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Editorial

Improving CPAP compliance – man more than machine

Almost two decades of clinical experience and several controlled studies have documented that positive airway pressure (PAP) is an effective treatment for obstructive sleep apnea [1,2]. Objective and subjective sleepiness and quality of life measures are all improved. Despite numerous improvements in the technology of positive airway pressure devices, the major challenge to physicians is to increase acceptance and compliance with this treatment. Below I will briefly mention some important advances in treatment options that may improve compliance. Then I will emphasize that the human factor (physician/staff interaction with the patient) is by far the most important element in improving compliance. Hence the title, 'Man more than machine'.

Since the original description of continuous positive airway pressure (CPAP) a number of technological innovations have increased PAP treatment options. Bilevel pressure treatment allows the delivery of separately adjustable levels of pressure in inspiration and expiration [3]. This may allow the maintenance of airway patency with a lower expiratory pressure. Patients who report difficulty exhaling may find bilevel pressure more comfortable. In one study of unselected patients this treatment mode did not increase compliance when compared with CPAP [4]. However, most physicians find that a number of patients will tolerate bilevel pressure better than CPAP. This group includes patients with chronic obstructive pulmonary disease (COPD) or expiratory muscle weakness and those patients requiring very high levels of pressure to maintain upper airway patency. Auto-titrating (autoCPAP) devices are another technological advance that may improve compliance [5,6]. These blower units increase or decrease the delivered pressure according to algorithms that vary between different devices. Some machines monitor airway vibration while others monitor flow, snoring, or evidence of airflow limitation (inspiratory flattening). Auto-titrating devices may allow maintenance of airway patency with a much lower nightly mean positive pressure. For example, if a patient requires 10 cmH_2O in NREM sleep and 15 cmH_2O in REM sleep, the patient may sleep most of the night on 10 cmH_2O pressure. A patient with a fixed pressure device would probably be treated with 15 cmH_2O for the entire night. Recent studies found a slight improvement in compliance when auto-titrating CPAP was utilized for treatment [5,6]. However, because of the added expense, these devices are not widely used as routine treatment for most patients.

One reason that technological innovations in blower unit design have made only modest improvements in compliance is that problems with the nasal mask interface (discomfort, leaks, need for mask adjustments with changes in body position) are often the most common source of patient dissatisfaction [7]. Air leaks into the eyes can produce drying and intolerance. Over tightening of the mask in an attempt to solve this problem can cause significant damage to the upper bridge of the nose. Severe leaks may prevent maintenance of airway patency or cause a loss of humidity. Patents with nasal obstruction and congestion may find breathing through the nasal route very difficult. Fortunately, an increased emphasis on improvement in mask design has finally been noted and a wide array of alternatives are available. Several brands should be tried if necessary to determine the optimum mask for a given patient. Alternatives to the usual nasal mask include nasal prongs and full face masks. Nasal prongs will work in some patients in

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whom a fit at the top of the nose is difficult. A full face mask may help patients with intractable nasal congestion or mouth leaks [8].

The importance of adding humidification to PAP treatment has also been recently recognized. Massie and coworkers found an increase in compliance and satisfaction with CPAP treatment when heated humidification was used compared to no humidification. The use of cold passover humidification produced intermediate results [9]. Unfortunately, in the United States, Medicare will pay for cold passover humidification but will not reimburse for the additional cost of heated humidification. However, in patients with severe nasal disease or mouth leaks heated humidification may be more efficacious.

Technological advances in compliance monitoring have also emerged. While patient report of compliance should always be obtained, it may be very misleading. Therefore, today there is an increased awareness of the importance of objective compliance monitoring. The simplest method is to record changes in the run time meter of blower units. Sadly, the cheapest unit may not have this simple and inexpensive device: an omission I personally find inexcusable. While it is possible that patients could turn their units on without using PAP in order to appear compliant, two studies suggests this is not a major problem [10,11]. Nevertheless, more expensive units with memory capable of storing time at pressure information are now available. This information can be quickly downloaded and can give a day by day and hour by hour picture of the pattern of compliance. For example, one could determine that CPAP use was discontinued every morning at 3:30 AM. A summary of average compliance over a selected period of time can also be quickly computed. One could determine the percentage of nights that a patient used the device for 4 h or more (or some other threshold value). The newest step in compliance monitoring is the recent development of memory cards that can record compliance information from machines and be mailed to the physician or home health care agency for review of compliance information.

While the above advances in technology are indeed welcomed by the sleep community, they are no substitute for the human factor. Technological advances are always more expensive and the most efficient use of resources requires expertise in applying them. Every patient does not need bilevel pressure, an auto-titrating CPAP device, and heated humidification. The art and science of sleep medicine is to identify which patients will likely benefit from a given device. For example, a patient with severe mouth dryness and nasal disease will probably require heated humidification. A pressure intolerant patient requiring substantially higher pressure in the supine position or in REM sleep may find an auto-titrating device more satisfactory. Detailed objective compliance monitoring may be very useful in patients still sleepy after using nasal CPAP. Finding 'unexpectedly' poor compliance may prevent a costly search for other explanations of persistent sleepiness.

The human factor is also essential in designing a treatment algorithm for patient education and optimizing the delivery of PAP treatment. Patients must first tolerate a PAP titration and accept treatment. They then must have sufficient compliance to obtain a clinical benefit. The first step to increase acceptance is education. Repetition is essential. The traditional 2 night approach (first night diagnostic, second night PAP titration) allows for an educational opportunity between sleep studies. After the diagnostic study, the patient is educated about the presence and severity of OSA, the consequences of non-treatment, and the benefits of treatment. The advantages and disadvantages of various treatment alternatives should also be discussed. If PAP is chosen, one then can provide education about PAP treatment. An opportunity for adequate mask fitting (trying several types) and familiarization with the sensation of being on PAP may improve acceptance of PAP on the initial titration night. In the United States the partial night approach (initial diagnostic portion followed by PAP titration) is becoming the norm because of economic considerations. Unfortunately, the first experience many patients have with CPAP is a hastily fitted mask in the middle of the night followed by an unfamiliar blast of air. A recent case controlled retrospective study found that the split night protocol does not reduce compliance [12]. However, this study was performed in a sophisticated treatment environment with good pre-study education and mask fitting. If a partial night protocol is to be used, the initial patient education must be more comprehensive. Information about both OSA and PAP should begin at the time a study is ordered and be repeated in the sleep laboratory pre-

study. Patients must arrive at the sleep laboratory early enough so that adequate time is available for education and mask fitting. The technician must feel that pre-study education is an important part of their job.

Once the patient begins PAP, close follow-up is essential. Studies have documented that more intensive support equals higher rates of compliance [13]. Hopefully future studies will better define those interventions that increase compliance in a cost effective manner. The timing of interventions is also important as the early use of PAP predicts long term compliance [14]. In general patients experiencing significant side effects use CPAP therapy less [11]. Therefore, considerable effort should be put into identifying and correcting side effects, education, and encouraging compliance. Treatment of nasal symptoms, trying a different size or brand of mask, adding humidification, adjusting the pressure level, or changing the mode of PAP should all be done if necessary within the first weeks and months of treatment. In some European sleep centers with high rates of compliance [10,13] patients spend additional nights in the hospital after the initial CPAP set up to quickly identify and treat problems. In the United States this is not possible, and the alternative is frequent contact with the patient by the sleep laboratory or home health care agency during the first weeks of treatment. Simple measures may help. Chervin and coworkers found that weekly telephone calls at the start of CPAP use (to uncover problems and encourage use) improved compliance [15]. Hoy and coworkers felt that the inclusion of the bed partner/spouse in education, CPAP training, and follow-up visits is a simple method to increase compliance [13]. Patients must have a way of easily contacting knowledgeable support personnel such as a business card with appropriate telephone numbers.

While support personnel can be very effective at handling problems with PAP treatment, the close involvement of a knowledgeable sleep physician is essential. I believe that studies need to be formulated to demonstrate the value of the direction of PAP care by specialists in the same way that studies have shown that specialists are more effective in directing care of asthma and other diseases. Rapid and open communication between the physician directing treatment and support personnel is vital to quickly address treatment problems.

Objective compliance data can be very useful in identifying which patients need more extensive attention. It may also serve as an assessment of the adequacy of the local protocol for administering PAP. Studies to define which interventions actually increase compliance and quality of life measures are needed. Ultimately, objective compliance data may prove that a systematic specialist-driven system for PAP treatment is more effective. In this regard, it is important to remember that the ultimate goal of treatment is control of symptoms and improvement of quality of life measures. Some patients may achieve considerable improvement with less than perfect compliance.

Hopefully a combination of judicious use of technological advances and optimal human-to-human interaction can improve patient compliance with PAP and ultimately, improve outcomes in patients with OSA. While the last two decades have seen a heavy emphasis on development of diagnosis and PAP treatment options, this may well be the decade of compliance and patient outcomes. A new emphasis on the monitoring and documentation of compliance and the design of effective specialist-driven delivery systems may both increase the quality of care and be more cost effective.

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