Implementation of Cycled Lighting in a Single-Room Neonatal ICU

Monica Coventry, RNC, MSN, and Amy Jamison, RNC, BSN

The practice of nursery lighting has changed over the past several decades. In the 1970s, the most prevalent strategy was to continually dim the lights in the entire patient care area or cover the infants’ incubators, on the theory that dim lighting was appropriate for premature infants because it was similar to the environment in utero. Research has shown that constant dimness deprives infants of the light stimulation needed to reset their biological clock every 24 hours. Lack of light impedes growth because less cortisol is produced. Exposure of premature infants to low-intensity cycled lighting induces distinct patterns of rest/activity that are apparent within 1 week after discharge. Infants exposed to early cycled light (at birth and 32 weeks postmenstrual age [PMA]) gain weight faster than infants who do not receive cycled lighting until 36 weeks PMA.

Neonatal Intensive Care Unit Design

Neonatal intensive care units (NICUs) have also gone through architectural changes over the past few decades. The early NICUs incorporated open designs with up to 30 infant beds in a crowded, noisy room. In the 1980s and 1990s, as premature survival rates improved, the NICUs were built with a pinwheel design providing more privacy while allowing staff to observe several infants at a time. The current trend is the single patient room design providing complete environmental lighting control and much needed privacy for families.

Our Unit

We are a level III perinatal center providing specialized care for mothers and their premature or high-risk babies under one roof. The NICU has 25 single patient rooms where parents can spend the night on a couch bed. The NICU’s mission is to bring the baby back within the family’s embrace by nurturing the family’s role as caregivers.

In July, 2006, we moved from a NICU with a large, open bed design to our new unit. Aware of the impact of cycled lighting on premature infants we determined this to be an ideal time to implement a new lighting protocol. Before the move, the staff was educated on the research evidence for cycled lighting. Light levels were obtained with a light meter in the old and new units and displayed on posters for the staff. The light values in our new unit were as follows: isolette uncovered with overhead light dimmed two-thirds (250 lux), isolette covered with overhead light on dimmed two-thirds (140 lux), nurses’ station (740 lux), medication room (1000 lux).

Continued on page 95
and the procedure light (1500-2000 lux). In the patient rooms, there is a small overhead light for computer charting and a sconce above the couch as a reading light for parents. These lights do not affect the light levels measured in the isolette. The headwall light is on a dimmer switch. Before implementing the lighting protocol each room was tested with a light meter. We found that the middle third range of the dimmer switch was the appropriate light level. This range was written on each dimmer switch.

**Cycled Lighting Protocol**

A cycled lighting protocol was developed by our Developmental Care Committee made up of a neonatologist, nurse practitioner, nurse educator, respiratory therapist, and staff nurses. They provided lighting guidelines for our unit. The protocol for stable infants is as follows: infants 32 weeks and older receive 210-270 lux from 7 AM to 7 PM; blankets are not permitted on top of the isolettes; infants are allowed 2 naps in dimness in this 12-hour period; lighting is lower than 25 lux from 7 PM to 7 AM. For infants born at less than 32 weeks gestation, constant dim lighting at less than 200 lux is used. Unstable ventilator and infants with continuous positive airway pressure may need constant dim lighting.

**Implementation**

During the first several months, old habits were hard to break. The most difficult adjustment for the staff was keeping the blanket off the top of the isolette during the day while the lights were on. Another problem was that the physicians and practitioners turned the lights off when they left the room after examining the infant. After an adjustment period of 4 months, a Performance Improvement study was conducted for 6 consecutive months to determine compliance with the new lighting guidelines. Each month, 10 rooms on day shift and 10 rooms on night shift were checked for appropriate light levels. The night shift was easy. The nurses were used to keeping the lights off at night, so compliance was 100%. For the day shift, 10 rooms with infants 32 week gestation and greater were checked to see if the lights were on, that the dimmer switches were set on the middle third range, and that the isolette blanket was removed. There was 90% to 100% compliance on day shift. Positive feedback was given to the nurses who were not following the guidelines. We attribute this success to 2 factors: the single-room design and strong administrative support. In addition nurses and parents have biological clocks and enjoy working in the light.

Our unit has recently acquired its own light meter. In the near future we would like to give feedback to the nurses on the exact lux measurement of the room to increase their awareness of light levels. We strongly recommend implementation of cycled lighting in a single-room NICU setting—it is easy to implement; it will establish distinct day/night cycles for infants, families, and staff; and it promote optimal growth in premature infants during their hospital stay, giving them a good start before discharge.

**Acknowledgments**

The authors would like to thank Rosanna F. Hess, RN, DNP, for editing our article and for her continued encouragement and support.

**Financial Disclosures**

None reported.

Monica Coventry is an NICU educator at Aultman Hospital in Canton, Ohio. Amy Jamison is a neonatal patient care specialist at Aultman Hospital. For more information, contact Monica Coventry at mcoventry@neo.rr.com.
Implementation of Cycled Lighting in a Single-Room Neonatal ICU
Monica Coventry and Amy Jamison

Crit Care Nurse 2009;29 96-95 10.4037/ccn2009328
©2009 American Association of Critical-Care Nurses
Published online http://ccn.aacnjournals.org/

Personal use only. For copyright permission information:
http://ccn.aacnjournals.org/cgi/external_ref?link_type=PERMISSIONDIRECT

Subscription Information
http://ccn.aacnjournals.org/subscriptions/

Information for authors
http://ccn.aacnjournals.org/misc/ifora.xhtml

Submit a manuscript
http://www.editorialmanager.com/ccn

Email alerts
http://ccn.aacnjournals.org/subscriptions/etoc.xhtml