

Music Therapy Intervention in an Open-Bay Neonatal Intensive Care Unit Room is Associated with Less Noise and Higher Signals: A Case-Control Study

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Aims

Sustained and intense noise exposure in the Neonatal Intensive Care Unit (NICU) may be a critical negative influencer on neurodevelopmental outcomes in preterm infants¹; often associated with stress responses, alteration in physiological stability, sleep deprivation, autonomic changes, alteration in endocrine and metabolic response, and hearing deficits.^{2,3} Varied strategies including architectural design, special noise-alert or sound-reduction devices, and staff education were reported with inconclusive outcomes.⁴ Nevertheless, the potential influence of music therapy (MT) interventions on noise reduction are missing. This study aimed to evaluate the effect of MT on noise levels in the NICU and to compare the specific effects of individual MT (IMT) and environmental MT (EMT).

Methods

This case-control study was conducted in a level III NICU. Noise levels were recorded simultaneously from two open bay rooms, one with MT and the other without. Each room included a maximum of 10 infants. MT sessions were carried out for approximately 45 minutes with either IMT or EMT, implemented according to the first sounds: Rhythm Breath and Lullaby (RBL) model.⁵ Noise production data were recorded for 4 hours, on 26 occasions of EMT and IMT, and analyzed using R software, version 4.0.2. The analysis compared the ambient noise level in the open bay rooms, and the signal-to-noise ratio (SNR); A measure that compares the level of signals to background noise. When higher than 0dB, the SNR can indicate if there was more signal than noise.

Results

Overall average equivalent continuous noise level (Leq) were lower in the room with MT as compared to the room without MT (53.1 (3.6) vs. 61.4 (4.7) dBA, $p=0.02$, $d=2.1$ (CI, 0.82, 3.42)). IMT was associated with lower Overall Leq levels as compared to EMT (51.2 vs. 56.5 dBA, $p=0.04$, $d=1.6$ (CI, 0.53, 1.97)). The lowest sound levels with MT, occurred approximately 60 minutes after the MT started (46 ± 3.9 dBA), with a

gradual increase during the remaining recording time, but still significantly lower compared to the room without MT. Signal to noise ratio (SNR) was higher (18.1 vs. 10.3 dBA, $p=0.01$, $d=2.8$ (CI, 1.3, 3.86)) in the room with MT as compared to the room without MT.

Relevance to NIDCAP

Current strategies most often used to reduce perceptual sound levels are insulation and isolation. These approaches fall short in that they only address reduction of stressors, but do not contribute towards creating a developmentally appropriated auditory stimulation. Accordingly, the current study relates to core components of the NIDCAP model, namely, modulation of stress in the NICU, infants' sensorial experiences and addressing regulation needs of the NICU's physical environment.⁶

Conclusions

Integrating MT modalities such as IMT and EMT in an open bay NICU room may help in reduction of noise levels. Both MT modalities resulted in higher SNR compared to the control group, which may indicate that they are meaningful for the neurodevelopment of these preterm infants.

References

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