

NISTAR

Transport Service Guidelines

Neonatal Thermoregulation

Background:

The normal neonatal temperature range is 36.5°C to 37.2°C per axilla. Hypothermia is common in neonates, particularly in the compromised patient. It is important to remember that there are significant risks associated with both hypothermia and hyperthermia. The time needed to stabilise a baby for transfer can often be reduced if the baby's temperature is maintained within the normal limits, before the arrival of the transfer team.

The primary challenges in neonatal transport include:

- Limited facility for providing humidity in transport incubators
- It is more difficult to re-warm a baby during transfer compared with in NICU
- Environmental temperature may be more difficult to control

Measures to maintain stable temperature:

1. En route to referring unit

- Ensure incubator is plugged in to ambulance power source and is switched on.
- Switch on ambulance heater to warm the environment in preparation for the return journey.
- Set incubator to thermo neutral range for weight and maturity of baby (see table below), this may be in excess of 37°C for extremely preterm infants.
- If baby is <28/40 or <1kg, consider adding 200mls of sterile water onto humidity sponge (found under the incubator tray) if this is available and permitted by infection control policies.
- See below for the use of Transwarmers.

2. On arrival at referring unit

Ensure ambulance doors are kept closed to prevent heat loss whilst you are in the referring unit.

Use modalities to prevent heat loss:

- Hat
- Minimal handling – do not perform non-emergency procedures until warm
- Use the referring unit's incubator heat boost facility if available.
- Increase transport incubator temperature, and consider adding humidity.
- Ensure the room is warm prior to moving baby, minimise draughts
- Recheck axilla temperature with digital thermometer. Ideally, baby's temperature will be above 36.5°C before transfer
- Plan the baby's move into the transport incubator and perform with minimal delay
- If baby is <28/40 or <1kg, or temperature is <35°C, wrap bubble wrap around the baby leaving room for warm air to circulate. Do not completely seal around the baby as this traps a pocket of cooler air. Remember to ensure that the airway is not compromised, that venous and lines are secure and that venous access is readily available.
- Babies who are ventilated or on CPAP must have warmed humidified gas delivered. The current ventilator system uses an F+P humidifier.
- Use a heat and moisture exchanger (HME) if the baby is ventilated with a BabyPac ventilator, as the circuit does not work with the F+P humidifier.

Transwarmers

- These may be used to provide boosted heating where a transport incubator is not available, such as in a Babypod, or if the baby needs to be removed from the incubator for a procedure or for radiology (not MRI).
- Activate it and allow it to warm adequately before use. A second transwarmer may be required if there is a prolonged period of exposure to potential cooling.
- Do **not** use a Transwarmer™ inside a heated incubator – there is a danger of it overheating and tripping the incubator heater to shut down.
- If using a baby pod consider whether baby will benefit from a Transwarmer™ mattress
- Ensure that the Transwarmer™ temperature is between 19°C and 26°C before activation. **Do not** activate Transwarmer™ outside this range.
- See separate NISTAR guideline for the use of a transwarmer.

If baby's temperature is less than 36°C

- Recheck axillary temperature after 30 mins of warming.
- Ensure transport incubator is pre-warmed to maximum temperature.
- Add humidity to incubator if available.
- If transfer is time critical (e.g., gastroschisis) it may be necessary to transfer before baby has been completely rewarmed. Optimise the potential for rewarming during the journey using the methods described.

When in the Transport Incubator

- Maintain a thermoneutral environment (see chart below)
- Continually monitor baby's skin temperature using the transport incubator temperature probe, sited on lower abdomen using a reflecting disc. Ensure that the probe is the correct way up on the skin.
- Check that the baby's axillary temperature correlates with the skin temperature probe.
- Ensure that warm air flow is not blocked by bedding.

3. On transferring to the ambulance

- Operate incubator within thermoneutral range (see chart below)
- Use an incubator cover in cold or wet weather
- Remember to always use the ambulance power supply
- Careful adjustment of incubator temperature throughout the journey may be required.

4. On arrival at Receiving Unit

- Handover all aspects of baby's care to receiving team before moving the baby, including details of temperature control / stability.
- Measure and document axillary temperature immediately prior to moving baby from transport incubator
- Ensure all preparations for baby's transfer are made before opening transport incubator doors, and offer assistance to unit staff with moving baby.

Special considerations:

Overheating

This may occur in bigger babies, and hence careful monitoring and adjustment of incubator temperature is required during transfer.

Neonatal encephalopathy

Babies who have hypoxic ischemic encephalopathy (HIE) may be transferred to RMH for specialist body cooling.

These babies should be kept cool in transfer:

- See separate cooling protocol for detail
- Sufficient venous access, preferably including a UVC, should be secured before the baby becomes cool
- Keep core body temperature at 33.5°C – use a rectal temperature servo probe

Neutral Thermal Environmental Temperature Chart

Age and Weight	Environment Temperature	
	Starting °C	Range °C
0-6 Hours		
under 1200 grams	35.0	34.0-35.4
1201-1500 grams	34.1	33.9-34.4
1501-2500 grams	33.4	32.8-33.8
over 2500 grams (and over 36 weeks)	32.9	32.0-33.8
6-12 Hours		
under 1200 grams	35.0	34.0-35.4
1201-1500 grams	34.0	33.5-34.4
1501-2500 grams	33.1	32.2-33.8
over 2500 grams (and over 36 weeks)	32.8	31.4-33.8
12-24 Hours		
under 1200 grams	34.0	34.0-35.4
1201-1500 grams	33.8	33.3-34.3
1501-2500 grams	32.8	31.8-33.8
over 2500 grams (and over 36 weeks)	32.4	31.0-33.7
24-36 Hours		
under 1200 grams	34.0	34.0-35.0
1201-1500 grams	33.6	33.1-34.2
1501-2500 grams	32.6	31.6-33.6
over 2500 grams (and over 36 weeks)	32.1	30.7-33.5

Neutral thermal environment:

An environment in which the temperature is maintained in the neutral thermal zone. This is the range of environmental temperatures wherein the body temperature is readily maintained in a normal range and oxygen and glucose consumption is minimal.

