Should use of 4 hours continuous positive airway pressure per night be considered acceptable compliance?

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CPAP use can determine the cardiovascular risk reduction; physicians must endeavour to get the best CPAP use http://ow.ly/zPZbP

Continuous positive airway pressure (CPAP) reduces blood pressure in obstructive sleep apnoea (OSA) patients, as well as in patients with resistant hypertension. The effect of CPAP is directly related to treatment compliance [1–3]. Observational studies have shown a reduction in cardiovascular mortality risk in severe OSA patients treated with CPAP and adequate compliance [4–6]. A recent randomised controlled trial (RCT) showed a reduction in cardiovascular events (including hypertension incidence) in patients with adequate CPAP compliance [7]. However, what is an adequate definition of CPAP compliance?

Ideally, CPAP compliance should take place for as long as the patient is sleeping but, in practice, this occurs in a minority of subjects. Based on several studies, compliance of $\geqslant$4 h per night has been considered acceptable. However, dose–response studies have found that different compliance levels achieve different dimensions of clinical improvement [8–11]. For instance, in order to obtain an improvement in Epworth sleepiness scale at least 4 h·night^{-1} of CPAP is required [8], 6 h·night^{-1} is required for multiple sleep latency test and memory [8, 11] and 7.5 h·night^{-1} for functional outcome associated with a sleepiness questionnaire [8]. Therefore, is there a CPAP compliance level to obtain a reduction in cardiovascular risk?

There is little information about the necessary CPAP compliance needed to decrease cardiovascular risk. In an observational study, cardiovascular mortality was reduced in OSA patients with CPAP compliance of $\geqslant$4 h·night^{-1} [4]. In another observational study, mortality (mainly from cardiovascular causes) decreased with night-time CPAP use of 1–6 h·night^{-1} but decreased more acutely with a compliance of $\geqslant$6 h·night^{-1} [5]. In a recent RCT, reduction of blood pressure in OSA patients with hypertension required 5.6 h·night^{-1} of CPAP [2] and compliance of 5.96 h·night^{-1} decreased the incidence cardiovascular events (including hypertension) [7].

Several studies have explored potential CPAP compliance improvement by adding simple or combined strategies to the standard management [12–17]. Accordingly, CPAP use increased in $>$1 h·night^{-1} producing clinical improvement. In this issue of the *European Respiratory Journal*, Bouloukaki *et al.* [18] present results from the largest RCT on this topic comparing the effect of multidimensional *versus* standard strategies on CPAP compliance for 2 years of follow-up. The authors randomised 3100 newly diagnosed OSA patients to the standard group or the intensive group. Night-time CPAP use improved on average by $>$1.7 h with the multidimensional intervention than with the standard one. This resulted in an important clinical improvement but the most significant data showed that cardiovascular event incidence decreased by 50%. Hospitalisations due to new cardiovascular events occurred in 45 (2.9%) patients in the multidimensional strategy and in 96 (6.2%) in the standard strategy. From these, fatal events occurred

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in 1.8% and in 4% of patients, respectively. To put these data into perspective, we present the results of the study by MARIN *et al.* [4]. Cardiovascular incidence for 2 years was 1.28% and cardiovascular mortality was 0.7% for patients with severe OSA with $\geqslant$4 h of CPAP use. Although these data seem lower than in the study by BOULOUKAKI *et al.* [18], in another large RCT the subgroup with better CPAP compliance (5.96 h·night^{-1}) had an estimated cardiovascular incidence (without hypertension incidence) of 7.3% for 2 years [7].

In the study by BOULOUKAKI *et al.* [18], the multidimensional intervention was an independent factor used to explain cardiovascular mortality reduction. This means that an increase of 1.7 h·night^{-1} resulted in a survival improvement. In addition, another independent factor of mortality was CPAP use for $<$6 h·night^{-1}; although more interesting data could be a dose–response analysis to determine what CPAP compliance level would result in a survival improvement.

Another important aspect of the study by BOULOUKAKI *et al.* [18] was the economical evaluation, which took into account the intervention burden and the economical saving caused by the prevention of hospital admissions due to cardiovascular problems. This resulted in an incremental burden of €100 with a saving of €41 713. Unfortunately, the study was not designed to analyse cost-effectiveness. It is very important to transfer the results from clinical research assessing efficacy directly into healthcare systems and the public.

In summary, the present study shows that achieving better CPAP compliance using an active intervention decreases cardiovascular mortality and suggests CPAP use of $\geqslant$6 h·night^{-1}. Future studies using dose–response evaluation and cost-effectiveness analysis would be welcomed

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