MAGAZINE

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SEP/OCT 2023

FOR SLEEP PROFESSIONALS

THE MESSY DIVORCE OF RESTLESS LEGS SYNDROME AND DOPAMINE AGONISTS

TARGETING SLEEP TO COMBAT NEURODEGENERATIVE DISEASES

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DIABETES AND SLEEP APNEA

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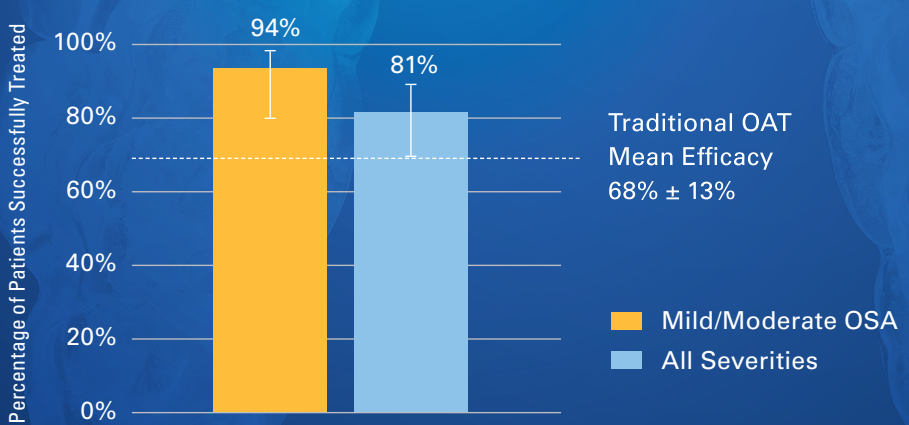

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[2]Sall E. Precision Oral Appliance Therapy: The Prime - Time Treatment for OSA. World Sleep Congress. Rome, Italy. Poster Abstract #289. March 2022.
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Falling Back and Raising Awareness

Fall is upon us. Soon, we will turn back the clocks on November 5th. The AASM and other organizations are advocating for a shift away from daylight savings to year-round standard time. It is essential for sleep health professionals to explain to patients why they might have difficulty during this time. Consider reading this comprehensive article, "Time to Realign Synchronizing to Earth's Light/Dark Cycles," in Sleep Lab Magazine (Jan/Feb 2022). Find out more about this important public health issue. AASM Position Paper Save Standard Time

October is Health Literacy Month. The National Library of Medicine states that health illiteracy impacts nearly 9 of 10 adults. Because sleep is a biological imperative, improving sleep health literacy in the general population should be an important initiative for sleep practitioners and researchers. This is critical as sleep issues cross all ages and demographics. Improving sleep health literacy may also help with self-efficacy and other behavioral aspects of sleep apnea care. See Amber Carmen Arroyo's excellent article in this edition. See the links below to learn more about health literacy interventions and free training.

Health Literacy On Demand Clinical Conversations Training Program Training Resources

Materials we encourage our patients to review may need to be updated to reflect plain language and readability. A recent review article by Mohile et al. on nocturnal enuresis demonstrated that the documents reviewed averaged above a 9th-grade reading level, which may be too difficult for many readers. Another review by Robbins and colleagues in 2022 demonstrated a similar trend in readability.

Americans are aging; that's a fact! Make sure to read "Targeting Sleep to Combat Neurodegenerative Diseases and Aging" by Drs. Keil and Jansson at the Iliff lab, University of Washington. This article presents a comprehensive overview of the aging process and underscores the potential of sleep as a therapeutic target.

Make sleep inquiry an ALWAYS event!
Robyn Woidtke

ABOUT THE COVER:

Dopamine agonists were initially considered a breakthrough treatment for RLS until the emergence of a phenomenon known as augmentation occurred in which symptoms would worsen over time.

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New Revelations on the Relationship Between **Diabetes and Sleep Apnea**

Nathan Costiuc, MSN, APRN, FNP-BC

The language of medicine has long been characterized by its separation into specialties, each with its own lexicon and perspectives. These specialties typically stay confined to their own spaces with clear lines of distinction when an issue becomes "someone else's problem." The more we learn about medicine and the human body's interconnectedness, the more we discover these separations are hard to maintain.

The relationship between sleep apnea and diabetes is a notable example of this, where the barriers of disciplines dissolve in view of a multi-system illness. The most recent research on the interplay between these conditions only further confirms this truth, leaving the modern healthcare provider with a responsibility to consider the implications of these illnesses in tandem.

DIABETES AND SLEEP APNEA: A PRIMER

For the sake of this article, we will primarily discuss the most common presentation of diabetes: Type 2 (T2DM). At its center lies a condition called insulin resistance, where cells become less responsive to the effects of insulin, which is the hormone responsible for glucose entering the cells.

When this resistance occurs, it causes elevated glucose levels in the blood. To compensate for this resistance, the pancreas initially produces more insulin, but eventually, the beta cells that produce insulin become ineffective at such a high production level to overcome cellular insulin resistance. Additional metabolic factors exacerbate this issue, like the production of new glucose in the liver, mitochondrial dysfunction, and adipose-related inflammation, which further worsens insulin resistance. Ultimately, blood glucose levels rise, and this longstanding hyperglycemia damages both large and small blood vessels and organs throughout the body.

The relationship between sleep apnea and diabetes is complex, and they both contribute to worsening the other condition. Apneic episodes lead to the release of inflammatory mediators like epinephrine, norepinephrine, certain cytokines, and cortisol, all of which affect glucose regulation. While these inflammatory mediators are inherent and critical to the normal functioning of various systems, their release at inappropriate times associated with sleep disturbances have been recognized for a plethora of adverse effects, especially in relation to diabetes.[1, 2] Chronic hyperglycemia worsens upper airway narrowing and collapse, mediated by neuropathy, fluid retention, and fat deposition. Sleep apnea can lead to imbalances in hormones like leptin and ghrelin, which regulate appetite and metabolism, and can contribute to weight gain, which then exacerbates insulin resistance. Daytime tiredness may decrease motivation to stay active, further worsening weight gain.

The list of interplaying factors is extensive, even past what has been mentioned. While many sleep and diabetes providers are well aware of these implications, recent research has led to further revelations on the relationship between these two illnesses.

Below is a summary of some recent articles discussing this relationship. We highly recommend reviewing them in further detail.

Research Article #1: Revelations in Continuous Glucose Monitoring

A recent study in Sleep Medicine investigated obstructive sleep apnea's (OSA) specific impact on real-time glucose regulation.[3] They compared patients with mild OSA (ODI: 5.0–14.9 events/hr) and moderate-to-severe OSA (ODI ≥15 events/hr) who also have type 2 diabetes. Over seven days, the researchers collected continuous glucose monitoring (CGM) data from 63 adults and used actigraphy to map glucose variability to sleep/wake cycles.

Those with moderate-to-severe OSA showed higher average glucose levels during sleep and wake compared to those with mild OSA, along with a higher variability of glucose rate of change during wake. This serves the hypothesis that there is a correlation between sleep apnea and diabetes in terms of disease severity.

Research Article #2: The Intertwined Trio of Sleep Apnea, Obesity, and Diabetes

An excellent literature review[4] was published in *Current Diabetes Report* investigating the intricate relationships between obesity, OSA, and type 2 diabetes and how these illnesses collectively impact cardiovascular and metabolic health.

The article summarizes what is currently known about the comorbid prevalence of these illnesses, namely that estimations reveal OSA (defined as AHI>5.0/h) is present in 86.6% of obese patients with T2DM and clinically significant OSA (defined as AHI > 15/h) was present in 53.1% of the same cohort. They also cover sleep deprivation's contribution to obesity, the independent pathophysiological mechanisms directly between T2DM and OSA (like catecholamine surges and neuromyopathic effects), synergistic effects on cardiovascular and vascular disease risk, and the under-diagnosis and treatment of OSA.

What's interesting about this article is not necessarily that it furnishes cutting-edge findings but that it serves as formal recognition by the endocrinology community of the critical nature of sleep in diabetes/obesity management.

Research Article #3: Respiratory Effort's Contribution to Diabetes

While research regarding the effect of OSA on the pathogenesis of T2DM has been plentiful, the mechanisms in focus have classically been apnea-hypopnea index (AHI) and OSA-related hypoxic burden indices like oxygen desaturation. In a departure from this approach, this study[3] investigated the independent contribution

of Respiratory Effort (RE) to the development of T2DM.

A large sample study[5] published in Sleep (n=1,128) had patients undergo a PSG study while tracking sleep mandibular jaw movement (MJM) measurements. As a result, they successfully predicted the prevalence of T2DM using parameters derived from the MJM signal, particularly the time spent with increased RE during sleep. The predictive effect was stronger than what could be obtained using AHI and O2 saturation.

RESEARCH IMPLICATIONS

We can make various conclusions from recent research regarding diabetes and sleep apnea, but all of them are covered under the umbrella of thinking holistically. Clearly, there are straight lines drawn between diabetes and sleep apnea, and it is incumbent upon providers in both domains to consider their effects outside of the echo chamber of their specialty. Consider using respiratory effort thresholds to determine the need for diabetes screening and referral. Use your medical networks to urge the importance of sleep screenings, especially for those who manage diabetes. One day, we may see the barriers of disciplines dissolve and patients treated with comprehensive consideration.

Nathan is a nurse practitioner and freelance writer based in West Palm Beach, Florida. He sees disabled veterans struggling with sleep disturbances in the context of multiple comorbidities.

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The Messy but Needed Private Divorce of RESTLESS LEGS SYNDROME and Dopamine Agonists

Andy Berkowski, MD

But you still see them everywhere together! Whether eating together at the food court, sitting next to each other at the local sporting event, or picking out ears of corn at the farmer's market, healthcare workers continue to see people with restless legs syndrome (RLS) and dopamine agonist medications (DAs) side-by-side. Few seem to be aware that the relationship was rocky as far back as the early 2000s, and they were divorced several years ago. Those with RLS continue to suffer from this close association.

RLS is a neurologic disorder whose cardinal features include often indescribable sensations, usually in the legs, accompanied by an urge to move. The urge is relieved by movement, worsened by rest, and most prominent at nighttime. RLS may affect up to 5% of the US adult population, and its symptoms can be quite unpleasant and distressful to those afflicted. RLS can additionally disrupt their sleep, as they can be awake at night, kicking, stretching, or even walking around instead of being sound asleep.

Treatment for this condition was largely elusive until around the turn of the century with the incidental discovery that medications related to a neurotransmitter, dopamine, magically relieve symptoms of RLS. After an explosion of clinical trials, short-term success for patients, and, of course, heavy marketing, dopamine agonists became enshrined as the go-to treatment, such that every multiple-choice question in a medical school course or board examination would end with the answer being treatment with a DA. DAs currently comprise three of only four FDA-approved medications for RLS and include pramipexole (Mirapex®), ropinirole (Requip®), and rotigotine (Neupro®). These medications stimulate dopamine receptors in the brain, targeting those involved with pathways that quiet down sensations produced by the RLS biological process. In the short term, tapping into the dopamine system can provide potent relief of symptoms, often to the point that those with RLS may no longer experience any symptoms, provided they do not miss their evening dose.

With great relief of symptoms, clinical trials, and FDA approval—why, then, the bad break up of RLS and DAs? Levodopa, the active compound in Sinemet®, currently the standard treatment for Parkinson's Disease, is a precursor to the chemical dopamine and is converted to dopamine when it enters the brain. It was initially used in RLS in the 1990s with short-term effectiveness. However, by the late '90s, there were already published reports showing a bizarre phenomenon called augmentation, in which symptoms of RLS would worsen over time. Despite working slightly differently than levodopa, DAs also began leading to RLS augmentation in the early 2000s when they were approved and started a rapid ascent in medical prescribing.

Augmentation comes from the Latin augere, which means "to increase." Augmentation is a long-term worsening of RLS with hallmark features that may include an onset of symptoms progressively earlier than at nighttime, a spread of symptoms beyond the legs to the torso or arms, shorter time for sedentary activities to trigger symptoms, an increase from a previously effective DA dose, and even an initial triggering of RLS immediately after taking the medication. In medical terms, this is an iatrogenic phenomenon caused by the treatment itself, and it actually can augment the severity of the condition beyond what can occur naturally. Most of the most severe cases of RLS are those treated with DAs and develop severe augmentation. To make matters worse, dopamine affects many other processes in the brain, including movement—as in Parkinson's disease, mood, and behavior. It also was determined that this group of drugs led to other side effects, most prominently impulse control disorders (ICDs). ICDs are behaviors that a person does to excess or out of compulsion and include compulsive eating, substance abuse, gambling, shopping, use of pornography, and even otherwise benign habits done to excess (e.g., hours spent consumed with a hobby without restraint). These have been shown with DA treatment for RLS as well as Parkinson's Disease and typically resolve when an individual is taken off the medication. More than the top half-dozen medications reported to the FDA database as leading to ICDs are dopamine agonists or similar drugs.

If it were not bad enough, DAs do not just "lose effectiveness" but may worsen the condition, even permanently. The proposed mechanism for augmentation is a drug adaptation of the brain to long-term exposure or chemical dependence. The dopamine receptors and pathways that relieve RLS decrease in number (down-regulate), and some of the receptors that increase symptoms actually grow in number (up-regulate) to balance the receptor stimulation from constant exposure to the treatments. An individual cannot simply stop the DA they are on and start something else, or they may have a tremendous rebound or withdrawal response with extremely severe RLS for days or weeks thereafter. Most patients with augmentation have to taper off a DA over weeks and months and also usually start other treatments just to endure the weaning process and rebound symptoms. Those who are able to taper completely off DAs go through a recovery process, often significant. Still, many are left with much more severe RLS than before they ever started on the medications years prior.

From the late '90s to the mid-2010s, published retrospective and observational studies as well as clinical experience of RLS specialists, mounted evidence that augmentation was a substantial problem. This phenomenon occurs over several months to years, and it could not have been picked up by earlier clinical trials that tested the drugs from as little as one night to a few months. For more than a decade, the relationship between RLS and DAs was rocky. The separation became official in 2016 with the joint publication by the three most prominent RLS organizations in the world—the International RLS Study Group, the European RLS Study Group, and the RLS Foundation. This consensus

statement warned of the dangers of augmentation with DAs and suggested the use of another class of drugs—the alpha-2-delta ligands, such as gabapentin (Neurontin®) and pregabalin (Lyrica®) as a first-line medication group. The divorce may have become official with the 2021 consensus guidelines published by the Scientific and Medical Advisory Board of the RLS Foundation, which further downgraded the use of DAs and warned of augmentation risks. With more than two decades of use and the continued suffering of those with RLS from the effects of augmentation, future guidelines are sure to come out increasingly more strongly against their use. The opinion of many RLS specialists joins this author that these treatments should not be used at all except in rare, short-term circumstances.

The divorce has seemed private, however. Since 2016, the prescribing of these drugs has been slow to change, with almost 60% of RLS patients still being treated with DAs, often with doses exceeding maximum recommended thresholds, based on a 2021 study. Didn't you just see RLS with a DA at the theatre together the other night? The reasons for this are many. Major shifts in recommendations can take decades to take hold for any treatment approach. Those readers involved in sleep medicine know that the field is much more focused on obstructive sleep apnea and performing polysomnography (PSG). RLS is relegated to an annoying sideshow, with patients who are feeling miserable and gradually getting worse despite (or because of) our treatment. Though periodic limb movements in sleep (PLMS) can pop up on a PSG, assessment of PLMS currently has no role in the diagnosis and management of the condition, so there is no exciting, lucrative diagnostic test or treatment procedure to stimulate the interest of sleep center administration to focus on more RLS.

The most important reason for the persistence of RLS treated with DAs is that most clinicians are not familiar with the currently recommended treatments for RLS, and there are also numerous barriers to RLS patients obtaining these treatments. Intravenous iron infusion is a consensus first-line treatment. Still, it involves a poorly understood procedure in which a clinician must have access to an infusion center or an individual such as a hematologist affiliated with one and knowledgeable enough to know how to administer iron. This does not even account for the lack of insurance coverage for this treatment for RLS. The previously mentioned alpha-2-delta medications often cause drowsiness or dizziness, are controlled substances in many states, and may be substantially less effective in those with previous augmentation. The oldest and most powerful treatment for RLS is low-dose opioids…did you just say, opioids?! Needless to say, RLS patients are the babies thrown out with the bathwater due to the backlash of the medical community against opioids amidst the current crisis in opioid-related poisoning deaths in the US. Opioids have been found to be safe, effective, and often necessary for moderate to severe RLS, particularly in those with severe augmentation when other treatments have failed. However, many patients suffering from augmentation are put on a higher dose of a DA or futilely switched to a different one instead of getting opioids to avoid the perceived risk and hassle of opioid prescribing in today's environment. Compared to some of the first-line treatments above, it is sometimes easier to open that e-prescribing box in the electronic record and send a new prescription for a DA.

It may seem like a huge endeavor, with lawyers involved and everything else, but the permanent divorce and physical separation of restless legs syndrome and dopamine agonists must happen now for the sake of the tens of thousands enduring the consequences of a toxic relationship. ■

J. Andrew Berkowski, MD, is the founder of ReLACS Health, a direct specialty care sleep clinic specializing in RLS and complex sleep disorders.

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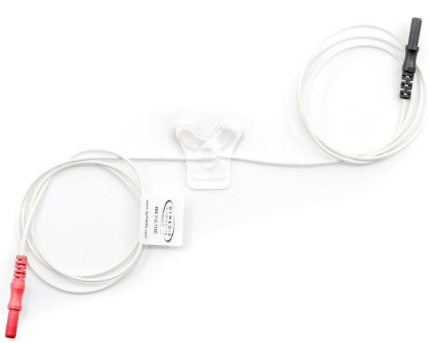

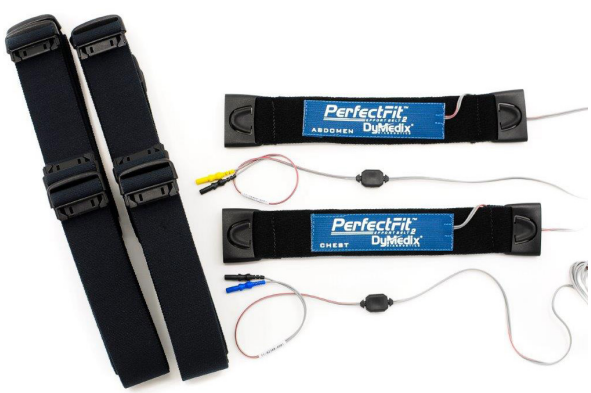

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Why is Narcolepsy Awareness Important?

Cara Weaver

For so many people living with narcolepsy, there are countless layers of misunderstandings to face before even having a name for what they're experiencing. They can be, and often are, misdiagnosed, discouraged from seeking answers, or simply just not informed enough to seek out help in the first place.

We can't and don't expect everyone to be an expert on narcolepsy. However, simply knowing the signs of the disorder, the truth behind the stigma, and having resources to refer patients and colleagues to as needed can be life changing.

What is narcolepsy?

Narcolepsy is a lifelong disorder of the central nervous system characterized by the brain's inability to control sleep-wake cycles.

Why is narcolepsy important to understand?

In a survey of around 100 physicians in the Greater Boston Area in 2022, it was found that only 48% of the professionals were able to identify three out of five symptoms of narcolepsy Cataplexy, Hallucinations, Excessive Daytime Sleepiness, Sleep Paralysis, Sleep Disruption (CHESS). Click on the above links to learn more. Only 4% were able to identify all five symptoms.[1]

When telling their stories leading to an official diagnosis, people with narcolepsy will often express that they were misunderstood or pushed away by certain healthcare professionals.

The journey to obtain a diagnosis is complex and often consists of a multitude of testing procedures. This can be taxing emotionally, physically, and financially. Whether it be primary care providers, sleep specialists, psychologists, or other healthcare providers (HCPs), the knowledge and reactions of these professionals are pivotal in receiving a proper diagnosis.

Part of what we do at Wake Up Narcolepsy (WUN) is to help people share their stories. Below are quotes to demonstrate the difference it would have made, or did make, to have someone recognize narcolepsy. All of the following can be found on Wake Up Narcolepsy's blog and were written by Tana Bao MSN, NP-C, FNP-BC.

- "Tom knows he is fortunate he had a quick turnaround time to diagnosis, likely because of not only having significant cataplexy but also because of his proximity to a doctor that knew what cataplexy was." - *Living with Narcolepsy: Thomas Heckmaster's Journey to Advocacy and Marathon Running*
- "For Kristin, it had been an excruciating four years having to watch her daughter, a once joyful and happy child, struggle [with symptoms of narcolepsy] without really knowing why. She only wishes their therapist—or anyone at all, really—would have suggested sleep testing sooner." - *Mother's Day and Narcolepsy: Reflections from a Mom and Daughter Duo*
- "It wasn't until a doctor referred her for sleep testing specifically for narcolepsy that she received her diagnosis in 2019— twenty years after the onset of her first symptoms." - *Tara O'Connor on Navigating College and Careers with Narcolepsy*
- "Although Sophie was diagnosed young at age fourteen, she had to endure a multitude of other medical tests, work-ups, and treatments before receiving her narcolepsy diagnosis. Sophie's mother kept pressing their physicians since they knew something was clearly not right." - *Sophie LeBlanc's Narcolepsy Journey*

Wake Up Narcolepsy seeks to educate, raise awareness, and fund research about this sleep disorder. All these efforts help lessen the burdens experienced by people living with narcolepsy. Every individual who takes the initiative to learn more is helping to advance this mission.

Where can I learn more?

- What Does That Mean? - Terms to Know When Talking about Narcolepsy
  - Taking suggestions from our community for which terms to highlight, we break them down into bite-sized pieces for the general public.
- Do You Know Narcolepsy? Poster & Brochure
  - In collaboration with The Hypersomnolence Support Network Japan, we offer brochure and poster versions of these graphics meant to depict the symptoms of Narcolepsy.
- Monthly Blog Posts
  - Each month, we highlight different perspectives of Narcolepsy and showcase how everyone experiences it differently.
- Physician Card & Poster
  - Intended for physician's offices to direct patients to resources, you can download these digitally or email info@wakeupnarcolepsy.org and ask for physical copies to be mailed.
- Public Service Announcement
  - Hear from people living with narcolepsy in this video created in collaboration with Red Square Pictures.
- Social Media
  - Stay up to date with what is happening with WUN.
- The Monthly Wake Up
  - Sign up for our monthly newsletter highlighting WUN's services and events.
- In-Person Events
  - Save the date: WUN National Summit - April 27th, 2024, in Seattle, Washington.

Wake Up Narcolepsy (WUN) is a 501(c)(3) nonprofit organization dedicated to driving narcolepsy awareness, education and research towards improved treatments and a cure. More information can be found at www.wakeupnarcolepsy.org

Cara Weaver is the marketing & communications coordinator at Wake Up Narcolepsy and is also a person with Narcolepsy Type 2.

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Empowering CPAP Adherence:

Unleashing the Potential of Behavioral Science in Sleep Medicine

Amber Carmen Arroyo, PhD

Continuous positive airway pressure (CPAP) therapy is the first line and is typically considered the gold standard treatment for obstructive sleep apnea (OSA).[1] Yet, adherence to CPAP has been consistently low since CPAP's inception, generally ranging from just 30 to 60%.[2] Despite exponential growth in the rate of OSA diagnoses,[3] a recent review found that despite technological advancements, rates of adherence have remained unchanged over the past two decades.[1] So why are rates of adherence to CPAP therapy so low, and how can we improve people's behaviors around CPAP? Well, an entire field is dedicated to answering questions like these.

Behavioral science is the study of human behavior and the factors that influence it. In the context of health behaviors, it seeks to understand why people make certain choices related to their well-being and how those choices can be modified to achieve healthier outcomes. For OSA specifically, behavioral science can be used to understand why people do or do not use their CPAP and how to change their psychological decision-making to lead to more regular CPAP use. This article examines the key theories of behavioral science, their core constructs, and how they can be implemented in the field of sleep medicine to improve CPAP adherence among sleep apnea patients.

FOUNDATIONS OF BEHAVIORAL SCIENCE

There are more than eighty theories of behavioral science that provide insight into the process of altering behaviors. Each theory offers its own perspective on what drives behavior change. For example, social cognitive theory[4] posits that self-efficacy, outcome expectancies, intentions, perceived barriers, and goals are the most important psychological factors influencing whether a person will perform a health behavior, such as using their CPAP machine. The Health Belief Model[5] suggests that perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy are the foremost drivers of health behavior change.

What unites all these theories is the presence of psychological factors that initiate change in health behaviors. Regardless of what the specific psychological factors are, all theories assert that an individual's psychology serves as key leverage point for initiating and sustaining health behavior changes like increased CPAP use. Identifying the psychological factors that influence a patient's decision to use their CPAP machine consistently is pivotal for lasting habit formation and sleep apnea symptom management.

By identifying and modifying these psychological factors that predict decision-making around regular CPAP use, healthcare professionals can empower patients to successfully treat their sleep apnea and improve their health and well-being. In recent years, there has been a greater scientific movement to measure psychological constructs when evaluating CPAP adherence. This is because there is a growing body of evidence demonstrating that targeting psychosocial factors in CPAP promotion can be effective in increasing adherence.[6] If we understand which psychological aspects influence regular CPAP use, we can manipulate these triggers to enact lasting CPAP use.

PSYCHOLOGICAL DRIVERS OF CPAP ADHERENCE

All behaviors, including health behaviors like CPAP use, initiate with a psychological decision. Patient non-adherence to CPAP therapy can thus be explained by a deficit in one or more of the psychological factors of CPAP decision-making. As discussed in the previous section, there are many different theories of behavior change, all claiming to pinpoint the key drivers of behavior. This variability likely arises from these theories each tapping into fundamental truths about human behavior, and their ability to reliably forecast behavior changes hinges on an interplay of factors, including patient characteristics, the specific behaviors targeted, and the circumstances at hand.

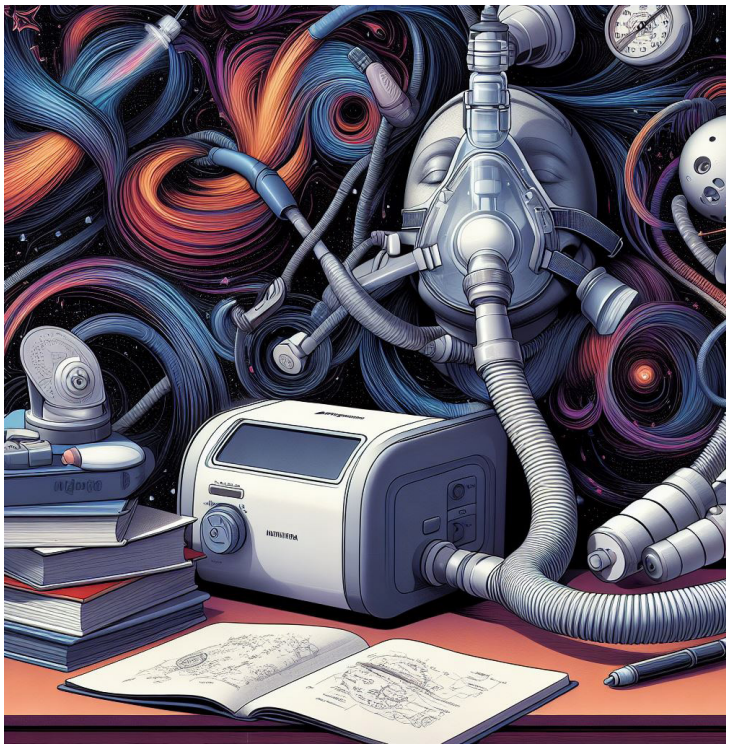
Thus, while certain psychological constructs consistently emerge as the most prevalent predictors of CPAP adherence, it is crucial to acknowledge that this may not be universally applicable to all individuals or may not remain static for a single patient throughout their treatment journey. As is standard practice in patient care, it is important to use evidence-based decision-making to inform treatment strategies and to monitor and alter the course of treatment as needed. What works for one patient may not work for another, and what is effective now may become ineffective over time. The starting point for the patient journey should be where the weight of the evidence lies for the largest body of patients, and then branch out from this foundation as needed.

Research identifies a handful of psychological factors predictive of CPAP adherence for patients. Several psychological factors have been identified as important, and the best approach is likely multifactorial and requires targeting multiple psychological predictors of CPAP adherence.

One influential study found differences between CPAP adherent and non-adherent patients in terms of their psychological risk perceptions, symptom recognition, self-efficacy, outcome expectations, treatment goals, and treatment facilitators/barriers.[7] Other studies have identified psychological factors predicting CPAP adherence as cognitive/motivational knowledge,[8] beliefs about OSA and CPAP,[9] social support,[10] health value,[11] perceived barriers[12], and decisional balance.[13]

Several studies conducted over decades have identified self-efficacy, risk perception, and outcome expectancies as critical determinants of CPAP use.[6] While this is not meant to be a comprehensive list of the psychological factors linked to CPAP adherence, it does highlight some of the pervasive psychological predictors deemed significant in CPAP decision-making. It also underscores the key differences in psychology between patients who adhere to CPAP therapy and those who do not.

A patient's lack of adherence to CPAP therapy does not signify a lost cause. Rather, it provides an opportunity to address the underlying psychological barriers or deficits that may influence their poor adherence to CPAP.



EVIDENCE-BASED STRATEGIES FOR BEHAVIOR CHANGE

The most effective way to bring about lasting change in health behavior is by modifying the underlying psychological factors predictive of that health behavior. In the context of CPAP adherence, this means altering the psychological factors that trigger an individual's decision to use the CPAP machine consistently. We can accomplish this by using evidence-based behavior change techniques (BCTs). BCTs are the irreducible active ingredients of interventions used to facilitate behavior change, and there are 93 BCTs listed in the most common taxonomy of BCTs.[14]

Extensive work has been dedicated to pinpointing which BCTs demonstrate a significant connection to specific psychological constructs. The Human Behaviour Change Project[15] brought together a panel of global experts in behavior change. They systematically reviewed an extensive collection of research articles on behavior change interventions, resulting in the creation of a database that establishes connections between each of the BCTs and the psychological factors they influence to ultimately drive behavior change.

The complete database is available on their website (https://theoryandtechniquetool.humanbehaviourchange.org/tool) to explore which psychological factors are significantly linked to specific BCTs. The project's website also provides access to a range of tools and training materials to be utilized freely (https://www.humanbehaviourchange.org/). In addition, there are useful training materials related to understanding and implementing BCTs on the Center for Behavior Change[16] website (bct-taxonomy.com).

To give an example, the psychological construct self-efficacy (an individual's belief about their capability to successfully perform a behavior) is present in several theories of behavior change. The BCTs linked to changes in self-efficacy are:

- Problem solving,
- Instructions on how to perform the behavior,
- Demonstration of behavior,
- Behavioral practice/rehearsal,
- Graded tasks,
- Verbal persuasion about capability,
- Focus on past success,
- Self-talk.

As an illustration of one BCT link to self-efficacy, we can take the BCT 'problem-solving.' A sleep technologist could guide a patient in troubleshooting common CPAP equipment issues, such as mask leak or discomfort. Being guided through the process of successfully solving a common barrier to CPAP use could increase levels of self-efficacy within the patient and result in increased CPAP use.

Technologists and physicians in the sleep field naturally employ various techniques, yet sometimes without a deliberate determination about why specific approaches are chosen. Given the limited time available for patient interaction during office visits, it becomes critical to utilize these moments judiciously, drawing from the full spectrum of evidence-based practices at one's disposal. Indeed, interventions informed by theories of behavior change have consistently demonstrated greater efficacy compared to those lacking such theoretical foundations,[17] and it has been noted that the integration of techniques from health behavior theories can enhance effectiveness of sleep interventions.[18]

ENHANCING CPAP ADHERENCE IN PATIENT CARE

While a technologist or physician in a sleep clinic may not have a background in behavioral science, there are still ways of implementing techniques from behavioral science in everyday practice. One way is to assess the psychological constructs a patient may have deficits in, either formally through self-report surveys or through normal conversation that takes place during the patient visit.

One prominent self-report survey is the Self-Efficacy Measure for Sleep Apnea (SEMSA-26),[19] used to measure a patient's psychological risk perceptions of sleep apnea, their outcome expectancies of CPAP therapy, and their treatment self-efficacy. The article by Weaver and colleagues[19] provides the full survey and how to calculate scores for each of the three psychological constructs it measures. When self-report surveys are not feasible, another approach is to pay attention to patient's attitudes and statements during office visits. For example, while describing how to use CPAP and the importance of wearing it each night, a patient states, "I'm not sure if I can do this every night. It seems too complicated," this is an indication that their self-efficacy is low.

When a deficit is noticed in one of the psychological constructs associated with poor CPAP adherence, the technician or physician can use the BCTs known to increase those constructs to ultimately drive better adherence to CPAP therapy. Below are some cases of how this could be implemented.

CASE EXAMPLES

Case 1: Enhancing Social Support. We know that more social support is associated with greater CPAP adherence.[10] If you observe that a patient lacks social support, you can employ one of the BCTs associated with enhancing social support. For example, encourage the patient to join a local or online support group for individuals with sleep apnea. Another strategy is to incorporate family members or bed partners in the

CPAP education process to create a supportive environment.

Case 2: Increasing Perceived Risk. We know that patients with lower risk perceptions of sleep apnea are more likely to be non-adherent to CPAP therapy.[7] We know from the database that the BCT 'information about health consequences' is significantly linked to increases in perceived risk. In cases where a patient appears indifferent or lacks understanding about the risks associated with sleep apnea, one can apply this BCT by educating the patient on the potential long-term health risks associated with untreated sleep apnea and how CPAP usage can mitigate that risk. Another effective BCT linked to perceived risk is 'salience of consequences' (emphasizing consequences to make them more memorable), which can be implemented through visual aids like infographics to visually represent the physiological impact of untreated sleep apnea.

Case 3: Improving Self-Efficacy. We know that self-efficacy is one of the strongest predictors of CPAP adherence.[6] If a patient is struggling to use the CPAP machine for an entire night and feels overwhelmed by the prospect of using it for a full night, the BCT 'graded tasks' can be employed to bolster their self-efficacy. Recommending a gradual approach, starting with shorter durations of CPAP use, like during a nap or for a few hours initially, and then progressively extending the duration as smaller milestones are achieved. This step-by-step approach can help the patient build confidence to be successful with CPAP therapy. Another effective BCT 'self-talk' is valuable when a patient is experiencing self-doubt or negative self-talk related to their ability to use their CPAP machine. This presents an opportunity to encourage the patient to engage in positive self-talk and affirmations such as "I am capable of using my CPAP machine consistently" and "I am taking control of my sleep apnea and improving my health." These affirmations can serve as powerful countermeasures against negative thoughts to promote a healthier mindset toward using the CPAP machine consistently.

CONCLUSION

This article gave a brief introduction to behavioral science, yet its scope extends far beyond the theories and techniques discussed here. It encompasses a complex interplay of factors, including the cognitive, social, and environmental determinants of health. All sleep medicine professionals are encouraged to explore the online courses, webinars, and certifications available through the Society of Behavioral Sleep Medicine. The annual conference offers valuable research insights and training opportunities applicable to all professionals in the field of sleep medicine.

Unfortunately, the current healthcare system often lacks the capacity for extensive one-on-one time with patients, and some patients simply require extra support to be successful with CPAP treatment. As a response, an increasing number of sleep medicine providers are turning to remote patient monitoring reimbursement to extend support beyond regular office visits.

Sleep apnea continues to be a prominent concern for public health, and rates of diagnosis are only increasing. The unwavering low levels of CPAP adherence that have persisted for two decades can no longer be tolerated. The onus cannot solely be on patients to improve CPAP adherence, and there are individuals who want to treat their sleep apnea but just need extra support to be successful. Sleep medicine professionals have a trove of techniques and a robust evidence base from behavioral science to draw upon in order to assist patients in achieving success with CPAP treatment. ■

Amber Carmen Arroyo, PhD is an expert in health psychology and has published research in peer-reviewed journals on integrating behavioral science with technology to improve sleep health and well-being.

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Unlocking Therapeutic Potential:

Targeting Sleep to Combat Neurodegenerative Diseases and Aging

Samantha A. Keil, PhD & Deidre Jansson, MSc, PhD

The intricate relationship between sleep and aging has gained increasing interest, with growing evidence of sleep disruption years before the development of cardinal neurodegenerative disease symptoms. Over the last few decades, our understanding of the bidirectional relationship between sleep disorders and comorbid illness, including hypertension, cardiovascular disease, depression, and neurodegenerative disease states has continued to evolve. This article explores the consequences of sleep disruption within clinical populations and highlights how targeting sleep could hold transformative therapeutic potential.

AGE-RELATED SLEEP CHANGES

As we age, sleep undergoes noticeable changes that can influence neurologic health. Clinically, alterations in sleep have long been considered a natural part of the aging process, with patients expressing alterations in sleep architecture (non-Rapid Eye Movement [NREM], Rapid Eye Movement [REM]), circadian rhythm disruptions, and shifts in total sleep time as they grow older.[1-3] Often approached as distinct from sleep disorders, changes including reductions in slow-wave sleep and increased sleep fragmentation with nighttime waking and early rise times have been associated with increased age-related decline in cognitive performance. Research suggests that these age-related changes stem from physiological alterations in sleep regulatory mechanisms within the brain, changes in neuroendocrine levels, and altered function of the suprachiasmatic nucleus.[2-4] However, as the scope of sleep research grows, emerging evidence suggests that these age-related sleep changes may have far-reaching implications for both neuropathologic disease and comorbid illness.

COMORBID ILLNESS AND SLEEP DISTURBANCE

Importantly, these sleep changes occur concurrently with other comorbid disease states, becoming more prevalent with age. Further, comorbid illnesses can also significantly contribute to sleep disturbances. Patients suffering from conditions including chronic pain, metabolic dysfunction, and respiratory disorders often experience alterations in sleep, with higher levels of reported insomnia, sleep apnea, and increased sleep fragmentation with difficulty falling and staying asleep.[5-8] When experienced chronically, these sleep changes have been associated with increased inflammation, chronic intermittent hypoxia, and oxidative stress.[9-11] Similarly, mounting evidence shows that the increased sympathetic nervous system activity and altered vascular function caused by chronic sleep apnea and disrupted sleep impact cardiovascular and cerebrovascular disease progression and risk.[12]

Additionally, research supports an intricate and cyclic link between sleep and depression. Not only are sleep disturbances a common symptom of depression, but chronic sleep deprivation can precipitate or exacerbate mood symptoms. Depressive symptoms have been shown to result in insomnia or hypersomnia, altered sleep architecture, and disrupted circadian rhythms.[13] As depression is itself a prevalent comorbidity in neurodegenerative disease states, the bidirectional relationship between sleep disruption and depression should be addressed.

NEURODEGENERATIVE DISEASES AND SLEEP

The connection between sleep and neurodegenerative disease progression is a rapidly evolving field of research. While neurodegenerative diseases are characterized by cardinal cognitive and motor function impairment, patients also experience substantial sleep changes. In fact, these sleep disturbances often precede clinical manifestations of these diseases, hinting at their potential role as prodromal markers.

Sleep fragmentation altered sleep architecture, and disturbances in circadian rhythms are commonly expressed in patients across neurodegenerative disease states. Importantly, emerging research supports that these disturbances are not only a symptom of disease but are also likely to contribute to disease progression. Fragmented and decreased slow-wave sleep is associated with decreased glymphatic function or brain waste clearance.[14] This is thought to lead to increased levels of neuropathologic protein deposits such as amyloid-beta and neurofibrillary tau,[15] the pathologic hallmarks of Alzheimer's disease. In Parkinson's and Huntington's disease, REM sleep abnormalities, sleep fragmentation, and daytime sleepiness are thought to be early signs of disease, with these sleep changes influencing the progression of motor symptoms and loss of quality of life.[16-17] Patients with amyotrophic lateral sclerosis (ALS), a motor neuron disease, often experience disrupted sleep patterns due to physical limitations and respiratory compromise.[18] Similarly, the impact of demyelination in patients with multiple s-clerosis has been associated with increased prevalence of fatigue and chronic sleep disturbance.[19] While this is not an exhaustive list, these conditions highlight the complicated relationship between sleep, aging, and neurodegenerative disease. Each disorder is uniquely tied to changes in sleep architecture, circadian rhythm, and sleep-related symptoms.

THE GLYMPHATIC SYSTEM, SLEEP, AND NEURODEGENERATIVE DISEASE

Beyond the alterations in sleep architecture and circadian rhythms associated with aging and neurodegenerative diseases, a critical player in this complex relationship is the glymphatic system. This recently discovered system functions to distribute and remove interstitial solutes and waste within the brain. It is thought to be primarily active during slow-wave sleep.[20-21] Reduction in slow-wave sleep and increased sleep fragmentation, common in aging and neurodegenerative disease conditions, have been linked to glymphatic clearance efficiency.[22] Consequently, this impairment can lead to the accumulation of toxic metabolites, including the amyloid-beta and neurofibrillary tau proteins implicated in Alzheimer's disease, potentially accelerating neurodegenerative disease progression.[23] Understanding the intricate interplay between sleep, the glymphatic system, and neurodegenera-

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tive diseases highlights the therapeutic potential of targeting sleep to mitigate the onset and progression of these devastating conditions.[24-25]

MEASURING AND ADDRESSING SLEEP CLINICALLY

Understanding and clinically addressing the impact of chronic sleep disruptions on neurodegenerative disease and comorbid conditions is paramount. Historically, evaluating a patient's sleep experience has relied heavily on self-reporting via standardized sleep questionnaires such as the Epworth Sleepiness Scale and Pittsburgh Sleep Quality Index.[26-27] While these self-reports continue to provide valuable insight into a patient's current sleep experience, technological advances can highlight sleep more objectively. Polysomnography (PSG), currently the gold standard for evaluating objective sleep, provides the multi-modal monitoring of brain activity (EEG), eye movements (EOG), muscle activity (EMG), heart rate, respiratory rate, and oxygen saturation.[28] This comprehensive approach allows for a detailed assessment of sleep stages and related physiological parameters. Alternatively, while not as detailed as a PSG, physiologic monitors, including actigraphy watches, bed and mattress sensors, and even biometric wearables like fitness watches, can provide information about sleep patterns, heart rate, and movement patterns across time. When paired with subjective self-report, these technologies offer crucial insight into a patient's sleep.

Addressing any identified sleep disturbances in a clinical setting requires a multidisciplinary approach that integrates the patient's neurological, psychological, and sleep health factors. Often, these sleep disturbances are managed pharmacologically, using either prescription or over-the-counter sleep aids.[29-30] While pharmacological intervention can successfully increase sleep duration, it must be approached with careful consideration of potential interactions with existing medications and disease-specific factors. Moreover, it is becoming increasingly evident that when prescribing medications, care should be taken into consideration of the impact on not only sleep quality but also sleep architecture.[31]

The emergence of non-pharmacologic sleep interventions has demonstrated their effectiveness in addressing primary sleep disorders and sleep disturbances secondary to neurodegenerative disease. At their most basic, these interventions predominantly focus on enhancing sleep hygiene by promoting healthier sleep habits, including maintaining a consistent sleep schedule, creating a comfortable sleeping environment, and avoiding stimulants and electronics before bedtime. One notable approach is cognitive-behavioral therapy of insomnia (CBT-I), which utilizes a structured therapeutic approach to encourage better cognitive and behavioral habits toward improved sleep quality.[32]

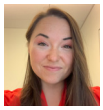
Additionally, interventions targeting overall physical and mental health can profoundly impact sleep. Adjustments in diet and nutrition, incorporating a regular exercise regime, and managing weight can also positively influence sleep health. Moreover, reducing stress and anxiety through techniques such as progressive muscle relaxation, deep breathing exercises, and mindfulness meditation provides individuals with tools conducive to healthy sleep.[33] For example, incorporating regular yoga or tai-chi to target breathing, synchronize heart rate and movement, and improve vascular function may enhance glymphatic clearance and offer a complementary intervention for age-associated changes in sleep.[34-35] In essence, by establishing an active role in their sleep optimization, these non-pharmacological sleep interventions empower patients with multi-modal strategies towards improving their sleep health and overall well-being.

Furthermore, as sleep research continues to underscore the role of chronic sleep disruption in comorbid disease progression, innovative non-invasive techniques are actively under exploration. For instance, light exposure therapy, originally developed for seasonal affective disorder, utilizes bright light in the morning to regulate circadian rhythm and sleep-wake cycles.[36] Noninvasive brain stimulation techniques, including transcranial magnetic stimulation (TMS) and transcranial electrical stimulation (tES), predominantly known for their use with mood disorders like depression, also show promise for sleep disruption intervention.[37-38] Utilizing non-invasive neurostimulation, they modulate neural activity and potentially enhance glymphatic clearance, a process vital for solute distribution and brain waste removal. Additionally, acoustic and auditory stimulation, featuring elements like binau-

ral beats, are being evaluated for their ability to influence brain wave states and the potential to foster deep and restorative sleep.[39] Even virtual and augmented reality (VR/AR) have entered the therapeutic arena, offering immersive, relaxing environments to promote relaxation and facilitate sleep.[40]

CONCLUSION

The nexus of sleep disruption, aging, and comorbid illnesses with neurodegenerative disease underscores the need for comprehensive management strategies that address sleep health within the multifaced nature of these conditions. As the research delves deeper into the intricate relationship between sleep and health, our potential to alleviate suffering and improve patient outcomes expands exponentially. It presents an opportunity to reshape the approach to patient care. Harnessing improved sleep health as a therapeutic tool by integrating sleep-focused interventions into our strategies for holistic patient care provides new horizons for improving patient well-being.



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OAT, CPAP, and Beyond:

Understanding Patient Needs and Preferences in OSA Treatment

Kevin Postol, DDS

The ability to deliver personalized care requires clinical teams to consider all available treatment options for their patients, determining the optimal therapy by considering numerous factors — including patient preference. For clinicians evaluating patients with obstructive sleep apnea (OSA), patient presentation and preference are key considerations when creating a treatment plan that will stick. In developing the plan, it is vital that patients are active participants, given the opportunity to understand options and voice opinions about their personal reservations, challenges, and both short and long-term goals.

Choice is critical for patient adherence to an OSA management plan, with options that may include an alternative therapy like oral appliance therapy (OAT) or even more than one therapy—either simultaneously or over the length of treatment – often leading to maximum patient adherence.

PATIENT-SPECIFIC CONSIDERATIONS

The key to patient-specific care for OSA is performing a thorough evaluation of each patient and recognizing what their barriers to treatment success may be. For example, when a qualified dentist selects an appropriate oral appliance for a patient who presents with a normal body mass index (BMI), no other underlying health issues, and a full set of healthy teeth, there are many different oral appliances from which to select.

However, in many instances, qualified dentists must rely on their clinical judgment and expertise to select appliances for patients who are claustrophobic, grind their teeth, are missing teeth, or have undergone extensive dental work. It is imperative to select the right appliance to ensure that the patient can and will use the appliance selected for their unique situation.

Some patients may be able to tolerate a CPAP mask but may struggle with mask straps—an issue that an attached oral appliance can remedy. The tolerance for high air pressures of CPAP is also highly variable and can be negotiated through combination approaches.

About half of patients who use CPAP are non-adherent, often citing complaints such as dry eyes, nosebleeds, irritation of the face or nose, or the sound of the CPAP disturbing the bed partner. For these patients, oral appliances may be an excellent alternative.

Responders to OAT include the following traits — Patients who have mild apnea—experiencing fewer than 15 events per hour —as well as women and those aged 65 or younger, Those who experience more hypopneas as compared to apneas, and existing CPAP patients who are considering OAT, with pressures less than 12 cm H20.[1]

FINDING THE RIGHT TREATMENT

Historically, OAT has been prescribed when a patient is intolerant of CPAP, but the latest clinical practice guidelines[2] indicate that patients who are intolerant of CPAP therapy or prefer alternate therapy should be referred to a qualified dentist for an oral appliance.

Because OAT is far less invasive, it is often better tolerated than CPAP.[3] Recognizing this, a recent study from Dr. Danny Eckert's group at Flinders University reversed the traditional OSA treatment model.[4] Patients were all provided with an oral appliance first, which was well-tolerated and successfully treated about 50% of the patients. In the remaining patients, add-on therapy was initiated, including expiratory positive airway pressure (EPAP), supine avoidance devices, oxygen, and pharmaceuticals. Oral appliances combined with these additional therapies fixed almost all 50% of the remaining patients, with very few requiring CPAP.

This study demonstrates what we all know – there is no one-size-fits-all treatment for OSA. For some patients, CPAP by itself will be tremendously successful. For others, OAT by itself will be tremendously successful. In other instances, combination therapies may be prescribed simultaneously. In instances where both OAT and CPAP are prescribed together, these may be used simultaneously; other times, patients will choose to wear one then the other, alternating nights. When worn together, the treating dentist can sometimes connect the appliance and the CPAP if the patient finds CPAP straps bothersome. There are many ways of combining treatments and various therapies to accommodate patients' presentations and preferences.

ACHIEVING TREATMENT GOALS

Clinicians should initiate candid conversations about the common goal—getting the patient as healthy as possible—and what success may look like based on symptoms, lifestyle, and treatment options. While not every patient is a candidate for every OSA treatment option, an initial intervention that achieves the desired effect may generate enough improvement to reconsider a therapy or new combination strategy. The complex physiology of apnea as a disorder and its wide range of treatment options requires the expertise of physicians and qualified dentists cooperating to achieve these advanced, personalized strategies for sleep success. ■

Kevin Postol, DDS, a national and local speaker on sleep apnea, is the president-elect of the American Academy of Dental Sleep Medicine (AADSM) and operates a dental sleep medicine practice in St. Louis, Missouri.

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Later School Start Times:

A Personal Story of Improved Mental Health and Well-Being

Amrit Joshi

Balancing healthy sleep habits, academic excellence, and athletic performance is a task achieved by few yet sought by many. As a high school senior and an all-league varsity athlete, I can testify that balancing these activities feels impossible at times. However, the addition of a later school start time at the dawn of my freshman year brought about numerous unexpected benefits, both physically and mentally.

According to the Youth Risk Behavior Survey (CDC 2021), roughly 70 percent of high school students do not get the recommended 8-10 hours of sleep per night. Over the last calendar year, I have averaged 8-9 hours per night; my peers who learn of this are amazed by this fact. After improving my sleep, I noticed dramatic increases in energy, strength, cognition, and focus– both in school and extracurricular activities. For athletes especially, getting within the range of 8-10 hours per night is crucial for improved performance in the classroom and on the field/court.

The passage of SB328 to extend school start time (9 a.m.) has had an enormous impact on my mental health as well. Passed in 2019, this California law prohibits secondary schools from starting before 8:30 a.m. and was based on dozens of studies showing the benefits of such a change. According to the National Sleep Foundation, "Sleep-deprived teens are more likely to report anxiety, depression, and suicidal thoughts and behaviors."

I have previously struggled with depression and anxiety, and the profound effect that later school start times have had on my mental health is noticeable not only by me but also by others--and not only in my academic performance but also in my athletic achievements. Junior year was the hardest by far in all domains. Yet, a rigorous devotion to a minimum of 8 hours and an average of 8-9 hours of nightly sleep led to some of my most productive athletic and academic results.

In addition to the lack of adequate sleep, the World Health Organization reports that 85% of girls and 76% of boys need to meet the daily recommendation of 60 minutes of physical activity per day. While physical education can provide some of this, I found myself needing much more than this. I sought ways to get active before school by running, biking, or even walking my dog. I could also begin and continue a consistent workout schedule before school while still getting adequate sleep nightly. I have struggled with body image issues since a young age; later school start times and more sleep have helped me improve my body and self-image to a place of acceptance and contentment.

Getting enough sleep is not an easy task! Every student knows that staying up late and waking up five minutes before it is time to leave in the morning, followed by a frantic mad dash to make it to 1st period on time, is a high school ritual. As students, I simply suggest that we alter the narrative so that being 'successful' is synonymous with getting adequate sleep and embracing this lifestyle improvement at a very low opportunity cost. There is no need to go online and fruitlessly look up "how to not fall asleep in class" or "how to do better on my tests" (I am guilty of both). Later school start times across the country will undoubtedly improve performance and well-being in many facets of students'—and faculty members' —lives.

Editor's Note

We thank Amrit for his willingness to share his experiences regarding later school start times. This is an important national and public health issue. It does my heart good to hear about successful policy-making for the good of the people, particularly young people, and how it can positively change lives. Robyn

Amrit Joshi is a senior at Gunn High School in Palo Alto, Calif.

The Future is Now!

Drew Copeland, RPSGT, CCSH

The year is 2033, and a revolution in sleep medicine is unfolding across the planet. Individuals worldwide embrace innovative wearable devices that monitor a range of health parameters in real time, offering detailed insights into their physiological state.

As night falls, these devices become guardians of sleep, utilizing AI algorithms to identify early signs of sleep disorders and initiate interventions. For those with insomnia, smart mattresses, bone-conduction microphones, and automated scent diffusers foster deep, restorative sleep. Meanwhile, individuals with obstructive and central sleep apnea benefit from technology that stimulates the hypoglossal and phrenic nerves, promoting optimal airflow and peaceful sleep.

Telemedicine is at the forefront, facilitating swift consultations with sleep physicians from the comfort of home. Augmented reality interfaces and AI-powered diagnostic platforms assist in remote examinations and data analysis, paving the way for personalized treatment

plans. These plans are pushed directly to the patient, setting reminders, gathering feedback, and analyzing treatment responses.

Oral appliance scans are taken with a smartphone camera and 3D-printed moments later with a built-in adherence monitor. Microdrones deliver "nose-bud" PAP devices: hoseless, self-contained units that autosense arousals, loop gain, and ventilatory/hypoxic burden on a breath-by-breath basis, automatically adjusting pressures and comfort settings.

Teams of sleep coaches, empowered by AI-assisted analysis, monitor thousands of patients, providing timely guidance to struggling patients. Clinical escalations are performed automatically, and every data point captured is added to the global sleep cohort to further research and refine best clinical practices (which are automatically updated in every EHR).

Morning arrives with a gentle wake-up call from the wearable devices, ensuring a refreshing start to the day. Across the nation, clinics leverage AI tools for rapid diagnosis and tailored treatment plans, transforming the healthcare landscape into a realm of efficiency and personalization. Thanks to these advancements, the dream of healthy sleep is now a reality, promising restful nights and vibrant mornings for all.

BACK TO THE PRESENT

Alright, sleep experts, we've just glimpsed a future where the phrase "I'm just a bad sleeper" might become a relic of the past. Yes, we're peeking into the not-so-distant future, where sleep medicine is an effective, efficient experience for both patient and provider. A future where a patient is mostly unaware that they are being evaluated, diagnosed, and treated--as Bill Gates once said, "The advance of technology is based on making it fit in so that you don't really even notice it, so it's part of everyday life."

We're not talking about a weird, sci-fi "utopia" where everyone has a personal robot assistant to tuck them in at night, but rather a reachable reality that's unfolding thanks to the relentless march of technology paired with a dash of creativity. It's a landscape where sleep clinicians are the orchestra conductors, utilizing augmented reality, sensor tech, and AI as their baton as they guide their symphony of sleeping patients into a beautiful sonata of somnolence.

A VISION OF THE (NEAR) FUTURE

I'm not just here to paint you a fantastical picture of this unrealistic future. In the upcoming issues of Sleep Lab Magazine, we'll be rolling up our sleeves to delve deeper into the revolution that's shaking up the world of sleep medicine. Expect interviews with the masterminds behind the tech, insights into the burgeoning field of AI sleep solutions, and a closer look at the gadgets promising to redefine our nightly rest.

So, to all the sleep physicians, technologists, and industry partners out there, it's time to open our minds to the slightly astonishing yet entirely possible developments on the horizon of sleep technology. This series will serve as a call to not just dream of delivering optimal sleep medicine but to eagerly anticipate and explore the innovations that are set to make those dreams a reality. Let's step forward with a spirit of curiosity and a readiness to embrace a future that promises a revolutionized approach to actual personalized medicine while also considering the broader societal impacts and the potential to reshape healthcare as we know it. Let's keep the conversation grounded yet hopeful as we venture into a future brimming with potential.

Sleep, the final frontier
These are the voyages of the field of Sleep Medicine
Its bold, new mission
To explore strange new technology
To seek out new operating models
And new care pathways
To boldly go where our patients need us to go

Drew Copeland, RPSGT, is a 20-year veteran in the field of sleep medicine and resides in Brooklyn, New York. He possesses a penchant for technology and knows just enough to get himself into trouble.

Sleep Pharmaceutical Update

Harmony Biosciences announces FDA Orphan Drug Designation for Pitolisant in Idiopathic Hypersomnia Treatment

Harmony Biosciences Holdings, Inc. announced that the U.S. Food and Drug Administration (FDA) has granted Orphan Drug designation to pitolisant for the treatment of idiopathic hypersomnia (IH).

The FDA's Orphan Drug designation incentivizes the advancement of promising therapies for rare diseases. Approximately 80,000 people in the U.S. are believed to be affected by IH, with 40,000 currently having been diagnosed. IH is a condition with high unmet medical need.

Harmony is currently evaluating the efficacy and safety of pitolisant in adult patients with IH in the Phase 3 registrational INTUNE study, a double-blind, placebo-controlled, randomized withdrawal study. Topline study results are anticipated in the fourth quarter of 2023 following enrollment completion nine months ahead of plan.

"The FDA's decision to grant Orphan Drug designation reinforces our belief in pitolisant as a promising therapy for adult patients with IH, with the unique added benefit of it being a non-scheduled, once-daily treatment option working through histamine to improve wakefulness," said Kumar Budur, M.D., Chief Medical Officer at Harmony Biosciences. "With the completion of enrollment in our INTUNE study nine months ahead of schedule and topline results expected in Q4, this designation is a significant advance in our clinical and commercial development initiatives. We look forward to working closely with the FDA and the broader IH community to address the unmet medical needs of patients living with this condition."

Jazz Pharmaceuticals Showcases Impact of Sleep Medicine Portfolio at Psych Congress 2023

Jazz Pharmaceuticals plc announced that six abstracts presenting data from across its sleep medicine portfolio were featured at the 36th annual Psych Congress, held September 6-10, 2023. One of the accepted abstracts provided a comprehensive review of clinical data that assessed the impact of oxybate on sleep quality, sleep architecture and measures of disrupted nighttime sleep in narcolepsy. Oxybate is the active ingredient in Xywav® (calcium, magnesium, potassium, and sodium oxybates) oral solution.

This review encompassed key data from five clinical studies that evaluated all high-sodium oxybates, fixed-dose and twice-nightly administrations, in both oxybate-experienced patients and those who had not undergone prior treatment. The review found that oxybate improved measures of sleep architecture and disrupted nighttime sleep in narcolepsy patients, independent of dosing regimen or prior oxybate experience.

"These compelling data add to the growing body of literature that looks at the effects of oxybate therapy in terms of sleep quality, sleep architecture and daytime function," said Richard K. Bogan, MD, FCCP, FAASM, associate clinical professor at the University of South Carolina School of Medicine and Medical University of South Carolina in Charleston, South Carolina. "The review found that there was no significant difference in the improvement of sleep quality between oxybate dosing schedules. This is an important endpoint, as many patients utilize the twice-nightly dosing to individualize treatment of their sleep disorder."

Other highlights from Psych Congress 2023 included:

- In narcolepsy:
- A subgroup analysis from the Phase 3 study of Xywav in adults with narcolepsy, which found that the treatment's safety and efficacy were similar in those with and without psychiatric comorbidities, including depression and anxiety, and that there were no signals for the occurrence of new psychiatric disorders in either subgroup.
- In idiopathic hypersomnia:
- Two posters featuring results from online surveys of U.S. physicians and patients living with idiopathic hypersomnia that provided insights into physicians' understanding of the disorder as well as the diagnostic journey and quality of life impact for patients.

"Idiopathic hypersomnia has a profound impact on those who live with this debilitating sleep disorder," said Kelvin Tan, MBBCh, MRCPCH, senior vice president and chief medical officer of Jazz Pharmaceuticals. "Jazz has a longstanding legacy in sleep medicine, and we are proud of our research into new treatment approaches that may benefit patients living with serious sleep conditions such as idiopathic hypersomnia and narcolepsy. We are presenting multiple datasets that show the significant impact that idiopathic hypersomnia has on patient quality of life, which highlights the need for effective treatment options."

The Psych Congress 2023 presentations are available on-demand through the conference mobile application. Abstracts and posters will also be published on HMP Global's Psychiatry & Behavioral Health Learning Network 30-60 days after the event ends.

Centessa Pharmaceuticals to Present Preclinical Data for Novel Orexin Receptor 2 (OX2R) Agonist at World Sleep Congress

Centessa Pharmaceuticals plc with offices in London and Boston, a clinical-stage pharmaceutical company focused on discovering and developing medicines that are transformational for patients, today announced that preclinical data for ORX750, its first orexin agonist development candidate, will be featured in an oral presentation at the World Sleep Congress being held on October 20-25, 2023, in Rio de Janeiro, Brazil. ORX750 is an orally administered, selective orexin receptor 2 (OX2R) agonist in preclinical development for the treatment of narcolepsy and other sleep disorders.

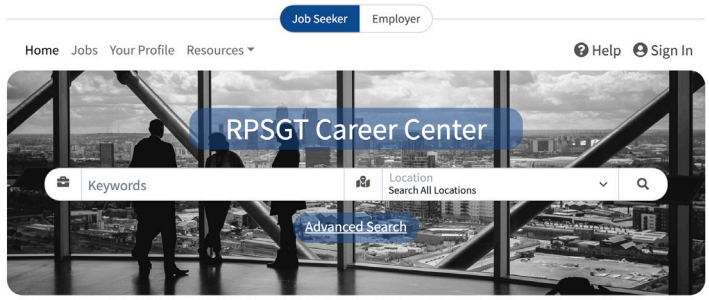
In addition, Sarah Wurts Black, PhD, Head of Biology for Centessa's orexin program, will co-chair a symposium at the Congress focused on the development of orexin receptor agonists.

"We believe ORX750 has the potential to be a best-in-class therapy to treat narcolepsy and other sleep disorders, and we are thrilled with the opportunity to share preclinical data in an oral presentation at the World Sleep Congress," said Saurabh Saha, MD, PhD, Chief Executive Officer of Centessa.

BRPT **VIEWPOINT** from the BRPT

Explore New Job Opportunities
Through The BRPT's Online Career Center

Jim Magruder, BRPT Chief Executive Officer



The BRPT's online career center is an excellent, free resource for job seekers looking to make their next move. Specialized online job boards make looking for – and getting – a job today efficient, accessible, and easy. The BRPT's online career center provides a full array of job openings. It allows users to create an individualized profile, "set up job alerts" for which they are well-suited and upload their resume and other features.

Getting Started

To begin, simply go to https://www.brpt.org/etc/career-center/ to create your login and profile. This is where you will first upload your resume and choose one of three profile visibility options: a) Public – profile and any documents are searchable; b) Confidential – profile is searchable, but contact information is hidden; and c) Private – your profile is not searchable.

To better hone your search, you can choose from a list of detailed career categories, ranging from Allied Health (Coordinator, Sleep Specialist, Polysomnographic Technologist, Supervisor, etc.) to Operations (DME specialist, Manager, Marketing/Sales). This is also where you can specify an expected salary and select the employment type you are looking for (full-time, contract, part-time, per diem, etc.) and even indicate whether or not you are a student looking for an internship. Finally, a series of questions will enable you to drill down further into whether or not you are willing to relocate or travel.

Once your profile is complete and you have selected your search criteria, it is time to begin perusing available job opportunities. Job seekers may search by using keywords or location; you may also browse a database of job openings. Once you submit a search, the career center platform will present you with an option to set up a "Job Alert" whenever job openings meet your criteria. In doing so, you will receive emails daily with matching jobs, so you will not miss a chance to apply for a job that is right for you.

Additional Resources

The BRPT's online career center offers a suite of additional materials to polish your skills and ensure you are putting your best foot forward in the process. This includes a career learning center that fosters career and professional development through articles and videos on a variety of topics ranging from tips for salary negotiations to writing a successful cover letter. Preparing for an interview? The BRPT's career center can help to prepare you by suggesting questions to ask potential employers and behavioral interviewing tips, to name a few.

The Career Center also offers job seekers several fee-based options, including:

- A Reference Checking option that allows job seekers to find out what past employers are telling your prospective employers, allowing you to potentially head off questionable references before they hinder your chances. Reference checking and employment verification interviews are conducted by experienced professionals who use complete discretion and confidentiality when contacting your references.
- A Resume Writing & LinkedIn Profile Development option that uses certified, experienced writers who do the work for you. Options include resume critique, writing, and/or distribution; biography and Curriculum Vitae (CV) development; a LinkedIn profile audit, and more.
- Career Coaching services, which include a team of experienced coaches from a variety of professional backgrounds, all of whom have graduated from an accredited career coach training program and are certified in behavioral style analysis and interpretation.

Please note: The above fee-based services are not BRPT offerings but rather provided by its Career Center vendor, Naylor & Associates. The BRPT is not affiliated with these services, nor does it receive any of the revenue generated from them.

If you are looking to embark on a new job search or simply want to see what is out there, be sure to check out the free tools available in the BRPT's Career Center. The number of job listings and employers hiring changes day-to-day, but on average, there are more than 250 current job listings and nearly 60 employers featured. As the field of sleep technology continues to expand, so too does the number of opportunities available to sleep health professionals.

VIDEO WALL