SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

This study had two aims: the first was to describe the patterns of the environmental factors of light, sound, and temperature during day and night at the bedside and in the hallways of pediatric wards and to ascertain if these conform to recommended standards. The second objective was to compare pediatric patients' sleep quality in hospital and at home and identify potential sleep disruptors.

Environment in pediatric wards: Light, sound, and temperature

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Key Concepts/Context

Sleep is crucial to the well-being of humans, especially so for the recovery of those undergoing treatment or recuperating in hospitals. The authors cite studies that allude to the relevance quality of sleep has on health, neurodevelopment, generally, and to immune functioning and healing in patients. They indicate that patients in hospitals experience sleep disturbance, especially at night; and that sleep disruptors often result from the hospital environment. In this study the authors describe environmental factors – light, sound, and temperature levels – in five pediatric wards of a tertiary care hospital, compare patients' sleep quality (hospital and home), and identify sleep disruptors. The study found that light intensity levels were being maintained in accordance with standard recommendations. However, sound and temperature levels were much higher than recommended, and sleep quality for almost half of the patients was worse in the hospital than at home.

Methods

This was a multi-method study – exploratory, descriptive, multiple-case in design targeted to describe sound, light, and temperature levels, with surveys administered to the caregivers to understand the sleep characteristics of the pediatric patients. The study was conducted in five pediatric wards – four medical and one surgical – of a tertiary care hospital. The medical wards were comprised of nine rooms for general pediatrics, hematology, and neurology, 10 rooms for infectious diseases and gastroenterology, four rooms for nephrology, and six rooms for respiratory diseases. The surgical ward had seven rooms. Most of these rooms had shared occupancy, some had private bathrooms, and all had at least one window. Data collection took place over three time periods in a day. These time periods were categorized according to the levels of disturbance in the wards – daytime (7 a.m.- 8 p.m.) had more people in the ward; evening (8 p.m. - 11 p.m.) was less busy than daytime and was dinner and therapeutics time; and nighttime (11 p.m. - 7 a.m.) was the main time for resting. A luxmeter was used to measure light, an

integrating sound level meter to measure sound, and a data logger device to measure temperature. The equipment were placed on a patient's bedside in one room per unit (randomly selected shared room without a bathroom) and in the ceiling of the hallway. Data was collected for three days. A questionnaire on patients' sleep characteristics was also distributed to the caregivers in the rooms where the equipment was placed. The hospital policy allowed one caregiver to stay with the patient during the night. Of the 50 questionnaires provided to the caregivers, 34 were completed. Data from the equipment were analyzed using IBM Statistical Package for Social Science (SPSS) Statistics for Windows version 21®. Descriptive statistics were used to describe the characteristics of light, sound, and temperature and to analyze the survey responses.

Findings

Light: For 86% of the evaluated time, the value of light was within the recommended range – below 5 lux at night and below 100 lux during the day. Light levels were higher than the recommended levels in the rooms than in the hallways. The rooms of wards A, D, and E recorded higher lux values between 10 a.m. and 4 p.m. than during night.

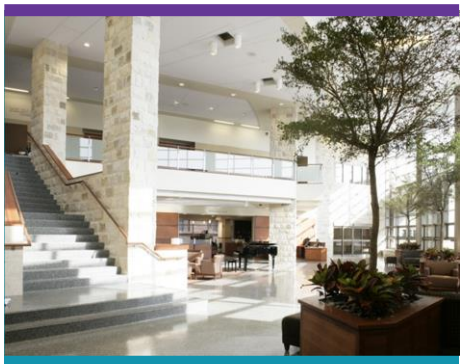
Sound: During the entire study period, sound levels were higher than the World Health Organization's (WHO) recommended ≥35dB for hospitals. In comparison to nighttime, sound levels were higher during daytime. The mean sound level values for rooms ranged from 54.8 to 62.3dB (daytime) from 57.9 to 63 dB (evening); between 43.4 and 54.9 dB (night). For the hallways, the mean sound level value ranged between 59.6 and 65.2db (daytime), from 57.9 to 62 dB (evening) and between 44.1 and 53.5 dB (night). The lowest mean sound value was 43.4dB in the room of ward B at night and the highest mean value was 65.2dB in the hallway of ward C in the daytime.

Temperature: All wards recorded temperatures higher than the recommended 24°C, which is the highest value in Portugal, for 78% of the study time. The mean values ranged from 23.9°C (evening) and 25.9°C (night) in the rooms and 22.7°C (day and night) and 26.1°C (night) in the hallways.

Sleep characteristics: Caregivers (77% mothers, 23% fathers) made the following comparisons of their children's sleep characteristics at home versus in hospital:–

Caregivers were almost equally divided over quality of sleep at home versus the hospital – 41% indicated it was worse in the hospital, 47% indicated it was the same in both places, and 12% indicated it was better in the hospital.

Caregivers believed that the patients slept longer at home than in the hospital. They reported:



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- 59% of patients were able to sleep 8-10 hours at home compared to 29% in hospital.
- 44% of patients were able to sleep 6-8 hours at home compared to 9% in hospital.
- 6% of patients were able to sleep <6 hours at home compared to 21% in hospital.
- 26% of patients were able to sleep >10 hours at home compared to 6% in hospital.

Caregivers (47%) reported patients were more restless in the hospital than at home. Patients fell asleep at the same time at home and in the hospital, according to 53% of caregivers, while 35% of the parents said their children fell asleep at a later time. 53% of the caregivers noted that the patients woke up more times at the hospital than at home because of noise (38%), provision of care (26%), light (18%) and pain/discomfort (6%).

Limitations

Authors identified their study to have several limitations: a. The study setting included different wards and varying levels of care; b. Data collection was done using different scales; c. Sources of light, sound, and causes for temperature variations were not identified; d. The small sample of caregivers made it difficult to relate responses to the objective measurements of the environmental factors.

Some other limitations of the study include: a. The descriptions of the rooms were broad. The study does not indicate which of the rooms had more than one window or if these windows had access to natural light or if beds were placed near windows or doors. The authors do indicate that light intensity could have been affected by the orientation of the building, but do not elaborate on this; b. The authors do not indicate which bed was selected to place the equipment or why.

Design Implications

Given the descriptive nature of the study, there are no implications for design from the findings of this study. However, the authors indicate the inclusion of the following design elements for a good light environment: exterior shutters (which can be closed during nap time); bedside lamps (which can be turned on instead of ceiling lights during care time).