**Topic Expert Group:** Care procedures

**Temperature management in newborn infants**


**Target group**
Newborn infants and parents

**User group**
Healthcare professionals, neonatal units, hospitals, and health services

**Statement of Standard**
Environmental management of temperature and humidity is necessary to optimise the management of newborn infants.

**Rationale**
Normal axillary temperature is defined to be between 36.5 and 37.5 degrees Celsius by international bodies. (1,2) Variation of body temperature from normal is more common in preterm and ill infants. The optimal environmental temperature is termed the thermo-neutral temperature, as defined as the temperature at which metabolic requirements of the infant are minimal. (3) Different studies have shown that low body temperatures in newborn infants are associated with mortality, increased risk of illness and delayed growth. (4–6) Similarly, high body temperature is associated with adverse outcomes, particularly in infants following hypoxia ischemia and very preterm infants. (7,8)

The physiological and behavioural responses of preterm infants to hot or cold environments are less developed than in term infants. Reduced bodyweight-body surface ratio can result in higher heat loss. Preterm infants can also have high trans-epidermal water losses through evaporation because of their thin porous skin. High evaporative water loss causes high energy expenditure due to skin cooling, increasing neonatal morbidity. (3) In addition, preterm and ill infants may be exposed during procedures to insert central catheters, endo-tracheal intubation and resuscitation, which cause fluctuation in body temperature.

**Benefits**

**Short-term benefits**
- Reduced risk of hypothermia (9)
- Reduced risk of hyperthermia (7,9)
- Minimises trans-epidermal water loss (10)
- Improved comfort and reduced physiologic instability and stress (11)
- Stabilised body temperature by skin-to-skin care (12,13)

**Long-term benefits**
- Improved developmental outcomes (4–6)
### Components of the standard

<table>
<thead>
<tr>
<th>Component</th>
<th>Grading of evidence</th>
<th>Indicator of meeting the standard</th>
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</thead>
<tbody>
<tr>
<td><strong>For parents and family</strong></td>
<td></td>
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<tr>
<td>1. Parents are informed by healthcare professionals about the ideal body</td>
<td>A (High quality)</td>
<td>Patient information sheet</td>
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<tr>
<td>temperature and importance of temperature management. (14)</td>
<td>B (High quality)</td>
<td></td>
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<tr>
<td>2. Parents are invited to measure their infant’s temperature. (14,15)</td>
<td>A (High quality)</td>
<td>Patient information sheet, parent feedback</td>
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<td>A (High quality)</td>
<td>B (High quality)</td>
<td></td>
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<tr>
<td>3. Skin-to-skin care is provided as soon as possible. (3,12,13)</td>
<td>A (High quality)</td>
<td>Audit report, parent feedback, patient information sheet</td>
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<tr>
<td>(see TEG Infant- and family-centred developmental care)</td>
<td>B (High quality)</td>
<td></td>
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<tr>
<td><strong>For healthcare professionals</strong></td>
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<tr>
<td>4. A unit guideline on temperature management is adhered to by all</td>
<td>A (High quality)</td>
<td>Guideline</td>
</tr>
<tr>
<td>healthcare professionals. (3,16)</td>
<td>B (High quality)</td>
<td></td>
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<tr>
<td>5. Training on temperature measurement, management including incubator</td>
<td>A (High quality)</td>
<td>Training documentation</td>
</tr>
<tr>
<td>settings for the best thermal environment, the importance of</td>
<td>B (High quality)</td>
<td></td>
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<tr>
<td>maintaining normothermia in the newborn infant, and the risks of</td>
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<tr>
<td>hypothermia and hyperthermia, is attended by all responsible</td>
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<td>healthcare professionals. (3–6,9,17–21)</td>
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<td><strong>For neonatal unit</strong></td>
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<tr>
<td>6. A unit guideline on temperature management is available and regularly</td>
<td>A (High quality)</td>
<td>Guideline</td>
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<tr>
<td>updated. (3,16)</td>
<td>B (High quality)</td>
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<td>7. Appropriate facilities for temperature management are available. (5,17,22–24)</td>
<td>A (Moderate quality)</td>
<td>Audit report, guideline</td>
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<td>B (High quality)</td>
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<td><strong>For hospital</strong></td>
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<td>8. Training on temperature management is ensured. (3–6,9,17–21)</td>
<td>A (High quality)</td>
<td>Training documentation</td>
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<tr>
<td>B (High quality)</td>
<td></td>
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<tr>
<td>9. Appropriate facilities for neonatal temperature management are</td>
<td>A (Moderate quality)</td>
<td>Audit report, guideline</td>
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<tr>
<td>provided. (5,17,22–24)</td>
<td>B (High quality)</td>
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</tbody>
</table>
For health service

10. Rates of hypo- and hyperthermia are monitored. (25)  A (High quality)  B (High quality)  Audit report

Where to go – further development of care

<table>
<thead>
<tr>
<th>Further development</th>
<th>Grading of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>For parents and family</td>
<td>N/A</td>
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<tr>
<td>For healthcare professionals</td>
<td>N/A</td>
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<tr>
<td>For neonatal unit</td>
<td>N/A</td>
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<tr>
<td>For hospital</td>
<td>N/A</td>
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<tr>
<td>For health service</td>
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<tr>
<td>• Contribute to benchmarking strategies to monitor temperature control in different settings, e.g. postnatal ward or transfer. (25)</td>
<td>A (High quality)  B (High quality)</td>
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</tbody>
</table>

Getting started

Initial steps

For parents and family
- Parents are verbally informed by healthcare professionals about the ideal body temperature and importance of temperature management.
- Parents are encouraged to measure their infant’s temperature and contribute to thermal management.

For healthcare professionals
- Attend training on temperature measurement, management including incubator settings for the best thermal environment, the importance of maintaining normothermia in the newborn infant, and the risks of hypothermia and hyperthermia.

For neonatal unit
- Develop and implement a unit guideline on temperature management.
- Develop information material on the ideal body temperature and importance of temperature management for parents.

For hospital
- Support healthcare professionals to participate in training on temperature management.

For health service
- Develop benchmarking of admission temperatures.
Description

Preterm infants and very low birthweight infants are prone to rapid heat loss through mechanisms of conduction, evaporation, radiation and convection. Low body temperature is directly related to higher mortality and morbidity rates. (4,8,18) A very preterm infant’s admission temperature is inversely related to in-hospital mortality, with a 28% increase in the mortality rate per every 1 °C of decrease in the admission temperature. Low temperature on admission increases the rate of oxygen consumption, causes pulmonary and systemic vasoconstriction, and is associated with worsening of respiratory distress, metabolic acidosis, hypoglycaemia, coagulation disorder, and increases the risk of late sepsis and peri-intraventricular haemorrhage. (26,27)

Careful temperature management should be a standard in delivery-rooms, during transport and in the NICU.

Delivery room

In preparation for the transition process or resuscitation of a preterm infant, the temperature in the delivery room should be increased to 23°C–25°C for term infants, and should be >28°C for infants <28 weeks of gestation. (2,16,28,29) For infants born before 32 weeks’ of gestation, the neonatal team should take steps to prevent cooling by 1) placing a thermal mattress under the newborn infant, 2) using plastic wrap or a bag to cover the infant without drying, and 3) placing a hat immediately after delivery. (27,30,31) For infants who require respiratory support gases should be heated and humidified. The target axillary temperature in a newborn infant during resuscitation is between 36.5°C and 37.5°C. (6,28) Hyperthermia (>38°C) should be avoided due to increased risk of RDS, neonatal seizures, cerebral palsy and early death. (32–35) Admission temperature should be regularly audited.

Transport

The transport of the newborn infant from delivery-room to the NICU needs to be safe and controlled. Very preterm infants should be transferred in a suitable transport incubator, pre-heated to 37°C, if it is not possible to effect the transfer skin-to-skin with mother or father.

NICU

Room temperature in the NICU should be maintained >23°C. Incubator temperature is dependent on the infant’s size and age. Each unit should have strict protocols for the management of environmental incubator temperature and the use of humidity to reduce evaporative water loss, that are regularly audited. Skin-to-skin care is used whenever possible (see TEG Infant- and family-centred developmental care) and care should be taken to avoid thermal stress during bathing. (see TEG Care procedures)

Source


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Lifecycle
5 years/next revision: 2023

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