



KEY POINT SUMMARY

OBJECTIVES

The study's two objectives were to (1) describe (using both descriptive statistics and quantitative content analysis) the noise environment in an ICU patient room over 1 day; the patient's physical status during the same day; and early signs of ICU delirium; and (2) describe (using qualitative content analysis) patients' recall of the noise environment in the ICU patient room.

The Sound Environment in an ICU Patient Room – A Content Analysis of Sound Levels and Patient Experiences

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Key Concepts/Context

This study was a prestudy for the planning and design of a larger one, where the aim is to investigate the relationship between sound (objective and subjective) and adult intensive care unit (ICU) delirium and/or other factors. It used sound measurement, behavioral observation, and interview methods. The results provide a good list of sound/noise impact on patients and subsequent ICU design considerations.

This study took place in Sweden.

Methods

Ninety patients were recruited using convenience sampling. (The study excluded people with head injury, known hearing impairment, or dementia.) Of the 19 recruited, 6 died or otherwise withdrew from the study, resulting in a final study group of 13 patients. Researchers collected general patient health status data, ICU delirium observations, and sound level data for each patient over a 24-hour period. Finally, researchers also conducted interviews following ICU discharge.

Data were subject to both qualitative and quantitative content analysis. The study also presented descriptive analyses of demographic variables, such as age and length of stay. Because of the small sample, data were presented descriptively using nonparametric statistics (medians), except for the sound levels, which researchers analyzed using parametric statistics (means). Level of significance was set to 0.05. To analyze possible relationships between sound levels (LAF-max and LAeq) and number of early signs of ICU delirium, the study used the Spearman correlation test. Researchers used the Statistical Package for the Social Sciences for Windows 18.00 for all analyses. And analyzed interviews using qualitative conventional manifest



content analysis and followed the process of organizing and integrating texts into emerging codes, subcategories, and categories.

Findings

The sound levels in the patient room were high, and the LAF max levels exceeded 55 dB 70-90% of the time. Most patients remembered some sounds from their stay in the ICU, and while many were aware of the sounds, they were not disturbing by them. In this small sample, the researchers found no statistical connection between early signs of ICU delirium and high sound levels (LAeq $p=0.63$, $r=-0.15$ and LAmx $p=0.99$, $r=-0.004$). However, it is not only high sound levels that are a problem for patients and advanced medical treatments and technical equipment are experienced as disturbing and can create feelings of helplessness, lessening the likelihood of finding the peace and calm that are necessary for recovery and well-being.

In addition, interview results revealed the variety and complexity of the various sounds in an ICU patient room. For example the same sound could be experienced as disturbing on one occasion and safe and comforting on another, such as, staff chatting. Finally, the results indicate that all sounds were experienced subjectively, and that patients had both positive and negative experiences of the sound environment.

Limitations

The authors note that the early signs of ICU delirium protocol, which is under development, has some limitations in that it has not yet been analyzed for validity and reliability. They also note that some of the signs, for example, “no eye contact,” can be connected to the sedative treatment as well as to ICU delirium. Another weakness of the protocol is that it is meant to be administered by nurses, who may not always have the time to identify the signs and/or complete the protocol.

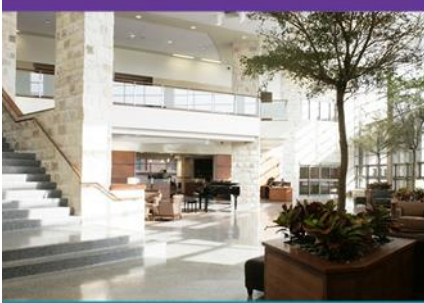
Reviewer note: This is a pilot study and was done to test various research methods. Findings should be considered similar to a case study.

Design Implications

This study illustrates the need to improve the physical environment in the ICU patient room.

It also indicates that intervention strategies are needed, including:

- Acoustical improvements
- Lessening of noise
- Reduction of the volumes of technical alarms



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However, more research is needed to describe and understand the existing conditions of the ICU patient room and find connections between noise and health.