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Nursing Aspects of Sleep Medicine

Gary Stanton, M.D.

Diplomate in Neurology and Sleep Medicine, American Board of Psychiatry and Neurology
Director of Sleep Disorders Program, Emerson Hospital, Concord, MA 01742

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Abstract: Nurses often spend time with patients who are awake and asleep. The nurse therefore is in a privileged position to talk with patients about their sleep, and to observe important clinical behaviors in the sleeping patient. This article briefly reviews sleep physiology and pathophysiology, and discusses certain common sleep disorders that a nurse might identify. Such disorders include insomnia, obstructive sleep apnea, restless legs syndrome, parasomnia behaviors, and sundowning. Nursing aspects of these conditions are reviewed.

Key words: sleep, REM, insomnia, obstructive sleep apnea, restless legs syndrome, parasomnias, sundowning.

Nurses bring particular benefits to patients with sleep disorders. A nurse spends relatively more time with a patient than a physician, particularly when the patient is hospitalized. A nurse can listen to the patient's description of the nature and character of a sleep problem, consider the patient's concerns, and help find a solution. A nurse administers medication to the patient, and is present to appreciate its clinical therapeutic effects and potential side effects related to sleep. A nurse often directly observes the patient napping during the day or sleeping at night, and can assess behaviors such as arousals, motor restlessness, ventilatory disturbances, parasomnia behaviors, or seizures.

Sleep disorders are common among the general population. They include problems such as insomnia, sleep apnea, and restless legs syndrome, which are frequently undiagnosed and untreated before people become patients, often for other reasons. Preexisting sleep problems often become amplified in the setting of acute or chronic medical or surgical illness, especially in the hospitalized setting. Even patients who ordinarily have no sleep problems at home might develop sleep problems when hospitalized. Such problems could be related to various factors, including anxiety, depression, side effects of medications, medical equipment, the hospital environment, or to the pain and other symptoms of their medical illness.

It is useful to briefly review sleep physiology. The brain has one anatomy, but three states of function. These are wakefulness, non-REM sleep, and REM sleep. "REM" refers to rapid eye movements. Clinical criteria for wakefulness include responsiveness to external stimuli and an activated EEG (electroencephalogram). Criteria for non-REM sleep include a decreased responsiveness to external stimuli, and a slower, synchronized EEG. And criteria for REM sleep include a further decrease of responsiveness associated with rapid eye movements, with a paradoxically activated EEG. Non-REM sleep and REM sleep occur in cycles throughout the night, with non-REM sleep normally predominating in the first half of the night, and REM sleep predominating in the second half. About 80% of dreams

occur in REM sleep. These dreams tend to be more complex and structured than the simpler, more fragmented dreams that occur in non-REM sleep.

There are two independent drives that govern sleep-wake behavior. First, there is a homeostatic drive to sleep, which is a function of increasing wakefulness. The longer we are awake, the more sleepy we become. Second, there is a circadian drive towards arousal, a function of the suprachiasmatic nucleus (SCN) of the brain. Changes in SCN output result in variations of the sleep drive throughout the day and night, with a 24.2 hour periodicity. Maximum sleepiness occurs about 3-5AM and 3-5PM, when the SCN drive to arousal is the least. Thus the homeostatic and circadian drives coexist in a push-pull relationship. The SCN, which is located in the hypothalamus, contains the major circadian pacemaker. Activation of the brain also is facilitated by the ascending reticular activating system (ARAS). The ARAS sends an activating signal from the brainstem to the thalamus, which is then relayed to the hypothalamus and basal forebrain regions, and from there to the cerebral cortex to help maintain wakefulness. Neurotransmitters that promote wakefulness include: norepinephrine, dopamine, serotonin, acetylcholine, histamine, and hypocretin (also called orexin). Neurotransmitters that promote sleep include GABA, melatonin, and adenosine. Melatonin production from the pineal gland is stimulated by decreased environmental light. Its secretion occurs in a darkened environment, and results in decreased core body temperature and a somnogenic effect. We tend to fall asleep as our body temperature decreases. The average total sleep time in an adult is about 7.5 hours.

Sleep is associated with a variety of physiological changes, notably of the autonomic nervous system. For example, parasympathetic tone is increased in non-REM sleep, and further increased in REM sleep (except for phasic increases in sympathetic tone, which may be even greater than in wakefulness). Changes also occur involving hormone secretion, fluid-electrolyte balance, and immune

responsiveness, among others. There are important differences in non-REM sleep as opposed to REM sleep, particularly involving cardiovascular functions. For example, in REM sleep the heart rate is more irregular, and there is more variation of the blood pressure. Another example concerns muscle tone, which in generally is reduced in REM sleep. The clinical consequence of this is the prominence of phasic movements in REM sleep, such as rapid eye movements and twitches of the face and hands, but not gross body movements. Theories have been put forth to explain the purpose of sleep, and include energy conservation, synaptic and neural network maintenance, memory consolidation, thermoregulation, and immunoregulation, among others. Sleep remains to some extent a biological mystery.

We now turn our attention to nursing and sleep pathophysiology. Clinical assessment begins with an appropriate history. Patients should be asked key questions. "How is your sleep?" "How many hours do you sleep?" "When you awaken, do you feel refreshed?" "Do you have excessive daytime fatigue or sleepiness?" "Do you feel sleepy when you drive a car?" "Do you have trouble falling asleep or staying asleep." "Do you snore?" "Do you have known sleep apnea or use CPAP or BiPAP?" "When you sit or lie down in the evening or in bed, do you have an excessive, uncomfortable urge to move your legs?" "When you sleep, do you move about excessively or act out dreams?" We will see below why these are important questions.

It is important to make a distinction between sleep and fatigue or tiredness. Sleepiness is the behavioral state of heaviness of the eyelids, sagging of the head, yawning, and an ability to nap given the opportunity to sleep. Fatigue is the state of a sustained lack of energy, coupled with a lack of motivation and drive. Many patients will say they are fatigued or tired when they actually mean they are sleepy. Other patients complain of fatigue but cannot nap even if given the chance. The Epworth Sleepiness Scale is a useful tool that can help distinguish between sleepiness and fatigue. In completing it a patient estimates his or her probability of falling asleep in 8 specific situations on a scale of 0-3. A total score of 10 or more out of a maximum 24 is consistent with a diagnosis of excessive daytime sleepiness. However, one should keep in mind that not every patient with a bonafide sleep disorder will have an abnormal score, and so clinical correlation is always important. If nurse believes that a patient suffers from drowsy driving, it is appropriate to advise that patient never to operate a motor vehicle or dangerous machinery when sleepy, and to document that advice in the nurse's notes.

The most prevalent sleep disorder is insomnia. At least one out of three adults report insomnia in general. It is more common in women, middle-aged and older adults, patients with psychiatric and medical disorders, and in shift workers. There are two principal types of insomnia. Sleep onset insomnia is more common in young adults, often involving sleep latencies of more than 30 minutes. Sleep maintenance insomnia (with excessive awakenings after sleep onset or an early morning awakening) is more common in middle-aged and elderly patients. Many patients complain of both types.

To diagnose insomnia, there should also be a daytime complaint, such as fatigue. This is because some people, called short sleepers, require fewer than 7-8 hours in order to feel fully rested and awake. Long sleepers, requiring more than 7-8 hours also exist. Furthermore, insomnia can be confused with excessive variability of sleep phase timing. For example, healthy teenagers often prefer to stay up late into the early morning hours and to sleep in, complaining of fatigue only if they are forced to awaken earlier (to go to school or work). Sometimes asking a patient about sleep and waking patterns during vacations is helpful to figure out what the patient's actual sleep need may be, and to determine if fulfilling that sleep need is truly restorative. It is important to keep in mind that insomnia in some but not all patients may be a symptom of depression.

Nurses must be aware of the arousing as opposed to sedating effects of a variety of medications. Examples of drugs with arousing effects include methylphenidate, pemoline, modafinil, protriptyline, selegiline, bupropion, levodopa, donepezil, and caffeine. Examples of drugs with hypnotic effects include benzodiazepines (such as lorazepam and diazepam), nonbenzodiazepines (such as zolpidem and eszopiclone), certain antidepressants (such as amitriptyline and trazodone), certain anticonvulsants (such as gabapentin and pregabalin), certain antipsychotics (such as olanzapine and haloperidol), and over-the-counter agents (such as diphenhydramine and melatonin). Many other examples exist.

What are the nursing aspects of insomnia? A nurse may reassure a patient that short term insomnia during an acute illness or hospitalization is common and is typically self-limited. Reassure anxious patients with positive thoughts, reminding them that sooner or later sleep will come, and that you are there to help. Such positive thoughts help to diminish their arousal, and thereby help promote sleep onset. A nurse can educate patients about sleep hygiene. This involves avoiding caffeine later in the day, avoiding prolonged naps, taking a late afternoon or early evening walk if possible, and allowing a one hour down time prior to bedtime. Earplugs and a mask may help reduce arousals from environmental factors. A patient should be asked about pain status prior to bedtime to optimize comfort. This might involve proper positioning and the administration of analgesic agents. If hypnotic agents have been prescribed on an as-needed basis, it may be possible to discuss with the patient their timing of administration, taking into consideration the agent's potency, latency to clinical effect, likely duration of clinical effect, and possible side effects. If a patient complains of lack of relief from a hypnotic medication, try and determine if the problem concerns primarily a sleep onset as opposed to sleep maintenance insomnia. A sleep onset insomnia may respond better to an agent with rapid onset of action, whereas a sleep maintenance insomnia might respond better to an agent with a relatively longer half-life. Such options may be discussed with the housestaff and hospital pharmacist. Any patient complaining of insomnia should also be questioned about an underlying depression.

Nurses are in a unique position to observe hospitalized patients for obstructive sleep apnea (OSA) syndrome. This

is a common, often undiagnosed condition. Symptoms include snoring, restless sleep, and daytime sleepiness. It may occur at any age, but especially in middle-aged men, and post-menopausal women. In adults it occurs more often in obese patients, but not uncommonly may occur in non-obese patients. Abnormal obstructive sleep apnea is actually a laboratory diagnosis, in which ventilatory disturbances lasting at least 10 seconds occur more than 5 times an hour. A nurse may or may not accurately diagnose sleep apnea by simple clinical observation. Most commonly apneas and hypopneas are obstructive involving the upper airway, in which ongoing ventilatory effort is ineffective due to a physiologic full or partial upper airway collapse. The result is sympathetic arousal, with or without hypoxemia or an actual full awakening, associated with increased ventilatory effort sufficient to overcome the obstruction. Another type of apnea is central, which involves a transient absence of ventilatory effort. Obstructive and central events may occur in the same patient, often as mixed events. The sleep apnea syndrome involves symptoms of excessive daytime sleepiness or fatigue, often with memory and attentional difficulties, impairing the patient's quality of life. It may cause cardiovascular complications, especially arterial hypertension. It may aggravate congestive heart failure or a tendency towards cardiac arrhythmias, such as atrial fibrillation. Epidemiologically it increases a patient's risk for myocardial infarction, stroke, and motor vehicle accidents. It aggravates diabetes mellitus, and promotes nocturia. It increases mortality. It is best treated by nasal CPAP (continuous positive airway pressure).

What are the nursing aspects of OSA? If a patient is asleep, take a moment to observe for snoring and apneas. Note that OSA may be aggravated by certain medications, especially benzodiazepines and opiate analgesics. If nighttime hypoxemia is noted, check on the patient for possible snoring or witnessed apnea. If a patient with OSA seems restless, if nocturnal hypoxemia is noted, or if PVCs or other arrhythmias occur during sleep, positioning the patient on the side or elevating the patient's head might help. O₂ may be indicated. When the patient is awake, question him or her about symptoms of OSA, especially if the patient was admitted for cardiovascular or cerebrovascular problems, or if the patient has hypertension. If the patient uses CPAP or BiPAP at home, encourage him or her to have someone bring it to the hospital for use during naps and sleep at night. If the patient falls asleep in the hospital without having applied his or her CPAP, it is best to wake the patient and to help put it on correctly. Unfortunately, diagnostic sleep testing is typically not authorized by insurance companies for testing on in-patients in the United States. A nurse can do a patient a great service by telling him or her as well as the house staff about any concern for OSA, and suggest an eventual out-patient sleep medicine consultation for diagnostic testing and treatment.

Nurses are also likely to observe leg movements in patients with restless legs syndrome (RLS). RLS may occur as an isolated condition, or in association with a great variety of sleep, neurological, or other medical disorders. RLS is a symptom of wakefulness. During sleep, many patients with RLS will exhibit leg movements known as periodic leg movements of sleep (PLMS). Patients with RLS will

complain of an unpleasant urge to move the legs, often with a creeping or crawling sensation at the calves, relieved with movement, worse in the evening and during the night, often disturbing sleep onset and maintenance.

What are the nursing aspects of RLS? If a nurse sees patients moving the legs often when awake, or repeatedly kicking them when asleep, question them about possible RLS. Ask patients if RLS symptoms were helped or worsened by current or prior medications (most SSRIs, other psychotropic drugs, and some antihistamines might aggravate RLS). Check to see if laboratory tests show evidence for anemia, kidney dysfunction, or iron deficiency. Discuss the patient's RLS with the house staff to consider diminishing a suspected aggravating drug. If the ferritin level is less than 40-50 ng/ml, iron supplementation often helps RLS. If necessary other agents may be prescribed that often benefit RLS, including ropinirole, pramipexole, or gabapentin, and may be discussed with house staff as a treatment option.

Nurses sometimes observe patients exhibiting parasomnias, which are certain behaviors occurring during sleep. They may arise from non-REM sleep or REM sleep. Non-REM sleep parasomnias most often consist of confusional arousals, night terrors, and somnambulism (sleepwalking). They tend to occur in younger patients, often on a familial basis, usually during the first half of the night, and typically arising out of slow wave sleep. Such events are often aggravated by stress, illness, pain, sleep deprivation, certain medications (including non-benzodiazepine hypnotics, such as zolpidem), and by other sleep disorders, especially OSA. The patient usually has no memory for the event.

Other parasomnias arise out of REM sleep. They represent dream enactment behaviors, more often occurring in older patients. Patients appear to act out dreams, often violently. When questioned, a patient may reluctantly admit having attacked his or her bed partner while dreaming. Such patients may suffer significant injuries by falling out of bed, or by walking, running, and falling while asleep. Such behaviors may be aggravated by certain medications, especially by SSRIs and other psychotropic agents, as well as by untreated OSA. Dream enactment behaviors may also occur as a symptom of a neurological condition, called REM sleep behavior disorder (RBD). In RBD, there is a failure of REM sleep atonia, in which the sleeping patient may move about during dreams. This disorder not uncommonly precedes or accompanies Parkinson's disease and other neurodegenerative conditions. Patients often remember they had been dreaming if they awaken in the course of dream enactment behaviors.

What are the nursing aspects of parasomnias? First and foremost the nurse must assure the patient's safety and comfort. Siderails with padding, a bed alarm, and in severe cases, restraints or enclosures may be indicated. A nurse may help identify potential aggravating factors that might trigger arousals. If necessary, clonazepam may be discussed with the housestaff as an often effective agent in treating non-REM sleep and REM sleep parasomnias.

Nurses often observe patients exhibiting sundowning behavior. Its occurrence is increased in patients with dementia. Sundowning involves a cyclical agitation at night, with an reversal of the normal sleep schedule. The patient sleeps more during the day and is awake at night, often with agitation. It is aggravated by an early bedtime, an increased use of sedatives, advanced impairment of cognition, a variety of associated medical conditions, and by underlying circadian rhythm disturbances. It is often a difficult problem in the management of hospitalized or institutionalized patients.

What are the nursing aspects of sundowning? As with parasomnias, patient comfort and safety are most important. Placing the patient's bed next to a window allows sunlight exposure, which suppresses daytime melatonin secretion and the drive to sleep. Family and nursing visits help promote daytime wakefulness and activity. An early dinner, and a light snack prior to bedtime may help. Treatment of the patient's underlying medical, psychiatric, or neurological condition improves sundowning. If possible, avoidance of

excessive sedating medications during the daytime will allow daytime vigilance. The role of melatonin is unclear. Melatonin given at low dosage about 1-3 hours prior to the desired bedtime may help adjust the patient's sleep phase or timing of sleep onset. Low or higher dosages of melatonin given at bedtime may also have hypnotic effects. The utility of other prescription hypnotic agents or antipsychotic medications is debated. A nurse may discuss medication options with the house staff.

What is the main message of this discussion of nursing aspects of sleep medicine? It is to always remember Eugene Robin's observation that: "the sleeping patient is still a patient."

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