SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

To test interventions that might create positive emotional-cognitive responses to the soundscape of a cardiothoracic (CT) ward through the use of laboratory listening evaluations.

Exploring positive hospital ward soundscape interventions

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Key Concepts/Context

Research has repeatedly shown strong relationships between human health and the characteristics of physical environments, such as a given environment's soundscape. A soundscape encompasses all the sounds generated within an environment, rather than a single sound source like an air vent. While there have been negative health effects associated with the excessive sound often produced in hospital soundscapes, there potentially could be beneficial outcomes in maintaining and thoroughly understanding the soundscapes of certain hospital areas. Examining subjective responses to existing hospital soundscapes may present more feasible methods for improving hospital soundscapes in general.

Methods

- 24 participants (11 female, 13 male) with a mean age of 32 were involved in the interventions. The participants were sourced from both outside and within the university community with which the authors were affiliated.
- Participants listened to 12 unique 20-second CT soundscapes sequentially through a 16-speaker system (KEF iQ70 and HTS3001SE speakers), with 10-second interludes between each clip.
- Four conditions were designed for the interventions: a control intervention featuring the CT soundscapes by themselves, a natural sound (NS) intervention featuring birdsongs and running water playing behind the CT soundscape, a steady-state sound (SSS) intervention which placed a white-noise effect produced by a sterilizer machine sound behind the CT soundscape, and a sound-source information (SSI) intervention in which participants were given written information describing aspects of CT sounds as they listened. Participants experienced each of the conditions on separate occasions, with a minimum of two days between evaluations. Participants were split into four groups with randomized condition sequence orders and with different soundscape clips playing at the beginning of the intervention.

- All clips were played back using a PC computer operating Nuendo 4 sound editing software at 95% playback volume. A-weighted decibels (dB(A)) during playback ranged from 62.34 to 72.31, depending on the clip.
- Participant responses to the interventions were recorded on paper questionnaires using four 7-point semantic differential scales. The two perceptual dimensions addressed in the responses were "Relaxation" and "Interest and Understanding." "Relaxation" was measured with bipolar semantic scales (relaxed-stressed and comfortable-uncomfortable) while "Interest and Understanding" used scales of curious-uninterested and intrigued-bored. Additional demographic and open-ended questions were included to provide descriptive data.

Findings

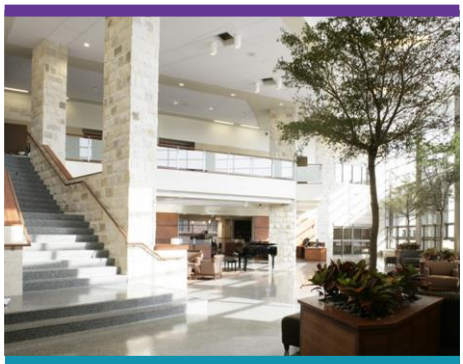
A significant difference was found between the control intervention and all other interventions. Relaxation responses were significantly affected by interventions featuring NS, with a 10.1% positive change in responses. SSI produced a 4.7% positive change, while SSS had a 3.3% change. Subjective comments showed negative feedback towards sounds of patient and staff conversation, especially when the conversations were private. Monitor alarm sounds were called "annoying." Overall, the interventions successfully altered emotional-cognitive responses with significant effects on the dimension of "Relaxation," with natural sounds and written sound source information having the most notable effect.

Design Implications

Sound levels within different areas of a hospital should be monitored so that they do not exceed standards put forth by entities such as the World Health Organization. Elements of nature are very often cited as positive influences on patients in hospitals; patient access to windows, perhaps with the ability to open and close, could provide natural lighting, pleasant views, and natural sounds. For patients located in areas with an excessive amount of sound, designers might consider drafting leaflets describing the sources of each sound, since this intervention had a positive influence on relaxation in this study. Rooms could be acoustically designed to either absorb or disperse sounds and reduce overall sound levels perceived by patients.

Limitations

The authors noted several limitations to this study. The participants selected were not representative of CT ward patient demographics, which usually include elderly patients. Being in a hospital can be a stressful experience that affects a patient's subjective experiences with sound; this dimension was not reflected in the study design. Using semantic scales to judge emotional-cognitive responses is a limited



measure that might be too narrow to capture other important details of patient reactions to soundscapes. No visual cues were used during the interventions; visual cues could affect perceptions of sound.

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