Original Article

Sleep Quality of Inpatients in Acute Care Settings: Comparison of Patients and Nurses' Perceptions and Identification of Influencing Factors

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Abstract
Background: Assessing sleep quality in acute care patients is crucial because of the impact of sleep deprivation on their recovery. In medical and surgical units, sleep can be affected by a number of factors. Nurses can find it challenging to assess patients' sleep quality due to its subjectivity. Results related to nurses' perceptions of patients' sleep vary between studies, highlighting the need for further research in this area.
Aims: The aims were to describe and compare patients' and nurses' perceptions of inpatient sleep quality in an acute care setting; and identify factors influencing patients' sleep quality.
Methodology: In this comparative descriptive study, patients' and nurses' perceptions of patients' sleep quality were measured using the Richards-Campbell Sleep Questionnaire (RCSQ). Factors influencing sleep quality were identified by patients using a modified version of the sleep questionnaire (Freedman, Kotzer & Schwab, 1999).
Results: Although the patients' (n=106) mean overall RCSQ score was 48.0, demonstrating acceptable sleep quality, only 26.4% rated their sleep as good quality. The main factors influencing their sleep were pain, the comfort of their bed and pillow, having roommates, noise in the unit and staff voices, needing to use the toilet, noises in the room, having to sleep in an uncomfortable position, and anxiety. Comparison of 73 patient-nurse pairs showed a significant difference ($p < 0.001$) between patients' and nurses' perception of sleep in all five components and the mean overall scores of the RCSQ.
Conclusions: Nearly three quarters of patients hospitalized in a medical or surgical unit experienced sleep difficulties, and nurses overestimated patients' sleep quality.
Key words: sleep deprivation, inpatient, sleep questionnaire, sleep evaluation, acute care, nursing.

Introduction

Managing hospitalized patients' need for sleep and rest is one of the nurses' responsibilities (Henderson, 1991). Studies show diminished sleep quality in hospitalized people, making them more vulnerable to sleep deprivation (Ünsal & Demir, 2012; Yilmaz, Sayin & Gurler, 2012; Zhang et al., 2013; Myoji, et al., 2015). Sleep is crucial for physical and psychological recovery, especially during periods of treatment and convalescence (Aitken et al., 2017). However, hospital environments are not always suitable to address patients' sleep-related needs (Lopez, Blackburn & Springer, 2018; Gellerstedt et al., 2019).

Sleep deprivation can lead to a variety of cognitive, pulmonary, cardiovascular, and metabolic disorders (Chang, Owens & LaBuzetta, 2020). These disorders include reduced concentration, memory and motivation,

and can increase irritability, fatigue and daytime sleepiness. In addition, they can affect reasoning, judgment, pain sensitivity, motor functions, visual and auditory vigilance, while slowing reflexes and weakening the immune system (Van Cauter et al., 2008; Sasmita et al., 2015; Salzmann-Erikson, Lagerqvist & Pousette, 2016; Ritmala-Castren et al., 2017). Patients may have less energy to follow their recovery plan and could be more vulnerable to infections (D'souza, Alvares & Baliga, 2019; Elliott et al., 2021).

In the hospital setting, several factors can influence patients' sleep quality, including physiological factors (e.g. pain, dyspnea, discomfort and hunger), environmental factors (e.g. nocturnal nursing care, noise and lighting), as well as psychological factors (e.g. anxiety, boredom, and lack of privacy) (Zhang et al., 2013; Aparício & Panin, 2020). Other factors can affect sleep quality such as age, gender, diagnosis, disease severity, and associated symptoms, health history, as well as certain medications (Javadi et al., 2015; D'souza, Alvares & Baliga, 2019). Even sedatives and analgesics prescribed to promote sleep, and comfort can lead to abnormal sleep patterns and fail to offer the same restorative function as natural sleep (Watson, Ceriana & Fanfulla, 2012).

Despite the negative effects of sleep deprivation, sleep quality and quantity are often overlooked by healthcare professionals (Gellerstedt et al., 2019). Sleep promotion is reportedly not a priority in hospital settings (Gellerstedt et al., 2015; Reyes-Téllez et al., 2024). It is not always easy to assess patients' sleep effectively, as sleep quality is subjective (Buysse et al., 1989). Nurses have to refer to patients' perceptions and personal observations, and reportedly tend to overestimate patients' sleep (Nicolás et al., 2008; Van Den Ende et al., 2022; Delaney et al., 2023). Few validated tools for the assessment of patients sleep by nurses have been identified in the literature. However, several studies have used the Richards-Campbell Sleep Questionnaire (RCSQ) as a tool for nurses to assess patients' sleep quality, for its validity and simplicity (Nicolás et al., 2008; Kamdar et al., 2012; Ritmala-Castren et al., 2017; Louis et al., 2020; Van Den Ende et al., 2022). However, findings related to nursing perception of patients' sleep vary among studies (Louis et al., 2020). Further research is therefore needed to explain these discrepancies.

Sleep-related studies involve a mainly physiological and medical approach. Virginia Henderson's (1991) needs theory serves as a frame of reference in this study, as it focuses on the person and builds on the fundamentals of nursing, rather than the disease. According to Henderson, people have 14 basic needs that are essential to their well-being and survival and cannot be independent if one of these needs is not being met. Sleep may not always be a priority, but it should be integrated into the care plan, as it is an important factor in the functional recovery process (Horsten et al., 2018; Kornienko, 2021). It's up to nurses to integrate patients' sleep and rest needs into their clinical approach. Consequently, sleep quality components have been targeted and linked to Henderson's theory (Figure 1).

The aims of this study were to describe and compare patients' and nurses' perceptions of inpatients' sleep quality in an acute care setting, and to identify factors influencing their sleep quality.

The research questions were:

1. What is the sleep quality of people hospitalized in an acute care setting as perceived by patients?
2. What is the sleep quality of people hospitalized in an acute care setting as perceived by nurses?
3. Is there a difference between patients' and nurses' perceptions of the sleep quality of patients hospitalized in an acute care setting?
4. What are the principal factors affecting sleep quality in acute-care inpatients?

Methodology

This comparative descriptive study was approved by the research ethics board of a university (case No. 2223-112) and a health network (case No. 101779) in a Canadian province. It took place in a 27-bed medical unit and a 26-bed surgical unit of a regional hospital. Each unit included private rooms, double-occupancy rooms, and a 4-bed room,

accommodating adults and elderly people requiring acute care. The target population was people hospitalized in one of the two units that met the selection criteria (Table 1), as well as the nurses working in these units who were assigned to the patients participating in the study.

Data collection took place in 2023 for a period of two-and-a-half months. A power analysis performed a priori using G*Power software determined that 69 patient-nurse pairs were required for a paired-samples t-test (r = 0.50), to obtain 80% power with a threshold of 0.05 (Bourque & El Adlouni, 2016).

Sociodemographic and clinical data were collected using fillable forms developed by the researcher, one for patients and one for nurses. The clinical data questionnaire was completed by the researcher based on information in the patient's chart, including reasons for admission, care and medication received during the night, sleep habits and state of health. The questionnaires were explained to patients face-to-face by the researcher so that they could fill them in the following morning, between 8:30 and 12:00.

The RCSQ was completed by patients and nurses to collect and compare patients sleep quality data. The RCSQ has been used in numerous studies in care and home settings (Frisk & Nordström, 2003; Nicolás et al., 2008; Ritmala-Castren et al., 2017; Carrera-Hernandez et al., 2018). This 5-item questionnaire, using a visual analogue scale, subjectively measures five sleep components: (1) time taken to fall asleep; (2) sleep depth; (3) number of waking episodes; (4) the percentage of time spent awake; and (5) perception of overall sleep quality. Respondents indicate an X on response lines ranging from 0 to 100 mm, and the average overall score was obtained by averaging the results of the five statements (Richards, O'Sullivan & Phillips, 2000). A lower average overall score indicates poorer sleep quality. In this study, poor sleep quality is defined by mean global scores between 0 and 33 mm, acceptable quality between 34 and 66 mm, and good quality between 67 and 100 mm (Frisk & Nordström, 2003; Nicolás et al., 2008; Ritmala-Castren et al., 2017; Carrera-Hernandez et al., 2018). The questionnaire took about two minutes to complete, which is convenient for patients who are tired and nurses who are in a hurry (Richards, O'Sullivan & Phillips, 2000). In a study by Richards, O'Sullivan and Phillips (2000), RCSQ results showed a positive correlation of 0.58 with sleep variables measured by polysomnography.

The nurses used a modified version of the RCSQ, in which first-person pronouns had been replaced by third-person pronouns. A pilot test of the questionnaires was carried out with two patients and two nurses from the two target units. The RCSQ showed a Cronbach's alpha of 0.96 for nurses' perceptions and 0.89 for patients' perceptions.

Patients completed a modified version of the sleep questionnaire (Freedman, Kotzer & Schwab, 1999). The questionnaire compares sleep quality at home and in hospital, assesses daytime sleepiness during hospitalization, and identifies sleep-disturbing factors. Thirty-three physiological, environmental and psychological factors that could affect patients' sleep quality were examined. The modifications that were made include adding 24 new factors found in the literature relevant to the targeted units, such as pain, anxiety, and whether the room was shared. Questions related to length of hospital stay and eight noises not relevant to the units (e.g. noises related to mechanical ventilation) were removed from the original questionnaire. Data were collected on a Likert scale from 1 to 10, with sleep quality ranging from 1 "poor" to 10 "excellent", daytime sleepiness from 1 "unable to stay awake" to 10 "fully alert" and factors ranging from 1 "no disturbance" to 10 "significant disturbance" (Freedman, Kotzer & Schwab, 1999). The managers of both units approved the content to ensure that the identified factors corresponded to the context of the units. The modified version of the sleep questionnaire showed a Cronbach's alpha of 0.71. A French translation of the RCSQ and the sleep questionnaire (Freedman, Kotzer & Schwab, 1999) was produced using the reverse method.

Data were analyzed using SPSS software version 29. Descriptive statistics were used for sociodemographic and clinical data, presented

as means and as standard deviations. Patients' and nurses' perceptions of patients' sleep quality were compared using a paired-samples t-test, as the combined data involved the same subjects, the same night, and the same measuring instrument (Bourque & El Adlouni, 2016). The significance level was set at 0.05, with a 95% confidence interval.

Results

One hundred and six patients took part in the study, for a participation rate of 82.2%, since 13 patients from the surgical unit and 10 patients from the medical unit who met the eligibility criteria refused to participate. The mean age of patients was 70.2 ± 11.7 years (min=38, max=97). The evaluated night's sleep corresponded on average to the 8th night of hospitalization (lowest 2nd, highest 66th). The first night was not evaluated to avoid biases linked to a new environment. Patient characteristics are presented in Table 2.

Nine nurses took part in the study, for a participation rate of 29%, as 14 nurses from the surgical unit and 8 nurses from the medical unit did not respond to the invitation. They were all female, with an average age of 29.6 ± 9.0 years (min=22, max=48); five worked in the surgical unit and four in the medical unit. Their average practical experience was 5.2 years ± 5.2 (min=2 months, max=14.5 years) and they had approximately 7 patients assigned per night shift.

According to the RCSQ, 34% of patients had poor sleep (< 33 mm); 39.6% had acceptable sleep (34 to 66 mm) and 26.4% had good sleep (> 67 mm). The mean overall score was 48.0, indicating an acceptable sleep quality (Table 3). No significant differences were noted in the RCSQ components, nor in the total score with regard to sociodemographic and clinical data, such as age, gender and hospitalization units.

Seventy-three patient-nurse pairs assessed patients' sleep quality using the RCSQ on a single night (Table 4). Mean patient scores ranged from 42.0 (sleep depth) to 61.5 (sleep latency), while nurse scores ranged from 78.5 (returning to sleep) to 80.6 (sleep quality). The difference between patients' and nurses' perceptions was significant for all five items and the mean overall scores (51.8 for patients compared to 79.6 for nurses). The sizes of the effect for all items were large (-0.9 to -1.1) except for item 2, which was medium (-0.6) (Bourque & El Adlouni, 2016).

The results obtained from the sleep questionnaire (Freedman, Kotzer & Schwab, 1999) show that the average sleep quality of patients (n=106) at home was 7.6 (min=3, max=10), i.e. adequate, whereas in the hospital it was 4.1 (min=1, max=8), indicating poorer sleep. In addition, average daytime sleepiness in the hospital was 6.9 (min=3, max=10).

The ten factors with the greatest impact on sleep quality according to patients are presented in order of importance (Table 5). All have a minimum score of 1 and a maximum score of 10, except for the item relating to toilet use (max=9).

The other 15 factors in order of importance were: temperature in the room, thirst, discomfort related to drains and dressings, room noise caused by nursing, noise from equipment, alarms, lack of privacy, breathing difficulties, noise in the bathroom, night nursing interventions, people entering and leaving the room, nausea or vomiting, lights in the room, boredom, lack of air circulation in the room, lights in corridors, organization of staff work, hunger, taking vital signs, telephone, feeling of insecurity, taking venipuncture and diagnostic tests.

Although nursing interventions during the night were not among the top 10 influencing factors, an independent-samples t-test showed that patients who received no care (n = 51) obtained a mean score of 55.2 (± 25.0) on the RCSQ, compared with 41.4 (± 20.2) for those who received care (n = 55) showing poorer sleep quality ($p < .001$).

Figure 1. Needs theory (Henderson, 1991) and sleep quality.

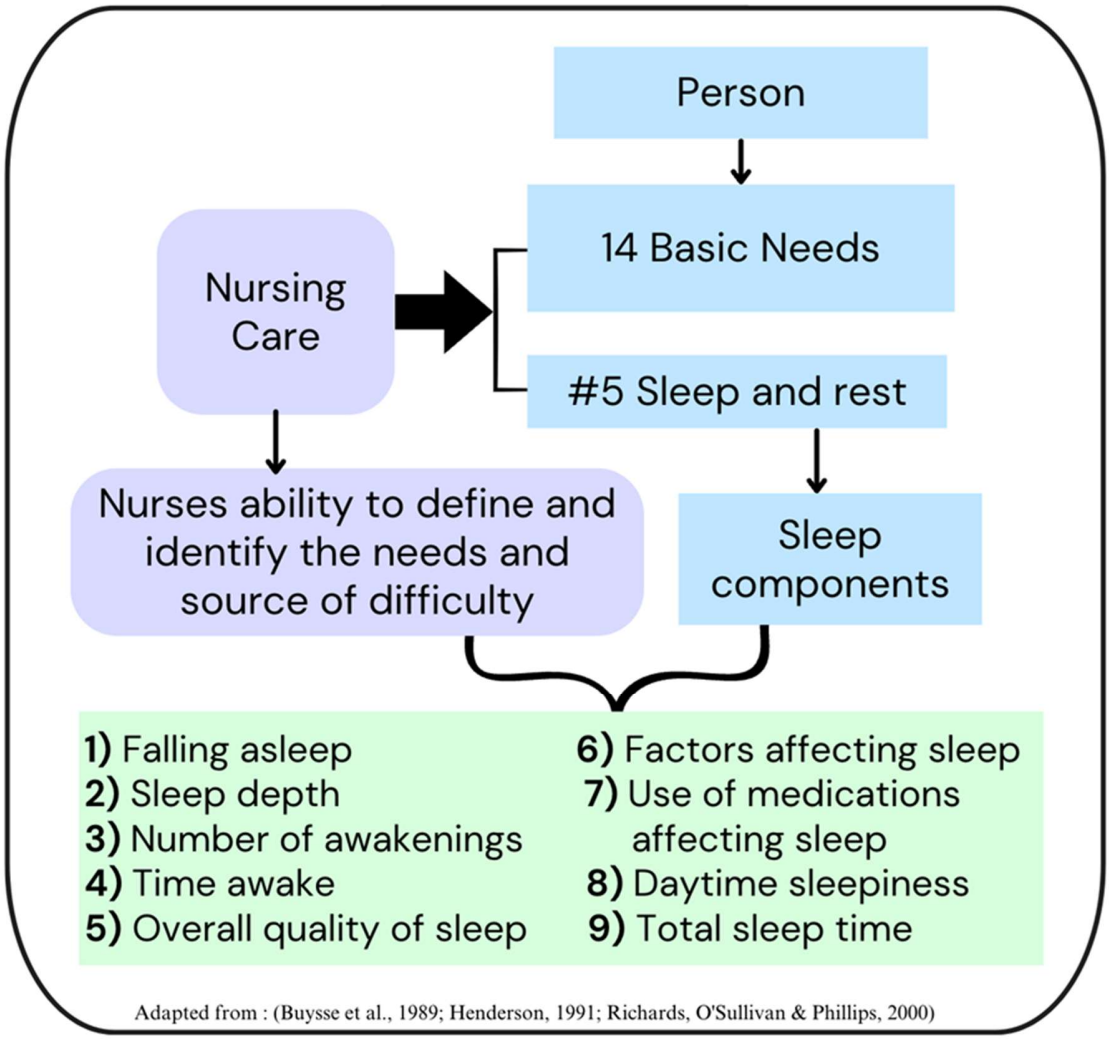

Table 1. Inclusion and exclusion criteria

Inclusion	Exclusion
• Be 18 years of age or older. • Be hospitalized in a medical or surgical unit of the regional hospital for at least two nights. • Understand French or English.	• Have a neurocognitive disorder. • Have an altered state of consciousness. • Have engaged in substance abuse or are experiencing withdrawal.

Table 2. Patient sociodemographic and clinical data (n=106)

Characteristics	N	%
Gender		
Female	56	52.8
Male	50	47.2
Language		
French	103	97.2
English	3	2.8
Education		
Less than high school diploma	5	4.7
High school diploma	30	28.3
College or university diploma	65	61.3
History		
Chronic pain	16	15.1
Smoking	11	10.4
Sleep apnea	11	10.4
CPAP at home and during hospitalization	8	7.5
Anxiety	8	7.5
Units		
Medical	55	51.9
Surgical	51	48.1
Hospitalization room		
Private room	22	20.8
Semi-private room	70	66.0
4-bed room	14	13.2
Factors		
Nursing care during the night	55	51.9
Bedtime sleeping pill	54	50.9
Analgesic at bedtime or during the night	47	44.3
Postoperative period	38	35.8
Intravenous infusion	28	26.4
Urinary catheter	15	14.2
Telemetry	14	13.2

Table 3. Scores obtained on the Richards-Campbell Sleep Questionnaire (n=106*)

Items	Mean score (mm)	SD	Minimum-Maximum
1- Sleep latency	59.0	25.3	0.5-98.5
2- Sleep depth	37.9	29.8	0.0-96.0
3- Awakenings	51.5	27.5	1.5-99.0
4- Returning to sleep	47.8	26.9	0.0-99.0
5- Sleep quality	44.1	29.9	0.5-99.0
Total score	48.0	23.6	1.0-96.2

* 5 missing data for item 4 (n=101).

Table 4. Comparison of patients versus nurses Richards-Campbell Sleep Questionnaire scores (n=73*)

Items	Patients' average score $\bar{x}$, SD	Nurses' average score $\bar{x}$, SD	Difference (95% CI)	P
1-Sleep latency	61.5 (24.7)	78.8 (22.9)	-17.3 (27.1)	<.001
2-Sleep depth	42.0 (31.1)	79.6 (25.5)	-37.5 (34.1)	<.001
3- Awakenings	56.1 (27.6)	79.8 (23.9)	-23.8 (26.8)	<.001
4- Returning to sleep	49.6 (27.4)	78.5 (25.7)	-28.9 (33.3)	<.001
5- Sleep quality	49.7 (30.1)	80.6 (25.1)	-30.9 (32.0)	<.001
Total Score	51.8 (24.1)	79.6 (22.7)	-27.7 (25.6)	<.001

*5 missing data for item 4 (n=68), four patients and one nurse.

Table 5. Top ten factors influencing patients' sleep quality (n=106)

Factors	$\bar{x}$, SD
1.Pain	5.6 ± 3.0
2.Bed and pillow comfort	4.1 ± 2.3
3.Having one or more people sharing the room.	3.7 ± 2.8
4.Noise in the unit	3.4 ± 2.3
5.Staff voices	3.4 ± 2.3
6.Having to use the toilet	3.4 ± 2.2
7.Room noise	3.3 ± 2.7
8.Room noise due to person sharing it	3.2 ± 3.0
9.Having to sleep in an uncomfortable position	2.9 ± 2.6
10.Anxiety and worry about hospitalization	2.8 ± 2.7

Discussion

This study demonstrates impaired sleep quality in patients hospitalized on an acute care unit. Indeed, several studies report lower sleep quality in acute care or intensive care patients (Ünsal & Demir, 2012; Bani Younis et al., 2019; D'souza, Alvares & Baliga, 2019; Delaney et al., 2023). The mean overall RCSQ score of 48.0 obtained by the 106 patients is consistent with values reported in other studies, confirming that patients experience significant sleep difficulties during hospitalization (Aitken et al., 2017; Litton et al., 2017; Menear et al., 2017; Hansen et al., 2018; Bani Younis et al., 2019; Czempik et al., 2020; Delaney et al., 2023). In the literature, this average score indicates an acceptable sleep quality, but often lower than that observed at home. Indeed, the results of the study demonstrates a significantly higher sleep quality at home (7.6) than in hospital (4.1), corroborating existing data (Freedman, Kotzer & Schwab, 1999; Wesselius et al., 2018).

Studies show that hospitalized patients can sleep for long periods, but spend less time in deep sleep, resulting in light, fragmented sleep and increased daytime sleepiness (Bihari et al., 2012; Elías, 2021; Kornienko, 2021). This daytime sleepiness, often linked to poor quality sleep, was also reported by patients in this study, with an average sleep questionnaire score of 6.9. Moreover, the RCSQ results from our study indicate a sleep depth of 37.9, the lowest RCSQ score, confirming that many patients perceive their sleep as light. Also, patients who received overnight nursing care had lower mean scores on the RCSQ, suggesting that these interventions may have contributed to their sleep fragmentation.

The significant difference between patients' and nurses' perceptions of patients' sleep quality is a crucial element to consider. Indeed, in our study, nurses overrated patients' sleep quality according to the RCSQ, 51.8 for patients compared with 79.6 for nurses. This trend is corroborated by studies revealing that healthcare professionals do not always adequately assess patients' sleep problems (Nicolás et al., 2008; Kamdar et al., 2012; Van Den Ende et al., 2022; Delaney et al., 2023). This significant difference in perceptions could result from nurses' lack of awareness of the specific challenges of inpatient sleep, a lack of sleep assessment tools and a limited understanding of the factors influencing sleep quality. Although nurses recognize the importance of sleep to patient recovery, they are faced with a lack of adequate assessment tools and a lack of institutional support, making their task difficult (Gellerstedt et al., 2019). Indeed, no sleep assessment tool or policy was available on the units, other than having to indicate in a sleep and rest section of the chart: seemed to sleep, said to have slept at intervals, napped, evening and bedtime care, visits to patients every hour and as needed. This context has important implications for nursing. If nurses assess sleep quality as adequate, while patients perceive the opposite, this can lead to a lack of appropriate interventions to improve sleep, thus hindering patient recovery. It is essential to return to a humanistic approach to nursing and to understand patients' needs through an empathic perspective (Henderson, 1991), particularly in a context of care that is overly focused on efficiency and diagnosis (Reyes-Téllez et al., 2024).

The results of this study demonstrate the impact of physiological, environmental and psychological factors on patients' sleep quality. Among physiological factors, pain was the number one factor and the need to use the toilet was the sixth key factor that disrupted sleep. In two studies, more than half of surgical patients suffered from pain that disrupted their sleep (Yilmaz, Sayin & Gurler, 2012; Zhang et al., 2013), hence the importance of better pain management and meeting physiological needs to promote sleep.

Bed and pillow comfort was the second key factor influencing patients' sleep quality. The management of environmental factors, such as environmental comfort and noise management, is essential. Bed and pillow comfort are crucial to promoting sleep quality (Aparício & Panin, 2020). As perceptions of these factors vary from patient to patient, it is important that nurses receive adequate training to better respond to the specific needs of each patient. In addition,

noise from staff and room sharers was identified as particularly disturbing for patients, these findings are consistent with previous studies (Li et al., 2011; Bihari et al., 2012; Kornienko, 2021).

Having to sleep in an uncomfortable position was the 9th key factor, despite visits from a nurse every hour and at night if necessary, notably because some post-op patients or those with drains cannot lie down as usual. Anxiety and worries related to hospitalization were the tenth key factor affecting patients' sleep, supporting other studies showing that psychological factors affect sleep quality (Carrera-Hernandez et al., 2018; Aparício & Panin, 2020). Nearly half the patients in the study by Zhang et al. (2013) showed anxiety, underlining the importance of an empathetic approach and of considering psychological needs in the nursing process (Henderson, 1991).

Limitations: The sleep quality was assessed using a subjective, self-reported questionnaire, and the results may have been influenced by the Hawthorne effect. No objective data were collected (e.g. duration of sleep stages). The study was carried out in a single hospital. Disease severity, associated treatments, and length of hospital stay were not considered.

Conclusions and Recommendations: The results of the study corroborate other studies of inpatient sleep quality, showing that many patients suffer from sleep problems, and that perceptions of patients sleep quality differs between patients and nurses. These findings underline the need for targeted interventions to improve hospital sleep quality. Specific training, e.g. in the form of an online module, could raise staff awareness of the evidence and factors affecting sleep, such as noise and nonessential nocturnal interruptions. Furthermore, the development of standardized assessment tools integrated into the clinical record, based on sleep quality components, would enable a more valid assessment of patients' sleep quality. These initiatives would raise awareness and encourage the adoption of practices better adapted to patients' sleep and rest needs.

The study highlights potentially interconnected physiological, environmental, and psychological factors linked to the admission diagnosis, in line with the literature supporting a holistic approach to the hospitalized person. Management of modifiable factors (e.g. pain, bed and pillow discomfort, noise) should be a priority to promote patient recovery. These recommendations are in line with those of previous studies, namely the adoption of strategies to minimize sleep disruption (Farrehi, Nallamothu & Navvab, 2015; Ritmala-Castren et al., 2022).

Since sleep is essential to recovery, it's imperative that nurses adapt their approach to sleep problems. This includes better communication with patients to understand their experiences, check sleep-related medication at home, and discuss their sleep and rest habits to ensure continuity during hospitalization.

In addition, further research is essential to better understand the factors influencing sleep quality in various hospital settings. Larger studies, including an analysis of room types (private, semi-private, or multi-bed), could help better pinpoint environmental impacts on sleep (Schafthuizen et al., 2023). The use of standardized assessment instruments would also make it possible to document these challenges more accurately and develop more effective interventions.

For effective recovery, it's imperative to meet patients' basic needs, including sleep (Henderson, 1991). The results of this study reinforce the importance of a holistic approach to nursing care and the identification of factors influencing sleep. By integrating factor management into their practice, nurses can better support patients in meeting their needs, contributing to an optimal recovery and improved state of well-being. Taking basic needs into account should be a practical requirement for improving the quality of hospital care.

In the future, it would be relevant to explore diversified methodological approaches in the field of sleep quality.

Qualitative studies, involving interviews, would provide a better understanding of the subjective experience of sleep in a hospital setting. Rigorous assessment of the validity and fidelity of the sleep measurement tools used is also necessary to reinforce their metrological qualities. Finally, it would be relevant to conduct a before and after quasi-experimental study to evaluate the effect of an intervention (using a sleep measurement tool and online sleep training in a hospital settings) on nurses' assessment of sleep quality.

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