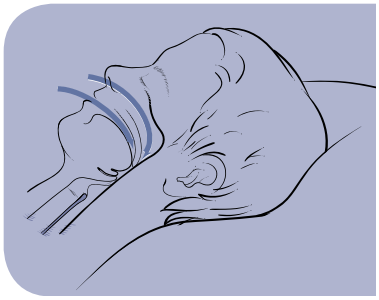


MANAGEMENT OF

Obstructive Sleep Apnea (OSA)

in the Primary Care Setting

This care process model (CPM) was developed by a multidisciplinary Sleep Apnea Development Team, in collaboration with Intermountain Healthcare's Primary Care Clinical Program. The CPM promotes a model of care for screening, testing, diagnosis, treatment, and long-term management for patients with — or at risk for — obstructive sleep apnea (OSA). The model is derived from national guidelines and practice parameters from the American Academy of Sleep Medicine (AASM), along with other evidence-based literature and local expert consensus.

Why Focus ON OBSTRUCTIVE SLEEP APNEA?

- **OSA is common, and recognition by clinicians is low.** Based on probability studies with in-lab polysomnography, 1 in 5 adults have at least mild OSA, and 1 in 15 have OSA of moderate or worse severity. An estimated 75% to 80% of cases that could benefit from treatment remain undiagnosed.[YOU3]
- **OSA can have serious health consequences.** OSA is associated with increased incidence of hypertension, heart disease, atrial fibrillation, stroke, glucose intolerance, and impotence. Untreated OSA can cause daytime sleepiness, cognitive impairment, loss in work productivity, and increased risk of automobile crashes — and can significantly reduce quality of life. Severe, untreated OSA may increase cardiovascular mortality.[HIR]
- **OSA is costly to the economy.** One study showed an increased risk of lost workdays before OSA diagnosis and treatment — 1.8 times more days for women and 1.6 times more days for men than controls.[SJS]
- **OSA is costly to public health.** At least 1 million police-reported crashes (1,550 deaths, $12.5 billion in losses) are caused by driver fatigue each year. It has been projected that, if all U.S. drivers with OSA were treated with CPAP at a cost of $3.18 billion, the U.S. would save $11.1 billion in collision costs and 980 lives.[TEN]
- **Primary care practitioners can make a significant difference.** PCPs are in an ideal position to recognize and manage OSA by incorporating recommended screening, evaluation, and referral processes into daily practices. Improved diagnosis and treatment of OSA reduces morbidity and mortality, improves comorbid disease processes, and improves patient quality of life.[PAG1]

GOALS

- **Increase recognition** of potential obstructive sleep apnea (OSA) and other sleep disorders in the primary care setting.
- **Guide appropriate referral** for sleep consultations and/or sleep lab studies.
- **Reduce variation** in approach to screening, diagnosis, treatment, and long-term management of OSA — not only in the primary care community, but also within and between sleep centers.
- **Facilitate improved coordination of care** between PCPs and sleep specialists.
- **Provide education tools** to support implementation.

WHAT'S NEW?

- Home sleep testing (HST) exclusions and indicators *(pages 3(**f**), 5(**d**), and 13)*
- HST follow-up indications *(page 18)*

WHAT'S INSIDE

Intermountain® Healthcare

ALGORITHM: SCREENING AND REFERRAL

PATIENT VISIT
Patient concern and/or clinical suspicion of possible sleep disorder and/or part of routine health maintenance evaluation

EVALUATE patient and administer STOP-BANG OSA screening questionnaire (a, b)

- ☐ **S**noring: Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?
- ☐ **T**ired: Do you often feel tired, fatigued, or sleepy during the daytime, even after a "good" night's sleep?
- ☐ **O**bserved: Has anyone observed you stop breathing during your sleep?
- ☐ **P**ressure: Do you have or are you being treated for high blood pressure?
- ☐ **B**ody mass index (BMI) greater than **35**?
- ☐ **A**ge older than 50 years?
- ☐ **N**eck circumference greater than **17** inches (men) or **16** inches (women)?
- ☐ **G**ender = male?

See page 19 for information on accessing and ordering Intermountain's STOP-BANG clinical form and patient questionnaire.

2 or fewer STOP-BANG factors = LOW RISK for OSA

3 or more STOP-BANG factors = HIGH RISK for OSA

Does clinical correlation support significant risk level (b)?
- no → **Other indications (c)?**
- yes → **Refer for SLEEP CONSULTATION** *AND/OR* **SLEEP STUDIES (d)**

Other indications (c)?
- yes → **Refer for SLEEP CONSULTATION** *AND/OR* **SLEEP STUDIES (d)**
- no → **Still concerned?**

Still concerned?
- no → **Reevaluate** *prn*
- yes → **Consult / communicate with sleep specialist (d)** *AND/OR* **Conduct nocturnal pulse oximetry (f)**

Reevaluate *prn*
- no → **Consult / communicate with sleep specialist (d)** *AND/OR* **Conduct nocturnal pulse oximetry (f)**

Refer for SLEEP CONSULTATION *AND/OR* **SLEEP STUDIES (d)**

Any urgent factors (e)?
- yes → **Schedule delay?**
- no → **Patient reluctance?**

Schedule delay?
- yes → **Consult / communicate with sleep specialist (d)** *AND/OR* **Conduct nocturnal pulse oximetry (f)**
- no → **Patient reluctance?**

Patient reluctance?
- yes → **Consult / communicate with sleep specialist (d)** *AND/OR* **Conduct nocturnal pulse oximetry (f)**
- no → **1. Schedule sleep consult/studies** using available referral forms **(d)**.
  2. Provide applicable patient education and instructions **(g)**.

Consult / communicate with sleep specialist (d) *AND/OR* **Conduct nocturnal pulse oximetry (f)**
- No ongoing concern → **Reevaluate** *prn*
- Significant hypoxemia noted → **Start O_2 during sleep until sleep consult/study (d)**
- Ongoing concerns but no significant hypoxemia → **1. Schedule sleep consult/studies** using available referral forms **(d)**. **2. Provide applicable patient education** and instructions **(g)**.

Start O_2 during sleep until sleep consult/study (d) → **1. Schedule sleep consult/studies** using available referral forms **(d)**. **2. Provide applicable patient education** and instructions **(g)**.

See **TESTING and TREATMENT Algorithm** (page 4)

*STOP-BANG questionnaire adapted with permission from Chung F, Yegneswaran B, Liao P, et al. *Anesthesiology.* 2008;108(5):812-821.[CHU]

SCREENING AND REFERRAL ALGORITHM NOTES

(a) STOP-BANG OSA screening questionnaire

Intermountain is recommending use of the STOP-BANG screening questionnaire because it is concise and easy to use, and it has been validated in a pre-surgical setting. The STOP-BANG is based on the following symptoms and risks shown to be strongly associated with OSA. *(See pages 8–11 for more information on OSA risk factors and OSA screening questionnaires.)*

- **S**noring
- **T**iredness/sleepiness/fatigue
- **O**bserved breathing cessation or gasping for air during sleep
- **P**ressure (Hypertension)
- **B**ody mass index > 35
- **A**ge > 50
- **N**eck circumference > 17 inches (men) or 16 inches (women)
- **G**ender = male

(b) STOP-BANG note

There is some concern that the **STOP-BANG** screen may be too sensitive for the primary care setting, since such a large percentage of the general population may be overweight, over 50, male, and/or hypertensive. Of greater concern, however, is that OSA is under-diagnosed and under-treated in the primary care setting. Using a sensitive screen helps alert providers to the possibility of OSA. Providers should weigh all these factors, along with specific patient characteristics, when determining next steps for referral and sleep testing. This algorithm provides a guide only.

(c) Other high-risk indications

In addition to the STOP-BANG factors, the following factors have been shown to be of concern and/or to have a strong association with OSA and should be evaluated as part of a comprehensive sleep evaluation. The presence of these symptoms or conditions may heighten your suspicion of OSA and/or indicate the need for consultation with a sleep specialist. *(See pages 8 and 9 for more details on these associations.)*

- **Sensitive occupation** such as commercial driver, pilot, etc.
  Note: Federal guidelines may require use of different sleep apnea screening criteria, testing, and documentation; referral to a sleep specialist is recommended
- **Chronic opioid use**
- **Cardiovascular disease** such as atrial fibrillation (AF) or nocturnal dysrhythmias, heart failure, coronary artery disease, and hypertension, especially if treatment-resistant
- **Neurological disease** such as TIA or stroke and neuromuscular disease
- **Other anatomical risk factors** such as obesity (BMI 30 to 35; **STOP-BANG** tool screens BMI > 35); Mallampati Class III or IV OR Friedman Class III or IV; and retrognathia (*See page 9 for others)*
- **Metabolic syndrome** or Type 2 diabetes
- **Polycythemia**
- **Simultaneous use of antihypertensives and antidepressants**
- **COPD**/pulmonary hypertension
- **Suspicion of sleep disorders other than OSA**
- **Other concerns** based on physician judgment

(d) Referral and communication

- **Many PCPs can manage patients with straightforward symptoms and risk factors of OSA if they choose to do so.** Complex cases should be referred to a sleep specialist to ensure appropriate test selection, education, and follow-up — all of which are critical for successful treatment outcomes. See the *sidebar on page 11* for further discussion on direct referral for sleep studies versus referral for sleep consultation. Use the algorithm on *pages 4 and 5* to help guide test selection, treatment, and follow-up.
- **Communication between the PCP and sleep specialist is important.** Talk with a specialist if scheduling is delayed to help assess urgency and/or to select a in-lab study. If a patient is referred directly for sleep studies, it's critical to communicate required clinical information to the sleep lab. A standard referral form is available *(see page 19)*.

(e) Urgent factors

Patient should be seen as soon as possible if any of these factors are present:

- Known or suspected severe hypoxemia
- Job sensitive (e.g., commercial driver or pilot)
- Nodding off or falling asleep while driving
- Severe cardiac, pulmonary, or neurological disease
- Refractory hypertension
- Recent history of TIA
- Anticipated surgery
- Other time-sensitive risk as determined by physician judgment

(f) Nocturnal pulse oximetry and other home sleep testing (HST) as screening tests

Overnight pulse oximetry and other HST devices may play a role in **screening** for OSA, but are **NOT recommended to confirm diagnosis or determine treatment** (*see the Testing and Treatment Algorithm on pages 4 to 5 for more information*). Even as screening tools, these devices have limitations and should not be used automatically, but rather in specific circumstances as part of the OSA screening process.

- **Indications.** HST can be useful for the following:
  - To help stage urgency if patient can't get in for sleep consult or study in a timely manner or to exclude patients with low pretest probability
  - To help convince the reluctant patient of the importance of a sleep study
  - To assess need for supplemental O_2 while waiting for definitive testing and treatment
  - To help determine if a patient should be referred for sleep consultation
  - To test patients with physical limitations (if it would be challenging to come to the sleep lab) or when in-hospital testing is unavailable
  - For patients with uncomplicated OSA with high pretest probability of moderate to severe OSA, without significant comorbid sleep disorders
- **Limitations.** The usefulness of HST can be limited by:
  - Inadequate equipment *(see page 13 for recommended minimum equipment requirements)*
  - Interpretation by untrained physicians
  - False positive or false negative tests

NOTES: Multichannel HSTs should be done in conjunction with a comprehensive sleep evaluation and should be supervised by board-certified/eligible sleep specialists. Insurance does not pay PCPs to read HSTs. HSTs should only be ordered through a local sleep lab. If AHI is less than 15 on the HST, the patient needs an inpatient study. *See pages 13 and 18 for more information on home sleep testing.*

(g) Patient education materials

Patient Fact Sheets and other materials are available to support OSA recognition and understanding, as well as testing and treatment. *See page 19 for a description of available materials and how to order them.*

ALGORITHM: TESTING, DIAGNOSIS, AND TREATMENT

Risk assessment indicates need for SLEEP CONSULT AND/OR SLEEP STUDY

SELECT MOST APPROPRIATE STUDIES — as approved by sleep specialist (a)

1. **In-lab full-night polysomnography (PSG) – (b)**
   First full-night is diagnostic only; a subsequent full-night study is needed for CPAP titration
2. **In-lab split-night polysomnography (PSG) – (c)**
   Acceptable if criteria met; can accomplish both diagnosis and CPAP titration in one night
3. **Home sleep testing (HST) – only ordered by a sleep specialist (d)**
   Generally ***not*** recommended unless required by insurance (see **(d)** for indications and exclusions)

Diagnosis of OSA? (e)

- **no** → **Refer for specialty consultation (k)** (if not already)
- **yes**

EDUCATE PATIENT AND FAMILY (f)

Obstructive Sleep Apnea Fact Sheet

DISCUSS TREATMENT OPTIONS (g, h)

Patient offered CPAP?

- **yes and accept** → **CPAP TITRATION (i)**
- **no or decline** → **CONSIDER ALTERNATIVE or ADJUNCTIVE THERAPIES (h)**

PROVIDE CPAP TREATMENT EDUCATION *(page 17)*

- Proper equipment use
- Potential complications/troubleshooting
- How to integrate a PAP routine into daily life
- Long-term expectations

CPAP Fact Sheet

CONSIDER ALTERNATIVE or ADJUNCTIVE THERAPIES (h)

- **Behavioral modifications (h1)**
- **Oral appliances (h2)**
- **Surgery** to address anatomical problems **(h3)**
- **Adjunctive therapies** such as oxygen, medication, bariatric surgery **(h4)**

*Also promote appropriate behavioral modifications **(h1)***

FOLLOW-UP and ONGOING MANAGEMENT

Follow-up within 1 month and at least annually or as needed to:

- **ASSESS** weight and blood pressure; treatment effectiveness, including number of events, symptom improvement, and satisfaction; treatment adherence; equipment interface; complications; etc.
- **REINFORCE** treatment education.
- **ADJUST** treatment as needed.

Some insurance providers, such as Medicare, require outcomes assessment and reporting within specific time frames (*see page 18 for more information*).

Treatment successful? (j)

- **yes** → back to FOLLOW-UP and ONGOING MANAGEMENT
- **no** →
  - Adjust treatment and reinforce education.
  - Follow-up again within 1 month.
  - If treatment still unsuccessful, refer for specialty consultation.

TESTING, DIAGNOSIS, AND TREATMENT ALGORITHM NOTES

(a) Sleep study review

All sleep study orders are reviewed and approved by a sleep specialist in the referral lab. Please use the *Sleep Lab Referral Form*. If any sleep disorder other than OSA is suspected, a sleep consult is required before the sleep study is performed.

(b) In-lab full-night PSG

Full-night, attended studies performed in the laboratory have traditionally been the standard approach for diagnosis, followed by a full-night PSG for CPAP titration to determine optimal pressure. However, split-night, diagnostic-titration studies may be adequate and preferable in some cases if criteria are met *(see (c) below)*.

(c) In-lab split-night PSG

A benefit of using PSG for diagnosis is the ability to perform a split-night study, in which the first part of the testing is to establish the diagnosis, and the remaining portion is to determine an effective CPAP treatment pressure. A split-night study is a valid alternative to full-night PSG if the following four criteria are met:

1. **An apnea hypopnea index (AHI) of ≥40 events per hour of sleep is documented during ≥2 hours of sleep.** Alternatively, an AHI of 20 to 39 events per hour of sleep is documented during ≥2 hours of sleep and there is strong supportive evidence of OSA (e.g., repetitive long obstructions with major desaturations).
2. **CPAP titration is conducted over ≥3 hours,** since obstructive events can worsen as the night progresses.
3. **Elimination or near elimination of obstructive events with CPAP** is documented by PSG during rapid eye movement (REM) and non-REM (NREM) sleep. This should include REM sleep in the supine position, when apneas are most likely to occur.
4. A second full-night PSG for CPAP titration is performed if the diagnosis is confirmed but criteria 2 and 3 are not met.

(d) Home sleep testing (HST)

Unless required by insurance or when treatment is urgent and standard PSG is not available, HST is **not recommended for diagnosis of OSA** due to poor sensitivity, especially for physicians without specialized training. Further, HST devices have not been standardized.

*See Screening and Referral Algorithm note **(f)** on page 3 for more information. Also see page 13 for HST screening guidelines.*

(e) OSA diagnostic criteria

- **Apnea-hypopnea index (AHI)** or **respiratory disturbance index (RDI)** greater than or equal to **15 events per hour** OR
- **AHI or RDI** greater than or equal t**o 5 and less than or equal to 14** events per hour **with documented symptoms** of excessive daytime sleepiness, impaired cognition, mood disorders or insomnia, or documented hypertension, ischemic heart disease, or history of stroke.

(f) Patient/family education

Education should include information about study findings, including severity; disease pathophysiology; risks of untreated OSA; treatment options; and what to expect. *See page 19 for more information and available patient resources.*

(g) Positive airway pressure (PAP)

PAP is the standard for treatment. *See page 15 for more information on CPAP, BPAP, and APAP.*

- **Continuous positive airway pressure (CPAP)** is the standard treatment for OSA and should be used whenever possible.[AASM,KUS2]
- **Bi-level positive airway pressure (BPAP)** may be useful in cases where high pressure is needed and the patient experiences difficulty exhaling against a fixed pressure or central hypoventilation is present (AASM GUIDELINE).[AASM,KUS2]
- **Automatic self-adjusting positive airway pressure (APAP)** may be used for patients with moderate to severe OSA without significant comorbidities such as CHF, asthma, COPD, other lung diseases, central sleep apnea, and hypoxia. Close monitoring (1- to 2-week evaluations) during initial treatment period is recommended. An experienced sleep physician should review autotitrating raw data and adjust treatment accordingly.[AASM,KUS1]

(h) Alternate and adjunctive therapies

PAP is the standard for treatment.
See page 15 for more information on CPAP, BPAP, and APAP.

1. **Behavioral modifications** include weight loss; reduced alcohol consumption, especially before bedtime; modified sleeping position; and good sleep hygiene. *See Behavioral therapies on page 16.*
2. **Oral appliances** may be indicated for use in patients with mild to moderate OSA who prefer them to CPAP or who do not respond to or are not appropriate candidates for CPAP treatment. *See Alternative therapies on page 17.*
3. **Surgical procedures** depend on severity of OSA and may be considered if significant anatomic problems are present or if PAP therapy is not tolerated or fails to eliminate OSA symptoms. *See Alternative therapies on page 17.*
4. **Adjunctive therapies** (oxygen, medication, bariatric surgery). *See Other adjunctive therapies in the page 17 sidebar.*

(i) CPAP titration

- **Full-night or split-night PSG: Full-night PSG** following a diagnostic PSG is the standard approach for CPAP titration to determine the optimal PAP level. However, **split-night PSG** that meets criteria (allowing CPAP titration to be conducted over 3 hours or more) is also a valid method of CPAP titration.[AASM1,KUS1]
- **APAP devices** are not currently recommended for split-night titration. However, for patients with moderate to severe OSA without significant comorbidities (CHF, COPD, central sleep apnea syndromes, or hypoventilation syndromes), certain APAP devices may be used during attended titration with PSG to identify a single pressure for use with standard CPAP (AASM GUIDELINE). Certain APAP devices may also be used in these patients in an unattended way to determine a fixed CPAP treatment pressure (AASM OPTION).[AASM1,MOR1] *See page 15.*

(j) What "successful" means

Examples of successful treatment include the following *(see page 18)*:

- <10 episodes/hour based on 3% desaturation index
- Symptom improvement or resolution
- Patient/bed partner satisfaction/improved quality of life
- Good compliance: >70% of nights >4 hours per night
- Minimal or no complications

(k) Referral for specialty consultation

If diagnostic criteria are not met and the patient continues to have sleep-related signs and symptoms, refer to a sleep specialist to rule out other possible causes of symptoms. Also refer if treatment is unsuccessful.

Refer to ENT if physical findings of upper-airway obstruction (nasal obstruction, tonsillar hypertrophy, etc.).

SLEEP MEDICINE SPECIALIST CERTIFICATION INFORMATION

Certification for sleep specialists has been available for more than 30 years. Until 2006, the independent American Board of Sleep Medicine (ABSM) offered an annual exam for sleep medicine specialists. In 2007, authorized boards of the American Board of Medical Specialties began to offer certification examinations for sleep medicine, recognizing sleep medicine as a medical subspecialty. The American Academy of Sleep Medicine (AASM) offers additional training for sleep clinicians who specialize in the treatment of sleep disorders through behavioral and cognitive methods, with a certification exam administered by the ABSM. Following is a summary of these certifications. For more information, go to aasmnet.org/accreditation.aspx.

- **Board Certification in Sleep Medicine - Current (2007 – Present):** The certification exam in sleep medicine is currently offered by authorized member boards of the ABSM.
- **Board Certification in Sleep Medicine - Previous (1978 – 2006):** Sleep specialists who were certified between 1978 and 2006 earned the title of Diplomate of the ABSM. Although the ABSM no longer administers the board exam in sleep medicine, candidates who passed the exam retain lifetime certification. The ABSM will continue to maintain and verify all of its certification records.
- **Certification in Behavioral Sleep Medicine:** The ABSM administers the Behavioral Sleep Medicine Exam to certify clinicians in the specialized treatment of sleep disorders through behavioral and cognitive methods.

OVERVIEW

The recommendations in this CPM were largely derived from evidence-based practice parameters of the American Academy of Sleep Medicine (AASM). Where evidence-based guidelines do not exist, recommendations are based on consensus from clinician experts. Where applicable, the AASM levels of recommendation in the table that follows are noted throughout this document.[AASM1]

TABLE 1. AASM levels of recommendations[AASM1]

STANDARD	A generally accepted patient-care strategy that reflects a high degree of clinical certainty; implies the use of Level 1 Evidence, which directly addresses the clinical issue, or overwhelming Level 2 Evidence.
GUIDELINE	A patient-care strategy that reflects a moderate degree of clinical certainty; implies the use of Level 2 Evidence or a consensus of Level 3 Evidence.
OPTION	A patient-care strategy that reflects uncertain clinical use; implies sufficient, inconclusive, or conflicting evidence or conflicting expert opinion.
CONSENSUS	Reflects the shared judgment of the committee members and reviewers, based on the literature and common clinical practice of topic experts.

TABLE 2. AASM key principles for evaluation and management of OSA[AASM1]

1. Questions about OSA should be incorporated into **routine health screenings**.
2. Suspicion should trigger a **comprehensive sleep evaluation,** including a sleep-oriented **history and physical, objective testing, and patient education**.
3. **Objective testing** should confirm the presence or absence of OSA and its **severity.**
4. Once diagnosed, patient should be included in **deciding on a treatment strategy.**
5. OSA should be approached as a life-long disease **requiring long-term multidisciplinary management,** including outcome assessment and long-term follow-up.

TABLE 3. Definitions used in this CPM

Obstructive sleep apnea	**Apnea** or **hypopnea** resulting from complete or partial collapse, respectively, of the pharynx during sleep.
Apnea	Cessation of airflow for 10 seconds or more.
Hypopnea	A reduction in, but not complete cessation of, airflow to less than 50% of normal, usually in association with a reduction in oxyhemoglobin saturation.
Apnea-hypopnea index (AHI)	Average number of episodes of apnea and hypopnea *per hour of sleep.*
Respiratory disturbance index (RDI)	Average number of episodes of "respiratory disturbances" p*er hour of continuous monitoring.* (Note that the definition of "respiratory disturbance" varies in published medical literature and for the purposes of this document is defined in the context of the type of sleep test used, e.g., home studies.)
Diagnostic criteria from the Centers for Medicare and Medicaid Services (CMS)	**AHI or RDI greater than or equal to 15 events per hour** *OR* **AHI or RDI greater than or equal to 5 and less than or equal to 14 events per hour with documented symptoms** (excessive daytime sleepiness, impaired cognition, mood disorders or insomnia, or documented hypertension, ischemic heart disease, or history of stroke)
Severity classifications (AASM CONSENSUS)	**Mild:** RDI ≥5 per hour and <15 per hour **Moderate:** RDI ≥15 per hour and ≤30 per hour **Severe:** >30 per hour

SCREENING AND REFERRAL

Primary care providers can play a vital role in screening for OSA by being aware of signs and symptoms, predisposing risk factors, and comorbidities associated with obstructive sleep apnea (OSA).[DOG] The Screening and Referral Algorithm on pages 2 and 3 provides a suggested approach to identifying and referring high-risk patients in a primary care setting. This section provides further information and a summary of evidence to support those recommendations.

Signs and symptoms

The most common signs of sleep apnea are loud snoring, witnessed cessation of breathing, and excessive daytime sleepiness. These and other symptoms are summarized in the table below. In general, the more of these symptoms a patient has, and the more severe these symptoms are, the greater the pretest probability that a patient will have moderate or severe OSA.

TABLE 4. Signs and symptoms of OSA

Loud and habitual snoring	• Loud snoring is one of the most predictive signs of OSA. Snoring occurs in 30% to 50% of adults over age 50, but not all snorers have OSA. Loud and habitual snoring, however, especially with other signs and symptoms such as excess sleepiness, high BMI, or high blood pressure, is highly predictive of obstructive sleep apnea.[NET,YOU2] • A study by Morris et al in 2008 found that the statistic most predictive of OSA was snoring severity, and that combining snoring severity with BMI yielded a highly sensitive screening test for moderate/severe OSA.[MOR3]
Witnessed cessation of breathing or gasping/choking at night	• Witnessed cessation of breathing (including gasping, choking, snorting, or struggling to breathe at night) is highly predictive of sleep apnea. A study by Flemons et al found that a bed partner's report of nocturnal gasping/choking was one of the 4 strongest predictors of sleep apnea (along with neck circumference, hypertension, and habitual snoring), and is therefore part of a proposed sleep apnea clinical prediction rule.[FLE]
Excessive daytime sleepiness, fatigue, or non-refreshing sleep	• Excessive daytime sleepiness, along with habitual snoring and/or witnessed cessation of breathing may be predictive of OSA, or may be a sign of another sleep disorder. To assess sleepiness severity objectively, use a tool such as the **Epworth Sleepiness Scale** (AASM CONSENSUS). More information about the Epworth scale can be found on page 10.[JOH] • People with OSA demonstrate slower reaction times, increased steering errors, and more off-road incidents in simulation studies. Because of this, accidents occur up to 15 times more than frequently in people without OSA.[TEN] If a patient reports difficulty staying awake while driving, evaluation by a sleep specialist is urgent — especially if the patient is in a sensitive occupation such as a commercial driver or pilot *(see page 11 Referral and communication sidebar).*
Other sleep-related symptoms	Other sleep-related symptoms and nocturnal behaviors such as those listed below should be assessed as part of a comprehensive sleep evaluation. These symptoms may represent manifestations of sleep disorders other than OSA (such as insomnia, restless legs syndrome, and narcolepsy) and may require specialized evaluation and management by a sleep specialist. • Nocturia • Morning headaches • Decreased concentration • Memory loss • Decreased libido • Irritability

SLEEP COMPLAINTS ARE PREVALENT IN PRIMARY CARE

- Sleep complaints are highly prevalent in primary care populations. Patients at highest risk for sleep disturbance are those with pain, mental illness, limited activity, and overall "poor physical and mental health."[ALA]
- In an analysis of sleep data reported by Hiestand et al in *Chest,* 31% of men and 21% of women met criteria indicating a high risk of OSA.[HIE]
- Of 1,935 patients screened for sleep syndromes in 5 family practice offices in North Carolina, more than half reported excessive daytime sleepiness, and 33% had insomnia and/or reported OSA symptoms. Patients with hypertension, pain syndromes, and depression had a significantly increased risk for all sleep complaints.[ALA]
- In a survey of patients from 40 primary care offices and clinics in the United States, Germany, and Spain, one third of participants (32%) had a high pretest probability for OSA, with a higher rate in the United States (35.8% of 3,915 participants). A high pretest probability was more often present in men than women and in those with a BMI ≥30. The authors concluded that primary care providers will encounter a high demand for services to confirm or manage sleep apnea, sleepiness, and obesity.[NET]

IMPORTANT — DRIVING RISK:

If a patient reports difficulty staying awake while driving, referral to a sleep specialist for evaluation is urgent, especially if the patient is in a sensitive occupation such as a commercial driver or pilot. Ask drivers and pilots to call the sleep specialist's office and identify themselves as commercial drivers or pilots. Many offices accommodate these patients immediately due to the public safety issues inherent in this type of problem. Advise patients to restrict their driving as appropriate to their conditions, and document that advice. *See page 11 for more information.*

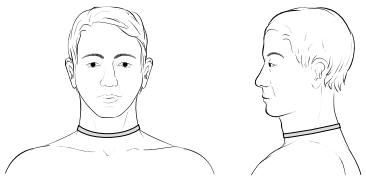
BODY MASS INDEX (BMI) QUICK REFERENCE

A BMI over 30 is considered a contributing risk factor for obstructive sleep apnea; a body mass index over 35 may be an independent risk factor.

Height	Weight (lb)	
	For BMI 30 (at risk)	For BMI 35 (high risk)
4'10"	143	167
4'11"	148	173
5'	153	179
5'1"	158	185
5'2"	164	191
5'3"	169	197
5'4"	174	204
5'5"	180	210
5'6"	186	216
5'7"	191	223

Height	Weight (lb)	
	For BMI 30 (at risk)	For BMI 35 (high risk)
5'8"	197	230
5'9"	203	237
5'10"	209	243
5'11"	215	250
6'	221	258
6'1"	227	265
6'2"	233	272
6'3"	240	279
6'4"	246	287
6'5"	253	295

TIPS FOR MEASURING NECK CIRCUMFERENCE



- Measure the neck circumference at a point just below the larynx (Adam's Apple) and perpendicular to the long axis of the neck. The tape will be as close to horizontal as anatomically feasible.
- Do not place the tape measure over the Adam's Apple.
- The patient should look straight ahead during measurement, with shoulders relaxed (not hunched). Take care not to involve the shoulder/neck muscles (trapezius) in the measurement.

Risk factors and associated conditions

A sleep-based medical history and physical exam will identify predisposing characteristics (risk factors or associated conditions) that should lead to further in-depth investigation of the possibility of OSA. High-risk patients with nocturnal symptoms of OSA should undergo sleep studies. *(See pages 12 and 13 for more information on sleep studies.)*

TABLE 5. OSA risk factors and associated conditions

Hypertension	• Epidemiologists consider OSA to be an **independent risk factor for hypertension**[HIR] and the Joint National Committee on the Detection and Management of Hypertension identifies OSA as an important identifiable cause of hypertension.[SOM] • An estimated 20% of the overall adult population in the U.S. have hypertension, whereas up to **56% of patients with OSA are estimated to have hypertension**. Prevalence of hypertension increases in a direct linear relationship with OSA severity.[HIR] • Patients with moderate or worse OSA had **3 times the odds of developing new hypertension**.[YOU3] • Patients with hypertension should undergo OSA evaluation and testing if they have nocturnal symptoms suggestive of OSA or if they remain hypertensive despite optimal medical management (AASM CONSENSUS).[AASM1]
Obesity, High BMI	• **Obesity is the single most important cause** of OSA; 40% to 70% of obese patients have OSA[HIR] and OSA prevalence increases in a graded manner with increasing BMI.[AASM2] • In a longitudinal analysis of 690 Wisconsin patients followed over 4 years, a 10% increase in weight was associated with a 6-fold greater risk of developing OSA among persons initially free of OSA.[RON,YOU3]
Neck size	• **Neck circumference is the strongest anthropomorphic predictor** of sleep-disordered breathing, suggesting that upper-body obesity, rather than a more generalized distribution of body fat, may be important for the development of OSA. • OSA is particularly prominent in **men with a neck size over 17 inches and in women with a neck size over 16 inches**.[AASM1] *(See sidebar for tips on measuring neck circumference.)*
Age/gender	• **OSA prevalence increases with age.** Among patients 65 years and older there is a 2- to 3-fold higher prevalence than in patients age 30 to 64. However, this increase plateaus after age 65.[YOU1] • OSA is diagnosed up to **8 times more often in men than in women**, but is thought to be only about twice as common, suggesting that women are less likely to be evaluated and diagnosed.[YOU3] • Recent data show that **younger and middle-aged peopl**e with OSA may be more likely to have hypertension[HAA] and atrial fibrillation[GAM1,GAM2] and suffer greater all-cause mortality,[LAV] which suggests the need for more aggressive diagnostic and therapeutic strategies in these age groups.
Chronic opioid use	• **Sleep consultation is recommended for ALL patients on moderate to high doses of any long-acting opioid.** Chronic opioid use has been associated with sometimes severe respiratory disturbances with sleep as well as death due to respiratory depression. Physicians should be aware of the possible effects of opioids on sleep and refer patients to a sleep specialist if sleep-related symptoms develop.[WAL] • **Respiratory depression accumulates over days** and patients often inappropriately increase their dose if it doesn't "kick in." Patients and their family members need to be very vigilant for signs of OSA and immediately contact their prescribing physician if signs develop.

TABLE 5. OSA risk factors and associated conditions *(continued)*

Cardiovascular (CV) disease	• Patients with OSA have increased likelihood of **cardiac arrhythmias, most notably atrial fibrillation**. One study found that OSA is strikingly more prevalent in patients with atrial fibrillation (AF) than in high-risk patients with multiple other CV diseases (49% versus 32%).[GAM1,GAM2] • Several studies demonstrate a high prevalence of sleep apnea in patients with moderate-to-severe **congestive heart failure** (estimates range from 10% to 37%).[SOM] • Prevalence of OSA has been shown to be up to 2-fold greater in patients with **coronary artery disease (CAD)** than in non-CAD patients.[SOM] • Both early and recent studies suggest the possibility that OSA may have more deleterious cardiovascular consequences in subjects <50 years old.[SIG]
Neurological disease	• Patients with OSA are up to **2 to 3 times more likely to have a stroke** than are members of the general population. Middle-aged and older individuals are most susceptible, especially men.[NIH,YOU3] Overall prevalence of OSA in patients with stroke is between 43% and 91%. Treatment of OSA may improve functional outcomes and rehab potential.[HIR] • Patients with significant **neurologic or neuromuscular disease** may have more complicated sleep-related breathing disorders or concurrent sleep disorders that require testing and treatment strategies outside these guidelines.
Mallampati or Friedman (Modified Mallampati) score III or IV	• The **Mallampati score** assesses the relationship between the soft palate and the base of the tongue while the tongue is protruded *(see sidebar)*. A higher Mallampati Score (Class III or IV) has been shown to be predictive of the presence and severity of OSA, especially if associated with nasal obstruction. The **Friedman palate position score** is a modification of the Mallampati score in which the tongue is not protruded. Studies substituting this scale yielded similar results.[FRI,LII,PAG1]
Other anatomical risk factors	In addition to BMI, neck size, and Mallampati or Friedman scores, the Adult Obstructive Sleep Apnea Task Force of the AASM recommends that the following anatomical features be evaluated (AASM CONSENSUS)[AASM1]: • Presence of retrognathia • Lateral peritonsillar narrowing • Macroglossia • Tonsillar hypertrophy • Elongated/enlarge uvula • High arched/narrow hard palate • Nasal abnormalities (polyps, deviation, valve abnormalities, turbinate hypertrophy)
Metabolic syndrome or type 2 diabetes	• Patients with **diabetes or insulin resistance** have a 3-fold higher prevalence of OSA compared to the general population.[SIG] Moderate to severe OSA occurs in 36% of patients with diabetes (49% men, 21% women).[HIR] • In a 2008 study, more than 86% of participants with **metabolic syndrome** had at least mild OSA (31% moderate and 23% severe). Waist circumference was significantly related to the presence of OSA, and severe OSA was most likely in those with a higher BMI.[FOS]
Polycythemia	• Lab values indicating polycythemia may be a sign of long-standing and/or severe apnea.[CHO]
Simultaneous use of antihypertensives and antidepressants	• A recent study showed that simultaneous therapy with **antihypertensive and antidepressant medications** predicts the increased likelihood of OSA. The probability was highest in the young and middle-aged groups receiving prescriptions for both medications. The authors concluded that OSA should be considered in any patient with **hypertension and depression or unexplained fatigue** who is receiving both types of medications.[FAR]
COPD or other significant pulmonary disease	• Patients with significant pulmonary disease (including **COPD, baseline hypoxemia, hypercapnia, or pulmonary hypertension**) often have sleep disorders that are more complex than OSA and should be referred to a sleep specialist for consultation.

MALLAMPATI SCORE

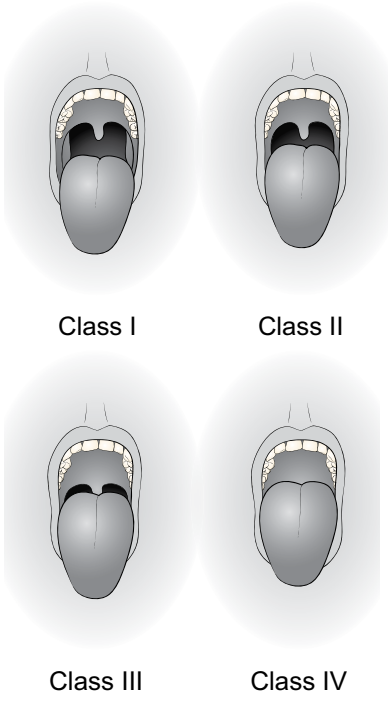
A higher Mallampati Score (Class III or IV) has been shown to be predictive of the presence and severity of OSA, especially if associated with nasal obstruction. Mallampati scoring is as follows[FAR,HIR,KUS4]:

Class I: Tonsils, uvula, and soft palate are fully visible.

Class II: Hard and soft palate, upper portion of tonsils, and uvula are visible.

Class III: Soft and hard palate and base of the uvula are visible.

Class IV: Only hard palate is visible.



TREATMENT CAN IMPROVE RISK PROFILE

Studies have shown that treating OSA — especially with continuous positive airway pressure (CPAP) — can improve health risks and outcomes, including lowering blood pressure, reducing CV-related hospital admission, reducing blood glucose, and reducing risk of motor vehicle accidents. *For more information on treatment benefits, see page 14.*

SLEEP LAB REFERRAL FORM

Communicating required clinical information to the sleep lab is important, especially if the patient is being referred directly for sleep studies rather than consultation. Information provided should include:

- Indications for testing or consultation
- Results from screening questionnaire(s)
- Results from nocturnal oximetry testing, if done
- Information on special needs such as falls risk, language barriers, etc.
- Your assessment of urgency


Sleep Lab Referral

A standard referral form is available. See page 19 for information on how to access this form.

Sleep apnea questionnaires

Many screening questionnaires and other assessment tools are available, but no one tool is perfect for screening for sleep apnea. Only one (the Berlin) has been validated in a primary care setting. However, the **STOP** and **STOP-BANG**, which have been validated in surgical patients, show promise. They are concise and easy to use and have a high sensitivity, especially for patients with moderate to severe OSA. Some of these tools, like the Epworth Sleepiness Scale, can also be used to monitor treatment effectiveness.

TABLE 6. Summary of sleep questionnaires

STOP-BANG questionnaire[CHU]  STOP-BANG Questionnaire *See page 19 for information on how to access this form.*	• The **STOP** and **STOP-BANG** questionnaires have been validated in surgical patients, but show promise for use in other settings because of their ease of use, high completion rate, and easy mnemonics to serve as useful reminders for clinicians. • **The STOP questionnaire** has 4 yes/no questions relating to **S**noring, **T**iredness during daytime, **O**bserved apnea, and high blood **P**ressure. Two (2) or more "YES" answers place the patient in the "High Risk" category for sleep apnea. The sensitivities of the questionnaire were as follows: 65.6% for AHI 5 to 10; 74.3% for AHI >10 to 15; and 79.5% for AHI >15. • **The STOP-BANG questionnaire** incorporates **B**ody mass index, **A**ge, **N**eck circumferences, and **G**ender into the **STOP** questionnaire. With these added factors, 3 or more "YES" answers place the patient in the "High Risk" category for sleep apnea. The added factors increase the sensitivities as follows: 83.6% for AHI 5 to 10; 92.9% for AHI >10 to 15; and 100% for AHI >15.
Epworth sleepiness scale[JOH]  Epworth Sleepiness Scale *See page 19 for information on how to access this form.*	• Patients often underestimate their level of sleepiness. The Epworth sleepiness scale is a common, simple, statistically validated questionnaire that helps provide an objective measure of sleepiness. • The scale can be used **for both initial screening and treatment follow-up** (to help assess treatment outcome). • The scale lists several situations, and the patient is asked to evaluate sleepiness in those situations using a rating scale of 0 to 3. – A score of 0 to 5 should be interpreted as the lower half of the normal range. – A score of 6 to 10 should be interpreted as the upper half of the normal range. – A score of 11 to 15 should be interpreted as moderately sleepy. – A score of 16 to 24 should be interpreted as very sleepy.

Screening for OSA in commercial motor vehicle (CMV) operators

- **Medical qualification:** Commercial motor vehicle (CMV) drivers, pilots, and sometimes others whose jobs affect public safety, are required to document medical qualification to perform their duties under relevant medical standards and federal rules, which are different for each group. Medical examinations of commercial drivers will be restricted to medical personnel qualified by testing and registered as medical examiners through a national registry starting in May 2014. Medical examinations of pilots are currently performed only by physicians designated by the Federal Air Surgeon.
- **New guidelines for OSA screening in CMV operators with possible or probable sleep apnea:** Although screening for OSA has not yet been federally mandated as part of the above medical qualification exams, such screening is both prudent and recommended. In 2006 a joint task force of the American College of Chest Physicians (ACCP), American College of Occupational and Environmental Medicine (ACOEM), and the National Sleep Foundation (NSF) released guidelines for screening and management of OSA. This task force recommended drivers be grouped into 3 categories for medical qualification purposes. Characteristics of each of these groups are summarized in the table below.[HAR2]

TABLE 7. Driver categories for medical qualification[HAR2]

1	2	3
Medically qualified to drive commercial vehicles if driver meets either of the following:	**In-service evaluation recommended** if driver falls into any one of the following 5 major categories (**3-month maximum certification**):	**Out-of-service immediate evaluation recommended** if driver meets any one of the following factors:
1. No positive findings or any of the numbered in-service evaluation factors (see column 2). 2. Diagnosis of OSA with continuous positive airway pressure compliance documented.	1. Sleep history suggestive of OSA (snoring, excessive daytime sleepiness, witnessed apneas). 2. Two or more of the following (1) body mass index >35 kg/m^2; (2) neck circumference >17 inches in men and 16 inches in women; (3) hypertension (new, uncontrolled, or unable to control with fewer than two medications). 3. Epworth sleepiness scale score >10. 4. Previously diagnosed sleep disorder; compliance claimed, but no recent medical visits/compliance data available for immediate review (must be reviewed within 3-month period); if found not to be compliant, should be removed from service (includes surgical treatment). 5. Apnea-hypopnea index >5 but <30 in a prior sleep study or polysomnography and no excessive daytime somnolence (Epworth sleepiness scale score <11); no motor vehicle accidents; no hypertension requiring two or more agents to control.	1. Observed unexplained excessive daytime sleepiness (sleeping in examination or waiting room) or confessed excessive sleepiness. 2. Motor vehicle accident (run off road, at fault, rear-end collision) likely related to sleep disturbance unless evaluated for sleep disorder in the interim. 3. Epworth sleepiness scale score ≧16 or functional outcomes of sleep questionnaire score <18. 4. Previously diagnosed sleep disorder (1) noncompliant (continuous positive airway pressure treatment not tolerated)w; (2) no recent follow-up (within recommended time frame); (3) any surgical approach with no objective follow-up. 5. Apnea-hypopnea index >30.

Adapted from Hartenbaum N, Collop N, Rosen I, et al. *CHEST* 2006;130;904[HAR2]

- **Referral to sleep specialist.** Drivers of CMVs, pilots, or others whose jobs affect public safety should always be referred to a sleep disorders specialist for evaluation and management if they have symptoms of sleep apnea (or any condition affecting alertness). As appropriate, ask drivers or pilots to call the sleep specialist's office and identify themselves as commercial drivers or pilots. Many offices accommodate these patients immediately due to the public safety issues inherent in this type of problem.
- **Other advice to patients.** Advise patients to restrict their safety sensitive activities as appropriate to their condition; document that advice in the medical record.

REFERRAL AND COMMUNICATION

Information gathered from assessment tools, along with history and physical findings, can help guide risk assessment and decisions regarding further objective testing.

- **If the patient has straightforward symptoms or risk factors associated with OSA,** PCPs may choose to select appropriate sleep test(s) and manage education, treatment, and follow-up themselves. If referring directly for an in-lab sleep study, it's important to communicate required information *(see sidebar on page 10)*. Talk with a specialist if there is a delay in scheduling or as needed to help assess urgency and/or to select an appropriate in-lab study. All sleep study orders are reviewed and approved by a sleep specialist in the referral lab.
- **For more complex cases** — or if the PCP does not feel comfortable with test selection and ongoing education and follow-up — a sleep consultation is recommended rather than direct referral for sleep studies. Sleep specialists have special training in clinical assessment, physiologic testing, diagnosis, and management of sleep disorders. A specialist can ensure that the most appropriate testing is done from the beginning. This not only expedites optimal treatment, but also minimizes the inconvenience and financial consequences of multiple tests. Specialists are usually more familiar with testing, treatment, and reporting requirements of multiple insurance providers, including Medicare. A sleep specialist can also ensure appropriate comprehensive patient education and follow-up. Increased intensity of patient education has been shown to improve PAP utilization and treatment outcomes.[KUS2]

PAP TITRATION[AASM1,KUS1,KUS3]

- After a patient is diagnosed with OSA, the current standard of practice involves performing attended PSG, during which positive airway pressure is adjusted throughout the recording period to determine the optimal pressure for maintaining upper airway patency.
- Full-night, attended PSG performed in the laboratory is the preferred approach for titration to determine the optimal PAP level; however, split-night, diagnostic-titration studies are usually adequate (AASM GUIDELINE).
- All potential PAP titration candidates should receive adequate PAP education, hands-on demonstration, careful mask fitting, and acclimatization prior to titration.
- Airway pressures should be increased until apneas, hypopneas, respiratory effort-related arousals (RERAs), and snoring are eliminated.
- Other titration guidelines are provided in AASM clinical guidelines. *See pages 13 and 14 for more information on PAP treatment recommendations.*

TYPES OF SLEEP STUDIES

Sleep studies collect different information ("channels"). The type of sleep study is defined by how many channels and what information it collects *(see Table 8 at right)*.

Overnight, attended sleep study:

- **Type I:** Records 12 or more channels of information and detects many sleep disorders (full- or split-night PSG).

Home sleep tests (HSTs):

- **Type II:** Records 7 or more channels that may include airflow, respiratory effort, blood oxygen saturation, brain activity (EEG), heart activity (EKG), leg movements (EMG), and eye movements (EOG).
- **Type III:** Records 4 to 7 channels that may include airflow, respiratory effort, blood oxygen saturation, and heart activity (EKG). (**Most common HST**.)
- **Type IV:** Records 1 to 3 channels of information that may include blood oxygen saturation (oximeter) and airflow.[AASM2]

▶ Link to AASM guidelines at aasmnet.org/practiceguidelines.aspx

SLEEP STUDIES

Objective testing should be performed to confirm diagnosis and determine severity for patients found to be at moderate to high risk of OSA. For patients at highest risk, this should be done in an expedited manner so treatment can be started as soon as possible. For others, the timing of further testing should be determined by the risk of OSA and presence of daytime impairment or associated morbidity. **The two accepted methods of objective testing** (AASM STANDARD) are[AASM1]:

- **In-laboratory polysomnography (PSG).** PSG is the standard approach for diagnosis and PAP titration. See the table below for a summary of recommendations.
- **Home sleep studies (HSTs) with portable monitors (PMs).** See the table on the following page for a summary of recommendations and considerations for use of PMs.

TABLE 8. In-lab sleep studies

Full-night, attended polysomnography (PSG)	• **Attended facility-based PSG** is a comprehensive diagnostic sleep test that includes at least the following measures: electroencephalography (EEG); electrooculography (EOG); electromyography (EMG); heart rate or electrocardiography (ECG); airflow; breathing/respiratory effort; and arterial oxygen saturation (SaO_2). • **Attended PSG is performed in a sleep laboratory facility** in which a technologist supervises the recording during sleep time and has the ability to intervene if needed. • Full-night, attended studies performed in the laboratory have traditionally been the **standard approach for diagnosis** and are often used following a diagnostic full-night PSG for **CPAP titration** to determine optimal pressure. • PSG can also be used as **follow-up to monitor efficacy and adjust treatment** (*see follow-up recommendations on page 18*).
Split-night attended polysomnography (PSG)	• **With split-night PSG,** the first part of the testing establishes the diagnosis, and the remaining portion determines an effective PAP treatment pressure. A split-night study is a valid alternative to full-night PSG if the following criteria are met[AASM1,KUS3]: 1] **An apnea hypopnea index (AHI) of ≥40 events per hour of sleep is documented during ≥2 hours of sleep.** Alternatively, an AHI of 20 to 39 events per hour of sleep is documented during ≥2 hours of sleep and there is strong supportive evidence of OSA (e.g., repetitive long obstructions with major desaturations). 2] **CPAP titration is conducted over ≥3 hours**, since obstructive events can worsen as the night progresses. 3] **Elimination or near elimination of obstructive events with CPAP** is documented by PSG during rapid eye movement (REM) and non-REM (NREM) sleep. This should include REM sleep in the supine position, when apneas are most likely to occur. 4] A second, full-night PSG for CPAP titration is performed if the diagnosis is confirmed but criteria 2] and 3] are not met. • In patients where there is a strong suspicion of OSA, if other causes for symptoms have been excluded, a second diagnostic overnight PSG may be necessary to diagnose the disorder.[KUS3]
Multi-sleep latency test (MSLT)	• The MSLT is not routinely indicated in the initial evaluation and diagnosis of OSA or in an assessment of change following treatment with nasal CPAP. However, if excessive sleepiness continues despite optimal treatment, the patient may require an evaluation for possible narcolepsy, including the MSLT (AASM GUIDELINE).

TABLE 9. HST description and recommendations[AASM1,COL]

Nocturnal oximetry	• **Exclusions:** Oximetry lacks the specificity and sensitivity to be used as an alternative to polysomnography or an attended cardiorespiratory (Type I) sleep study for diagnosing sleep-related breathing disorders (AASM GUIDELINE). However, when performed with appropriately sensitive equipment and interpreted by experienced clinicians in context with other clinical history, it can be useful for **screening and referral** for diagnostic testing *(see sidebar at right).* • Some studies criticize overnight oximetry as being too insensitive for OSA, but many of those studies were based on use of devices that underestimated cyclic desaturations (e.g., collecting data points too infrequently) and/or defined significant desaturations as greater than 4% from baseline (3% is recommended). *See sidebar for recording and reporting recommendations and other parameters for successful nocturnal oximetry.* • A normal tracing does not rule out mild OSA nor other sleep disorders. *See sidebar at right for a summary of indications, limitations, and recording/reporting recommendations for nocturnal oximetry.*
Home sleep testing (HST) (unattended) ***Note:*** *The recent acceptance of HST as an accepted method for OSA testing and diagnosis remains controversial due to some evidence suggesting that quality is not as good. Practice continues to be shaped by new research, insurance coverage decisions, and equipment availability.*	• **HSTs may be used to diagnose OSA if the following criteria are met** (AASM CONSENSUS)**:** – Performed only **in conjunction with a comprehensive sleep evaluation and ordered through a local sleep lab** – **Supervised** by a practitioner with board certification in sleep medicine or an individual who fulfills the eligibility criteria for the sleep medicine certification examination – Performed in those with **high pretest probability** of moderate to severe OSA – Not used in patients with significant comorbid sleep disorders or medical conditions (e.g., moderate to severe pulmonary disease, neuromuscular disease, congestive heart failure) – If AHI <15 on HST, a full polysomnography is required • **Exclusions:** HST is **not appropriate** for **diagnosis** of OSA for patients who meet any of these criteria: – Pilots and drivers – Patients with comorbidities (CHF, neuromuscular disease, COPD, chronic pain therapy with narcotics, etc.) – Patients with non-OSA sleep disorders (RLS, narcolepsy, insomnia, parasomnia, Circadian rhythm disorders, etc.) • **HST may be indicated** for the **diagnosis** of OSA in patients for whom in-laboratory PSG is not possible by virtue of immobility, safety, or critical illness. HST may also be indicated to **monitor** the response to non-CPAP treatments for sleep apnea. • **At a minimum, an HST device must record airflow, respiratory effort, and blood oxygenation.** The airflow, effort, and oximetric biosensors conventionally used for in-laboratory PSG should be used in HST. An experienced sleep technician should either perform the application of HST biosensors or should directly educate the patient to do so (AASM CONSENSUS). • The Centers for Medicare & Medicaid Services (CMS) determined that a positive diagnosis of OSA for the coverage of CPAP must include a clinical evaluation and a positive objective testing based on one of the following[CMS]: – Attended PSG performed in a sleep laboratory *(see previous page)* – Unattended home sleep testing (HST) with a Type II or III home sleep test device or a Type IV HST device that measures at least 3 channels The sleep test must have been previously ordered by the beneficiary's treating physician and furnished under appropriate physician supervision.

NOCTURNAL OXIMETRY

Indications:

- **To screen patients with a high pretest probability** of OSA, to help stage urgency if patient can't get in for sleep consult or study in a timely manner, or to help select appropriate studies and/or consultation
- **To exclude patients with a low pretest probability**
- **To help convince the reluctant patient** of the importance of a sleep study
- **To assess need for supplemental O_2** while waiting for definitive testing and treatment
- **For follow-up evaluation of treatment effectiveness** as an adjunct to symptom response

Limitations:[WIL]

- Inadequate equipment.
- Interpretation by untrained physicians.
- False positive or false negative tests. (Sensitivity and specificity are approximately 80%, meaning 1 in 5 will be false positive or false negative tests; thus, the test is not reliable for mild sleep apnea [false negatives].)
- Does not differentiate between types of respiratory disturbances.
- Substantial wakefulness and/or abnormal hemoglobins (e.g., COHb in smokers) can dramatically skew results.
- Results and interpretations are significantly affected by technical factors and software algorithms.

Recording and reporting

- **Averaging time:** 3 seconds or fewer
- **Percent required for a desaturation:** 3%
- **Window of time to consider a desaturation:** minimum of 4 seconds, maximum of 60 seconds

It's not just about the numbers!

Tracings must be interpreted by a clinician experienced in sleep medicine who recognizes the validity of data and artifacts and the significance of various patterns of cyclic oximetric variations and accompanying heart rate patterns. Physicians must review artifacts, abnormal patterns, etc., in the context of the patient's medical history.

KEYS TO SUCCESSFUL TREATMENT

- **Treat OSA as a chronic disease.**
- **Encourage patient choice and participation** in treatment.
- **Offer PAP as the preferred treatment** for all severity levels.
- **Assess outcomes** *(see page 18).*

CMS REQUIREMENTS FOR PAP THERAPY[CMS]

- **Before initiating PAP therapy,** the patient must have a "face-to-face" evaluation with their treating physician. The evaluation should include the following:
  - Signs and symptoms of OSA (from sleep history)
  - Epworth Sleepiness Scale *(see page 10)*
  - BMI
  - Neck circumference
  - Evaluation of cardiopulmonary and upper airway system

  Documentation of face-to-face evaluation needs to be contained in the patient's chart notes and forwarded to the durable medical equipment (DME) company with referral.
- **After initiating PAP therapy**, the patient must have a "reevaluation" with the treating physician between the 31st and 90th day of treatment to evaluate and show benefit; otherwise PAP is only covered for a 12-week period. The re-evaluation should include documentation that the symptoms of OSA have improved and objective evidence of compliance to therapy. Compliance is defined by Medicare as use of PAP device for at least 4 hours per night for 70% of the nights in a 30-consecutive-day period during the first 90 days.

See PAP therapy tips in the sidebar on page 15.

TREATMENT

Treatment options

Positive airway pressure (PAP), specifically continuous PAP (CPAP), is the gold standard for treatment of obstructive sleep apnea (OSA) in most cases.

Patients might either not tolerate CPAP or be unwilling to try it. In these cases, individualized **behavioral, alternative, and adjunctive therapies** may be used *(see pages 16 and 17 for guidelines)*. **Consultation with a sleep specialist is recommended.**

Treatment benefits

A growing body of evidence supports the benefits of appropriate diagnosis and treatment of OSA in terms of morbidity, mortality, and efficient use of healthcare resources.[PAG2] *See the table below for some of the most important benefits.*

TABLE 10. Documented benefits of OSA treatment, particularly CPAP

Symptoms and daily functioning	• A dose/response relationship between nightly hours of CPAP use and **improvement in sleepiness and daily functioning**.[BAL] • Significant improvement in subjective and objective sleepiness, as well as several measures of quality of life, cognitive function, and depression.[GIL]
Motor vehicle accidents	• Reduction in the risk of automobile accidents involving patients with OSA.[BAL] • For every dollar spent on CPAP, $3.49 saved in **reduced collision costs**.[SAS] • **Significant reduction in accident frequency and concentration faults** in driving simulator studies in patients with OSA and in surveys of driver records.[PAG2]
Blood pressure, CV disease, pulmonary disease, and stroke	• **Substantial reduction in both day and night arterial blood pressure** with effective CPAP treatment. Drops in mean blood pressure by 10 mm Hg predicted to reduce coronary heart disease event risk by 37% and stroke risk by 56%.[BEC] • **Marked CV risk reduction** of 38% to 64%, even in milder OSA.[BUC] • **Reduced hospitalization** with cardiovascular and pulmonary disease in OSA patients on nasal CPAP treatment. In one study, for 2 years before and after treatment for OSA, use of hospital days for CPAP users decreased from 413 before treatment to 54 after treatment, while utilization for CPAP non-users went from 137 hospital days to 188.[PAG1] • **Reduced incidence of fatal and non-fatal cardiovascular events** in patients with severe OSA.[MAI] • **Increase in ejection fraction** and decrease in systolic BP and HR after 1 month of CPAP treatment in patients with heart failure.[YOU3] • **Significantly reduced risk of death and hospitalization among patients with heart failure** and OSA. However, reduced compliance with CPAP therapy was significantly associated with an increased risk of death and hospitalization.[KAS] • **Reduced risk of recurrent atrial fibrillation** after successful cardioversion by about one half (from 82% to 41%).[SOM]
Blood glucose	• Rapid decrease in insulin sensitivity (after 2 days of CPAP), with improvement sustained at 3 months, especially in non-obese patients (BMI <30).[HAR1]
Cost / utilization	• 33% decrease in physician costs after treatment, and a decrease in duration of hospital stays from 1.27 days per patient per year 1 year before diagnosis to 0.54 days per patient per year after diagnosis and treatment.[PEP]

Positive airway pressure (PAP) therapies

Positive airway pressure (PAP) provides pneumatic splinting of the upper airway and is effective in reducing the AHI. It is the treatment of choice for OSA of all severities. PAP can be delivered in continuous (CPAP), bi-level (BPAP), or autotitrating (APAP) modes and can be applied through a nasal, oral, or oronasal interface during sleep. The following tables summarize AASM recommendations for PAP therapies. Note that other tests are also available.

TABLE 11. AASM recommendations for PAP therapies[AASM1,KUS2,MOR1]

Continuous positive airway pressure (CPAP) *CPAP provides a continuous positive pressure through both exhalation and inhalation.*	• **CPAP is indicated for the treatment of moderate to severe OSA** (AASM STANDARD) and mild OSA (AASM OPTION). • CPAP is recommended to **improve self-reported sleepiness** (AASM STANDARD) and quality of life (AASM OPTION). • CPAP is recommended as an **adjunctive therapy to lower blood pressure in hypertensive patients with OSA** (AASM OPTION). • Full-night, attended PSG performed in the laboratory is the preferred approach for **titration to determine optimal positive airway pressure**; however, split-night, diagnostic-titration studies are usually adequate (AASM GUIDELINE). • **CPAP usage should be objectively monitored** to help ensure utilization (AASM STANDARD). This recommendation is based on overwhelming evidence at all levels indicating patients with OSA overestimate their PAP usage. • **Close follow-up** for PAP usage and problems by appropriately trained healthcare providers is indicated to establish effective utilization patterns and remediate problems, if needed. This is especially important during the first few weeks of PAP use (AASM STANDARD). • The addition of **heated humidification** is indicated to improve CPAP utilization (AASM STANDARD). • **The addition of a systematic educational program** is indicated to improve PAP utilization (AASM STANDARD). Studies found increased intensity of patient education or frequency of provider contact improved utilization. • After initial CPAP setup, **long-term follow-up** for CPAP-treated patients with OSA by appropriately trained healthcare providers is indicated yearly and as needed to troubleshoot PAP mask, machine, or usage problems (AASM OPTION).
Bi-level PAP (BPAP) *BPAP provides a higher pressure on inhalation and a lower pressure on exhalation.*	• While the literature mainly supports CPAP therapy, BPAP is an optional therapy in some cases where high pressure is needed and the patient experiences difficulty exhaling against a fixed pressure or when coexisting central hypoventilation is present (AASM GUIDELINE).
Autotitrating positive airway pressure (APAP) *APAP systems have algorithms that attempt to provide the minimal pressure necessary to stabilize the upper airway. Since significant errors may occur with these systems when unattended, they do not replace having an attended study.*	• APAP is **not recommended to diagnose** OSA (AASM STANDARD). • APAP is **not an option for most patients**. Unattended APAP is NOT recommended for patients with CHF, moderate to severe lung disease, hypoxia, central sleep apnea, or suspected complex sleep problems. • APAP devices are **not currently recommended for split-night titration** (AASM STANDARD). • Certain APAP devices may be used during attended titration with PSG to identify a single pressure for use with standard CPAP for treatment of moderate to severe OSA (AASM GUIDELINE). • Certain APAP devices may be used in an unattended way to determine a fixed CPAP treatment pressure for patients with moderate to severe OSA without significant comorbidities (CHF, COPD, central sleep apnea syndromes, or hypoventilation syndromes) (AASM OPTION). • Patients being treated with fixed CPAP on the basis of APAP titration or being treated with APAP must have **close clinical follow up** to determine treatment effectiveness and safety. This is especially important during the first few weeks of PAP use (AASM STANDARD). • A reevaluation and, if necessary, a standard attended CPAP titration should be performed if symptoms do not resolve or if the APAP treatment otherwise appears to lack efficacy (AASM STANDARD).

POSITIVE AIRWAY PRESSURE (PAP) THERAPY TIPS

General tips

- PAP treatment is best approached using a multidisciplinary care team, which may include a sleep specialist, the referring physician, nursing personnel, a respiratory therapist, and a sleep technologist.
- Treatment with PAP should be supplemented with behavioral and other adjunctive therapies as appropriate *(see pages 16 and 17)*.
- Treatment education is essential *(see the sidebar on page 17 for tips)*.

Equipment tips

- To meet CMS requirements and optimize monitoring and follow-up, **request PAP equipment with downloadable statistics** including:
  - Compliance data
  - Efficacy data (e.g., AHI)
  - Evidence of mask leak
- Though mask leak and efficacy data are not always accurate, they help give a broad picture of what's going on and can be useful in your overall assessment and management of each patient.
- Mask, tubing, and filter should be changed every 6 months.

Autotitrating positive airway pressure (APAP) tips

Though CPAP is the treatment of choice for most patients, APAP is an option when your patient meets the criteria for use *(see table at left)*. If you and your patient do decide on APAP treatment, here are a few tips to optimize treatment effectiveness:

- Start at low pressure, using a range of 5–15.
- Arrange for mask fitting with a certified technician.
- Specify heated humidity on your prescription.
- Request downloaded statistics and follow-up with patients between 1 and 4 weeks.
- Review downloaded data for excessive mask leaking.

▶ Link to AASM guidelines at www.aasmnet.org/practiceguidelinesaspx

PATIENT EDUCATION: AN ESSENTIAL TREATMENT COMPONENT

Patient and family education is essential to successful initial and long-term management of OSA and should include the following:[AASM1]

- **Study results,** including severity of disease
- **Pathophysiology** of OSA, including an explanation of the natural course of the disease and associated disorders
- **Risk factor** identification, explanation of exacerbating factors, and risk factor modification
- **Treatment options**
- **Patient's role** in treatment, patient concerns
- **Goal setting**
- **Consequences of untreated disease**
- **Drowsy driving/sleepiness counseling**
- **Treatment education:** Treatment education is especially important for patients using PAP devices. In fact, research has shown that **increased intensity of patient education or frequency of health provider contact improve PAP utilization**. Treatment education should include[AASM1,KUS2]:
  - Proper equipment use
  - Potential complications/troubleshooting
  - How to integrate a PAP routine or other treatments into daily life
  - Use of heated humidification with CPAP
  - Travel issues with CPAP
  - Long-term treatment expectations

Use the tools summarized on page 19 to teach your patients and their families about the signs and symptoms of OSA — and the importance of prevention, treatment, and long-term management. These tools can also aid in ongoing treatment education important for patient compliance and successful outcomes.

Behavioral (lifestyle management) therapies

Behavioral therapies for OSA include weight loss, positional therapy, reduced alcohol consumption (especially before bedtime), and general sleep hygiene. The following table summarizes recommendations and rationale for each of these.

TABLE 12. Behavioral therapies for OSA[AASM1,GUI,KUS3,MOR2]

Weight loss[AASM1,MOR2]	• Successful weight loss may improve the apnea-hypopnea index (AHI) in obese patients with OSA (AASM GUIDELINE) and can also result in improved sleep efficiency, decreased snoring, and improved oxygenation. One study showed that a 10% reduction in weight predicted a 26% reduction in the AHI.[RON] • Weight loss should be encouraged as a specific treatment, even for those who are only moderately overweight. Ideal goal is a BMI of 25 or less. Components of a successful weight loss program include a reduced calorie diet, exercise, and behavior modification (refer to Intermountain's *Weigh to Health* resources at intermountainhealthcare.org/weight). • Dietary weight loss should be used as an adjunct to primary treatment for OSA (AASM OPTION). While most studies indicate improvement in measures of OSA in patients with moderate to severe OSA, few were cured by dietary approach alone. There are little data regarding success of dietary management on mild OSA. Furthermore, PAP, dental devices, and surgery have an immediate effect whereas the response to diet is delayed. Therefore, while dietary weight loss is recommended as a component of therapy for obese patients with OSA, this approach should be combined with a proven treatment. • PAP settings should be reassessed for those patients who gain or lose weight. After weight loss of 10% or more of body weight, a follow-up PSG is routinely indicated to determine if PAP therapy is still needed and/or if adjustments to PAP level are needed (AASM STANDARD).[KUS3] • Bariatric surgery may be adjunctive in the treatment of OSA in obese patients (AASM OPTION). However, surgical weight loss should be considered only in morbidly obese who have failed other treatments and should be used with caution. There have been reports of recurrence of OSA after several years, even without regaining of weight, and the procedure carries its own set of complications.
Reduced alcohol consumption	• Alcohol may increase inspiratory resistance, especially in snorers. Therefore, alcohol consumption should be reduced, especially at bedtime.
Sleeping position	• Sleep position can affect airway size and patency. Sleeping in the supine position can decrease the area of the upper airway, particularly in the lateral dimension. • Keeping the patient in a non-supine sleeping position is an effective secondary therapy or can be a supplement to primary therapies for OSA in patients who have a low AHI in the non-supine versus supine position (AASM GUIDELINE). Because not all patients normalize AHI when non-supine, improvement by position should be documented with PSG (AASM CONSENSUS). • A positioning device should be used when initiating positional therapy. This could be an alarm, a pillow, a backpack, or a tennis ball (AASM CONSENSUS). • Providers should consider use of an objective position monitor to establish the efficacy of a positioning device (AASM CONSENSUS).
Other	• Recommend usual sleep hygiene. • A randomized controlled trial of 31 patients with moderate OSA showed the oropharyngeal exercises involving the tongue, soft palate, and lateral pharyngeal wall significantly reduced OSA severity and symptoms. The authors concluded that such exercises represent a promising novel modality for treatment of patients for whom CPAP is not suitable and desirable.[GUI]

Alternative therapies

Some patients are unwilling to try CPAP. Others do not tolerate or show improvement with CPAP despite treatment education, follow-up, and troubleshooting. Patients with significant psychiatric, neurological, or developmental disorders may not be able to tolerate testing and therapy with CPAP. In all of these cases, evaluation and management strategies must be individualized and alternative treatments considered. **Consultation with a sleep specialist is recommended.**

TABLE 13. AASM guidelines for alternative treatments[AASM1,KUS3]

Oral appliances[AASM1,KUS4]	• Although not as efficacious as CPAP, oral appliances (OAs) are **indicated for use in patients with mild to moderate OSA** who prefer OAs to CPAP, do not respond to CPAP, are not appropriate candidates for CPAP, or fail treatment attempts with CPAP or treatment with behavioral measures such as weight loss or sleep position change (AASM GUIDELINE). • **Patients with severe OSA should have an initial trial of nasal CPAP** because greater effectiveness has been shown with this intervention than with the use of oral appliances. Upper airway surgery (e.g., tonsillectomy and adenoidectomy, craniofacial operations, tracheostomy) may also supersede use of oral appliances in patients for whom these operations are predicted to be highly effective in treating sleep apnea (AASM GUIDELINE). • **Oral appliances should be fitted by qualified dental personnel**. Dental management of patients with OAs should be overseen by practitioners who have undertaken serious training in sleep medicine and/or sleep-related breathing disorders with focused emphasis on the proper protocol for diagnosis, treatment, and follow-up of OSA while using an OA (AASM OPTION). • To ensure satisfactory therapeutic benefit from OAs, patients should undergo **polysomnography or an attended cardiorespiratory (Type I) sleep study** with the oral appliance in place after final adjustments of fit have been performed (AASM GUIDELINE). • Patients should return for regular **follow-up office visits with the dental specialist** until optimal fit is obtained and efficacy is shown. Subsequent follow-up with the dental specialist is recommended **every 6 months for the first year, and at least annually thereafter.** The purpose of follow-up is to monitor patient adherence, evaluate device deterioration or maladjustment, evaluate the health of the oral structures and integrity of the occlusion, and assess the patient for signs and symptoms of worsening OSA (AASM CONSENSUS). • Patients treated with oral appliances should also return for periodic follow-up office visits **with the referring clinician** to assess for signs and symptoms of worsening OSA. Close communication with the dental specialist is most conducive to good patient care. If signs or symptoms of OSA worsen or reoccur, an objective reevaluation of respiration during sleep is indicated (AASM OPTION).
Surgical procedures[AASM1]	• Surgical procedures may be considered if significant anatomic problems are present, if the patient is intolerant of PAP, and/or if PAP is unable to eliminate OSA symptoms (AASM CONSENSUS). Surgical options include a variety of upper airway reconstructive or by-pass procedures. Refer to the AASM Clinical Guidelines[AASM1] for more information.

OTHER ADJUNCTIVE THERAPIES

Pharmacological agents[AASM1,MOR2]

- The following pharmacological agents are not recommended for the treatment of OSA: SSRIs (AASM STANDARD), protriptyline (AASM GUIDELINE), methylxanthine derivatives (AASM STANDARD), and estrogen therapy (AASM STANDARD).
- Modafinil is recommended for the treatment of residual excessive daytime sleepiness in OSA patients who have sleepiness despite effective PAP treatment and who are lacking any other identifiable cause for their sleepiness.

Supplemental oxygen[AASM1,MOR2]

- Oxygen supplementation is not recommended as a primary treatment for OSA (AASM OPTION). Although studies show favorable effects on oxygenation, the effect on apneas, hypopneas, and subjective sleepiness was inconsistent.

Nasal decongestants[AASM1,MOR2]

- Short-acting nasal decongestants are not recommended as chronic therapy for nasal congestion for treatment of OSA (AASM OPTION). Topical decongestants that work through mucosal vasoconstriction typically have rebound vasodilation that would adversely affect nasal patency over intervals typical of total sleep times. Also, chronic use leads to rhinitis medicamentosa in susceptible individuals.

Topical nasal corticosteroids[AASM1,MOR2]

- Topical nasal corticosteroids may improve the AHI in patients with OSA and concurrent rhinitis, and thus may be a useful adjunct to primary therapies for OSA (AASM GUIDELINE). In addition to general support in the medical literature for treatment of nasal congestion with topical nasal corticosteroids, one study demonstrated improvement in mean AHI from 20 to 12 events/hour using fluticasone nasal spray. However, individual responses may vary, and therapeutic response should be individually assessed.

▶ Link to AASM guidelines at aasmnet.org/practiceguidelines.aspx

POLYSOMNOGRAPHY (PSG) OR HOME SLEEP TESTING (HST) FOLLOW-UP TESTING[AASM1,KUS3]:

Follow-up PSG or HST is not routinely indicated in patients treated with CPAP whose symptoms continue to be resolved with CPAP treatment.

Follow-up PSG is routinely indicated in OSA patients for the assessment of treatment results on CPAP in the following cases:

- After substantial weight loss (e.g., 10% of body weight) and after substantial weight gain with return of symptoms **(AASM STANDARD)**
- When clinical response is insufficient
- If symptoms return despite a good initial response to CPAP **(AASM STANDARD)**.

Follow-up HST may be indicated in these cases:

- To monitor the response to non-CPAP treatments for OSA, including oral appliances, upper airway surgery, and weight loss **(AASM CONSENSUS)**
- To verify prescribed therapy with oxygen or PAP after in-lab testing when adequate therapy could not be achieved **(EXPERT CONSENSUS)**
- To routinely verify therapy for patients treated chronically (if it has been 5 or more years since in-lab testing) **(EXPERT CONSENSUS)**
- To verify new equipment (e.g., after replacement of PAP device) **(EXPERT CONSENSUS)**
- To verify pressure therapy without supplemental oxygen when both were initially prescribed **(EXPERT CONSENSUS)**
- To confirm or clarify findings of an in-lab diagnostic study when indications for therapy were indeterminate (e.g., suboptimal sleep time) **(EXPERT CONSENSUS)**
- To verify current therapy when there is a substantial change in the patient's clinical status (e.g., change in comorbid condition, environment, or medication) **(EXPERT CONSENSUS)**
- To troubleshoot issues **(EXPERT CONSENSUS)**

FOLLOW-UP AND LONG-TERM MANAGEMENT

OSA should be managed like a chronic disease. Effective treatment requires ongoing follow-up to monitor effectiveness of and adherence to therapy; side effects or complications; risk-factor modification; and continued resolution of symptoms. This is true even for patients who have successfully eliminated OSA symptoms through weight loss, surgery, or other treatments.

Table 14 below summarizes components of effective follow-up and long-term management. In general, these parameters should be assessed **within one month of starting therapy, and then annually or as needed to address changes. Some insurance companies have other requirements.** For example, the Centers for Medicare & Medicaid Services (CMS) have the following requirements[CMS]:

- CPAP coverage for adults diagnosed with OSA is initially limited to 12 weeks. After that, CPAP is covered only for patients shown to benefit from CPAP during this period.
- The patient must have a face-to-face "reevaluation" with the treating physician no sooner than the 31st day but no later than the 90th day on service. The evaluation should include documentation that OSA symptoms have improved and evidence of compliance to therapy.

TABLE 14. Follow-up components, goals, and actions

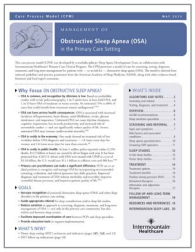
Risk factors and comorbidities	• **Assess weight/BMI.** Any reduction in weight may be helpful, but ideally aim for a BMI of 25 or less.[AASM1,MOR2] For any substantial weight loss or weight gain (10% of body weight or more), a follow-up PSG is routinely indicated to determine if PAP therapy is still needed and/or if adjustments to PAP level are needed (AASM STANDARD). *(See below.)* • **Assess blood pressure and improvement in other related comorbidities** such as atrial fibrillation.
Treatment effectiveness	• **Assess number of events/hour.** Aim for <10 episodes/hour based on a 3% desaturation index. An intermediate goal is a 50% reduction in the apnea-hypopnea index, but subtherapeutic treatment may not result in the same overall benefits as more effective treatment.[BEC] • **Assess for subjective or objective reduction in sleep-related symptoms** such as sleepiness, snoring, etc. For sleepiness assessment, the **Epworth Sleepiness Scale (ESS)** is recommended. *See page 10 for a description of this scale; see page 19 for information on how to access the scale.* • **Assess patient and bed partner satisfaction and quality of life measures** (for subjective or objective improvement).
Compliance	• **Assess for compliance to PAP therapy**. Use objective downloadable data whenever possible. Compliance is defined by Medicare as use of PAP device for at least 4 hours per night for 70% of the nights in a 30-consecutive-day period during the first 90 days.[CMS] • **Assess for regular use of oral appliances and compliance to behavioral modifications,** including alcohol and sedative use, sleeping position, and sleep hygiene. • **Troubleshoot reasons for non-compliance**; reinforce the importance of treatment.
Equipment	• **Assess mask/hose interface.** Does the mask hurt or leak? • **Assess mask/hose condition.** Is the hose broken, dirty filter, etc.? • **Assess for upper-airway irritation and/or pain** from CPAP or oral appliances. • **Troubleshoot and re-educate as necessary** (use *CPAP Fact Sheet, see page 19).* • **Refer for PAP training or sleep consult** if patient has ongoing equipment/mask/compliance problems. • **Remind patient that mask, tubing, and filter should be changed every 6 months.**
Follow-up sleep studies	• **Determine if follow-up PSG or HST is needed** *(see sidebar).* • **Consider nocturnal oximetry** for follow-up, especially for patients with a history of hypoxemia.

Note: If treatment continues to be unsuccessful after treatment adjustment and return follow-up visit(s), refer for consultation with a sleep specialist.

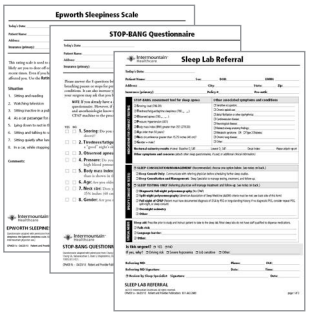
RESOURCES

Access this CPM and other resources from the Sleep topic page, which is accessible from intermountainphysician.org/ClinicalPrograms or intermountain.net/ClinicalPrograms. Click "S" from the **"Clinical Topics A-Z"** list and choose "Sleep."

Provider Tools



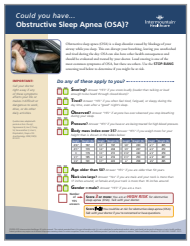
This care process model (CPM)
Order copies at iprintstore.org.



Forms, including *The Sleep Lab Referral*, *STOP-BANG*, *and Epworth Sleepiness forms.*

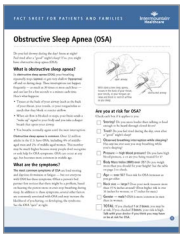
Print copies from iprintstore.org.

Patient Tools



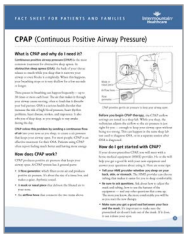
Color STOP-BANG handout, with English on one side, Spanish on the other.

Order copies at iprintstore.org.


Obstructive Sleep Apnea (OSA)


Home Oximetry


Sleep Lab Studies


CPAP


Live Well, Sleep Well

Fact sheets — order copies Order copies at iprintstore.org

In addition to the Intermountain resources above, patients can find a wealth of information including facts about sleep, sleep disorders, treatments and services, and an online discussion forum at the following AASM-sponsored site: www.sleepeducation.com

REFERENCES

AASM guidelines and standards of practice

The recommendations in this CPM were largely derived from the following clinical guideline from the American Academy of Sleep Medicine (AASM). This guideline brings together the recommendations from several AASM evidence-based practice parameters for evaluation and management of obstructive sleep apnea. For a complete list of other clinical guidelines, practice parameters, and practice reviews, go to: aasmnet.org/practiceguidelines.aspx

Other references

For a complete list of references used and cited within this document, go to:

intermountainphysician.org/clinicalprograms

or

intermountain.net/clinicalprograms

A link is provided on the Sleep topic page, or you can search for "OSA references" in the search field.

SLEEP MEDICINE SPECIALISTS:

To find a sleep specialist, go to intermountainhealthcare.org/providers and scroll to "**Sleep Medicine**" on the "**Specialty**" menu. You can narrow your search by **Hospital Affiliation, City, ZIP,** or **County**.

SLEEP APNEA DEVELOPMENT TEAM:

- Wayne Cannon, MD, Primary Care Clinical Program Leader (chair)
- Dixie Harris, MD, Medical Director, American Fork Hospital Sleep Center
- Douglas S. Ross, MD, Intermountain Utah Valley Pulmonary Clinic
- Howard M. Leaman, MD, LDS Hospital, St. Joseph Villa Sleep Lab
- Rick Morley, RRT, McKay-Dee Hospital Sleep Lab
- Robert J. Farney, MD, Medical Director, Intermountain Sleep Disorders Centers, LDS Hospital and St. Joseph's Villa
- Roy J. Gandolfi, MD, Granger Medical Clinic
- Steven Abplanalp, MBA, RRT, Director of Respiratory Services, Intermountain Healthcare
- Tom V. Cloward, MD, Medical Director, TOSH Sleep Disorders Center
- Vere L. Lancaster, MD, Intermountain Sandy Clinic; Medical Director, Homecare

This document presents a model of care for most patients, based on evidence and guidelines available at the time of publication. Recommendations should be adapted to meet the needs of individual patients and situations, and should not replace clinical judgment.

Intermountain® Healthcare

INTERMOUNTAIN SLEEP LABS AND CENTERS

AASM = Sleep Centers currently accredited by the American Academy of Sleep Medicine (AASM)
Note that Sleep "**Centers**" (versus "**Labs**") usually have on site sleep specialist consultation and follow-up.

Idaho	**Cassia Regional Medical Center Mini-Cassia Sleep Lab** 1501 Hiland Avenue, Suite E, Burley, ID 83318 Phone: 208-677-6488 **FAX: 208-677-6335**
Northern Utah	**Bear River Valley Hospital Sleep Lab** 905 North 1000 West, Tremonton, UT 84337 Phone: 435-207-4500 Contact: Mark Thompson **Logan Regional Hospital Sleep Center** 500 East 1400 North, Logan, UT 84341 Phone: 435-716-5709 **FAX: 435-716-2969** **McKay-Dee Hospital Sleep Center** 4401 Harrison Boulevard, Ogden, UT 84403 Phone: 801-387-2700 **FAX: 801-387-2709**
Salt Lake County	**Alta View Hospital Sleep Center** 9660 South 1300 East, Sandy, UT 84094 Phone: 801-501-2358 **FAX: 435-314-2385** **Intermountain Medical Center Sleep Lab (inpatient only)** 5121 Cottonwood Street, Murray, UT 84107 Phone: 801-507-2016 **FAX: 801-507-9598** **LDS Hospital Sleep Disorders Center (AASM)** 8th Avenue and C Street, Salt Lake City, UT 84143 Phone: 801-408-3617 **FAX: 801-408-5110** **Primary Children's Medical Center Sleep Center (AASM)** 100 Mario Capecchi Drive, Salt Lake City, UT 84113 Phone: 801-662-1780 **FAX: 801-662-1785** **Riverton Sleep Lab** 3723 West 12600 South, Suite 480, Riverton, UT 84065 Phone: 801-285-4870 **FAX: 801-412-3160** **St. Joseph's Villa Sleep Disorders Center (AASM)** 451 Bishop Federal Lane, Salt Lake City, UT 84105 Phone: 801-463-1309 **FAX: 801-412-3160** **TOSH Sleep Disorders Center (AASM)** 5770 South 250 East, Suite 340, Murray, UT 84107 Phone: 801-314-2400 **FAX: 801-314-2385**
Summit County	**Park City Sleep Lab** 900 Round Valley Drive, Park City, UT 84060 Phone: 435-658-7000 **FAX: 435-658-7520**
Wasatch County	**Heber Valley Medical Center Sleep Lab** 1485 South Highway 80, Heber City, UT 84032 Phone: 435-657-4444 **FAX: 435-657-4387**
Utah County	**American Fork Hospital Sleep Center (AASM)** 170 North 1100 East, American Fork, UT 84003 Phone: 801-855-4598 **FAX: 801-442-0432** **Utah Valley Regional Medical Center Sleep Center (AASM pending)** 1034 North 500 West, Provo, UT 84604 Phone: 801-855-4598 **FAX: 801-442-0432**
Southern Utah	**Dixie Regional Sleep Medicine Center (AASM)** 652 S. Medical Drive, Suite 310, St. George, UT 84790 Phone: 435-251-3940 **FAX: 435-251-3941** **Note:** This lab does not accept direct sleep test referrals from non-board-certified sleep doctors.
Rural Utah	**Garfield Memorial Hospital Sleep Lab** 200 North 400 East, Panguitch, UT 84759 Phone: 435-462-4190 **FAX: 435-676-1541** **Sanpete Valley Hospital Sleep Study Lab** 1100 South Medical Drive, Mount Pleasant, UT 84647 Phone: 435-462-4601 **FAX: 435-462-4627** **Sevier Valley Medical Center Sleep Lab** 1000 North Main, Richfield, UT 84701 Phone: 435-893-0252 **FAX:435-893-0258**

Patient and Provider Publications 801-442-2963 CPM031 - 05/31/13 (*minor revision 5/27/15, 5/19/16*).