Sleep Disturbances and External Stimulation and the Effects on the Infants in the NICU

Sophia Hoang; Jolie Nguyen; Vincent Nguyen
Kelle Huong Phan, DNP, RN, NNP-BC; Debra Smith, DNP, EdD, MBA, RN

College of Nursing
UNIVERSITY OF HOUSTON

PICOT Question

Among the preterm infants that are between the gestational age of 25 to 37 weeks in the neonatal intensive care unit (NICU), how does the impact of cycled lighting compare to being in near darkness increase the amount of sleep the infants receive over three months?

Population (P)	Preterm infants
Intervention (I)	Cycled lighting
Comparison (C)	Near darkness
Outcome (O)	Amount of sleep
Time (T)	25 to 37 weeks

Literature Search Criteria

Databases:
- PubMed
- JSTOR
- CINAHL

Key terms:
- NICU infants
- Cycled lighting
- Circadian rhythm
- Growth and development
- Sleep

Article criteria:
- Peer review article
- Published between 2017-2022

Image retrieved from http://www.neobrainparents.org/in-the-nicu

Background

Infants struggle to have adequate sleep in the NICU due to exposure to stimuli that could disrupt and shorten their sleep. Sleep is a fundamental physiological and psychological necessity that everyone needs in their life. During sleep, the infant's body is working to develop brain functions, maintain physical health, and help with growth and development.[1] Because sleep is a crucial aspect of life, especially during the early stages of life, many interventions are implemented to increase the quality of sleep these infants receive. Cycled lighting is an intervention used that exposes babies to light for 12 hours a day and dim lighting for the next 12 hours.[1] Infants that undergo the cycled lighting intervention have reported an increase in quality of sleep, thus resulting in a decreased stay in the Neonatal Intensive Care Unit.[2]

Synthesis of Findings

- Cycled lighting interventions have been shown to improve sleep by 20% for the newborn infants in the NICU by promoting a circadian rhythm.[1, 3-5]
- There is a correlation between light and wakefulness with an increase percentage of awakening during variations in lighting compared to controlled lighting.[2, 4, 5]
- Small variations of light can cause wakefulness in the newborn, so it is important that the light protectors in the incubators are checked for sufficient light protection.[2, 5]
- Cycled lighting is an effective intervention used to promote sleep along with music therapy which can be used in combination.[3, 6]
- The improved sleep allowed for an increase in weight gain by 500g and a decreased length of stay in the hospital by 17 days.[1, 2, 5, 6]

Decision to Change Practice

- Because sleep plays an important factor in physical growth and brain development, increasing the amount and quality of sleep is crucial for the infants in the NICU.
- Based on our findings, we recommend the NICU to use cycled lighting to help promote adequate sleep for the infants as well as enforcing a more synchronized circadian rhythm; therefore, helping the infant gain weight while decreasing the length of stay in the hospital
- The enhanced sleep – brought upon by cycled lighting – will continue after discharge and can also improve the family's sleep over the next three months.
- The evidence strengthens the need to phase out continuous dimmed lighting in favor of cycled lighting due to the many benefits.

Evaluation

- After the three-month implementation period, sleep will increase by 20% in the evening hours following cycled lighting intervention.
- Evaluation will be based on a questionnaire to help measure improved infant quality of sleep at home following discharge.
- The results will measure the length of stay in the hospital compared to the infants in continuous dimmed lighting, weight, and quality of sleep in the NICU and at home after discharge.

Image retrieved from: https://www.ckbhospital.com/blogs/what-to-expect-when-your-baby-is-in-the-nicu-2/

Acknowledgments

The completion of this research project would not have been possible without the help from the University of Houston College of Nursing for providing us the opportunity to complete this research project. We would also like to extend our gratitude to Dr. Kelle Phan and Dr. Deborah Smith for providing invaluable guidance throughout the course of our research.

Lastly, we would like to thank our sponsors, the George & Mary Josephine Hamman Foundation and R.E. Bob and Vivian Smith Foundation, for their relentless support.

References

1. Brandon DH, Silva SG, Park J, Malcolm W, Kamhawy H, Holditch-Davis D. (2017). Timing for the Introduction of Cycled Light for Extremely preterm infants: A randomized controlled trial. Res Nurs Health, 40(4), 294-310. https://doi.org/10.1002/nur.21797.
2. Zachritz, W., Fulmer, M., & Chaney, N. (2017). An evidence-based infant safe sleep program toreduce sudden unexplained infant deaths. AJN, American Journal of Nursing, 116(11),48–55. https://doi.org/10.1097/01.naj.0000505590.78202.a2.
3. van den Hoogen A, Teunis CJ, Shellhaas RA, Pillen S, Benders M, Dudink J. (2017). How to improve sleep in a neonatal intensive care unit: A systematic review. Early Hum Dev, 113, 78-86. https://doi.org/10.1016/j.earlhumdev.2017.07.002.
4. Orsi, K. C. S. C., Avena, M. J., Pradella-Hallinan, M. L. de C., Pedreira, M. da L. G., Tsunemi, M. H., Avelar, A. F. M., & Pinheiro, E. M. (2017). Effects of handling and environment on preterm newborns sleeping in incubators. Journal of Obstetric, Gynecologic & Neonatal Nursing, 46(2), 238-247. https://doi.org/10.1016/j.jogn.2016.09.005.
5. Zores C, Dufour A, Pebayle T, Dahan I, Astruc D, Kuhn P. (2018). Observational study found that even small variations in light can wake up very preterm infants in a neonatal intensive care unit. Acta Paediatrica, 107(7), 1191-1197. https://doi.org/10.1111/ apa.14261.
6. Kobus S, Diezel M, Dewan MV, Huening B, Dathe A-K, Felderhoff-Mueser U, Bruns N. (2021). Music therapy is effective during sleep in preterm infants. International Journal of Environmental Research and Public Health, 18(16), 8245. https://doi.org/ 10.3390/ijerph18168245.