Sleep Quality in Adult Hospitalized Patients With Infection: An Observational Study

Farrin A. Manian, MD, MPH and Cyrus J. Manian, BA

Abstract: *Background:* Sleep deprivation may adversely affect host defenses against infection while infection may impact sleep. We studied sleep quality in hospitalized patients with infection-related diagnoses. *Methods:* This was an observational study in a 900-bed tertiary care community teaching hospital involving consecutive patients seen by an infectious disease consultant from June 26, 2008 to December 31, 2011. During routine part of their care, patients were enquired about their sleep quality, categorized into either "sound" or "unsound" sleep and the reason (s) for experiencing unsound sleep. *Results:* Of 1,238 unique patients (mean age, 59 years), 592 (47.8%) reported unsound sleep. Patients of 50 years or younger were more likely to report unsound sleep compared with those in the age groups of 50 to 79 years (57.1% versus 45.7%) and 80 years or older (57.1% versus 36.5%) (OR: 1.58 [95% CI: 1.23–2.0] and OR: 2.32 [95% CI: 1.59–3.38], respectively). Skin and soft tissue infections, central nervous system infections, osteomyelitis/diskitis and the head and neck infections were associated with ≥50% rates of unsound sleep. Staff disruptions, pain and anxiety were the most commonly cited reasons for unsound sleep (28.9%, 26.4% and 9.6%, respectively). Patients receiving sedating and/or hypnotic medications were no more likely to report sound sleep, compared with those not receiving such medications (50.7% versus 58.7%, respectively, OR: 0.71 [95% CI: 0.5–1.00]). *Conclusions:* Self-reported unsound sleep is common among hospitalized patients with an infection-related diagnosis, is associated with less advanced age and is often attributed to staff disruptions, pain and/or anxiety. Interventions at improving sleep quality in this patient population seem warranted.

Key Indexing Terms: Sleep; Infection; Hospital; Pain; Staff disruption; Anxiety. **[Am J Med Sci 2015;349(1):56–60.]**

The importance of quality sleep in hospitalized patients is increasingly recognized.[1] Sleep deprivation is associated with numerous physiological and psychological disturbances, including worsening glucose tolerance, hypertension, decreased ventilator drive, increased sympathetic cardiovascular activation, anxiety, decreased cognitive performance and poor balance.[1–5] Lack of adequate sleep may also cause immunological abnormalities and lead to increased susceptibility to infections.[6–11] Conversely, infectious disease conditions may lead to increasing requirements for sleep.[11] Interestingly, despite the commonly held belief that sleep is important to recovery from illness,[10] relatively few studies have addressed sleep in hospitalized patients outside the intensive care unit (ICU) settings.[12–15] Even less is known about sleep quality in hospitalized patients with infection despite several infectious disease–related conditions (eg, pneumonia and skin and soft tissue infections [SSTI]) frequently being listed among the most common discharge diagnoses.[16] We, herein, report our experience with adult patients who, as part of their care under an infectious disease consultation service, were routinely asked about the quality of their sleep and the reason(s) for their unsound sleep experience during their hospitalization.

METHODS

This was a prospective observational study performed at Mercy Hospital, a 900-bed tertiary care community hospital, in St. Louis. From June 26, 2008 to December 31, 2011, all adult inpatients (18 years or older) seen in consultation by 1 of the authors (F.A.M.), an infectious disease physician, were routinely enquired about their sleep quality during the previous night as part of their initial encounter or, if not possible, during a subsequent hospital visit; exceptions included those with persistent cognitive impairment (eg, those with dementia). Patients from all adult hospital wards, including ICUs, were included. Patients were routinely asked "How did you sleep last night?" as part of their initial interview by the infectious disease consultant; enquiry was postponed to a later hospital date if the patient's cognitive abilities did not allow for a reliable response at the time, or if the patient had not spent a full night in a hospital wardroom (eg, partial stay in the emergency room).

Patient responses were categorized into either "Sound" or "Unsound" categories. Responses such as "great," "good," "no problem" or similar terms were classified as sound sleep. "Unsound" sleep encompassed both "Fair" and "Poor" categories. "Fair," "so-so," "on and off" or similar descriptions were classified as "Fair" sleep, whereas "Poor" sleep encompassed terms such as "terrible," "bad," "none," "not much" or similar terms. Patients were also asked to provide the reason(s) for their unsound sleep. No patient was included in the study more than once.

For each patient, age, race and gender were recorded. In addition, during a 14-month period from June 26, 2008 through August 30, 2009, ward location (ICU versus non-ICU), the number of days of hospitalization at the time of enquiry, the primary infection-related diagnosis at the time of consultation and the list of potentially sedating and/or hypnotic (S/H) medications administered between 8 PM and 12 AM on the night before enquiry were recorded in real time. Patient diagnosis was based on the providing physicians' assessment. No attempt was made to distinguish surgical from medical patients. Abdominal infection diagnosis included diverticulitis, abscess and postoperative deep organ space infection. Bloodstream infections included those with primary (eg, vascular access–related) or secondary (ie, extravascular) sources. "Miscellaneous" category included diagnoses that were initially presumed but not necessarily proven to be infectious in origin (eg, fever of unclear source, encephalopathy and leukocytosis). S/H medications were grouped into 5 major categories: narcotics (eg, morphine, oxycodone, hydrocodone and fentanyl), benzodiazepines (eg, lorazepam, diazepam, temazepam and alprazolam), nonbenzodiazepine gamma butyric acid agonists

From the Department of Medicine (FAM), Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts; and Department of Psychology (CJM), University of Missouri-Kansas City, Kansas City, Missouri.

Submitted April 16, 2014; accepted in revised form August 15, 2014.

The authors have no financial or other conflicts of interest to disclose.

The content is solely the responsibility of the authors and does not necessarily represent the official views of Harvard Catalyst, Harvard University, it affiliate academic healthcare centers, its corporate contributors, or the University of Missouri-Kansas City.

Correspondence: Farrin A. Manian, MD, MPH, Department of Medicine, Massachusetts General Hospital, 50 Staniford Street, Suite 503B, Boston, MA 02114 (E-mail: fmanian@mgh.harvard.edu).

(eg, zolpidem), antihistamines (eg, diphenhydramine) and miscellaneous drugs (eg, quetiapine, tricyclic antidepressants, trazodone and melatonin). Patients were considered to have received these medications if 1 or more dose was administered independent of dosage between 8 PM and 12 AM during the night before the sleep query was made.

Because enquiry into the quality of sleep should be a routine part of the care of hospitalized patients,[12] patients were not made aware of the conduction of the study. The study protocol was approved by the Mercy Hospital Institutional Review Board with exemption for patient informed consent granted. The χ^2 with Yates' correction and Fisher's exact tests of significance were used for the comparison of categorical data. STATISTICA (StatSoft, Inc, Tulsa, OK) and InStat (GraphPad Software, Inc, San Diego, CA) software were used for data analysis, with $P < 0.05$ considered statistically significant.

RESULTS

Of 1,357 potentially eligible patients, 119 (8.8%) were excluded because of persistent cognitive limitations. Of the remaining 1,238 cases, 626 (50.6%) were male, 612 (49.4%) were female, 1,117 (90.2%) were white, 108 (8.7%) were black and 13 (1.1%) belonged to other races. The mean age was 59 years (range, 18–100 years). Unsound sleep was reported by 592 (47.8%) patients, of which 183 (14.8%) and 409 (33.0%) responses were classified as either fair or poor sleep quality, respectively.

Table 1 shows reported sleep quality by patient characteristics. There were no significant differences in sleep quality by race or gender. As a group, patients younger than 50 years had a significantly higher rate of unsound sleep compared with age groups of 50 to 79 years (57.1% versus 45.7%; OR: 1.58 [95% CI: 1.23–2.0]) and 80 years or older (57.1% versus 36.5%; OR: 2.32 [95% CI: 1.59–3.38]).

Of 592 patients who reported unsound sleep, 447 (75.5%) provided 1 or more specific reasons for their unfavorable experience (Table 2). Staff disruptions, pain and anxiety were the most frequently cited reasons for unsound sleep (28.9%, 26.4%, and 9.6%, respectively); with noise cited by 6.7% of patients.

TABLE 1. Self-reported sleep quality in hospitalized patients by patient characteristics

Patient characteristic	Sound (N = 1,238), n (%)	Unsound (N = 1,238), n (%)	Total	*P*
Race				
White	582 (52.1)	535 (47.9)	1,117	0.87
Non-white	64 (52.9)	57 (47.1)	121	
Gender				
Male	330 (52.7)	296 (47.3)	626	0.70
Female	316 (51.6)	296 (48.4)	612	
Age, yr				
<50	157 (42.9)	209 (57.1)	366	
50–79	381 (54.3)	321 (45.7)	702	0.0005[a]
≥80	108 (63.5)	62 (36.5)	170	<0.0001[b]

[a] vs. age group less than 50 years, OR: 1.58 (95% CI: 1.23–2.0), $P = 0.0005$.

[b] vs. age group less than 50 years, OR: 2.32 (95% CI: 1.59–3.38), $P < 0.0001$.

TABLE 2. Reasons cited for unsound sleep by hospitalized patients

Reason	N = 447, n (%)[a]
Staff disruptions	129 (28.9)
Pain	118 (26.4)
Anxiety	43 (9.6)
Noise	30 (6.7)
Fever	20 (4.5)
Roommate	19 (4.3)
IV access	10 (2.2)
Frequent urination	9 (2.0)
Diarrhea	9 (2.0)
Poor sleep at home	9 (2.0)
Uncomfortable bed	6 (1.3)
Sleep during daytime	6 (1.3)
Dyspnea	5 (1.1)
Cough	4 (0.9)
Hospital	4 (0.9)
Itching	3 (0.7)
No sleeping pill	3 (0.7)
Heartburn	3 (0.7)
Room cold	3 (0.7)
Chills	3 (0.7)
Room hot	2 (0.4)
Sweating	2 (0.4)
Constipation	2 (0.4)
Sinus drainage	2 (0.4)
Corticosteroids	2 (0.4)
Nocturnal profession	2 (0.4)
Watch television	2 (0.4)
I want my own bed	2 (0.4)
Baby in the room	2 (0.4)
Miscellaneous[b]	19 (4.3)

[a] 26 patients cited more than 1 reason.

[b] Reasons cited only once: bi-pap machine, nosebleed, burping, hiccoughs, compression stockings, thirsty, pillow, pillow between legs, hyperactive due to propoxyphene, staples, visitors, spasms, lack of activity, nightmares, 10 cups of coffee, sore throat, chest tightness, surgery and throat clearing.

Table 3 shows the 3 most commonly cited reasons for unsound sleep by age group, gender and race. The age group of less than 50 years was significantly more likely to cite pain as a reason for unsound sleep compared with age groups of 50 to 79 years (36.0% versus 22.1%; OR: 2.0 [95% CI: 1.3–3.1]) and 80 years or older (36.0% versus 14.3%; OR: 3.4 [95% CI: 1.3–8.5]). Male patients were significantly more likely to cite staff disruptions than female patients (34.4% versus 23.6%; OR: 1.7 [95% CI: 1.1–2.6]), whereas female patients were significantly more likely than male patients to cite anxiety as a cause of unsound sleep (12.7% versus 6.4%; OR: 2.2 [95% CI: 1.1–4.3]). No other significant associations between selected patient characteristics and cited reasons for unsound sleep were found.

Of a total of 638 eligible patients seen during the 14-month period from June 26, 2008 through August 30, 2009, duration of hospitalization at the time of the sleep query, the time of S/H medication administration, primary infectious disease–related diagnosis and ward location could not be determined and/or were inadvertently not recorded in 65, 68, 57 and 28 cases, respectively. The duration of hospitalization at the