Hypothermia in Newborn Babies

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In the early 1900s, it was realized that adequate environmental warmth was essential in the care of small infants because they could not maintain their body heat. Due to less insulation, an infant’s thermal control is more limited than that of an adult who can maintain body heat at temperature as low as 0°C (32°F). Hypothermia has since been recognized as a significant contributor to neonatal morbidity and mortality for all newborn infants, and has been described in every continent and even in many countries that are considered to be tropical.

Although data on hypothermia in newborns are rather scarce, studies in selected countries have revealed the importance of hypothermia as a cause of death. A study in Ethiopia revealed that 67% of high-risk infants who were born outside the hospital were hypothermic. A WHO-supported study in Nepal showed that 80% of infants born in hospital became hypothermic soon after birth. A large series of births in China found the incidence of hypothermic scleraemia to be 6-7 per thousand.

Hypothermia Defined

Hypothermia occurs when the body temperature drops below 36.5°C (97.7°F), the lower limit of normal range of 36.5-37.5°C (97.8-99.5°F).

Distribution and Incidence

Neonatal cold injury occurs throughout the world, even in warm climates. In one hospital during an 8-year study in Ethiopia, 67% of low birth weight and high-risk infants admitted to a special care unit from outside were hypothermic.

In a hospital in India, hypothermia on admission to the special care unit was associated with a mortality rate twice that of infants admitted with a normal temperature. In Nepal, primarily during the winter months, over 80% of the infants born became hypothermic after and 50% remained hypothermic at 24 hours. The labour and postnatal wards were cold at around 20°C (68°F), and this was a significant factor in the development of hypothermia.

In a large series of births in the provinces in China the incidence of scleraema was 6.7 per thousand. High-risk factors were prematurity and low birth weight. Another high-risk factor was low room temperature during childbirth. It was found that when infants were born in a room temperature less than 20°C (68°F), it took at least 14 hours to warm them to a temperature of 36°C (96.8°F). When the room temperature was above 20°C (68°F) only 3-4 hours of re-warming was needed.

General Risk Factors

The most important factors influencing the occurrence of hypothermia in new born infants include:

- incorrect care of the baby immediately after birth.
- sepsis or other infection.
- the age of the neonate born at the time of transport.
- inadequate warming procedures before and during transport of the infant.
- Asphyxia, hypoxia, other illness of the baby.
- inadequate warming conditions during resuscitation.

Causative Factors

Lack of awareness about the importance of drying the baby immediately after birth, of placing the newborn in direct skin-to-skin contact with the mother as a source of heat, of wrapping the baby and mother warm, and of providing a warm environment for delivery and the after care of the newborn are the principal factors responsible for the high incidence of hypothermia.

Signs of Hypothermia

Early clinical signs which should arouse suspicion of cold stress due to hypothermia are:

- The feet are cold to the touch and become cold before the body is cold.
- Weak sucking ability.
- Reduction in activity-lethargy; and
- A weak cry.

If hypothermia persists there is a risk of neonatal cold
injury developing, in which case the infant usually becomes lethargic, with slow, shallow and irregular respiration and a slow heart rate (bradycardia) corresponding to the degree of fall in body temperature. Hypoglycemia and metabolic acidosis may develop. There is a real risk of death.

The face and extremities may have a bright red colour while the rest of body is pale; central cyanosis may be present. Sclerema, a hardening of the skin, associated with reddening and oedema is seen mainly on the back and the limbs but may cover the whole body.

An important objective of appropriate care of the newborn is to avoid hypothermia from the moment of birth, by using procedures that will prevent heat loss and maintain the temperature within the normal range, thus conserving the infant’s energy for growth and development.

**Loss of Heat**

There are four ways a newborn may lose heat to the environment:

- Radiation
- Convection
- Conduction
- Evaporation

**Radiation** – Heat loss occurs by radiation from the infant to cooler object in the vicinity, for example, if an infant in a cot is placed close to a cold wall, a window or other object.

**Convection** – Heat loss occurs when the infant loses heat to the cooler surrounding air.

**Conduction** – Loss of body heat by conduction occurs when there is direct contact of the skin with a cooler object or surface. For example, if the infant is placed in direct contact with a cold surface – a table, weighing scale, or rubber sheet – heat will be lost to the cold surface, particularly if the surface is metallic.

**Evaporation** – Heat loss by evaporation occurs when fluid (amniotic fluid, water) evaporates from the wet skin to air. This happens when the infant is not dried immediately and thoroughly.

**Role of a Nurse**

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Hypothermia can be prevented by drying the infant immediately after birth, placing in direct skin-to-skin contact with mother, and covering both (mother & baby) with heavy, and clean blanket. The “warm chain” is a concept introduced to describe a set of interlinked procedures, which will minimize the likelihood of hypothermia. Failure to implement any one of them will break the chain and increase the possibility of undesirable cooling of the infant. The link in the “warm chain” includes:

- Warm delivery room
- Immediate drying
- Skin-to-skin contact
- Breast-feeding
- Postpone bathing and weighing of the newborn
- Appropriate clothing and bedding
- Keeping mother and baby together
- Warm transportation
- Warm resuscitation
- Training and awareness

**Conclusion**

If all newborn infants, including preterm and small infants are carefully dried and given to their mother in skin-to-skin contact immediately after delivery, the risk of hypothermia is greatly reduced.

There is sufficient evidence to conclude that immediate postdelivery hypothermia is harmful to newborn, increasing the risk of morbidity and mortality.

In certain circumstances, skin-to-skin contact is not possible. In these situations, alternative means of preventing heat loss and providing warmth will be necessary. The various methods available have been described.

The information presented here provides a basis from which managers and health care providers can develop their own plans and procedures for the prevention and management of hypothermia in the newborn.

**Reference**

4. NALS, (1994), Teaching aid on neonatal resuscitation. Text book of neonatal resuscitation. New Delhi, division of Neonatology, All India Institute of Medical Sciences