

Original Article

Cost-effectiveness of Continuous Positive Airway Pressure Treatment in Moderate-Severe Obstructive Sleep Apnea Syndrome[☆]


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ABSTRACT

Introduction: The socioeconomic impact of obstructive sleep apnea-hypopnea syndrome (OSAHS) is considerable. The aim of this study was to evaluate the cost-effectiveness of treating OSAHS with continuous positive airway pressure (CPAP) and the impact of CPAP compliance.

Methods: This was a retrospective, case-crossover study of 373 patients with OSAHS receiving CPAP. We compared changes in costs, Epworth score and health-related quality of life (EQ-5D questionnaires) between the year before treatment and the year after treatment. The incremental cost-effectiveness ratio (ICER) for the first year of treatment was estimated, and projections were made for the second year, using different effectiveness and cost scenarios.

Results: The visual analog scale score for the EQ-5D questionnaire increased by 5 points and the Epworth score fell by 10 points during the year of CPAP treatment. Mean gain in quality-adjusted life years (QALY) was 0.05 per patient per year ($P < .001$): 0.07 among compliers and -0.04 among non-compliers. ICER was €51,147/QALY during the first year of CPAP treatment and €1544/QALY during the second year.

Conclusion: CPAP treatment in patients with moderate-severe OSAHS improves the quality of life of compliant patients, and is cost-effective as of the second year.

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Análisis coste-efectividad del tratamiento con presión positiva continua de la vía aérea en el síndrome de apnea-hipopnea durante el sueño (SAHS) moderado-grave

RESUMEN

Introducción: El síndrome de apnea-hipopnea durante el sueño (SAHS) supone un gran impacto socioeconómico. El objetivo de este estudio es evaluar el coste-efectividad del tratamiento del SAHS con presión positiva continua de la vía aérea superior (CPAP) y estimar la influencia que tiene el cumplimiento de la CPAP.

Métodos: Estudio retrospectivo de «casos cruzados» de 373 pacientes SAHS tratados con CPAP. Se calcularon variaciones en costes, puntuación en el test de Epworth y calidad de vida relacionada con la salud (cuestionario EQ-5D) entre el año previo al tratamiento y el año después del mismo. Se estimó la ratio de coste-efectividad incremental (RCEI) para el primer año de tratamiento y se realizó una proyección para el segundo año bajo distintos escenarios de efectividad y costes.

Palabras clave:

Apnea del sueño

Presión positiva continua de vías aéreas

Análisis coste-efectividad

Calidad de vida

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Resultados: La puntuación de la escala visual analógica del cuestionario EQ-5D aumentó en 5 puntos y el test de Epworth disminuyó en 10 puntos al año del tratamiento con CPAP, con una ganancia media en años de vida ajustados por calidad (AVAC) de 0,05 por paciente y año ($p<0,001$): 0,07 en cumplidores y $-0,04$ en no cumplidores. La RCEI fue de 51.147 €/AVAC durante el primer año de tratamiento con CPAP y de 1.544AVAC el segundo año.

Conclusión: El tratamiento con CPAP en pacientes con SAHS moderado-grave mejora la calidad de vida de los pacientes cumplidores y es coste-efectivo a partir del segundo año.

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Introduction

Sleep apnea-hypopnea syndrome (OSAHS) affects 2%–4% of the general middle-aged population,¹ and over 7 million Spaniards are at risk of developing this disease.^{2,3} OSAHS has been associated with increased prevalence and incidence of metabolic changes and cardiovascular diseases, such as arterial hypertension (AHT), heart failure, ischemic heart disease, stroke, and sudden death,^{4–6} along with higher accident rates in the workplace, at home and on the roads,^{7,8} making it a public health issue with a high economic burden.

Increases in healthcare spending due to continuous improvements in the diagnosis and treatment of such a prevalent disease as OSAHS are foreseeable in years to come, but these may be compensated in the long term by a reduction in cardiovascular complications and increased work productivity.

Continuous positive airway pressure (CPAP) is the treatment of choice in most OSAHS patients. It is not a curative treatment and needs to be applied continuously and indefinitely.⁹ The diagnosis of OSAHS and treatment with CPAP, albeit costly for the healthcare system, are essential, because undiagnosed or untreated OSAHS patients use 2–3 times more resources than the general population.¹⁰ Moreover, several studies have been published on the positive impact, both in the short and long term, of CPAP treatment on patients' health-related quality of life (HRQoL), although these are all based on small series of patients.^{11–14}

Cost-effectiveness studies of CPAP therapy in OSAHS estimate whether the cost of CPAP treatment is compensated by improved symptoms and quality of life. Several studies that use Markov models based on literature reviews and secondary sources to simulate the course of the disease and the use of resources have shown that CPAP is cost-effective compared to other therapeutic interventions.^{15–17}

The main objective of this study was to analyze the cost-effectiveness of CPAP in patients with a diagnosis of OSAHS after 1 year of treatment, using primary data, and to predict the impact after 2 years of treatment. The secondary objective was to estimate the possible influence of patient compliance on the cost-effectiveness of CPAP treatment.

Materials and methods

Study population and design

This was a retrospective, observational, case-crossover study in patients with a diagnosis of OSAHS receiving CPAP between January 2008 and February 2012 in the Sleep-Disordered Breathing Unit (SDBU) of the Hospital Universitari Sant Joan de Reus, who had been followed up for at least 1 year. The "case period" was defined as the 365 days following the clinical diagnosis of OSAHS and the "control period" was the preceding 365-day period. Of the 1790 patients seen in the SDBU due to suspected OSAHS, 373 patients with moderate or severe OSAHS treated with CPAP, with evaluable case report forms (CRF) at the beginning of treatment and at the end of the 1-year follow-up period were finally included (Fig. 1). The

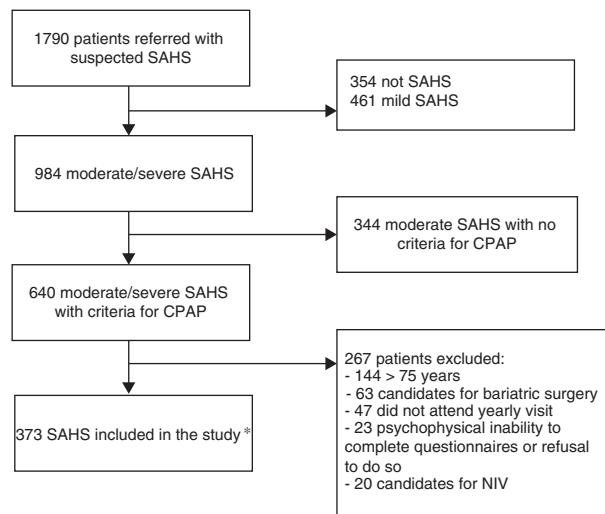


Fig. 1. Flow chart of study design. *OSAHS diagnosis was performed by in-hospital CRPG in 34.3% of cases, on an outpatient basis in 33.2%, and by standard PSG monitored in the hospital in 32.4%. CRPG: cardiorespiratory polygraph; NIV: non-invasive ventilation; PSG: polysomnography; OSAHS: sleep apnea-hypopnea syndrome.

study was approved by the hospital's Ethics and Clinical Research Committee (code 15-03-26/3aclaob1).

Exclusion criteria were: age younger than 18 years, psychophysical inability to complete questionnaires or refusal to answer them, Cheyne–Stokes syndrome, indication for uvulopalatopharyngoplasty, significant nasal obstruction preventing use of CPAP, need for invasive mechanical ventilation, and indication for bariatric surgery.

Diagnosis of OSAHS was determined by means of standard polysomnography (PSG) monitored in the hospital, or cardiorespiratory polygraphy (CRPG) either overnight in the SDBU or on an outpatient basis (Table 1). The techniques and the analysis were applied according to standardized guidelines.^{18,19} CPAP treatment was indicated in patients with a diagnosis of severe OSAHS and in patients with moderate OSAHS associated with cardiovascular disease or daytime sleepiness. Between 3 and 10 days after diagnosis, patients spent 1 night in the SDBU for titration of the effective pressure by automatic CPAP (auto-CPAP)²⁰ (Table 1). All autotitration recordings for determining the optimal pressure were performed in the hospital to avoid unevaluable studies and to emphasize compliance, defined as at least 4 h a night. This period was measured using the generator timer.

Study procedures

Each patient's clinical history, cardiovascular risk factors (diabetes mellitus, AHT, dyslipidemia), cardiovascular events (CVE) (stroke, ischemic heart disease, heart failure, arrhythmias, other), cancer, use of healthcare resources (diagnostic tests, medical visits,

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