

The Clinician's GUIDE to *PAP* *Adherence*

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With a Foreword by

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Chief Operating Officer/Associate Executive Director

American Association for Respiratory Care



Produced in collaboration with the
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Supported by an educational grant from ResMed Inc.

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It is estimated that more than 12 million Americans have sleep-disordered breathing (SDB). Left untreated, patients are at risk for impairment, including daytime sleepiness (which could result in less than adequate work or school performance) and a potential risk for impaired awareness when driving a car (and thus, the potential for an automobile accident). Fortunately, there are a variety of interventions that SDB patients have at their disposal to manage this disorder — most notably the positive airway pressure (PAP) device.

The American Association for Respiratory Care and its members have long recognized that patient adherence for the management of SDB is often inadequate. Once a positive pressure device is provided to the patient, its ongoing utilization will be left in large part to the patient and their caregivers. There are many understandable reasons that the patient may have for not using their PAP device, thus resulting in less than adequate utilization. In order for the clinician to provide appropriate counsel to these patients, it is first necessary to better understand the patient's reluctance to use the PAP device and the steps necessary for appropriate intervention.

As respiratory therapists, we have an opportunity to assure that the patient and family understand the utility of PAP devices. We can serve as a key resource professional who can identify poor adherence and the reasons for it and then work with the patient to take the necessary steps to improve it. We are relied upon also to have answers to questions that patients and caregivers may have about these devices. This opportunity takes place at the time of diagnosis, set-up of device, and when the patient presents to the acute care hospital or out-patient clinic. It is essential no matter where the respiratory therapist works that we be proficient in assessing inadequate adherence and simultaneously provide the necessary guidance that should correct this. The “Clinician's Guide to PAP Adherence” should provide the necessary tools to help you as you work with your patients.

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- how to register to take an examination to assess your mastery of course objectives,
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Learning Objectives

You should expect to learn the following as you read this book.

1. Cite the risk factors commonly associated with sleep-disordered breathing (SDB).
2. Identify the cardiovascular comorbidities frequently associated with SDB in adults.
3. Explain the mechanism by which SDB is thought to lead to or aggravate Type 2 diabetes.
4. Given a comorbidity commonly associated with SDB, explain how treatment for SDB may result in improvement of the comorbid condition.
5. Recognize the common history and physical findings that lead to strong suspicion of an SDB diagnosis.
6. Cite the criteria that must be met to establish a definitive diagnosis for SDB.
7. Describe the limitations of portable home SDB studies.
8. Describe basic differences between types of positive airway pressure (PAP) devices used to treat SDB.
9. List the indications, contraindications, and benefits of PAP therapy.
10. List common barriers to effective PAP therapy.
11. Identify common problems reported by patients receiving PAP therapy and recognize possible causes and solutions to these problems.
12. Identify needs to be considered when offering interface options to the patient to maximize comfortable and proper fit.
13. Describe the most effective method of introducing a patient to PAP.
14. Describe the “Ask-Provide-Ask” patient interaction technique.
15. Describe the four basic skills of motivational interviewing



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Sleep-disordered breathing (SDB) is a spectrum of breathing disorders during sleep. It spans from mild sleep disruption caused by upper airway congestion all the way to a cessation of breathing, as in central sleep apnea and obstructive sleep apnea (OSA). Characterized by repetitive, complete, or partial upper airway collapse during sleep, SDB affects as many as 15 million adult Americans.¹ It is more common in men, especially those with the risk factors of obesity, large neck circumference, as well as being middle-aged or older. The associated signs and symptoms are loud interrupted snoring, unrefreshing sleep, and excessive daytime sleepiness. Excessive daytime sleepiness is often the major presenting complaint, yet patients may present with a number of symptoms suggestive of SDB or with no symptoms at all.

At-risk Populations and Comorbidities

Cardiovascular Disease

Sleep-disordered breathing has been recognized increasingly as an important medical condition with multiple comorbidities. SDB causes a lack of air entering the lungs during apnea, which results in oxyhemoglobin desaturation with associated fluctuations in blood pressure and heart rate. These biological stresses can increase a patient's risk of developing or worsening cardiovascular disease and can alter glucose metabolism in patients with diabetes. Numerous articles in the medical literature discuss a direct link between SDB and several serious health issues, especially cardiovascular morbidities.¹

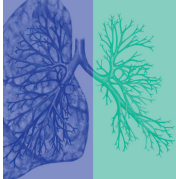
Hypertension: The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure identifies SDB as an important identifiable cause of hypertension.² SDB is particularly common in patients with resistant hypertension, and the American Heart Association identifies SDB as a secondary cause of the condition. Furthermore, studies indicate that the more severe the SDB, the less likely blood pressure is controlled despite the use of medications; and in normotensive persons, SDB can precede and predict the development of hypertension.³

Treatment of SDB with continuous positive airway pressure (CPAP) has been shown to markedly improve blood pressure control. A review of CPAP intervention trials suggests that CPAP use can be expected to lower blood pressure in hypertensive patients, with the largest benefit seen in those with severe SDB.³

Heart Failure: Sleep-disordered breathing is common in patients with symptomatic diastolic heart failure (DHF), and DHF patients with SDB are likely to have worse diastolic dysfunction than those without SDB.⁴ SDB may contribute to the progression of heart failure through several mechanisms: by eliciting greater sympathetic outflow during wakefulness and sleep, by increasing left ventricular afterload, by inducing hypoxia and secondary increases in right ventricular afterload, and by increasing the risk of myocardial infarction.¹

Recent data suggests that the presence of untreated SDB in patients with heart failure is associated with an increased risk of death compared to patients without SDB.¹ Yet, CPAP offers an effective treatment, lowering daytime heart rate and systolic blood pressure and increasing ejection fraction.

Stroke: In an analysis of more than 6,000 subjects from the Sleep Heart Health Study, the overall risk of prevalent stroke was greater among those with SDB, and increasing severity of SDB was associated with an increased risk of death among stroke patients. SDB was also associated with an increased risk of suffering a first-ever stroke.¹



Arrhythmias: Cardiac arrhythmias are reportedly more frequent in persons with SDB and increase with the number of apneic episodes and the severity of the associated hypoxemia.¹ Recent data from the Sleep Heart Health Study suggests that those with severe SDB had a two- to four-fold higher risk of nocturnal complex arrhythmias. And the same study showed patients with SDB had increased likelihoods of atrial fibrillation, nonsustained ventricular tachycardia, and complex ventricular ectopy.

Coronary Artery Disease: The prevalence of SDB in coronary artery disease patients has been shown to be twice that of those without the disease. In a study of more than 200 patients, an independent association between SDB and coronary artery disease as measurable by artery calcification was confirmed.¹

Even more importantly, it is argued that SDB may be a potential trigger for cardiac ischemia as it elicits severe hypoxemia, acidosis, increased blood pressure, and sympathetic vasoconstriction, as well as simultaneous changes in intrathoracic and cardiac transmural pressures. In fact, longer term studies show that SDB leads to a significant increase in the composite end point of death, myocardial infarction, and cerebrovascular events in patients with coronary artery disease.¹

However, an observational study suggested that in this patient population, CPAP intervention was associated with a decrease in the occurrence of new cardiovascular events¹ (see Table 1).

Table 1: Comorbid Cardiovascular Conditions of SDB in Adults

Cardiovascular Disease

- Hypertension
- Coronary artery disease
- Congestive heart failure
- Arrhythmias
- Stroke

Activation of Cardiovascular Disease Mechanisms

- Sympathetic activation
- Metabolic dysregulation
- Left atrial enlargement
- Endothelial dysfunction
- Systemic inflammation
- Hypercoagulability

Adapted from Young T, Skatrud J, Peppard PE. Risk factors for obstructive sleep apnea in adults. JAMA 2004; 291(16):2013-2016.

Type 2 Diabetes

Sleep-disordered breathing can disrupt glucose metabolism in patients with diabetes, thought largely to be a response to the oxygen desaturation events that accompany each apnea and hypopnea (partial obstruction of airflow with accompanying oxygen desaturation). This results in an increase in glucose caused by an increase in insulin resistance, which is readily demonstrated in glucose tolerance tests with the severity of the metabolic dysfunction linked to the severity of the SDB. Obesity is closely linked with an increase in Type 2 diabetes and cardiovascular disease, and the likely link is an acute sympathetic response to the oxygen desaturation events leading to a release of cytokines and vascular disruption.

As in cardiovascular diseases, successful treatment of SDB with CPAP has been demonstrated to decrease insulin resistance even within a few days of treatment and is sustained over time. It also results in a decrease of the acute sympathetic response and the accompanying release of cytokines and vascular disruption.



Reviewing this accumulation of research confirming a direct association between SDB and cardiovascular disease and diabetes, we promote a more aggressive diagnostic strategy. Studies continue to confirm that effective treatment of SDB can reduce a patient's risk of developing and experiencing complications from the above-mentioned conditions; therefore, physicians are encouraged to refer patients with suspected SDB to an accredited sleep disorders center for a comprehensive evaluation and/or overnight sleep study because commencing treatment for SDB is critical.

Effective Treatment Interventions: Lifestyle and behavior modifications such as weight loss and positional therapy to maintain a non-supine position during sleep can be effective. However, CPAP applied via a nasal interface is the current standard for the majority of patients because of its demonstrated efficacy in reducing apneas and hypopneas. If CPAP therapy proves unacceptable, oral appliances aimed at enlarging the pharyngeal airway may be considered. Surgical interventions are also available; however, success rates vary.

Diagnosis

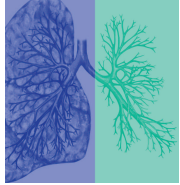
The diagnosis starts with a comprehensive and sleep-related evaluation by a physician knowledgeable in this sleep disorder. A detailed history is obtained from the patient and their sleep observer, which can be aided by the use of questionnaires about sleep habits and observations. Validated case-finding tools are also available, such as the Berlin Questionnaire,⁵ Epworth Sleepiness Scale,⁶ and STOP Questionnaire.⁷

Details of the history generally include assessing the presence and severity of interrupted snoring, nighttime awakenings or choking episodes, nocturia, unrefreshing sleep, and daytime sleepiness. Other findings can include the lack of dreaming, complaints of a dry mouth, and nasal congestion. Many of the daytime symptoms come from sleep deprivation caused by the SDB, such as poor memory, irritability, decreased social engagement, and forgetfulness.

Physical examination focuses on an assessment of obesity and the presence of hypertension or coronary heart disease, as well as the anatomy of the upper airway. These can include a body mass index of ≥ 30 , increased neck circumference (≥ 17 inches in men, ≥ 16 inches in women), nasal congestion, large rising tongue, low-lying soft palate, large tonsils and/or uvula, and a generally crowded airway. The Mallampati score of the upper airway is associated with the presence and severity of SDB. This score was developed by anesthesiologists to evaluate the upper airway prior to intubation for surgery and has been applied successfully to the evaluation of potential SDB patients.^{8,9}

Definitive diagnosis of SDB is made by a Type 1 overnight sleep study (polysomnogram), ideally performed in an accredited sleep lab or center with a trained sleep technologist (polysomnographic technologist or PSGT) in attendance. Measurements include the assessment of the presence of sleep and its stages, nasal and oral airflow, body position, chest and abdominal movement, snoring, cardiac rhythms, oxygen saturation, leg movements, and other clinical assessments. These are then evaluated by an assessment (scoring) of the entire record and the patient's experience during the study. These findings are then interpreted by a physician trained in the field of sleep medicine.

Portable home SDB studies (Types 2–4) have been proposed for patients whose clinical evaluation indicates a high risk of significant SDB and who may have difficulty obtaining a sleep study in an accredited laboratory, sometimes because of lack of testing availability. These are less complex devices, often measuring only a few variables. Moreover, this form of testing does not provide the observations of a trained PSGT. In addition, in-lab testing allows for initiating CPAP treatment on the same night once the SDB diagnosis has been confirmed (split-night study). Complex patients, such as those with accompanying heart failure or chronic lung disease, or general debility due to comorbid disease or advanced age, should be studied only in a laboratory setting with a PSGT in attendance.



The Science of PAP Management in SDB Patients

Sleep-disordered breathing is characterized by intermittent partial or complete collapse of the upper airway during sleep. Dr. Colin Sullivan introduced CPAP generators for the noninvasive treatment of SDB in 1981. Using a patient interface, the CPAP generator is able to provide a continuous flow of air pressure into the back of the throat. The generated pressure then effectively splints the upper airway open and allows for unobstructed breathing. Positive airway pressure (PAP) therapy is a highly effective method of treating even severe cases of SDB.

Types of PAP Devices

New generations of PAP devices are relatively portable, quiet, and often come with a variety of features designed to enhance patient comfort. A basic CPAP generator provides the patient with a fixed pressure of PAP therapy throughout both inspiration and expiration. Many CPAP devices are equipped with a ramp feature that allows the clinician to set a length of time for the gradual increase of the PAP pressure from a low level to the final prescribed pressure. Patients who require a relatively high pressure to maintain an open airway may find it easier to fall asleep while on a lower pressure.

A bi-level PAP device delivers a higher pressure level on inspiration PAP (IPAP) and cycles to a lower pressure on expiration PAP (EPAP). A bi-level device may be appropriate for the patient who requires a high level of CPAP to resolve all respiratory events and who is intolerant of the final high pressure. The bi-level device allows for the setting of the EPAP at the pressure determined to resolve obstructive apneas and the IPAP setting at the pressure determined to resolve the remaining respiratory events (snoring, hypopneas, desaturations, etc.). The level of pressure difference between the IPAP and EPAP settings provides a pressure-supported augmentation of tidal volume that can benefit some patients, especially those who have underlying hypoxemia or hypoventilation. Some bi-level devices allow the clinician to set a rate that cycles the device from inspiration to expiration. Using the back-up rate feature and the bi-level settings allows for noninvasive ventilation and may be useful in patients with neuromuscular disorders or COPD.

Auto-titration or auto-adjusting PAP (APAP) devices monitor a patient's respiratory patterns and have the ability to titrate pressure levels based on respiratory event detection algorithms. The APAP algorithms used by different manufacturers are proprietary and may vary greatly in their response to respiratory events. While some of the devices respond to snoring, flow limitation, apneas, or hypopneas, others may have a more limited response. In addition to having variable responses to different types of respiratory events, the algorithms may also respond to events in different time intervals or with varying degrees of pressure changes. APAP devices are particularly attractive to patients who require significantly different pressures in different sleep positions or sleep stages (e.g., supine or rapid-eye movement-dependant SDB). The patient with fluctuating weight or seasonal allergies leading to nasal symptoms may benefit from APAP as well. Finally, a well-established patient who experiences a positive or negative change in their condition, such as weight loss or return of daytime sleepiness, may benefit from the temporary use of an APAP device to assess for CPAP settings.

Expiratory pressure relief and proportional PAP are features offered on some PAP devices that allow for a slight decrease in pressure at exhalation. Though the features are primarily designed to address the patient's comfort level and perception that exhalation against a positive pressure is difficult, the actual amount of pressure decrease varies from one PAP manufacturer to another. As manufacturers continue to develop new versions of their proprietary algorithms and product designs, the clinician must strive to familiarize oneself with the various devices.

Indications

Sleep-disordered breathing is prevalent in the general population with an increased prevalence in certain groups, including the obese and the senior populations. Sleep-disordered breathing is made up of a variety of different types of apnea, and the choice of treatment modality is dependant on the type of apneas identified and the patient's tolerance of the prescribed device. Simple SDB is treatable with basic CPAP in most instances, though the use of a bi-level PAP device is indicated in some apneics.



The treatment of complicated cases of central apnea, Cheyne-Stokes respirations, or complex SDB may require the use of high-technology devices. COPD and neuromuscular patients may require the use of noninvasive ventilation accomplished with bi-level devices with or without back-up rates.

Contraindications

Positive airway pressure therapy is a noninvasive treatment and, as such, has few contraindications, although untreated pneumothorax or increased intracranial pressure is of concern with any type of PAP therapy. PAP therapy is most commonly applied using a nasal interface (mask) or nasal prong style of interface; some patients will prefer a full-face mask that covers both the nose and mouth area. Obstructed or significantly compromised nasal structures will make the use of PAP therapy problematic and, unless correctable, may be a relative contraindication for PAP use.

Benefits of PAP Therapy

The consequences of untreated SDB are many and vary from sleepiness throughout the day, preventing daytime functioning, to an increased incidence of cardiovascular conditions such as hypertension, myocardial infarction, and cerebrovascular accident. In general, the appropriate use of PAP therapy will improve sleep quality and lead to a decrease in daytime sleepiness. It is important to note that not all patients with SDB report symptoms of daytime sleepiness. In those individuals who present with complaints of morning headaches most likely associated with changes in oxygen and carbon dioxide levels throughout the night, many will report an improvement in the frequency and intensity of those headaches. As sleep quality improves, there may also be a concurrent improvement in daytime cognitive function and short-term memory.

Untreated SDB is also associated with a nighttime increase in sympathetic activity, causing both systolic and diastolic blood pressure increases as well as cardiac dysrhythmias and an increase in the development of atherosclerosis. Eliminating the SDB using PAP therapy can result in a decrease in nighttime and daytime blood pressure and can be associated with the reduction or elimination of nighttime tachycardia-bradycardia dysrhythmias, premature beats, and potential myocardial infarction.

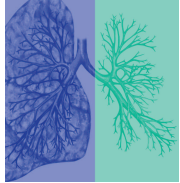
Poor sleep quality and sleep deprivation have been associated with the development of insulin resistance in normal volunteers. Patients with untreated SDB are at high risk for the development of insulin resistance, and those patients who have diabetes may find the condition difficult to control until the SDB is treated.

Gastroesophageal reflux disease (GERD) has also been associated with SDB and is likely due to the increased negative intrathoracic pressures generated by breathing against a closed airway. Treating the SDB may improve GERD symptoms. With treatment of SDB, the improvement of sleep quality will likely lead to an increase in the deeper stages of sleep and promote the secretion of anti-diuretic hormone essential for the control of nighttime fluid production. The improved sleep quality associated with the successful treatment of SDB is also associated with improvement in mood, decreases in depressive symptoms, and improved psychosocial relationships both at work and at home.

Common Barriers to Effective PAP Therapy

Patient-related Airway Pressure

Although PAP is a relatively simple therapy, it can be intimidating and problematic for the patient. PAP therapy uses a blower to force air into the upper airway at a pressure level high enough to prevent the collapse of the airway. In some patients the level of pressure required can be significant; and even in those who require lower pressure settings, the feeling of the air pressure in the upper airway may be uncomfortable. The continuous flow of air into the upper airway may cause irritation or drying of the nasal passages and ultimately lead to a feeling of congestion and/or a reflex rhinorrhea. In a few patients, the nasal dryness is enough to cause the development of epistaxis. At higher pressures or in the event of the mouth opening with the use of the nasal interface, the patient may also experience a dry throat and mouth. In rare instances and usually at higher pressures, the patient may suffer from a painful pressure in the ears caused by air in the Eustachian tubes. Chest



discomfort or gastric distention/bloating are rarely seen; but higher pressures may be associated with swallowing air, especially if the patient has a relatively low esophageal opening pressure.

Interface

Most patients and clinicians discover that the mask interface is a crucial part of PAP therapy tolerance and comfort. It is important that the patient be fitted with an appropriately sized interface in a style that is both accepted and comfortable. The fit of the interface and its headgear are crucial to eliminating the most commonly seen complaints: pressure sores, eye irritation, development of skin creases, and air leaks. Air leaks can be categorized as those from an open mouth or those from around the interface itself.

Inadequate Education

Most medical therapies are better accepted if the patient is provided the opportunity to learn about the disease process being treated and is given an explanation of how the therapy works. Ideally, education on SDB starts at the initial physician evaluation and continues throughout the evaluation, testing, and equipment set-up process. In addition, sharing information on potential therapies and expected outcomes is also beneficial. Finally, a thorough explanation of PAP therapy, PAP equipment, and its use and maintenance is essential to the patient and family's comfort level with the equipment and therapy.

Behavioral

It is often the family or spouse of a patient who first brings his or her sleep disorder to their attention. As in many chronic diseases, SDB is not a condition that suddenly appears; its gradual onset with subsequent symptoms is usually slow enough that the patient may be unaware of the changes. This may lead to uncertainty and even a denial of symptoms in general. Even after documentation of the SDB, the patient may still deny a problem exists and be reluctant to accept a therapy with no perceived benefit. Additionally, even a patient who accepts the diagnosis may deny the seriousness of the diagnosis and remain reluctant to accept therapy. The PAP equipment is noninvasive but nonetheless can be bulky on the face, irritating to wear, and a source of embarrassment to some patients.

The bedroom area is a private area to most adults, and the use of PAP therapy can be considered intrusive. If family members or spouses are not accepting of the therapy, the patient will be even more reluctant to continue. Young adults and women in particular may be embarrassed by the PAP interface and headgear. It is important to include family members in the education process to give them the opportunity to provide support to the patient.

Cognitive

Patient-related: Patients with severe sleepiness from untreated SDB can present with less than ideal ability to assimilate information. Repetitive instructions beginning at the initial evaluation and then with each follow-up visit are crucial. Asking the patient and family or caregiver to demonstrate the use of the equipment and its maintenance will help ensure continued proficiency. It is also important to consider any other learning challenges the patient and clinician will encounter, including language or cultural differences. A patient should be provided with learning materials in a language they can read and understand. The use of a translator may be necessary for some patients. Caregivers of developmentally challenged patients should also be included in the information and education process for both the sleep disorder and the prescribed therapy.

Provider-related: Clinicians need to have a high level of background experience to be able to explain procedures, therapies, and troubleshooting of therapies to patients and family. Although it is ideal for the physician to explain the possible diagnosis, testing procedures, and possible therapies, the patient and family will have continued questions throughout the process. It is important that the clinician take the time to explain all aspects of care to the patient and answer any question as it arises. Clinicians will often cite the lack of reimbursement as reason to limit the amount of time spent with a patient for educational purposes, but it is



important to realize that the most successful use of PAP therapy is associated with programs and clinicians who spend an increased amount of time with the patient and family. Follow-up care appears to be one of the key indicators to long-term compliance of patients needing PAP therapy. Although there are no absolute standards for follow-up frequency and type, most published literature correlates successful use of PAP with frequent follow-up and reinforcement of educational materials in the first few weeks of therapy.

The home medical equipment (HME) provider is one of the key links for the successful PAP-therapy patient. These clinicians have a large role in the reinforcement of educational material initially provided by the physician or sleep clinic. They often take primary responsibility for training patients and family on the use and maintenance of the equipment in the home. HME providers have a large role in the fitting of interfaces, identification of problems, and troubleshooting both patient and equipment issues. As the interface seems to be the source of patient dissatisfaction in many cases, the HME clinician may be asked to provide a variety of options to the patient. While some companies do their best to provide patient options, others may be limited by parent companies or manufacturer agreements as to what brands or styles are available.

Equipment-related: There are a number of different types of PAP machines with various features. Some of the features, such as ramping and expiratory pressure relief, are designed to improve patient comfort. Some features, such as APAP or bi-level PAP, are designed to address specific types of SDB. Some features, such as downloadable usage cards, are designed to provide the health care provider and clinicians with objective data that can be used to assess the patient's usage patterns, problems such as interface leaks, or changes in a patient's condition. Machines with extra features are rarely reimbursed at higher rates than simple PAP machines. Also, due to the higher HME cost of these machines and possible contracts with manufacturers, HME companies may not be able to routinely make all brands and all types of equipment available.

Most new generation PAP machines are quite durable and small enough that portability is not a problem. Many brands offer battery-operated models suitable for camping or use during travel. The cost of basic PAP machines has come down considerably, though final charges to patients are influenced by insurance reimbursement schedules and manufacturer/retailer contracts. Table 2 lists some factors that may positively or negatively influence the patient's compliance with PAP therapy. A list of common problems and solutions for PAP therapy is located at the end of this manual.

Table 2. PAP Compliance Factors

Increased Compliance

- Severe SDB (≥ 30 /hour)
- Resolution of symptoms
- Older patient
- Early benefit (≤ 7 days)
- Frequent follow-ups
- Patient education
- Auto-PAP vs. CPAP/bi-level PAP
- Wife shares the bed
- Bed partner encouragement
- Self-management of chronic illness
- Behavioral readiness to change
- Women
- Comorbid illness
- Sleep center involvement

Decreased Compliance

- Mild SDB
- Young and/or single adult
- High PAP level
- Claustrophobia
- Full-face mask interface
- No or limited patient education
- Ill-fitting mask
- Nasal congestion
- Persistence of symptoms
- Depressive symptoms
- Lack of self-efficacy
- No physician or family support
- Patient denial
- Skin irritation from interface
- Cognitive deficit (dementia and language barrier)



Assessing Patient, Family, and/or Caregiver Education Needs

Successful positive airway pressure compliance depends on many factors that determine how well a patient adheres to therapy. Any preconceived negative notion can influence how receptive the patient is to the treatment of their sleep-disordered breathing. The challenge is to provide correct information to the patient and family and/or caregiver of the consequences of untreated SDB and PAP therapy. The most important course for assuring compliance with PAP is proper education of clinicians working with patients who have SDB. When the diagnosis of SDB is determined and PAP is the choice of treatment, education for the patient, significant other, and family members by a competent clinician or health care provider is tantamount to successful PAP adherence. Having a positive support system in place at the beginning of the education process and PAP therapy is helpful in PAP compliance. First impressions count, and positive support is imperative.

Ideally, the patient's physician will have explained the serious health risks and psychosocial consequences that are associated with untreated sleep-disordered breathing as well as the benefits from successful treatment. The patient and their support team should have a clear understanding that SDB is a serious medical condition that requires attention and treatment before orientation to treatment is initiated.

Educational Content and Process

Patients have the right to know about the equipment they will most likely use for the rest of their lives. Studies show that the extent of patient education on PAP use and compliance is directly related to the depth of that education. An interactive introduction to PAP therapy and instruction on the operation, use, and maintenance of the equipment by a knowledgeable, attentive, and understanding clinician or health care provider is essential.

Although the patient has not been given the option of selecting the type of prescribed treatment unit (CPAP, bi-level PAP, APAP), the choices are many and it is important that the patient learns the features of each unit before choosing. Some may prefer to select a system based on appearance, size, or color with a very quiet/silent blower, heated humidifier, or even a system with imbedded heated wire technology in the tubing.

Once the PAP unit is selected, the manufacturer's recommended orientation guide/manual should be followed. Be generous with the time it takes to instruct the patient and their support system. Be cognizant of the patient's language barriers, health care literacy, and mental and physical capabilities — such as ability to understand explanations or limitations in hand/eye coordination, finger strength and manual dexterity, or low/no vision. Be prepared to help patients work through anticipated challenges. Ensure that your explanations are clear and understood when reviewing how to assemble and disassemble the PAP interface supplies and operate the PAP unit, as well as the why, when, and how to change filters. Point out (and highlight) the written directions in the operation manual during the education process. Be sure the patient understands the ramp function as well as how to adjust the humidifier heater setting. Have the patient repeat what has been demonstrated.

Interface Fitting and Desensitization

Acceptance and compliance to PAP therapy is directly related to the initial education, which should include selecting the correct type, size, and fit of interface. A well-fitting interface will improve patient comfort and, in turn, lead to acceptance and compliance to PAP therapy. Ideally, this is accomplished during the patient's titration study. If possible, it is helpful to have the patient continue to use the same type of PAP interface for the first few months. The goal is to allow the patient to adjust to therapeutic pressure before an assortment of PAP interfaces is presented for selection. It is discouraging for the patient and PAP specialist to spend the first three months finding a "stylish" mask instead of adapting to therapeutic pressure.



The choice of PAP interfaces and their fit is better understood once the patient is comfortable with treatment pressure. Occasionally there are some patients who must be refitted with a suitable PAP interface that will allow them to resume the acceptance process. During the interface fitting session, two important things need to happen. The first is that the clinician should determine which interface fits the patient best. The second is to ask the patient which interface felt the most comfortable. This is an important key to compliance at home.

Several factors need to be considered when offering interface options to the patient to ensure the interface will feel comfortable and fit properly. Facial features such as full or shallow cheeks, facial hair, nose shape, deviated septum, narrow bridge, and nasal versus oral breathing are crucial in selecting interfaces. Patients who wear dentures will need to decide whether to sleep with or without them at night. Fitting a PAP interface is less of a challenge if they choose to sleep with their dentures in place. Patients should check the stability of their denture adhesive prior to applying their PAP to avoid getting air under their dentures and possibly dislodging them. Sleeping without their dentures will present an interface-fitting challenge. It is important for the clinician to remain current on PAP interface improvements and new designs.

Introduction to PAP as a Titration Study

The most effective method for determining fit and function is to have the patient sit at the bedside in a chair, block one nostril and sniff, and then repeat on the other side to determine if there is a patent nasal airway. This will help determine if a full-face or nasal-oral interface should be considered. If there are concerns of claustrophobia, reassure the patient that if the claustrophobia is overwhelming, the fitting trial will be interrupted immediately and they will have an opportunity to relax. Each interface selected can be applied with PAP on a low setting for the patient to determine which fits best and is most comfortable.

To make the nasal interface fitting with pressure more tolerable, instruct the patient to rest the tongue on the roof of the mouth to avoid breathing through the mouth. Fitting a full-face or oral-nasal interface works best if the jaw is relaxed and the mouth is partially open. Remind the patient to breathe normally, then gently apply the interface for only three to four easy breaths. Then remove the interface and ask the patient's opinion. Listen with interest and respond positively to their comments. Based on their comments, some patients may require several desensitization sessions. At some point during the interface selection and fitting, disassembly and reassembly of the chosen interface should be reviewed.

Explain the purpose of the exhalation port as well as some of the other comfort features of the device. Encourage the patient to adhere to a proper cleaning and disinfection technique for PAP interface and related components on a weekly basis.

The final test is to yield control of the interface to the patient and have him/her hold it in place, being careful not to occlude the exhalation ports. Once breathing is comfortable with a low pressure, the headgear may be attached. Encourage him/her to lie down, preferably supine, with the pressure on. Allow the patient to wear the interface with the pressure on for a few minutes before removing it. Ask the patient if they have any other concerns and document interface type, size, and desensitization process in the chart.

Desensitization Process After PAP Titration

Some patients continue to have difficulty adjusting to their interface and/or therapeutic pressure after their PAP titration in the sleep lab. It is helpful to have them return to the sleep lab for a re-evaluation of their current interface and/or desensitization session. Follow the initial desensitization procedure previously described. When the patient has adapted to the lower pressure, gradually increase pressure to the prescribed level to check for patient comfort, proper fit, and air leaks. Allow the patient to acclimate for a short time before concluding the education session. Encourage the



patient to continue acclimation exercises at home by performing practice breathing sessions with the interface and pressure on for about an hour while doing something that is a distraction, such as watching television, listening to music or a book on tape, or even reading. They should use PAP whenever they take a nap. Patients should be encouraged to use PAP during the first four to five hours of sleep with the ultimate goal of using PAP their entire sleep period. Remind them that every hour of sleep with PAP on is a success.

PAP compliance can diminish rapidly when the patient experiences uncomfortable side effects that fragment sleep. Up to 75% of patients may experience symptoms (e.g., sinus pain, dry and/or congested nasal membranes, or dry mouth and throat), which may be resolved with heated humidification.^{10,11} The addition of a chin strap will help keep the patient's mouth closed to aid in correcting the dry mouth and throat as well as eliminating oral leaks. Poor-fitting interfaces lend to significant problems such as air leaks toward the eyes, resulting in conjunctivitis.¹² Excessive pressure leaks can also be responsible for an inadequate therapeutic pressure level contributing to residual sleep apnea. Pressure sores anywhere around the nose are usually due to either a PAP misfit or tight headgear.¹⁰ A facial rash in the same area where the interface rests may be due to sensitivity to interface construction materials or too much moisture being delivered with the prescribed pressure. Inadequate PAP titration could also be responsible for some patients putting their PAP aside since some symptoms persist and could discourage continued use.

Additional PAP complaints include air swallowing, earaches, headaches, chest discomfort, lung pain, bed partner complaints, and simple inconvenience.^{10,12,13} Experiencing only a few of these side effects can influence how well the patient will accept and use PAP therapy. Any potential PAP treatment benefits may lose importance when adverse side effects become overwhelming. The competent clinician must present a thorough PAP therapy introduction to the patient and their important support system.

Tools for Helping Patients Improve PAP Compliance and Adherence

Patient acceptance and compliance of PAP can be measured in a number of ways. Two patient report questionnaires are:

- *The Epworth Sleepiness Scale* is a self-administered questionnaire designed to measure daytime sleepiness. Patients rate their chances of dozing on a scale of 0 to 3 in eight different situations. The final score ranges between 0 (no daytime tiredness) and 24 (maximum daytime sleepiness). This can be used to determine the patient's perspective on how the daytime sleepiness has improved since starting PAP treatment.⁶
- *The Functional Outcomes of Sleep Questionnaire* is designed to assess the impact of excessive sleepiness on daytime function and measure improvement after treatment. It is comprised of 30 questions divided into five scales: activity level, vigilance, intimacy and sexual relationships, general productivity, and social outcome. Each scale is rated from 0 (maximum functional impact) to 24 (no functional impact). Only items that are regular activities are included in the scoring criteria since some questions may not have a response.¹⁴

Newer PAP units employ technology that facilitates more accurate tracking of data management, which reports patient adherence and potential problems with their current PAP interface.

Once they have become adjusted to PAP therapy, many patients describe an overall improvement in quality of life. With a better quality night's sleep, patients report feeling more energetic and alert during the day. There is improvement in concentration and memory, work performance, driving skills, dealing with challenging and even boring tasks, and their functional level is more consistent



with their peers. It is the patient's perspective of how PAP affects their life. When the patient has a positive opinion about the benefits of using PAP therapy, he or she is more likely to remain compliant. PAP may do more than help improve sleep. It can also be instrumental in improving other comorbidities related to sleep apnea, such as diabetes, high blood pressure, heart disease, heart failure, and stroke.

Despite all the efforts at educating patients in the use of CPAP for the treatment of SDB — including training them on the use of the equipment as well as pointing out the adverse effects of non-treatment — approximately 50% of patients discontinue CPAP use within the first year. Although this seems like a dismal failure, non-adherence to treatment is not unique to CPAP users. Studies have revealed that 20–40% of patients who are treated for an acute illness, e.g., acute bronchitis, do not complete the treatment. In chronic illnesses, such as diabetes, COPD, and heart failure, as many as 30–60% do not adhere to the recommended treatment program. This increases to 80% non-adherence for preventive treatment, such as calcium supplementation to prevent osteoporosis. As noted above, various factors can be identified that give evidence predicting an increased or decreased compliance with CPAP. These are meant to be only a guide, as each patient must be convinced of CPAP benefit in order to keep using it. Successful compliance with CPAP is very dependent on the interaction between the patient and the health care provider. Ideally, the goal is to have the patient become self-reliant with the use of CPAP.

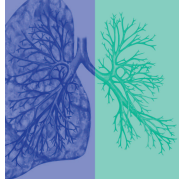
Too often the interaction between the respiratory therapist and the patient becomes adversarial, with the therapist becoming frustrated at the patient's lack of regular use of CPAP, despite all the teaching and encouraging. Several techniques have been identified that may assist in the interchange and place the patient "in charge."

The "Ask-Provide-Ask" formula has been suggested to improve patient compliance, in contrast to confronting the patient about his/her lack of CPAP use. The steps include:

1. *Ask* what the patient knows. ("Tell me what you know about CPAP.")
2. *Provide* information with the patient's permission. ("May I share some additional information with you about CPAP?")
3. *Ask* the patient's reaction to the information. ("What are your thoughts about these additional benefits of CPAP?") In contrast, health care providers often dominate the conversation, when in many situations it is better to start out by asking the patient what understanding he/she has about a specific treatment that is recommended.

Common traps to avoid with unmotivated patients include:

1. Confrontational-denial trap (*Provider*: "Not using CPAP may increase the risk for a stroke." *Patient*: "I'm young. I'll take my chances.")
2. Question-answer trap (*Provider*: "Why don't you want to use CPAP?" *Patient*: "Because I can't stand it." *Provider*: "Why?" *Patient*: "It's not very romantic.")
3. A premature focus trap in which the provider starts giving advice that he/she thinks the patient needs before soliciting any patient input.
4. Expert trap in which the provider chooses the focus of discussion, not asking the patient's opinion.



Motivational Interviewing

The motivational interviewing technique of promoting patient change and adherence to therapy was introduced in the early 1980s, using a format that can be accomplished within a brief 10–15 minute patient encounter. It is based on four counseling principles:

1. Express empathy by “being with” the patient.
2. Develop and identify a discrepancy in the patient behavior.
3. Expect and roll with the resistance to change.
4. Support patient self-efficacy.

Motivational interviewing consists of four skills:

1. *Reflective/active listening*: This clarifies the patient’s understanding, hopefully diminishes resistance, and provides empathy that may encourage discussion of the reasons why the patient should change. (“Tell me your understanding of OSA.” or “So you say you would rather not use CPAP.”)
2. *Ask open-ended questions*, avoiding “yes/no” answers and trying to discuss the reasons for change. (“What worries you about OSA?” “What do you think would happen if you don’t use CPAP?” “How might CPAP help you?”)
3. *Affirm the patient*, which supports self-efficacy and builds a rapport, reinforcing the patient’s efforts. (“Thank you for discussing this with me.” “It’s great you are using CPAP on most nights.” “I appreciate your honesty about not using CPAP.”)
4. *Summarizing* during the interview, which reinforces the issue discussed, identifies the desire to change and sets an actual plan to change. (“You said that you’re concerned about the effect of OSA on your heart. What else?”)

Motivational interviewing has been successfully used by health professionals in the management of chronic illness (e.g., diabetes, COPD, and heart failure) in which the patient is asked to change his/her lifestyle habits. Considering that SDB is also a chronic illness, these principles can apply to the use of CPAP as well. Various resources are available to learn more about this technique, including information at the web site www.motivationalinterview.org and at other resources listed at the end of this document.

Success with acceptance and compliance is based on initial positive education, pressure desensitization, interface selection, humidification, support, and follow-up. Initial and long-term follow-up is critical. The patient should receive support and contact information, including telephone numbers. Some patients are hesitant to call for more information and encouragement. It is imperative that the home care provider’s clinician contact the patient to inquire about any problems with PAP and provide encouragement on nightly adherence and positive reinforcement, as well as answer any questions they might have. These support calls should occur every day for the first three days after the initial education process and be followed by weekly phone calls for the next three weeks, monthly for two months, and then quarterly. If the patient has challenges that cannot be resolved, the home care provider’s clinician should refer the patient back to the sleep center staff. Each contact should be documented and a copy forwarded to the sleep center/sleep specialist or the patient’s home care provider for entry in the patient’s chart.

Unless the patient has significant challenges that cannot be resolved with the home care provider or sleep center’s clinicians, a clinical re-evaluation follow-up with the sleep center physician will occur between Day 31 and before Day 90 of PAP initiation, which will satisfy current Medicare/Medicaid and other third-party payer requirements. The patient is requested to bring the PAP unit and accessories to the visit. If the PAP unit has the capability, all information recorded via the unit should be downloaded for review during each visit. Any concerns of interface fit, leaks, or pressure



setting will be addressed at this time. The patient is encouraged to see the sleep physician three months from this visit followed by another visit in six months and then annually.

The patient's primary care physician (PCP) should receive updated notes regarding patient visits to the sleep physician for the patient's chart. The patient's physician routinely assesses the continued effectiveness of PAP treatment to determine whether further intervention is warranted. It is helpful to have a sleep center PAP specialist available for a PAP clinic for those patients needing additional assistance in adjusting to PAP therapy and/or interface issues.

Because it can be difficult to adjust to PAP therapy for SDB, it is helpful to learn from others who use PAP or know someone who uses PAP. An SDB support group can be a source of good information as well as positive reinforcement. Organizing a support group takes time, patience, and some creativity. The American Sleep Apnea Association joined the A.W.A.K.E. (Alert, Well, And Keeping Energetic) Network in 1990 in an effort to assist patients, their families, and the health care community concerned with SDB. This support organization is composed of hundreds of mutual-help support groups for persons affected by SDB. Members have a better understanding of the nature of their disorder and their prescribed treatment.

Many sleep disorder centers present SDB awareness meetings in an effort to provide an avenue for people with SDB, their families, support persons, and others interested in learning more about SDB and PAP therapy. A regularly planned program with appealing topics and speakers that spark interest will draw many who have SDB or who know someone who has SDB. Ultimately, some time should be set aside for group discussion. Support group meetings and PAP clinics created to provide education and encourage patient acceptance and compliance will increase patient compliance to positive airway pressure. A program that offers consistent follow-up, troubleshooting, and regular feedback to both patients and physicians can improve PAP compliance.

In addition to support groups, there are tools to help improve PAP compliance and adherence that are available from several organizations. Many manufacturers of PAP units and interfaces include educational DVDs/CDs with their equipment to help patients become more familiar with their new treatment program. Some sleep centers/labs prepare their own "Tips and Tricks" literature for their patients who use PAP. A few books have been written regarding SDB and nasal CPAP. They include: "This Book Blows: A CPAP Bedside Companion" by Mike Moran; "My Daddy Snores" by Nancy H. Rothstein; "Remmy and the Brain Train" by Dr. James B. Maas; and "Snoring from A to ZZZZ" by Dr. Derek S. Lipman.

There are several online SDB support groups and discussion forums for the PAP therapy user. The following are also accessible online and offer sleep disorder information, opportunities to discuss PAP challenges with other users, and customer testimonials. Some also include a CPAP newsletter:

- Apnea Support Forum, American Sleep Apnea Association (www.apneasupport.org)
- Sleep Health Centers (www.sleephealth.com/cpap/index.htm)
- Talk About Sleep (www.talkaboutsleepp.com)
- Sleep Quest (www.sleepquest.com/c_support.html)
- Battle Sleep Apnea (<http://battlesleepapnea.com>)
- CPAP Talk (www.cpaptalk.com)

Other informational resource web sites are listed in Additional Reading.



Follow-up Guidelines

Sleep-disordered breathing is a chronic illness, not unlike COPD, asthma, diabetes, and other chronic illnesses. In order to achieve successful treatment, both patients and caregivers must realize the chronic nature of this sleep disorder and the fact that they are likely to need continued treatment and follow-up for the rest of their lives. Except for the rare patient in which a surgical procedure totally resolves the problem (e.g., tonsillectomy in children with SDB), ongoing successful treatment of SDB requires a collaboration of the patient's physician, HME provider, sleep center, and sleep physician specialist, as well as the patient's bed partner and family. These processes begin with the initial referral of the patient for evaluation and/or sleep testing and continue throughout the patient's treatment program.

In contrast to other chronic illnesses (such as hypertension and diabetes, for which national professional organizations have published evidence-based guidelines for treatment), there are no such guidelines for the ongoing treatment of SDB. As a result, the appropriate treatment program for patient follow-up remains controversial. Nonetheless, guidance can be obtained from publications of national professional organizations, such as the consensus statement on treatment published by the American Academy of Sleep Medicine (AASM). AASM web links that are appropriate include www.aasmnet.org/Resources/ClinicalGuidelines/OSA_Adults.pdf and www.aasmnet.org/Resources/PracticeParameters/PP_PositiveAirwayPressure.pdf. Other valuable links include: www.aarc.org and www.yourlunghealth.org.

Initial Follow-up and Subsequent Contacts and Visits

A number of randomized controlled trials have addressed issues such as the optimal time for the first follow-up visit, frequency of follow-up, and what parameters to study. Although there is no agreement on the best approach, most report that the visit should be relatively soon after the treatment with PAP is initiated. Most agree that the sooner the better, because a good first experience by the patient will enhance their continued use of the equipment and vice versa. Table 3 lists the variables that favor compliance and those that do not. A variety of contact methods have been utilized, such as daily phone calls for the first week, with further follow-up at two weeks, four weeks, three months, and six months. Others have provided a nurse home visit on Days 7, 14, 28, and then at four months. The AASM suggests that the initial visit be conducted in the first few weeks, followed by every three months for a year and then yearly.

These follow-ups are best conducted by the HME respiratory therapists, as well as nurses with specialized training in positive airway pressure treatment. Patients are often also followed by the sleep center staff, with periodic evaluations by the sleep physician specialist. Unfortunately, some communities do not have access to a sleep center, as a result of which the PCP must rely heavily on the HME provider. The initial follow-up visit may be mandated by the third-party payer, whose goal is to assure that the patient is using the equipment as prescribed. For example, Medicare guidelines require that a physician must have a face-to-face consultation with the patient within the first 31–90 days of initiation of treatment in order for the HME to obtain reimbursement for the equipment.

Table 3. Follow-up Topics To Assess PAP Compliance

- Frequency of use
- Nightly duration of use
- Knowledge of equipment operation
- Interface comfort
- Change in symptoms (see Table 4)
- Bed partner response
- Change in comorbid illness
- Change in weight
- Device download data
- Humidifier care



Follow-up Parameters

During the follow-up visit — either in the patient's home, sleep center, or physician's office — the primary question is how often the patient is using PAP during sleep. Questions should address whether patients have developed tolerance to the use of the device, noting continued improvement in the symptoms that resulted in the initial referral. In addition to the response of the patient and the bed partner, a number of the PAP units provide a data card that can be downloaded, showing the hours and frequency of the use of the machine. Some HME providers and sleep centers utilize evaluation tools, such as the Epworth Sleepiness Scale, to determine the effectiveness of the treatment.

The follow-up visit should also address the patient's current status of any comorbid illness, such as a change in blood pressure medications, diabetes control, or pedal edema. The quality of sleep should also be assessed, including dream frequency, sleep quality, and the aspects of a good night's sleep (e.g., improved memory, ability to concentrate, decrease in irritability, and daytime sleepiness). Considerable time must also focus on the patient's comfort with the use of the interface and other equipment, as an ill-fitting interface or higher pressure may lead to poor treatment compliance. This is particularly important in the initial visit. In addition, a return of snoring and/or daytime sleepiness sometime later can indicate the need to check the proper function of the equipment. An increase in patient weight or sleep habits can also change the effectiveness of the treatment and may require repeat sleep testing. Table 4 lists signs and symptoms the clinician should evaluate and address.

Table 4. SDB Signs and Symptoms

- Loud interrupted snoring
- Unrefreshing sleep
- Daytime sleepiness
- Nighttime gasping episodes
- Frequent nocturia
- Nighttime sweating
- Restless sleep
- Frequent awakenings
- Morning headache
- Decreased/no dreams
- Morning dry mouth
- Nighttime drooling
- Frequent naps
- Sleep deprivation
 - Concentration
 - Memory
 - Irritability
 - Impatience
- Comorbid illness: cardiovascular disease, diabetes



Summary

Sleep-disordered breathing occurs in up to 4% of men and 2% of women — and if untreated is associated with morbidity and possibly increased mortality. The mainstay of treatment is the nightly use of positive airway pressure, which ideally can resolve the SDB completely. Unfortunately, compliance with the nightly use of a PAP device is low, with only about 40% of people utilizing the device at least four hours every night on more than 70% of the days. Multiple factors can influence patient compliance with PAP use, a lot of them connected to mechanical issues in utilizing the PAP device and interface. The initial responses to PAP and the subsequent continuation of care can be well addressed by a respiratory therapist working jointly with a home medical equipment provider.

Continued and regular use of PAP can eliminate many symptoms associated with this disorder and can improve the management of a number of comorbid illnesses, such as hypertension, cardiovascular disease, and adult-onset diabetes mellitus. This publication was intended to be a helpful tool for the practicing respiratory therapist who performs the patient's initial application of the PAP device and continues through the patient follow-up. Only a small number of randomized controlled trials have been published that address the continuity of care, and no standard guidelines have been published. This publication was intended to address the many nuances of the care of the SDB patients being treated with PAP. It is our hope that the suggestions listed here will aid the respiratory therapist in obtaining the best possible compliance of the patient with positive airway pressure.



Q — When I have a head cold or sinus infection, wearing the CPAP system is too uncomfortable. Sometimes I may go for days without it. What can I do when this happens?

For an actual sinus infection, it is important to contact your physician for treatment, potentially with antibiotics. A cold virus will probably last seven to 10 days; but temporary use of nasal decongestants, nasal steroids, or an adjustment in humidity levels may provide symptomatic relief.

During those times, you may find that you can tolerate CPAP by changing to a full-face mask and breathing through your mouth. Heated humidity will make it more tolerable, so be sure that your humidifier chamber is full before you go to bed. Washing your mask, bore tubing, and humidifier chamber with non-degreaser type liquid dish detergent and disinfecting them on a regular basis will help to avoid recontamination.

Q — The air that the machine is providing is irritable because it is hot and dry. I am using a humidifier but this still happens. What can reduce this discomfort?

If the machine is providing hot and dry air, check to make sure the unit is functioning properly and that air intake filters are not obstructed or dirty. It might be appropriate to change your humidifier settings to a lower temperature or switch to cool humidity, but only if that is more comfortable.

In addition to checking the filters and proper function of your equipment, confirm that the heat setting for your humidifier is at its usual setting and that the chamber has an adequate water supply.

Q — My nose continually runs when I am wearing the bi-level PAP.

Some users of PAP do have a reflex rhinorrhea for the first few weeks of therapy. If the runny nose remains, the use of heated humidity, nasal decongestants, or nasal steroids may be necessary.

The nose has a tendency to respond when there isn't enough humidity with your prescribed pressure. Increase your heater setting and be sure that you have an adequate water supply in your water chamber. If you notice droplets in your mask and/or tubing, it may be necessary to insulate your hose with a light-weight towel. There are bore-tubing covers on the market to accommodate these needs.

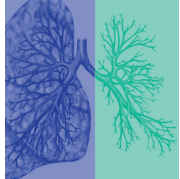
Q — I get a lot of air that blows into my eyes while using my CPAP machine. Other than replacing this with another interface, what are my options?

An adjustment in the current headgear or a different headgear altogether may help your current interface fit better. Adjustment of the forehead stabilizer area may also allow the current interface to fit better at the bridge of the nose. Add some padding, such as moleskin, which may provide a better fit and prevent leaking. If your nasal bridge area is narrow or unusually shaped, ultimately the use of a nasal prong type of interface may be the best answer.

Apply your interface with your pressure turned on. When it is applied without the continuous flow of air, the outer cushion oftentimes gets a crease at the top of your interface and cannot fill adequately to avoid the leaks.

Q — My wife tells me I snore when I am using the CPAP. I thought this was supposed to stop that. What can I do about this?

There may need to be a subtle 1 or 2 cm adjustment in the PAP pressure setting to alleviate true snoring. The use of nasal decongestants, nasal steroids, or a nasal dilator such as nasal dilator strips may also improve nasal airflow and decrease the potential for snoring and/or mouth leaks. It is important to check the interface fit to ensure interface leaks are minimized. If your mouth is coming open or you are exhaling through your mouth, a chin strap may be helpful. Finally, make sure the exhalation port(s) on the interface are intact and functioning properly as the escaping air may be mistaken for snoring.



If none of these stops the snoring, you should contact your PAP provider and have them check that your PAP unit pressure is set according to your prescription. Your system may have a “ramp” feature that is set at a pressure too low for too long for your initial start each night. If your system has down-load technology, it would be good for the PAP provider to take a look at a download. If you continue to snore with the interface on, you should contact your sleep physician for further evaluation.

Q — Can I travel with my CPAP system? Are there any regulations I should be concerned about when I fly? Can I carry the system on the plane with me?

Travel with the newest generation of PAP machines is less problematic, as sizes of the machine and their carry-on cases have gotten smaller. Plan to carry the PAP machine onboard as carry-on luggage and be prepared to open the bag during the scanning process. A note from your physician describing the medical necessity of your equipment may also be helpful if the airline security personnel are unfamiliar with the equipment. Contact your HME provider for any special instructions for use and care of your equipment if traveling to different altitudes or countries.

In addition, be sure to carry your interface, bore tubing, and power cord with related converters in your bag. If you leave your humidifier at home, be sure that you have the necessary adapter(s) so that you can connect your bore tubing.

Q — My wife uses CPAP and is starting to develop nasal pressure sores and is complaining about skin creases.

Excessive tightening of the interface and headgear are likely causes of pressure sores and skin creases on the face. Adjust the headgear for a better and looser fit, striking a balance between potential interface leaks and interface tightness. Alternatively, a nasal prong type of interface is an option. If the pressure sores are in the nostrils from using a prong type of interface, a smaller size of prong is appropriate or a temporary switch to a nasal interface is indicated.

Use of a non-petroleum based ointment in the nostrils will help to lubricate and protect the nasal membrane from the turbulence of the positive airway pressure. Some people just need to rotate the use of a couple different types of interfaces. When using nasal pillows, it is a good idea to give the nose a two-day vacation every once in awhile and go to a nasal interface.

Q — I recently started using CPAP, but I awake with gastric bloating and occasionally with chest discomfort. What are my options?

Accidental swallowing of air during your PAP therapy may cause your symptoms. Verify with your health care provider that the pressure settings are still appropriate for you as a slight decrease in pressure may help alleviate your symptoms. Alternatively, your physician may recommend the use of special machine features such as expiratory pressure relief or bi-level PAP therapy to help decrease the pressure you must exhale against.

If the chest discomfort is accompanied by other symptoms of a heart attack, you should call 911 and go to the nearest emergency room.

Q — My husband was recently placed on oxygen. Is it possible to use oxygen and CPAP at the same time? If so, how — and how would we arrange this?

If needed, supplemental oxygen can easily be added to the PAP therapy. The HME provider of your PAP machine can normally also provide you with the appropriate oxygen equipment and demonstrate how to place the oxygen tubing inline with the PAP interface/machine.

If your husband's PCP ordered the supplemental oxygen, you may want to contact your husband's sleep physician. His sleep physician may want an overnight oximetry done a week or two after he has slept with PAP and the oxygen.



Q — Will I need to be on CPAP forever for my SDB? If I lose weight, will that decrease my ongoing need to wear it?

In many instances, the underlying cause of the unstable upper airway that leads to SDB is lifelong. However, if increased weight was a major factor in your SDB, weight loss can decrease the amount of pressure needed to stabilize your airway. In some cases, a significant weight loss can eliminate the need for PAP therapy.

Assuming that you do lose weight, it is very important to talk with your sleep physician about your need to continue PAP therapy.

Q — I am still sleepy during the day, and this is especially true while driving. I wear the unit nightly but am not noticing a significant change.

Inadequate quality or quantity of sleep leads to excessive daytime sleepiness. Wearing the PAP therapy will improve the quality of your sleep; however, it is important to strive for a quantity of seven to nine hours of nighttime sleep on a regular basis. If you are using PAP at an appropriate pressure and sleeping for seven to nine hours every night, your health care provider should evaluate your residual sleepiness. A review of your sleeping habits, medications, and other medical conditions may reveal some helpful information and alternative strategies. If no other causes for your sleepiness are found, your physician may choose to prescribe an alerting medication in addition to your PAP therapy. In any case, avoid driving long distances and during the times of day when you are most sleepy.

Depending on the interface you are using, you may be sleeping with your mouth open and breathing only through your mouth. A chin strap or full-face interface might be needed. If your PAP unit has download technology, it will be helpful to contact your sleep physician and review the downloaded information to see if your PAP is working for you.

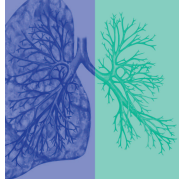
Q — If I use my CPAP only once or twice a week, will that suffice? It is just too much of an inconvenience to wear this night after night.

Very limited use of PAP therapy will likely provide little long-term benefit; though with continued practice and determination, you may slowly be able to increase the time used. Try to increase the number of nights you use the therapy, even if you only manage a few minutes each time. Over the course of several weeks, slowly increase the time spent on PAP therapy each night. Be very patient with yourself. Talk to your health care provider and enquire about desensitization therapy or behavioral modification programs if anxiety or claustrophobia is causing your reluctance to use the therapy. If interface discomfort or fit is a problem, contact your HME provider for assistance. Also, be sure to visit with your physician so he or she is aware of your difficulties and is given the opportunity to provide you with information and education to help you be successful in using your therapy.

Using PAP on a regular basis requires a longtime commitment. If PAP is far too inconvenient, you may want to discuss your other treatment options with your sleep physician, who may recommend an oral device or surgery. Consider your options and decide if you are truly inconvenienced or just not “sold” on the therapy. Ask your local sleep center if there is a support group that you might visit for ideas on how to become more convinced on the concept of PAP, the fastest and best way to treat SDB.

Q — How often should I get a sleep test?

After your initial diagnosis and PAP titration study, a repeat sleep study is not usually necessary unless you have a return of those symptoms that originally took you to your physician (such as daytime sleepiness, snoring, etc.) or you have a change such as weight loss/gain or upper airway surgery. Regular follow-up with your health care provider is important to evaluate if current therapy remains successful and your health is maintained.



Q — What is the best method to clean my interface, and how often should I be doing this?

Ideally, you should clean your interface and humidifier chamber on a daily basis. Disassemble and apply a small amount of mild non-degreaser dish detergent or baby shampoo to your fingers and gently wash thoroughly with water. Rinse thoroughly with clear water to remove all soap. Place the wet parts on a towel and allow to air dry. Solutions containing fragrance, conditioners, or moisturizers will leave a residue. A disinfectant cloth approved for use on PAP equipment may be used in lieu of soap and water. *Caution: Do not clean any parts of the system with alcohol or cleaning solutions containing alcohol.*

On a weekly basis, you should disinfect your interface, bore tubing, and humidifier chamber. To disinfect your accessory equipment, you may use a cold sterilizing solution, following the manufacturer's directions closely. You may also use one part vinegar to three parts water. Allow all parts to soak for 30 minutes, rinse with warm water, and place on a towel or over the shower rod to dry. *Caution: Do not steam autoclave or gas sterilize your PAP equipment.* These processes may harden or deform the flexible plastic parts of your equipment and adversely affect their function.

It is recommended that you clean your headgear, chin strap, and shell retainer strap as needed or a minimum of once each month. To maximize the life of these items, hand washing with a standard laundry detergent is recommended, but you may use the gentle wash cycle for machine washing. Do not use bleach. Before washing, remove them from your interface and refasten the hook-and-loop tabs to protect other garments in the laundry. Air dry or machine dry with no heat because heat will shorten the life of the elastic. *Do not iron.*

Q — I get claustrophobic when I wear CPAP. How can I be expected to wear this if it makes me so uncomfortable? Is there anything I can do to desensitize this feeling?

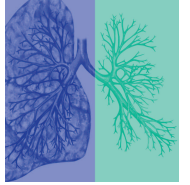
First, determine when you get that claustrophobic feeling. Is it when you put your interface on? If you use the “ramp” function, the pressure may not meet your initial need for air; and/or if you use the ramp function, it may be set at a pressure too low or the length of time may be too slow or long. If the claustrophobia continues, you could set aside some time during your waking hours and hold the mask to your face with the pressure turned on while doing something that is a distraction such as doing crossword puzzles, reading, watching television, or listening to the radio or a book on tape. Once you are able to breathe easily while holding the mask in place, consider applying the headgear and continue to desensitize. When you have accomplished this, pat yourself on the back and consider taking a short nap wearing your PAP. A word of warning: If you should decide to take a drink while wearing PAP, disconnect the bore tubing from your mask before drinking, and be sure to stop breathing before you swallow! Don't forget to continue with your desensitization session.

Q — Where can I learn more about SDB and about CPAP devices? Is there a web site?

Contact your local sleep center/lab and ask about a support group in your area. You may also find a wealth of information on the World Wide Web. Go to your favorite search engine (i.e., Yahoo, Google, MSN, AOL, etc.) and enter the word CPAP in the search field. You will spend hours reading answers to almost all of your questions.

Q — What kind of a physician or practice should I go to for treatment of my SDB?

You may start with your own PCP. It is imperative that you be honest with your primary care physician about your signs and symptoms that suggest a sleep disorder. Based on your symptoms, your PCP will most likely refer you to a physician who specializes in sleep disorders medicine. It may help to know what your particular health insurance dictates. Most sleep medicine specialists and sleep centers/labs accept self referrals.

**Q — Why is it necessary to have a sleep test?**

According to the National Heart, Lung, and Blood Institute, sleep studies allow physicians to measure how much and how well you sleep. They also help show whether you have sleep problems and how severe they are. Sleep studies are important because untreated sleep disorders can increase your risk of high blood pressure, heart attack, stroke, and Type 2 diabetes. People usually aren't aware of their breathing and movements while sleeping. They may never think to talk to their physicians about sleep and health-related issues that may be linked to sleep problems.

Q — Are there oral devices I can use, and what are they?

The American Academy of Sleep Medicine recommends dental devices for patients with mild to moderate SDB who are not appropriate candidates for PAP or who have not been helped by PAP.¹⁵

PAP should be used for patients with severe SDB whenever possible. Several dental appliances, such as mandibular advancement devices (MAD) and tongue-retaining devices, are available. A trained dental professional such as a dentist or orthodontist should fit these appliances. Patients fitted with one of these appliances should have a check-up early on to see if it is working; short-term success usually predicts long-term benefits. It may need to be adjusted or replaced periodically.



Tips for the PAP Clinician

When introducing patients to positive airway pressure, it is helpful to include their family and/or bed partner in the education process.

Be cognitive of the patient's mental and physical capabilities (e.g., ability to understand explanations; limitations in hand/eye coordination, finger strength, and manual dexterity; or low/no vision).

The visually impaired will need more instruction on how to identify on/off, ramp, and any other feature buttons on the PAP unit. Cut a small piece of tape and apply it just above the on/off button; this can be used as a landmark. Filling the humidifier chamber will require a pouring cup that holds the pre-determined amount of water to fill the chamber. Make sure the patient understands how to set the heater controller. Work together with the patient and their support system on disassembling and reassembling the PAP interface. It may be helpful to record your education session for future reference. For patients with limited vision, underline key points in the manufacturer's operation manual with a red highlight marker.

When introducing the patient to PAP and the interface, make the nasal mask fitting with pressure more tolerable by instructing the patient to rest their tongue on the roof of their mouth to avoid breathing through mouth.

A well-fitting interface will improve patient comfort and, in turn, lead toward acceptance and compliance to PAP therapy. Ideally, this is accomplished during the patient's titration study. If possible, it is helpful to have the patient continue to use the same type of PAP interface for the first few months. The goal is to allow the patient to adjust to therapeutic pressure before an assortment of PAP interfaces is presented for selection.

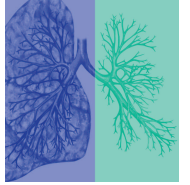
Facial hair and/or a mustache may cause excess air leaks. If the patient is resistant to shave, have him trim the upper portion of his mustache immediately below the nares just enough for his nasal mask to rest on the skin for a better seal. If there are unacceptable air leaks where there is excess facial hair, have the patient trim his beard closer to his face or remove it. If there is resistance to shaving, consider a different interface such as nasal pillows or a nasal prong type cannula.

When the patient gets up to go to the bathroom, instruct them to leave the mask in place, disconnect the bore tubing from the mask, and then reconnect upon returning to bed.

Excessive oral leaks/mouth drops open: When using a nasal interface, consider applying a snug-fitting chin strap. There are a number of chin straps on the market that range from a simple soft chin cup with elastic straps that attach at the crown of the head using hook-and-loop technology, to a cloth chin cup attached to a beanie-type cap with a "D" ring on each side. If this is unsuccessful, a full-face type interface should be considered.

Dentures in place at night:

- Pros: Support from dentures provides more stable foundation for a better fitting interface (nasal or full-face)
- Cons: Pain from pressure of nasal interface to the gum area related to the upper denture may be experienced.
 - Loose dentures may dislodge.
 - Loose dentures may vibrate.

**Dentures out at night:**

Pros: Mouth is more comfortable for patient.

Cons: Sunken cheeks and upper lip limit PAP interface choices. (Consider nasal pillows and/or nasal cannula-type interface.)

Dry mouth and throat may be experienced. (Increase heated humidity, apply chin strap, apply horseshoe-shaped skin-friendly tape that tightly pulls lower lip up to assist in keeping mouth closed. A full-face type interface might be a better option.)

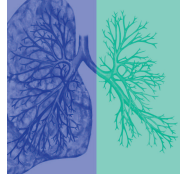


Table of Common Problems and Solutions

Problem	Possible Cause(s)	Possible Solution(s)
Nasal irritation/ congestion/rhinorrhea	Dry air	Heated humidification
	Chronic rhinitis Nasal allergies	Nasal decongestants Nasal steroids Antihistamines PCP referral
Dry throat and/or mouth	Dry air	Heated humidification
	Mouth leak	Chin strap Full-face interface
Painful pressure in ears	High airway pressure	Verify PAP level Decrease PAP level Trial on auto or bi-level PAP
	Nasal congestion	Nasal decongestants Nasal steroids
Gastric bloating and/or chest discomfort	Air swallowing High airway pressure	Decrease PAP level Trial on auto or bi-level PAP
Claustrophobia	Anxiety	Desensitization Anxiolytics
	Interface	Optimize interface fit
Nasal pressure sores	Poor interface fit	Readjust head gear Change interface size or style Apply skin protection Reassess patient education on interface fit
Eye irritation	Interface air leak	Readjust head gear Change interface size or style Reassess patient education on interface fit
Skin creases	Improperly adjusted head gear	Readjust head gear Change interface size or style Reassess patient education on interface fit
Skin irritation	Sensitivity to interface	Trial using nasal pillows
	Improperly adjusted head gear	Readjust head gear
	Heat rash	Lower temperature on humidifier Trial using nasal pillows or skin protector
Air leaks	Excessive interface/head gear wear	Replace interface and/or head gear
	Poor interface fit	Change interface/ nasal pillows
	Improperly adjusted head gear	Readjust head gear
	Excessive air pressure	Verify pressure setting Consider pressure change Consider auto or bi-level mode
	Facial hair interference	Trial with nasal pillows Shave



References

1. Somers VK, White DP, Amin R, et al. Sleep apnea and cardiovascular disease: an American Heart Association/American College of Cardiology Foundation Scientific Statement from the American Heart Association Council for High Blood Pressure Research Professional Education Committee, Council on Clinical Cardiology, Stroke Council, and Council on Cardiovascular Nursing. *J Am Coll Cardiol* 2008; 52(8):686-717.
2. Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC7 report. *JAMA* 2003; 289(19):2560-2572.
3. Calhoun DA, Jones D, Textor S, et al. Resistant hypertension: diagnosis, evaluation, and treatment: a scientific statement from the American Heart Association Professional Education Committee of the Council for High Blood Pressure Research. *Circulation* 2008; 117(25):e510-526.
4. Chan J, Sanderson J, Chan W, et al. Prevalence of sleep-disordered breathing in diastolic heart failure. *Chest* 1997; 111(6):1488-1493.
5. Netzer NC, Stoohs RA, Netzer CM, et al. Using the Berlin Questionnaire to identify patients at risk for the sleep apnea syndrome. *Ann Intern Med* 1999; 131(7):485-491.
6. Johns MW. Reliability and factor analysis of the Epworth Sleepiness Scale. *Sleep* 1992; 15(4):376-381.
7. Chung F, Yegneswaran B, Liao P, et al. STOP questionnaire: a tool to screen patients for obstructive sleep apnea. *Anesthesiology* 2008; 108(5):812-821.
8. Nuckton TJ, Glidden DV, Browner WS, Claman DM. Physical examination: Mallampati score as an independent predictor of obstructive sleep apnea. *Sleep* 2006; 29(7):903-908.
9. Mallampati SR, Gatt SP, Gugino LD, et al. A clinical sign to predict difficult tracheal intubation: a prospective study. *Can Anaesth Soc J* 1985; 32(4):429-434.
10. Pepin JL, Leger P, Veale D, et al. Side effects of nasal continuous positive airway pressure in sleep apnea syndrome. Study of 193 patients in two French sleep centers, *Chest* 1995; 107(2):375-381.
11. Constantinidis J, Knobber D, Steinhart H, et al. Fine-structural investigations of the effect of nCPAP-mask application on the nasal mucosa. *Acta Oto* 2000; 120(3):432-437.
12. Kryger MH, Roth T, Dement WC. Principles and practice of sleep medicine, 3rd ed. Philadelphia: WB Saunders Company; 2000.
13. Zozula R, Rosen R. Compliance with continuous positive airway pressure therapy: assessing and improving treatment outcomes. *Curr Opin Pulm Med* 2001; 7(6):391-398.
14. Weaver TE, Laizner A, Evans LK, et al. An instrument to measure functional status outcomes of excessive sleepiness (Functional Outcomes of Sleep Questionnaire). *Sleep* 1997; 20(10):835-843.
15. Kushida CA, Morgenthaler TI, Littner MR, et al. Practice parameters for the treatment of snoring and obstructive sleep apnea with oral appliances: an update for 2005. *Sleep* 2006; 29(2):240-243.

Levensky ER, Forcehimes A, O'Donohue WT, Beitz K. Motivational interviewing: an evidence-based approach to counseling helps patients follow treatment recommendations. *Am J Nurs* 2007; 107(10):50-58.

Miller WR, Rollnick S, editors. *Motivational interviewing: preparing people for change*, 2nd ed. New York: Guilford Press; 2002.

O'Donohue WT, Levensky ER, editors. *Promoting adherence: a practical handbook for healthcare providers*. Thousand Oaks, CA: Sage Publications; 2006.

Rollnick S, Mason P, Butler C, et al. *Health behavior change: a guide for practitioners*. New York: Churchill Livingstone; 1999.

Smith I, Haniffa M, Lasserson TJ: Interventions to improve use of continuous positive airway pressure for obstructive sleep apnoea. *Cochrane Database of Systematic Reviews*, 2009. Available at: www.thecochranelibrary.com Accessed August 16, 2009

Web Sites

American Association for Respiratory Care (AARC), www.aarc.org

American Academy of Sleep Medicine (AASM), www.aasmnet.org

American College of Chest Physicians (ACCP), www.chestnet.org

American Sleep Apnea Association (ASAA), www.sleepapnea.org

American Thoracic Society (ATS), www.thoracic.org

Motivational Interviewing, www.motivationalinterview.org

National Heart, Lung, and Blood Institute (NHLBI), www.nhlbi.nih.gov

National Sleep Foundation (NSF), www.sleepfoundation.org

Your Lung Health, www.yourlunghealth.org