



Temperature Control

Thermoregulation is an important aspect of neonatal care that affects healthy newborns, as well as sick or premature infants. Infants need assistance with maintaining a neutral thermal environment, in which the least amount of an infant's energy is needed to maintain a normal body temperature. Maintaining this temperature requires a balance between heat that the infant produces and heat that is lost.

At birth, an infant loses heat rapidly due to exposure in a cold delivery room (convection) or through the evaporation of fluid from the infant's skin. An infant's core body temperature can drop 2 °C to 3 °C in the first 30 minutes of life. An infant may lose heat quickly when placed directly on cold surfaces, such as a scale or an X-ray plate (conduction), as well as through radiation, such as through walls or windows. In order to maintain temperature after delivery, an infant will metabolize brown fat stores, glycogen stores, or both. Infants who are born early have fewer brown fat stores than healthy newborns. By being exposed to heat losses for an extended period of time, these stores may become depleted, causing the infant to develop cold stress. When an infant experiences cold stress, blood vessels throughout the body will constrict, causing systemic vasoconstriction. Vasoconstriction prevents blood flow and oxygen from being delivered to tissues, which increases the risk for organ and tissue damage. This can lead to increased oxygen needs, hypoglycemia, increased risk for blood pressure alterations, and potentially intraventricular hemorrhage when rewarmed.

Here are some ways to minimize heat loss in an infant:

- Increase the temperature of the delivery room and use prewarmed surfaces while stabilizing the infant.
 - Heat respiratory gases (oxygen being breathed in from a ventilator or nasal cannula).
 - Place a warm blanket on a scale or X-ray plate prior to use.
 - Use a radiant warmer or double-walled isolette (shown at right) to reduce radiant heat losses.
- Use humidity for very premature infants to reduce heat loss through evaporation.
 - Use developmental care, including facilitated tucking, to minimize surface area exposure.



When an infant is able to maintain temperature without radiant heat, he or she can be dressed in clothes and a hat, swaddled, and placed in an open crib.

It is also important to avoid overheating the infant while trying to maintain an infant's neutral thermal environment. If an infant is too warm or warmed up too quickly after being cold, he or she may experience further physiological changes such as increased heart rate and



respiratory rate and the risk of dehydration and altered acid-base status. A sustained increase in body temperature can cause apnea, bradycardia, and oxygen desaturation.

Bibliography

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Temperature Control: Information for Parents

Babies can sometimes have a hard time keeping their temperature in the normal range. Full-term babies have a layer of fat under their skin that helps them stay warm. When babies are born early, they don't have as much fat under their skin.

Right after birth, your baby can get cold really fast. The best way to keep your baby warm is to dry your baby; give your baby a warm, dry bed; and place a hat on his or her head.

In the neonatal intensive care unit (NICU), one of the beds that can be used is called a radiant warmer. It is like an open crib, with a heater on it that helps your baby stay

warm. Another bed your baby may use is called an isolette or incubator. This gives a preemie or sick baby extra heat to help keep his or her temperature where it should be.

When your baby is older and bigger, he or she can be dressed in clothes or a t-shirt, wrapped in a blanket, and put in an open crib or bassinet. This is one of the milestones along the journey to go home.

It is also important to make sure your baby doesn't get too warm. Dressing your baby in too many clothes, covering your baby in too many blankets, or covering your baby's face can make him or her too warm. For more information related to this subject, see also Safe Sleep.



Double-walled isolette. Courtesy of GE Healthcare.



Babies can be wrapped in a blanket and placed in an open bassinet.

Things to remember when going home:

- If your baby's body temperature is lower than 97 °F (36 °C), undress your baby, place him or her skin to skin on your chest, wrap yourselves in blankets, and call your baby's provider. You should also call the provider if your baby's temperature is higher than 100.4 °F (38 °C).
- If your baby's hands or feet are cool or look pale or blue, warm them with a blanket. You can also add a layer of clothing. If the color of your baby's hands and feet does not improve, call your baby's provider.



Babies can be dressed in layers, but no more than one additional layer than you are wearing.

- Dress your baby in layers. To avoid overheating, add only one more layer of clothing than you are wearing if the temperature is cool, and remove a layer of clothing if your baby is warm. Use sleepers when you can.
- Remove clothes when they are wet or dirty.
- Keep your baby away from drafts and windows as much as possible.
- Keep the crib away from drafts, windows, and outside walls by placing your baby's crib on the inner wall of the room.
- Always place a hat on your baby when you go outside in cool or windy weather.