



KEY POINT SUMMARY

OBJECTIVES

The objective of this study was to find out if single-patient rooms in ICUs and reducing noise sources were more effective in reducing noise in a pediatric environment.

DESIGN IMPLICATIONS

Single-bedded rooms help in reducing mean sound/noise levels in a PICU.

The effectiveness of environmental strategies on noise reduction in a pediatric intensive care unit: Creation of single-patient bedrooms and reducing noise sources

Kol, E., Aydin, P., & Dursun, O. 2015 | *Journal for Specialists in Pediatric Nursing*. Volume 20, Pages 210-217

Key Concepts/Context

Noise has been documented to be an adverse issue for patients and workers in a healthcare setting. The authors refer to literature that indicates that in intensive care units (ICUs), an increasing number of medical devices, equipment, and healthcare providers add to the crowding and ensuing noise levels in the ICUs. Further, the authors note that literature shows that noise levels in ICUs are higher than the levels recommended by the World Health Organization, International Noise Council, and the U.S. Environmental Protection Agency. Noise levels in pediatric ICUs (PICUs) are not any different. In this study, noise levels and sources in two PICU environments were measured and observed – one was an older unit with a multi-bedded unit and the other was a newly remodeled unit with single-bedded rooms. Both units were part of the same hospital in Turkey. The study found that noise emanated largely from nurses' stations and the alarms of different medical devices and equipment. The study also concluded that that noise levels were significantly lower in the single-bed unit as compared to the multi-bed unit.

Methods

This study examined noise levels in a pediatric ICU before and after the unit's move from a multi-bed to a single-bed unit. The multi-bed ICU was located at the entrance to the pediatric clinic on the hospital's third floor. This unit had four beds with curtains separating them during interventions or emergencies. The nurses' station and medication preparation area were about two to three meters from the patient bed; the ICU opened directly into a hallway, on the other side of which were other patient rooms. In the first phase of the study, noise measurements were made in the existing multi-bed unit (before moving to the remodeled unit). In the four months



following this, the ICU was moved to a new space – a unit that had eight single-patient rooms separated by glass walls with sliding doors opening into the hallway. The patient rooms were located on one side of the hallway, while the nurses' station and medication preparation area was on the other side. There were fewer medical devices in the new unit, and medical devices from the old unit having a high-volume alarms were replaced in the new unit. In the second phase of the study, noise levels were measured in one of the patient rooms. Noise-level measurements made in both units took place 24/7 for a month. Further, observations were noted about the noise sources in both units. Data were analyzed statistically using independent and paired t-tests.

Findings

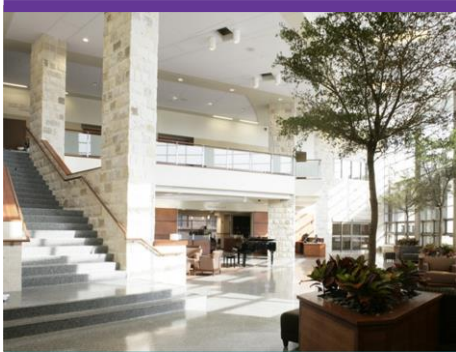
The study found that:

The main noise sources in the multi-bed unit were associated with staff members and alarms from the various medical devices. Following are the observed noise sources and their noise levels:

- Voices from the nurses' station: 84 dB-A
- Perfusor alarm: 81 dB-A
- Nebulizer alarm: 80 dB-A
- Monitor alarm: 78.6 dB-A
- Staff conversation at bedside: 72.2 dB-A
- Other alarms (ventilator, pulse oximeter, infusion) and telephone: 71.6 - 68 dB-A
- Central air-conditioning: 50 dB-A

Noise levels decreased from a daytime 72.1 dB-A to 56 dB-A when the PICU moved from the multi-bed unit to the single-bed unit. The noise measurements were as follows (all differences were significant: $P < 0.05$):

- Mean noise levels:
 - In the multi-bed unit: Daytime: 72.1 dB-A; Evenings: 64 dB-A; Night: 60 dB-A
 - In the single-bed unit: Daytime: 56 dB-A; Evenings: 54 dB-A; Night: 53 dB-A
- Peak noise levels:
 - In the multi-bed unit: Daytime: 91 dB-A; Evenings: 88.3 dB-A; Night: 84.3 dB-A
 - In the single-bed unit: Daytime: 74.1 dB-A; Evenings: 70.9 dB-A; Night: 68.4 dB-A
- Minimum noise levels
 - In the multi-bed unit: Daytime: 54.2 dB-A; Evenings: 48.7 dB-A; Night: 47 dB-A



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- In the single-bed unit: Daytime: 49.1 dB-A; Evenings: 47.9 dB-A; Night: 45.6 dB-A

Limitations

The authors identify the following to be a limitation of their study: noise levels for the ICU as a whole in the new unit were not measured.

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