

Quality of Sleep in a Level 3 NICU

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Aim

NIDCAP neurobehavioural observations are conducted routinely in our NICU, and recently have been augmented with video. This project evaluated the quality of sleep of infants in our level 3 NICU, as part of ongoing education and quality improvement.

Methods

A convenience sample of preterm infants were recruited for NIDCAP observations with video. Parents provided informed consent. Infants were observed in their beds and/or while held. These observations occurred while the infants slept, and other interventions were minimal. Behavioural states were assigned during observation according to the NIDCAP Manual for Naturalistic Observation of Newborn Behavior.¹ The number and frequency of state changes, the longest epoch of state and its duration, total time in each state, and length of sleep-wake cycle were calculated. A sleep-wake cycle was defined as a period of sustained Deep Sleep (DS) followed by spontaneous arousal to Quiet Awake.² Parents, nurses, and neonatologists were asked to estimate the length of infants' Sleep Wake cycles.

Results/Findings

Nineteen infants were observed for a total of 38 observations. Infants were observed in their bedspace in the NICU at various times of the day. No attempt was made to modify the environment or to replicate the environment when an infant was observed more than once (13 infants). Twenty-four observations occurred while the infant was in a crib and 14 while held. Twelve of these 14 held episodes were skin-to-skin with a parent. Data are presented for 17 observations; further analysis is ongoing.

- The mean length of time between state transitions was 2 minutes 39 seconds (range 1'12" to 10'15").
- The longest epoch of any one state during any one observation was a mean of 12 minutes 42 seconds (range 3' to 33'). Most of these epochs were of Light Sleep, state 2A.
- DS was observed during 9 of these 17 observations. The infant was being held during 7; the percentage of time in DS while held ranged from 6.6% to 80.5%. For the two observations of infants in the crib, the percentage of time in DS Sleep ranged from 5.1% to 17.5%.
- Of the eight observations for which no DS was observed, the infant was always in the crib.

- Five infants were observed both in the crib and while being held. All five achieved more DS when held (up to 80.5% of the time) compared to the crib (maximum 5.1% of the time).
- Parents, neonatologists, and nurses were unsure of the length of sleep-wake cycle. When asked to estimate, responses varied between 20 minutes and 3 hours.
- Very few infants achieved a sleep-wake cycle, as defined above.

Limitations

- Polysomnographic identification of sleep-wake states was not possible. This could have improved the accuracy of the assignment of behavioural state.
- Only five of 19 infants were observed in both conditions (held and in crib), which may limit the validity of the comparison between "sleep while held" and "sleep in crib".
- The physical environment of each infant's bedspace was not standardized, which may have impacted the quality of sleep.

Relevance to NIDCAP

The NIDCAP Naturalistic Observation is a clinically useful tool to assess the quality of sleep in the NICU. Observation of sleep states and Sleep Wake cycles may be one method of assessing improvements in the quality of neurodevelopmental care in the NICU.

Conclusion

Preterm infants in our NICU had suboptimal organization of sleep, with frequent transitions of state, little if any Deep Sleep, and poorly defined sleep-wake cycles. Infants achieved more Deep Sleep when held than in their crib. Our results demonstrate the critical developmental impact of prolonged close contact with parents and will guide practice change.

References:

1. Als H. Manual for the naturalistic observation of newborn behavior. Copyright NIDCAP Federation International, 2006, 2015.
2. Graven SN, Browne JV. Sleep and brain development. *Newborn and Infant Nursing Reviews*. 2008;8(4):173-9.