SCOPE: **Staff working in maternity and NNU**

GUIDELINE: Temperature control in NNU

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PURPOSE: To provide infants with an appropriate thermal environment for gestation and weight.

DEFINITION: A neutral thermal environment is one in which an infant's body temperature remains normal with minimal metabolic effort and therefore minimal oxygen consumption.
The temperature of the nursery will be maintained at **25-26°C.**

BABIES AT RISK OF THERMAL INSTABILITY:

1. Small for gestational age infants.
2. Premature infants <37 weeks gestation.
3. Infants with neurological problems.
4. Infants with cardiorespiratory problems.
5. Low birthweight infants <2500 grams.
6. Infants with low blood sugars.
7. Infants with endocrine problems.
8. Sedated infants.

GUIDELINE:

1. Action: Assessing infant

- Assess infant's condition: respiratory and cardiovascular status, axilla temperature. Acceptable axilla temperature is 36.5- 37.5°C for term healthy babies (WHO definition).
- **The optimum temperature for babies requiring NNU care is 36.7-37°C. This will minimise metabolic effort.**
- Determine the appropriate method of controlling the infant's temperature**:**
  - Ventilated and critically ill infants initially on radiant warmer with servo control
  - Incubators are used for stable babies who require additional warmth.
  - Stable infants able to maintain normal temperature and are gaining weight can be nursed in a cot
  - The decision to move a baby into a cot will be based on the individual baby's ability to maintain its temperature, weight and weight gain. Weight of the baby is likely to be 1800gm or more before considering moving into a cot.
  - The incubator temperature should be weaned down 0.5 °C at a time until 30°C is achieved and the baby's temperature is stable.
  - If term infants are cared for in an incubator for observational purposes weaning is not needed
  - If a baby is undergoing phototherapy and unable to maintain temperature in a cot due to weight or gestation an incubator may be appropriate

2. Action: Checking temperature

- Use digital thermometer.
- Use individual plastic probe covers for each baby.
- Clean the thermometer (not the probe) with Clinelle wipes between patients.

3. Action: Nursing infant on radiant heater

- Ensure radiant heater is pre-warmed to minimise heat loss by conduction.
- Inspect the servo thermometer probe, especially the tip of the probe to ensure the device is free from defect.
- Attach servo probe to abdomen with reflective probe cover.
- Set servo temperature at 36.5 - 36.7°C
- Ensure that servo probe is securely attached to the infant, and the infant is not lying on the probe.
- Avoid phototherapy lights shining directly on the probe to prevent inadvertent heating from the phototherapy as this will give false readings, which can lead to a decrease or increase in supplied radiant heat. Also, overheating of the probe lead to cooling down of infant.
- Check skin condition and change site 8-12 hourly to detect any pressure areas /bruising due to placement of probe.
- Check probe site hourly to ensure it is securely and correctly attached, and baby not lying on probe.
- Record hourly and observe trends of skin and set temperatures.
- Record axilla temperature 4 hourly.
- Place baby in flexed position and provide nesting to minimise draughts.
- Using individual baby's behaviour cues to determine timing of nursing care.

4. Action: Nursing infant in incubator

- Pre-warm incubator to 34°C before placing infant on mattress to minimise heat loss by conduction
- Normal incubator temperature range may vary from 28 - 35°C. The smaller the baby, generally the higher the incubator temperature.
- We usually do not use servo control in incubators. Adjust temperature of incubator to maintain a stable temperature. A stable temperature promotes weight gain.
- The temperature to be set according to the baby's gestational age, weight and chronological age.
- The temperature of the incubator is altered 0.5 degree at a time and the baby's temperature should be checked 30 minutes after making the adjustment
- Avoid opening main incubator doors and use portholes for access to baby to prevent heat loss from incubator
- Incubator must always be turned on to ensure continuous air flow.
- Record air and axilla temperature 2-4 hourly.
- Do not bathe babies <1500g as bathing causes rapid loss of heat.

- Lie the infant in a flexed position and use nesting to provide a comfortable position, which makes the infant more settled and leads to energy conservation.

5. Action: Skin servo control

5.1 Contraindication for skin servo control

- Infants with circulatory compromise – severe hypothermia, sepsis: rapid warming may cause vasodilation and hypovolaemic shock.
- Severe skin compromise – burns, collodion infants: avoid use of tapes/probes on skin to prevent further skin/tissue compromise, which increases the risk of infection.
- Cerebral damage – asphyxia, hydrocephalus: thermo-regulation centre in brain may be permanently damaged, thus mask signs of temperature instability.

5.2 Iatrogenic hazards relating to servo control

a) Hypo/hyperthermia may result from:
   - Improper probe placement
   - Infant lying on probe
   - Tight clothing/blankets/nappies over probe
   - Radiant heat absorbed by probe (when reflective cover is not on properly).
   - Inappropriate temperature setting – too high/too low.

b) Temperature instability related to sepsis or cerebral damage may be overlooked as skin temperature will remain stable, therefore observe for:
   - ***Swings in incubator air temperature*** that are unrelated to events such as handling or open incubator doors
   - ***Inappropriate air temperature*** for infant's size, gestation or post-natal age.

6. Action: Nursing infant in cot

- Infants >1800g who is stable, able to maintain her temperature with no signs of respiratory distress may be nursed in a cot.
- The decision to move the baby to a cot is based on the individual baby considering thermal stability, weight and weight gain
- Ensure infant's clothing and wraps are dry to minimise evaporative heat loss.
- Infant may require bonnet & bootees and 1 or 2 wraps/blankets.
- If infant's temperature is not within the normal range within 3-4 hours, transfer to an incubator.

7. Action: Management of hypothermia

7.1. **Consequences of hypothermia:**
   - Increased oxygen consumption hypoxia and metabolic acidosis.
   - Increased energy consumption hypoglycaemia, slow or delayed weight gain.
   - Reduced oxygen delivery to vital organs, particularly the bowel and kidneys.
   - Decreased surfactant production and decreased efficiency of surfactant.
   - Increased risk of sepsis and haemorrhage.

- Vasoconstriction and reduced peripheral perfusion.
- Increased free fatty acid production – may displace bilirubin from albumin leading to increased jaundice.
- Severe cold stress resulting in tissue necrosis.
- Increased infant mortality.

7.2. Management

a) Observe for signs and symptoms of hypothermia (temperature <36.5°C)
- Cold to touch
- Colour, cyanosis, pallor
- Lethargy
- Decreased or increased spontaneous activity
- Respiratory distress – grunting, tachypnoea. apnoea
- Bradycardia or tachycardia
- Not tolerating feeds

b) Identify possible cause of hypothermia:
- Sepsis
- Frequent handling
- Inappropriate temperature settings of incubator or radiant warmer
- Bathing
- Inappropriate positioning

c) For infant on radiant heater
- Check servo probe is securely attached.
- Warm infant slowly: increase servo 0.2-0.5°C, generally 0.2°C per hour to prevent overheating.
- Nurse in flexed position and well nested
- Put bonnet and bootees on, if not contraindicated
- Minimise draughts
- Check axilla temperature hourly until within normal range.

d) For infant in incubator on air control
- Increase air temperature 0.2 – 0.5°C
- Bonnet and bootees on, if not contraindicated.
- Nurse in flexed position, well nested.
- Check axilla temperature hourly until within normal range.

e) For an infant in a cot
- Put bonnet & bootees on
- Use extra wrap around baby; may use quilt
- Check axilla temperature hourly until within normal range.

- If infant's temperature does not rise 0.2 – 0.5°C within an hour, transfer into an incubator

8. Action: Management of hyperthermia

8.1. Consequences of hyperthermia

- Recurrent apnoea
- Increased fluid loss hypernatraemia, increased jaundice
- Increased postnatal weight loss
- Increased neonatal mortality

8.2. Management

a) Observe for signs and symptoms of hyperthermia (temperature >37.4°C)
   - Infant looks and feels hot
   - Irritability and restlessness
   - Tachycardia
   - Apnoea or tachycardia
   - Not tolerating feeds dehydration

b) Identify possible cause of hyperthermia:
   - Inappropriate incubator temperature or servo control setting
   - Over-swaddling
   - Phototherapy
   - Baby lying on servo probe
   - Heat table temp sensors covered
   - Sepsis
   - Cerebral damage
   - Drug therapy
   - Dehydration
   - Adverse reaction to blood transfusion

c) Remedy situation if possible
   Correct environmental factors which may have contributed to hyperthermia
   - Reduce infant's temperature slowly by reducing incubator/heat table temperature 0.2 – 0.5°C per hour to prevent hypothermia.
   - Reassess axilla temperature hourly prior to changes.
   - If servo probe is being used, check probe position and attachment.

REFERENCES

Waikato DHB guideline October 2014
http://www.adhb.govt.nz/newborn/Guidelines/Admission/BabyInIncubator.htm Accessed 25/08/18

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