

Future of Sleep Apnea: Continuum of Care

The sleep apnea industry is undergoing a paradigm shift in the way it treats its patients. Over the past two months, we have seen seminal events like AASM's endorsement of portable home monitoring for type III devices, and updated Auto-CPAP practice parameters that allow titrations in the home (albeit for a subset of the sleep apnea population).^{1,2} There was also the much anticipated announcement from CMS, which proposed initiating CPAP based on clinical evaluation and home testing only (in-lab evaluation may not be required).³ Final CMS ruling is expected in March 2008.

Clearly, patients will benefit from the convenience of home diagnosis and expediency of CPAP administration; these new developments are certainly very promising and timely. However, we must be prudent in the way we implement the new guidelines. On the surface, the transition from the sleep lab to the home can be viewed as simply an exercise in cost optimization of the delivery of care. In other words, the economics of the disease and not the disease itself may become the focus. This can be very detrimental to everyone; the patient, the physician and whatever service organization in between.

A deeper understanding of the disease and a thorough review of the AASM and CMS's guidelines paint a different picture. Clearly, cost of testing is an issue, especially with the anticipated lower reimbursement for home studies; however, the real challenge for the industry going forward is how to properly manage the complexities of the disease itself from home over time. Sleep-disordered breathing is a disorder with serious cardiovascular comorbidities like Congestive Heart Failure (CHF), Chronic Obstructive Pulmonary Disease (COPD) and others that may require supplemental oxygen or totally different therapeutic intervention such as Bi-level positive pressure regulation. Moreover, the disorder itself can change form over time. Research estimates up to 15% of OSA patients suffer from a disease state known as Complex Sleep Apnea, which is characterized by an emergence of central respiratory events shortly after CPAP initiation.⁵ The unmasking of central events in that patient population, possibly due to further destabilization of the patient chemoresponsiveness, will require therapeutic intervention different from traditional CPAP like Adaptive Servo Ventilation.⁶

Another growing area that will require a more thorough therapy follow-up is post-operative initiation of CPAP. The American Society of Anesthesiologists (ASA), through its updated guidelines on perioperative management of sleep apnea, strongly recommends identifying obstructive sleep apnea pre-operatively for at-risk patients and suggests careful post-operative management including the use of CPAP.⁷ Considering the high prevalence of sleep disordered breathing in many

types of surgical patients, especially bariatric and cardiovascular surgeries, the new ASA guidelines will not only fuel sleep apnea diagnosis in the home or on the ward but as importantly will demand careful therapy follow-up.⁷ Monitoring CPAP will not be limited to the hospital but will also include the home as the patient will likely be discharged with CPAP to treat their newly diagnosed sleep apnea.⁸ Adding CPAP assessment to the continuum of care of surgical patients is particularly important nowadays as patients are quickly discharged from the hospital often before any long-term surgical effects are stabilized like weight loss from bariatric surgeries, which can impact CPAP. These are some clinical reasons that require from us to re-think the way we care for the sleep apnea patient.

The need to pay close attention to patient follow-up is clear in the new guidelines themselves. While AASM and CMS differ on some issues like provider qualifications, and method of CPAP titration, they both agree on one fundamental area; continued sleep apnea patient care must be based on assessing the "clinical benefit" of therapy. CMS's announcement proposed the therapy assessment to happen at the twelve week mark after CPAP initiation.

Therefore, a new sleep apnea care model is upon us. The disease is becoming efficacy-based, and the best way to achieve successful outcomes under this new model is to "manage the disease." Disease management has been implemented in a number of other chronic and costly disease states like CHF or diabetes with great success. In those cases, specific physiological parameters such as EKG, weight, blood pressure and others are routinely tracked over time and abnormal readings are automatically flagged for intervention. Success is documented in many studies. Recently, extensive research conducted on 460 CHF patients showed that disease management through a tele-home monitor resulted in 36% drop in hospital re-admissions, 31% decrease in the total number of hemodynamic instability, and more than \$1,500 savings per patient.⁴ Considering that sleep apnea is more common than both CHF and diabetes combined, it is only natural to consider a similar proactive approach for sleep apnea management in order to uncover significant benefits for all.

Current patient follow-up programs offered by many providers to improve CPAP compliance are a great start but fall short of quantifying clinical benefit sufficient to alter or optimize therapy. Effective disease management for sleep apnea will require monitoring of at least some basic physiological signals that can identify the cardiorespiratory response such as oxygen saturation, chest and abdominal respiration, airflow and heart rate or activity. It is true that some patient involvement will be required; however, small, wearable and self-administered home monitors exist and can indeed pro-

vide valuable feedback to the provider, sometimes in real time, using automated web technology. After all, it is the maturity of those portable technologies that helped convince CMS, AASM, and other authorities to reconsider their position on home diagnosis. Moreover, the use of these monitors will likely be intermittent and not for everyone; they will be applied for at risk patients shortly after CPAP administration and as their clinical symptoms change. Therefore, inconvenience is minimized especially if the long-term benefits were properly relayed to the patients.

Managing the disease can be done with the same home portable monitors used during the initial diagnosis since they record the needed cardiorespiratory information (Type III monitors are recommended). Some CPAP machines log a "derived apnea-hypopnea index" (AHI) internally but that is not enough for clinical assessment. For one, CPAP's do not distinguish central apnea events from obstructive apnea events due to their lack of chest and abdominal motion information. Therefore, a persistently elevated apnea count derived from the CPAP present a conundrum to the provider: is the elevation due to central events in which case the patient should be placed on ASV, or is the high apnea index due to remnant obstructive events in which case slight upward adjustment of CPAP pressure would suffice. Other important signs of respiratory insufficiency that are even more difficult to evaluate by the CPAP's derived AHI are hypopneas, hypoventilation, periodic breathing and others since they require data from at least oxygen saturation in addition to chest and abdominal excursions.

Usage time, which is another compliance parameter internally generated by CPAP machines, also lacks critical information for clinical benefit evaluation. In fact, it can be misleading. Recent research found that CPAP nightly use by OSA and complex sleep apnea patients can be very similar;⁹ yet, the right treatments for those diseases can be vastly different.⁶ However, as mentioned in the CMS announcement, adherence time will be useful to identify patients with false positive diagnosis; people who do not use the CPAP machine will likely be those who do not have the disease. Usage time is a great metric to prevent over prescription of CPAP machines; however, it can hardly be useful to detect abnormal clinical symptomology.

In conclusion, depending on the final CMS ruling, sleep disordered breathing care may include the more natural home setting, which will afford great conveniences to patients and

tremendous opportunities to providers. However, regardless of the reimbursement debate outcome, the treatment of the disease is becoming efficacy-based placing new demands on all of us. To achieve the best results clinically and economically, our future efforts must focus on proactive care of sleep apnea by thoroughly evaluating clinical benefit of therapy in the home. This is especially true in light of new and efficient portable monitoring technologies that can afford such high quality continuum of care.

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