SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

To evaluate the soundscape of an ICU while paying particular attention to noise sources using advanced audio recording and analysis techniques.

DESIGN IMPLICATIONS

Separate, easily accessible spaces near or inside patient rooms intended for necessary staff conversation could be implemented to reduce staff-generated noise via conversation. Research cited within this article noted that 85% to 99.5% of alarm sounds generated within ICUs were not clinically relevant; equipment that produces fewer unnecessary alarm sounds should be considered.

Analysis of the soundscape in an intensive care unit based on the annotation of an audio recording

Park, M., Kohlrausch, A., de Bruijn, W., de Jager, P., & Simons, K. 2014 | *The Journal of the Acoustical Society of America* Volume 135, Issue 4, Pages 1875-1886

Key Concepts/Context

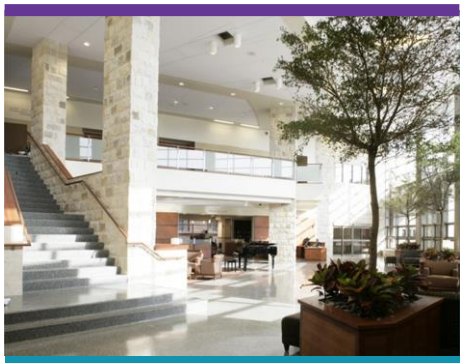
Patients receiving treatment in intensive care units (ICUs) are often subjected to elevated noise levels that can complicate recovery by disturbing sleep patterns and causing stress, anxiety, and changes in cardiovascular response. Although previous research has thoroughly analyzed the various sources of noise in ICUs, the authors of this study believe that inadequate recording and sound analysis techniques, as well as the presence of human observers collecting data, have restricted the depth of previous findings.

Methods

Recording equipment was affixed to the ceiling above an ICU patient's bed in a 14-bed care center. The room housed life support equipment behind the bed and was not in an isolated location within the ICU. Audio was continuously recorded for three days, during which time two patients occupied the room at different times for respiratory treatment. A 24-hour segment of the recording was analyzed and six categories of sound were found: patient verbalizations, staff verbalizations, staff actions, alarms, medical devices, and unidentifiable sounds. The acoustic energy of each sound source was analyzed to pinpoint instances of peak volumes.

Findings

Most of the acoustic energy recorded by the authors came from patient-involved speech, likely due to the microphone's location. Staff-generated noise, which arose through conversation and various care-related actions, was the second most common source of high acoustic energy. While noises produced by the mechanical ventilator and other alarms were easily detectable, their infrequency and relatively low acoustic power made them a weaker noise source compared to staff conversation. The authors suggest that noise levels in ICU environments could be



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greatly decreased if staff were able to relocate from patient rooms during conversation.

Limitations

The authors note the following limitations: microphone placement within the ICU room had a noticeable effect on which noises were more easily detectible, which may have affected this study's results; only a 24-hour period of audio was analyzed; and the presence of recording equipment within the room may have altered the behavior of staff and patients.

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AIA Academy of Architecture for Health of the American Institute of Architects

ASHE American Society for Healthcare Engineering, A personal membership group of the American Hospital Association

AAHF Academy of Architecture for Health Foundation

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