Hypothermia Protocol

Introduction:

Hypothermia is a core body temperature < 36.5° C. A new-born is at a particular disadvantage in maintaining a normal body temperature. With the neonate's large body surface and lean subcutaneous fat, the new-born loses about four times as much heat as the adult. Symptoms progress from peripheral cold, hypothermia, cyanosis, lethargic, poor feeding, hypoglycemia, bradycardia, convulsion, cardiac arrest and death.

Methods to check Temperature:

- Axillary method (under the armpit)
- Tympanic method (in the ear) for babies more than 6 months in wards/ HDU.

Grades of hypothermia:

- Normal axillary temperature is 36.5-37.5°C.
- Cold stress <36.5°C to 36°C
- Moderate hypothermia 36°C to 32°C
- Severe hypothermia <32°C

Warm Chain:

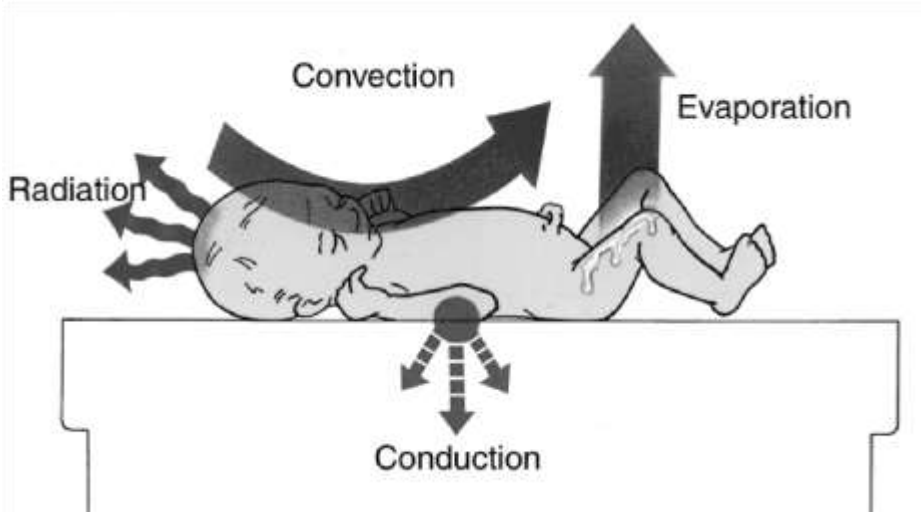
Baby must be kept warm at the place of birth and during transportation for special care

- Place of birth warm (set room temperature 26°C).
- Infant warm during resuscitation

Put the normal hat for all babies and the plastic bag to receive babies less than 32 weeks/1.5 kg

- Immediately dry the baby.
- Skin-to-skin contact between baby and the mother.
- Breast feeding.
- Postponing bath and weight check • Appropriate clothing and bedding.
- Mother and baby together.
- Warm transportation.
- Training/awareness of healthcare providers.

New-born loses heat by:



Evaporation-particularly soon after birth (due to evaporation of amniotic fluid from skin surface),
Conduction- (by coming in contact with cold objects-cloth, tray etc.),
Convection- (by air currents in which cold air replaces warm air around baby-open windows, fans) and
Radiation- (to colder solid objects in vicinity-walls) The process of heat gain is by conduction, convection and radiation in addition to non-shivering thermo genesis.

- If a neonate undergoes any change of environment or increased exposure, eg procedures, phototherapy, new transfer to an incubator or cot, they will require 30 to 60 minute temperature checks for the first few hours until the temperature is stable.

Open cot/ cradle: A well neonate who weighs more than 1.2 kg and > 32 weeks, who no longer requires close monitoring or intensive care, is gaining weight and who is maintaining a stable central temperature in 26-28°C room temperature, can be transferred to a small cot/ cradle . The neonate should be covered or wrapped in baby wrapper and should wear a hat.

- The axilla temperature should be checked each pre feed / third hourly once and recorded. If their temperature falls outside the normal range, the medical staff should be informed and readings must be taken more frequently (every 30 to 60 minutes). This should be continued until their temperature has normalized.
- Peripheral monitoring: Make sure peripheries are warm and well perfused.

Radiant warmer: They are convenient to use, allow direct access to the neonate and maintain the neonate's temperature during procedures.

- Switch on the warmer before 30 minutes. The overhead heater should be turned on and the ‘Manual’ control should be selected rather than 'Servo'.

- It will take 30 minutes to reach the desired temperature from the overhead heater.
- After placing the baby in the warmer change to ‘servo’ mode from the ‘manual’ mode and set the temperature to 37°C.
- Continuous central monitoring can be done by placing a probe over the abdomen (in supine position) or over the back (in prone position). Avoiding bony prominences and excoriated areas.
- If the neonate is hypothermic, the initial settings need to be higher**.** Increase the overhead heater in increments of 0.5°C every 15 to 30 minute until the neonate’s temperature is within normal range.
- Assess temperature every 30 minutes to one hour to monitor temperature and success of warming.

Incubator care: Incubators are now specifically designed to minimise heat losses by radiation, convection, conduction and evaporation whilst allowing clear visibility and access to the neonate. Ambient temperature and humidity are easily controlled. Any neonate less than 1 kg and < 28 weeks should be nursed within an enclosed incubator, upto a week of age

- Before admission pre heat the incubator temperature according to the specific age and gestation and adjust incubator temperature according to individual response
- Check and record incubator temperature hourly.
- Alter set temperature according to the neonate’s temperature and adjust by 0.5-1°C every 15-30 minutes, depending on the extent of temperature
- Do not leave a neonate inside a switched off incubator
- Do not expose an incubator to direct sunlight.
- Care and interventions, eg suction and nappy care, should be carried out via portholes, avoiding opening the side or roof completely
- Where appropriate, the incubator should be changed every seven days, particularly if humidity is being used. This should be recorded in the nursing records.
- Any technical problems with the incubator should be addressed with biomedical engineering.

Use of humidity: Any neonate less than 28 weeks gestation should be nursed in a closed incubator with added humidity.

- The use of humidity maintains temperature, assists fluid and electrolyte management, decreases insensible water loss and maintains skin integrity.

- The optimum level of humidity is determined by gestational age, days of life, skin maturity and underlying pathology.
- Sterile water and 2 drops of vinegar should be used and humidity levels checked hourly.
- Water should be changed daily and fill the container with sterile water.
- Humidity should be set initially at 80 per cent for gestations 23-28 weeks. After 72 hours, start weaning by 5% daily and aim to stop completely by day 7
- Humidity should be decreased after three days or as per baby maintaining the body temperature. • When weaning humidity increase the incubator or Giraffe Omni Bed temperature by 0.5 degree increments, alongside 30-60 minute temperature checks aiming to maintain a normal central temperature (36.5-37.5).
- Check the container water level every four hours. It will need topping up regularly.
- Check for condensation inside the incubator regularly and wipe away with a clean/dry cloth.
- Avoid opening the doors and portholes (and roof if using a Giraffe OmniBed).
- Skin should be inspected regularly to check for integrity and any signs of infection.
- The incubator should be changed every 7 days, sent for cleaning and the date recorded in the nursing notes. Change the humidifier jar every 3 days. Change the air filter every 3 months

Delivery room management

1. Delivery room temperature should be kept at ≥26^{o}C
2. Radiant warmer should be kept on in prewarm mode at least 20-30 minutes prior to delivery
3. Linen used to receive the baby must be warm.
4. Food grade plastic bags which are sterilized should be used to receive VLBW infants. They should be placed in the bag and drying should be avoided.
5. All babies should be clothed with linen which are warm.

During transport

Labour room / OT to NICU:

1. All high risk infants who require admission to NICU should be transferred in the radiant warmer or transport incubator.
2. If baby could not be transferred in radiant warmer, phase changing mattress (EMBRACE) which is warmed adequately can be used to cover the infants and can be transferred in the baby cradle.
3. VLBW infants should be transported along with the plastic bags used during resuscitation.

Extramural retrieval / Transfer for surgery

1. Transport incubator which is set in servo controlled mode should be used with the skin temperature set at 36.5^{o}C.

2. Babies who are hypothermic during retrieval can be warmed in the transferring unit before transport.
3. Operation theatre should be informed well in advance so that the ambient temperature is kept at ≥26^{o}C
4. EMBRACE should be kept ready if any additional source of heat is required during transport.

Procedures in NICU

1. All procedures in NICU may be performed in babies more than 1.5 kg under radiant warmer with the baby in the servo controlled mode with skin temperature set at 36.5^{o}C.
2. Ideally all procedures in LBW&ELBW must be done through the access port of the incubator with the humidity set and air temperature set to the ideal level . Babies in Giraffe Omni Bed can be converted to radiant warmer mode for easy accessibility if needed,but care should be taken to maintain the neonate euthermic during the procedure.
3. Simple procedures which require minimal access such as blood sampling can be done through the access port of the incubators.The number of times and the duration for which the incubator ports are opened should be minimal.
4. While taking x-rays do not keep the x-ray plate in direct contact with the baby. Always ensure that the technician keeps the cassette in the tray meant for it and not in the baby mattress.

Maintaining euthermia during surgeries:

1. Ambience temperature in the operation theatre should be kept at ≥26^{o}C. OT team should be informed well in advance for the same.
2. Special warmer mattress can be arranged for major surgeries.
3. Rectal temperature of the baby has to be monitored continuously by using a rectal probe connected to the multipara monitor.

All infusions including blood should be warmed to body temperature before infusion

Before discharge, the allocated nurse/ in charge nurse should be explain the importance of how and why to maintain the baby's temperature.

Conclusion:

Maintaining a normal thermal state in a new-born is an essential basic need in the early days of life. All efforts must be made to maintain the warm chain, detect hypothermia early and take prompt remedial measures to correct it. Specially LBW and at risk baby need close monitoring and

stricter preventive measures. This will significantly reduce the morbidity and mortality in the newborn period.

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