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Early View

Research letter

Something is changing in adherence to CPAP therapy: real world data after 1 year of treatment in patients with obstructive sleep apnea

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Title page

Something is changing in adherence to CPAP therapy: real world data after one year of treatment in patients with obstructive sleep apnea.

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Research Letter (1170/1200)

Obstructive sleep apnea syndrome (OSA) is a common sleep disorder, affecting at least 24% of male and 9% of female population (1). Despite progresses in alternative treatment options, continuous positive airway pressure (CPAP) therapy is still the first-line treatment in moderate to severe OSA. The effectiveness of CPAP treatment is proportional to the usage: the greater the number of hours of CPAP use per night the greater the improvement in OSA symptoms, daytime sleepiness, quality of life, sleep architecture and blood pressure. Adherence to treatment, however, is the crucial issue: in many case series more than 50% of patients with OSA had interrupted treatment one year after the prescription (2).

Several studies have proposed different protocols or approaches to increase adherence, i.e.: instructions to patients to manage CPAP machine, humidifier and the mask; psychological programs such as intensive sleep education, cognitive behavioral intervention, social cognitive therapy, motivational enhancement therapy, telemedicine intervention, behavioral treatment (3-8). In spite of the major burden imposed it is still unclear if these interventions really increase the adherence to CPAP therapy in the real world and on the long term, although they usually obtain an improvement – often marginal – in the number of hours of CPAP use (Table 1). Cistulli et al. (9) recently revised a large cloud-based database of patients showing that the rate of adherence to CPAP therapy, defined as 4 hours PAP use on 70% of nights in a consecutive 30-day period in the first 90 days of therapy, was 75%, independently of machine type, suggesting that 3 out of 4 patients in common practice are adherent to treatment.

In the light of these consideration, we decided to analyze CPAP adherence in consecutive OSAS patients in a clinical setting, according to our clinical practice. This is a retrospective monocentric observational study.

In our clinical setting the first step is a home cardio-respiratory study; the results are communicated in a 30-minute visit with a sleep certified physician where patient is informed of OSA diagnosis and possible treatment options., Candidates to CPAP treatment undergo a 40-minute session with a skilled technician who chooses a properly fitting mask and trains patient to CPAP use, ramp adjustment and management of humidifier. After one week of autoCPAP training at home, a fixed CPAP prescription follows according to data obtained

from the device and confirmed by a sleep study. The patient obtains a formal prescription of CPAP after attending a group educational session with a sleep expert technician lasting about one hour, characterized by introduction to respiratory sleep disorders, choice of treatment, CPAP machine management and information on reimbursement policies and possible restrictions to driver's license. After one year of treatment a follow-up visit is scheduled including an interview and assessment of CPAP usage from the built in data stored on the device. In case of need the patient has the opportunity to contact the sleep lab before the scheduled visit.

We analyzed data of consecutive OSA patients accessing our sleep lab between 2015-2017. During this period 1611 patients had a diagnosis of OSA, but 272 patients opted to undergo an alternative treatment. On the basis of the data downloaded from the device used at home, we divided the 1339 (338 F) patients who accepted CPAP treatment into three groups: group 1 poor adherence (≤3.9 hrs/night); group 2 acceptable adherence (4 to 4.9 hrs/night) and group 3 good adherence (at least 5 hrs/night – median 6.8 hours). No difference among these three groups was found regarding age (60.6±11.4 *vs* 62.5±10.9 *vs* 61.4±11.3 years, respectively), weight (89.0±19.1 *vs* 87.9±18.8 *vs* 89.7±20.4 kg), height (169.4±8.4 *vs* 169.1±8 *vs* 168.7±8.9 cm), apnea/hypopnea per hour (34.0±20.8 *vs* 37.1±21.4 *vs* 40.7±24.2), oxygen desaturations per hour (28.4±21.2 *vs* 29.8±23 *vs* 34.7±24.6), mean SaO_2 dips (88.3±7.5 *vs* 88.1±4.5 *vs* 87.6±5.3%), time spent with SaO2 <90% (14.4±20.7 *vs* 17.7±24 *vs* 21.5±25.7% of the recording). After one year 65.7% (N= 879) of our patients use CPAP at least 5 hrs/night, 11.6% (N=155) between 4 and 4.9 and only 22% (N=305) <3.9 h/night. Adherence to treatment in the first week is not discriminant since patients do not receive a CPAP prescription until they show at least 4 hrs/night of usage.

Our study reports adherence to CPAP therapy after one year of treatment in consecutive patients in a clinical setting including an educational session. Our data suggest that a sustainable, patient centered program can work in real life leading to adherence rates comparable or even better than more expensive and articulated interventions (3-8). This is more important if we consider the cost of sleep disorders for the national health system.

Our study confirms data of Cistulli et al.(9), a study conducted on a far bigger sample (m vs k) of unselected patients using a unique device brand, relying on a more traditional definition of adherence and 90 days follow-up showing an adherence rate of about 75%. Our study adopted a more restrictive adherence definition (at least 4 hours every night), includes all patients who were prescribed CPAP in a clinical setting, used different CPAP brands and a standardized protocol. One year follow-up is a time-span offering a more reliable information

on long-term adherence. A limitation of both studies is that case series do not include those who refused treatment, who in our practice can rely on a tailored alternative therapeutic program. The final message is that about 4 out of 5 patients who decide to start CPAP treatment have a satisfying adherence on long term. We believe that a careful choice of interface and education of patients in the first week is crucial, but the opportunity to have a quick access to the lab when a problem occurs is another key to success: 1 out of 5 patients relied on this opportunity and the new programs of telemonitoring could help in assuring more timely interventions. Expensive tools and time-consuming programs statistically increase the time on CPAP, but often this difference is below a clinically relevant threshold (8), or can lead to good results (10), but are difficult to apply on big numbers. However 22% of patients who use CPAP less than 4 hrs per night is still a critical rate and additional resources could be focused on these subjects more than in the effort to enhance adherence of patients already compliant to treatment. Future studies should focus on investigating the causes of the low adherence in this new scenario and construct a specific protocol on the basis of personality characteristics and co-morbidity, particularly when insomnia is the cause of an insufficient use.

In conclusion our study suggests that nowadays adherence to CPAP therapy is effective applying a standard protocol consisting of a diagnostic procedure, accurate pressure setting and mask choice, a group educational session on sleep and sleep disorders, and one-yr follow up visit. Adherence rates are consistently high compared to the figures of a decade ago, possibly for the improvement of technology and for more opportunities of alternative treatments in less severe patients, supporting the hypothesis that a sustainable and accurate procedure of OSA patients management can work in real life.

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Table 1. Results of some protocols designed to enhance OSA patients' adherence to CPAP therapy

Study/Year	**N**	**Intervention**	**Results Adherence** (hrs/night): intervention vs control group	**Time of follow up**
Olsen et al, 2012 (4)	106	Three one-on one motivational interviewing sessions	4.21 ± 3.25 vs 3.00 ± 3.18	12 mths
Aloia et al, 2013 (5)	227	Two 45-min,one-on-one sessions, either MET or education	3.86 ± 2.61 vs 3.73 ± 2.50	12 mths
Bakker et al, 2016 (6)	83	Motivational enhancement, two 1 hr in person session + 6 phone calls lasting 10-30 minutes	4.4 ±2.9 vs 3.3 ± 2.7	6 mths
Hostler et al, 2017 (7)	61	Web-based engagement tool (Philips Sleep Mapper)	4.0 (CI 2.4-4.8) vs 2.7 (CI 1.7-3.9)	11 wks
Pépin et al, 2018 (8)	306	Remote activity, sleep, BP oximetry, and adherence monitoring with coaching	5.28 ± 2.23 vs 4.75 ± 2.50	6 mths

Data are expressed as mean ± standard deviation, unless otherwise stated.

Definition of abbreviations: AHI, apnea hypopnea index; BP, blood pressure; CPAP, continuous positive airway pressure; MET, motivational enhancement treatment