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Neurol. Bull. 1: 1-6, 2009
doi:10.7191/neurol_bull.2009.1000

NEUROLOGICAL BULLETIN

FEATURING ARTICLES BY TRAINEES IN NEUROLOGY & NEUROSCIENCE

Improving Awareness of Sleep Disorders in Neurology Clinics

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Abstract

Objective
Our main goals were to assess the incidence of sleep problems in our patients and to improve the awareness of sleep disorders amongst our neurology clinicians. We hoped that our patients with significant sleep-related symptoms would be referred for further objective testing.

Methods
We designed a 5-question sleep quality survey to be filled out by each patient seen in our outpatient neurology clinics. The forms were collected for entry and analysis on an Excel spreadsheet program. A response of 2 or 3 (moderate or high chance of having a symptom) for each of the questions 1-4 and a "yes" for question 5 were considered significant symptomology. We compared the incidence of sleep problems between the general clinic and the multiple sclerosis (MS) clinic.

Results
Surveys from 1008 patients were analyzed. A large majority (78%) of the neurology patients seen in our clinics was found to have at least one significant sleep related symptom. Most of these patients were not referred for further diagnostic testing by polysomnography (PSG) or for formal evaluation by a sleep clinic.

Conclusions
Our data support a well-known notion that neurological patients have a high prevalence of symptoms related to sleep disorders. As neurologists, we ought to include sleep as one of the functions of the brain, and we need to be more diligent in the diagnosis of sleep disorders in our patients. Our future goals include verification of our data with objective evidence from PSG results or formal sleep evaluations.

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Keywords: sleep disorders, sleep apnea, cerebrovascular disease/stroke, multiple sclerosis

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Introduction

Neurologists are likely to encounter patients with excessive daytime sleepiness, insomnia, unpleasant restless feelings in the legs, and snoring, amongst other complaints. Many primary neurological disorders - multiple sclerosis (MS), chronic pain syndromes, neuromuscular disorders, peripheral neuropathy, epilepsy, cerebrovascular disease, Parkinson's disease, Alzheimer's disease, other dementing disorders, and other neurodegenerative conditions - are associated with disordered sleep. Given the high association of sleep disorders with many neurologic disorders, and the high prevalence of sleep disorders in the general population, our review of systems examination ought to routinely include sleep related questions.

Neurologists treat sleep disorders, and yet, how frequently do we ask our patients in general neurology clinics about their sleep? In most sleep clinics, the Epworth Sleepiness Scale (ESS) serves as a validated tool for assessing overall sleepiness. It consists of eight questions, each scored with a degree of severity ranging from 0 to 3.[1] One of the limitations of this scale is that it asks patients to imagine themselves in situations that they may rarely experience. The wording can lead to confusion, and there also may be individual variation of scores over time. Is there an efficient way to assess patient sleep problems in the office setting? Lengthy questionnaires that are time consuming for the patient and that cannot be reviewed in the outpatient clinic via a discussion between the clinician and the patient seem less effective in diagnosing and managing a sleep disorder. In the process of managing neurological patients in the resident clinic, we wondered about the incidence of sleep problems, specifically obstructive sleep apnea (OSA), insomnia, and restless leg syndrome (RLS), amongst others, and how effective are we at picking up sleep complaints in our patients. These questions and a goal to improve the awareness of diagnosing sleep disorders motivated us to formulate a short and open-ended 5-question survey that was distributed in our neurology clinics. We wanted the questions to be simple and succinct to improve patient compliance given the time constraints in outpatient clinics, and also to allow a discussion about the responses between the patient and the clinician to facilitate further testing and management. Our hope was that with the suspicion of a significant sleep related symptom, the patient would be referred for a sleep study, referred to the sleep clinic, or both. Accurate diagnosis of sleep disorders is important because of the negative impacts of untreated sleep symptoms on health and social function, and also because sleep disorders are generally remediable with appropriate treatment.[2]

Methods

From December 2006 to November 2007, a sleep quality survey was distributed to every patient seen in the Neurology clinic at University of Massachusetts Medical Center and the Multiple Sclerosis clinic at the Memorial campus (Appendix). Typically, the patients filled out their responses during the check-in for their visits, and the responses were reviewed by the clinicians during the clinic visits. Question 1 in the questionnaire addresses the excessive daytime sleepiness symptom, which is a common but non-specific complaint often seen with sleep apnea and narcolepsy. Question 2 asks about insomnia, generally thought to be idiopathic or psychophysiological, or from a secondary cause. Question 3 addresses RLS by incorporating the clinical symptoms needed for the diagnosis. Question 4 asks about snoring, which is seen typically with OSA syndrome. The aim of Question 5 is to serve as an open-ended question for the patients' subjective com-

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Table 1: Percent of patients with significant sleep complaints in General and MS Clinics

	Q1: Daytime Sleep-iness	**Q2: Insomnia**	**Q3: RLS**	**Q4: Snoring**	**Q5: Subjective Complaints**
General Clinics	46%	39%	17%	37%	37%
MS Clinic	54%	40%	24%	32%	36%
p-value	0.02	-	<0.004	-	-

ments or for complaints heard from bed-partners. The separate location of the MS clinic on a different campus allowed a comparative analysis of the data from the two clinics.

For questions 1 through 4, an answer of 2 or 3 (moderate or high chance of having a symptom) was considered significant, and for question 5, the responses of "yes" or "no" were further broken down into subjective comments. This approach turned out to be beneficial in evaluating the patient's perspective or the bed-partner's perspective on the sleep complaints. We instructed the clinicians to write on the patient's questionnaire if a referral for a sleep study, a referral to sleep clinic, or both were ordered. The responses to all five questions, the comments for the final question, and whether there was a referral to sleep clinic, a polysomnogram (PSG) ordered, or both were recorded for each patient on an Excel spreadsheet. Statistical analyses were done to determine the percentage of patients with a significant sleep problem, as well as the percentage of patients with significant sleep symptomology who had further testing and/or referral. A Chi -Square analysis was performed between the general clinic and the MS clinic for each question and comment about referral to determine any statistically significant difference in the incidence of sleep symptoms.

Results

Surveys from a total of 1008 patients (549 patients from the neurology clinics at the University campus and 459 patients from the MS clinic at the Memorial campus) were analyzed (Table 1). A large majority (78%) of the patients was found to have at least one significant sleep related symptom. For question 1, a greater number of patients in the MS clinic (54%) reported excessive daytime sleepiness compared to the general clinic patients (46%) ($p = 0.02$). Of this group of excessively sleepy patients, 16% reported a previously diagnosed sleep disorder. However, only 13% of patients who reported significant daytime sleepiness were given appropriate referral for sleep clinic and/or a PSG, leaving the remaining 71% of patients without an appropriate referral for further evaluation. For question 2, 39% of patients in the general clinic and 40% of patients in the MS clinic reported significant trouble sleeping at night; 16% of these patients were given a referral, another 16% of patients reported a co-existing sleep problem, and 68% of patients were given no referral. For question 3, a greater number of MS clinic patients (24%) reported restless leg symptoms than the general clinic patients (17%) ($p < 0.004$). Overall, 18% of these patients were given a referral, 22% of patients reported a co-existing sleep disorder or neuropathy, leaving 60% of these patients unreferred. For question 4, 37% of general clinic patients

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and 32% of MS clinic patients reported significant difficulties with snoring; 22% of these patients were given a referral, another 18% reported an underlying sleep disorder or sleep apnea, and the remaining 60% of patients were not given any referral.

For question 5, 37% of general clinic patients and 36% of MS clinic patients answered "yes" to the presence of concerns/ complaints about their sleep habits; 20% of these patients were given a referral, an additional 25% of these patients reported an existing sleep disorder, and the remaining 55% of patients were not given any referral. For all the patients in this study who were sent for a sleep clinic opinion and/or for the PSG testing, we are currently in the process of obtaining some objective data from formal evaluations and PSG. Question 4, which addresses snoring, and question 1, which addresses excessive daytime sleepiness, were also analyzed specifically to evaluate for OSA. The overall incidence of symptomatic snorers who also exhibited significant daytime sleepiness was 22% in our population. The referral rate for further evaluation in this group of patients was only 23% for the general neurology and MS patients.

Discussion

As indicated by the data collected in our clinics, neurological patients have a high incidence of symptoms related to sleep disorders. We found a higher (22%) incidence of symptoms related to OSA in our neurology patients than the reported prevalence (2%-4%) of OSA in the general population.[2] Similarly, we found that 17% of the general clinic patients had significant RLS symptoms, which is greater than the reported prevalence of RLS (10%-15%) in the general adult population.[3] The reported prevalence of RLS in patients with MS is about 37.5%.[3] We also found a significantly greater incidence of RLS symptoms in our MS patients compared to the general neurology clinic patients.

There is a prominent role of the brain in sleep regulation. The brain is active during the distinctive physiologic states of wakefulness, rapid eye movement (REM) sleep, and non-rapid eye movement (NREM) sleep in humans.[4] As neurologists, we must include sleep as one of the functions of the brain, and we must ask about this brain function in addition to asking our patients about headache, weakness, or numbness. We believe that such a history-taking exercise about sleep can be done via simple questions that the patient can quickly complete. More importantly, clinicians ought to take the time to conduct an accurate history of the patient's sleep complaint to ensure a prompt diagnosis. Patients may use other terms, such as "tiredness" or "fatigue," to describe sleepiness, thus leading to potential semantic confusion.[5] Therefore, as with most medical conditions, diagnosis of sleep disorders begins with the history.

In our study, even the majority of patients who reported significant excessive daytime sleepiness and/or snoring were not sent for further evaluation. Our findings highlight the need as neurologists to increase our awareness of sleep disorders in our patients. While we cannot be entirely certain about why so many of these sleep-related symptoms went unevaluated, we can endorse the importance of evaluating and treating sleep related issues in order to improve our patients' health and performance in society. We are all aware of the dangers of operating machinery or driving while sleepy. According to one study, there are greater than 50,000 motor vehicle accidents each year in the United States attributed to driving while sleepy.[6] Decreased performance due to sleepiness may be worse than that associated with alcohol intoxication.[7]

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Some of the advantages of our study are that we were able to survey a large number of patients who were seen in the multiple general and sub-specialty neurology clinics. The questionnaire had simply worded questions. Such a design, along with open-ended questions, can also allow for a patient-clinician discussion during the office visit regarding the responses and further management. There are some limitations to our survey design. Our questionnaire, unlike the validated measures such as the ESS, has not been studied for validity. Our goal was more focused on determining the incidence of sleep problems and increasing awareness of sleep symptoms in our clinics, and to extend this methodology to any/all medical settings. The data now need objective verification of the questions with formal evaluations and PSG to confirm a particular sleep disorder diagnosis.

It is clear that we need to improve our inquiry and diagnosis of sleep disorders in our patients. Our short-term goals include an effort to verify our data with objective evidence and a re-evaluation of the referral rate for a PSG, or a sleep consultation, and to further heighten the awareness of our colleagues about their patients' often unaddressed sleep related issues. Our long-term goal is to offer our sleep quality questionnaire to other medical clinics to increase further awareness of sleep disorders. The impact of treating sleep disorders can be gratifying, because it can lead to a real improvement in our patients' memory, performance, and quality of life.

References

1. Johns MW. A new method for measuring daytime sleepiness: the Epworth sleepiness scale. Sleep 1991;14:540-545.
2. Guilleminault C, Brooks SN. Excessive daytime sleepiness: a challenge for the practising neurologist. Brain 2001;124:1482-1491.
3. Walters AS. Restless leg syndrome and periodic limb movements in sleep. Neurology Continuum 2007;13:115-138.
4. Grigg-Damberger M. Normal sleep: impact of age, circadian rhythms, and sleep. Neurology Continuum 2007;13:31-84.
5. Tachibana N, Howard RS, Hirsch NP, Miller DH, Moseley IF, Fish D. Sleep problems in multiple sclerosis. Eur Neurol 1994;34:320-323.
6. Mahowald MW. Eyes wide shut. The dangers of sleepy driving. Minn Med 2000;83:25-30.
7. Powell NB, Riley RW, Schechtman KB, Blumen MB, Dinges DF, Guilleminault C. A comparative model: reaction time performance in sleep-disordered breathing versus alcohol-impaired controls. Laryngoscope 1999;109:1648-1654.

Disclosure: the authors report no conflicts of interest.

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(ISSN 1942-4043)

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doi:10.7191/neurol_bull.2009.1000

Appendix

Sleep Quality Questionnaire

UMASS MEMORIAL
AMBULATORY NEUROLOGY CLINIC

Date_____ Doctor_____

SLEEP QUALITY

1. Do you feel at all sleepy during the day?

    0. No chance
    1. Slight chance
    2. Moderate chance
    3. High chance

2. Do you have trouble sleeping at night?

    0. No chance
    1. Slight chance
    2. Moderate chance
    3. High chance

3. At bedtime, do you ever have unpleasant, restless feelings in your legs that can be relieved by walking or movement?

    0. No chance
    1. Slight chance
    2. Moderate chance
    3. High chance

4. Do you snore (even softly)?

    0. No chance
    1. Slight chance
    2. Moderate chance
    3. High chance

5. Have there been concerns or complaints about your sleep habits?

    Yes No

If yes, explain: _____

_____

_____