



KEY POINT SUMMARY

OBJECTIVES

This study assessed patients' and staff's perceptions of noise levels and sources in the hospital environment and identified interventions to reduce the noise level.

Environmental Noise Sources and Interventions to Minimize Them: A Tale of Two Hospitals

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Key Concepts/Context

Delivering patient care in a hospital is noisy. Yet research shows that noise interferes with the healing process and can disrupt the patient's experience. Higher noise levels are linked to stress reaction; sleep disturbance; and increased heart rate, blood pressure, and muscle tension, creating an overarching issue that touches multiple disciplines and departments in the hospital. This study examines the assessments of noise on patient care units (PCUs) before and after implementation of noise control interventions. It sought to: (1) identify the time of day and noises that were most bothersome in the hospital environment as reported by patients, nursing staff, and nursing leadership; (2) describe noise control interventions implemented; (3) describe the level of noise on PCUs as identified by patients and nursing staff; (4) compare decibel readings before and after noise reduction interventions were implemented on selected PCUs; (5) identify noise control interventions that could be easily replicated across diverse PCU environments; and (6) explore differences and similarities in noise readings between two noise measurement devices.

Methods

To expand the methodology of an earlier quality improvement project implemented at the study setting (one PCU) researchers used a mixed-method research design (quantitative and qualitative). They used a pre- and poststudy design. They started by measuring noise level readings along with staff and patient perceptions to collect baseline data. Then, after noise interventions were implemented, researchers collected the same data 1 and 6 months later.



The investigators developed the survey and assessment instruments based on existing noise literature and previous experience. Face and content validity were established. Both patient and staff survey instruments used a 5-point Likert response scale of very quiet to very loud for rating noise levels. The survey also asked respondents to identify the noisiest time of the day.

Respondents identified bothersome noises from a pick-list, with the opportunity for multiple choices. They also could list noises not on the pick-list.

Using dosimeters and sound-level meters, the researchers collected pre- and postintervention noise levels measured in decibels (dB) on 31 PCUs (12 randomly selected and 19 voluntary units). In addition, they used a general field work type II sound-level meter on 4 PCUs to log additional noise measurement parameters for postintervention comparisons.

The authors then shared the unit-specific data with staff, who used the data to identify and implement noise reduction interventions. Six months later, the investigators obtained postintervention data.

Analyses were completed using statistical software. P values $<.05$ were considered statistically significant. Content analysis of patient and staff comments was completed using ATLAS software.

Findings

Respondents reported that morning is the most bothersome time of day. Both patients and staff perceived voices as the most bothersome. The interventions significantly reduced noise, except on the night shift.

Four themes emerged from the qualitative data: (1) equipment: infrastructure (e.g., pagers, carts), (2) equipment: patient-related (e.g., monitors, pumps), (3) environment (e.g., activities at nurses' station, doors), and (4) human factors (e.g., voices, footwear, visitors).

After implementing noise reduction interventions, actual noise level readings were higher. But both patients and staff reported that the perception of bothersome noise decreased.

Limitations

The authors did not note any limitations, however, sample size limits generalizability, as does the case study approach.



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Design Implications

The interventions significantly reduced noise as perceived by patients and staff. A structured process to identify noise sources and standardization of noise measurement methods can improve the patient hospital experience.

The study identified noise control interventions that could be replicated across PCUs, including padding chart holders, padding pneumatic tube drop-stations on the PCUs, and installing quieter paper towel dispensers. Comparison of noise measurement uncovered that all dB(A) measurements are not the same and may result in large differences in numerical dB(A) values. The authors conclude that standardization of noise measurements would allow comparison across studies.