**Polyethylene suit for prevention of hypothermia in preterm infants.**

**Introduction**

Hypothermia is a significant issue frequently encountered in preterm infants, serving as a major factor contributing to early-life mortality. Due to their distinct physical characteristics and the immature thermoregulation mechanisms, preterm infants are susceptible to rapid heat loss to the surrounding environment, this makes their body temperature susceptible to easy fluctuations in response to environmental conditions.

Hypothermia in preterm infants can lead to severe complications that may pose life-threatening if not addressed promptly. These include decreased surfactant production in the lungs, loss of alveolar function resulting is respiratory distress syndrome, decreases blood circulation to vital organs, cardiac dysfunction, and impaired adaptation to cold stress, which in turn hampers weight gain or may even leading to weight loss. Consequently, preventing heat loss in preterm infants is crucial for their survival.

The International Liaison Committee on Resuscitation (ILCOR) (2006) recommends wrapping newborns for prevent heat loss, particularly those weighing less than 1,500 grams, in plastic immediately after birth in the delivery room. This practice helps minimize heat loss by acting as an insulating barrier that prevents body heat from escaping through the skin into the environment. Such a method effectively mitigates heat loss due to evaporation and convection while allowing radiant heat from warming devices to penetrate to the infant.

As a result, the Polyethylene Suit innovation was developed. This transparent plastic suit, with a three-layer fabric cap that conforms to the infant's head size. This design ensures rapid body coverage immediately after birth, offering an affordable and safe solution. It allows clear observation of the infant's condition, facilitates physical examination and auscultation. Medical procedures such as umbilical catheter insertion and neonatal resuscitation can be performed without removing the suit. This innovation helps prevent hypothermia during the critical neonatal period, including transportation to the neonatal intensive care unit (NICU), and while in the NICU care.

**Objective** To prevent heat loss and reduce the incidence of hypothermia in preterm infants. (Hypothermia was defined as body temperature less than 36.5 $^{\circ}$C)

**The innovation development process using the Design Thinking Approach** 1) Empathize: This stage involves understanding the target group within the specific context to gain insights into their needs, challenges, and pain points. 2) Define: The problem is clearly identified and articulated. In this case, the issue is the high incidence of admission hypothermia at NICU (50.4%). Additionally, the impact of hypothermia on preterm infants is recognized as a critical concern that requires intervention. 3) Ideate: This stage focuses on the exploration and generation of potential solutions. It involves the analysis of existing data, review of relevant literature, and the application of creative thinking techniques to propose innovative approaches to address the defined problem. 4) Prototype: A prototype of the proposed innovation is developed. The innovation is designed to be a practical for healthcare provider and user-friendly solution to the identified problem. 5) Test: The prototype undergoes testing to assess its effectiveness and feasibility. Data is collected during the testing phase to evaluate its performance and usability. Based on the findings, modifications are made to optimize the prototype for effective use with the target group.

**Key features of the innovation**: The polyethylene suit for preventing hypothermia in preterm infants is made from clear polyethylene plastic. It is designed to be safely worn and easy to use, with a three-layer stretch fabric cap to insulate the infant's head. The suit allows for clear observation of the infant's condition, facilitates physical examination and auscultation. Medical procedures such as umbilical catheter insertion and neonatal resuscitation can be performed without removing the suit. This helps prevent hypothermia during the early neonatal period.

**Target group:** Preterm infants with a gestational age of less than 37 weeks and a birth weight of less than 2,000 grams.

**Result** The prevention of heat loss in preterm infants through the use of a polyethylene suit, combined with basic neonatal care procedures, can effectively prevent hypothermia in preterm infants and reduce incidence of admission hypothermia was significantly reduce from 50.4 to 28.9%.