

SLEEP-WAKE CYCLE PATTERN, SLEEP QUALITY AND COMPLAINTS ABOUT SLEEP DISTURBANCES MADE BY INPATIENTS

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Running title: Sleep in hospitalized patients

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ABSTRACT

Objectives: Comparing the sleep-wake cycle, sleep quality, and sleep-related complaints of patients in a private general hospital to those patients in a public general hospital

Methods: Transversal study conducted with a sample comprising 50 patients in a public hospital and 42 patients in a private hospital. Protocols: Pittsburgh Sleep Quality Index, Questionnaire on Sleep Habits and medical records. The Student's t-Test was utilized for independent samples and for Person's correlation.

Results: The sleep quality averages for patients in the private hospital and in the public hospital were 5.3 ± 2.9 and 7.04 ± 4.2 , respectively, with a significant difference between them ($t = 2.2$; $p < 0.05$). Overall, 74% of patients in the public hospital and 69% of patients in the private hospital showed excessive daily sleepiness. Disturbed sleep during the night for medication was the most frequent complaint in relation to the hospital environment. Only a few complaints were made by patients, and the ones that were reported were seldom acted on by the health care professionals.

Conclusions: Environmental and individual factors should be considered in the etiology, predisposition and maintenance of sleep disturbances in patients treated in general hospitals.

Key words: Inpatients, Sleep, Sleep disorders, Hospitals, Behavioral Medicine, Health.

INTRODUCTION

The prevalence of sleep disorders has shown a marked increase lately, affecting between 30 and 50% of the general population (1). These disorders are the result of health and/or behavioral

problems, such as harmful sleep habits (2,3). However, those who suffer from sleep disorders do not give too much attention to the problem, and few patients seek professional help or mention the problem during a clinical examination (4,5).

In general hospital inpatients, the frequency of sleep disorders

is up to twice as high as that of the population at large (6,7), and there is a tendency to ignore sleep disturbances or complaints of sleep disturbances (8). Some of the most frequent disturbances are sleep fragmentation and reduced night sleep during the hospitalization period. The amount of the total sleep period can range from 1 to 15 hours (4), resulting in a variation in the distribution of non-REM (Rapid eye movements) and REM sleep stages (9,10).

The high frequency of sleep disorders in hospitalized patients and their indifference to this affliction can be attributed to two factors:

1) *individual*: presence of clinical pathologies, seriousness of the disease, pain, use of painkillers, sedation and duration of the hospital stay (11); emotional alterations or changes, among them anxiety, depression and stress (12,13).

2) *environmental*: hospital's physical structure or hospital environment (noise, unsuitable environmental temperature, excessive light) (14); hospital work routine (interruptions for medication during the night); lack of an adequate hospital structure to maintain the sleep-wake cycle pattern and provide good sleep quality to patients (14).

Most published studies focus mainly on environmental factors (noise and work routine) involved in predisposing, triggering and maintaining sleep disorders and disturbances in ICU patients. The influence of these factors, however, remains controversial (14).

The purpose of this study was to compare the sleep-wake cycle patterns and the sleep quality of patients in a public general hospital to those in a private general hospital; additionally, the sleep complaints at each facility were evaluated.

METHODS

Study and sample type

A transversal study was conducted in both a private and public hospital in the city of Natal, Brazil with a convenience sample (nonrandomized allocation). All patients agreed to participate in the study, and 100% completed it. A total of 42 patients (21 female and 21 male), mean age 53.05 ± 20.2 years, were interviewed at the private hospital, and 50 patients (28 male and 22 female), mean age 47.3 ± 16.9 years, were interviewed at the public institution.

Instruments

The instruments used were demographic-social characteristics (with the purpose of recording age, education level, and marital status), the Pittsburgh Sleep Quality Index, the Sleep Habits Questionnaire and medical records for accessing complaints on sleep disturbances.

Sleep quality was assessed by the Pittsburgh Sleep Quality Index (PSQI) (15). This questionnaire comprises seven items whose summed scores result in the sleep quality index. The maximum value is 20; values above 5 characterize poor sleep quality; values above 10 point to a clinical diagnosis of sleep disturbances or disorders. This instrument allows a retrospective assessment of sleep quality, as the items are related to the patient's sleep habits one month after hospital admission. The Portuguese validated

version was used to avoid possible measuring biases (16).

An adapted Sleep Habits Questionnaire was used to assess the patient's sleep-wake cycle pattern based on the number of sleep and waking hours recorded during the hospital stay. This questionnaire consists of five questions about the hospital sleep environment and nine questions about the patient's sleep during hospitalization (naps, sleepiness, insomnia and parasomnia). The original version of the questionnaire was developed with the purpose of evaluating sleep habits in school sites; it contained 32 questions about home conditions, health, sleep (sleep-wake pattern, occurrence of arousals during the night, naps and sleep disturbances and disorders shown by the patients and by family members), consumption of psychostimulant substances and other activities developed when they were at home (17).

Procedures

The instruments used were applied after the examiner read and explained each question and the proper answering procedure. If a question was not understood, the interviewer repeated it. If it was not understood, it was repeated once again. If no answer was forthcoming, the examiner proceeded to the next question.

The study was approved by Rio Grande do Norte Federal University Ethics Committee. After being informed on the purpose of the research, the patients were invited to participate in the study. Written, informed consent was obtained from all participants, whose privacy was respected and maintained throughout the experiment.

Statistical analysis

In order to characterize the sample, a data descriptive analysis (means, standard deviations and absolute and relative frequencies) was performed. The Student's t-test for independent samples was used to compare data on patients from the public and the private hospital, and Pearson's correlation was applied to assess the correlations between sleep variables and individual characteristics at a significance level of 5%. SPSS software was used in all tests.

RESULTS

In both hospitals, the patients who participated in the present study went to bed early and slept an average of 7 hours (Table 1). The private hospital inpatients slept longer and fell asleep earlier than those in the public hospital ($t = 8.42, p < 0.001$; $t = 9.48, p < 0.0001$, respectively). Although the patients' sleep quality was poor in both hospitals, the private hospital patients had a better sleep quality compared to that of public hospital patients ($t=2.2$; $p<0.05$) (Table 1).

Table 1: Parameters of sleep of inpatients at a public and a private hospital based on the Sleep Habits Questionnaire.

Sleep Characteristics	Public Hospital	Private Hospital
Sleep Onset	22:13 ± 106 min	22:06 ± 90 min*
Sleep duration	7h ± 115 min	7h43min ± 89min*
PSQI	7.04 ± 4.2	5.3 ± 2.9*

* Statistically significant differences between the hospitals (t -test=2.2; $p<0.005$)

In both hospitals, no correlation was found between patients' ages and PSQI scores ($r = -0.121$; $p > 0.05$).

We found that male patients at the private hospital went to sleep earlier than their male counterparts at the public hospital, while female patients at the public hospital went to sleep earlier compared to the females at the private institution. Both male and female patients at the public hospital slept fewer hours compared to their private hospital counterparts. All of these results were not statistically significant. (Table 2).

Table 2: Parameters of sleep of male and female inpatients at a public and at a private hospital based on the Sleep Habits Questionnaire.

Sleep Characteristics by sex	Public Hospital	Private Hospital
Sleep Onset/Men	22:15 ± 1:20	22:01±01:50
Sleep Onset/Women	21:49 ± 1:48	22:03±01:10
Sleep Duration / Men	06h56min± 115min	07h37min± 138min
Sleep Duration / Women	07h32min±117min	7h47min±78min
PSQI / Men	7.75±4.2	5.1±2.8*
PSQI / Women	6.14±4.2	5.5±3.0

* Statistically significant differences between the hospitals (t -test = 2.4; $p < 0.05$)

Regarding variables related to sleep-wake cycle patterns, no differences in sex distribution were observed in patients at either hospital.

Analysis of male and female patients' sleep quality at both hospitals showed that all patients had poor sleep quality (Table 2). Significant differences in sleep quality were found only between male patients at both the private and the public hospital ($t = 2.4$; $p < 0.05$), with private hospital patients enjoying a better sleep quality.

The mean hospital stays of patients at the private and public hospitals were 7 and 10 days, respectively. An indirect and significant correlation was observed between hospital stay and PSQI scores of public hospital patients, with worse scores recorded during the first days of hospitalization ($r = -0.325$; $p < 0.05$).

When data were separated by sex for the two hospitals, the male and female patients at the public hospital were hospitalized for 9.3 and 10.7 days, respectively, while the hospital stay of their male and female counterparts at the private hospital was 6.9 and 3.5 days. No statistically significant correlation was found between hospital stay duration and PSQI scores (private hospital: male $r = -.354$, $p > 0.05$; female $r = -.107$, $p > 0.05$).

With respect to hospital environment, there were numerous complaints concerning excessive noise. At the public hospital, 16% of the patients complained about excessive noise, while 28% reported little noise. At the private hospital, 14% complained about excessive noise in their room, while only 4% reported little noise. In the private hospital, an average of two patients occupied each room, while the public hospital average was six patients.

Around 48% of the public hospital patients and 64.3% of the private hospital patients had their night sleep interrupted for medication. Moreover, these patients displayed excessive daytime sleepiness (74% at the public hospital and 69% at the private hospital) with frequent daytime dozing (79.2 and 74% in the private and the public hospital, respectively).

Interrupted sleep was more frequent among women at the public hospital (women=59% and men=42.9%) and more frequent among men at the private hospital (men=76.2% and women=52.3%). Concurrently, these patients displayed excessive daytime sleepiness (men=75% and women=72.8% at the public hospital; men=81% and women=57% at the private institution), with daytime dozing (men=79% and women=63.3% at the public hospital and 71.4% of the private institution).

The results indicated that the patients who dozed frequently had lower PSQI scores ($r = -0.330$; $p < 0.05$). The frequency of sleep complaints from public and private hospital inpatients and assessment of these complaints in regards to sex distribution are presented in Tables 3 and 4, respectively.

Table 3: Frequency of sleep complaints of inpatients at a public and at a private hospital.

Hospital	Complaint	Register of the complaint	Professional intervention	Medical records
Public Hospital	40%	20%	10%	16%
Private Hospital	45%	26.2%	19%	7.3%

Table 4: Frequency of sleep complaints of male and female inpatients at a public and at a private hospital.

Hospital	Sex	Complaint	Register of the complaint	Professional intervention	Medical records
Public Hospital	Men	42.9%	25%	17.9%	17.9%
	Women	36.4%	13.6%	did not occur	13%
Private Hospital	Men	47.6%	33.3%	19.5%	9.5%
	Women	28.6%	19.5%	19.5%	4.8%

DISCUSSION

According to the present study, the inpatients at both hospitals had irregular sleep-wake patterns. This finding corroborates a previous study in which hospitalized patients displayed irregular sleep and wake cycle patterns and longer daytime sleep (18).

The present study showed that 48% of those patients hospitalized in the public hospital and 64.3% of in the private institution had their sleep interrupted during the night for medication. At the same time, patients at both hospitals experienced excessive daytime sleepiness, longer daytime sleep and night time sleep fragmentation due to the fact that patients were awakened during the night to take their medication. Excessive daytime sleepiness is directly related to the amount of night time sleep; that is, when there is total or partial sleep deprivation during the night time sleep period, there is a corresponding increase in daytime sleep (19).

The patients' sleep quality at both hospitals was poor (scores above 5). Hublin et al. (18) suggest that inpatients have poor sleep quality as a result of hospitalization. However, the private hospital patients had comparatively better sleep quality. This may be due to the following factors: 1. hospital stay duration – the public hospital patients were hospitalized for a longer period of time (10 days) than those at the private hospital (7 days); 2. hospital environment – in the public hospital, there was a larger number of patients in the same room (6 patients) than in the private hospital (2 patients);

3. interruption of night time sleep for medication. It should be pointed out that a longer hospital stay coupled with an unsuitable hospital environment tends to worsen sleep quality (11).

Concomitantly, we found that private hospital patients experienced more frequent daytime dozing (79.2%) compared to those at the public hospital (74%). We observed an inverse correlation between dozing frequency and PSQI scores: patients with more frequent daytime dozing had lower PSQI scores. Given that dozing is a way to replace fragmented sleep, it can result in a better sleep quality.

When we assessed the patient's sleep pattern characteristics by sex, no statistically significant differences for sleep onset or duration were found. A statistically significant difference was found only between male patients from the private and the public hospital with regard to the sleep quality variable, showing that the former had better sleep quality. This finding also confirms the previous suggestion that sleep quality might have been better because of hospital stay duration (the men at the private hospital were hospitalized for a shorter period of time than those at the public institution). Private hospital patients also dozed more frequently (81% versus 79% for public hospital patients). Although the female patients at the private institution were hospitalized for fewer days (3.5) and dozed more frequently when compared to their female counterparts at the public facility, no statistically significant differences were found concerning sleep quality.

More than two-thirds of the patients hospitalized at both hospitals reported that they did not seek medical help. This indicates an indifference to their sleep disorders. At the same time, medical intervention in the case of sleep complaints was performed in only 20% of the cases. Shocat et al. (8) indicated that recognition of sleep complaints by health professionals is low. According to their study, only one-third of patients with insomnia report their sleep disorders, and only 5% of doctors assess their patients' sleep patterns. These results corroborate the data mentioned in the present study, in which only 10 and 19% of professionals at the public and the private hospital, respectively, assess sleep disorder complaints.

As it was observed, the hospital context caused sleep pattern changes through environmental (number of patients per room and excessive noise, among others) and individual alterations (almost no attempt to register the complaint of disturbed or altered sleep). In order to overcome this, a Sleep Hygiene Program has been suggested for hospitals, along with a rigorous assessment of sleep complaints by the medical team. These measures would promote shorter hospital stays, a reduction in the indiscriminate use of hypnotic drugs and a consequent reduction in treatment costs.

A limitation to the present study was the general or habitual nature of the data, which were obtained from subjective protocols where patients may have over- or underestimated the assessment of their sleep pattern during their hospital stay. Sleep data were not evaluated based on objective records, such as those obtained by polysomnography. Furthermore, no continual daily assessment was carried out.

In conclusion, both individual and environmental factors must be considered in the etiology, predisposition and maintenance of sleep disturbances in general hospital inpatients.

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