ResMedica
clinical newsletter

Compliance—an expert's opinion

An interview with Dr. C Massie

Dr. Clifford Massie is currently Clinical Director of the Center for Sleep Health of Suburban Lung Associates, Elk Grove Village, Illinois, USA. Dr. Massie holds a PhD in Clinical Psychology from the University of Miami, Florida 1993. He completed his pre-doctoral Residency in Clinical Psychology 1992/93 at Rush-Presbyterian, St Luke's Medical Centre in Chicago, Illinois. He became a diplomate of the American Academy of Sleep Medicine in 1996. While he is widely experienced in the field of sleep disorders, he has a particular interest and expertise in the area of CPAP compliance and patient outcomes. In the following interview, Dr. Massie shares his insights into this important area.

Is there an industry definition of CPAP compliance?

"I don't think there is yet. In many research studies, the criteria we follow is usage. We regard greater than 70% usage per night as a way of measuring acceptable treatment compliance. However, I don't think there is sufficient outcome data yet that would demonstrate improvements in both health outcomes and daytime functioning. There's no data available that says if you use a device on seven out of ten days that means you are compliant rather than non-compliant."

Do you use the term 'efficacy data'?

"I think we will be using that term more when we have more patients routinely put on autotitration machines or machines that provide data on AHI while on therapy.

"For example, what would you do with a patient who is using therapy every night for six hours and the mask leak is low, but the AHI is elevated? That sort of information may help guide treatment decisions."

What affects patient efficacy/compliance?

"I think the important thing is to get proper educational support up front. Research has shown over and over again that if you intervene early, with simple problem-solving techniques and education, it significantly improves compliance to treatment. For example, explaining to a patient what's going to happen during treatment and how their condition can have an impact on their health.

"Things like proper mask fit are crucial. Improvements in mask design and the large variety of masks available means patients should not be having any kind of skin irritation or excessive mask leak.

"Heated humidification should also be routine; we still have patients who come in and complain because the air is cold and dry."

When you say routine, do you mean everyone is prescribed heated humidification?

"Yes. We prescribe everyone to go on heated humidity. With integrated humidifiers and devices readily available today, it is easier and very practical from this standpoint."

Does information and data effectively support patients?

"Absolutely! We download the data on computer and we show them the printout, and that helps patients. It's direct feedback about what's going on, so they can see if they are doing well or if there are problems or variability. We find that invaluable."

So you mean when a patient sees the download it's a positive reinforcement or an opportunity to explain the problems and troubleshoot?

"Exactly."

Given that CPAP is not a cure, how do you motivate patients that have a mild to moderate diagnosis?

"There are many chronic illnesses and conditions that require maintenance therapy for long periods of time, and sleep apnea falls into this area.

"People understand that high blood pressure is a

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Dr. Massie

Clinical Director of the Center for Sleep Health of Suburban Lung Associates

serious condition, it has to do with your heart, and you can't have it too high. Now, more and more people are being educated and learning that sleep apnea is also serious. You explain that sleep apnea can have serious consequences on health, just like hypertension, coronary artery disease, and diabetes.

"If someone has mild disease and he is asymptomatic, there are a number of treatment options. But if someone comes in with an AHI of 11, a REM index of 26, he's excessively sleepy during the day, and he has high blood pressure, you explain to that patient that these things may be interrelated. It's important not to ignore sleep apnea. If we treat it, there will be an overall beneficial impact for you. This motivates them to comply."

What data do you use to check that your patients are optimally treated?

"The majority of patients are on a fixed CPAP device so most of the machines don't have AHI, just usage data. So we look at that. If a patient is sleeping for seven hours a night and the data shows mask on time is 3.6 hours, that's a fairly large discrepancy. The mask may become dislodged, it may not be replaced following a nighttime awakening, or they're not actually getting seven hours of sleep. We want the patient to use it the entire time they are asleep.

"When patients are using automatic devices and we have access to efficacy data, we look at that as well. If the leak is unacceptably high, we can identify any problems with the mask or mouth leak. If the patient has a good fitting mask, and the AHI is high, then we need to intervene. If the AHI is less than five, then therapy is working. It's helpful to get the data in terms of AHI and mask leak; it's also helpful to show the patient the graphics."

How often do you need to maintain follow-up consultations to ensure a patient is optimally treated?

"We bring patients in after a couple of weeks following the titration study, so we have a chance to address problems early on. If a patient is doing well, the follow up interval is longer. Patients who present with problems are followed more closely.

"The question of retesting is a good one. If there are obvious changes in risk factors (eg, weight gain) then retesting may be indicated. This would also apply to ruling out a co-morbid sleep disorder. However, follow up sleep study data can show dramatically different results, even with little change in clinical symptoms. For example, one patient had a study four years ago for primary snoring only (AHI= 0). Various treatment options were discussed with him. He was seen four years later with a complaint of "mildly worse snoring," according to his wife. No other changes in clinical symptoms were noted. The follow-up sleep study showed an AHI of 56."

With current literature indicating that OSA is a cause of hypertension and has a significant role in cardiovascular implications, doesn't this suggest that it is even more imperative to have patients optimally treated?

"Yes, it is very important; it's a natural evolution of CPAP therapy. Historically, we've told patients, you've got high blood pressure and we'll treat it with medications." Now we tell patients that effective control of sleep apnea may help with blood pressure control."

If a patient is diagnosed with severe OSA and they are a professional driver (ie, cab or truck), who is liable if that person does not comply with treatment?

"This is a difficult, sticky issue. In the US, the hospital, prescribing doctor and sleep lab have all been involved in lawsuits about this type of issue."

Does that mean you have to prove that you have done everything possible to encourage that patient to comply with treatment, such as follow-up questionnaires, follow-up consultations, and education?

"When we treat patients who drive or fly for a living and need authorization from us, we require objective CPAP usage data and a maintenance of wakefulness test (MWT) before we will okay the patient to return to work.

"The Federal Aviation Administration has a policy called the Sleep Apnea Evaluation Specification—pilots must have a sleep study, they must be treated with either CPAP or surgery, and they must have an MWT. Also, the patients must be seen annually—it's a good start, but I think the protocol should be more detailed and rigorous.

"A representative from one of the major airlines

called us and said, 'Dr. Massie, what we're really concerned about are the employees who are not part of the flight crew, such as baggage handlers, who are not covered by the same requirements as the flight crew.' We would like to partner with the industry to develop a protocol for identifying, diagnosing, treating, and following up these employees."

Shouldn't we be routinely screening all professional drivers?

"We probably should. However, it is a difficult issue to balance the rights of individuals with safety concerns. The majority of research studies on truck drivers have been conducted outside the United States. The evidence from those studies is compelling. Great strides have been made, however, there needs to be consensus among health care providers, industry and law makers about how best to screen, not only professional drivers, but all people with risk factors for sleep apnea.

What data would be required to protect the physician in litigation cases?

"The American Academy of Sleep Medicine is working on a consensus paper—a new 'Standards of Practice' paper—that will address standardization issues with the MWT and the MSLT. The MWT is carried out in a controlled environment and we have normative data. But the downside is that it's not very ecologically valid. Changing one aspect of the test protocol can significantly affect the test results. Also, I don't think there's a protocol for shift workers—how do you assess their "work" time alertness properly?

"If you have a patient with severe sleep apnea you need usage data, efficacy data like AHI, and an MWT performed according to a standardized protocol. If use is adequate, mask seal is good and the patient is sufficiently alert, I would hope that would be sufficient data and would stand up in a legal situation. If you are meeting the standards required in your field, that's probably about all you can do?"

From the Editor

This edition of ResMedica Clinical Newsletter focuses on the issues surrounding compliance for patients using CPAP therapy.

One of the most important questions is the differentiation between compliance and efficacy. We canvass opinions from a number of experts about what constitutes compliance and how they assess efficacy. In this context, we also look at the usefulness of new data that has become available with the development of CPAP machines that collect and keep data over long periods of time.

In this issue we feature interviews with Dr. Massie, Clinical Director of the Center for Sleep Health of Suburban Lung Associates in Illinois, and Jill Glenn. Jill has been working in the sleep field for more than ten years and has now established Sleep Health and Wellness NW—a home care dealer. The company also runs two independent sleep centers.

Dr. Massie discusses how he assesses compliance, and explains the types of data he uses to evaluate the efficacy of a patient's treatment. He makes particular comment about the value of having this data available to patients as a means of motivating them to persevere through difficulties with treatment. We also touch on the very interesting, and at times controversial, area of litigation.

Jill Glenn also discusses how she motivates and manages patients on CPAP therapy and what interventions she uses to help resolve problems.

Why do some patients give up on CPAP therapy? In many cases this happens quite quickly after commencing treatment. We consider factors that contribute to poor compliance, such as mask suitability, patient education, the type of treatment chosen, and nasal irritation. We also look at the importance of follow-up to assess how a patient is tracking and pre-empt and prevent problems that might affect compliance.

Finally we have a 'real life' story from marine engineer, Peter Morgan, who tells how CPAP therapy changed his life—quite literally.

I hope you find this issue of ResMedica Clinical Newsletter both useful and informative. Don't forget you can register online at our Web site www.resmed.com.

Lisa MacKenzie
Editor

ResMed

Improving compliance

Facts and Figures—at a glance

In recent studies, compliance with CPAP therapy for OSA is shown to be very high (80%-88%).[1,2,3]

The improvement in compliance over the last ten years can be largely attributed to:

- improvements in mask design, which have made masks more comfortable[4]
- greater provision of support (education; troubleshooting; coping strategies) to CPAP users (especially new users)[5,6,7,8]
- minimization of mouth leak which causes nasal congestion, nasal dryness, and sore throat (in up to 40% of CPAP patients[9] and 100% of NPPV patients[10]) by means of heated humidification[11,12]—or a full face mask[13]
- for patients requiring higher treatment pressure, the use of ResMed AutoSet® devices[14]
- improvement to Excessive Daytime Sleepiness from CPAP therapy is crucial to compliance. [15]

A closer look . . . Improving compliance

Ensuring that a patient complies with CPAP therapy is, without a doubt, the critical first step to ensuring effective treatment.

According to numerous research articles, issues such as mask suitability, patient education, the type of treatment chosen, and nasal irritation all play a part in the patient's ability or failure to comply.

Education and data

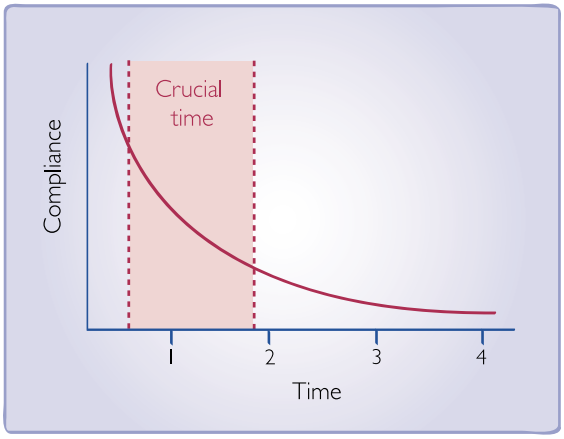
Educating the patient and empowering them to be actively involved in their treatment can have a significant impact on compliance to treatment. Educating clinicians, physicians and dealers that the key to resolving issues is simple early intervention, is also a factor in compliance. Deciding on the type of intervention involves the collection of feedback: both subjective information from the patient and if possible, quantitative data recorded by the CPAP machine. Sin et al[1] concluded that a population-based CPAP program consisting of consistent follow-up, troubleshooting, and regular feedback to both patients and physicians can achieve CPAP compliance rates of > 85% over six months.

Mask fit

Historically, poor mask fit has had a significant impact on compliance. Pepin et al[2] investigated the side effects and adverse reactions to CPAP therapy. These included allergy to the face, air leaks, and abrasions of the ridge of the nose. The findings highlighted that half of the patients in their study complained of at least one side effect due to the nasal mask. They concluded that individually moulded masks reduced the number of abrasions on the bridge of the nose and the incidence of red eyes in the morning.

Investigations such as this have resulted in a concerted effort to improve mask technology. Consequently, a steady release of improved masks, particularly over the past four years, has seen mask-related side effects fall considerably.

Non compliance graph —
Early intervention is a factor in compliance



Nasal irritation—humidification

According to Richards et al[9] nasal congestion, dry nose and throat, and sore throat affect approximately 40% of patients using CPAP.

Various studies have looked at the effect of humidification on nasal symptoms and compliance and concluded that heated humidification improves compliance with CPAP.

Rakotonanahary et al[11] also demonstrated that heated humidification significantly improves the CPAP daily rate of use and that its need may be predicted.

Massie et al[12] suggested that this was due to a reduction in side effects associated with upper airway symptoms and a more refreshed feeling upon awakening. They noted that compliance gains may be realized sooner if patients are started with heated humidity at CPAP initiation.

Martins et al[13] found that inhaled air dryness during CPAP therapy can be significantly attenuated by heated humidification, even during mouth leaks, and can be totally prevented by using a face mask.

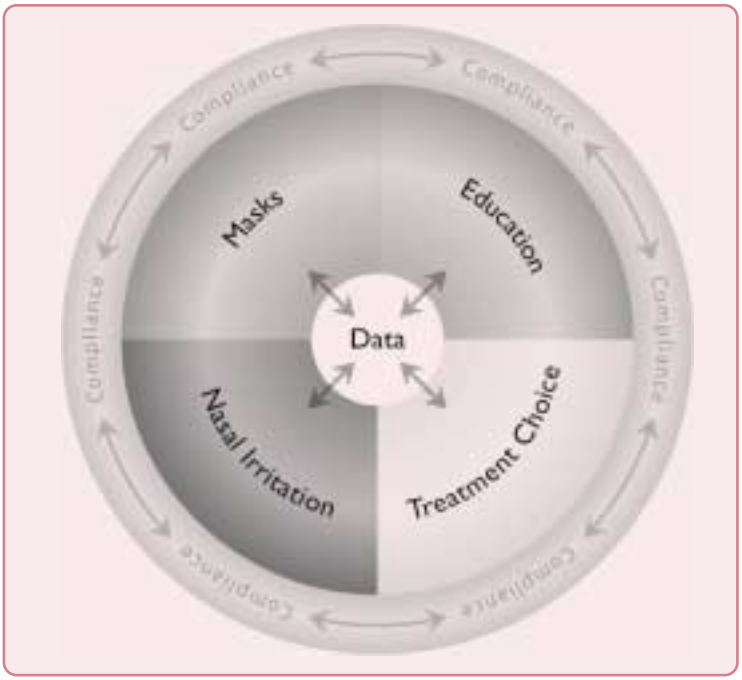
Type of treatment

Treatment choice can also improve compliance. For example a recent article by Massie et al[14] revealed that patients requiring pressures greater than 10 cm H_2O had improved compliance by approximately 12% and improved quality of life when they used AutoSet. Median pressure was lower and SF-36 vitality scores and mental health scores were better. Patients also reported more restful sleep, better quality sleep, and less discomfort from pressure

Flexible devices that have integrated humidification, universal power supply, DC capabilities, and provide comprehensive data, allow the treatment to suit the patient.

1. Sin DD, Mayers I, et al. *CHEST 2002*; 121:430-5
2. Pepin JL, Krieger J, et al. *Am J Respir Crit Care Med 1999*; 160:1124-9
3. Kalan A, Kenyon GS, et al. *J Laryngol Otol 1999*; 113:888-92
4. Smith et al. *Sleep 2003*; 26(Sup.) A: 406-407
5. Lewis KE, Seale L, et al. *Sleep 2004*; 27:134-8 PMID: 14998250.
6. Stepnowsky CJ Jr, Bardwell WA, Moore PJ, Ancoli-Israel S, Dimsdale JE. *Sleep 2002; 25*(7):758-62
7. Popescu G, Latham M, et al. *Thorax 2001*; 56:727-33
8. Chervin RD, Theut S, et al. *Sleep 1997*; 20:284-9
9. Richards GN, Cistulli PA, et al. *Am J Respir Crit Care Med 1996*; 154:182-186
10. Meyer TJ, Pressman MR, Benditt J, McCool FD, Millman RP, Natarajan R, Hill NS. *Sleep 1997*; 20(7):561-569.
11. Rakotonanahary D, Pelletier-Fleury N, et al. *CHEST 2001*; 119:460-5
12. Massie CA, Hart RW, et al. *CHEST 1999*; 116:403-8
13. Martins De Araujo MT, et al. *CHEST 2000*; 117:142-7
14. Massie CA, McArdle N, et al. *Am J Respir Crit Care Med 2003*; 167:20-3
15. Drake CL, Day R, et al. *Sleep 2003*; 26:308-11

Compliance Wheel—
Facts influencing compliance



Correction

In our last issue of ResMedica, which featured hypertension, the photograph of Professor Virend Kristen Somers was incorrectly captioned. He is Professor of Medicine in the divisions of Cardiovascular Diseases and Hypertension at the Mayo Clinic and not, as captioned, Associate Professor.

Patient compliance—the personal approach

An interview with Jill Glenn

Jill Glenn
Sleep Technologist

Jill Glenn is a registered technologist who has been working in the sleep field for more than ten years. She worked as a sleep technologist in a hospital environment before moving into the private sector, where she set up and managed three private practice sleep centers. This year she established her own business, Sleep Health and Wellness NW—a company that runs two independent sleep centers in Oregon. The enterprise also provides sleep staff and sleep management services, and markets a range of CPAP accessories designed to improve patient comfort.

In this interview, Jill talks about her experiences as a sleep center manager and how she works to improve patient compliance.

How would you describe compliance?

"I'm not so interested in whether somebody has been using their CPAP for five or six hours, but I do want to know whether it is working for them. I think compliance can be described as the ability to follow the treatment, getting a resolution of symptoms, and taking the steps needed for the patient to feel that it's working to improve their quality of life."

In your experience, what factors influence compliance?

"One of the main things that helps with compliance is immediate and ongoing contact with the patient. In my experience the patient is most likely to quit CPAP within the first two to four weeks. Keeping close contact makes a big difference. Initially we contact them every three days, then every week, if that goes well, then after four weeks. You don't want to bombard them but you do want them to know you are there as their resource. Alternatively, if they have a complaint, you can resolve it immediately.

"Initial education is absolutely crucial. Too often patients are given equipment without knowing why they have to have it. It's important to sit down with the patient and ensure they understand their sleep study, why CPAP would be helpful for them, and how the product works.

"Offering choices involves the patient. It's important to offer patients quite a few mask choices so they can choose something that appeals to them. You can also try to keep the newest and top of the line CPAP equipment around. These top of the line products help provide compliance data, and they can choose the most comfortable, the quietest, or the one they feel they can trust."

One of your accessories is a thermal fleece sleeve that wraps around tubing to reduce rainout. What impact does rainout have on compliance?

"Early on, it was easy to see that the majority of complaints were related to dry mouth, dry and sore nasal passages, and oral breathing (opening the mouth) at night. Patients would take their masks off during the night, and would wake up in the morning with no recollection of having done so. We thought this was related to lack of humidification so we added humidifiers. As a result we saw this specific complaint come down by about 80%. We concluded that heated humidifiers resulted in a huge improvement in compliance immediately, eliminating the dryness and the sore nasal passages.

"Then a new complaint surfaced—rainout. Patients with sinus problems or a history of allergies were likely to reach a point with their CPAP where they were still congested and dry but couldn't turn up the humidifier any further because the condensation in the mask or their tubes made it really uncomfortable.

"We knew if we sealed the tubing from the air in the bedroom we would diminish that; the thermal fleece called Tube Buddies™ insulates the tubing and protects it from the colder outside air, which reduces rainout and also absorbs any remaining condensation. Patients also responded well to the warm, fuzzy feeling near their faces and hands.

"From a compliance point of view it made a difference. Heated humidification is so important and resolving the issue of rainout has made a difference."

You talk about educating patients. What data do you discuss with them?

"I have always focused on graphs because a lot of people can relate to pictures rather then terminology. By showing before and after pictures, they can see the differences between their delta and REM sleep on successive nights.

"You can also show them how many arousals they've had before and after. You explain that those are awakenings in their sleep and we need to get rid of them.

"Next is heart rate variability which can be related back to hypertension. The patient can see what their body is doing and how that might relate to how they're feeling now. They can also see how the CPAP is having an effect, even in the short term, so the gaps before and after are obvious visuals for them.

"I end with the apnea-hypopnea index (AHI), because (a) I want them to know what their body is doing and (b) it's easier to show them that this is the issue that's creating all those things.

"You can send them home with copies of those graphs to share with friends and their spouse. They might post them in the bedroom to serve as a reminder or encouragement for what they're doing."

How have improvements in technology helped improve compliance?

"Automatic or variable units, which collect data, have helped with compliance. In the past we had options for collecting data, but they were expensive. Mostly we were forced just to adjust pressure up and down or suggest an repeat sleep study for the patient (which might not find anything new and is expensive). It didn't always make a difference and patients would come back frustrated.

"We can use so much data from the new units and we don't charge for that once they're in our program. If someone has an issue, we can just put them on the variable devices then get the download.

"It is so much better not to have to guess! For the patients, just getting and showing them the download validates the need to keep trying, and that's quite empowering for them."

What specific things do you look for in the download?

"We look for leak—the biggest reason why people aren't doing well at home—for AHI, and also for changes from where their pressure was.

"We also make sure we run testing over a weekend, to see if their social environment was making a difference to their outcome.

"Another helpful thing to identify from the download is how long they use the device and what time they take their mask off."

How have advances in mask technology affected compliance?

"Back in 1993/94 we only had one or two mask choices and it was really hard to get patients compliant. It was so hard to get a good mask fit, particularly when we were using masks that were made of vinyl. Patients were waking up with skin breakdowns and sores and we had no heated humidifiers. It was definitely a struggle.

"When ResMed came out with the Mirage™, there was an immediate improvement in compliance. It was the first mask where I could adjust the forehead bar and the base to adapt it to the patient.

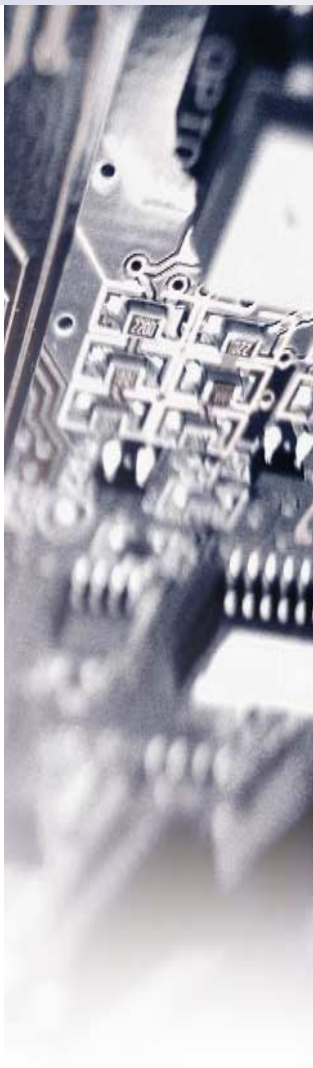
"It set the industry looking at mask comfort, not only for the patient but also for the spouse in terms of noise."

Do you have a follow-up program?

"We see patients every six months and outline the management plan with them in advance so they know our intention is to be actively engaged.

"It's important to download the visual data when they come in and go through it with them right at that moment. This way they know you are problem solving and trying to give them a solution right away. This is important because we're trying to tell them what they're doing is important—yet if we stall on our end it sends a contradictory message.

"If they have issues they come in right away so they feel we are actively engaged in making a difference for them."



Web site of interest

The Cardiopulmonary and Critical Care Journal is the official publication of the American College of Chest Physicians. Each month it features cutting edge clinical investigations in the multidisciplinary specialties of chest medicine. Topics include pulmonology, cardiology, thoracic surgery, transplantation, sleep and breathing, airways disease, and more. CHEST also features basic science, special reports, case, board review questions, and more. The editorial explores controversial issues and promotes further discussion by physicians dealing with chest medicine. Nearly 23,000 readers worldwide turn to CHEST each month to keep up-to-date on the latest in chest-related medicine.

www.chestjournal.org

"CPAP changed my life"—
an OSA sufferer's tale

Peter Morgan's background was initially in marine engineering, serving on Esso tankers in the British Merchant Navy. He established one of the foremost independent corrosion consulting groups within the UK. The group specializes in litigation and arbitration and has undertaken some significant projects.

Peter is a consultant for companies such as BP, Shell International, Elf, Occidental USA, and Brunei Shell. He is also actively involved in his local sleep apnea support group, WelshSAS, where he is a trustee of the society.

"This is a story of the 15 years of pain, embarrassment, and gradual health deterioration that I suffered until a couple of real expert physicians recognized the true nature of my problem and changed my life with CPAP.

"During the late 1980s, I was made aware that my snoring was getting worse—it was so bad my wife demanded single beds or a separate bedroom. In the hot summer nights our bedroom window remained open and neighbors on the other side of the street started making passing comments. Even the local policeman started whistling the Beach Boys song 'Good Vibrations' every time he saw me.

"I then decided that I needed help, so I visited my GP who prescribed nasal sprays and other medications which failed to have any impact on my snoring at all. Finally, he sent me to an ENT specialist who recommended that I have an Uvulopalatopharyngoplasty (UPPP). This surgery involves the removal of the uvula and trimming the lower edge of the soft palate. If present, tonsils are generally removed and the surrounding tissue is also trimmed. Naturally, there are risks involved with surgery—such as the effects of the general anesthetic on your breathing, swelling of the airway, pre and post-operative medications (which can also suppress your breathing), bleeding, and PAIN!

"I was told that the UPPP would stop my snoring, which it did for about a year. However, it gradually came back worse than before. Unbeknown to me OSA had set in!

"More embarrassing moments started to intrude on my life again…

"On aircraft, the snoring was so bad that people would move seats. One particular time, when I had consumed some alcohol (I was celebrating the completion of some work I was doing), I managed to empty an entire row of seats—including some in the neighboring aisle. I received some odd looks from the aircrew—I did have lots of room though. I subsequently had to warn passengers of the problem when seated next to them.

"While chairing a conference in Singapore, I fell asleep during a presentation and proceeded to snore loudly into the microphone in front of me.

"As a teacher, I fell asleep in front of the class during a short quiet reading period.

"Even the dog, which shares our bedroom, moved out to sleep on the landing.

"I was then referred to another specialist who advised me that I needed to lose weight. Laser surgery was out of the question because the UPPP had been so radical he feared causing some damage to vital structures. I was prescribed amphetamines (better known as speed), which caused serious problems at airports when customs officers performed general searches, not to mention the side effects. I soon stopped using these.

"My condition worsened. I became irritable and would fly off the handle at a moment's notice. I fell asleep while holding cups of hot tea. I was frequently and unfairly arguing with my wife, who has such remarkable patience. I found myself compensating for my condition by having several short naps and reducing meetings to shorter periods so I would make it through the day.

"My health problems were becoming more pronounced. I was diagnosed with high blood pressure and placed on medication, and I experienced nocturia. On average, I needed to go seven to eight times a night.

"Three years ago, a suspected lymphoma of the throat was detected by a superb ENT who was simply testing my hearing. I underwent a biopsy and, to much relief, the growth turned out to be inflammatory tissue that had grown back from the UPPP. As I was returning from the operating theater, I experienced what they call a 'crash.' Due to undetected apneas, I experienced complications with the anaesthesia so the doctors had to frantically revive me. The ENT, fortunately, recognized my problems as possible OSA, so he referred me to his colleague, a sleep-disorder specialist, for a sleep study. I checked into the sleep lab, had my usual nightcap, and then I was wired

up for the night I was diagnosed with acute/severe OSA, and she prescribed CPAP therapy. I was promised the following:

- a good night's sleep
- lower blood pressure
- reduced nocturia
- a more active and alert brain.

"I was then fitted out with a CPAP device and what I affectionately call my 'Darth Vader' mask and sent on my way.

"The effects of using CPAP, in my opinion, are miraculous. I even find the sound of gentle 'hissing' air relaxing and soothing, and I drift off to sleep with no problem.

"The first night's sleep was absolutely perfect, it was wonderful—not one little snore. I awoke for the first time in many, many long years feeling refreshed and raring to go. I only got up once during the night to visit the restroom—simply marvelous. The only two problems were that my wife did not sleep a wink because I was too quiet, and the dog (Nell) was a little bewildered because she did not know who I was with the mask on!

Peter Morgan—at work as a Marine Engineer

"Six months later, my blood pressure has dropped, I no longer fall asleep at critical moments, I no longer suffer nocturia, and finally, my brain activity and thinking have returned to normal. CPAP has changed my life dramatically."

by Peter G. Morgan

Berlin Questionnaire

What it tests: The Berlin questionnaire was developed by pulmonary surgeons specifically to identify patients who are likely to have OSA.

How it works: Patients complete a survey that asks questions about the risk factors associated with sleep apnea: the presence and frequency of snoring behavior, daytime sleepiness or fatigue, and the presence of obesity or hypertension. Patients provide information about age, weight, height, sex, neck circumference, and ethnicity. Doctors will then enter in the BMI.

Ease of use: Patients complete the survey independently and find it both convenient and acceptable. However, the survey does require the doctor to give a rating number for each category of questions to produce a result.

Limitations: The survey appears to identify patients who are likely to have sleep apnea, but does require minor analysis to arrive at its results.

Value for OSA diagnosis and management: It is a very useful tool and research indicates that the questionnaire predicted elevated risk patients as accurately as polysomnography.[1]

1. Netzer N, et al. *Ann Intern Med* 1999; 131:485-491

Recent research articles

1. **Long-term compliance rates to continuous positive airway pressure in obstructive sleep apnea: a population-based study.** Sin Don D; Mayers Irvin; Man Godfrey C W; Pawluk Larry Department of Pulmonary Medicine, University of Alberta, Edmonton, AB, Canada. *Chest (United States) Feb 2002, 21 (2) p430-5*

STUDY OBJECTIVES: To determine long-term compliance rates to continuous positive airway pressure (CPAP) therapy in patients with obstructive sleep apnea enrolled in a comprehensive CPAP program in the community. DESIGN: Prospective cohort longitudinal study. SETTING: University sleep disorders center. PATIENTS: 296 patients with an apnea-hypopnea index (AHI) > or = 20/h on polysomnography. INTERVENTIONS: A CPAP device equipped with a monitoring chip was supplied. Within the first week, daily telephone contacts were made. Patients were seen at two weeks, four weeks, three months, and six months. RESULTS: Of the 296 subjects enrolled, 81.1% were males. Mean +/- SD AHI was 64.4 +/- 34.2/h of sleep; age, 51 +/- 11.7 years; and body mass index, 35.2 +/- 7.9 kg/m(2). The mean duration of CPAP use was 5.7 h/d at two weeks, 5.7 h/d at four weeks, 5.9 h/d at three months, and 5.8 h/d at six months. The percentage of patients using CPAP > or = 3.5 h/d was 89.0% at two weeks, 86.6% at 4 weeks, 88.6% at three months, and 88.5% at six months. There was a decrease in the Epworth Sleepiness Scale (ESS) score of 44% by 2 weeks of therapy. The patients continue to improve over the follow-up period, with the lowest mean ESS score observed at 6 months. With multiple regression analysis, three variables were found to be significantly correlated with increased CPAP use: female gender, increasing age, and reduction in ESS score. CONCLUSION: A population-based CPAP program consisting of consistent follow-up, "troubleshooting," and regular feedback to both patients and physicians can achieve CPAP compliance rates of > 85% over six months.

2. **Sleep during titration predicts continuous positive airway pressure compliance.** Drake Christopher L; Day Ryan; Hudgel David; Stefadu Yevgeniy; Parks Mary; Syron Mary Lou; Roth Thomas. *Sleep (United States) May 1 2003, 26 (3) p308-11*

STUDY OBJECTIVES: Poor compliance with continuous positive airway pressure (CPAP) has been identified as a significant obstacle in the treatment of obstructive sleep apnea. While previous studies have focused on diagnostic screening variables, side effects, health beliefs, and measures of disease severity, investigators have generally ignored sleep parameters assessed during CPAP titration as predictors of compliance. As the titration night represents patients' initial exposure to nocturnal CPAP treatment, we hypothesized that nocturnal polysomnographic (PSG) variables, representing improved sleep at this time, would predict higher subsequent compliance. DESIGN: Prospective analyses of a sequential case series were undertaken using nocturnal PSG variables during titration as early predictors of CPAP compliance. SETTING: Accredited sleep center. PATIENTS: 71 patients with sleep apnea, aged 31–78 years, with a mean respiratory disturbance index of 62.0 +/- 32.2. Interventions: N/A MEASUREMENTS AND RESULTS: Compliance was calculated as mean hours per night of CPAP use over the initial follow-up period (mean 46.9 days). Standard PSG variables and subjective reports of sleep were used as predictive variables in multivariate analyses. Mean objective compliance was 5.04 hours per night +/- 2.59. Consistent with our hypothesis, the best predictor of compliance was change in sleep efficiency (SE) from diagnostic to titration night [F (1,66) = 17.31, p < .000 (r = .48)], indicating that patients whose sleep improved most on the titration night had the highest levels of compliance. This relationship was also significant after controlling for measures of disease severity obtained during the diagnostic testing night. Importantly, individuals whose sleep improved on the CPAP titration night had nightly compliance rates of approximately two hours greater than patients whose sleep did not improve during titration. CONCLUSIONS: The findings suggest that patients' initial experience with CPAP treatment and, in particular, the degree of improvement in sleep during CPAP titration may be crucial factors in determining their subsequent use of this treatment modality.

3. **Quality of life in bed partners of patients with obstructive sleep apnea or hypopnea after treatment with continuous positive airway pressure.** Parish James M; Lyng Philip J Division of Pulmonary Medicine, Mayo Clinic, 13400 East Shea Boulevard, Scottsdale, AZ 85259, USA. *Chest (United States) Sep 2003, 124 (3) p942-7 Comment in Chest. 2003 Sep;124(3) 780-1*

OBJECTIVE: Obstructive sleep apnea (OSA) has been shown to affect the quality of life (QOL) in patients, and QOL improves after treatment with nasal continuous positive airway pressure (CPAP). However, the effects on the bed partner of the patient with OSA have received

little attention. We studied QOL in patients with OSA and their bed partners, and the effect of CPAP therapy on QOL. DESIGN: 54 patients and their bed partners who had been seen for evaluation of OSA, had undergone polysomnography, and subsequently had received treatment with CPAP. Patients and bed partners completed the Epworth sleepiness scale (ESS) and QOL questionnaires before and after the patients' therapy. SETTING: Sleep disorders center in an academic medical center. PARTICIPANTS: Patients with documented OSA and regular bed partners. INTERVENTIONS: Both individuals completed the 36-item short-form health survey (SF-36), the ESS, and the Calgary sleep apnea quality of life index (SAQLI). At about six weeks after CPAP therapy, patients and their bed partners completed the same set of questionnaires again. RESULTS: Of the 54 subjects who completed the study, the mean (+/- SD) apnea-hypopnea index was 48.4 +/- 33.3. For the subjects, the mean ESS decreased from 12.9 +/- 4.4 to 7.3 +/- 4.0 ($p < 0.001$) after treatment with CPAP. For the bed partners, the mean ESS decreased from 7.4 +/- 6.1 to 5.8 +/- 4.7 ($p = 0.02$). The mean scores on the SAQLI were 4.1 +/- 1.0 for the subjects and 4.5 +/- 1.3 for the bed partners. Following CPAP therapy, the SAQLI increased in the subjects to 4.9 +/- 1.2 ($p < 0.001$), and in the bed partners to 5.1 +/- 0.9 ($p = 0.002$). The SF-36 showed positive changes in both the subjects and the bed partners. Significant improvements were observed in the subjects in role—physical, vitality, social functioning, role—emotional, and mental health domains. In the bed partners, significant changes in the SF-36 were observed in role-physical, vitality, social functioning, and mental health domains. CONCLUSION: OSA results in impaired QOL in both the patients and their bed partners. Treatment with CPAP improves QOL, as measured by the SF-36 and the SAQLI.

4. Nasal CPAP treatment for OSA: developing a new perspective on dosing strategies and compliance. Stepnowsky CJ Jr, Moore PJ. *J Psychosom Res 2003 Jun; 54(6): 599-605.*

Nasal CPAP is presently considered as the "treatment of choice" for OSA. Though some OSA patients adhere to treatment recommendations and ultimately respond quite well to CPAP therapy, there is a substantial subgroup for which compliance is a particularly difficult issue. Despite receiving recommendations to the contrary and for reasons that are incompletely understood, the majority of OSA patients settle for a partial compliance pattern. Whether a partial compliance schedule is beneficial or harmful is virtually unexamined. Unlike other medical treatments, there are few data concerning the "dose-response relationship" of CPAP to its desired effects. We argue that CPAP "dose" is a function not only of CPAP pressure but of time-on-CPAP as well. Critical questions that remain unanswered are what "dose" of CPAP is needed to effect an appropriate treatment outcome and which treatment outcomes should form the basis of our recommendations. Recent placebo-controlled studies comparing CPAP to suboptimal CPAP pressures may be informative in this regard. Directions for future research are suggested.

5. Improving CPAP use by patients with the sleep apnoea/hypopnoea syndrome (SAHS). Engleman Heather M; Wild Matt R Edinburgh Sleep Centre, University of Edinburgh, UK. *Sleep Med Rev (England) Feb 2003, 7 (1) p81-99.*

Though continuous positive airway pressure (CPAP) is the treatment of choice for the sleep apnoea/hypopnoea syndrome (SAHS), suboptimal adherence to CPAP is common. Internationally, some 5–50% of SAHS patients recommended for CPAP either reject this treatment option or discontinue within the first week, and 12–25% of remaining patients can be expected to have discontinued CPAP by three years. Biomedical investigations of patients' CPAP use reveal frequent adverse effects, weak prospective relationships between symptomatic or physiological disease severity and CPAP use, and moderate correlations between use and benefit. Relatively expensive high-technological interventions to improve CPAP use (eg "intelligent" CPAP, humidification) are the subject of several well-conducted studies favouring their effectiveness. More basic educational and behavioural supports, and low-technological interventions (eg chinstraps, mask re-fitting) appear valued, but are currently less rigorously evaluated. In other diseases with demanding treatment regimens, cognitive constructs including health attitudes and beliefs (health value, locus of control, chance, powerful others, self-efficacy) and mental and physical health status are significant predictors of adherence. The enhancement of multidisciplinary models with psychosocial interpretations may provide increased explanatory and interventional potential in models of CPAP use. While acknowledging the scarcity of evidence, a structured, multidisciplinary, cost-efficient model is suggested, containing educational, behavioural and technological components as basic support, and with high-expertise cognitive-behavioural intervention in more difficult cases of low CPAP use. (59 Refs.)

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12–15 September 2004	Toronto, Canada	HFSA (Heart Failure Society of America)
5–9 October 2004	Prague, Czech Republic	17th European Sleep Research Society Congress
15–17 October 2004	Sydney, Australia	ASA (Australasian Sleep Association)
23–28 October 2004	Seattle, WA, USA	CHEST 2004
26–28 October 2004	Orlando, FL, USA	Medtrade 2004
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