Introduction

Studies have shown that a womb-like light environment can reduce the levels of cortisol and promote the release of growth hormones, while also extend sleep duration and help with adaptation to a circadian rhythm at an early stage. In order to limit the amount of stimuli, (specifically light) that affects neonatal infants, hospital staff currently cover isolettes with fabric isolette covers. This temporary solution is a major health hazard to the neonates due to increased risk of infection and the limited view of the infant at all times. Fabric covers fester bacteria, especially when they fall off and are not sanitized or washed before being placed back on the isolette. The fabric covers also limit the view of the baby at all times, which is especially vital during emergencies. In an emergency situation, the immediate response of the caretaker is vital to the survival of the baby. The constant darkness is also detrimental to the development of the baby eyes because optical development is hindered by total lack of light stimulus. Therefore, in order to minimize the issues with light stimuli, caretakers and babies would benefit from a device that: reduces risk of infection, limits light stimuli efficiently, and is easily programmable to serve a vast array of functions.

The goal of the project is to develop a method of retrofitting current isolette walls that controls the amount of light permitted. Films will be used to control light transmission into the isolette, and the films will be controlled by an Arduino.

Innovation

Currently the only solution for reducing light stimulus to the neo-natal infant is by using a blanket to cover the isolette. The use of films that control the amount of light it permits is something that has not been done commercially. The use of films that can quickly change opacity would revolutionize the treatment of neonates as it would allow constant supervision of the babies during care, and also a method of notification in case of emergency. The future developments of this product would include modular advancement that make the films more reactive to different stimuli in the environment and the vitals of the baby. For example, the film would become clear immediately in case of emergency detected by the vitals allowing for immediate detection of the baby at risk amidst the many isolettes in the NICU. Modular development of the current design is also innovative because it can be adapted for many different situations and developments in scientific knowledge. For example, if there is development in research on light cycling, it is simple to control the opacity of the isolette wall that can promote development.

Global Impact

This product will allow for better treatment and care of neonatal infants. The impact is bifocal: it will improve the ability of the caretakers to supervise the baby, and it will also promote the development of the premature baby by recreating the environment of the womb.