



# SLHD – Royal Prince Alfred Hospital Guideline

<b>Women and Babies: Thermoregulation in Neonates</b>	
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# Women and Babies: Thermoregulation in Neonates

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## Women and Babies: Thermoregulation in Neonates

### 1. Introduction

Thermoregulation is the ability to maintain a balance between heat production and heat loss. The maintenance of body temperature within a normal range will minimise both metabolic and oxygen consumption (neutral thermal zone). Current recommendations are to maintain core temperature between 36.5 and 37.5 °C at all times except in the context of therapeutic hypothermia. (1)

For otherwise healthy infants, early skin to skin contact after delivery increased infant temperature +0.3°C and promoted breastfeeding. (2) [LOE I GOR A] Routine monitoring of otherwise healthy infants to detect hypothermia (temperature < 36.5°C) can be with a axillary digital thermometer. (3)

Newborn infants, especially those born premature, low birth weight and/or sick are at risk of hypothermia. (4-6) Additionally, infants exposed to maternal chorioamnionitis, advanced neonatal resuscitation, delivery room temperature < 25°C, and/or cold unhumidified gases in the delivery room and during transport are at risk of hypothermia. (4, 5)

Extremely preterm infants who are hypothermic on admission have increased risk of death and neurodevelopmental impairment. (7-10) Admission temperature is a KPI for ANZNN data. Very preterm infants as well as infants born in low resources settings who are hyperthermic on admission are also at increased risk of mortality. (9, 11) Thermal care interventions in the delivery room for preterm neonates are associated with improved core body temperature [LOE I GOR B]. Specifically, use of a plastic bag or wrap with a plastic cap or with heated humidified gas was associated with lower risk of major brain injury and mortality [LOE I GOR B]. (12, 13) Care should be taken when using multiple interventions to avoid hyperthermia (13). [LOE I] [see RPAH\_GL2022\_031: Early management of extremely preterm and/or extremely low birthweight infants] A servocontrolled temperature probe placement in the dorsal, thoracic, or axillary area during delivery room resuscitation results in similar admission temperatures in moderately preterm infants. [LOE II]

Whilst an axillary digital thermometer temperature approximates rectal temperature in otherwise healthy infants (3), for very preterm infants on admission it has been reported that axillary temperature has a sensitivity of 65% when used to detect rectal hyperthermia and 100% sensitivity for hypothermia. [LOE III-2]

There is insufficient data to determine if the use of radiant warmers (and plastic wrap over the infant) versus incubators for regulating body temperature in newborn infants affects morbidities or mortality. However, use of a humidicrib reduces transepidermal water loss. (14) [LOE I] The use of servo-controlled incubators with abdominal skin temperature set at 36 ° C decreased neonatal mortality in preterm and low birth weight infants compared to the use of manual air temperature controlled incubators. (15) Current recommendations are to target the neutral thermal zone by targeting abdominal skin temperature set at 36.5° C through servocontrol. (15) [LOE I GOR B]

Interventions in the NICU that have been found to reduce hypothermia in very preterm infants include:

- use of servo-controlled incubators by targeting abdominal skin temperature set at 36.5° C (15); [LOE I]
- use of higher humidity compared to lower humidity in incubators (16-21); [LOE I]
- use of topical emollients including coconut oil (22); [LOE II]

- use of plastic wrap or plastic drapes for procedures in the NICU (23-27); [LOE I] and
- use of kangaroo mother care for stable low birthweight infants (28); [LOE I]

Therapeutic hypothermia for moderate to severe neonatal encephalopathy reduces neurologic disability and cerebral palsy and possibly mortality. (29, 30) [LOE I GOR A] Current evidence is insufficient to recommend routine therapeutic hypothermia for babies with mild encephalopathy. (31) [LOE I GOR D] Infants with hypoxic-ischaemic encephalopathy with elevated temperatures (>37.5°C) are at increased risk of death and disability. (32) [LOE III-2]

ANZCOR recommendation: For term and near-term infants at risk of hypoxic ischaemic encephalopathy, the target during resuscitation and stabilisation should be to maintain normothermia (with care to avoid hyperthermia), until a decision has been made that the newborn has signs of encephalopathy and meets criteria for induced hypothermia. Any newborn who is considered a possible candidate for therapeutic hypothermia should be discussed as soon as possible after initial resuscitation with a neonatal intensive care specialist. (33) [see [Therapeutic Hypothermia for Neonatal Hypoxic Ischemic Encephalopathy guideline](#)]. Servo controlled cooling (SCC) results in better thermoregulation in neonates undergoing therapeutic hypothermia compared to manually controlled cooling in the NICU (34) [LOE II] and during patient transport. (35) [LOE II]

Quality improvement thermoregulation initiatives within the delivery area and NICU can positively impact the outcomes for premature/very-low-birthweight infants. (36) [LOE III-3]

## **2. The Aims / Expected Outcomes of this Guideline**

- All clinical staff are aware of the importance of thermoregulation
- All clinical staff can safely manage the baby's environment to promote normothermia

## **3. Risk Statement**

SLHD Enterprise Risk Management System (ERMS) Risk # 105: Minimise adverse events

- Minimise risk of adverse events through increasing knowledge and skills

## **4. Scope**

- This guideline applies to clinical staff providing care in the Neonatal Intensive Care Unit (NICU) and Special Care Nursery (SCN) at RPA

## **5. Education and Training**

- Newborn thermoregulation work packages
- Unit based delivery of in-services as required

## **6. Implementation**

- Guideline available on RPA Newborn Care SharePoint, internet page and SLHD Intranet
- Distribution of guideline via email to NICU staff

## 7. Key Performance Indicators and Service Measures

- Monitoring of clinical incidents relating to thermoregulation managed via incident management system (IMS+)
- NICUS ePrem data collection – admission temperature infants born < 28 weeks gestation
- ANZNN Individual unit feedback: Admission temperature by gestational age and birthweight - Babies who were inborn and did not receive therapeutic hypothermia

## 8. Guidelines

### 8.1 Thermoregulation of newborn infants

Preterm infants are at an increased risk of hypothermia as they possess a disproportionate body mass-to-surface area ratio, reduced thermal insulation in decreased brown adipose tissue, a thin epidermis that has increased permeability with high transepidermal water loss (evaporation), poor vasomotor control and a naturally extended position that exposes a greater body surface area to the external environment. Preterm infants are at greatest risk for hypothermia immediately after birth in the delivery room and on admission to NICU. During the transition to extrauterine life, a newborn can experience heat loss at a rate of 1.0°C per minute. The newborn suffering cold stress will employ vasoconstriction of the peripheries or metabolism of brown adipose tissue. Hyperthermia is also associated with adverse outcomes in very preterm infants and asphyxiated infants. (37)

### 8.2 Neutral Thermal Zone

Neutral thermal zone (NTZ) or neutral thermal environment is defined as the external temperature range within which the metabolic rate and oxygen consumption are at a minimum, while the infant maintains a normal body temperature. The normal body temperature is 36.5 to 37.5°C. However, even within this range some infants will have central-peripheral temperature difference indicating cold stress. (38) The World Health Organisation (WHO) defines hypothermia as a body temperature <36.5°C [see table]. (37)

Temperature	Classification
>37.5°C	Hyperthermia
36.5°C - 37.5°C	Normal Range
36.0°C - 36.4°C	Mild Hypothermia
32.0°C – 35.9°C	Moderate Hypothermia
<32.0°C	Severe Hypothermia

#### Clinical considerations:

Newborn infants with moderate to severe hypoxic ischaemic encephalopathy should be considered for therapeutic hypothermia [see [Therapeutic Hypothermia for Neonatal Hypoxic Ischemic Encephalopathy guideline](#)].

Temperature fluctuations occur especially in response to environment especially in delivery room settings (12), extremely low birthweight infants (<1000 g) in the first 48 hours when vasomotor control is poor (38), during procedures including PICC insertion (23), and in infants with illness including sepsis who have sustained increases in central-peripheral temperature difference. (39) Infants with temperature fluctuations should have a clinical review to identify the disease and / or environmental cause.

### 8.3 Mechanism of Heat Transfer

**Evaporation:** Occurs when moisture on the surface of skin or within the respiratory tract converts to a vapour, which has a cooling effect. Consider evaporative heat loss for the newborn following birth or bathing.

**Conduction:** Occurs when skin comes into direct contact with a cooler surface, such as placing a baby on a cold scale or in a cot.

**Radiation:** Heat is radiated to cooler objects surrounding the infant although there is no skin contact, such as a cot placed next to a cold window.

**Convection:** Direct heat loss from the infant to the surrounding air, particularly when the air around the infant is lower than body temperature, such as air moving over the newborn during transfer.

### 8.4 Delivery Room Environment

Newborn infants, especially those born premature, low birth weight and/or sick are at risk of hypothermia (4-6). Additionally, infants exposed to maternal chorioamnionitis, advanced neonatal resuscitation, delivery room temperature < 25°C, and cold unhumidified gases in the delivery room and transport are at risk of hypothermia. (4, 5)

Thermal care interventions in the delivery room for preterm neonates are associated with improved core body temperature [LOE I GOR B]. Specifically, use of a plastic bag or wrap with a plastic cap or with heated humidified gas was associated with lower risk of major brain injury and mortality [LOE I GOR B]. (12, 13) Care should be taken when using multiple interventions to avoid hyperthermia. (13)

For otherwise healthy infants including vigorous late preterm infants, early skin to skin contact after delivery increased infant temperature +0.3°C and promoted breastfeeding (2) without complications. (40) [LOE I GOR A] Routine monitoring of otherwise healthy infants to detect hypothermia can be with a axillary digital thermometer. (3)

The following interventions are targeted at minimising heat loss, optimising heat gain, and preventing hypothermia (also called the 'warm chain'):

- The birth environment should be  $\geq 25^{\circ}\text{C}$  (37)
- Immediate drying for infants not immediately placed in a plastic wrap/polyethylene bag.
- For infants born < 32 weeks and /or <1500 g – place in plastic wrap/polyethylene bag (Neohelp™ see Figure) (12)
- Skin to skin contact and breast feeding (where appropriate) (12)
- If on radiant heater resuscitaire, ensure radiant heater on and correct heating setting (note that different systems have different heat outputs so familiarise yourself to the system). If placed in a transport incubator, prewarm incubator
- Ensure all linen and resuscitation equipment including surfactant prewarmed and use warm humidified gases when possible. (12)

- Education and awareness

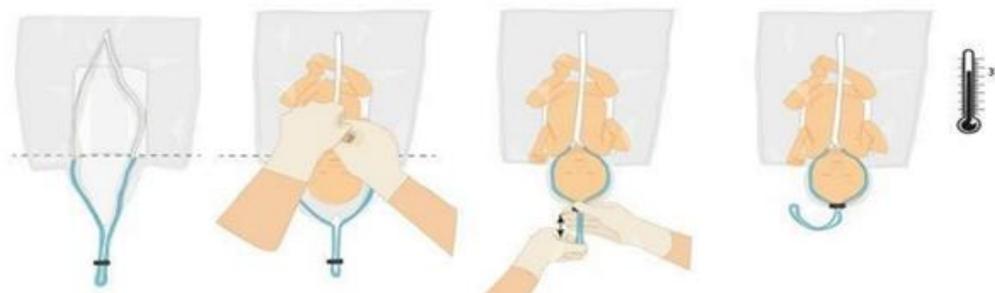


Figure 1. Neohelp Application (Image from WA Thermoregulation CPG)

### 8.5 Neonatal Admissions

On admission, the correct bed-type and temperature and humidity settings should be chosen based on each baby's needs. The NTZ and the baby's developmental requirements should guide these decisions ([see Appendices 1 and 2](#)).

Maintain core temperature within the NTZ at all times, with the aim to reduce variability and cold stress by maintaining between 36.7 and 37.2°C.

Any baby requiring humidity or with respiratory compromise or clinical instability should not be dressed or covered by fabrics.

All babies, irrespective of gestation, should have continuous skin temperature monitoring from admission until they are swaddled.

During resuscitations in the Neonatal Intensive Care Unit, it is essential to consider the maintenance of the newborn's temperature. Cold stress may be eliminated by employing overhead heat on the resuscitaire or ensuring appropriate heating in the humidicrib ([see Appendix 1](#)).

Warm blankets are available from Labour Ward.

#### Humidicrib

Humidicribs [incubators, 'Isolettes' or 'Baby Leos'] are fully enclosed cots that allow heated air and humidity to be added to the baby's environment whilst reducing stimuli including light and sound. These humidicribs are double walled to reduce radiant and conductive heat loss. Current humidicribs are efficient when only one side is opened for cares or procedures, but not when both sides are opened together which results in high convective and evaporative heat loss.

Humidicribs are the admission bed of choice for all babies born < 33 weeks gestation or ≤ 1800 g. Some preterm babies born ≥ 33 weeks gestation may require a humidicrib if hypothermic on admission. All preterm infants' ≤ 30 weeks' gestation and / or ≤ 1000 g should be nursed in the 'Draegar Baby Leo' where possible.

Term and near-term infants may be swaddled and nursed in a cot if stable. For those requiring respiratory care an open care system should be used. Infants with suspected

perinatal asphyxia should not be placed in a humidicrib as this places them at risk of hyperthermia.

When using a humidicrib, avoid or minimise the time doors on opposite sides of the humidicrib are open during procedures and cares – this practice will increase heat loss via convection. If using a Baby Leo, ensure touch time is activated before opening crib doors as this creates an air curtain to prevent heat loss.

### **Humidity**

Humidification function should only be used for babies < 28 weeks gestation. Immature skin barrier function leads to large insensible transepidermal water loss (TEWL) in the very preterm neonate.

In infants < 26 weeks gestation, humidity on 'Day 0' should be  $\geq 80\%$ . Avoid excessive rainout as visibility is reduced and bedding will be moist. Humidity target range at the end of the first week of life is 60-70% and humidity target range until 32 weeks of life is 50-65%. Please see the RPAH Newborn Care Early management of extremely preterm and/or extremely low birthweight infants Guideline for more detailed information on humidity.

### **Temperature**

Temperature should initially be set on air mode ([see Appendix 1](#)). After 15 minutes and/or after the skin temperature probe has correlated with the baby's axilla temperature, switch to 'skin mode'. Skin mode setting should be set at:

- 36.5°C for babies < 1500 g
- 36°C for babies > 1500 g

Precautions:

- Babies must never be nursed in a humidicrib with the power turned off
- Babies must have cardiorespiratory monitoring in place if there is a cover over the humidicrib and / or there is an unsafe sleep environment
- Always check the temperature and humidity settings have not changed if power is temporarily removed (e.g., if baby is moved to a different bedspace)
- Minimise the time doors on opposite sides of the incubator are open during procedures and routine care – this practice will increase heat loss via convection

### **Open Care /Radiant Warmer**

Infants'  $\geq 33$  weeks gestation may be nursed in an open care cot if they are normothermic and it is clinically indicated (e.g. requiring respiratory support or phototherapy).

Start on manual mode, set to 20-30% heat. After 15 minutes and/ or after the skin temperature probe has correlated with the axilla digital temperature, switch to skin mode set at 36°C and adjust as needed based on the axilla digital temperature readings.

## Standard Cot

Infants  $\geq 35$  weeks gestation may be swaddled and nursed in a standard cot. (see [Appendix 2](#))

- It is developmentally appropriate for the baby
- The baby is clinically stable

Note: babies in cots must be nursed in accordance with SIDS guidelines.

## Warming babies

If a baby is not maintaining their temperature  $\geq 36.5^{\circ}\text{C}$  in a cot, they should be re-warmed in a humidicrib, nested and nursed in only a nappy; or if appropriate, use a CosyTherm (see 8.9 Heated Mattress/CosyTherm).

### 8.6 Heating Modes

Mode	Use
Servo Mode/Baby Mode/Skin Mode/Servo Control	<p>Allows the operator to set a desired skin temperature for the baby and have the humidicrib or open care automatically adjust its heating output in response to the baby's actual skin temperature</p> <p>The baby must have continuous skin temperature monitoring for this mode and it is vital that the probe is correctly placed and visualised regularly for potential dislodgement or soiling</p>
Manual	User adjusts heater power and the option to monitor the baby's skin temp using the skin sensor

All babies  $< 32$  weeks gestation and / or  $< 1500\text{g}$  should be nursed in servo mode from admission

- After 32 weeks gestation servo mode is optional, however skin temperature monitoring should continue until the baby is swaddled
- All babies nursed on an open care should have skin temperature monitoring from admission set to servo mode until the baby is swaddled
- Attach skin probe to the axilla using Mepitac followed by a hydrogel gold teddy bear and ensure it is securely attached
- After 15 minutes check the axillary temperature and switch the device onto skin mode if the skin temperature is reflective of the axilla temperature
- Re-site the temperature probe at a minimum of daily, and once per shift if the skin is sensitive. Document and record on the medical record

### 8.5.1 Temperature Probes

Limited evidence on the ideal site for probe placement in NICU suggests similar results for axillary and abdominal probe sites. (41) For infant resuscitation of moderately preterm infants, dorsal, axilla and thoracic temperature probe positions yielded similar temperatures (42). The axilla is commonly preferred as it allows prone, supine and side lying positioning without needing to re-site the probe. However, the abdomen is also an acceptable site.

- Temperature probes are re-sited with a frequency of at least once daily, more often dependent on skin condition and recorded on the medical record
- Draeger Isolette 8000. Temperature probes are disposable and white in colour
- Open Care/Radiant Warmer. Re-usable temperature probes are attached to the device and used for an individual baby
- Draeger: BabyLeo's temperature probes are the yellow probes and are disposable
- When transferring the infant from servo to manual / air control, set the air temperature at the same temperature that was consistently delivered over the previous 24 hours. If the infant has significant temperature fluctuations, consider if the infant is ready to transition to manual control
- When undertaking cares or resiting the skin temperature probe, consider changing the humidicrib back to air mode for the interim whilst waiting for the skin temperature probe to read the baby's skin correctly. Following this the device can be switched back to skin mode

If a baby is taken out of a humidicrib (on servo mode) for skin to skin and the temperature probe is removed, change the crib to '**air mode**'. This ensures the humidicrib temperature does not fluctuate whilst baby is out for skin to skin, set the air temperature to what the baby has been needing prior to the cuddle.

Upon return to the humidicrib, reposition the temperature probe and remain on air mode until the baby's skin temperature has stabilised (i.e. 15 minutes). Then change back to servo mode.

#### **Manual Mode**

Clinicians using this mode must pay careful attention to prevent hypo / hyperthermia. This mode should only be used in stable infants who are  $\geq 33$  weeks CGA.

Manual Mode, also referred to as 'Air Mode', is used for pre-warming prior to admission and for ongoing thermoregulation management. Output temperature of humidicrib or open care is set by clinician based on their assessment of the infant's temperature and environment needs. There is no machine controlled/automatic feedback loop in this mode.

### 8.6.2 Weaning Humidicrib Temperatures in Manual Mode

If the infant has 2 or 3 consecutive axilla digital temperatures over  $37^{\circ}\text{C}$ , decrease the humidicrib temperature by  $0.3$  to  $0.5^{\circ}\text{C}$  and recheck the baby's temperature in 30 minutes. Ensure the temperature is stabilised before continuing to wean. Skin temperature monitoring should be continued until babies are swaddled.

## 8.7 Monitoring

Temperature probes provide continuous temperature monitoring and are recorded hourly on the observation chart. Frequency of measurement is dependent on stability and in general axilla digital temperature is taken prior to cares.

## 8.8 Transitioning out of the Humidicrib

Medically stable preterm infants can be transferred to unheated open cots e.g Neocots) at a lower body weight of 1600 grams without adverse effects on temperature stability or weight gain. Earlier transfer does not necessarily result in earlier discharge. (43) [LOE I] However, in addition to weight and gestational age criteria, developmental needs including positioning should be considered.

The following criteria should be considered for transition out of the humidicrib (see [Appendix 2](#) for decision making tool):

- Normothermia for  $\geq 24$  hours in humidicrib temperature  $\leq 28^{\circ}\text{C}$ .
- Demonstrated consistent weight gain.
- $\geq 35$  weeks gestation.
- Medically stable, and
- Able to hold and maintain head in midline.

Some babies may be developmentally ready to transition out of a humidicrib but still require some thermoregulatory assistance or developmental care. Open care systems with radiant heaters or use of heated mattress aids may be considered in babies requiring thermoregulation. For more information of assessing and meeting developmental needs, see the Developmental Positioning Guideline (SharePoint).

## 8.9 Heated Mattress/CosyTherm©

The heated mattress may be used as an aid in transitioning from humidicrib to cot. It is not used as a rewarming device for hypothermic infants. Temperature selection of the heated mattress is manually adjusted by the nurse to deliver the required set temperature to maintain normothermia for baby.

### Prior to taking baby out of incubator:

- Appropriate weight usually  $\geq 1800$  g
- Birthweight has been regained and appropriate weight-gain
- Clinically stable
- Tolerating full enteral feeds
- Maintaining normothermia in incubator set at  $\leq 28^{\circ}\text{C}$  with baby lightly dressed

### Setting up the CosyTherm

- Secure the control unit to the cot and plug into the mains supply
- Place the mattress in the cot with the printed side at the bottom away from baby and the lead at the foot of the bed

- Switch the control unit on using the green switch at the right
- The machine will do the safety checks. Ensure it is set on the 33-37°C option
- Set machine temp to 37°C

#### **Nursing care of babies on the Heated Mattress/CosyTherm**

- Cover CosyTherm mattress with a thin cotton sheet
- Check that temp is set at 37°C
- Baby should be lightly dressed with one layer of clothing e.g. jump suit and nappy. Wrap baby loosely with a thin cuddly and cover with a cuddly and blanket or 2 blankets
- Take axilla temperature 30mins after transfer to cot. The mattress temperature should be adjusted every 30 minutes +/- 0.5°C if the baby's temperature is >37°C Continue to record axilla temperature every 30 minutes for 2 hours
- If normothermia is maintained for 2 hours then temperature can be taken 3-4 hourly with routine cares/feeds
- Do not bath baby after transition to cot until baby's temperature has been normal and stable for 48 hours

#### **Failure to maintain normothermia:**

- If the axilla digital temperature remains < 36.5°C but > 36.0°C on four successive occasions, transfer baby back into incubator for at least 24 hours
- Babies must be transferred back into the incubator if the axilla temperature is ≤ 36°C at any time or if their clinical condition deteriorates
- Set incubator temperature the same as before transfer

#### **Weaning from the Heated Mattress/CosyTherm**

- Reduce the mattress temperature by 0.5°C 3 to 4 hourly with feeds / cares as tolerated until the mattress setting is 35°C. Do not hurry this process
- Once the infant is maintaining axilla temperature at ≥ 37°C for 3 to 4 hours the heated mattress can be turned off. Keep mattress in situ until you are satisfied that the temperature will remain stable and then remove mattress

#### **Cleaning and storage**

- Clean CosyTherm mattress and control unit before and after use with mild detergent wipes
- Do not bend or fold mattress
- Do not place objects on top of mattress (except another CosyTherm mattress)
- Do not impair integrity of mattress covering – NO pins
- Store mattress and control unit safely

#### **8.10 Infection Control**

- Humidicribs are changed every 7 days and should be wiped over daily with suitable neutral detergent wipes

- If humidity is ceased, the water chamber must be emptied and dried before returning to the humidicrib
- The BabyLeo™ are changed every two weeks. To ensure specific post humidity cleaning, the humidity bag remains attached and clamped once humidity is ceased until the BabyLeo™ undergoes the specific cleaning process
- Open care systems require changing every 14 days and should be wiped over daily with suitable neutral detergent wipes
- Open cots do not require changing but should be wiped over daily with suitable neutral detergent wipes

## 9. Definitions

<i>BAT</i>	Brown Adipose Tissue
<i>NTZ</i>	Neutral Thermal Zone
<i>ANZNN</i>	Australia and New Zealand Neonatal Network
<i>TEWL</i>	Transepidermal Water Loss
<i>Hypothermia</i>	Temperature <36.5 °C
<i>Hyperthermia</i>	Temperature >37.5 °C
<i>Axillary digital temperature</i>	Taken with digital thermometer
<i>Continuous skin temperature monitoring</i>	Probe placed in axilla (preferred) or other suitable site including thorax, abdomen or dorsal

## 10. Consultation

NICU Guideline Committee

NICU Staff Clinicians

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[https://www.rch.org.au/rchcpg/hospital\\_clinical\\_guideline\\_index/Thermoregulation\\_in\\_the\\_Premature\\_Infant/#neutral-thermal-environment-chart](https://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Thermoregulation_in_the_Premature_Infant/#neutral-thermal-environment-chart)

## 12. National Safety and Quality Standard/s, 2<sup>nd</sup> ed

-  Clinical Governance Standard
-  Preventing and Controlling Healthcare-Associated Infection Standard
-  Comprehensive Care Standard
-  Communicating for Safety Standard
-  Recognising and Responding to Acute Deterioration Standard

### 13. Appendix 1 Neutral Thermal Zone

Age	Weight (grams)	Starting Temperature (°C)	Range of Temperature (°C)	Age	Weight (grams)	Starting Temperature (°C)	Range of Temperature (°C)
0 - 6 Hours	< 1200	35.0	34.0 - 35.4	4 - 12 Days	< 1500	33.5	33.0 - 34.0
	1200 - 1500	34.1	33.9 - 34.4		1501 - 2500	32.1	31. - 33.2
	1501 - 2500	33.4	32.8 - 33.8		> 2500	Day 4-5: 31.0	30.5 - 32.6
	> 2500	32.9	32.0 - 33.8			Day 5-6: 30.9	29.4 - 32.3
6 - 12 Hours	< 1200	35.0	34.0 - 35.4			Day 6-8: 30.6	29.0 - 32.2
	1200 - 1500	34.0	33.5 - 34.4			Day 8-10: 30.3	29.0 - 31.4
	1500 - 2500	33.1	32.2 - 33.8		Day 10-12: 30.1	29.0 - 31.4	
> 2500	32.8	31.4 - 33.8	12 - 14 Days	< 1500	33.5	32.6 - 34.0	
12 - 24 Hours	< 1200	34.0		34.0 - 35.4	1501 - 2500	32.1	31.0 - 33.2
	1200 - 1500	33.8		33.3 - 34.3	Over 2500	32.8	31.8 - 33.8
	1501 - 2500	32.8		31.8 - 33.8	> 2500	29.8	29.0 - 30.8
	> 2500	32.4	31 - 33.7	2-3 weeks	< 1500	33.1	32.2 - 34.0
24 - 36 Hours	< 1200	34.0	34.0 - 35.0		1501 - 2500	31.7	30.5 - 33.0
	1200 - 1500	33.6	33.1 - 34.2	3-4 weeks	< 1500	32.6	31.6 - 33.6
	1501 - 2500	32.6	31.6 - 33.6		1501 - 2500	31.4	30.0 - 32.7
	> 2500	32.1	30.7 - 33.5	4-5 weeks	< 1500	32.0	31.2 - 33.0
36 - 48 Hours	< 1200	34.0	34.0 - 35.0		1501 - 2500	30.9	29.5 - 35.2
	1200 - 1500	33.5	33.0 - 34.1	5-6 weeks	< 1500	31.4	30.6 - 32.3
	1501 - 2500	32.5	31.4 - 33.5		1501 - 2500	30.4	29.0 - 31.8
	> 2500	31.9	30.5 - 33.3				
72 - 96 Hours	< 1200	34.0	34.0 - 35.0				
	1200 - 1500	33.5	33.0 - 34.0				
	1501 - 2500	32.2	31.1 - 33.2				
> 2500	31.3	29.8 - 32.8					

Table 1: Neutral Thermal Zone [44]

### 13.1 Appendix 2: Decision Making Tool for Transitioning out of Humidicribs

At RPAH Newborn Care, the decision to move babies out of humidicribs and into cots or open care systems should be made by assessment of both the babies’ thermoregulatory and developmental needs. The following flowchart should be used to assess developmental readiness:

#### Neurodevelopmental Considerations for Transitioning from Humidicrib to Cot



Table 2: Considerations for transferring from humidicrib to cot (RPA Newborn Care Physiotherapists)