

# Sleep Disturbance in Hospitalized Recipients of Stem Cell Transplantation

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Disrupted sleep is considered a patient outcome sensitive to oncology nursing care and can lead to a variety of physical and psychologic dysfunctions, such as insomnia, chronic pain, respiratory distress, obesity, stress, and anxiety. Although sleep disturbances have been studied in recipients of hematopoietic stem cell transplantations (HSCTs), these studies have not examined the acute phase of transplantation. The current study aimed to identify the level of sleep disturbance in this patient population, identify factors contributing to decreased ability to sleep for hospitalized recipients of HSCT, and compare the differences in sleep disturbance between age, gender, type of transplantation, and initial stem cell transplantation versus readmission for transplantation-associated complications. Among the 69 patients studied, 26% reported clinical insomnia, as measured by the Insomnia Severity Index, and 74% had some degree of insomnia. Patient characteristics were not significantly associated with insomnia scores. Patients reported bathroom use as the most frequent reason for sleep disruption (85%). These findings suggest that sleep disturbances are common in hospitalized patients undergoing HSCT, and strategies to reduce disruptions are needed to improve patient outcomes.

**O**ncology nurses, including nurses in the hematopoietic stem cell transplantation (HSCT) unit, become experts in the practice of holistic assessment and the management of cancer symptoms and their treatments. Assessment skills are established by oncology nurses and fine-tuned through experience. Nurses have the distinct ability to influence patient-centered outcomes such as cancer and treatment-related symptoms (Given & Sherwood, 2005). In the HSCT recipient population, the threat of disturbed sleep from lengthy hospitalization, multiple medications and fluids, unfamiliar surroundings, and environmental influences is an area nurses can and should improve to better the patient experience.

## Background

Sleep is an essential component of a healthy life. Disrupted sleep can lead to a variety of physical and psychological dys-

### At a Glance

- ◆ Sleep disturbances are understudied in recipients of hematopoietic stem cell transplantations (HSCTs).
- ◆ In a sample of 69 adults undergoing HSCT for hematologic malignancies, the majority reported some degree of insomnia as measured by the Insomnia Severity Index.
- ◆ Toileting needs and staff interruptions are areas to improve practice and promote sleep quality in this population.

functions, including insomnia, chronic pain, respiratory dysfunction, obesity, stress, and anxiety (Friese, 2008). Patients with cancer often are affected by side effects such as pain or depression that can manifest as insomnia. They also can experience sleep deprivation from side effects of the treatment, such as anemia, daytime fatigue, and the physiologic

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effects of medications (O'Donnell, 2004). Hospitalized patients experience more sleep disturbances than adults in the general population (Flaherty, 2008; Moraes de Almondes, Bezerra Mota, & Fontenele Araújo, 2008). Several studies have measured interventions to promote sleep in hospitalized patients (Alessi et al., 2005; LaReau, Benson, Watcharotone, & Manguba, 2008; Martin, Marler, Harker, Josephson, & Alessi, 2007; Richards, O'Sullivan, & Phillips, 2000); however, no evidence-based interventions for sleep-wake disturbances exist that are categorized as recommended for practice by the Oncology Nursing Society's (ONS's) Putting Evidence Into Practice (PEP) program (Page & Berger, 2009; Page, Berger, & Johnson, 2006; Pieszak, 2011). In addition, no studies were found that assessed sleep disturbances during inpatient hospitalization for HSCT. The literature review and findings of the PEP team were the catalyst for the development of the current descriptive study involving the HSCT population.

Limited studies have focused on sleep disturbances in recipients of HSCT. Andrykowski et al. (2005) found that survivors who had completed stem cell transplantation reported poorer outcomes in areas such as physical health, physical functioning, and psychological adjustment than a healthy control group. Survivors also reported more sleep problems and greater fatigue than the healthy control group.

In another study, Andrykowski et al. (1997) assessed energy level and sleep quality in adult bone marrow transplantation survivors. They reported that 50%–66% of patients who were three to four years post-transplantation still experienced issues with energy levels or sleep disturbances. In another study following survivors who had completed stem cell transplantation, more than half of participants reported tiredness as one of the two most common disturbances (Edman, Larsen, Hägglund, & Gardulf, 2001). Only one study described the effect of sleep-wake disturbances on long-term hospitalized patients who received HSCT. Rischer, Scherwath, Zander, Koch, and Schulz-Kindermann (2009) described sleep disturbances in the acute course of HSCT encompassing the time period around hospitalization. The study found that sleep problems were significantly worse during the inpatient hospitalization phase than at any other point (Rischer et al., 2009).

ONS (2010) has developed PEP as a resource for oncology nurses. The purpose of PEP is to improve oncology nursing-sensitive patient outcomes through resources that summarize evidence-based interventions for common clinical problems (Eaton & Tipton, 2009). Integrating the most current evidence into practice is a priority for high-quality and cost-effective nursing care (ONS, 2010).

Berger et al. (2005) summarized the findings of the 2004 ONS State of the Science conference on sleep-wake disturbances. During this session, a group of experts in the field of sleep-wake disturbances defined outcomes for sleep, reviewed the current literature for measurement tools, and identified studies that included interventions for sleep. Sleep-wake disturbances was added to the list of outcomes to be developed in the PEP program as a resource for all nurses caring for patients with cancer (Page & Berger, 2009). For the current study, the authors used these cards<sup>a</sup> as a framework to investigate sleep in hospitalized patients who receive stem cell transplantations.

<sup>a</sup> The Oncology Nursing Society's Putting Evidence Into Practice cards were replaced in 2009 with *Putting Evidence Into Practice: Improving Oncology Patient Outcomes* (Eaton & Tipton, 2009).

The specific question raised was: What factors contribute to sleep-wake disturbances in the inpatient setting in recipients of HSCT? The assumption directing the study was that recipients of HSCT are uniquely prone to sleep-wake disturbances because of their long hospitalizations, numerous medications, complications experienced from the transplantation process, and complex psychosocial needs. The current study was designed to determine the sleep deficits present in the hospitalized stem cell transplantation population and the patients' perceptions of the reasons behind the deficit.

## Methods

### Design

A descriptive retrospective study design was used to determine the existence of a sleep disturbance in lengthy hospitalizations for recipients of stem cell transplantations. The study aimed to identify level of sleep disturbance in the patient population, identify factors contributing to decreased ability to sleep for hospitalized patients undergoing HSCT, and to compare the differences in sleep disturbance between age, gender, type of transplantation, and initial stem cell transplantation versus readmission for transplantation-associated complications.

### Measures

Several tools have been developed to assess sleep quality or sleep-wake disturbances (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989; Ersner et al., 1999; Richardson, 1997; Richardson, Crow, Coghill, & Turnock, 2007). Two tools have been used to assess sleep disturbances in the oncology population: the Pittsburgh Sleep Quality Index and the Insomnia Severity Index (ISI) (Buysse et al., 1989; Savard, Savard, Simard, & Ivers, 2005). The ISI was chosen because of its straightforwardness and small time commitment from the patient. The ISI also was appropriate because the scoring system easily classifies a patient within a range of insomnia. The ISI is a seven-item questionnaire that assesses patient perception of sleep pattern and quality over the prior two weeks. Patients scored each question, and responses ranged from 0 (not at all, very dissatisfied) to 4 (very much, very satisfied). The scores from each item were added to give a total score ranging from 0–28. A score of 0–7 indicates no clinically significant insomnia, 8–14 indicates subthreshold insomnia, 15–21 indicates clinical insomnia of moderate severity, and a score of 22–28 indicates severe clinical insomnia (Bastien, Valières, & Morin, 2001).

In the current study, the authors were interested in the number of patients reporting subthreshold or clinical insomnia. The ISI has been clinically tested, and is a reliable and valid tool for assessing patient perception of insomnia severity (Bastien et al., 2001).

The questionnaire participants received included the ISI and one subjective question regarding the patient's perceived reasons for insomnia. Demographic questions were included to better define the population affected by insomnia (see Figure 1).

### Study Population

Hospitalized recipients of all types of stem cell transplantations, including autologous and allogeneic (e.g., related,

Insomnia Severity Index					
For each question, CIRCLE the number that best describes your answer. Please rate the current (last 2 weeks) severity of your insomnia problems.					
	None	Mild	Moderate	Severe	Very Severe
1. Difficulty falling asleep	0	1	2	3	4
2. Difficulty staying asleep	0	1	2	3	4
3. Problem waking up too early	0	1	2	3	4
4. How SATISFIED/DISSATISFIED are you with your current sleep pattern?					
Very Satisfied	Satisfied	Moderately Satisfied	Dissatisfied	Very Dissatisfied	
0	1	2	3	4	
5. How NOTICEABLE to others do you think your sleep problem is in terms of impairing the quality of your life?					
Not at all noticeable	A little	Somewhat	Much	Very Much	
0	1	2	3	4	
6. How WORRIED/DISTRESSED are you about your current sleep problem?					
Not at all worried	A little	Somewhat	Much	Very Much	
0	1	2	3	4	
7. To what extent do you consider your sleep problem to INTERFERE with your daily functioning (e.g., daytime fatigue, mood, ability to function, concentration, memory, mood) CURRENTLY?					
Not at all interfering	A little	Somewhat	Much	Very Much	
0	1	2	3	4	

Demographics				
Circle the best answer.				
1. Gender	Male		Female	
2. Age	18–29	30–39	40–49	50–59
	60–69	70–79	> 80	
3. Type of transplant	Autologous		Allogeneic (related)	
	Cord transplant		Allogeneic (unrelated)	
4. Admission type	Initial transplant		Readmission	
5. Have you ever had a diagnosed sleep disorder?	Yes		No	

Factors in Sleep Difficulties				
Check all that apply.				
If you did experience sleep difficulties while hospitalized, in your opinion, what were the contributing factors?				
<input type="checkbox"/>	Staff interrupting for care (vital signs, lab draw, etc.)			
<input type="checkbox"/>	Frequent bathroom use (urine or diarrhea)			
<input type="checkbox"/>	Noise			
<input type="checkbox"/>	Anxiety about yourself (about transplant itself or about outcome)			
<input type="checkbox"/>	Anxiety thinking about others (parents, children, spouse, etc.)			
<input type="checkbox"/>	Uncontrolled physical symptoms (pain, nausea, etc.)			
<input type="checkbox"/>	Other (Please specify.): _____			

**Figure 1. Sleep Study Questionnaire**

Note. Insomnia Severity Index adapted with permission from Charles M. Morin.

unrelated, cord blood), were eligible. Participants were recruited for the study from the inpatient adult population of a hematopoietic transplantation unit of a large, academic, tertiary-care facility. Eligibility criteria included any stem cell transplantation recipient hospitalized for at least 14 days on the inpatient unit. Exclusion criteria included any patients who had a previously diagnosed sleep disorder or any length of stay in the intensive care unit during the prior 14 days of hospitalization.

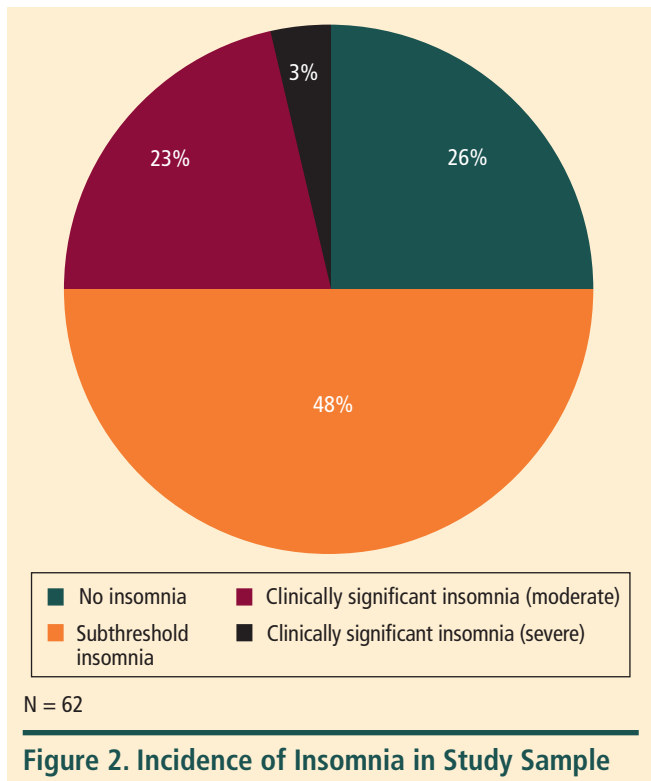
### Procedure

Institutional review board approval was attained. After verbal consent was obtained, participants were asked to complete the assessment tool, including demographics, ISI, and the subjective question addressing the patient's perception of factors contributing to their inability to sleep. Data collection occurred at or soon after the 14th day of hospitalization, but

was reflective of the prior two weeks of hospitalization, as this was the timeframe the ISI was designed to measure. The tool was administered by trained transplantation staff nurses to eligible patients.

### Data Analysis

First, ISI scores were calculated on all patients and the descriptive statistics were examined. The authors then examined the distribution of patients who had subthreshold (ISI score = 8–14), clinical (ISI score = 15–21), or severe insomnia (ISI score = 22–28). This classification was used for all subsequent analyses. Patients with clinical insomnia (moderate and severe) versus subthreshold insomnia were then compared by demographic characteristics using chi-square tests. Finally, the authors restricted the analysis to the patients with subthreshold or clinical insomnia and tabulated the patients' reported reasons for disturbed sleep.



**Figure 2. Incidence of Insomnia in Study Sample**

## Results

Of 93 potential participants identified for the study, 69 patients completed 73 surveys. Five patients completed two surveys each—one on initial admission for stem cell transplantation and one when readmitted for transplantation-associated complications. Five patients declined to participate in the study. Two patients were excluded for having spent time in the intensive care unit during their stay, and one patient’s confusion made completing the tool impossible and led to exclusion from the study. Sixteen patients were discharged before a study team member was able to approach them with a survey.

Figure 2 shows the incidence of insomnia in the sample patient population. The mean ISI score was 10.9 (SD = 5.7), indicating an average of subthreshold insomnia, and the median score was 11 (range = 0–25). Most patients had subthreshold insomnia or greater.

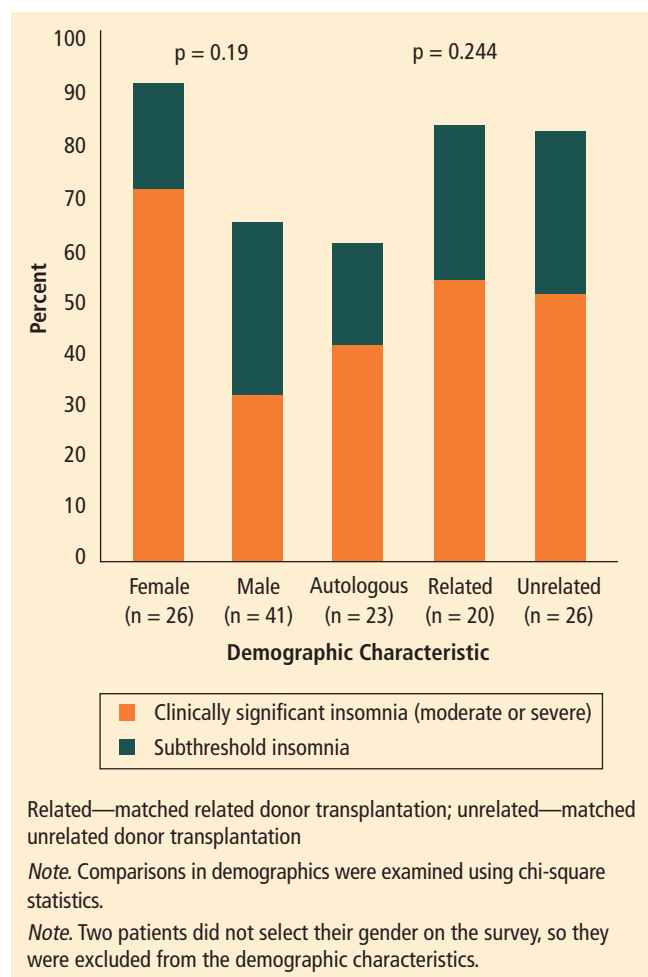
Figure 3 illustrates the incidence of insomnia by demographics. Eighty-seven percent of women reported insomnia compared to 67% of men. Patients who received an autologous transplantation reported less insomnia than either type of allogeneic transplantation, which could be attributed to the fact that, at the 14th day of hospitalization, they were at different phases of the treatment course. By that time, autologous patients are ready for discharge, whereas allogeneic patients still are recovering from their treatment and managing their symptoms. Neither of these trends was statistically significant. No difference was observed in reported insomnia based on age or type of admission. Patients were able to determine why their sleep was disturbed (see Table 1), and the most frequently reported reasons were frequent toileting (85%) and staff interruptions for care (80%).

## Limitations

The population assessed was a convenience sample of recipients of HSCT from one institution. A larger sample size with additional study sites would have enabled the authors to see trends in each of the smaller demographic populations reviewed. Availability of study personnel and discharges before 14 days affected the ability to collect a larger sample. Small amounts of demographic data were omitted by patients. In future studies, data collectors could review the tool for completeness prior to submission. Another interesting step would be to measure sleep on admission as a baseline and again on the 14th day to identify problems that specifically arose during hospitalization. However, the data reported provide the HSCT nursing community with findings that may lead to interventions to improve sleep quality in this patient population.

## Nursing Implications

Nurses are in the position to influence patient-centered outcomes in the hospital, including sleep. By enhancing sleep, nurses can help recipients of HSCT be in an optimal position to recover from chemotherapy, gain strength, fight infection, and enhance quality of life. Nurses can help promote sleep by encouraging



**Figure 3. Frequency of Insomnia by Demographics**

Related—matched related donor transplantation; unrelated—matched unrelated donor transplantation

Note. Comparisons in demographics were examined using chi-square statistics.

Note. Two patients did not select their gender on the survey, so they were excluded from the demographic characteristics.



**Table 1. Patient-Reported Reasons for Sleep Disturbance**

REASON	n	%
Toileting	39	85
Staff interruptions	37	80
Physical symptoms	19	41
Anxiety, self (e.g., transplantation, outcome)	18	39
Anxiety, others (e.g., parents, children, spouse)	16	35
Noise	11	24

N = 46

Note. Analysis was limited to patients who had subthreshold or clinical insomnia.

toileting, helping the patient manage symptoms, providing medications when needed, and minimizing environmental noise. When nurses focus their interventions at bedtime, they provide an optimal sleep environment. Sleep is an important component of the recovery process. Based on the results of the ISI and the patients' descriptions of sleep deficit, nurses need to acknowledge the importance of sleep and intervene to promote a high-quality sleep. Patients have their own ideas about why they are unable to get the proper sleep while hospitalized and the authors learned, through this study, not to project nurses' ideas about why patients are not sleeping. The factors experienced by patients often are not noticed by nursing staff, and patient input is invaluable in assessing and creating a plan to promote sleep.

## Conclusions

Difficulty sleeping is a significant concern for patients undergoing HSCT. When looking at the contributing factors for sleep disturbance, it originally was predicted that noise would be the most significant issue reported by patients. In fact, noise was the least reported, whereas frequent bathroom use and staff interruptions for care were the most reported factors contributing to disturbed sleep. Interventions to promote sleep should focus on minimizing need for frequent toileting and interruptions by staff during the night hours. Interventions that could be tested in the future include grouping nursing care at night to minimize interruptions beyond scheduled hourly rounds and reinforcing rounds by nurses before bed, with a focus on encouraging bathroom use and alleviating physical symptoms. All patients in the current study had 24-hour continuous IV fluids running. To reduce nighttime bathroom use, collaborating with the medical team may be beneficial to decrease IV fluid rates at night when possible.

When nurses are aware of patients' perceptions of sleep problems, they are in a better position to intervene. Patients can benefit from the nurses' increased knowledge of contributing factors for sleep disturbance. Nurses have the ability to influence the environment to optimize conditions for sleep, therefore promoting health and healing after HSCT.

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