Evaluating Sleep Quality in Older Adults

The Pittsburgh Sleep Quality Index can be used to detect sleep disturbances or deficits.
Overview: Inadequate sleep—sleep of poor quality or insufficient duration or both—has been linked to health problems ranging from cognitive impairment to compromised immunity. Insomnia occurs more frequently after age 70, and more than half of adults ages 65 and older report at least one chronic sleep complaint. The Pittsburgh Sleep Quality Index is easily used to assess the quality and patterns of sleep in older adults. It consists of 18 questions covering seven areas in which sleep problems occur and can be completed in about 10 minutes. For a free online video demonstrating the use of this index, go to http://links.lww.com/A261.

Madeline Song, age 82, arrived at the ED two days ago, after she fell at home and briefly lost consciousness. (This case is a composite based on my experience.) It was determined that she had a possible subdural hematoma and new-onset anemia, and she was admitted to the medical–surgical unit for observation. On admission she was alert and able to give a health history coherently. Ms. Song has several chronic illnesses: osteoarthritis in both hips, lumbar spinal stenosis, mild congestive heart failure, and hypertension. She has been taking the following prescribed medications: furosemide (Lasix) 40 mg twice daily; oxycodone with acetaminophen (Percocet), two 7.5 mg/325 mg tablets at night; acetaminophen (Tylenol) 1 g twice daily, as needed; and atenolol (Tenormin) 25 mg in the morning. Although it’s not prescribed, she also takes ibuprofen (Advil and others) 400 mg up to three times daily “when the pain is bad,” as well as a daily multivitamin. Her insurer has authorized a hospital stay of five days, with a longer stay if surgery proves necessary.

The night-shift RN, Harold Bell, has noticed that the lights have been on in Ms. Song’s room for two nights. The day-shift nurse has noted that she is sleeping a lot during the day. Mr. Bell finds her sitting in a bedside chair. He introduces himself and says, “I’ve noticed that you’ve been awake during the past two nights. Do you have trouble sleeping?” “Yes,” Ms. Song says, “sleeping a full night is a rare thing for me, and it’s even harder in the hospital.”

The Pittsburgh Sleep Quality Index (PSQI) provides a subjective measure of sleep quality and patterns. The tool focuses on sleep quality during the previous month, although some studies have used shorter periods of sleep (such as two days and one week). The PSQI, a self-administered questionnaire, includes four open-ended questions and 14 questions to be answered using event-frequency and semantic scales. (The latter use paired words of opposite meaning, such as good–bad.) The tool looks at seven areas: subjective sleep quality, sleep latency (the time it takes to fall asleep), sleep duration, habitual sleep efficiency (the ratio of total sleep time to time in bed), sleep disturbances, the use of sleep-promoting medication (prescribed or over-the-counter), and daytime dysfunction.

The first questions address the patient’s usual bedtime and rising time, as well as how long it takes to fall asleep and how many hours of sleep are obtained per night. Next, the assessment quantifies specific physical and psychological events, such as waking during the night, having to use the bathroom, being unable to breathe easily, coughing or snoring, feeling too hot or cold, having bad dreams, and having pain. The patient is also asked...
Once thought of as a “passive, dormant” part of daily life, sleep is now understood to include vital physiologic processes: it helps to “maintain mood, memory, and cognitive performance [and] plays a pivotal role in the normal function of the endocrine and immune systems.” But many older adults may not be getting adequate sleep. In 2003 the National Sleep Foundation polled 1,506 older adults ages 55 to 84 and found that about two-thirds had one or more symptoms of a sleep problem “at least a few nights a week.” The prevalence of insomnia rises with age, affecting 23% to 41% of adults ages 70 and older, with women ages 80 to 89 having the highest prevalence rate, according to one review. And a large epidemiologic study of more than 9,000 adults ages 65 and older found that more than half reported at least one chronic sleep problem “occurring most of the time.”

Sleep disturbances or deprivation or both have been linked with a range of negative outcomes, including compromised endocrine and immune function, cognitive impairment, hypertension, impaired healing of damaged tissues, and obesity, among others. One study found that sleep duration and quality were predictors of glycemic control in patients with type 2 diabetes. When the patients’ quality of sleep improved, their glycemic control (as measured using glycosylated hemoglobin levels) improved also. A recent review found that 17 of 23 cross-sectional studies in adults “supported an independent association between short sleep duration and increased weight,” although the strength of the association waned with age. In the Cardiovascular Health Study, 5,201 adults 65 years of age and older were surveyed regarding sleep disturbance. The researchers concluded that people with “confirmed angina were 1.6 times more likely to report difficulty falling asleep,” although it wasn’t clear whether poor sleep caused or resulted from the heart condition. The National Institute for Neurological Disorders and Stroke notes that sleep deprivation can cause or exacerbate confusion, depression, and pain. A lack of or inadequate sleep contributes to slowed responses and difficulty concentrating and making decisions, which may explain in part why older adults who sleep poorly fall more often in the home and have more accidents while driving.

What are the costs associated with poor sleep? Insomnia’s fiscal costs are wide ranging. They stem from vehicular accidents caused by driver fatigue, work accidents related to fatigue-related attention deficits, sleep assessments, and pharmacologic and nonpharmacologic interventions to treat sleep disturbances. A 1994 review of the economic effects of insomnia estimated its annual fiscal cost to be $92.5 billion to $107.5 billion in the United States alone. The current annual cost is probably higher. In a recent retrospective study of 75,558 elderly patients with insomnia and 75,558 without insomnia, researchers determined that direct health care costs—inpatient, outpatient, ED, and pharmacy costs for all diseases within a six-month period—averaged $1,143 higher among patients with insomnia than among controls.

Early detection and intervention for sleep disturbances among older adults can likely help reduce the financial burden associated with sleep-related accidents and illness and promote better quality lives.

(For a related article, see Sleep Disturbance in Older Adults, May 2007.)

REFERENCES

how often she or he uses sleep-promoting drugs, how often it's been hard to stay awake during daylight activities, and how often it’s been difficult to “keep enthusiasm up to get things done.” Last, the patient rates overall sleep quality on a semantic scale ranging from “very good” to “very bad.”

HOW TO ADMINISTER THE PSQI
While the patient can complete the PSQI independently, a nurse can administer it verbally if the patient has an IV line in the writing hand, for example, or cannot read or write. Sensory and cognitive deficits, literacy level, and language needs should be assessed before beginning. If vision is impaired, the questionnaire can be enlarged. Self-administration can help patients feel empowered and save nurses time, but as with any self-administered tool, there’s some risk that directions or questions will be misunderstood.

When administering the PSQI to a patient, the nurse should read the directions and questions exactly or nearly exactly as written; this ensures consistency and reliability. The nurse may also need to engage the patient and encourage participation—for example, making eye contact and ensuring that patients with hearing aids are wearing them. Closing the door and drawing a curtain around the bed reduce noise and secure privacy. (To see the section of the online video that discusses the assessment of sleep using the PSQI, go to http://links.lww.com/A262.)

Scoring. The PSQI includes a scoring key for calculating a patient’s seven subscores, each of which can range from 0 to 3. The subscores are tallied, yielding a “global” score that can range from 0 to 21. A global score of 5 or more indicates poor sleep quality; the higher the score, the worse the quality. (See The Pittsburgh Sleep Quality Index, page 47, for more details.)

Each question measures a specific area in which sleep problems occur. The seven components assessed and their associated questions are as follows:

- Component 1, subjective sleep quality—question 9
- Component 2, sleep latency—questions 2 and 5a
- Component 3, sleep duration—question 4
- Component 4, habitual sleep efficiency—questions 1, 3, and 4
- Component 5, sleep disturbances—questions 5b through 5j
- Component 6, use of sleep-promoting medications—question 6
- Component 7, daytime dysfunction—questions 7 and 8

It takes about 10 minutes to administer the questionnaire and tally the responses.

Although the PSQI has been translated into several languages—including Hebrew, Korean, German, Chinese, and Japanese—the translations may not be readily available; nurses should contact the developers of such translations to request a copy. Having an interpreter administer the tool to non–English speakers can be problematic; individual knowledge and skills vary, and an informal translation may be inaccurate, skewing the results.

To watch the segment of the online video in which an expert discusses how sleep disturbances affect the lives of older patients, go to http://links.lww.com/A263.

ASSESSING MS. SONG
Mr. Bell asks Ms. Song if he can ask her some questions about her sleep. Ms. Song agrees, and they begin.

Mr. Bell: “Ms. Song, when have you usually gone to bed?” Ms. Song: “At home I go to bed around 11 PM.”

Mr. Bell: “How long has it taken you to fall asleep each night?” Ms. Song: “It usually takes you to fall asleep each night.” Ms. Song: “It usually takes about two hours.” Mr. Bell records 120 minutes on the PSQI score sheet.

Mr. Bell: “When have you usually gotten up in the morning?” Ms. Song: “Not until 7 AM.”

Mr. Bell: “How many hours of sleep do you get each night?” Ms. Song: “About four.”

Mr. Bell explains that next, he’ll ask about possible reasons for Ms. Song’s sleep difficulties during the past month. He adds, “As I ask each question, I’d like you to think about whether it has happened ‘not during the past month,’ ‘less than once a week,’ ‘once or twice a week,’ or ‘three or more times per week.’”

Mr. Bell: “During the past month, have you had trouble sleeping because you can’t get to sleep within 30 minutes?” Ms. Song: “Well, most of the time.”

Mr. Bell: “How often have you had trouble sleeping because you feel too cold?” Ms. Song: “Sometimes in the winter I get cold.”
Mr. Bell: “And has it affected your sleep during the past month, including your time in the hospital?” Ms. Song: “No.”

Mr. Bell: “How often have you had trouble sleeping because you feel too hot?” Ms. Song: “Never.”

Mr. Bell: “How often have you had trouble sleeping because you have bad dreams?” Ms. Song: “Sometimes in my dreams people are chasing me, and I’m afraid they’re going to hurt me.”

Mr. Bell: “Do you have the bad dreams less than once a week, once or twice a week, or three or more times a week?” Ms. Song: “Those bad dreams come about twice a week. It’s hard to shake them.”

Mr. Bell: “How often have you had trouble sleeping because of pain?” Ms. Song: “I have pain most of the time. I try to take Tylenol when I go to bed, and sometimes I’ll also take a couple of Advils. About once a week I have to take that special Tylenol [oxycodone and acetaminophen], but it makes me groggy in the morning.”

Mr. Bell: “So once a week you have trouble sleeping because of pain?” Ms. Song: “Yes.”

Mr. Bell: “Are there any other reasons why you’ve had trouble sleeping during the past month?” Ms. Song: “Sometimes the noise from the subway wakes me up.”

Mr. Bell: “How often does that happen?” Ms. Song: “A few times per week.”

Mr. Bell: “Three or more times per week?” Ms. Song: “Yes.”

The nurse says that he has a few more questions.

Mr. Bell: “During the past month, how often have you taken medicine to help you sleep? This could be prescribed or over-the-counter medicine.” Ms. Song: “My doctor won’t give me any more sleeping pills. So I tried one that a friend of mine was getting at the drugstore, but it didn’t help me much.”

Mr. Bell: “And when did you use it?” Ms. Song: “Last week, just one night, and it didn’t work.”

Mr. Bell: “Now, during the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activities?” Ms. Song: “I don’t drive anymore: I can’t with my arthritis. My husband tells me that I’ve been falling asleep when we play mah jong with our neighbors.”

Mr. Bell: “So have you been falling asleep once or twice a week or three or more times a week during the past month?” Ms. Song: “ Probably once or twice a week.”

Mr. Bell: “During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?” Ms. Song: “I usually get tired by the late afternoon, and then I don’t feel like doing much.”

Mr. Bell: “Is that happening once or twice a week or three or more times a week?” Ms. Song: “Unfortunately, it’s three or more times a week. I wish I could do more.”

Mr. Bell: “My last question is this: during the last month, how would you rate your sleep quality overall? Would you describe it as ‘very good,’ ‘fairly good,’ ‘fairly bad,’ or ‘very bad?’” Ms. Song: “My sleep has been fairly bad. Can you help me?”

Mr. Bell: “I think there are some ways I can help you tonight and for when you go home. I’ll calculate your score, and then we’ll talk more.”

**Scoring Ms. Song’s responses.** Using the scoring key, Mr. Bell calculates the subscores as follows: component 1: 2; component 2: 3; component 3: 3; component 4: 3; component 5: 2; component 6: 1; component 7: 3. Ms. Song’s PSQI global score is 17. Her major barriers to sleep are nightmares, environmental noise, pain, and nocturia.

**Communicating the findings.** Mr. Bell explains to Ms. Song that her PSQI score indicates an overall poor quality of sleep. He explains that sleep-promoting medications won’t prevent interruptions to sleep caused by environmental noise, bad dreams, or the need to void. He tells her that he’ll talk with the health care team about altering the timing of her diuretic and limiting fluids after 6 pm, as well as perhaps changing her pain medication to one that doesn’t cause morning grogginess. He says that he’ll arrange for the social worker to talk with her about managing the bad dreams and about follow-up care after she’s discharged. Ms. Song says she feels relieved and would like to learn more about sleep. Mr. Bell gives her the National Institute on Aging fact sheet on sleep in older adults (www.niapublications.org/agepages/PDFs/A_Good_Nights_Sleep.pdf). After assessing her current pain level—she says, “I’m not really in pain,
The Pittsburgh Sleep Quality Index (PSQI)

By: Carole Smyth MSN, APRN, BC, ANP/GNP, Montefiore Medical Center

WHY:
For all people, sleep is part of the rhythm of life. Without a “good” sleep, the body loses the ability to revitalize, the mind is less adept and one’s mood is altered. Circadian rhythms have a major impact on older adults’ health and well-being. Normal aging changes conspire to interfere with the quality of sleep, while health and medication use can affect the sleep patterns in a negative manner. A nursing assessment of sleep begins with a comprehensive assessment of sleep quality and sleep patterns. The nurse may be able to improve the sleep problem immediately with interventions or work with the health care team to assess the sleep problem in greater depth.

BEST TOOL:
The Pittsburgh Sleep Quality Index (PSQI) is an effective instrument used to measure the quality and patterns of sleep in the older adult. It differentiates “poor” from “good” sleep by measuring seven areas: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction over the last month. The client self-rates each of these seven areas of sleep. Scoring of answers is based on a 0 to 3 scale, whereby 3 reflects the negative extreme on the Likert Scale. A global sum of “5” or greater indicates a “poor” sleeper. Although there are several questions that request the evaluation of the client’s bedmate or roommate, these are not scored (not reflected in the attached instrument; refer to “More on the Topic”, Buysse, et al., 1989, for these questions).

TARGET POPULATION:
The PSQI can be used for both an initial assessment and ongoing comparative measurements with older adults across all health care settings.

VALIDITY AND RELIABILITY:
The PSQI has internal consistency and a reliability coefficient (Cronbach’s alpha) of 0.83 for its seven components. Numerous studies using the PSQI in a variety of older adult populations throughout the world have supported high validity and reliability.

STRENGTHS AND LIMITATIONS:
The PSQI is a subjective measure of sleep. Self-reporting can empower the client, but can reflect inaccurate information if the client has difficulty understanding what is written, or cannot see or physically write out responses. Moreover, the scale is presented in English and has been used mostly in English speaking countries, with recent studies validating Chinese and Japanese versions. The scale can be adapted to enable the client to respond verbally to items on the scale by having the nurse read the statements to the client.

MORE ON THE TOPIC:

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The Pittsburgh Sleep Quality Index (PSQI)

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

During the past month,
1. When have you usually gone to bed? ___________________
2. How long (in minutes) has it taken you to fall asleep each night? ___________________
3. When have you usually gotten up in the morning? ___________________
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed) ___________________

5. During the past month, how often have you had trouble sleeping because you…
   a. Cannot get to sleep within 30 minutes
   b. Wake up in the middle of the night or early morning
   c. Have to get up to use the bathroom
   d. Cannot breathe comfortably
   e. Cough or snore loudly
   f. Feel too cold
   g. Feel too hot
   h. Have bad dreams
   i. Have pain
   j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s):

6. During the past month, how often have you taken medicine (prescribed or “over the counter”) to help you sleep?

7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?

9. During the past month, how would you rate your sleep quality overall?

   Very good (0)  Fairly good (1)  Fairly bad (2)  Very bad (3)

Component 1 #9 Score .......................................................... C1_______
Component 2 #2 Score (<15min=0; 16-30 min=1; 31-60 min=2; >60 min=3) + #5a Score
   (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3) .................................................... C2_______
Component 3 #4 Score (>7=0; 6-7=1; 5-6=2; <5=3) .................................................... C3_______
Component 4 (total # of hours asleep)/(total # of hours in bed) x 100
   >85%=0, 75%-84%=1, 65%-74%=2, <65%=3 .................................................... C4_______
Component 5 Sum of Scores #5b to #5j (0=0; 1-9=1; 10-18=2; 19-27=3) ....................... C5_______
Component 6 #6 Score .............................................................. C6_______
Component 7 #7 Score + #8 Score (0=0; 1-2=1; 3-4=2; 5-6=3) ........................................ C7_______

Add the seven component scores together ________ Global PSQI Score ________

but the bed’s uncomfortable”—Mr. Bell straightens the bed linens and repositions her. Ms. Song says she thinks she may be able to sleep.

Before he goes off duty, Mr. Bell discusses Ms. Song’s PSQI results with the day-shift nurse and the rest of the health care team. To reduce nocturia, he suggests that the diuretic be given only in the morning and that the nursing staff offer more fluid before 6 PM and less thereafter. He also requests an order for a consultation with the social worker, who can determine whether counseling and evaluation of the home environment through a community agency might be an appropriate response to Ms. Song’s nightmares. For pain, Mr. Bell advocates a change from oxycodone and acetaminophen to transdermal lidocaine (Lidoderm), which might reduce lower back pain without causing morning grogginess. The physician agrees to a trial of transdermal lidocaine during Ms. Song’s hospitalization. Last, Mr. Bell discusses Ms. Song’s sleep problems with her insurance company’s nurse care manager, who can help coordinate care with Ms. Song’s community physician and the company’s chronic care management team. (For more information, see Catching Those Zs in the Hospital, online only at http://links.lww.com/A420.)

CONSIDER THIS

What evidence supports the use of the PSQI? The PSQI has been used in studies with populations including community-dwelling and hospitalized older adults9-12 and people with disorders including depression,4 dementia,4 type 2 diabetes,7 and cardiovascular disease10; it has demonstrated consistent reliability and validity. Data on the psychometric properties of the PSQI are as follows (for an explanation of psychometric properties, see “Define Your Terms,” October 2007):

• Reliability. The PSQI has demonstrated acceptable internal consistency with Cronbach’s α coefficients ranging from 0.77 to 0.83, with the lower value reported for a Japanese version of the tool.1, 11, 12 The PSQI’s stability over time is also good, as shown by test–retest Cronbach’s α coefficients of 0.85 to 0.87.1, 12

• Validity. The PSQI can distinguish between people who have problems with sleep and people who don’t. In the original research, the cutoff score of 5 for the global PSQI score correctly identified the sleep quality of 88.5% of all patients.1

• Sensitivity. The PSQI was shown initially to have a sensitivity of 89.6%, meaning that it could identify those with poor sleep quality almost 90% of the time.1 A subsequent study found the sensitivity to be 98.7%, although it dropped to 93.4% when the cutoff global score was raised from 5 to 6.2 Another study found that sensitivity was 85.7% when the cutoff global score was 5.512

• Specificity. The PSQI has been shown to have a specificity of 86.5% in identifying people without poor sleep (those who have global PSQI scores of less than 5).1

Has the PSQI been used with people who have depression or dementia? Studies using the PSQI have demonstrated that depression predicts sleep problems and sleep problems can predict depression, including among older adults.7, 11 For more information about the use of the PSQI in people with depression, go to http://links.lww.com/A421.

The PSQI has also been used with patients with dementia. Boddy and colleagues studied sleep quality in five groups: older adults who were healthy, those with Parkinson’s disease with and without dementia, those with Lewy body dementia, and those with Alzheimer’s disease.4 PSQI scores were markedly higher in people with Parkinson’s disease and Lewy body dementia than in healthy people. (Unexpectedly, people with Alzheimer’s disease had the lowest PSQI scores of all, which suggests that “their pathophysiology is anatomically and/or temporally distinct.”)

Because cognitive function varies among patients with any type of dementia, nurses should assess the patient’s ability to understand the questionnaire before administering the PSQI.

Are there other tools for assessing sleep? Other tools include the Epworth Sleepiness Scale (ESS; www.hartfordign.org/publications/trythis/issue06.pdf) and the Functional Outcomes of Sleep Questionnaire (FOSQ; www.atsqol.org/sections/instruments/fj/pages/fosq.html). But the eight-question ESS focuses on excessive daytime sleepiness rather than on the quality of sleep, and the 30-item FOSQ assesses “the impact of disorders of excessive sleepiness” on five domains of everyday living.
How To
try this

Carole A. Smyth is an NP in the Medical Housecall Program at Montefiore Medical Center in Bronx, NY. The author of this article has disclosed no significant ties, financial or otherwise, to any company that might have an interest in the publication of this educational activity. Contact author: csmyth@montefiore.org.

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REFERENCES

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GENERAL PURPOSE: To instruct registered professional nurses in the use of the Pittsburgh Sleep Quality Index (PSQI) to assess the quality and patterns of sleep in older adults.

LEARNING OBJECTIVES: After reading this article and taking the test on the next page, you will be able to:
• outline the background information helpful for understanding the problems of impaired sleep.
• review the use of the PSQI to evaluate sleep.

TEST INSTRUCTIONS
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