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Cross-sectional Analysis of Sound Levels in the Neonatal Intensive Care Unit (NICU) at Thomas Jefferson University Hospital

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ABSTRACT:

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Introduction. Infants in the NICU are considered at greater risk of developmental delay. It is now known that excessively loud noise can have a negative impact on parameters such as blood pressure, breathing, heart beat and oxygen saturation. Previous research has concluded that the optimal decibel (dB) level for proper growth of neonate hair cells rests around 45dB. Consequently, the American Academy of Pediatrics recommends that noise levels in the NICU be maintained to a maximum of 45dBA. However, little research has focused on designing new noise-altering products and their impact on neonatal outcomes.

Methods. This was a cross sectional study. The NICU at Thomas Jefferson University Hospital was observed for room arrangements and general workflow. Additionally, decibel levels around empty neonatal incubators were measured. A decibel analyzer (REED Instruments SD-4023, Wilmington, NC) was used to record sound levels, both inside and outside of isolettes during various routine activities, including patient rounds, provider-parent conversations and vital monitoring alarms.

Results. 30 discrete data points were surveyed, in addition to a 24-hour continuous decibel recording. Across all discrete data points, decibel levels had a mean of 65.6dB (SD ± 10.3). Ambient noise alone in a patient room was measured at 50dB. Noise levels in an open and closed isolette were measured at 58 and 57dB, respectively. Isolette side door opening and closing had a mean of 80.2dB (SD ± 7.60). With medical devices active in the patient room, noise levels had a mean of 62.7dB (SD ± 7.74).

Conclusions. All data points were above the recommended safe noise level of 45dB. This data supports our development of a noise reduction product for use within neonatal isolettes. Our design will incorporate sterilizable, sound-absorbent materials and diffusion technologies to decrease ambient noise within neonatal incubators.