Determinants of adherence to continuous positive airway pressure therapy in adults with obstructive sleep apnea

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ASBTRACT

Objectives Adherence to continuous positive airway pressure (CPAP) devices in patients with obstructive sleep apnea (OSA) determines the effectiveness of the treatment. Likewise, the assessment of the control of the disease must consider the information referred by the patient, among other value-based health measures related to the satisfaction of the intervention. The objectives of this study were a) Determine the factors related to adherence to CPAP devices in subjects with OSA affiliated to an insurance company of the healthcare system in Colombia. b) Assess symptom control associated to the disease from the individual’s perspective and his/her satisfaction with the treatment received.

Materials and Methods 1,501 subjects with OSA were surveyed by telephone to explore: sociodemographic factors, habits and lifestyles, use of CPAP and its adverse events, control of the disease, comorbidities, access to care and therapy satisfaction. Using multilevel logistic regression techniques, the influence of the various factors on adherence to CPAP was analyzed, using Stata 13 software.

Results Adherence to CPAP therapy was of 58% and the control of symptoms was of 41.7%. The factors that determined the use of CPAP were knowledge on how the device operates, and the disturbances during sleep due to the mask or nasal pad. Therapy satisfaction was predominantly very good or good.

Conclusion Even with moderate adherence values and a good experience with CPAP therapy, symptomatic control of the disease is poor. Many of the factors that affect the use of CPAP are modifiable with a proper approach by the devices´ service provider.

Key Words: Sleep apnea syndromes; continuous positive airway pressure; disorders of excessive somnolence; patient compliance; patient satisfaction (source: MeSH, NLM).

RESUMEN

Objetivos La adherencia a los dispositivos de presión positiva continua de la vía aérea (CPAP) en pacientes con síndrome de apnea obstructiva del sueño (SAOS) define la efectividad del tratamiento. Los objetivos de este estudio fueron: a) Determinar los factores relacionados con la adherencia al CPAP en pacientes con SAOS de una aseguradora del Sistema General de Seguridad Social en Salud colombiano y b) evaluar el control de los síntomas de la enfermedad desde la perspectiva del individuo y su satisfacción con la terapia.

Materiales y Métodos Mediante encuesta telefónica a 1 501 pacientes con SAOS se exploraron factores sociodemográficos, hábitos y estilos de vida, uso del CPAP y eventos adversos relacionados, control de la enfermedad, comorbilidad, acceso a la atención y satisfacción con la terapia. Utilizando técnicas de regresión logística multinivel, se analizó la influencia de los distintos factores sobre la adherencia al CPAP mediante el software Stata 13.
Resultados La adherencia al CPAP fue del 58% y el control de los síntomas del 41,7%. Los factores que determinaron el uso del CPAP fueron el conocimiento del funcionamiento del equipo y la dificultad para dormir debida a la mascarilla o la almohadilla nasal. La satisfacción con la terapia fue buena o muy buena predominantemente.

Conclusiones Aún con valores de adherencia moderados y una buena experiencia con la terapia CPAP, el control sintomático de la enfermedad es pobre, pues varios de los factores afectan el uso del CPAP. Dichos factores se pueden intervenir con un adecuado abordaje por parte del prestador de servicios del dispositivo.

Palabras Clave: Síndromes de la apnea del sueño; presión de las vías aéreas positiva continua; trastornos de somnolencia excesiva; cooperación del paciente; satisfacción del paciente (fuente: DeCS, BIREME).

O bstructive sleep apnea (osa) is a disorder that affects the quality of life of people that suffer from it, in addition to being an important cardiovascular risk factor (1). The objective of cpap therapy, as treatment pillar, is to improve the symptoms associated with osa, such as daytime sleepiness and disturbances in attentions span (2).

The insurance companies of the Colombian Healthcare System have within their roles the comprehensive health risk management of the population insured (3). In eps Sanitas, an insurance company, there is a growing trend, evident in recent years, of the incidence of osa along with a poor adherence to cpap devices and an increase in costs derived from care.

The adherence to cpap therapy varies between 28 to 83%, with an average long-term adherence rate of 50% (4). Among the factors that determine adherence, the following stand out: age, smoking, osa severity, modality of the device and tolerance to it. Thus, the study of the determinants of adherence arises as an approach to identify the modifiable factors to guide the design of new health interventions that increase the value in health provided.

The value in Health of the cpap therapy is measured by the combination of the degree of symptom control achieved and the presentation of secondary adverse events (5). Our hypothesis is that several of the complications associated with the use of cpap affect the subjects’ adherence to these devices and thus symptom control of the disease.

MATERIALS AND METHODS

Context and population

An observational and prospective cross-sectional study was conducted in adults diagnosed with osa affiliated to eps Sanitas and treated with continuous positive airway pressure devices during 2018. In this year, the cpap user population represented 12,000 cases distributed in the insured population of the country (around 2.5 million people).

In the study population, subjects with clinical suspicion of osa (increased risk of osa) is indicated by the presence of excessive daytime sleepiness and at least two of the following three criteria: habitual loud snoring; witnessed apnea, gasping, or choking; or diagnosis of hypertension) were evaluated by a polysomnography (psg) which defines the diagnostic classification and severity of the disease. Cpap therapies were prescribed by a sleep medicine physician, with expertise in the diagnosis and management of adults with osa, in patients with predominantly moderate to severe osa [ahí (apnea-hypopnea index) cutoff of ≥15 events/h]. Only subjects with use of cpap device for at least six months were considered eligible for this study. After the diagnosis, patients were followed up by four different ventilation device providers, all had the same follow up schedule (at first month and subsequently every six months during the first year and annually from the second year on) and the same patient education schemes.

Exclusion criteria were defined by the concomitant presence of other sleep-related disorders, such as central sleep apnea syndromes, sleep-related hypoventilation disorders and sleep-related hypoxemia disorders, restrictive lung diseases, restrictive pathology of the chest, severe heart failure, severe arrhythmias, severe cardiomyopathy, personal history of mental illness, and major cognitive disorders. Patients with severe cardiopulmonary diseases usually are managed in specialized clinics for osa and they do not represent the vast majority of patients in our insured population requiring cpap.

Sampling frame

Probabilistic sampling was performed in the defined population based on an estimated sample size for a multivariable logistic regression model. In the calculation a probability of adherence was assumed of 0.35 and an or of 2.7, for those who do not know how to use the positive pressure device, taking into account an alpha error of 0.05, a power of 0.95 and a r square of 0.1 in a two-tailed test, obtaining an estimate of 230 subjects. This calculation was made using the G*Power 3.1 program of the University of Düsseldorf (6-7).

Collection of data and variables

All participants in the study were asked for their verbal informed consent prior to the completion of the telephone
survey, only those who agreed to participate were included for data analysis. Each of the eligible subjects was reached by telephone by a respiratory therapist who reviewed the last reading of the electronic cards of the CPAP devices. Adherence was considered when the device was used for at least four hours each day for five days of the week (adherent-use threshold).

In the telephone interview a standardized questionnaire was formulated for the collection of sociodemographic characteristics, habits and healthy lifestyles (alcohol, AUDIT-C questionnaire), important medical history, symptoms of the disease (Epworth Sleepiness Scale), adverse events secondary to the use of the CPAP device, knowledge of the device, use of healthcare services in the last year and the degree of satisfaction with the service.

Data analysis
The study variables were described considering their qualitative or quantitative nature. For the first variables, absolute and relative frequencies were calculated; while for the latter, measures of central tendency and dispersion were calculated. To determine the distribution of each of the characteristics according to the level of adherence to the CPAP devices, the chi-square test was used when the variables were categorical; while for the numerical ones the Student t test or Mann-Whitney U test were used, according to the statistical normality of the data.

The possible associations between sociodemographic variables, habits and healthy lifestyles, clinical characteristics, information related to the device and its adverse events and access to services with the level of adherence to CPAP were explored, adjusting a multilevel logistic regression model whose dependent variable was the threshold of adherence use. The model used as independent variables all those characteristics with statistical significance in the bivariable analysis.

As a term of random effects or level variable, the positive pressure device provider was used. To estimate the level effect of the provider, the intraclass correlation coefficient was calculated in order to know the percentage of variation of the response due to the level. The data analysis was carried out through the statistical program Stata 13.

This work has been approved by the Research Ethics Committee of the Fundación Universitaria Sanitas and has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. All persons gave their verbal informed consent (phone interview) prior to their inclusion in the study.

RESULTS
Between August and December 2018, 1,501 subjects with OSA affiliated to the insurance company nationwide were interviewed. The interviewee, in 5% of the cases, was the main caregiver. Male participants were 53.6% of the sample and average age of all patients was 64.7 years (SD: 13.0 years).

Table 1 shows the characterization of the study population, with a predominance of subjects from the Bogotá Regional of the insurance company. More than half of the subjects were inactive workwise, and only 7% alternated between day and night shifts due to their occupation. The group of single, separated or widowed subjects accounted for a third of the total sample.

In terms of habits and healthy lifestyles, 58% of subjects slept accompanied and 52.2% performed at least 150 minutes of moderate aerobic physical activity per week. The recommended consumption of fruits and vegetables per day was barely seen in one third of the subjects, although the prevalence of tobacco consumption and alcohol risk consumption did not represent more than 5% each (Table 1).

In regards to the use of CPAP, almost a third of respondents were unaware of when the device was functioning properly. Symptoms such as difficulty sleeping due to the mask, nasal or throat discomfort and dry mouth represented the most frequent adverse events due to its use (Table 1). However, the satisfaction with the device reported by the subjects was good or very good in 82% of cases, regular (13%) and bad or very bad (5%).

The level of control of OSA, assessed by the absence of sleepiness referred by the subjects through the Epworth Scale, was observed in 41.7% of respondents. In respect to the associated comorbidity, 79% of subjects were overweight or obese at the time of the interview. Likewise, the first three conditions apart from overweight and obesity accompanying OSA were, in order of frequency, hypertension, upper respiratory tract conditions (recurrent rhinitis, sinusitis or laryngitis) and hypothyroidism (Table 1).

The evaluation of access to healthcare services revealed that 75% of subjects had a visit to the specialist for the management of their disease in the last six months, while 71% of them denied having been seen by respiratory therapy during the last year (Table 1). The level of satisfaction referred of the overall experience with the attention received for the management of OSA was good or very good in 75% of respondents, neutral (14%) and bad or very bad (11%).
La satisfacción con el dispositivo de presión positiva fue obtenida por el lectura registrado de la tarjeta CPAP electrónica. De estas, 57.9% de la población del estudio usó el dispositivo por al menos cuatro horas en el 70% o más de los 90 últimos días. Mientras que 79.5% de los respondientes reportaron, en la entrevista telefónica, el uso de CPAP por al menos cuatro horas, 5 días o más por semana. El tipo de dispositivo más usado fue CPAP (82.7%), seguido de AutoCPAP (8.6%), nivel positivo presión inspiratoria (BPAP) (6.1%), y otros (2.6%).

La tabla 2 presenta el análisis bivariado resultando de la relación entre cada uno de los factores estudiados y la adherencia al dispositivo CPAP. La edad fue el único factor demostrando una asociación con la adherencia de manera significativa.

En 670 (44.6%) sujetos, información sobre la adherencia fue obtenida mediante el registro de lectura de la tarjeta CPAP electrónica. De estos, 57.9% de la población del estudio usaron el dispositivo por al menos cuatro horas en el 70% o más de los 90 últimos días. Mientras que 79.5% de los respondientes reportaron, en la entrevista telefónica, el uso de CPAP por al menos cuatro horas, 5 días o más por semana. El tipo de dispositivo más usado fue CPAP (82.7%), seguido de AutoCPAP (8.6%), nivel positivo presión inspiratoria (BPAP) (6.1%), y otros (2.6%).
CPAP, the proportion of subjects over 45 years was higher in the adherent groups. On the other hand, habits such as the consumption of fruits and vegetables, exercise and use of tobacco and alcohol were not associated with a greater or worse adherence to positive pressure devices.

Regarding the variables related to the CPAP, the device provider and the ability to operate the equipment were significantly associated with their adherence; meanwhile knowledge on how to adjust the mask to the face lingered at borderline of statistical significance (Table 2).

Three of the adverse events studied in relation to the use of CPAP devices showed a statistically significant association with the adherence to the device therapy. Thus, the proportion of subjects with difficulty sleeping due to the mask or nasal pad was higher in the non-adherent group, compared to the adherent group. Likewise, the non-adherent group referred ocular, chest and sinus discomforts or difficulty exhaling in higher frequency (Table 2).

None of the variables related to comorbidity showed a significant association with subjects’ adherence to CPAP. However, in terms of access to services for the care of OSA, the specialized medicine visit in the last six months was a factor associated with adherence to the device. The proportion of subjects with a recent visit to the specialist was higher in the group of adherent subjects compared with non-adherent. The other variables of the care model studied were not associated with adherence to CPAP (Table 2).

Table 2. Bivariate analysis between the analyzed factors and CPAP adherence

| Variable | Non-adherent | Adherent | P value |
|----------|--------------|----------|---------|
| Sex      |              |          |         |
| Male     | 138 (48.9)   | 209 (53.9)| 0.207   |
| Female   | 144 (51.1)   | 179 (46.1)|         |
| Age      |              |          |         |
| 18-44 years | 27 (9.6)   | 21 (5.4)  | 0.039   |
| ≥45 years | 255 (90.4)  | 367 (94.6)|         |
| Regional (within Colombia) | | | |
| Bogotá   | 225 (79.8)   | 322 (83.0)|         |
| Barranquilla | 6 (2.1) | 5 (1.3) | 0.797 |
| Bucaramanga | 3 (1.1)   | 4 (1.0)  |         |
| Cali     | 18 (6.4)     | 24 (6.2)  |         |
| Medellin | 11 (3.9)     | 9 (2.3)   |         |
| Ethnicity|              |          |         |
| Afro/indigenous/ROM | 3 (1.1) | 3 (0.8) | 0.693 |
| Other    | 279 (98.9)   | 385 (99.2)|         |
| Workshift|              |          |         |
| Dayshift | 111 (39.4)   | 127 (32.7)| 0.129   |
| Night/Mixed-shift | 23 (8.2) | 27 (7.0) |         |
| Not employed | 148 (52.4) | 234 (60.3)|         |
| Education|              |          |         |
| None/primary education | 45 (16.0) | 61 (15.7) | 0.406 |
| Secondary education | 72 (25.5) | 117 (30.2)|         |
| Technical/university | 165 (58.5) | 210 (54.1)|         |
| Social class/socioeconomic stratum | | | |
| Stratum 1 y 2 | 44 (15.6) | 62 (16.0) | 0.976 |
| Stratum 3 | 99 (35.1) | 136 (35.0)|         |
| Stratum 4 | 86 (30.5) | 113 (29.1)|         |
| Stratum 5 y 6 | 53 (18.8) | 77 (19.9)|         |
| Marital status| | | |
| Married | 159 (56.4)   | 223 (57.5)| 0.979   |
| Separated | 25 (8.9)    | 37 (9.6)  |         |
| Single   | 38 (13.4)    | 51 (13.1) |         |
| Civil union | 23 (8.2)   | 32 (8.2)  |         |
| Widower  | 37 (13.1)    | 45 (11.6) |         |
| Healthy habits and lifestyles| | | |
| Sleeps accompanied | | | |
| No | 130 (46.1) | 178 (45.9) | 0.954 |
| Yes | 152 (53.9) | 210 (54.1)|         |
| Exercise | | | |
| <150 min/week | 138 (48.9) | 185 (47.7) | 0.748 |
| ≥150 min/week | 144 (51.1) | 203 (52.3)|         |
| Nutrition | | | |
| <5 servings of fruits and vegetables/day | 198 (70.2) | 264 (68.0) | 0.549 |
| ≥5 servings of fruits and vegetables/day | 84 (29.8) | 124 (32.0)|         |
| Smoke (any consumption), n (%) | | | |
| No | 270 (95.7)   | 364 (93.8)| 0.274   |
| Yes | 12 (4.3)     | 24 (6.2)  |         |
| Alcohol | | | |
| No | 198 (70.2)   | 264 (68.0)| 0.549   |
| Yes | 84 (29.8)    | 124 (32.0)|         |
| Variable | Non-adherent n (%) | Adherent n (%) | P value |
|----------|--------------------|----------------|---------|
| **Ventilation device** | | | |
| Provider | | | |
| Provider 1 | 54 (19.1) | 81 (20.9) | 0.011 |
| Provider 2 | 59 (20.9) | 79 (20.4) | 0.33 |
| Provider 3 | 93 (33.0) | 162 (41.7) | 0.023 |
| Provider 4 | 76 (27.0) | 66 (17.0) | 0.071 |
| Knows how to start/operate the device | | | |
| No | 20 (7.1) | 11 (2.8) | 0.10 |
| Yes | 262 (92.9) | 377 (97.2) | |
| Knows how to connect the mask/nasal pad to the device | | | |
| No | 17 (6.0) | 16 (4.1) | 0.261 |
| Yes | 265 (94.0) | 372 (95.9) | |
| Knows how to adjust the mask/nasal pad to the face | | | |
| No | 20 (7.1) | 15 (3.9) | 0.064 |
| Yes | 262 (92.9) | 373 (96.1) | |
| Knows when the device is not working properly | | | |
| No | 96 (34.0) | 116 (29.9) | 0.255 |
| Yes | 186 (66.0) | 272 (70.1) | |
| Use of vibrating positional device | | | |
| No | 280 (99.3) | 386 (99.5) | 0.748 |
| Yes | 2 (0.7) | 2 (0.5) | |
| Use of mandibular advancement device | | | |
| No | 280 (99.3) | 386 (99.5) | 0.748 |
| Yes | 2 (0.7) | 2 (0.5) | |
| **Adverse events related to the device** | | | |
| Difficulty sleeping due to the mask/nasal pad | | | |
| No | 150 (53.2) | 260 (67.0) | <0.001 |
| Yes | 132 (46.8) | 128 (33.0) | |
| Excessive noise prevents sleep | | | |
| No | 234 (83.0) | 333 (85.8) | 0.313 |
| Yes | 48 (17.0) | 55 (14.2) | |
| Nasal/throat symptoms | | | |
| No | 165 (58.5) | 238 (61.3) | 0.460 |
| Yes | 117 (41.5) | 150 (28.7) | |
| Dry mouth | | | |
| No | 171 (60.6) | 245 (63.1) | 0.509 |
| Yes | 111 (39.4) | 143 (36.9) | |
| Skin events | | | |
| No | 229 (81.2) | 324 (83.5) | 0.439 |
| Yes | 53 (18.8) | 64 (16.5) | |
| Ocular symptoms | | | |
| No | 213 (75.5) | 320 (82.5) | 0.028 |
| Yes | 69 (24.5) | 68 (17.5) | |
| Abdominal distention | | | |
| No | 214 (75.9) | 315 (81.2) | 0.097 |
| Yes | 68 (24.1) | 73 (18.8) | |
| Chest or sinus discomfort or difficulty exhaling | | | |
| No | 228 (80.8) | 343 (88.4) | 0.007 |
| Yes | 54 (19.2) | 45 (11.6) | |
| The partner complains about the use of the device | | | |
| No/sleeps alone | 239 (84.8) | 321 (82.7) | 0.486 |
| Yes | 43 (15.2) | 67 (17.3) | |
| **Comorbidities** | | | |
| Body Mass Index | | | |
| Under weight | 2 (0.7) | 1 (0.3) | 0.684 |
| Normal | 56 (19.9) | 76 (19.6) | |
| Overweight/obesity | 224 (79.4) | 311 (80.1) | |
| Arterial hypertension | | | |
| No | 128 (45.4) | 159 (41.0) | 0.255 |
| Yes | 154 (54.6) | 229 (59.0) | |
| Diabetes mellitus | | | |
| No | 226 (80.1) | 299 (77.1) | 0.339 |
| Yes | 56 (19.9) | 89 (22.9) | |
| Cerebrovascular Disease | | | |
| No | 268 (95.0) | 370 (95.4) | 0.845 |
| Yes | 14 (5.0) | 18 (4.6) | |
| Recurrent rhinitis, sinusitis or laryngitis | | | |
| No | 179 (63.5) | 268 (69.1) | 0.129 |
| Yes | 103 (36.5) | 120 (30.9) | |
| Asthma | | | |
| No | 263 (93.3) | 366 (94.3) | 0.569 |
| Yes | 19 (6.7) | 22 (5.7) | |
| COPD | | | |
| No | 231 (81.9) | 308 (79.4) | 0.414 |
| Yes | 51 (18.1) | 80 (20.6) | |
| Hypothyroidism | | | |
| No | 182 (64.5) | 256 (66.0) | 0.699 |
| Yes | 100 (35.5) | 132 (34.0) | |
| Use of sedatives or tranquilizers | | | |
| No | 225 (79.8) | 326 (84.0) | 0.157 |
| Yes | 57 (20.2) | 62 (16.0) | |
The multivariable analysis of the data was based on a maximum model containing the variables of: age, sex, ability to operate the equipment, ability to adjust the mask/nasal pad to the face, difficulty sleeping due to the mask/nasal pad, ocular symptoms, abdominal distension, chest or paranasal sinuses discomforts or difficulty exhaling, and specialized medicine consultation; considering as a level variable the CPAP service provider.

Only two of the factors of the maximum model were significantly related to subject's adherence to positive pressure devices, and two of them remained at borderline of statistical significance (Table 3). The ability to operate the equipment almost tripled the adherence odds (OR: 2.90; 95% CI: 1.32 to 6.38) compared to those who did not know how to operate it; while those that referred difficulty sleeping due to the mask/nasal pad reduced adherence odds by 41%, compared to those that did not present this discomfort (Table 3).

On the other hand, being 45 years of age or older increased the odds of adherence to CPAP by 70%, compared with subjects 18 to 44 years of age, and presenting chest or sinus discomfort or difficulty exhaling decreased adherence odds by 36%; although these effects were barely kept at borderline of statistical significance (Table 3).

The final model described was adjusted by the CPAP service provider as a level variable with a statistically significant residual intraclass correlation of 2.08% (95% CI 0.30 to 12.76). That is, the CPAP provider explains around 2% of the variability in the level of adherence.

### DISCUSSION

Among the most relevant findings of this study, 58% of subjects with OSA used the CPAP device for at least 4 hours, 70% or more of the nights, reaching a control of daytime sleepiness of 41.7% of the sample analyzed. The factors associated with the adherence to these devices were the ability to operate the equipment and the difficulty sleeping due to the mask or nasal pad.

Likewise, the observed prevalence of overweight and obesity, arterial hypertension and diabetes mellitus concomitant with OSA itself as cardiovascular risk factors in the study population stand out. However, subjects referred low involvement in cardiovascular risk programs as well as education workshops for OSA management.

Similarly, the use of complementary forms of intervention to CPAP therapy, such as mandibular advancement devices were reported by less than 1% of the study population. However, the perceived satisfaction of the care received and the CPAP therapy itself was valued as good or very good primarily.

There are several reasons that can explain the level of adherence observed. Adverse events secondary to the use of the positive pressure devices affected a significant proportion of subjects in this study, which may not have been intervened successfully by the device provider during the subject’s adaptation process. However, the level of adherence found is within the limits published by other authors in the literature, which range between 41.6% and 78% (8-10).

As in our work, authors such as Baratta et al. (8) and Bazurto et al. (11) have also assessed the main discomforts derived from the use of CPAP involved in discontinuation of therapy. These authors found that the complaints most
frequently referred by subjects were upper airway symptoms (e.g. nasal) and those related to the facial mask (e.g. pressure). The latter closely linked to low adherence in our study. Unlike the findings of this work, several previously published studies have identified that cardiovascular risk factors, such as hypertension\(12\), history of myocardial infarction and cerebrovascular events\(8\) and smoking \(8\)-9\) constitute independent risk factors for poor adherence to CPAP.

In regards to the health value provided by CPAP therapy in subjects with OSA, the published results on the control of daytime sleepiness, measured using the Epworth Sleepiness Scale, show a frequency of symptomatic sleepiness of up to 58% of cases in subjects with different severity levels of the disease \(13\)-\(14\). In our work, severe excessive daytime sleepiness affected 46% of adults with OSA, similar to that observed by Bostokeky et al. \(13\) after one to six months of treatment with CPAP in adults with severe disease.

The level of satisfaction with CPAP therapy has also been a subject of study in different publications. A survey of more than 3,000 users of these devices in France revealed that overall satisfaction was good or excellent in 90% of subjects \(15\). Likewise, in a clinical trial in Sweden in which two follow-up alternatives were compared in subjects with OSA, satisfaction with CPAP reached 99% in both groups \(16\). Although these values are higher than those observed in this study, the results of our work show a great consistency between the overall satisfaction with the CPAP and the one referred with the attention received for the management of OSA.

Although several of the adverse events secondary to the use of CPAP have been described in this study, other factors that determine adherence such as the knowledge of the risk derived from the disease and the perceptions and expectations regarding the therapy were not addressed by the interviews. Future analyzes of this nature, especially of a qualitative nature, could reveal other direct causes that explain poor adherence in certain groups of subjects.

In the Broström et al. \(17\) study some of the barriers identified in CPAP users consisted of negative attitudes prior to and during the therapy, based on feelings of doubt regarding the certainty of the diagnosis and the need for CPAP therapy. Some subjects experienced shame at the need for treatment with CPAP and its use in the presence of other people.

The accessibility of information from the automatic readings of the electronic cards of the devices leads to the question of whether the subjects from which no information on the use of CPAP was obtained, the levels of adherence and their associated factors were the same as those found in the analyzed sample. However, in terms of the sample estimate made, the n studied was sufficient for the proposed objectives.

Considering the low involvement in cardiovascular programs in the study population, as well as the low participation of educational activities for the management of OSA, some questions are proposed that can be addressed by practice and research: Is the program offer, in health education and prevention aimed at patients with OSA, sufficient? Is the population with the disease aware of the value of treating their condition? Do patients with OSA know the risk of unwanted cardiovascular events or death? and finally, are the causes of non-compliance to available therapies by patients known and addressed by healthcare services?

It is well known how mandibular advancement devices an alternative to CPAP in subjects with mild and moderate OSA are, helping to prevent snoring and excessive daytime sleepiness \(18\)-\(19\). Even these devices are as effective as CPAP in terms of the benefit on quality of life (sleepiness and functional and cognitive outcomes), according to a recent meta-analysis of randomized controlled clinical trials; effect attributed to a lower adherence of subjects to CPAP devices \(20\).

Despite the above, in our study the use of mandibular advancement devices referred by subjects was very low, setting a favorable scenario for the inclusion of this technology to achieve cost-effective results in the population with OSA.

In conclusion, even with moderate adherence values and a good experience with CPAP therapy, the symptomatic control of the disease remains poor. The main factors associated with adherence were the subjects’ ability to operate the equipment and the adverse effects due to the mask or nasal pad; both factors modifiable with a proper approach by the devices’ service provider (e.g., reading the level of adherence, education about the use of CPAP or adjusting the face mask) ♣.

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Conflicts of interest: None.

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