

# SLEEP-RELATED BREATHING DISORDERS AND POSITIVE AIRWAY PRESSURE THERAPY IN ADULTS

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*Teofilo Lee-Chiong Jr.*

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*Max Hirshkowitz and Amir Sharafkhaneh*

### Epidemiology of Sleep-Related Breathing Disorders: Comparisons with the Veterans Health Administration Databases 443

*Amir Sharafkhaneh, Sheila Goodnight-White, Hossein Sharafkhaneh, Max Hirshkowitz, and Terry Young*

Diagnosed sleep apnea is common (2.9%) among Veterans Health Administration (VHA) beneficiaries. The projected actuarial prevalence may be 16% or more when extrapolated from published data. Further studies are needed to establish the true prevalence of sleep apnea in this population. Accurate information is required for appropriate resource allocation to meet health care needs of VHA beneficiaries. Importantly, strong associations between cardiovascular and other conditions and diagnosed sleep apnea were found, extending previously reported findings to the VHA beneficiary population. While the causal role of sleep apnea in these conditions cannot be determined from these data, the authors' findings stress the need for further studies. Understanding the impact of increased case-finding and therapeutic interventions for sleep apnea on patient outcomes, health care utilization, and cost in this high-risk population remains a high priority.

### Clinical and Laboratory Assessment of Sleep-Related Breathing Disorders 449

*Max Hirshkowitz, Amir Sharafkhaneh, and Meir Kryger*

Clinical assessment of a patient who has sleep-related breathing disorders (SRBD) begins with a comprehensive interview. This clinical interview helps identify signs and symptoms, establishes the patient's routine sleep-wake schedule, helps the provider make a proper differential diagnosis, and prompts ordering relevant diagnostic tests. This article illustrates a comprehensive overview of patient interviews and questionnaires, and provides detailed information on laboratory assessment to effectively guide treatment of SRBD.

**Nonlaboratory Assessment of Sleep-Related Breathing Disorders 461***Michael Littner, Max Hirshkowitz, Amir Shararfkhaneh, and Sheila Goodnight-White*

Portable monitoring systems designed for nonlaboratory assessment of sleep-related breathing disorders are another tool available for practicing sleep medicine. Many of these level III devices are sleep cardiopulmonary recorders. These devices are not intended to replace polysomnography, but rather to complement it when appropriate. When properly integrated into a sleep disorders program, nonlaboratory assessment can facilitate diagnosis of patients who have more severe sleep-disordered breathing.

**Economics of Home Monitoring 465***Nizar Suleman and Max Hirshkowitz*

This study shows that the cost of studies to diagnose obstructive sleep apnea (OSA) can be modeled. When cardiopulmonary recording (CPR) is used as a tool to diagnose OSA in populations in different practice settings, a cost savings-excess amount can be projected based on the cost of polysomnography (PSG), CPR:PSG cost ratio, as well as the proportion of patients with an apnea plus hypopnea index 15 to 30 (category B) in the populations. CPR at its current cost does not provide a cost-effective means to diagnose OSA; however, cost savings can be achieved if the cost of CPR is lower than 10–20% the cost of PSG.

**Upper Airway Resistance Syndrome 475***Suryakanta Velamuri*

Upper airway resistance syndrome is an important variant in the spectrum of sleep-related breathing disorders. Although not as obvious as sleep apnea in terms of pathophysiology, symptoms, and diagnosis, it frequently is the cause of excessive daytime sleepiness, fatigue, and other long-term sequelae. Further research is required on all aspects of this disorder to improve the understanding and provide appropriate patient care.

**Cyclic Alternating Pattern (CAP), Sleep Disordered Breathing, and Automatic Analysis 483***Christian Guilleminault, Agostinho da Rosa, Chad C. Hagen, and Olga Prilipko*

There is poor correlation between daytime complaints of patients with sleep disordered breathing and visual scoring of sleep disruption. Cyclic Alternating Pattern (CAP) brings new information on nonrapid eye movement sleep disturbances. An automatic scoring of CAP based on one central EEG lead was developed. Testing of the automatic analytic program by members of the CAP consensus group was performed. The summary of the different steps of the validation of the program, and Mutual Agreement findings between different scorers performing visual scoring and automatic scoring are summarized. An application of the scoring program was done on polysomnograms of young women with sleep complaints compared to non-complaining-matched control women.

**Sleep-Related Breathing Disorders and Sleepiness 491***Max Hirshkowitz and Heidemarie Gast*

A prospective, randomized, parallel control group outcome trial comparing improvement from baseline at 2-week follow-up in treated versus untreated groups was

conducted to assess continuous positive airway pressure (CPAP)-related changes in sleepiness in patients with obstructive sleep apnea (OSA). In addition to reduced self-reported sleepiness, CPAP therapy also improved electroencephalographically indexed sleepiness (MWT) in patients with OSA. Not surprisingly, patients who strictly adhered to therapeutic regimens showed the most improvement.

### **Sleep-Related Breathing Disorders and Continuous Positive Airway Pressure–related Changes in Cognition**

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*Heidemarie Gast, Susanne Schwalen, Hubert Ringendahl, Johannes Jörg, and Max Hirshkowitz*

The goal of this article is to assess continuous positive airway pressure (CPAP)-related neuropsychological changes in patients with obstructive sleep apnea (OSA). Many neuropsychological tests currently used to evaluate cognitive function were designed to assess brain lesions and damage and are not sensitive to CPAP treatment outcome. Timed tests or those that strain the ability of normal individuals seem more sensitive. It remains to be seen what CPAP-related cognitive or executive ability improvement actually occurs. The challenge for the future will be to develop more sensitive techniques for measuring such changes.

### **Sleep-Related Breathing Disorders and Mood Disorders**

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*Ali M. Hashmi, Nilgun Giray, and Max Hirshkowitz*

This study examines the relationship between measures of self-reported sleepiness, depressive symptoms, and sleep architecture in a group of patients diagnosed as having obstructive sleep apnea. On the basis of previous research, the authors hypothesize that a relationship exists between depression as measured by the Beck Depression Inventory and the severity of sleep-disordered breathing. They also investigate whether excessive sleepiness and depressive symptoms correlate. Finally, they seek to determine the relationship, if any, between depressive symptoms and measures of sleep continuity, integrity, and architecture.

### **Sleep-Related Breathing Disorders and Quality of Life**

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*Hossein Sharafkhaneh and Amir Sharafkhaneh*

Obstructive sleep apnea (OSA) diminishes quality of life (QOL). The clinical literature overwhelmingly indicates rapid improvement in QOL with adequate treatment of OSA, regardless of type of treatment and presence of underlying comorbid cardiovascular disease. The literature also shows similar effects on QOL in pediatric OSA. Further studies are needed to evaluate long-term effects of OSA therapy on QOL. Specifically, it is not clearly known if the surgical interventions, fixed-pressure continuous fixed airway pressure (CPAP), or use of a dental appliance maintain their efficacy over time, especially as patients age or gain weight.

### **Positive Airway Pressure Therapy for Obstructive Sleep Apnea**

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*Teofilo Lee-Chiong and Max Hirshkowitz*

Positive airway pressure is the preferred treatment for obstructive sleep apnea (OSA). Positive airway pressure maintains airway patency during sleep, leading to improved sleep quality, sleep continuity, daytime alertness, and overall quality of life in symptomatic patients who have moderate or severe OSA. Positive pressure devices come in three varieties, of which continuous positive airway pressure (CPAP) is the most

commonly prescribed. Further studies are needed to assess the benefits of CPAP therapy for patients who have less severe OSA and to specify better the positive cardiovascular outcomes.

**Positive Airway Pressure Adherence: Problems and Interventions****533***Mary W. Rose*

Positive airway pressure therapy is the optimal treatment for the overwhelming majority of patients who have obstructive sleep apnea, and the American Academy of Sleep Medicine Practice Parameters notes that continuous positive airway pressure (CPAP) is the first-line treatment for severe apnea. Despite the significant benefits of CPAP use, a significant proportion of patients are unable or unwilling to adhere to treatment. This article discusses ways of identifying patients likely to be noncompliant and ways to help them adjust to CPAP treatment.

**Perioperative Management of Obstructive Sleep Apnea****541***Charlie K. Lan and Mary W. Rose*

Obstructive sleep apnea (OSA) is a prevalent disease, and many patients who undergo surgery suffer from OSA. Because OSA increases the risk of perioperative complications, preoperative evaluation should include assessment for the presence of OSA and the adequacy of OSA therapy. Optimization of OSA therapy preoperatively may reduce perioperative complications related to OSA. Ultimately, a well-developed protocol for perioperative evaluation and management of patients who have OSA may reduce perioperative complications in these patients.

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