Worcestershire Acute Hospitals NHS Trust

GUIDELINE FOR THERMOREGULATION FOR NEWBORN INFANTS IN NEONATAL/SPECIAL CARE BABY UNITS

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Key Amendments

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INTRODUCTION

Regulation of infant temperature is critical in the first few hours of life for the term infant, but can remain critical for days in the pre-term / ill infant.

The goal of maintaining a stable body temperature is to ensure minimal energy is used for temperature control and therefore, maximum energy is available for growth. The maintenance of the body temperature within the normal range will also involve minimal oxygen consumption (Bruggermeyer, Gundon & Kenner, 1993).

DETAILS OF GUIDELINE

As a guide, the range of temperature for infants of all weights and gestations is 36.5 degrees centigrade to 37.5 degrees centigrade, when taken in the axilla (Rennie & Roberton, 1999).
To assist healthcare professionals in the maintenance of the 'Thermal Neutral State' a variety of equipment can now be used.

At Delivery

The delivery room should be as warm as possible. On the resuscitaire the overhead heater should be switched on to aid the warming of towels the baby will be placed on and reduce heat loss.
All babies under 30 weeks gestation should be placed in a plastic bag immediately after delivery to keep warm and reduce the risk of dehydration. No drying is necessary.

Incubators

Modern incubators have been designed with double-wall insulation. These incubators provide higher values for inner wall than outer wall temperatures, thus reducing the amount of heat loss through radiation to the cooler outer wall (Sinclair & Bracken, 1992).

Some incubators also have a 'servo-mode' which uses a skin probe attached to the infant. The probe sensor temperature is set, usually at 36.5 degrees centigrade, and the incubator air temperature will then fluctuate up or down to maintain the infant's temperature at the set point.

The following are suggested settings for abdominal skin probes (Rennie & Roberton, 1999):

Weight (Kg)	Abdominal Skin Temperature (Degrees Centigrade)
<1.0	36.9
1.0 – 1.5	36.7
1.5 – 2.0	36.5
2.0 – 2.5	36.3
>2.5	36.0

These are only guidelines and there will be variations with each individual infant. With servo-mode there can be wide fluctuations in the air temperature, especially when the infant is handled or the probe is not securely fitted against the infant's skin. It may also be a sign of continuing illness or infection in the infant. Axilla temperature should be recorded 4 hourly and the probe set point increased or decreased as required.

Humidity

Premature infants (under 34 weeks), very low birth weight (under 1.5Kg), and extremely low birth weight (under 1.0Kg), require humidity to help maintain their skin integrity and reduce insensible water loss through evaporation (Sinclair & Bracken, 1992). Infants who are under 30 weeks will require high levels initially, i.e. 60 – 70 %, to reduce the risk of dehydration. Infants 30 – 34 weeks can be nursed in lower levels, i.e. 50 – 60 % for the first few days, until the epidermis has formed the protective keratin layer which 'toughens' the outer layer of skin and is less water permeable (Kenner, Amlung & Flandermayer, 1998).

Once the infant's temperature has stabilised and the humidity has been discontinued the temperature can be controlled with the incubator set in air mode. The infant's axilla temperature should be recorded 2-4 hourly until stable then taken when doing 'cares' on the infant (Rennie & Roberton, 1999). This allows time for the incubator air temperature to settle if changes have been made.

Radiant Heater / Open Platform

Open platforms, with radiant heaters built in above, have been introduced into many Intensive Care Units as they allow easier access to the sick infant and those awaiting transfer (Sinclair & Bracken, 1992). A 'servo-mode' probe, initially set at 36.5 degrees centigrade, means that any size of infant can be nursed on them as the infant's temperature will be controlled by the overhead heater giving out more or less heat as the infant needs it.

To avoid dehydration, the infant will require extra fluids, up to 30 ml / kg / day, when being nursed on an open platform (Sinclair & Bracken, 1992).

Open platforms can be considered for use when the sicker or smaller infants require procedures such as arterial lines, ventilation, peripheral cannulation and long line insertion to provide easier access, and also when an infant is requiring transfer to another unit. Once all the procedures have been completed or the infant is not to be transferred, the infant can be transferred into an incubator, where humidity and oxygen can be given more easily.

Hot Cot (Water Bed)

Pre-term infants, 32-37 weeks and those over 1.4Kg, once over the initial intensive care period, who are maintaining their temperature in an incubator set at the lower end of the range i.e. 28 – 29 degrees centigrade, and who are gaining weight steadily may then be considered for transition out of the incubator into a 'hot cot' (Harvey, 2000). To assist with this transition, and to help ensure that incubator care does not need to be reinstated, the use of a water-filled mattress is becoming more common (Kanmed, 1992). The water in the mattress is warmed to a set temperature, usually 36.0 degrees centigrade, and a sheet put over the mattress. The infant should then be dressed in a vest and baby-gro, placed on the sheet and covered with a sheet and 2 or 3 blankets as in a normal cot. Any more blankets than this and the infant will not benefit from the ambient room temperature which should be 24 – 26 degrees centigrade. Axilla temperature should be taken 2-4 hourly. As the temperature is maintained the water temperature can be reduced gradually to 34 degrees centigrade. The water will need up to 2 hours to stabilise after an adjustment before a further change is made. The temperature can then be recorded when doing the infant's feeds or nappy change, at least 4 hourly.

As well as recording the infant's temperature, weight gain is also an important indicator of energy expenditure so should be monitored closely over the following few days (Harvey, 2000). If the infant has been gaining weight steadily whilst nursed in an incubator and then the weight gain slows or the infant loses weight, this may be an indication the more energy is being spent maintaining temperature rather than growing. The water temperature should be increased slightly and the weight monitored more closely, i.e. alternate days, by both the nursing and the medical staff.

Once the infant is maintaining temperature and gaining weight satisfactorily with the water set at 34 degrees centigrade the decision can be made for the infant to be transferred to a normal cot. The infant should not be left in the water bed with the mattress turned off as this will cool the infant also. The infant should be dressed in a hat and cardigan and have 2 – 3 blankets. The temperature should be recorded 3 – 4 hourly with cares until stable. If the temperature of the infant falls below 36.5 degrees the infant should be placed back into the hot cot for another day or so. Weight should also be monitored closely for the following few days.

Open Cot

A well newborn infant dressed in a vest, baby-gro, covered with blankets and nursed in a warm room will reduce it's heat loss up to three times that of an infant left naked or in minimal clothing. The head, having a large surface area, can be covered with a hat providing an effective way of increasing insulation. When nursing infants in open cots the ambient room temperature should normally be maintained between 22 – 26 degrees centigrade (Sinclair & Bracken, 1992).

Behaviour and position may give clues to cold stress, e.g. being unsettled, crying or increased activity, may be an attempt by the infant to reserve heat.

The heat preserved for the core temperature will be by peripheral vasoconstriction so the blood supply to the peripheries and non-vital organs such as the gut will be reduced (Roberton, 1993). The resulting action may be a slowing of the peristalsis of the gut and can affect the tolerance and the absorption of feeds (Merenstein & Gardner, 1003). Again, weight gain may be affected so should be monitored closely.

Advice should be given to parents about room temperature and number of blankets required when taking the infant home and to reduce the room temperature gradually in the home.

The nursing staff must do the best they can to protect the infant from thermal stresses as well as help them achieve 'Thermal Neutral State'. Each professional is responsible for remaining up to date with the use of each piece of equipment to ensure that it is used correctly and safely.

MONITORING TOOL

How will monitoring be carried out? Clinical Audit – Random Sampling

Who will monitor compliance with the guideline? Paediatric Clinical Improvement Group

STANDARDS	%	CLINICAL EXCEPTIONS
Temperatures for infants should be within the range of 36.5 – 37.5ºC	100%	

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