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Abstract

Noise in the Neonatal Intensive Care Unit (NICU) often exceeds recommended safe noise levels and has been found to have negative effects on premature infants and their health. Some of these effects can be changes in their heart rate, respiratory rate, and sleep patterns. In addition, negative effects, such as hearing loss, can cause permanent damage that impact children's long-term development. A preterm infant is an infant born before 37 weeks' gestation. Being born prematurely comes with its own problems and many risks. Attempting to survive in an environment that causes more stress is not healing. Understanding the effects of noise on preterm infants' physiological state and examining interventions to minimize NICU noise is essential. A review of the research literature was performed. Six primary studies exploring the effects of NICU noise on premature infants and interventions were found. The studies were divided into two categories: "Effects of noise exposure" and "Interventions."

Literature Review

Category 1: Effects of Noise Exposure on Premature Infants

The three studies in this category highlighted the effects that loud noises or noisy events have on the physiological states of premature infants in NICUs. All three studies compared noise levels in their settings to the safe noise level established by the American Academy of Pediatrics. The results of the studies show that NICU noise environments often exceed those recommended by the American Academy of Pediatrics and the negative effects it can have on patients in the NICU including changes in baseline vital signs, and disturbances in sleep patterns. The main limitation for the studies is that the sample sizes are small. More research needs to go into observing the effects noise has on premature infants along with measuring noise levels.

Category 2: Interventions to Minimize Noise

The studies in this category explored unique ways in which to minimize sound levels and/or minimize the exposure to noise for preterm infants in the NICU. Implementing quiet time on the NICU units has been found to help reduce noise caused by either staff and parents or electronic machines like ventilator alarms and telephones ringing, which in turn decreased neonates heart rates or helped them remain stable in their baseline vitals. The use of earmuffs was found to be beneficial in minimizing the exposure to noise for infants and therefore lead to positive changes in their vital signs, like a decreased heart rate, that aren't caused by stress related to excess noise.

Research Question

The research questions of this study are:

- In premature infants, what effects do loud NICU environments have on their physiological states?
- What interventions have been found to be helpful in minimizing their exposure to loud noise?

Research Proposal

Aim:

- Identify the effectiveness of implementing quiet times in NICU units to reduce noise levels and measure the effect it has on premature infants' physiological status

Study Population:

- n=50; premature infants in the Bay Area
- Born before or at 37 weeks gestation

Study Design:

- Quasi-experimental quantitative research study
- Take place over a time span of 3 months

Study Method:

- 50 preterm infants will be randomly categorized into two groups where one will receive the intervention of implementing quiet time (experimental group), and the other group will not receive quiet time but will continue to receive their routine care in their normal environment

Materials:

- Sound levels will be measured in both environments and analyzed to see how drastically different sound levels will be between the normal environment and the quiet environment
- Vital signs will also be recorded for both groups to compare the effects that sound levels have on premature infants

Analysis:

- Quantitative data will be collected from both groups and will be compared using a statistical computer software program
- Sound levels will be measured in decibels and will be compared using a statistical t-test between both environments
- A p-value of less than 0.05 will be considered as statistically significant
- All data from the 3-month period will be obtained to be analyzed
- This proposed research study will highlight the relationship between the amount of noise and changes in vital signs

Conclusion

Being born prematurely comes with its own risks and being in an environment that is not conducive to premature infants and their healing brings along more risks of negative consequences such as changes in their baseline status. This research paper has provided studies that highlight those negative consequences and how often times NICU noise levels exceed the recommended level set by the American Academy of Pediatrics. This shows that changes need to be made and some interventions studied by researchers have been proven to be effective such as placing earmuffs on the infants as well as implementing quiet times.

The proposal for further study includes implementing quiet times in NICUs and assessing the effects it has on lowering sound levels, something the other studies in the literature lacked measuring. Vital signs would also be measured to highlight the positive effects of having a quiet environment to heal and grow in for these premature infants. Becoming aware of the negative effects can help healthcare providers become aware of unnecessary noises in their units and hopefully make small changes that can make a big difference in the lives of the premature infants and full-term infants they care for in the NICU.

Literature Review Table

Category 1	• Babu, D. (2017). Effect of noise level on selected physiological parameters among neonates admitted in NICU • Hassanein, S. (2013). Neonatal Nursery Noise: Practice-based learning and improvement • Smith, S. (2018). Noise in the NICU: a new approach to examining acoustic events
Category 2	• Abujarir, R. (2012). The impact of earmuffs on VS in the NICU • Zauche, L. (2020). Influence of quiet time on the auditory environment of infants in the NICU • Zeraati, H. (2018). Effects of quiet time protocol

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