SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

The purpose of this study was to describe objectively and subjectively the sleep of elders hospitalized on a general medical unit and to determine the link between sleep and nighttime noise and light levels.

Sleep in Hospitalized Elders: A Pilot Study

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Key Concepts/Context

Sleep complaints are common among elders at home and in the hospital. These complaints include insomnia, difficulty falling sleep, and difficulty maintaining sleep, yet adequate sleep is commonly considered a necessary prerequisite to healing and recovery from illness. Sleep studies in the hospital have been limited largely to studies in critical care units rather than on general medical-surgical units, and most studies have been limited to subjective measures of sleep. The sleep environment, especially levels of ambient noise and light, is important to good sleep habits, particularly for the elderly trying to heal in a hospital environment.

Methods

Research Methodology/Setting

A descriptive exploratory pilot study was conducted on a medical unit in each of two acute care hospitals in the south-central United States. The units were similar in size and nurse-to-staff ratios, and patients had similar diagnoses and length of stay.

Sample

A convenience sample of 48 participants

Metrics and Measurement

Demographic data were obtained via patient or family interview and hospital record review. An actigraph, the MicroMini Motionlogger (Ambulatory Monitoring, Ardsley, NY), was worn on the dominant wrist continuously for 24 hours to measure the sleep variables, beginning at 7 p.m. the day of admission. Although an actigraph is usually placed on the nondominant wrist, an adjustment was made for this study because vascular access was typically initiated in the nondominant upper extremity. The actigraph was moved to the other extremity if the limb was immobilized. The microprocessor of the actigraph stored the data, which were downloaded into a

DESIGN IMPLICATIONS

This study helps validate the compounding evidence of the impact of sound and light on patients' ability to sleep. Designers should pay particular attention to the impact of architectural elements and interior finishes on sound levels, as well as the impact of light, particularly at night. This study also provides some tools that could be used to study sound and light on inpatient units.

personal computer. A light sensor (Extech Datalogging Light Meter, Waltham, MA) and a noise dosimeter (Extech Personal Noise Dosimeter) were secured behind the head of the patient's bed. The instruments collected data overnight (11 p.m.-7 a.m.), which were downloaded onto a computer daily. These times were chosen on the basis of a preliminary study (unpublished data). On the evening of the second day, the Richards-Campbell Sleep Questionnaire (RCSQ)17 was administered to all participants.

Confounding Variables

None were identified.

Data Analysis

Sleep characteristics were calculated from the actigraph data, using Action-W, Version 2 software (Ambulatory Monitoring) and the Cole-Kripke scoring algorithm, which compares activity levels of the current minute with the levels of the preceding four minutes and the following two minutes.

The Chi-square statistic was performed to determine the association between light and sound levels of good sleepers versus poor sleepers. The Wilcoxon rank-sum test for independent groups was used to compare light and sound levels with sleep characteristics of participants in private and semiprivate rooms and to compare nighttime sleep by gender. Pearson correlation coefficients were used to compare sleep variables with demographic variables and sound and light levels.

Multiple regression was conducted to determine whether the level of nocturnal noise or nocturnal light was associated with the quantity and quality of sleep.

Findings

Differences between sleep and light and sound levels in private and semiprivate rooms, although not statistically significant, did show a trend toward better sleep in private rooms. Lights-on times in private and semiprivate rooms were equal during the night, but light levels in private rooms were brighter. Participants in private rooms were subjected to higher maximum sound levels and a trend toward higher mean light levels but had longer periods of uninterrupted sleep and slightly better sleep overall. Good sleepers, those who slept more than five hours per night, were more likely to be in a private than a semiprivate room.

Sleep of these hospitalized elders was often disturbed on the first night of hospitalization. The average longest sleep episode of an hour was less than the needed 90 min to complete a full cycle of sleep and was perhaps age-related.

Sleep fragmentation may have been linked to semiprivate accommodations and a "first night" effect of sleeping in a strange environment. No association was found among sleep, pain, and the number of comorbidities. A nonsignificant trend toward

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better sleep efficiency in women may be explained in part by women's shorter wake periods, implying a quicker return to sleep after awakening and a longer duration of individual sleep episodes.

Both private and semiprivate hospital rooms were noisy. Nighttime light levels were low with an average of three periods of elevated light levels (mean, 64 lux) lasting an average of 1.75 hours. With the exception of median sound levels (51 vs. 44 dB[A], no association between light and sound levels was found. Overall median sound was equal to the level of an urban residence in the daytime, with peak levels of 97.3 dB(A) equal to that of city traffic. This exceeds the recommendations by WHO13 of 35 dB(A) at night for patient rooms, with peak levels no higher than 40 dB(A).

Limitations

This study had several limitations. Recruitment was sometimes difficult because many potential subjects had spent several hours in the emergency department before admission to the unit and were quite fatigued, creating a possible selection bias.

The staff of the units were not blinded to the study, so the presence of the actigraph and data logging instruments may have affected light and noise levels as well as the frequency and duration of nursing care procedures during the night. The study was limited to determination of sleep on only the first night of hospitalization. Extended monitoring over a number of nights would compensate for the "first night effect" and reveal patterns of sleep over time.

This study was underpowered. To determine the association of total minutes of nighttime sleep with age, environmental noise and light levels, a sample size of 182 is needed.