



FATIGUE AND SLEEP:

Making the Connection

Fatigue is a common problem seen in primary care and the family physician's responsibility is to identify the medical condition causing the fatigue. An important part of the evaluation is screening and referral for primary sleep disorders that require a comprehensive sleep evaluation.

By Charles H. Samuels, MD, CCFP

The frequency with which patients complain of fatigue in family practice is estimated to vary from 6% to 32% internationally.¹ In most cases, a physical cause for the fatigue is not found and psychological/psychiatric reasons are cited as the most likely cause of the fatigue. Lack of adequate sleep, sleep disruption and primary sleep disorders

are common causes and contributing factors to the complaint of fatigue.² Sleep disorders, however, are rarely screened for in the patient presenting with the complaint of fatigue.

The 2000 National Sleep Foundation (NSF) "Survey of Primary Care Physicians" revealed that 82% of physicians surveyed believed that daytime fatigue was a consequence of insomnia. The NSF survey confirmed that while 97% of physicians believe an assessment of the patients' sleep should be an integral part of a check-up, only 48% of physicians routinely screen patients for sleep problems.³ This discrepancy is likely the consequence of two aspects of physician training. First, the demands of medical school and post-graduate training reinforce a lack of respect for sleep and the restorative



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qualities of sleep. This can affect the physician's perception and understanding of the patient's complaint of fatigue and potential for sleep problems. Second, sleep medicine training is limited in the medical education curriculum throughout North America. A 1978 survey of American medical schools carried out by the American Sleep Disorders Association found that 46% of medical schools in the United States offered no formal education in sleep medicine. A repeat survey by the National Commission on Sleep Disorders Research in 1990 found that that percentage had dropped by only 9% in 12 years.⁴ In addition to the lack of adequate training in the area of sleep disorders, physicians do not have enough time with a patient during an average office visit to evaluate complaints of fatigue and sleep problems effectively. In the NSF survey, physicians agreed that continuing medical education (CME) in this area would be welcomed, and it appears an efficient and effective method for evaluating sleep and fatigue in primary care would be a useful clin-

ical tool. The purpose of this article is to address the relationship between sleep/wake disorders and the complaint of fatigue.

SLEEP PHYSIOLOGY

There are three processes that regulate sleep. The homeostatic process (HP) regulates the balance between sleep and waking. The need for sleep and the amount required for full restoration is determined by the amount and quality of the sleep in the preceding sleep period. Put simply, when an individual is sleep deprived due to a shortened sleep period on one night, the following night he/she will recover that sleep debt with a longer and deeper sleep. The circadian process (CP) regulates the timing of wakefulness and sleepiness during the 24-hour day. The CP is controlled in part by the regular exposure of the eyes to sunlight, which "sets" the biological clock daily and establishes the diurnal circadian cycle of wakefulness during the day and sleepiness at night. This

Summary

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- The frequency with which patients complain of fatigue in family practice is estimated to vary from 6% to 32% internationally. In most cases, a physical cause for the fatigue is not found, and psychological/psychiatric reasons are cited as the most likely cause of the fatigue.
- There are three processes that regulate sleep: the homeostatic process (HP) regulates the balance between sleep and waking; the circadian process (CP) regulates the timing of wakefulness and sleepiness during the 24-hour day; and the ultradian process (UP) is the cyclic rotation of rapid eye movement (REM) sleep and non-REM sleep (stages I-IV)
- In an initial 15-minute visit, a presumptive diagnosis of a sleep disorder can be made with a focused sleep history and limited physical examination. The screening sleep history will distinguish between insomnia and non-restorative sleep. A bed partner's observations of snoring, leg kicking, tooth grinding or other unusual behaviors in sleep will provide specific information that may lead to a diagnosis.
- Referral for a comprehensive sleep medicine evaluation, including sleep studies, should be initiated for patients with a presumptive diagnosis of sleep disordered breathing, periodic leg movements, excessive daytime sleepiness and non-restorative sleep.

diurnal cycle is disrupted in shift workers and in people with irregular sleep/wake schedules. The ultradian process (UP) is the cyclic rotation of rapid eye movement (REM) sleep and non-REM sleep (stages I-IV). The organization of this process through the night is referred to as sleep architecture. The distribution, when the stages occur in the sleep period, and the amount of REM and non-REM sleep, determines the baseline quality of the sleep. It is believed a certain amount of REM sleep is required to consolidate memory during sleep, and that physical restoration occurs during slow wave sleep (SWS) stages III and IV.⁵ Normal sleep physiology is, therefore, a function of:

- The HP, or the amount and quality of the sleep prior to the upcoming sleep period;
- The CP, or the regular morning exposure to sunlight, which regulates the circadian rhythm and determines the internal alerting/sedating signals; and
- The UP, or the amount and distribution of REM/non-REM sleep stages during the sleep period.

In addition to the above, there are some basic physiological principles that contribute to the restorative quality of sleep. Humans require seven to eight hours of sleep per day to be fully restored. The most efficient sleep is between midnight and 6 a.m. Fragmenting sleep with brief arousals (three seconds) at a frequency of > 20 per hour will negatively affect the restorative quality of sleep.⁵ The quality of one's sleep is, therefore, dependent on the total amount of sleep, the degree of sleep fragmentation/disruption and the timing of sleep in the 24-hour day/night cycle. A basic understanding of these processes and the common environmental and biological factors that influence the quality of sleep will provide the clinician with enough information to efficiently assess the contribution of sleep issues to the complaint of fatigue.

THE SLEEP HISTORY

The sleep history focuses on those aspects of sleep behavior that directly affect:

- The amount of sleep;
- The timing of sleep; and
- What might be disrupting sleep.

The goal of the sleep history is to identify those aspects of the sleep behavior that will reveal a specific diagnosis. This process can be achieved in an algorithmic fashion and is summarized in Tables 1 and 2.²

Sleep fragmentation is evaluated by identifying the common triggers for sleep disruption using the patient history and bed partner's observations.

Initially, it is important to do a basic sleep screen. Distinguish between the patient presenting with fatigue who describes his/her sleep as disrupted *versus* the patient who presents with fatigue and is not aware of any disruption in his/her sleep. This sets the stage for the focus of the history and reinforces the integral importance of the bed partner's observations of the patient's sleep.

Patients who complain of difficulty initiating and maintaining sleep with resultant daytime fatigue suffer from insomnia. Patients who do not complain of sleep disruption, but wake up un-rested (non-restorative sleep) likely suffer from a primary sleep disorder, such as sleep apnea, periodic leg movement disorder or teeth grinding (bruxism). The bed partner's observations may provide the presumptive diagnosis immediately, as in the case of someone who snores, stops breathing, kicks their legs during sleep or grinds their teeth.

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Table 1

The Sleep History Presentation and DDX: Doc, I Can't Sleep

1.	2.	3.	4.
Initial Insomnia Difficulty Falling Asleep	Maintenance Insomnia Difficulty Staying Asleep	I/M Insomnia Difficulty Falling & Staying Asleep	Terminal Insomnia Early Morning Awakening
↓	↓	↓	↓
Psychophysiological Insomnia (PPI) Anxiety Disorder Depression Restless Leg Syndrome Delayed Sleep Phase (Teens)	Sleep Apnea Periodic Limb Movements PPI Menopause Prostatism Children/Pets	Most common is PPI Consider multiple problems from both 1 and 2	Depression Advanced Sleep Phase (Elderly)

At the outset of the interview, establish whether the patient suffers from insomnia or non-restorative sleep, and then get a bed-partner report on sleep behaviors. Once you have done a basic sleep screen, proceed to a structured assessment of the patient's sleep to determine the amount of sleep a patient gets per night, the timing and regularity of the sleep schedule, and identify any triggers that are disrupting the sleep.

The Sleep in America Poll revealed that 30% of those polled get less than seven hours of sleep per night and only 37% get the recommended eight hours of sleep per night.⁶ Chronic sleep deprivation (insufficient sleep syndrome), therefore, is a common and prevalent problem in North American society, which contributes to fatigue.

To assess the amount of sleep, calculate the number of hours of sleep the patient gets per night and total it over seven days. The normal amount of sleep per week is 50 to 60 hours; less will accumulate as a chronic sleep debt, resulting in numer-

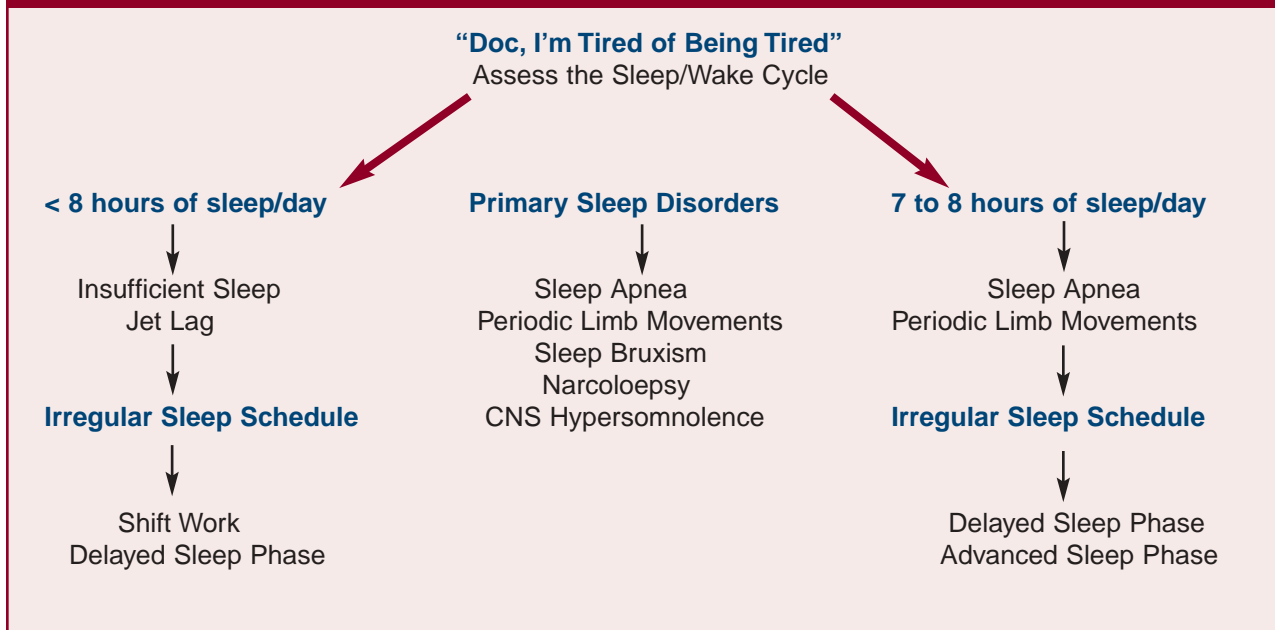
ous daytime complaints, including fatigue.⁷ Sleep debt can only be recovered to a certain degree before it becomes chronic and results in daytime consequences. By providing patients with an objective measure of how much sleep is necessary to feel rested, and comparing that to how much they are getting, they are more likely to accept that their fatigue is partly due to a lack of sleep. An accurate assessment of the amount of sleep per week is achieved by determining the following parameters for workdays and days off:

- Sleep Onset Latency (SOL) = Time from lights out to sleep;
- Total Sleep Period (TSP) = Time in bed to final awakening;
- Wake After Sleep Onset (WASO) = Time awake after sleep onset;
- Total Sleep Time (TST) = TSP - (SOL + WASO).

The timing and regularity of the sleep/wake cycle refers to when a patient sleeps during the day and the regularity of the sleep schedule over

Table 2

The Sleep History Presentation and DDX: Doc, I'm Tired of Being Tired



the week/month. It is also important to determine if there is a significant change in the timing of the sleep period over the course of the week. To ensure that sleep is most efficient, the bulk of the sleep period should occur between midnight and 6 a.m. Patients who cannot accommodate this sleep period should be provided with guidelines for scheduled napping. Scheduled napping is an effective strategy for patients whose fatigue is a function of sleep debt. Naps should generally be no more than 20 to 30 minutes and be timed 12 hours from the middle of the dominant sleep cycle. Patients who have initial insomnia should not nap because the nap will delay sleep onset at night.

The management of irregular sleep/wake schedules (Circadian Rhythm Disorders) in shift workers, night owls and those with jet lag is complex and beyond the scope of this article. It is important to recognize that patients presenting with fatigue may have very irregular sleep sched-

ules. This should not be ignored and may require specialty assessment by a sleep physician.

Sleep fragmentation is evaluated by identifying the common triggers for sleep disruption using the patient history and bed partner's observations. These can be divided into those triggers that are consciously recognized by the patient and those triggers that the patient is not aware of during sleep. Patients who suffer from initial and/or maintenance insomnia will usually be aware of triggers, such as restless legs, pain, urinary urgency/frequency, hot flashes, noise, light, young children, *etc.* Patients who suffer from non-restorative sleep are usually not aware of the triggers for arousal that fragment their sleep. This is why the bed partner's observations are important. Patients who snore, kick their legs in a rhythmic fashion, grind their teeth, sleep walk, or sleep talk may not be aware of the sleep disruption caused by these behaviors. The most common primary

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sleep disorders causing significant sleep fragmentation are snoring, sleep apnea, periodic leg movements and sleep bruxism.

Caffeine, nicotine, alcohol, street drugs and medications affect the depth and quality of sleep.

Sleep disordered breathing (sleep apnea) is diagnosed based on a history of loud, disruptive snoring. The physical exam is limited to weight, height, body mass index (BMI), neck circumference and an exam of the oropharynx.

These substances lighten sleep and reduce the arousal threshold. One of the most common medications that can have a negative affect on sleep is selective serotonin-reuptake inhibitor (SSRI) antidepressant medications. SSRIs are known to disrupt sleep architecture and can contribute to periodic limb movements.⁵ It is strongly recommended, therefore, that SSRIs not be used at night in patients who suffer from sleep problems.

Finally, assess the daytime consequences of the sleep problem. This is categorized into cognition (concentration and memory), mood (anxiety and depression) and physical functioning (myofascial pain, recurrent illness and fatigue). This will help to determine the severity of the problem, the patient's motivation to change behaviors contributing to the problem and the potential for a significant hazardous outcome as a result of the fatigue. Fatigue is considered to be a major contributing factor to industrial accidents and, therefore, it is important for physicians to assess safety issues with respect to the patient's occupation.⁸

Distinguishing between fatigue and daytime sleepiness will help to focus the diagnostic process further. Fatigue is a subjective sense of tiredness and lack of energy that is often described by the patient in terms of reduced or poor cognitive and physical functioning. Excessive sleepiness is described as an inability to remain awake, often in non-stimulating circumstances. There is certainly an overlap, but, often, patients who are fatigued will not complain of sleepiness and patients who are sleepy will not complain of fatigue. The Epworth Sleepiness Scale (Table 3) is a simple, validated scale that can be used to distinguish significant sleepiness from fatigue and help the clinician determine who requires further evaluation for excessive daytime sleepiness. Patients suffering from excessive daytime sleepiness need to be properly evaluated and treated. They may be suffering from narcolepsy, central nervous system (CNS) hypersomnolence, sleep apnea and/or periodic leg movements. These are conditions that can be effectively treated when recognized and if patients are referred for a comprehensive sleep evaluation.

MAKING A DIAGNOSIS

In an initial 15-minute visit, a presumptive diagnosis of a sleep disorder can be made with a focused sleep history and limited physical exam. The screening sleep history will distinguish between insomnia and non-restorative sleep. A bed partner's observations of snoring, leg kicking, tooth grinding or other unusual behaviors in sleep will provide specific information that may lead to a diagnosis (Tables 1 and 2). If the screening sleep history does not yield helpful information, briefly assess the amount of sleep, timing and regularity of the sleep schedule and identify triggers for sleep disruption.

Sleep disordered breathing (sleep apnea) is diag-

Table 3

Epworth Sleepiness Scale

Please use the following scale to rate the likelihood of you falling asleep in the following situations:

0 = Never 1 = Slight Chance 2 = Moderate Chance 3 = High Chance

	Never		High Chance
1. Sitting and Reading	0	1	2 3
2. Watching TV	0	1	2 3
3. Sitting, inactive in a public place (e.g., theatre or a meeting)	0	1	2 3
4. As a passenger in a car for an hour without a break	0	1	2 3
5. Lying down to rest in the afternoon when circumstances permit	0	1	2 3
6. Sitting and talking to someone	0	1	2 3
7. Sitting quietly after a lunch, without alcohol	0	1	2 3
8. In a car, while stopped for a few minutes in traffic	0	1	2 3

Sleepiness Scale Key: A total score of 10 or more suggests that you may need further evaluation by a physician to determine the cause of your excessive daytime sleepiness and whether you have an underlying sleep disorder.

nosed based on a history of loud, disruptive snoring associated with pauses in breathing or gasping. The physical exam is limited to weight, height, body mass index (BMI), neck circumference and an exam of the oropharynx. Patients with a BMI greater than 35, a neck circumference of greater than 45 cm and a narrow throat with a large tongue base are likely to have a degree of sleep disordered breathing. The diagnosis and treatment requires a sleep study. Restless leg syndrome (RLS) is a clinical diagnosis. The symptoms occur during a waking state and are described as an irresistible, restless urge to move the legs, which usually occurs in a diurnal pattern (in the evening and at sleep onset) and is relieved with movement.

Periodic limb movement disorder (PLMD) occurs during a sleep state and is described by the bed partner as repetitive leg kicking during sleep. The diagnosis is confirmed with a sleep study. Psychophysiological insomnia (PPI) is the most common form of insomnia seen in primary care. This condition occurs in anxious, hyperaroused individuals who are of the “type A” personality with perfectionist qualities. These patients often become frustrated with their sleep and adopt maladaptive behaviors (e.g., clock watching, watching television, reading in bed, excessive caffeine consumption) that perpetuate the insomnia. Circadian rhythm disorders include delayed sleep phase (DSP), advanced sleep phase (ASP), jet lag



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and shift work. DSP often occurs in teenagers and presents as difficulty falling asleep and difficulty waking up for school. ASP is common in the elderly and presents in those who go to bed early and wake up early in the morning. Depression and generalized anxiety disorder are common causes of insomnia and fatigue. Often, successful management of the mood does not result in an improvement in the sleep. In these cases, the insomnia should be

Correcting the behaviors that increase anxiety over sleep and promote stimulation will strengthen the correlation between the bedroom and sleep.

addressed independently of the mood disorder. Common triggers for sleep disruption that should be addressed by managing the underlying condition are gastroesophageal reflux, nighttime asthma cough, menopausal hot flashes, urinary urgency/frequency and pain/discomfort.⁹

THE MANAGEMENT PLAN

Once a presumptive diagnosis has been made, the family physician can confidently refer the patient for a sleep medicine assessment and/or initiate non-pharmacological interventions to improve sleep quality, minimize sleep debt and control nighttime triggers. The management of sleep disorders with specific medications is beyond the scope of this article.

Referral for a comprehensive sleep medicine evaluation, including sleep studies, should be initiated for patients with a presumptive diagnosis of sleep disordered breathing, periodic leg movements,

excessive daytime sleepiness (Epworth Sleepiness Scale of > 10/24) and non-restorative sleep. Sleep studies are not required for patients with psychophysiological insomnia, circadian rhythm disorders or depression. In this group of patients, a sleep medicine evaluation may be helpful after a three- to four-month trial of treatment is unsuccessful.

The non-pharmacological approach to the management of sleep disorders is a behavioral management program that addresses the maladaptive behaviors patients adopt in an effort to cope with their frustration of insomnia and/or non-restorative sleep. The program addresses issues related to sleep hygiene, sleep restriction and stimulus control.¹⁰ Sleep hygiene refers to lifestyle and environmental issues that are detrimental to high quality sleep. Lifestyle issues, such as consumption of stimulants (*e.g.*, caffeine, nicotine), alcohol consumption, diet and exercise can all have a negative effect on sleep. Caffeine and nicotine are stimulants and their primary effect is to lighten and fragment sleep. Caffeine intake should be limited and stopped after 2 p.m. Nicotine should also be limited and stopped after 4 p.m. Alcohol disrupts sleep architecture and is not recommended in the evening for people who have trouble sleeping.

Appropriate timing of exercise and hot baths before bedtime is important. Body temperature should be going down at sleep onset, not up. Therefore, vigorous exercise should not be done in the evening. A walk or hot bath two to four hours before sleep onset is recommended. The sleep environment is the bedroom, and it should be dark, quiet and comfortable. Noise (*e.g.*, snoring, children), movement (*e.g.*, bed partners and animals), temperature and light should all be controlled (see the patient information sheet at the end of this article). Stimulus control refers to the relationship between the maladaptive behaviors that promote insomnia in the sleep environment.

Correcting the behaviors that increase anxiety

over sleep and promote stimulation will strengthen the correlation between the bedroom and sleep. These behaviors include not relaxing for a minimum of one hour before sleep onset, watching/checking the clock in the middle of the night, and remaining in bed when one cannot sleep. Patients should be advised to relax before bedtime, eliminate the focus on time (*i.e.*, the clock) when they cannot sleep, and get out of bed if they cannot sleep, relax then return to bed when they feel sleepy. Watching TV, reading and listening to the radio in bed are maladaptive activities that should be done outside the bedroom. Sleep restriction improves sleep efficiency by minimizing the time spent in bed when not sleeping. Patients should be advised to keep a regular sleep schedule seven days a week and get seven to eight hours of sleep each night. Scheduled napping is very beneficial, as long as it is limited to 20 to 30 minutes and does not negatively affect sleep onset at night.

Patients whose primary complaint is difficulty initiating and maintaining sleep should be advised to go to bed later and wake up earlier (*e.g.*, bedtime between 11 p.m. and 12 p.m. and waking up between 6 a.m. and 7 a.m.) to consolidate their sleep and improve sleep efficiency.

SUMMARY

Fatigue is a common problem in primary care and the family physician's responsibility is to identify a medical condition causing the fatigue. Once medical causes for fatigue have been addressed, the family physician should proceed to dealing with issues related to psychological stress, psychiatric illness and sleep behaviors, all of which contribute to complaints of fatigue. An important part of the evaluation is screening and referral for primary sleep disorders that require a comprehensive sleep evaluation. A focused sleep history and physical examination can be done during a standard office visit to begin the process. The non-pharmacological man-

agement plan can be initiated at a follow-up visit once patients have had time to reflect on their sleep behaviors, sleep patterns and have asked their bed partner about observations of their sleep habits. Adding this sleep evaluation to your current approach to fatigue will offer you and your patients a more comprehensive assessment of their fatigue and greater success in managing a very difficult and frustrating problem.

CME

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