

# An integrated model involving sleep units and primary care for the diagnosis of sleep apnoea

*To the Editor:*

Obstructive sleep apnoea/hypopnea (OSAH) is a highly prevalent disease that increases the risk of cardiovascular, metabolic and neurocognitive disorders [1, 2]. Generally speaking, when OSAH is suspected primary care physicians refer the patient to a hospital sleep unit to assess the clinical history and decide the optimal sleep test for confirming the diagnosis [3]. In recent years there has been an increase in the demand for consultations and diagnostic studies in sleep units [4], resulting in long waiting lists. Therefore, new strategies are needed in order to improve the management of this disease. We consider that an ideal system would consist of an integrated network involving sleep units and primary care centres, which would permit a detailed classification of patients and reduce excessive delay for those with severe symptoms. Accordingly, the aim of the study was to demonstrate that in suspected sleep apnoea patients the initial assessment and the appropriate sleep test would be similar whether they were undertaken by a trained general pulmonologist in a primary care centre or by a sleep physician.

Our hospital has developed a new model of integrated care involving hospital sleep units and primary care centres, governed by a shared clinical protocol. The major premises for this model are: 1) when a family physician suspects OSAH, he or she sends the patient to a primary care pulmonologist, who has a basic knowledge of sleep medicine, as well as chronic obstructive pulmonary disease, asthma, *etc.*; 2) the pulmonologist (second level of health attention) assesses the patient and decides the type of sleep study required, according to the aforementioned common protocol; 3) the patient is referred to the sleep unit to perform the diagnostic study, and continuous positive airway pressure (CPAP) titration when required (normally at home but in some cases is performed in our sleep unit, depending on waiting lists); and 4) those cases that do not present any complexities or complications are followed up by a primary care pulmonologist in the primary care centre. Difficult cases are referred to the sleep clinic.

In the context of the above model, the aim of the present study is to analyse the capacity of the general pulmonologists working in the primary centres to properly assess the patient and decide the type of sleep study required. To this end, we reviewed all the patients who had been referred to our sleep unit with clinical suspicion of OSAH by primary care pulmonologists over the course of 2010. We collected clinical data from the medical history recorded by the primary care pulmonologist, as well as the type of sleep study prescribed. On the basis of these data, a sleep specialist from the hospital reviewed the ideal sleep test for each patient, according to the following criteria: full polysomnography (PSG) has to be ordered for patients with a suspicion of sleep apnoea/hypopnoea with other causes of sleepiness, such as insomnia, depression, fibromyalgia or fatigue chronic syndrome, or sleep disorders such as rapid eye movement sleep behaviour disorder or restless leg syndrome, or notorious associated cardiovascular or respiratory comorbidities [5]. In all other cases, respiratory polygraphy was required. The concordance between the test prescribed by the primary care pulmonologist and the ideal test recommended by the sleep specialist was analysed using kappa coefficient of agreement.

We included 96 patients in the study. [Table 1](#) summarises the patients' clinical and diagnostic characteristics. The most frequent comorbidity was hypertension (38%). The primary care pulmonologists prescribed 58 respiratory polygraphy and 38 full PSG studies. Using the predefined criteria, the sleep specialist considered that in eight of the 58 respiratory polygraphy tests, the ideal test would have been PSG; however, subsequent PSG was only really necessary to confirm diagnosis after respiratory polygraphy in two of these eight patients. Primary care pulmonologists prescribed 38 PSG test but the sleep specialist considered that in four patients this study was not necessary, because they could have been diagnosed with respiratory polygraphy. The degree of concordance between primary care pulmonologists and the sleep specialist as regards the choice of test was good (kappa 0.74,  $p < 0.001$ ). The mean apnoea/hypopnea index (AHI) in all the sleep studies was  $42.6 \pm 25.75$ . The pre-test probability of OSAH was estimated, with patients classified as having high, medium and low suspicion of OSAH [6]. High suspicion of OSAH (54%)

TABLE 1 Characteristics of patients studied

<b>Subjects</b>	96
<b>Sex</b>	
Male	68 (71)
Female	28 (29)
<b>Age years</b>	58.74 ± 12.6
<b>BMI kg·m<sup>-2</sup></b>	30.26 ± 5.39
<b>Epworth sleepiness scale</b>	11.57 ± 4.7
<b>Comorbidities</b>	
Hypertension	37 (38)
Ischaemic heart disease	16 (17)
Asthma	10 (10)
COPD	8 (8)
Diabetes mellitus	13 (14)
Stroke	3 (3)
Fibromyalgia	6 (6)
Psychiatric disease	11 (11)
<b>Pre-test probability of OSAH<sup>#</sup></b>	
High	52 (54)
Medium	27 (28)
Low	17 (18)
<b>Diagnostic test performed</b>	
Respiratory polygraphy	58 (60)
Full PSG	38 (40)
<b>Ideal sleep test</b>	
Respiratory polygraphy	54 (56)
Full PSG	42 (44)
<b>Diagnosis<sup>†</sup></b>	
OSAH	
Severe OSAH	56 (58)
Moderate OSAH	15 (16)
Mild OSAH	13 (14)
Positional	5 (5)
Simple snoring	6 (6)
Insomnia	1 (1)

Data are presented as n, n (%) or mean ± sd. BMI: body mass index; COPD: chronic obstructive pulmonary disease; OSAH: obstructive sleep apnoea/hypopnoea; PSG: polysomnography. <sup>#</sup>: low: snoring and observed apnoea, no sleepiness, no cardiovascular comorbidity; medium: snoring and observed apnoea and/or Epworth score 12–15 and/or BMI >30 kg·m<sup>-2</sup>, no cardiovascular comorbidity; high: snoring and observed apnoea and Epworth score >15 and/or BMI >30 kg·m<sup>-2</sup> and/or cardiovascular comorbidity [6]. <sup>†</sup>: diagnostic criteria based on that of LLOBERES *et al.* [6].

was very concordant with the definitive diagnosis of severe OSAH (58%). The diagnosis of OSAH [6] was obtained in 89 patients (93%), and a total of 59 patients (61%) were treated with CPAP.

We believe that an integrated model of primary care and sleep units is needed to improve the initial management of OSAH patients. We have shown that a primary care pulmonologist with intermediate training in sleep diseases and supported by an integrated care network could decide the optimal sleep test as effectively as a sleep specialist. The model facilitates early assessment of the patient in the primary care centres as well as distinction of patients with a high pre-test probability of OSAH from those with a low probability. In our population, the pre-test probability of OSAH was very similar to the diagnosis of severe OSAH. This could be very important in patients with work-related risk and severe OSAH, as primary care pulmonologists could prescribe the appropriate sleep test at an earlier point and will probably represent the most cost-effective model for attending patients with OSAH [5, 7]. Although the clinical examination would not greatly differ from a general consultation in a reference hospital, we consider this system may be more efficient than the “classical” hospital visit (as is the case with other specialities [8]) because patients will be better stratified by disease and severity, as mentioned. Only those who really require hospital resources will be referred in this setting. In addition, the general pulmonologist will become a link between primary care and hospital, thereby optimising the intercommunication between both levels of care [5]. Furthermore, we believe that most of the patients with CPAP will be managed outside respiratory centres.

The present study opens up new possibilities for the management of OSAH. It has been demonstrated that home respiratory polygraphy is an adequate test for the diagnosis and management of OSAH [9, 10]. As we have demonstrated that a sleep test could be correctly ordered by a pulmonologist integrated in primary care, the next step could be to perform simple home sleep studies in primary care centres, especially in those patients with a high risk of OSAH but no comorbidities. Although our model does not explore OSAH management in primary care, it provides a starting point for the transfer of this process to specialists other than sleep physicians. A recent study demonstrated that OSAH patients free of complications could be managed in primary care centres along similar lines to sleep units, using simplified devices, but at a lower cost [11]. The application of this Chai-Coetzer model in real practice has, however, three limitations: 1) their study did not include patients with a BMI higher than 50, or significant respiratory or cardiac disease, or serious psychiatric illness or cognitive impairment (48% of the population with suspected OSAH in their study); 2) the nurse from the primary care centre that managed the majority of patients in the metropolitan regions had had 15 years of experience in a sleep unit; and 3) primary care physicians may not be as skilled or motivated as the ones who participated in this randomised, controlled trial. In the light of these limitations, our model could represent a move towards initial care of OSAH in primary care centres (thereby avoiding a first visit to a specialised sleep unit), as well as opening up possibilities for the management of more complex patients.

Several limitations have to be considered in the present study. First, the criteria used for choosing full PSG as an initial sleep test have not been validated, although they were based on a consensus reached by various experts [5, 6]. This issue is currently under debate and no validated studies have yet demonstrated the optimal approach to this subject. The important point in our study, however, is that the same criteria were applied by both sleep specialists and pulmonologists from primary care centres, showing that the initial consultations for OSAH suspicion could be effectively carried out outside sleep units. Secondly, the present study was not designed to assess the cost–benefit advantages or potential clinical benefits of the integrated network. Apart from shorter waiting lists, a cost–benefit advantage would be derived from the lower cost of a visit to a primary care centre compared to a sleep unit consultation [11]. Our study is a step towards the definition of a new model that would facilitate the potential use of simplified devices, and even telemedicine, in primary care centres; this approach may provide a similar clinical efficacy to that of sleep units while also offering cost benefits [9–11]. It is, therefore, to be expected that new research in this field would confirm the validity of this model in clinical trials that include clinical outcomes and cost-effectiveness analysis.

To our knowledge, this is the first study to compare the capacity of a sleep specialist and a non-specialist integrated into a primary care team to choose a sleep test for patients with suspicion of OSAH. We have demonstrated that a sleep specialist is not indispensable for a correct indication of the test needed to diagnose OSAH in the majority of cases. At a time when economic difficulties make new cost-effective strategies essential, an integrated network for OSAH management seems to be an appropriate future direction worthy of consideration.



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Is a sleep specialist indispensable for initial assessment and testing when obstructive sleep apnoea is suspected? <http://ow.ly/nHFFO>

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