

Efficacy of a Training Program on Sleep Apnea–Hypopnea Syndrome Aimed at Primary Care Physicians

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OBJECTIVE: The level of clinical suspicion of sleep apnea–hypopnea syndrome (SAHS) among primary care physicians is low. The aim of this study was to analyze the impact of a primary care training program on the quality and quantity of referrals made due to suspected SAHS.

MATERIAL AND METHODS: A group of 16 primary care physicians were offered the option of participating in a training program consisting of 2 talks–workshops, the provision of up-to-date information on SAHS and a form for making referrals according to an established protocol, and the opportunity to contact the sleep department at our hospital directly. Twenty-one primary care physicians who did not receive training served as the control group. We gathered data on the quantity and quality of referrals made by both groups for the period January through June 2005 and 2006, and recorded the number of both SAHS diagnoses made and patients prescribed treatment with continuous positive airway pressure. Data were analyzed in function of the primary care population assigned to each group.

RESULTS: The training program was completed by 81.3% of the physicians. The number of referrals made by the training group increased 2.38-fold after the program (intergroup comparison, $P=0.001$). There was also a 2.36-fold increase in the percentage of cases of SAHS detected in the population ($P=0.008$), a 1.85-fold increase in the percentage of serious cases detected ($P=0.001$), and a 2-fold increase in the number of patients prescribed continuous positive airway pressure ($P=0.009$). Agreement between the data gathered by the physicians and the sleep specialist was significantly higher in the training group for all the items studied.

CONCLUSIONS: The implementation of a training program on SAHS aimed at primary care physicians improved both the quantity and quality of referrals made due to suspected SAHS.

Key words: Sleep apnea–hypopnea syndrome. SAHS. Primary care. Training program.

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Eficacia de un plan de formación en atención primaria sobre el síndrome de apneas-hipopneas durante el sueño

OBJETIVO: El grado de sospecha clínica del síndrome de apneas-hipopneas durante el sueño (SAHS) entre los médicos de atención primaria (MAP) es bajo. El propósito del presente trabajo ha sido analizar el impacto de un plan de formación dirigido a los MAP en la calidad y cantidad de las derivaciones realizadas por sospecha de SAHS.

MATERIAL Y MÉTODOS: Se ofreció a un grupo de 16 MAP un plan de formación consistente en 2 charlas-talleres, información actualizada sobre SAHS, una hoja de derivación protocolizada y contacto directo con la Unidad de Sueño. Un grupo de 21 MAP no formados sirvió como grupo control. Desde enero a junio de 2005 y 2006 se recogieron de ambos grupos datos referentes a la cantidad y calidad de las derivaciones realizadas según la población asignada a cada grupo, así como diagnósticos de SAHS y número de tratamientos prescritos con presión positiva continua de la vía aérea.

RESULTADOS: El 81,3% de los MAP siguió el plan de formación. El porcentaje de población asignada que fue derivada a la Unidad de Sueño aumentó en 2,38 veces tras el plan de formación en el grupo que la recibió (p intergrupos = 0,0001). Hubo un incremento de 2,36 veces en el porcentaje de población diagnosticada de SAHS (p intergrupos = 0,008), de 1,85 veces en SAHS graves (p intergrupos = 0,001) y de 2 veces en tratamientos prescritos con presión positiva continua de la vía aérea (p intergrupos = 0,009). La concordancia entre la información recogida por los MAP y por el especialista mejoró de forma significativa en todos los ítems estudiados.

CONCLUSIONES: La implantación de un plan de formación sobre SAHS dirigido a MAP resultó eficaz en la mejora de la cantidad y calidad de las derivaciones realizadas por sospecha de SAHS.

Palabras clave: SAHS. Sospecha clínica. Atención primaria. Plan de formación.

Introduction

Sleep apnea-hypopnea syndrome (SAHS) is a public health problem because of its high prevalence and serious consequences.¹ SAHS can cause sleepiness and therefore traffic accidents²⁻⁴ and there is increasingly strong evidence linking this syndrome to elevated cardiovascular morbidity and mortality.^{5,6}

Treatment with continuous positive airway pressure (CPAP) improves quality of life⁷ and possibly cardiovascular morbidity and mortality,^{6,8} and in patients with SAHS, it has been seen to reduce the utilization of health care resources by as much as a half or a third.⁹ It is therefore crucial to facilitate both the early detection of as many patients with suspected SAHS as possible and the prioritization of patients who would benefit from CPAP.

Primary care physicians in Spain play a major role in referring patients for specialist diagnosis and care. Although there has been an undeniable increase in the number of patients both diagnosed with and treated for SAHS in the past decade,^{10,11} several studies have found primary care physicians to have a remarkably low level of clinical suspicion.¹²⁻¹⁶ This low level of suspicion is even more remarkable considering that one third of the general population is estimated to have risk factors for SAHS.¹⁷ Low awareness levels may partly be responsible for the fact that 90% of patients with SAHS remain undiagnosed.¹⁸ The lack of formal training for primary care physicians in this area and the general public's lack of familiarity with the disorder are probably the 2 main factors responsible for this situation. Because it is estimated that 80% of the population visit a primary health care center at some stage in their lives,¹¹ training programs aimed at increasing levels of awareness and clinical suspicion of SAHS among primary care physicians could be extremely effective.

The aim of the present study was to analyze the impact of a primary care training program on the quality and quantity of referrals made for suspected SAHS.

Materials and Methods

Setting

Hospital General de Requena in Valencia, Spain, offers specialist care to 60 000 inhabitants based in a semi-rural setting. Of this population, 17.2% are aged over 65 years. The corresponding health district has 5 primary care facilities. The 2 largest centers (Requena and Utiel) have 16 primary care physicians serving 35 000 inhabitants and the other 3 centers have 15 physicians serving a total of 18 000 inhabitants. Hospital General de Requena also serves 7000 people living in the nearby province of Cuenca, which has 6 primary care physicians.

Training Program Characteristics

The primary care training program was conducted in the first 2 weeks of January 2006 and consisted of the following components:

1. A 90-minute talk given by a respiratory medicine researcher (M.A.M.G.) about theoretical aspects of SAHS (general concepts, epidemiology, risk factors, clinical features, cardiovascular

aspects, diagnostic methods, the role of the primary care physician in patient referral, treatment, and prognosis). Special emphasis was placed on issues related to everyday primary care routines.

2. A 90-minute workshop on CPAP focusing on practical aspects of treating SAHS, handling equipment and masks, monitoring patients under treatment, treating secondary effects, resolving possible problems, and referring patients to the sleep clinic.

3. Distribution of information in both written format (essential reading and SAHS consensus statement¹⁹) and electronic format (CD with presentation of theoretical aspects and SAHS consensus statement).

4. Direct telephone contact with the sleep unit at Hospital General de Requena for the rapid resolution of problems.

5. A form for making referrals according to an established protocol (Appendix 1). This form consisted of 3 parts: *a*) a written reminder to ask patients with suspected SAHS 3 key questions (if they snored, if apneas had been witnessed, or if they had excessive daytime sleepiness); *b*) clear, easy-to-follow referral criteria based on specific patient characteristics (clinical features of SAHS, cardiovascular history, and job involving risk); and *c*) a second note at the bottom of the form reminding physicians about how to prioritize referral (urgent, priority, ordinary, or no referral required). This form was designed to be attached by the physician to the standard referral form, together with any additional information and details of tests deemed necessary by the physician.

6. Distribution by primary care physicians of 1200 informative pamphlets entitled "SAHS Doesn't Hurt But It Can Kill" among the general public. The pamphlet, using simple language and descriptive pictures, described SAHS, together with its consequences and treatment methods, and urged readers to consult their physicians if they had what were classified as warning signs.

Data Collection

The 16 primary care physicians working at the Requena and Utiel primary care facilities were offered the option of participating in the training program. The remaining 21 physicians in the other centers did not receive training and served as the control group. Given that the study groups were formed according to geographical criteria and that physicians were not randomly assigned to one group or the other, anyone who did not participate in the training program despite having been invited was excluded from the study. We collected data corresponding to all referrals to our sleep clinic for suspected SAHS made by physicians in both the trained group and the untrained group. Data were collected for the period January 2006 through June 2006 after completion of the training program. Variables analyzed included number of referrals made, number of patients diagnosed with SAHS, percentage of patients with severe disease, prescription of CPAP treatment, characteristics of patients referred, quality of referrals (based on inclusion or omission of relevant data), and the level of agreement between data collected by the primary care physicians and a sleep specialist. We also analyzed the same data for the corresponding period in 2005. Excluded from our analysis were patients referred to the sleep clinic for reasons other than suspected SAHS, those referred by specialists or physicians other than primary care physicians, and those who participated in sleep studies performed for scientific or educational purposes.

Evaluation of the Effectiveness of the Training Program: Statistical Analysis

To evaluate the effectiveness of the training program, we retrospectively calculated the differences between the study

variables for 2005 and 2006 for both the group that had received training and the group that had not (intragroup measurements). We then compared the differences between the 2 groups (intergroup measurements) taking into account the characteristics of their patient panels. Quantitative variables were analyzed by analysis of variance for repeated measures and qualitative variables were analyzed by logistic regression analysis to adjust for the degree of statistical significance. The level of agreement between data collected by the physicians and the sleep specialist was analyzed using the κ statistic; a score of above 0.8 was considered excellent.²⁰ The agreement analysis was blinded in all cases as the specialist was unaware of the origin of the referrals. Statistical significance was set at a value of $P < .05$. The statistical software package SPSS version 11.0 for Windows (SPSS, Inc, Illinois, USA) was used to analyze the data.

Results

Thirteen (81.3%) of the 16 primary care physicians invited to participate in the training program accepted the invitation and successfully completed the program (ie, they attended the 2 talks-workshops). The other 21 primary care physicians in the health district did not receive training and served as the control group. None of the physicians moved or were replaced during the study period. The trained group made 2.38 times as many referrals in 2006 as in 2005 (0.43% of patient panel in 2006 compared to 0.18% in 2005). The corresponding percentages for the control group were 0.22% in 2006 and 0.2% in 2005, intergroup $P = .0001$). For the study group, this represented a 2.36-fold increase in the percentage of SAHS cases (apnea-hypopnea index >10) diagnosed (0.33% in 2006 compared to 0.14% in 2005, intergroup $P = .008$); a 1.85-fold increase in the number of serious cases (apnea-hypopnea index >30) detected (0.14% in 2006 compared to 0.07% in 2005, intergroup $P = .001$); and a 2-fold increase in the percentage of patients prescribed CPAP (0.2% in

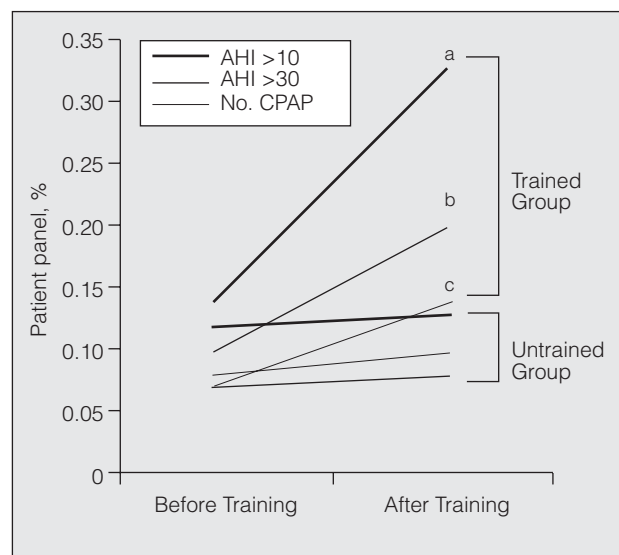


Figure 1. Percentage of patient panel in study group and control group newly diagnosed with sleep apnea-hypopnea syndrome (SAHS) and severe SAHS, and prescribed continuous positive airway pressure (CPAP) treatment after a training program (study group, patient panel of 35 000 and control group, patient panel of 25 000).

AHI indicates apnea-hypopnea index.

^aIntergroup $P = .008$.

^bIntergroup $P = .001$.

^cIntergroup $P = .009$.

2006 compared to 0.1% in 2005, intergroup $P = .009$) (Figure 1). On completion of the training program, the study group referred more women ($P = .03$) and more patients with cardiovascular risk factors ($P = .02$) and a history of cardiovascular events ($P = .01$) than did the control group. No differences were detected between the groups for age, anthropometric measurements, clinical features of SAHS, or polygraphic variables (Table 1).

TABLE 1
Characteristics of Patients Referred for Sleep Studies for Suspected Sleep Apnea-Hypopnea Syndrome in the Trained Group and the Control Group, Before and After the Training Period^a

Variable	Control Group			Trained Group			P (Difference) ^c
	January-June 2005 (n=49)	January-June 2006 (n=55)	Difference (95% CI) ^b	January-June 2005 (n=64)	January-June 2006 (n=149)	Difference (95% CI) ^b	
Age, y	57.1 (12.1)	55.9 (13.5)	-1.2 (-7.9 to 3.5)	57.7 (12.3)	56.9 (12.4)	-0.8 (-7.2 to 2.8)	NS
Women, No. (%)	13 (26.5)	16 (29.1)	2.6 (-4.3 to 7.4)	18 (28.1)	55 (37.1)	9 (3.1-17.3)	.03
BMI, kg/m ²	31.9 (7.1)	32.2 (6.8)	0.3 (-5.2 to 4.4)	31.7 (5.1)	32.3 (4.6)	0.6 (-5.8 to 4.1)	NS
Hypertension, No. (%)	25 (51)	31 (56.4)	5.4 (-6.9 a 3.3)	38 (59.3)	101 (67.8)	8.5 (-0.4 to 16.2)	.06
CVRF, No. (%)	18 (36.7)	21 (38.2)	1.5 (-5.1 to 4.5)	26 (40.6)	101 (67.8)	27.2 (35.3-16.1)	.02
Previous CVE, No. (%)	8 (16.3)	11 (20)	3.7 (-5.7 to 4.1)	12 (18.8)	42 (28.2)	9.4 (2.9-15.6)	.01
AHI	28.4 (21.1)	29.6 (24.2)	1.2 (-6.8 to 5.9)	30.1 (23.8)	27.2 (22.3)	-2.9 (-12.1 to 7.7)	NS
Mean SaO ₂ , %	92.5 (3.7)	92.7 (3.9)	0.2 (-5.1 to 4.8)	92.3 (3.3)	92.6 (3.2)	0.3 (-6.3 to 6.1)	NS
Minimum SaO ₂ , %	76.3 (11.5)	78.7 (11.1)	2.5 (-3.9 to 6.8)	76.1 (10.1)	76.8 (12.8)	0.7 (-7.2 to 5.9)	NS
Chronic snoring, No. (%)	46 (93.9)	53 (96.4)	2.5 (-6.4 to 3.6)	60 (93.8)	140 (94)	0.2 (-8.8 to 10.1)	NS
Witnessed apneas, No. (%)	29 (59.2)	34 (61.8)	2.6 (-6.1 to 4.4)	39 (60.1)	85 (57)	-3.1 (-9.9 to 3.7)	NS
Epworth score	11.2 (3.9)	10.7 (4.8)	0.5 (-5.5 to 4.3)	10.9 (3.3)	11.1 (4.1)	0.2 (-3.7 to 3.1)	NS

Abbreviations: AHI, apnea-hypopnea index; BMI, body mass index; CI, confidence interval; CVE, cardiovascular events; CVRF, cardiovascular risk factors (includes diabetes, smoking, and atrial fibrillation); NS, not significant.

^aData are shown as mean (SD) and number of patients and percentage.

^bExpressed as percentage for qualitative variables and mean for quantitative variables.

^cP for differences observed between study group and control group over course of study period.

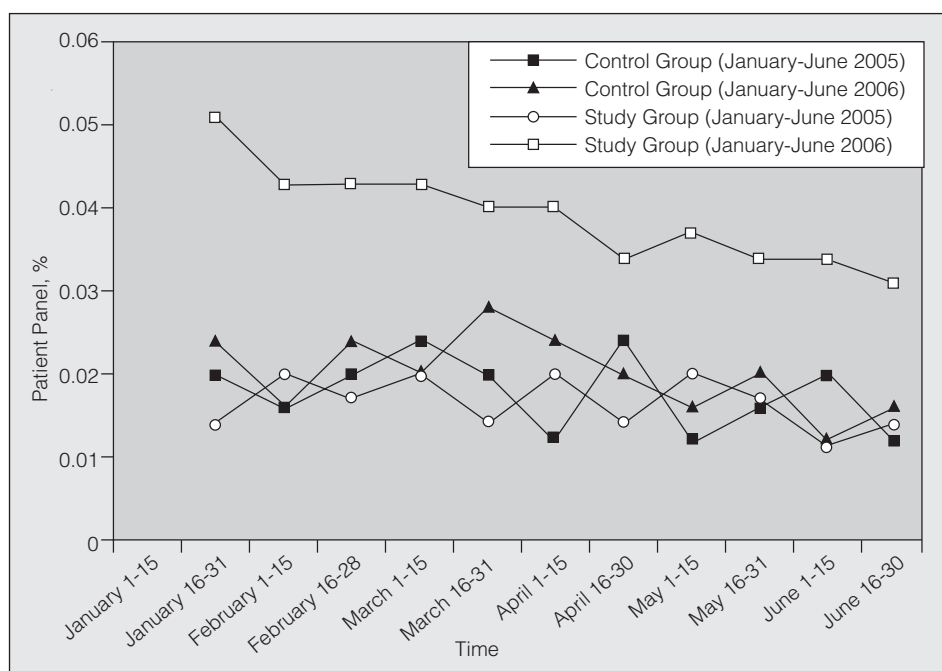


Figure 2. Changes in the percentage of patient panel referred by primary care physicians to sleep unit with suspected sleep apnea-hypopnea syndrome over the course of the study. Comparison between study group (patient panel of 35 000) and control group (patient panel of 25 000).

On analyzing the quality of the referrals made by the physicians in the trained group, we found a considerable decrease in both the number of referrals that contained insufficient information for all the items analyzed and the percentage of referrals which merely stated “suspected SAHS” or “rule out SAHS” (Table 2). We also found a very significant increase in the level of agreement between the clinical data recorded by the physicians who had received training and by the specialist at the sleep clinic for practically all the items recorded. The differences

between the physicians who had not received training and the sleep specialist were not significant (Table 3).

Finally, on analyzing the percentage of referrals made over the course of the study period (Figure 2), we found that this was highest in the weeks immediately following the training program but was to decrease progressively over the subsequent months. Nonetheless, physicians who had received training still referred a significantly higher percentage of patients for sleep studies than they had done in the same period in the previous year ($P=.02$) and than

TABLE 2
Quality of Referral Data Sent by the Primary Care Physicians in the Trained Group and the Control Group Before and After the Training Period^a

Item	Control Group			Trained Group			P (Difference)*
	January-June 2005 (n=49)	January-June 2006 (n=55)	Difference (95% CI)	January-June 2005 (n=64)	January-June 2006 (n=149)	Difference (95% CI)	
Chronic snoring, No. (%)	75.8	68.5	-7.3 (-11 to 3)	65.5	97.9	32.4 (26.4-47.1)	.0002
Witnessed apneas, No. (%)	65.5	55.7	-9.8 (-12 to 2.3)	55.1	95.9	40.8 (31.4-51.6)	.0001
Excessive daytime sleepiness, %	33.1	37.1	4 (-7 to 31)	44.6	94.9	50.3 (40.9-63.4)	.0006
Asphyxiation, %	11.2	14.2	3 (-9-2.5)	11.1	76.5	65.4 (51.1-79.8)	.0001
Hypertension, %	41.4	34.2	-7.2 (-10.8 to 2)	41.3	87.8	46.5 (33.7-54.9)	.0001
Hypertension control, %	10.2	11.7	1.5 (-4.7 to 3.1)	14.1	81.4	67 (53.2-81.8)	.0001
Previous CVE, %	14.1	13	-1.1 (-8.6 to 3)	19.7	74	54.3 (44.1-65.1)	.0001
Job involving risk, %	3.6	2.7	-0.9 (-8.8 to 6.4)	5.5	84.5	79 (62.9-94.8)	.0003
Obesity	10.3	14.2	3.9 (-3.3 to 4.6)	17.6	78.7	61.2 (49.9-77.3)	.0004
“Suspected SAHS,” %	12.2	11.7	-0.5 (-6.2 to 6.3)	15.6	2	-13.6 (-27.1 to 8.3)	.0002
“Rule out SAHS,” %	9.3	13	3.7 (-4.3 to 5.3)	11.1	2	-9.1 (-18.4 to 6.7)	.0001

Abbreviations: CVE, cardiovascular events; SAHS, sleep apnea-hypopnea syndrome.

^aQuality determined by inclusion or omission of relevant information regarding SAHS clinical features and patient history.

^bP for the difference observed between the study group (trained) and the control group before and after training.

the control group ($P=.006$) had done during the same period.

Discussion

Our results show that the implementation of a training program on SAHS aimed at primary care physicians improved both the quantity and quality of referrals to the sleep clinic for suspected SAHS. Accordingly, it also led to a significant increase in both the percentage of cases detected and the percentage of patients prescribed treatment with CPAP.

Primary care physicians are in an ideal position to screen for patients with SAHS as it is estimated that 80% of the general population visit their assigned caregiver at some stage.¹¹ Various studies have shown that the level of clinical suspicion of SAHS among primary care physicians is low, and that only a small percentage of patients (<0.3%) are referred to specialists. Most of these patients have a clear clinical picture and the diagnosis is nearly always confirmed. This suggests that patients with mild to moderate disease, and possibly a large percentage of patients with severe disease, are not being detected. Namen et al,¹⁷ for example, found that only 6% of patient charts in a primary care setting contained data relative to SAHS in a population in which 57% had risk factors. There are several possible reasons for this low level of clinical suspicion: the fact that SAHS is a relatively recently recognized disorder, the general lack of information among the general population, and the lack of formal training for primary care physicians in this area. Reveuni et al²¹ found that only 10% of primary care physicians asked 2 or more questions related to SAHS because they did not consider key symptoms such as snoring to be indicative of the disease. The same authors also reported that only 16% of physicians had ever talked to their patients about the risk factors for SAHS. This is a much lower percentage than those found for smoking, obesity, and other cardiovascular risk factors. This lack of familiarity with SAHS risk factors was even more pronounced for more recently described aspects of the disorder such as the association between SAHS and cardiovascular disease, or the presence of less typical clinical features in groups such as elderly patients and women.

Very little has been published on the impact of training programs aimed at primary care physicians on the quantity or quality of referrals for sleep studies. Namen et al¹⁷ found that a simple chart reminder aimed at primary care physicians led to a 5-fold increase in the percentage of medical records that contained information related to SAHS signs and symptoms (29% of records in chart-reminder group compared to 6% in non-chart reminder group, $P<.001$). They also found more entries per patient for SAHS signs and symptoms in the chart-reminder group (2.6 compared to 0.1, $P<.0001$). The physicians, however, did not consider these symptoms to be indicative of disease (particularly the presence of snoring) and, consequently, the number of referrals for sleep studies did not increase accordingly. This suggests that a simple chart reminder is not a powerful enough tool and that more comprehensive, specialized training is necessary. Zozula et al,²² for example, showed that an in-service training program on sleep and sleep

TABLE 3
Agreement (κ Statistic) Between Sleep Apnea-Hypopnea Syndrome Referral Data Recorded by the Primary Care Physicians in the Trained Group and the Control Group, Before and After Training, and Data Recorded by the Sleep Specialist

Variable	Primary Care Physician-Specialist κ Statistic			
	Control Group		Trained Group	
	January-June 2005 (n=49)	January-June 2006 (n=55)	January-June 2005 (n=64)	January-June 2006 (n=149)
Chronic snoring	0.69	0.71	0.73	0.89
Witnessed apneas	0.62	0.55	0.58	0.88 ^a
Excessive daytime sleepiness	0.62	0.58	0.67	0.84 ^b
Asphyxiation	0.38	0.45	0.41	0.8 ^a
Hypertension	0.64	0.67	0.71	0.8
Controlled hypertension	0.59	0.6	0.68	0.8 ^b
Previous CVE	0.59	0.62	0.68	0.87 ^b
Job involving risk	0.59	0.64	0.59	0.89 ^a
Obesity	0.7	0.7	0.66	0.91 ^a

Abbreviations: CVE, cardiovascular events.

^a $P<.01$.

^b $P<.05$ (with respect to values observed in 2005 and in the untrained control group).

disorders led to a 4-fold increase in the percentage of referrals for sleep studies and a 3-fold increase in the percentage of diagnoses made over a 4-year follow-up period. Their findings coincide with those of Ball et al,¹³ who conducted a project that involved training community physicians in the area of sleep disorders, providing them with diagnostic equipment, facilitating direct contact with a sleep unit, and providing the general public with information about the disorder. The outcome was an 8-fold increase in the number of referrals for sleep studies over a period of 2 years, and a considerable increase in the percentage of SAHS diagnoses and CPAP treatments prescribed. Our findings reflect similar improvements. On comparing the data for physicians before and after training (for corresponding periods in 2005 and 2006), we detected a 2.38-fold increase in the percentage of referrals made, a 2.36-fold increase in the percentage of cases of SAHS detected, a 1.85-fold increase in the percentage of serious cases detected, and a 2-fold increase in the percentage of CPAP treatments prescribed. Although our results are modest in absolute terms, we believe that the same program conducted over a larger geographical area would yield interesting findings in terms of impact on the detection of new SAHS cases and the prescription of CPAP treatments. It is worth noting, however, that our training program had a particularly high adherence rate (>80%) precisely because the study area was small and had relatively few primary care physicians. This high adherence rate undoubtedly contributed to improving our results. Such high rates would perhaps be difficult to achieve in urban or larger geographical areas, and if this were the case, the effectiveness of the program could be undermined. One of the priorities established by the Spanish Society of Pulmonology and Thoracic Surgery (SEPAR) in 2006 (year of SAHS) was the implementation of programs similar to

ours, but at a national level, to provide primary care physicians with training and the general public with information about SAHS.

The percentage of patients referred to the sleep unit with suspected SAHS decreased gradually in the study group over the course of the 6 months following training. This is logical, though, as no reminder tools were used. Nonetheless, it is important to stress that the percentage of referrals was still significantly higher at 6 months than it had been for the same period in the previous year. In any case, a longer study would have provided us with more reliable data regarding this aspect. We also believe that it would probably be a good idea to repeat the training program periodically.

The physicians who participated in the training program referred a higher percentage of both women and patients with cardiovascular risk factors for sleep studies. This is not surprising as the training program placed particular emphasis on the need to screen for SAHS in these 2 groups of patients as they are traditionally underdiagnosed and their symptoms particularly unfamiliar to primary care physicians. Netzer et al,¹¹ in a study assessing SAHS risk in a broad range of primary care settings, found that women typically consulted for daytime sleepiness and proneness to fatigue, while men typically consulted for snoring and witnessed apnea, these last 2 signs being much more typically associated with SAHS and hence easily recognizable.

One particularly innovative aspect of the present study was the use of a patient referral protocol. Masa et al,²³ in a recent study analyzing resources and delays in the diagnosis of SAHS in Spain, stressed that referral protocols drawn up on the basis of consensus between collaborating specialists and primary care physicians were an essential step towards shortening the current excessively long waiting periods for diagnosis. Because health care resources are limited and primary care physicians are allocated only a short time to attend to each patient, referral forms must be quick and easy to complete. The referral form used in the present study not only reminded physicians of key questions to ask and referral criteria to follow, but also provided them with a comprehensive picture of the patient through the completion of just 9 items. In addition, it was very well accepted by the physicians given that over 80% of them were still sending it in at 6 months. The form also contributed to substantially improving the quality of the referrals made and the level of agreement between data recorded by the physicians and those recorded by the sleep specialist. The primary care physicians systematically recorded relevant information (such as a job involving risk or cardiovascular characteristics) and virtually stopped making scant, uninformative notations such as "suspected SAHS" or "rule out SAHS".

In conclusion, the implementation of a primary care training program on SAHS proved effective at 6 months as it improved both the quantity and quality of referrals for sleep studies for suspected SAHS. In view of the fact that SAHS remains undiagnosed in many people and that this has serious implications, primary care physicians need to assume a greater role and responsibility in detecting and monitoring patients with SAHS or suspected SAHS

in the coming years. The implementation of training programs similar to the one described in the present study, combined with other measures such as greater awareness raising among the general public, and the health authorities in particular, about SAHS are necessary to improve the current situation and find solutions to this particularly worrying public health problem.

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APPENDIX 1

Protocol-Guided Referral Form Used by Primary Care Physicians for Patients With Suspected Sleep Apnea-Hypopnea Syndrome (SAHS)^a

Patient Referral Protocol					
I.	Ask every patient (and companion): “Do you snore?” (Not snoring substantially reduces the likelihood of SAHS.) “Do you ever stop breathing while snoring?” (Witnessed, repeated apneas are characteristic of SAHS.) “Do you fall asleep in situations in which you should not?” (Severe excessive daytime sleepiness is in itself sufficient reason for referral.)				
2.		No	Sometimes	Often	Doesn’t Know
	Snoring Witnessed apneas Asphyxiation Nonrefreshing sleep				
		No	Mild	Moderate	Severe
	Excessive sleepiness Obesity				
	Mild: regularly falls asleep while watching television, reading, or traveling. Moderate: regularly falls asleep at concerts, mass, the cinema, theater, etc. Severe: regularly falls asleep while driving, talking, eating, etc.				
		No	Yes	Difficult to Control	Doesn’t Know
	Hypertension Previous cardiovascular events		Controlled/uncontrolled Only one	Several	
	Difficult-to-control hypertension: normal blood pressure levels over 140/90 mm Hg despite the use of 3 antihypertensive drugs. Previous cardiovascular events: ischemic heart disease, heart failure, heart arrhythmias, cerebrovascular accident.				
		No	Yes	Drives Regularly	Job?
	Job involving risk				
3.	Priority	Type of Referral		Ordinary	
	Severe excessive sleepiness Well-founded suspicion of SAHS in a patient with risk factors Difficult-to-control hypertension			Regular snoring combined with another factor indicative of SAHS Heart or cerebrovascular events combined with another symptom indicative of SAHS Excessive sleepiness not explained by other factors (drugs, etc)	
	<i>Patients with only snoring, obesity, or hypertension and no other risk factor should not be referred.</i>				

^aThis is a close translation of the original Spanish form. It is provided here for comprehension purposes only.