EVALUATION OF A LIGHTING SYSTEM FOR NEONATAL INFANT INCUBATORS

John Bullough, M.S., Mark S. Rea, Ph.D.
Lighting Research Center, School of Architecture
Rensselaer Polytechnic Institute, Troy, NY 12180

Thousands of infants are born prematurely every year. Of these, a significant percentage contracts retinopathy of prematurity (ROP), which causes severe, irreversible damage to the retina, and even complete blindness in some infants. In the 1960s, oxygen-rich air in the incubator environment was discovered to be the primary cause of ROP. More recently, however, an increase in ROP incidence has occurred which is not due to high oxygen levels in the incubators. One factor which may contribute to the increase in the incidence of ROP is light.

Light levels in neonatal infant care units (NICUs) have increased dramatically over the past 50 years, primarily because of concern for the visibility and performance of nurses and doctors. In addition to the possible effects of light on ROP, continuous high light levels in the NICU may be harmful to infants for other reasons, such as disturbance of circadian rhythms, including the sleep/wake and body temperature cycles.

The primary issues of the neonatal environment necessarily relate to the health and well-being of the infants who reside there. However, the performance of the people who work in this environment is also extremely important, especially considering that neonatal care is a continuous, 24-hour endeavor. Research has found that accidents and mistakes are more common on late-night shifts, and that lighting can improve both the performance and mood of workers on these shifts. Yet the needs of health care workers and premature infants are drastically different.

Niagara Mohawk Power Corporation supported the development and initial evaluation of a prototype infant incubator lighting system using fiber optic technology. This permits control of the lighting environment for infants independently of that provided for the medical staff in the NICU. The Lighting Research Center assembled professionals from the neonatal care, nursing, medicine, and lighting disciplines for a focus group to identify issues which should be considered in the development of this prototype.

This focus group, a survey of nurses at the Albany Medical Center NICU, and a comprehensive literature survey provided the basis for the development of the prototype unit. This prototype was developed and initial testing was performed to determine if such an environment would be suitable and beneficial to premature and developing infants. The initial energy impact of this technology was also assessed.

Because of its capacity for careful control of the neonatal lighting environment, independent of that in the rest of the NICU, this prototype has the potential to be a useful tool in the study of the causes of ROP and other effects of the environment on the development of premature infants.

John Bullough, Research Associate
Lighting Research Center
Rensselaer Polytechnic Institute

M.S., Rensselaer Polytechnic Institute
TEL: (518) 276-4866
FAX: (518) 276-4835

Research Interests: biological and psychological effects of light, lighting for health care facilities, human factors, technology transfer

Recent Publications:


Second Annual
AMC/RPI
Joint Research Symposium

Book of Abstracts

The Albany Medical College

Rensselaer

Saturday, March 23, 1996
9:00 a.m. ~ 1:00 p.m.
Darrin Communication Center
Rensselaer Polytechnic Institute
Troy, New York