

# The Role of the Primary Care Physician in Recognizing Obstructive Sleep Apnea

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**Background:** Obstructive sleep apnea (OSA) is a common disorder among middle-aged adults. However, OSA is a recently described disorder for which most primary care physicians do not have formal training. The primary objectives of this article are to evaluate what percentage of patients referred by primary care physicians for sleep studies had OSA; to characterize the clinical features of these patients and compare them with our known OSA population; and to determine whether primary care physicians asked key questions contained in a work sheet to make the diagnosis of OSA.

**Methods:** A retrospective chart review at a hospital-based sleep center that is accredited to evaluate all sleep disorders, not just OSA. The health maintenance organization is a staff model one.

**Patients:** Sixty-nine patients who were referred for a sleep study by a health maintenance organization internist or fam-

ily practitioner between June 1, 1994, and May 30, 1995.

**Results:** Ninety-six percent of the 68 patients referred for polysomnography had OSA. Most were very symptomatic and obese. These 68 patients represent 0.13% of the primary care patient panel. In addition, most of the patients were referred by a few physicians; 6 (11%) of the 55 physicians ordered 33% of the 68 studies.

**Conclusions:** Primary care physicians did recognize obese patients with prominent symptoms of sleep apnea. However, only a small percentage of their patient panel was referred, suggesting that this condition is still underdiagnosed. This seems particularly true as most of the sleep studies were ordered by a small group of physicians. Future work incorporating educational interventions is necessary to improve detection and treatment of OSA.

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**O**BSTRUCTIVE sleep apnea (OSA) is a common disorder among middle-aged adults.<sup>1,2</sup> It occurs in 2% to 4% of this population and is more common in the elderly. However, OSA is a recently described disorder for which most primary care physicians do not have formal training. As managed care has a growing influence on the practice of medicine, primary care physicians may play a bigger role in screening for OSA. Prior to March 1994, the largest regional staff model health maintenance organization (HMO) restricted referrals for a sleep study to subspecialists in pulmonology, otorhinolaryngology, or neurology. On March 28, 1994, the HMO changed this policy. Primary care physicians, including internal medicine and family practice physicians were sent a memo instructing them to directly order sleep studies. They were provided with a work sheet to aid them in asking the appropriate questions to identify OSA. These work sheets were

also placed in the office area where the physicians worked.

We completed a retrospective chart review of the patients referred by primary care physicians for all-night sleep studies in the subsequent year. We attempted to answer 4 questions: (1) What percentage of patients referred by primary care physicians had OSA? (2) What were the clinical features of these patients? (3) How did this population of patients compare with our known OSA population? (4) Did the primary care physicians ask key questions from the work sheet in making the diagnosis of OSA?

## RESULTS

Sixty-eight patients were referred for PSG by primary care physicians between June 1, 1994, and May 30, 1995. Sixty-five (96%) of the 68 patients had OSA. Patients were middle aged (mean  $\pm$  SEM age, 46.8  $\pm$  1.5 years) and very obese (BMI,

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## PATIENTS AND METHODS

This retrospective chart review was approved by the Institutional Review Board of the HMO, Harvard Pilgrim Community Health Care, Providence, RI. The data base at the Sleep Disorders Center was reviewed to determine the number of patients referred by primary care physicians for sleep studies. Any patient referred by an internist or family practitioner between June 1, 1994, and May 30, 1995, was included. The sleep study data and the information included in the referral letter, copied progress notes, or the work sheet the referring physician sent with the request for a sleep study were reviewed. Any missing data were then obtained from the primary care physician's office chart. Cards were sent to patients whose anthropometric data were still missing after review of the above. The patients were subsequently assigned a number so that their data could be analyzed anonymously.

The sleep study consisted of an all-night polysomnogram (PSG) that included 2 electro-oculographic leads, 2 electroencephalographic leads, a submental electromyogram, an airflow thermistor, a snoring microphone, chest and abdominal piezoelectrode bands, 1-channel electrocardiogram representing V1, and bilateral anterior tibialis leg electromyographic leads. The PSGs were completed either as a baseline (monitored for the entire night) or as a split study. For a split study, a minimum of 2 hours of sleep was recorded. If OSA was documented during this time, nasal continuous positive airway pressure was titrated during the remainder of the study. Thirty (44%) of 68 studies were performed as split studies. Obstructive sleep apnea was defined as an apnea/hypopnea index of 5 events or more per hour of sleep. However, for a split study, an apnea/hypopnea index of 10 was required to initiate therapy with nasal continuous positive airway pressure. An apnea was defined as a cessation of airflow for 10 seconds or longer. A hypopnea was defined by the presence of 2 of the following 3 criteria: greater than 2% oxygen desaturation, 50% decrease in airflow, or an arousal evident on the electroencephalogram.

Historic controls consisted of 206 previously described patients with OSA evaluated at our Sleep Disorders Center.<sup>3</sup> This group was used only for comparison with our current group with regard to the apnea/hypopnea index; nadir oxygen saturation; age; and body mass index (BMI or Quetelet index [calculated as weight in kilograms divided by the square of the height in meters: weight (kg)/{height (m)}<sup>2</sup>]). Data were analyzed using StatView SE Plus Graphic (Abacus Concepts, Berkeley, Calif) for the Macintosh computer.

37.9 ± 1.3 kg/m<sup>2</sup>). Of the 62 patients asked, 30 (43.5%) had a history of hypertension. In 6 patients (10%), the presence or absence of hypertension was not noted in the referral note or office chart.

The 65 patients had quite significant OSA with a mean apnea/hypopnea index of 44.3 ± 4.2 and a nadir

**Table 1. Characteristics of Patients and Controls\***

Characteristic	HMO† Patients	Historic Controls‡
Age, y	46.8 ± 1.5	49.4 ± 0.8
Body mass index, kg/m <sup>2</sup>	37.9 ± 1.3	33.6 ± 0.5
Apnea/hypopnea index	44.4 ± 4.3	48.5 ± 2.4
Nadir oxygen saturation	81.9 ± 1.4	79.7 ± 0.8

\*Data are expressed as mean ± SEM.

†HMO indicates health maintenance organization.

‡Data from Millman et al.<sup>3</sup>

**Table 2. Questions Asked Patients**

Key Questions	Were Questions Asked?		Responses to Questions	
	No. (%) Asked	No. (%) Not Asked	No. (%) Yes	No. (%) No
Snoring	63 (93)	5 (7)	62 (98)	1 (2)
Apnea/gasping	46 (67)	22 (33)	33 (74)	13 (26)
Choking/sob arousals	30 (42)	38 (58)	23 (76)	7 (24)
Recurrent awakenings	35 (50)	33 (51)	26 (76)	9 (24)
Morning headache	24 (32)	44 (68)	12 (55)	12 (45)
Excessive daytime somnolence	63 (91)	5 (9)	59 (95)	4 (5)
Car crash or near miss	37 (54)	31 (46)	21 (57)	16 (43)
Decreased memory and concentration	23 (35)	45 (65)	14 (63)	9 (38)
Depression and irritability	25 (38)	43 (62)	20 (81)	5 (19)

oxygen saturation of 82% ± 1.4%. The mean age, BMI, apnea/hypopnea index, and nadir oxygen saturation are not clinically different from those of our historic controls (**Table 1**).

Primary care physicians asked questions regarding snoring, witnessed apnea or gasping, and excessive daytime sleepiness of 63, 46, and 63 patients, respectively. However, only 37 patients were asked by their physicians about car crashes and near misses. Questions regarding mood and memory were asked even less frequently. The number of patients who were asked each question by their physicians and patient responses are given in **Table 2**.

Table 2 also shows that patients were very symptomatic. Of the 63 patients asked, 62 (98%) snored and 59 (95%) experienced excessive daytime sleepiness. Twenty-three of the 30 patients asked had arousals with choking or shortness of breath, 33 of the 46 patients asked had witnessed apnea or gasping, and 26 of 35 patients had recurrent awakenings. Thirty-five percent of patients (24 of 68) were asked about morning headaches, and 50% (12/24) had them. Thirty-four percent of patients (23 of 68) were asked about decreased memory and concentration, and of these 61% (14/23) had this. Also, 37% of patients (25 of 68) were asked about depression and irritability. Of these, 20 (80%) of 25 exhibited this.

The 68 patients who were referred for sleep studies during this year came from a total panel of 54 000 patients serviced by 55 primary care physicians and their nurse practitioners. Although nurse practitioners had their own separate patient panel, any sleep studies they re-

quested were ordered through the associated primary care physician. Therefore, only 0.13% of the primary care patient panel was referred for sleep studies during this year. The distribution of requests for sleep studies was not evenly distributed across physicians. Forty (72%) of the physicians ordered only 1 study or did not order any studies. Three (5%) of the 55 physicians ordered 21 (31%) of the sleep studies; 6 (11%) physicians ordered 33 (49%) of the sleep studies.

## COMMENT

This study demonstrates that primary care physicians at a staff model HMO did recognize OSA. However, the patients who were sent for sleep studies were obese and tended to be quite symptomatic. Since these physicians only referred 0.13% of their patient panel, it is likely that they are not identifying patients with mild disease and may be missing patients with moderate to severe disease. In addition, the referral of most of the patients by a few physicians suggests that only a few physicians are identifying patients with OSA.

It is difficult to know the number of patients already diagnosed with OSA (patients who would not need referral for sleep studies) in this population. Since only 64 patients were sent by subspecialists for a sleep study in the preceding year, it is unlikely that most patients had already received this diagnosis. The relatively small number of patients referred during the preceding year also suggests that whether primary care physicians refer patients to subspecialists or refer directly to the sleep laboratory, only a small percentage of patients with OSA are being recognized. Last, it is also possible that patient panels may vary between physicians. Female physicians typically see more female patients, who have a lower prevalence of OSA. However, no practice was exclusively female, and even if it were, one would still expect to find patients with sleep OSA.

The work sheet may have helped some physicians screen for OSA by providing the appropriate symptoms and risk factors about which to inquire. Several studies have suggested that certain key symptoms and findings are useful in predicting who will have OSA.<sup>4-13</sup> For example, Crocker et al<sup>4</sup> found that 4 variables (apneas observed by a bed partner, hypertension, BMI, and age) were quite predictive of an apnea/hypopnea index higher than 15 among patients referred for a sleep apnea evaluation (sensitivity, 92%; specificity, 51%). It is not clear, however, how well this model would work for mild disease, ie, an apnea/hypopnea index greater than 5 but less than 15, or as a screening tool for the general population.<sup>6</sup> Flemmons et al<sup>5</sup> used multiple linear and logistic regression models to determine predictors of OSA (an apnea/hypopnea index, >10) in 180 patients referred for a sleep apnea evaluation. The key predictors of OSA in the patients referred for evaluation of OSA included neck circumference, hypertension, habitual snoring, and bed partner reports of gasping or choking during sleep.

Kump et al<sup>2</sup> conducted an in-depth study evaluating the ability of a questionnaire to identify "increased apnea activity" in both patients with OSA and their family members and neighbors who did not have known OSA.

The symptoms that best predicted increased apnea activity included self-reported snoring intensity, roommate observed choking, and falling asleep while driving. Of these, self-reported snoring was the most predictive factor. Including BMI and data on sex with the above symptoms increased predictive value further. The authors note that the odds of increased apnea activity increased progressively with worsening severity of symptoms. The odds ratios relating symptoms to OSA were slightly lower in the community sampled as compared with the group with OSA. However, the overall ability to predict OSA based on the above symptoms was similar for patients with known OSA and the cohort from the community.

Kump et al<sup>2</sup> note that the sensitivity and specificity are affected by the degree of severity that is used as a definition of abnormal, eg, mild snoring vs extremely loud snoring. The sensitivity increases and specificity decreases with use of more lenient definitions of abnormality. The level that the investigator chooses to call abnormal may vary depending on the purpose of the questionnaire. A questionnaire designed to identify more subjects with OSA would include mild snoring as abnormal. This would identify most subjects with apnea but would also include patients with snoring without OSA. On the other hand, if the cutoff for snoring intensity is extremely severe, approximately 60% of patients with OSA would be missed. However, very few patients without OSA would be included. Therefore, the wording of a questionnaire used to survey a patient population is very important to consider. Our work sheet included questions regarding common presenting symptoms and associated disorders. The common clinical features of OSA are as follows: chronic loud snoring, observed apneas or gasps, recurrent nocturnal awakenings, excessive daytime sleepiness, decreased memory and concentration, depression and irritability, and sexual dysfunction. The medical disorders commonly associated with OSA are listed as follows:

- Hypertension
- Upper body obesity
- Male sex
- Increasing age
- Abnormal pharyngeal anatomy
- Enlarged tonsils and adenoids
- Redundant pharyngeal tissue
- Retrognathia
- Nasal obstruction
- Excessive use of alcohol
- Untreated hypothyroidism
- Acromegaly

Only 22 (33%) referrals included a copy of the work sheet in the material sent to the Sleep Disorders Center in the patient's outpatient chart. It is not clear why most of the physicians did not use the worksheet. As the work sheet is a potential educational tool, the lack of exposure to the work sheet may have contributed to the physicians ordering fewer sleep studies. However, the 3 physicians who referred the most patients included information in their progress notes and did not complete the work sheet. The information sent to the sleep center may be a reflection of the physicians' style of communication rather than their actual exposure to the work

sheet. Nonetheless, a worksheet may be a useful guide for screening for OSA.

Physicians currently in practice received little or no formal training in sleep disorders during medical school. Students currently in medical school receive an average of approximately 2 hours of formal education about sleep disorders. The Walla Walla<sup>14</sup> project in Washington State demonstrated that with appropriate education of physicians and patients, provision of diagnostic equipment, and ongoing consultation with sleep disorders specialists, referral for sleep studies by primary care physicians increased almost 8-fold from 0.27% to 2.1%. In addition, 17 physicians in the Walla Walla Clinic who were exposed to the educational programs and had easy access for local consultation ordered 294 PSGs, while the 18 community physicians ordered only 39 PSGs. Their education consisted of a weekend course that was videotaped and repeated 9 months later. In addition, a lecture about sleep disorders was provided for the general public. It is interesting to note that the 2 internists most involved in the project developed a special interest in sleep medicine and became the local sleep medicine experts. They provided local consultation for assistance with diagnosis and management of sleep disorders.

### CONCLUSIONS

Primary care physicians did recognize obese patients with prominent symptoms of OSA. However, only a small percentage of their patient panel was referred, which suggests the condition is still underdiagnosed. This seems particularly true as a small group of physicians ordered most of the sleep studies. This underestimation of OSA despite access to the work sheet is most likely due to lack of formal training in this area. Education of primary care physicians and incorporation of a sleep history into the review of systems may increase detection of sleep disorders, referral for diagnosis and treatment, and thus prevention of associated complications. The Walla Walla project also suggests that easy access to consultation with

a sleep specialist may also facilitate screening for OSA by primary care physicians.

Therefore, future work incorporating educational interventions and enhancing accessibility to sleep centers is necessary to improve detection and treatment of OSA.

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