work as a patient advocate, I have seen many unmet needs in our sleep apnea community, and Sleep Apnea Squad is a way to create free resources to meet those needs. Each topic is addressed first with a live discussion on Project Sleep's YouTube channel, followed by a podcast, a PDF toolkit and social media content. In this way, we hope to meet people where they are and deliver resources in formats that appeal to our diverse community.

### What inspired the Sleep Apnea Squad program?

I saw that Project Sleep produced high-quality resources via the Narcolepsy Nerd Alert series, and I loved that they were creating videos, podcasts and printable toolkits to cater to different learning styles. That program's range of topics inspired me, and Sleep Apnea Squad is an opportunity to create important educational resources and an empowered sleep apnea community.

Interviewing people with sleep apnea for my podcast gave me a deep understanding of the challenges facing our sleep apnea community. As you know, delays in diagnosis and misdiagnosis are widespread, especially among women. There is a lack of awareness of sleep apnea symptoms and testing options. Many people who don't adapt to CPAP quickly are not getting support to be successful. Too many struggling CPAP users don't know about potential treatment options.

### Which topics will the Sleep Apnea Squad series address?

Sleep Apnea Squad will cover a variety of topics from navigating the treatment landscape to addressing social experiences like stigma and shame. We aim to address the most common questions and concerns we hear from the sleep apnea community. The first six Sleep Apnea Squad topics cover everything from identifying sleep apnea to making CPAP more comfortable and exploring new medications.

A multidisciplinary panel of experts will address each topic. This is one of the reasons I love Project Sleep, because the organization believes in bringing together various perspectives, including clinicians and researchers alongside people living with sleep apnea and loved ones, to build evidence-based, patient-centered resources.

### Who can access Sleep Apnea Squad resources?

Our resources are free and available to the general public. We aim to provide high-quality resources and a sense of community for people living with sleep apnea and their loved ones. Education is an ongoing journey, especially as novel treatments advance, and we're excited to continue developing as the sleep apnea space and patient needs evolve.

### Who runs the Sleep Apnea Squad program?

Sleep Apnea Squad is a program of Project Sleep, a 501(c)(3) nonprofit organization dedicated to raising awareness about sleep health, sleep equity and sleep disorders. Project Sleep was founded in 2013 as a patient-led organization that educates and empowers individuals through events, campaigns and programs that bring people together to talk about sleep as a pillar of health. As the sleep apnea program manager, I oversee Sleep Apnea Squad along with new sleep apnea awareness initiatives Project Sleep is excited to launch in 2025.

### How can clinicians support Sleep Apnea Squad?

We'd love to hear from you! What are the burning questions you hear from patients? How can we best get toolkits and educational materials to your patients? To share your suggestions or request Sleep Apnea Squad materials for your clinic, please contact us at: info@project-sleep.com.

*Learn more and share with your patients:* https://project-sleep.com/sleep-apnea-squad/.

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# How a military career shaped a life in sleep medicine

In this interview, we speak with Michael Russo, MD, about his journey from a military career to running a neurology and sleep disorders practice in Hawaii, his experiences serving around the world, and how meeting his wife Nataliya at SLEEP 2015 shaped his personal and professional path.

**You've served in diverse locations around the world, including Central America, Germany, Korea, and several U.S. Embassies. Can you share a snapshot of your journey — how you got started and some of the most memorable or impactful moments from your international assignments?**

I joined the U.S. Army as a ROTC cadet at Princeton University. I went to Chicago Medical School on a U.S. Army scholarship, graduating as a captain. I spent my internship at New York's Metropolitan Hospital Center. After completing my psychiatry internship, the U.S. Army — in its infinite wisdom — sent me to the 98th General Hospital in Nuremburg, Germany, as an ER physician. As I knew nothing of ER medicine, and before I could kill someone out of ignorance, I transferred to the 1st Armor Division's Second Brigade as brigade surgeon, where I successfully managed the health of the 5,000 soldiers and served as a medical officer for the U.S. Embassy in Prague and in Budapest. At that time in the late 1980s, Americans were not welcome in Eastern Europe. I was there when the Berlin Wall came down and was relieved to see the Iron Curtain fall throughout Eastern Europe.

I began my residency in neurology at New York University / Bellevue Hospital Center in 1990, just as Saddam Hussein invaded Kuwait. I joined the Rainbow Division of the New York National Guard, but I was not deployed to Desert Shield or Desert Storm. I was able to complete my residency, but not without regrets for not being in the field with my fellow soldiers. I returned to the Army after my residency, and I was assigned to a hospital in Seoul, Korea, as the neurologist for the Army and Air Force members. In this austere environment I learned of the need for strength through deterrence. I remember that all of Korea was totally silent, in a state of shock, when we learned of the death of North Korea's founding dictator, Kim Il Sung, in 1994. I was assigned as visiting medical officer to the U.S. Embassy in Beijing and in Bangkok, where I again saw how our U.S. State Department personnel worked closely and carefully, so far from their homes, and in sometimes hostile environments.

After Korea, I was assigned to Brooke Army Medical Center in San Antonio, Texas, where I became the director of neurological research. During this period, I was deployed as a medical officer to the deserts of Kuwait with the infantry.

Driving down the "Highway of Death" with a 100-truck convoy was the first time I experienced the effects of sleep deprivation on military operational performance. The highway was straight, no curves, and wide, with smoking, burned tanks, cars, and trucks bulldozed off the sides. The brigade had no significant sleep when we were asked to form the convoy and drive to the desert outpost. Everyone in the convoy was half asleep, or fully asleep. Movement was slow. My driver and I both fell asleep. When we got bumped by the truck behind

us, we woke up, and we rolled about 10 feet forward bumping the truck in front of us, then we fell back to sleep. That bump awoke the driver who then rolled his truck 10 feet, bumping the truck in front of him. So it went, for hours, with a hundred vehicles, rolling and bumping and awakening the drivers ahead. As the highway was straight, no trucks rolled off the road.

I returned to Washington with a new understanding of the effects of sleep deprivation on military performance and joined the sleep research unit at Walter Reed Army Institute of Research's (WRAIR) neuropsychiatry division. The division was studying the effects of sleep deprivation on performance in military operations. In that period, temazepam was used to help military members sleep, and methylphenidate was used to keep them alert. We studied the newly developed caffeine chewing gum, Stay Alert, and newly released modafinil, and later armodafinil.

During this period, I worked with the Defense Advanced Research Projects Agency (DARPA) on sleep and wake mechanisms and became director of WRAIR's neuro-sciences division. Having developed an interest in pilot flight performance, I then transferred to the U.S. Army's Aeromedical Research Laboratory, a sister lab of WRAIR, at Fort Rucker, Alabama, where I worked with pilots from the Army, Air Force, Navy and NASA to study how to best maintain alertness and situational awareness under duress.

In 2000, I had the honor of being selected for the Chairman of the Joint Chiefs of Staff Award for Excellence in Military Medicine, an award given at the Pentagon by the chairman to the top physician in the U.S. Army.

Later, I transferred to Tripler Army Medical Center in Hawaii, where there is a chronic shortage of physicians. When I completed military service, I decided to stay in Hawaii when I retired and utilize the skills learned throughout the prior years.

**We understand you met your wife Nataliya at SLEEP 2015. Can you share the story?**

In 2015, I attended the SLEEP meeting in Seattle. I was placing my poster when I met Nataliya, who was presenting her poster next to mine on work completed while a Fulbright Scholar at New York University under the mentorship of Sanjeev Kothare, MD. Nataliya and I worked with the same NYU neurology faculty, and we found we shared similar interests. Our backgrounds were totally different. I was raised in New York while she was raised in Dnipro, Ukraine. She was a pediatrician while I worked primarily with adults. We spoke for about two hours during the poster session. When she expressed that going home was unsafe, I invited her to Hawaii. Nataliya arrived in Hawaii in July 2015 with her 8-year-old son Yuriy. In October 2015, we married in Honolulu, with a ceremony on the beach near my sailboat. We've been so very happy together. Yuriy now has a sister to share life with. Our daughter, Jeanne-Marie, is 6 years old.

Nataliya and I are entering our tenth year together. We plan to celebrate on June 9 at SLEEP 2025, 10 years to the day we met at the poster session.

**After 34 years in the Army, what motivated you to open a neurology and sleep disorders practice in Hawaii?**

None of my military training prepared me for the business of medicine or running a private practice. I had no training on billing, submitting claims or obtaining authorizations. Nataliya learned the basics of American health care management and turned our practice into a profitable one. We have three offices on two islands (Oahu and Big Island) and see about 200 patients per week. Nataliya runs the practice, and I consult the patients.

**Can you describe some of the unique challenges and opportunities of providing neurological and sleep care in Hawaii?**

Hawaii is a 350-mile island chain. Kauai, the northernmost inhabited island, is followed by Oahu, Maui, and the Big Island, each about 100 miles apart. Travel is by air, as there are no ferries.

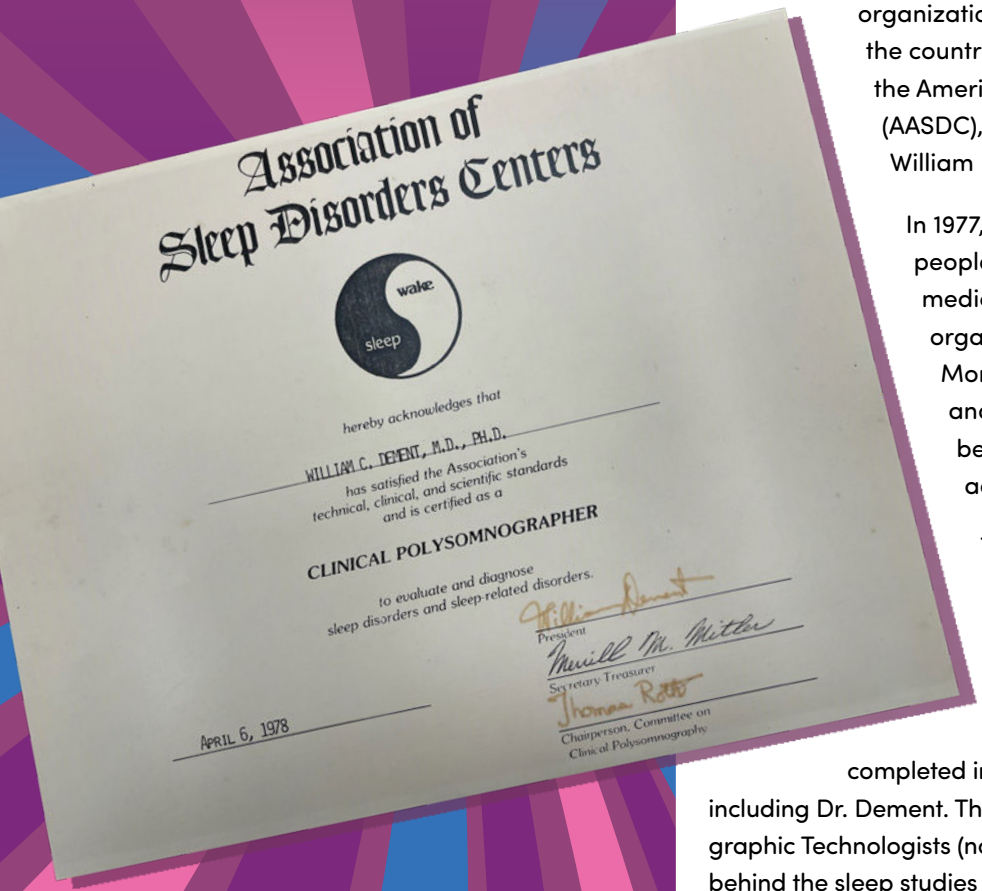
Each island has its own hospitals and health care systems, typically unable to meet the demand of the population. We have about 20 practicing sleep providers in Hawaii, with about 15 sleep labs scattered over four islands. With sleep techs so scarce, some of the labs are closed temporarily while seeking new techs. I have patients flying from other islands for sleep testing.

Treating patients for sleep apnea is a challenge. Many Big Island patients live on the slopes of Mauna Loa or Maua Kea, where there is no public water or electricity. Water is captured into large holding tanks and purified, while electricity is from solar panels or generators. Patients are reluctant to add a CPAP to their already limited electric system. I've made house calls to some patients who cannot easily travel. Unpaved roads weave through the rain forest, where there is no cell service, no Wi-Fi, and no street signs of any type to guide the way.

Since being elected to the board of directors of the California Sleep Society, I hope to bring the extensive knowledge of colleagues in California to our underserved population in Hawaii.

# THE 1970'S

## and the dawn of sleep medicine




## THE YEAR WAS 1975.

"Jaws" terrified moviegoers, the Vietnam War ended and "Saturday Night Live" debuted on NBC. Amid this cultural backdrop, a small group of visionaries convened at a hotel near Chicago's O'Hare Airport. Their mission? To address the growing need for a professional organization to represent sleep centers emerging across the country. By the end of their meeting, they founded the American Association of Sleep Disorders Centers (AASDC), the first organization of its kind, with Dr. William Dement as its inaugural president.

In 1977, while disco dominated dance floors and people flocked to see "Star Wars" in theaters, sleep medicine reached an important milestone. The organization accredited its first sleep centers at Montefiore Hospital in the Bronx, New York City, and Stanford University in California, marking the beginning of a now-expansive network of 2,300 accredited centers nationwide.

The following year, 1978, saw a cascade of achievements. While "Grease" had the world singing, the first issue of the journal Sleep debuted, advancing scientific research in the field. That same year, the first board certification exam in clinical polysomnography was completed in Cincinnati. Twenty-one sleep pioneers passed, including Dr. Dement. The creation of the Association of Polysomnographic Technologists (now the AAST) also ensured that the professionals behind the sleep studies had a home in this burgeoning field.

By 1979, as Sony Walkmans revolutionized personal music, and millions tuned in to "The Dukes of Hazzard," sleep medicine achieved another groundbreaking milestone. The "Diagnostic Classification of Sleep and Arousal Disorders" was published, providing the first formal system for classifying sleep disorders. For the first time, sleep medicine questions appeared on the National Board of Medical Examiners' exams, signifying the field's growing importance in medical education.

From a humble meeting near O'Hare to a legacy of innovation, these early milestones laid the groundwork for modern sleep medicine. As the AASM marks its 50th anniversary, it celebrates decades of progress in helping people sleep better and live healthier lives.

# Legacy and leadership: How Dr. Thomas Roth shaped the sleep field

Thomas Roth, PhD, didn't set out to pioneer the field of sleep medicine. In fact, he admitted that his entry into sleep science was almost accidental.

"I came into sleep in 1970 when there was no sleep medicine. It was a research society. And I came here because I desperately needed a summer job," he recalled.

What began as a temporary position quickly evolved into a career that would influence the landscape of sleep science and clinical sleep medicine. At a time when basic knowledge about sleep was just beginning to emerge, Dr. Roth was part of a close-knit group, including luminaries like Dr. William Dement, that would shape the course of this emerging field.

For Dr. Roth, the appeal of sleep research lay in its uncharted territory.

"I was amazed that in the era of molecular biology, the most rudimentary descriptions of a third of our lives were just emerging," he said. "For me, it was an indication that you could make a contribution."

Dr. Roth's sense of possibility guided his work for decades, leading him to found the Sleep Disorders and Research Center at Henry Ford Health in Detroit in 1978.

As his career developed, Dr. Roth found himself stepping into a series of leadership roles. He followed in Dr. Dement's footsteps, becoming the second president of the AASM, known at that time as the American Sleep Disorders Association, from 1987 to 1988. In assuming the presidency after Dr. Dement, Dr. Roth saw an opportunity to continue shaping the identity of the AASM.

"Given the singular nature of Dr. Dement, I felt I had to define the presidency moving forward," Dr. Roth reflected.

He took this role seriously, helping to establish a foundation for AASM that could support sleep medicine as it matured into a clinical specialty.

Colleagues who worked closely with Dr. Roth emphasized the central role he played in guiding the field through its formative years.

"For decades whenever the sleep field faced a critical challenge, Tom was chosen to lead," recalled Dr. James Walsh, a fellow researcher, long-time colleague, and AASM past president. "Whether that meant serving as a leader of the Sleep Research Society (SRS), AASM, National Sleep Foundation (NSF), and National Center on Sleep Disorders Research, as journal editor, or contributing to virtually every major sleep initiative nationally and internationally, Tom excelled. Personally, his intellect and ability to reason were my 'cognitive treadmill' from which I benefited greatly."

Dr. Christopher Drake, another close colleague, described Roth's contributions as foundational to the field of sleep medicine. "As a founding father of sleep medicine who provided countless contributions, Tom's passionate, honest, and wide-ranging leadership to the field is second to none," Dr. Drake said.

*Dr. Thomas Roth (right) presents the Distinguished Leadership Award to Dr. William Dement (left) in 1987.*

These reflections underscore Dr. Roth's contributions not only as a leader but also as a scientist. Over his career, Dr. Roth authored more than 850 publications, exploring topics such as sleep loss and fragmentation. His work with colleagues at Henry Ford Health advanced understanding in areas ranging from the effects of hypnotics and stimulants on sleep to the prevalence of daytime sleepiness.

One of Dr. Roth's most enduring contributions was his work in establishing early certification standards for sleep medicine. In 1978, he helped develop the first examination in clinical polysomnography, a test that served as a precursor to today's board certification examination in sleep medicine. The exam set professional standards that continue to shape clinical practice in sleep medicine today.

Dr. Roth's leadership was also evident in his role as editor-in-chief of Sleep, the field's leading journal. In this position, he was able to influence the direction of sleep science by promoting rigorous, evidence-based research. His work as editor further strengthened the journal's reputation as a vital resource for clinicians and researchers alike.

Throughout his career, Dr. Roth has been recognized with numerous awards, such as the AASM Distinguished Service Award, the SRS Distinguished Scientist Award, and the NSF Lifetime Achievement Award. These honors highlight the field's appreciation for his lasting contributions.

Dr. Roth's journey from a summer job to a decades-long career is a testament to his dedication to the evolving field of sleep medicine. Through his research, leadership, and mentorship, he has helped to lay a foundation that continues to support the study and treatment of sleep disorders today.

*This article marks the first in a series about influential leaders in sleep medicine as we celebrate the AASM's 50th anniversary.*

# Launch of a new sleep medicine fellowship program at UVA Health

*By Scott Schecter, MD; Mark S. Quigg, MD; Lizzie Daniels, MA; and Eric M. Davis, MD*

We are happy to report that we have established a new sleep medicine fellowship program at the University of Virginia with plans for our first fellows joining us in the summer of 2025. According to the AASM and the National Resident Matching Program (NRMP), we are the 102nd sleep medicine program in the U.S. and the only new program this year. The AASM asked us to share our experiences about and recommendations on starting a new fellowship. Here, we outline four key features which proved critical in establishing our program.

**Multi-disciplinary team approach to sleep medicine**

Our goals for a sleep medicine fellowship program started well over 15 years ago. At that time, we were predominantly an adult pulmonary-affiliated sleep program. Our initial expansion included pediatric sleep medicine and a team of neurologists. These specialties improved the care of a diverse set of patients and enhanced our development of a team CME-accredited educational forum. Over the next several years, we added sleep medicine faculty from anesthesiology, otolaryngology and clinical psychology while expanding our faculty from neurology, pediatrics and pulmonary medicine. A key step forward was the creation of a dedicated multidisciplinary sleep clinic where our combined subspecialties transcended individual origin. The development of our sleep clinic "home" was a catalyst that led us to pursue Accreditation Council for Graduate Medical Education (ACGME) accreditation.

**Mentorship and leadership**

We connected with peer institutions, prior colleagues, and advisors from the AASM as well as other sleep medicine fellowship programs to assist in developing a robust clinical training program. The AASM has an established cohort of sleep medicine fellowship directors and educational content provided to current programs. Additionally, we connected with Dr. Sean Hesselbacher of Eastern Virginia Medical School at Old Dominion University as well as others to review optimal ways to structure educational curricula. Such advice was invaluable and provided a simplified approach for us to gather our resources to assemble a comprehensive sleep training program for the ACGME application as well as our internal GME review. Mentorship is less useful if mentees are unable to act upon recommendations. Part of our success was the clear assignment of future roles for each faculty member, which has not only helped establish educational components but has strengthened our clinical programs.

**Funding strategies**

One key aspect of our eventual success was to partner with the hospital administration in highlighting the fact that a sleep medicine fellowship program would provide a budgetary lift rather than serve as another source of deficit. We evaluated the competitive landscape in our region and presented key attributes of our program to hospital leadership. Through the comparison of current trajectories of clinical volumes with and without a sleep medicine fellowship program, we were able to demonstrate a growth of clinical volume and resultant positive impact on key initiatives such as perioperative care and hospital discharge planning. We also recognized that money was not the only currency important to an academic institution. We noted that future recruitment *and retention* of faculty would be enhanced by growth in our academic program (and to use it as a focus in the process of promotion and tenure). Clinical research also benefits from improved educational training as we expect improvement in our ability to attract successful faculty members to join our team. Education and research, we argued, magnify excellence in clinical practice and benefit the institution as a whole.

**Patience and persistence**

This was the most difficult piece of our success in establishing a new program. Over 15 years separated our original lab accreditation to fellowship approval. Many times, we approached our institution for consideration of our new program. There was always enthusiasm for our proposal; however, the financial backing was difficult to secure. Developing a robust business model demonstrating the educational benefits as well as increase in the clinical and research growth in sleep medicine helped tipped the scale toward full support. Timing and other unmeasurable factors likely impacted our program approval. Regardless of the unclear variable of timing, we were poised for success because of a clear, unremitting, and enthusiastic desire that outlasted previous failed attempts.

We are thrilled to welcome our first clinical sleep medicine fellow this upcoming academic year and thereafter continue to expand our program in the coming years. If you have questions about starting a new program or have some challenges getting it approved, please reach out and be persistent!

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*Scott Schecter, MD, is an assistant professor of medicine and program lead at the Sleep Clinic at the University of Virginia.*

*Mark S. Quigg, MD, is the TR Johns Professor of Neurology and director of the UVA's Clinical Neurophysiology Labs.*

*Lizzie Daniels, MA, is the program coordinator for UVA's sleep medicine fellowship program.*

*Eric. M. Davis, MD, is associate professor of medicine and neurology and sleep medicine fellowship program director at the University of Virginia.*

# Staying current with actigraphy devices for sleep-wake monitoring

*By Makayla Cordoza, PhD, RN; Steven Holfinger, MD, MS; Shalini Paruthi, MD, FAASM; Sachin Shah, MD, MS; Cameron Barber, DO; Evin Jerkins, DO; Jennifer Y. So, MD; Navin Verna, MD, FAASM; Sharon Schutte-Rodin, MD, FAASM; on behalf of the AASM Emerging Technology Committee*

With the public's growing interest in sleep and activity habits, the market for actigraphy-based wearable devices designed to track movement and estimate sleep has rapidly expanded. For 2024, approximately 560 million wearable unit shipments were expected, reflecting their increasing relevance beyond sleep clinics to homes and the workplace. Actigraphy devices have evolved significantly in recent years, incorporating additional sensors such as photoplethysmography (PPG) alongside traditional triaxial accelerometers. Wearables typically worn on the wrist are also now available for the finger, arm and chest, offering extended monitoring of activity and sleep. The additional incorporation of artificial intelligence and multi-sensor algorithms to process and interpret wearable data for both consumers and clinicians has also enhanced the potential usefulness of these devices.

This article provides a broad overview of clinical applications for actigraphy-based wearables designed to be worn continuously (both day and night), including technical considerations and a summary of some currently available devices. The AASM and authors have no affiliation with any products and do not endorse any products described here.

## CLINICAL DEVICES FOR ACTIGRAPHY IN SLEEP MEDICINE

Actigraphy is an essential tool in sleep medicine, particularly for objectively evaluating sleep-wake patterns and aiding in the diagnosis and the treatment monitoring of sleep disorders. Common indications for actigraphy include its use prior to the Multiple Sleep Latency Test (MSLT) when evaluating central disorders of hypersomnolence to ensure insufficient sleep and circadian misalignment do not confound the results. Actigraphy is frequently used to assess circadian rhythm sleep-wake disorders and to evaluate insomnia characteristics. Actigraphy may also be employed to monitor the effectiveness of treatment interventions, such as response to cognitive-behavioral therapy for insomnia (CBT-I) or pharmacological treatments.

Selecting an appropriate actigraphy device involves several considerations such as:

- **Added features:** Examples include temperature, PPG, gyroscope, microphone, the ability to wear on different body locations, and other additional features that may be of interest when choosing a device.
- **Data outputs and reports:** Some wearable companies offer the ability to score raw data, use open-source algorithms, create custom reports and more.
- **Remote monitoring features:** Ability to view data in real time (to provide immediate feedback and monitor compliance) vs downloading data upon device return.
- **Battery life:** Minimize interruptions for required charging during monitoring.
- **Device validation:** Not all devices have validation studies against polysomnography that confirm accuracy and reliability for sleep indices. Considerations include: (1) published performance studies, especially what subjects and data outputs the validation included (e.g., adolescents vs adults, sleep duration, sleep staging, etc.), (2) when FDA-clearance is needed: use indications, inclusion/exclusions and predicate device comparisons, and (3) upcoming and ongoing studies, subjects and results from clinicaltrials.gov.
- **Special populations**: Accurate data capture requires wearable devices to have an adequate fit to optimize usage. Sizing limitations are a consideration for over/underweight and pediatric populations. The usability of the device (e.g., screen size, the need to navigate buttons, etc.) is also important and population dependent.

Actigraphy performance and validation in pediatric populations present unique challenges. Children's activity patterns and sleep architecture differ from those of adults, necessitating tailored

algorithms for accurate analysis. Studies comparing actigraphy to polysomnography in children generally demonstrate agreement in measuring total sleep time and sleep efficiency. However, interpreting actigraphy movement after sleep onset as wake or sleep, especially in children with movement disorders or developmental delays, presents performance challenges. Further research is needed to enhance algorithm precision for pediatric populations and to ensure reliable results in diverse clinical contexts.

Billing and reimbursement for remote patient monitoring (RPM) with actigraphy depends on proper coding and compliance with insurance requirements. Commonly used billing codes include CPT 99453, 99454 and 99457, which cover device setup, data transmission and patient interaction. Insurance coverage often requires the use of FDA-cleared devices and documented medical necessity. Reimbursement rates vary by state and insurer but are frequently available for pre-MSLT assessments, circadian rhythm evaluations, and pediatric monitoring when supported by adequate documentation. Medicaid and private insurers may cover these services, particularly if they align with telehealth and RPM policies.

## CONSUMER WEARABLES

Competition is high for consumer sleep devices, leading to both rapid technological advancements and shortcomings in available data to judge device performance. Consumers have benefited from longer battery life, improved comfort, intuitive app interfaces and a recent influx of smartwatches/bands, rings and other wearables. Consumer sleep tracking falls under the health and wellness category, which does not require FDA oversight. Consumers rely on device outputs without much demand for performance metrics. For example, many devices offer sleep staging with little validation of their accuracy outside of laboratory settings. Most manufacturers protect analytic algorithms, meaning access to raw data and population datasets are limited. Multiple publications have found consumer device accuracy varies by device and manufacturer. When evaluating consumer device performance for clinical applications it is important to consider the device model and software version. For example, device performance from the same manufacturer may vary, and software updates may alter accuracy.

Several consumer companies are moving into the health care space and re-marketing their devices for medical monitoring. For example, Happy Ring was originally advertised as a consumer device for mood and stress monitoring. It recently rebranded as Happy Health with the FDA-cleared Happy Ring for physiologic monitoring, including sleep, as part of its at-home health monitoring platform. Other consumer-available actigraphy-embedded devices have received FDA clearance for certain physiologic monitoring (e.g., Masimo W1) and for sleep indications (e.g., Apple Watch and Samsung Galaxy Watch for sleep apnea detection).

## SENSOR ANALYSIS

Actigraphy-based wearables use algorithms to identify aspects of sleep by using (at least) motion data from an accelerometer. A common issue with accelerometry-based algorithms is the overestimation of sleep if the user is sedentary or lays still in bed. Algorithms are also predominantly validated for nighttime sleep and are less reliable for detecting daytime sleep.

Fundamentally, an accelerometer identifies spatial displacement, which is the basis for sleep-wake estimation. Additional sensors like ambient light, body temperature or PPG (which can be used to report heart rate variability, respiratory rate and SpO2) can be used to improve the sleep algorithm and provide more data outputs. These parameters combined with microphone analysis create the potential for detection of additional sleep disorders.

## SUMMARY

Actigraphy can be a useful clinical tool for remote and long-term sleep monitoring and for assisting in the diagnosis and treatment efficacy for many sleep disorders. Advancements in wearable technologies have revolutionized both consumer and clinical applications related to assessing aspects of sleep and wake behaviors, sleep disorders and monitoring treatments. There are now numerous options for both consumer and medical actigraphy, with ongoing integration of added sensors, updated algorithms/AI, and other capabilities. These advancements come with benefits and challenges for clinicians and researchers in both choosing a technology for use, data management, costs, and in interpreting results for patients. Importantly, unclear and limited insurance reimbursement for actigraphy currently limits routine integration in clinical sleep and circadian care.

With the interest in sleep health monitoring and FDA clearance from consumer wearables growing, an ongoing increase in the number of patients presenting with findings from their apps, wearables and nearables is likely. Staying current with these rapidly evolving consumer and clinical sleep tracking technologies, as well as implementing clinical practice integration, remains challenging. Related AASM member resources include #SleepTechnology, Montage magazine, Talking Sleep, the AASM Engage members forum, publications (e.g., JCSM), courses (e.g., Sleep Medicine Trends, Sleep Medicine Disruptors and the SLEEP annual meeting), and many website links.

## TABLE 1: EXAMPLES OF COMMERCIAL ACTIGRAPHY DEVICES INTENDED TO BE WORN BOTH DAY AND NIGHT THAT MONITOR SLEEP/WAKE PATTERNS

| | |
|---|---|
| Rings | Oura Ring, Movano Evie Ring, RingConn, Ultrahuman Ring AIR, Vyvo BioSense Ring, Amazfit Helio Ring, Circular Ring, BodiMetrics Circul+, Samsung Galaxy Ring |
| Wrist-worn smartwatches and trackers | Samsung Galaxy Watch, Google Pixel Watch, Apple Watch, WHOOP, Vyvo Biosense Band and LifeWatch, Fitbit trackers and smartwatches, Garmin smartwatches, Amazfit smartwatchs, Masimo W1, Fatigue Science ReadiWatch, Citizen CZ Smart, Withings ScanWatch, Polar fitness and wellness watches, Bella Beat Ivy |

## TABLE 2: EXAMPLES OF CLINICAL AND RESEARCH-FOCUSED ACTIGRAPHY DEVICES AND THEIR FEATURES

| EXAMPLE ACTIGRAPHY DEVICE | ADDITIONAL SENSORS* | AVAILABLE REPORTS AND REMOTE DATA MANAGEMENT** | APPROXIMATE BATTERY LIFE ON A SINGLE CHARGE | FDA (510K) CLEARANCE |
|---|---|---|---|---|
| Actigraph (Leap, CentrePoint Insight Watch, wGT3X-BT) | Ambient light (wGT3X-BT)<br>Barometer, gyroscope, microphone, PPG (Leap)<br>Skin temperature (Leap, CentrePoint Insight Watch) | Reports and analytics for aspects of sleep, physical activity, gait and balance and vital signs. Event marker option.<br>Automated remote data upload available for Leap and CentrePoint Insight Watch. | 25-32 days<br>Rechargeable | Yes<br>(K181077, K231532) |
| ActivInsights (Band, GENEActiv) | Ambient light and temperature (GENEActiv only) | Reports and analytics for aspects of physical activity, movement, sleep, circadian rhythm and posture. Event marker option.<br>Wireless communication provides continuous remote monitoring for Band. | 30 days (GENEActiv), 12 months (Band)<br>GENEActiv rechargeable, BAND single use | Product website claims to have 510(k) exempt status for GENEActiv |
| Ambulatory Monitoring, Inc. (Micro Motionlogger and Sleep Watch 2.0, zzz-logger) | Ambient light, temperature (Micro Motionlogger and Sleep Watch 2.0 only); optional add-on: PVT | Reports and analytics for aspects of sleep and circadian parameters. Event marker option.<br>Remote monitoring not available for all devices. Zzz-Logger synchs wirelessly to a smartphone. | 30 days<br>Micro Motionlogger Watch and Zzz-Logger replaceable battery<br>Sleep Watch 2.0 rechargeable | Yes, (K854030) |
| BioIntelliSense (BioButton, BioSticker) | PPG, temperature | Reports and analytics for vital signs, gait, activity, body position and sleep.<br>Continuous remote monitoring and provides real-time algorithmic-based notifications. | 60 days (BioButton), 30 days (BioSticker)<br>BioButton rechargeable, BioSticker single use | Yes (K191614, K241101) |
| BioSensics PAMSys | 9-axis IMU, altimeter, microphone; optional add-on: speech and video analysis | Reports and analytics for body position, activity, sleep and falls.<br>Continuous remote monitoring and automatic data uploads. | 6 weeks<br>Rechargeable | None |
| Biostrap Kairos | PPG | Reports and analytics for activity, sleep and vital signs.<br>Continuous remote monitoring and automatic data uploads. | 5 days<br>Rechargeable | None |
| CamNtech (MotionWatch, PRO-Diary) | Ambient light (MotionWatch) | Reports and analytics for sleep, circadian rhythms and activity. Ask survey and sleep questions with PRO-Diary. Event marker option.<br>Remote monitoring and automatic data uploads not available. | 3 months<br>Replaceable battery | Yes (K132764) |
| Condor Instruments (ActTrust2, ActLumus) | Ambient light, temperature; optional add-on: digital sleep diary | Reports and analytics for sleep, circadian rhythms and activity. Event marker option.<br>ActLumus has automatic data uploading. | 3 months (ActTrust), 1 month (ActLumus)<br>Rechargeable | Yes (K151784) |
| Empatica EmbracePlus | EDA, PPG, skin temperature, gyroscope | Reports and analytics for vital signs, gait, activity, body position and sleep.<br>Continuous remote monitoring and automatic data uploads. | 14 days<br>Rechargeable | Yes (K221282, K230457) |
| Fibion SENS | None; optional add-on: vital signs (via chest wearable), bed sensor (nearable) | Reports and analytics for sleep, circadian rhythms, body position and activity.<br>Continuous remote monitoring and automatic data uploads. | 22 weeks<br>Single use | None |
| Happy Health Happy Ring | PPG, EDA, skin and ambient temperature | Reports and analytics for vital signs, stress, activity and sleep.<br>Continuous remote monitoring and automatic data uploads. | 36 hours<br>Rechargeable | Yes (K240236) |
| SOMNOmedics (SOMNOwatch eco and plus) | Ambient light; optional add-on: vital signs, PSG | Reports and analytics for sleep, circadian rhythms and activity. Event marker option.<br>Remote monitoring and automatic data uploads not available. | 25 days<br>Rechargeable | Yes<br>(K081485) |

** All devices use triaxial accelerometers*
***All provide access to raw data unless otherwise stated*
*Abbreviations: Photoplethysmography (PPG), electrodermal activity (EDA), inertial measurement unit (IMU), psychomotor vigilance test (PVT)*

# Managing medication effects on polysomnography

*By Matthew Anastasi, sleep team resources manager*

Welcome to Sleep Team Talk, a new column that looks at our field through the lens of the sleep team member. They are our sleep technologists, respiratory therapists, advanced practice providers, nurses, office/center managers, medical assistants, and other professionals who round out the critical staffing infrastructure and keep our sleep centers humming along.

Sleep Team Talk is an opportunity for "sleep team" staff to seek out answers to the most relevant topics that don't always headline the symposia of the day.

In this issue, we will field a question asked by a technologist who is new to the sleep field and wants to know more about an unfamiliar term.

**I'm new to scoring and was told to look out for "Prozac eyes" because I care for an acute patient population receiving polypharmacy. What are "Prozac eyes" and how do they affect a polysomnogram (PSG)?**

The use of medications by our sleep patients is commonplace. Data from the CDC 2021 National Health Interview Survey reveals that a majority of adults are taking prescription medications, and this number jumps to 9 in 10 adults aged 65 and older.

Medications have a predictable and measurable effect on many aspects of sleep. They can affect sleep from the patient's macro level of subjective sleepiness. On a polysomnogram, they influence the meso levels of sleep continuity and sleep architecture down to the smallest visible micro-level components of sleep signals.

**Subjective alertness** (e.g., stimulating or sedating)

**Continuity**, defined as the proportion of sleep relative to wakefulness (e.g., increase or decrease sleep latency, total sleep time, wake after sleep onset, number of awakenings and sleep efficiency)

**Architecture**, or the structure of staging NREM and REM sleep as summarized in a hypnogram (e.g., affect sleep stage proportions)

**Micro-architecture**, which are the smaller components of sleep signals (e.g., alter characteristics of EEG, EOG, EMG and EKG)

Having insights into these effects can inform scoring, interpretation and clinical care to promote better patient outcomes.

For example, antidepressants — the selective serotonin reuptake inhibitors (SSRIs), in particular —have a widespread effect on sleep through their alerting properties by extending the time to sleep onset, known as sleep onset latency, and increasing the number of awakenings, which are both sleep continuity effects. They also dramatically suppress or even eliminate stage R and reduce slow-wave sleep while increasing the overall proportion of stage N1, which are sleep architecture effects.

Antidepressants even affect micro-architecture by increasing phasic eye movements in NREM sleep.

Antidepressants like SSRIs work by increasing the

activity of serotonin and other neurotransmitters in the brain, which can influence the function of the eyes and other organs of the body.

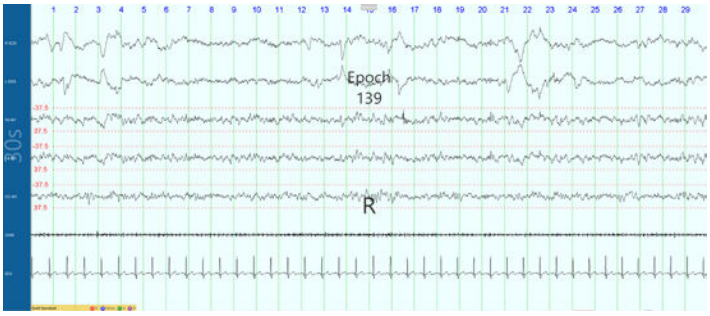
The eye movements impacted by SSRIs are believed to be related to an increase in serotonergic neurons that inhibit the brainstem "omnipause neurons" that normally suppress saccadic eye movements.

The rapid eye movements that normally only appear in stage R are a type of saccadic eye movement. In this way, antidepressant use can work at the neuronal level to facilitate the disinhibited release of saccades in NREM sleep.

This widespread effect not only has implications for collecting, scoring and interpreting a PSG, but it also leads to subjective effects on the physiology and psychology of patients long term.

A classic example of a medication effect on a PSG is "Prozac-eyes." Figures 1 and 2 show two epochs from the same patient on the same night, taken from Sleep ISR. This patient has an SSRI listed in the chart.

## FIGURE 1




## FIGURE 2

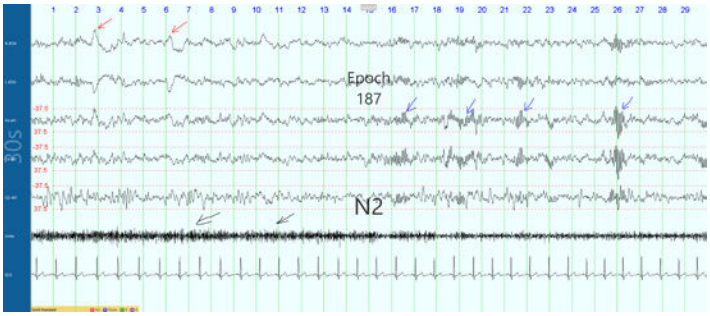



Figure 1 is a typical stage R epoch, and Figure 2 is an epoch showing an antidepressant medication effect on phasic eye movements in NREM stage N2 sleep. The red arrows show rapid eye movements. Look at the chin EMG on Figure 1 (low amplitude characteristic of stage R) compared with Figure 2 (increased amplitude typical of stage N2 shown with black arrows). Also, the EEG is consistent with stage N2 in Figure 2 with sleep spindles pointed out with blue arrows.

Upon reviewing the manifestation of this single medication on a patient's subjective and objective sleep, what does this mean for us?

The night technologist is the first sleep professional who will be in a position to identify medication effects on the PSG and avoid the misinterpretation of these effects. In this case, a technologist with a background in the effect of antidepressants on sleep would be able to spot the "Prozac eyes" and not overscore stage R. However, the entire care team has a role in providing good patient care.

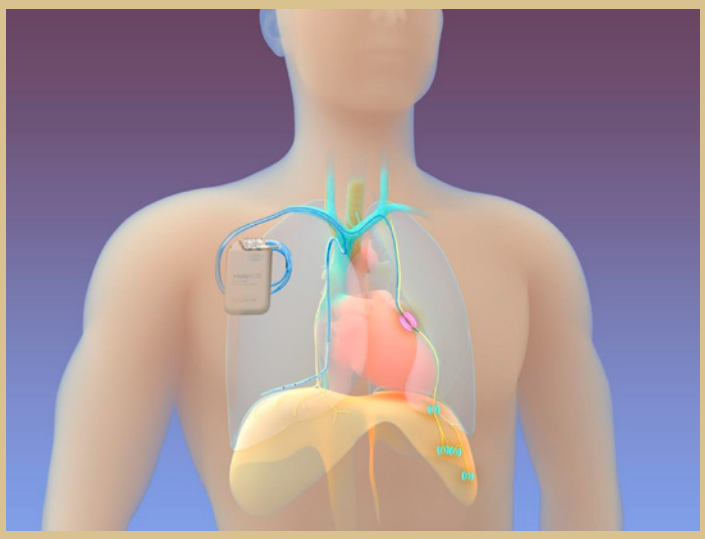
Having a thorough medical history in place before the study is critical to a) obtain a clean study; b) achieve scoring accuracy; and c) set the stage for accurate comments in the report. In other words, it's necessary for good patient care.

First, we need an accurate list of meds in the electronic medical record (EMR) and, if possible, we need to provide access to the EMR for staff who need it. With the EMR data at the ready, staff can connect the dots in real time between the patient's clinical background and its impact on patient care. Finally, proper documentation and communication handoff with these insights can resolve many needs of the patient.

As you can see by reviewing just one example, medications have real effects on the fundamental makeup of sleep. All this makes me think: While we are in search of clinical indications in the diagnostic data for sleep disorders like sleep apnea, periodic limb movement disorder, insomnia and narcolepsy, how much of a patient's sleep disturbance can be traced to their list of medications? And is overlooking medication effects a case of missing the forest for the trees?

*To have your sleep team-related inquiry answered in a future "Sleep Team Talk," please submit your question to sleepteam@aasm.org.*

# Phrenic nerve stimulation for the treatment of central sleep apnea



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The sleep medicine phrenic nerve stimulation codes became effective Jan. 1, 2024. They were created because of advances in phrenic nerve stimulation technology, improved diagnostic precision, and recognition of clinical needs in sleep medicine, all of which facilitated reimbursement and payer clarity. The creation of CPT codes 93150-53 represents a response to advances in diagnostic and therapeutic applications of phrenic nerve stimulation, particularly in sleep medicine. These codes help clinicians document, bill and receive reimbursement for specialized studies, reflecting their integral role in managing conditions like central sleep apnea (CSA).

The AASM worked with the American College of Cardiology (ACC) and the Heart Rhythm Society (HRS) to convert 12 phrenic nerve stimulation Category III codes to Category I codes. The AASM surveyed members on the programming codes only, while the ACC and HRS surveyed their members on all 12 of the codes.

## PHRENIC NERVE STIMULATION: HOW IT WORKS

Phrenic nerve stimulation for the treatment of CSA focuses on addressing the brain's failure to trigger breathing by providing electrical stimulation directly to the phrenic nerve, which controls diaphragm movement and breathing. The phrenic nerve originates in the neck and runs down to the diaphragm, facilitating breathing by sending signals to the diaphragm to contract, thus allowing air to flow into the lungs.

Phrenic nerve stimulation devices work by detecting the cessation of breathing during sleep and delivering a small, timed electrical impulse to the phrenic nerve. This stimulation causes the diaphragm to contract, mimicking natural respiration. The result is a restoration of a more normal breathing pattern and a reduction in apneic events.

## SLEEP-RELATED CPT CODES FOR PHRENIC NERVE STIMULATION

| | |
|---|---|
| **93150** | Therapy activation of implanted phrenic nerve stimulator system, including all interrogation and programming |
| **93151** | Interrogation and programming (minimum one parameter) of implanted phrenic nerve stimulator system |
| **93152** | Interrogation and programming of implanted phrenic nerve stimulator system during polysomnography |
| **93153** | Interrogation without programming of implanted phrenic nerve stimulator system |

*Note: CPT codes 33276, 33277, 33278, 33279, 33280, 33281, 33287 and 33288 are phrenic nerve stimulation codes used typically in cardiac catheterization.*

## BENEFITS OF PHRENIC NERVE STIMULATION FOR CSA

- Addressing the root cause: Unlike CPAP or oxygen therapy, which primarily target the symptoms of sleep apnea, phrenic nerve stimulation directly addresses the underlying problem of absent respiratory effort by stimulating the diaphragm.
- Non-invasive breathing support: Phrenic nerve stimulation offers a less invasive approach compared with other treatments for CSA, such as invasive mechanical ventilation, while still providing effective support for normalizing breathing patterns during sleep.
- Improved patient adherence: Many patients with CSA find CPAP difficult to tolerate, often discontinuing its use. Phrenic nerve stimulation, in contrast, is more comfortable for patients because it works internally without the need for external devices like masks or hoses.

## MAIN COMPONENTS OF A PHRENIC NERVE STIMULATOR

- Implantable pulse generator: This is the small device implanted in the chest. It generates electrical pulses that stimulate the phrenic nerve, triggering the diaphragm to contract and initiate breathing during sleep.
- Electrode leads: These thin, flexible wires are attached to the phrenic nerve, usually placed near the diaphragm. The leads transmit the electrical signals from the pulse generator to the phrenic nerve.
- External programmer: This is used by health care providers to adjust the settings of the pulse generator. It allows for customization of the stimulation intensity, timing, and frequency based on the patient's needs.
- Battery: The device is powered by a long-lasting battery that is either rechargeable or designed to last for several years before replacement.
- Sensors (optional): Some systems include sensors that monitor breathing patterns, adjusting the stimulation automatically when CSA events are detected.

## IDEAL CANDIDATES FOR PHRENIC NERVE STIMULATION

Not all patients with CSA are candidates for phrenic nerve stimulation. Ideal candidates include:

- Adults with moderate to severe CSA (AHI > 15) who have failed or cannot tolerate CPAP therapy.
- Patients with chronic heart failure and CSA, where phrenic nerve stimulation has been shown to improve cardiovascular outcomes.
- Those with idiopathic CSA where other interventions have been ineffective.

Phrenic nerve stimulation is generally not recommended for patients with obstructive sleep apnea as their apneas are caused by physical airway blockages rather than absent respiratory effort.

## WHEN TO USE THE CODES

These codes are appropriate for diagnostic or pre-intervention assessments of phrenic nerve function, typically in cases involving respiratory disorders. You would bill the codes to evaluate phrenic nerve integrity in patients with CSA before considering therapies like implantable phrenic nerve stimulation devices. Ensure the procedure is necessary for diagnosing or treating the specific condition. Use 93150 or 93152 for unilateral studies and 93151 or 93153 for bilateral studies.

## USE CASE

The patient is a 65-year-old female diagnosed with severe CSA that has not been adequately managed with CPAP therapy. Due to her CSA and comorbidities, including atrial fibrillation, she was identified as a candidate for phrenic nerve stimulation. After successful implantation of a phrenic nerve stimulation device, the sleep medicine physician assumes responsibility for ongoing monitoring and adjustments of the device to ensure proper functioning and control of her CSA episodes.

1. **Initial postoperative follow-up and device activation**
   - CPT code: 95970 (Electronic analysis of implanted neurostimulator pulse generator system; simple or complex adjustment)
   - Patient returns to her sleep medicine physician for the initial postoperative checkup and device activation. The physician performs electronic analysis and activates the phrenic nerve stimulation device. Any necessary initial adjustments are made to ensure optimal functionality.
   - ICD-10 code: G47.31 (CSA in conditions classified elsewhere)
   - Documentation: Post-op notes, details of device activation and patient symptoms.
2. **In-person device programming and adjustments**
   - CPT code: 95976 (Electronic analysis of implanted neurostimulator pulse generator system; with intraoperative or subsequent programming, first hour)
   - After activation, the patient visits her sleep physician for device programming. The physician programs the device to adapt to patient's individual needs based on feedback from the neurostimulator and her sleep apnea symptoms. This code is used for more complex programming adjustments.
   - ICD-10 code: Z96.82 (Presence of neurostimulator)
3. **Remote device reprogramming and review**
   - CPT code: 95977 (Electronic analysis of implanted neurostimulator pulse generator system; with intraoperative or subsequent programming, each additional 30 minutes)
   - If further adjustments are required after reviewing the remote monitoring data, the sleep physician performs remote device reprogramming. This code is used when the programming session exceeds the first hour or for subsequent programming updates as needed.
   - ICD-10 code: Z96.82 (Presence of neurostimulator)

In this use case, the sleep physician assumes responsibility for the long-term **monitoring** of patient's phrenic nerve stimulation device. Billing involves a combination of in-person and remote monitoring codes, including adjustments and reprogramming, based on the patient's clinical needs. Proper documentation of symptoms, device function, and programming adjustments ensures accurate reimbursement.

## FDA APPROVAL LANGUAGE

The approved FDA language for phrenic nerve stimulation states that it is indicated for the treatment of “moderate to severe CSA in adults” and functions as an implantable device that delivers electric stimulation to the phrenic nerve to help regulate breathing during sleep.

## RISKS OF INAPPROPRIATE CODING AND BILLING

Inappropriate coding and billing of the sleep medicine phrenic nerve stimulation codes can result in compliance risks, reimbursement issues and even legal penalties.

- Compliance risks: Inappropriate billing of these codes can trigger payer audits or penalties for non-compliance with coding guidelines. Repeated inappropriate coding may be seen as deliberate and lead to allegations of fraud.
- Reimbursement issues: Payers may deny claims or demand repayment if codes are misused or lack supporting documentation. Improper coding could lead to underbilling, resulting in reduced reimbursement.

Some potential coding errors are using the wrong code (bilateral versus unilateral), lack of medical necessity, insufficient documentation, unbundling (billing both unilateral and bilateral codes), and incorrect modifier use.

## CONCLUSION

Billing for phrenic nerve stimulation in sleep medicine involves specialized CPT codes and compliance with payer-specific guidelines. Below are key components:

- Relevant CPT codes: Phrenic nerve stimulation typically uses codes specific to device implantation, programming and follow-up.
- Pre-authorization: Always verify the payer’s requirements for PA.
- Documentation requirements: Physician notes should highlight the necessity and expected outcome.
- Modifiers: Appropriate use of modifiers (e.g., modifier 26 for professional component or modifier TC for technical component) is crucial for compliance and accurate reimbursement.
- Diagnosis codes: The diagnosis codes must substantiate the need for phrenic nerve stimulation; a common code may include CSA G47.31.

Successful billing hinges on precise coding, adherence to payer policies and robust documentation. Coordinating with payers early in the process helps mitigate denials and ensures timely reimbursement.

## Sleep Fact Sloth

### The songs that birds sing in their dreams

A team of researchers from the University of Buenos Aires developed a method to capture birds’ vocal muscle activity during sleep via electromyography (EMG). Then they use a dynamical systems model to translate the data into synthetic songs.

**Sources:** https://www.eurekalert.org/news-releases/1040993 **and** http://dx.doi.org/10.1063/5.0194301

# AASM® | FOUNDATION

*Investing in People, Research and Communities*

As the philanthropic arm of the American Academy of Sleep Medicine, the AASM Foundation is committed to embracing and celebrating diversity in all its forms.

As we look to ways to expand our programs and operations to be more inclusive and equitable, we have adopted the following statement to provide us a comprehensive framework that will help guide our policies and programs as we champion a bright future for sleep health.

## DIVERSITY, EQUITY, INCLUSION AND ACCESSIBILITY STATEMENT

The AASM Foundation values unique experiences, backgrounds and perspectives in achieving our goals of advancing science, supporting career growth, helping to reduce health disparities, and celebrating achievements in the sleep field. We foster diversity and inclusiveness amongst current and prospective volunteers, leaders, and collaborators. We are dedicated to identifying and eliminating barriers to inclusion within our programs, initiatives, and processes by implementing equitable and transparent practices. We are committed to meaningfully engaging in outreach to support the AASM Foundation's purpose of investing in people, research, and communities to improve the sleep health of all people.

– Adopted by the AASM Foundation board of directors on October 25, 2024

We are proud to have received the Platinum Seal of Transparency from Candid (formerly GuideStar). The seal indicates that we share clear and important information with the public about our goals, strategies and achievements. Learn more about the Candid Seal of Transparency by viewing our profile by scanning this code:

Platinum Transparency 2024

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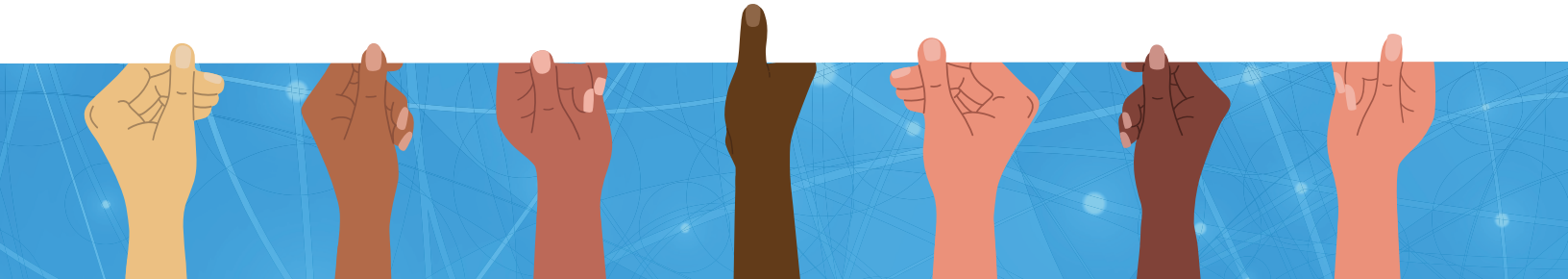
*The AASM Foundation is a 501(c)(3) organization.*
*Our IRS EIN # is 41-1920576.*

*All contributions are tax deductible as allowed by law.*



AASM American Academy of SLEEP MEDICINE

# EXPLORE THE BENEFITS *of the*

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*The Gold Standard for Accreditation and Patient Sleep Health*

## Service-Based Focus

Our service-focused model accredits various services (sleep clinic, in-lab sleep studies, home sleep apnea tests, durable medical equipment) and groups them into a network. This adaptable approach grows with the network and clearly defines the full range of accredited services available to patients.

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The updated AASM Standards for Accreditation simplifies compliance while upholding the gold standard for quality care.

## Streamlined Fees

We've updated accreditation fees to match our service-based model. You'll pay a flat fee for specific services. Our 5-year AASM accreditation offers better long-term value than the 3-year term from competitors.


For more information on the service-based accreditation model, please visit our website at

**aasm.org/accreditation**