



Getting Through the Night Sleep Apnea

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Sleep apnea, defined as the repetitive cessation of airflow during sleep, is classified as either an apnea (total cessation) or hypopnea (partial cessation). Apneas and hypopneas, each of which have a duration at least 10 seconds, are categorized as:

- central (loss of respiratory effort),
- obstructive (respiratory effort, but obstructed upper airway), or
- mixed (a combined central and obstructive component).

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Obstructive sleep apnea is by far the most common of these conditions, affecting approximately 2% to 4% of the adult population.¹ Obstructive sleep apnea syndrome (OSAS) requires a laboratory confirmation of apneas and hypopneas (> 10/hour of sleep), as well as typical symptoms (Table 1), which are caused by the arousals that terminate apneas and cause sleep fragmentation. Individuals can have apneas and hypopneas exceeding 90 events/hour without symptoms.²

Ricardo's Presentation

Ricardo, 44, presents with excessive sleepiness. His wife noted loud snoring and, rarely, apneas. He is hypertensive and denies restless legs syndrome or cataplexy. He occasionally drinks alcohol, but does not use sedatives or hypnotics.



On physical examination, Ricardo's blood pressure is 142/80 mmHg and his body mass index is 30. Other than a large uvula, his examination is normal.

A home sleep study obtained one month earlier showed:

- respiratory disturbance index = 7 events/hour;
- lowest oxyhemoglobin saturation = 88%; and
- 97% of the night saturation > 90%.

For more on Ricardo, go to page 110.

Table 1

Common clinical symptoms of obstructive sleep apnea

1. Excessive daytime somnolence
2. Increased irritability
3. Memory impairment
4. Impotence
5. Difficulty initiating sleep/insomnia
6. Wakes choking



Followup on Ricardo

Ricardo underwent level 1 polysomnography, which showed an apnea+hypopnea index of 12 events/hour. There were frequent hypopneas during random eye movement (REM) sleep associated with sleep fragmentation and repetitive arousals during non-REM sleep with crescendo snoring.

He then underwent CPAP titration, which he subsequently used most nights. His excessive somnolence resolved.

What's new in diagnosis and therapy?

Traditionally, suspected OSAS patients undergo overnight polysomnography (PSG) in a sleep laboratory. A level 1 PSG requires the measurement of sleep staging and respiration. While this process carries high, prohibitive labour costs (one technician can test two to three patients per night), new portable technologies (level 3 PSG) increase access to sleep testing by allowing for home assessment.

Patients should be informed that APAP is of unproven benefit.

Continuous positive airway pressure (CPAP) is the mainstay for treating OSAS.³ CPAP uses a fixed airway pressure, typically delivered by nasal mask, to splint open the upper airway, thereby preventing its repetitive obstruction.

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Table 2

Common misconceptions regarding level 3 (home) sleep apnea testing

Level 3 tests are useful screening tools.

False. Level 3 tests work best in a high prevalence population, while screening tests are designed to detect low prevalence events.

Level 3 tests are useful ways of prioritizing wait lists for level 1 tests.

False. Priority is based on clinical presentation not on the frequency of apneas and hypopneas.

Level 3 tests are less expensive than level 1 tests.

This is true on a superficial level. When the false negatives and missed alternative diagnoses are taken into consideration, it is likely that level 1 tests are more cost-effective on a global scale.

These devices now have the ability to measure indices of airway obstruction and, using proprietary algorithms, can adjust airway pressures to match patient needs. These self-adjusting CPAP devices (APAP) may improve clinical outcomes by facilitating patient comfort. APAP can also be used in the patient's home to estimate a fixed CPAP level, thereby avoiding repeat laboratory level 1 CPAP titrations.

What does the evidence say?

Evidence-based reviews do not support the wide-scale application of level 3 home testing.⁴ While these devices may be of benefit for selected patients, proof is still lacking. Level 3 testing is more expensive on a global scale than traditional level 1 testing and it cannot measure sleep staging or arousals, therefore, missing many causes of excessive daytime somnolence (Table 2,3).⁵ Patient preference between laboratory and home testing is also split equally.⁶



Table 3

Conditions commonly causing excessive daytime somnolence

1. Obstructive sleep apnea	Confirmed by level 1 or level 3 PSG and symptoms
2. Central sleep apnea	Confirmed by level 1 or level 3 PSG and symptoms
3. Periodic limb movements syndrome	Confirmed by level 1 PSG
4. Narcolepsy	Confirmed by level 1 PSG, multiple sleep latency test, and typical symptoms (cataplexy, sleep paralysis, hypnagogic hallucinations)
5. Insufficient sleep	Confirmed by history
6. Idiopathic hypersomnolence	Confirmed by level 1 PSG and multiple sleep latency test
7. High upper airway resistance syndrome	Confirmed by level 1 PSG and symptoms

PSG: polysomnography

APAP is contraindicated for patients with known, severe desaturations and is problematic in high, upper-airway resistance syndrome. Evidence supports the use of APAP as an adjunct to technician-observed laboratory testing.⁷

- social factors (e.g., job or school performance),
- medical comorbidities (e.g., congestive heart failure, pulmonary hypertension), and
- accident risk (e.g., motor vehicle or job related).

Sleep laboratory PSG is the gold standard for both the diagnosis of sleep apnea and CPAP titration.

For example, given the same symptoms and comorbidities, a long-haul trucker delivering fuel to isolated communities would have a higher priority for testing than a librarian.

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APAP devices, which cost more than CPAP, are being sold by homecare providers for the routine treatment of patients with OSAS. However, the evidence does not support the contention that APAP is clinically more effective at treating OSAS than CPAP.⁷ Patients should be informed that these devices are of unproven benefit.

Testing prioritization

Factors influencing the prioritization for PSG do not include disturbed breathing, but rather:



Take-home message



- A negative level 3 study cannot currently exclude clinically significant sleep-disordered breathing, as the benefit of level 3 testing remains unproven.
- There is a broad differential diagnosis for excessive daytime somnolence.
- Many of the disorders of excessive somnolence have excellent treatment options that significantly improve quality of life.

What should I remember?

Sleep laboratory PSG remains the gold standard for both the diagnosis of sleep apnea and CPAP titration. Level 3 testing shows some promise in selected patient populations, but does not have sufficient evidence to support its broader application. APAP can be useful within a sleep laboratory setting, but has not been validated for home use.

There are some major caveats to the use of APAP in unobserved settings. However, despite great technologic innovations in the field of sleep apnea in the last 10 years, this has not yet translated into major proven advances in patient care. CME

Frequently Asked Questions

1. What is the difference between level 1 and level 3 polysomnography?

Level 1 tests are technician-observed studies that include measurements of sleep staging, while level 3 tests may be unobserved and usually focus on respiratory measurements only.

2. Who should be referred for level 3 polysomnography?

Current evidence does not support level 3 unobserved tests.

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