

NCCU CLINICAL GUIDELINES

SECTION: 15

NEUROLOGY

Section: 15 Neurology
Systemic cooling for neuroprotection in neonates ≥ 35 wks gestational age with HIE
Date Revised: February 2012

Neonatology Clinical Guidelines
King Edward Memorial/Princess Margaret Hospitals

Perth Western Australia

SYSTEMIC COOLING FOR NEUROPROTECTION IN NEONATES ≥ 35 WEEKS GESTATIONAL AGE WITH HYPOXIC ISCHAEMIC ENCEPHALOPATHY (HIE)

This guideline is only for neonates ≥ 35 weeks gestation at birth. Hypothermia is not advisable for preterm neonates < 35 weeks gestation.

HIE following perinatal asphyxia contributes significantly to neonatal mortality and morbidity including long-term neurodevelopmental sequelae in up to 25%-60% of survivors.

Evidence from high quality RCTs indicates that cooling of neonates with moderate to severe HIE is safe and reduces the risk of death or disability at 18 to 22 months of age.

Therefore, cooling is the first intervention which has been proven in rigorously conducted scientific studies to be beneficial in term & near term neonates with HIE.

This guideline comes in 6 parts:

Part 1 – guideline for management in NICU at KEMH/PMH

Part 2 – guideline for the NETS team

Part 3 – guideline for referring hospitals

Part 4: – flow chart outlining management and standard investigations

Part 5 – data collection form for internal audit

Part 6 – parent information sheet

PART 1 – GUIDELINE FOR MANAGEMENT IN NICU AT KEMH/PMH

Essential: the following four inclusion criteria should be met to be eligible for cooling

INCLUSION CRITERIA

1. \geq 35 weeks gestational age
2. < 6hrs post birth.
3. Evidence of asphyxia as defined by the presence of at least two of the following four criteria:
 - a) Apgar <6 at 10 min or continued need for resuscitation with positive pressure ventilation +/- chest compressions at 10mins.
 - b) Any acute perinatal event that may result in HIE (ie. abruption of placenta, cord prolapse, severe FHR abnormality etc).
 - c) Cord pH <7.0 or base deficit of 12 or more.
 - d) If cord pH is not available, arterial pH <7.0 or BE >12mmol/l within 60mins of birth (if able to do gas).
4. Moderate or severe HIE based on modified Sarnat Classification (s. table below).

If a neonate meets eligibility criteria 1, 3, and 4 but is 6-12 hours of age, delayed initiation of cooling may be considered at the discretion of the attending neonatologists.

The presence of moderate/severe HIE according to the modified Sarnat Classification is defined as seizures **OR** presence of signs in at least three of the six categories given below:

Category	Moderate encephalopathy	Severe encephalopathy
Level of consciousness	Lethargic	Stupor/coma
Spontaneous activity	Decreased activity	No activity
Posture	Distal flexion, full extension	Decerebrate
Tone	Hypotonia	Flaccid
Primitive reflexes	Weak suck, incomplete Moro	Absent suck, absent Moro
Autonomic system		
Pupils	Constricted	dilated/non- reactive
Heart rate	Bradycardia	Variable heart rate
Respirations	Periodic breathing	Apnea

EXCLUSION CRITERIA

1. <35 weeks gestation

When screening a neonate for eligibility of cooling, please tick/fill in below list in the medical notes. Use the dedicated stamp.. This documentation applies to all neonates with HIE screened for eligibility of cooling, not just the ones who actually meet inclusion criteria and/or receive cooling.

Individual eligibility criteria checklist (please use stamp and put in medical notes):

- GA ≥ 35 weeks	Yes/no
- Apgar <6 at 10 minutes	Yes/no
- Need for assisted ventilation at 10 min	Yes/no
- Cord pH/postnatal pH <7	Yes/no
- Cord or postnatal base deficit > 12	Yes/no
- Level of consciousness	Awake/ lethargy/ stupor/ coma
- Spontaneous activity	Normal/ reduced/ no activity
- Posture	Normal/decerebrate/decorticate
- Tone	Normal/hypotonia/hypertonia
- Suck reflex	Normal/ weak/ absent
- Moro's reflex	Normal/ weak/ absent
- Pupils	Normal/ constricted/ dilated/NR
- Heart rate	Normal/bradycardia/variable
- Respirations	Normal/ periodic/ apnea
- Seizures	Yes/no
- Congenital anomaly	Yes/no
- Chromosomal anomaly	Yes/no
- Severe IUGR (BW <1800g)	Yes/no
- In extremis	Yes/no
- Ano-rectal anomaly	Yes/no
- Suspected head trauma or ICH	Yes/no

If the infant meets eligibility criteria for cooling, please follow the guidelines below.

Management

1. The decision to cool a neonate with HIE is made by the attending neonatologist or senior registrar.
2. In order to be effective, cooling should commence as soon as possible, i.e., within 6 hrs of birth.
3. Aim is to achieve target temperature range within 1 hour.
 - **Active cooling** – for 72 hours from the initiation of cooling.
 - **Rewarming** - 12 hours of active gradual re-warming time after completion of 72 hours of cooling.

Note: the 84 hour period of cooling and re-warming commences from the time cooling begins and not from the time of birth.

ACTIVE COOLING PHASE – MAINTENANCE OF TARGET RECTAL TEMPERATURE FOR 72 HOURS USING THE MEDITHERM 3 SERVO CONTROLLED COOLING AND WARMING MACHINE

Infant Cooling and rewarming are preferably done using the Meditherm 3. Manual cooling with cool packs is to be used in the NICU only if all the Meditherm machines are in use for other babies. Cooling should never be withheld or delayed because of unavailability of the Meditherm machine.

- Place the disposable neonatal mattress, paper side up underneath the baby. A single sheet can be used over the mattress if required.
- Connect the tubes to the grey insulated hose from the machine.
- Make sure all clamps are in the open position, both on the grey hose and on the neonatal mattress.
- Press the on switch, located at the front lower left of the Meditherm 3 machine.
- Select the centre square button, THE AUTOMATIC MODE. Tab to select the speed - choose the middle speed.
- Set the target temperature of the patient with the far lower right hand side square button. To cool below 36°C, keep the button depressed to confirm and set the new patient cooling set temperature to 33°C.
- The Meditherm machine will now cool the infant.
- When the infant temperature is approaching the target temp the machine will slow down automatically to prevent significant undershooting and will maintain the target temperature until the rewarming phase.

REWARMING PHASE – THIS PHASE WILL TAKE UP TO 12 HRS.

- After the period of cooling, to rewarm the infant, set the target temperature to the desired temperature 37°C, continue with the MODERATE rate setting which will rewarm the patient at 0.33°C per hour, i.e. from 33 to 36.5°C over 12 hours.
- The single patient neonatal mattresses can be used for up to 12 days.
- Once the infant's core temperature reaches 36.5°C at 12 hours the mattress is removed and the machine is turned off.
- The rectal probe is removed.
- Monitor neurological status closely during the rewarming phase.



ACTIVE COOLING PHASE – MAINTENANCE OF RECTAL TEMPERATURE BETWEEN 33.0 AND 34.0 FOR 72 HOURS USING COOL PACKS

Cooling using cool packs should be done only if all the Meditherm cooling machines are already in use. Cooling should not be delayed or withheld because of unavailability of Meditherm cooling machine. Cool gel packs are also a good method of cooling babies.

- Nurse the infant on a radiant warmer with warmer off
- Do not nurse on a sheepskin
- Do not dress
- Leave nappy unfastened
- Insert rectal probe and tape the 10cm mark to the upper inner aspect of the thigh. This depth will give an accurate core temperature. The probe remains in situ for the duration of the cooling period
- Set alarm limits for rectal temp at 33.0 – 34.0° Celsius
- Full cardiopulmonary monitoring including invasive blood pressure if possible
- Use cold packs from the fridge, never frozen
- Always put cold packs in cotton bags

Temperature algorithm	Number of cool packs to be applied	Areas to apply
>37.0	4	Head, shoulders, neck, trunk
36.1 – 37.0	3	Shoulders, neck, trunk
35.1 -36.0	2	Shoulders, trunk
34.1 – 35.0	1	Trunk
33.0-34.0	0	Nil

- When rectal temp <33.0, set radiant warmer on manual and gradually adjust heater output to maintain rectal temp at 33.0 – 34.0⁰ Celsius. Turn off the heater once temperature reaches 33.5.
 - If infant is ventilated, leave ventilation humidity at normal temperature
 - When hypothermia has been achieved & temperature range is stable, apply Brainz Monitor
 - Cooling should not be stopped earlier than the 72 hour period. If the attending neonatal consultant decides to stop cooling earlier the reason must be documented in the medical records.
 - All other documentation/care/treatment should be as per NICU routine care of infant requiring intensive care
 - Advise/reassure parents re: appearance, cool to touch
- Caution: watch temperature range more closely in infants treated with anticonvulsants or muscle relaxants as they may cool much quicker

REWARMING PHASE – THIS PHASE WILL TAKE UP TO 12 HRS.

- Takes place after the completion of 72 hrs of cooling and **not** 72 hrs after birth
- Rewarming process should be gradual and occur over a period of 10-12 hours; rapid rewarming may be harmful.
- Apply skin temperature probe and turn radiant warmer on if switched off
- Set servo at 34.0⁰ Celsius
- Increase servo temp by 0.5 every 2 hours until rectal temperature is 36.5⁰ Celsius
- Adjust alarm limits accordingly on rectal temp range as temp increases
- Record both skin & rectal temp hourly
- When normothermia has been achieved, **pay particular attention to avoid overheating the infant above 37⁰ Celsius**

INVESTIGATIONS: PLEASE ENSURE BELOW INVESTIGATIONS ARE DONE AND RECORDED IN THE MEDICAL NOTES.

Investigations	Day 1	Day 2	Day 3	Day 4
Full blood picture	Y	Y	Y	Y
U & E's, Creat, Ca	Y	Y	Y	Y
Lactate	Y	Y	Y	N
PT, PTT	Y	Y	Y	Y
Glucose	Y	Y	Y	Y
Neuro assessment/ Modified Sarnat staging*	Y	Y	Y	Y
ABG/CBG	Y	Y	Y	Y
LFT's	Y	Y	Y	N
12 ECG (only if concerns)	-	-	-	-
Brainz Monitor	Y	Y	Y	
EEG (usually at 72hr)			Y	-
MRI (before day 8, ideally on day 4)	-	-	-	Y-

***Modified Sarnat staging:**

1. Mild: hyperalertness, hyper-reflexia, dilated pupils, tachycardia, absence of seizures.
2. Moderate: lethargy, hyper-reflexia, miosis, bradycardia, seizures, hypotonia with weak suck & Moro.
3. Severe: stupor, flaccidity, small to midposition pupils which react poorly to light, decreased stretch reflexes, hypothermia, absent Moro.

Follow-up: Please inform the discharge coordinator to ensure appropriate follow up including developmental assessments are arranged.

PART 2 – GUIDELINE FOR THE NETS TEAM

SYSTEMIC COOLING FOR NEUROPROTECTION IN NEONATES \geq 35 WEEKS GESTATION WITH HYPOXIC ISCHAEMIC ENCEPHALOPATHY (HIE)

In addition to cooling, the rest of the management is routine and in accordance with the transport protocol.

Once a call has been received from the peripheral hospital, the senior registrar or consultant will discuss with the referring GP/Paediatrician regarding the eligibility and feasibility of cooling the neonate. Once a decision is made to cool the infant, the referring physician will commence cooling using appropriate equipment. **Earlier the cooling is commenced better will be the outcome.**

Equipment

Esky contents:

- Four cold packs at fridge temp
- Two frozen cold packs
- Disposable rectal temperature probe (Mallinckrodt Mon-A-Therm, size 9Fr)
- Cable to connect temperature probe to Propaq monitor
- Cotton covers for cold packs

Management

1. In order to be effective, cooling should commence as soon as possible and definitely within 6 hrs of birth.
2. Please advise the referring physician to avoid overheating the infant and to commence cooling if they have the resources and they are able to do so.
3. If the referring team is unable to commence active cooling, discuss the importance of **passive** cooling and aim to reach the hospital as quickly as possible to commence cooling.
4. Insert rectal probe and tape the 10cm mark to the upper inner aspect of the thigh. This depth will give an accurate core temperature. The probe remains in situ for the duration of the cooling period.
5. Connect the rectal temperature probe to the monitor (remove T2)
6. Arterial line insertion is not a prerequisite for beginning cooling during transport. Insert an arterial line if the overall clinical condition necessitates the presence of a line.
7. Connect to full cardiopulmonary monitoring

Active cooling phase:

(Aim is to achieve target temperature range within 1 hour).

1. Do not dress, leave nappy unfastened
2. Always put cold packs in cotton bags

Temperature algorithm	Number of cool packs to be applied	Areas to apply
>37.0	4	Head, shoulders, neck, trunk
36.1 – 37.0	3	Shoulders, neck, trunk
35.1 -36.0	2	Shoulders, trunk
34.1 – 35.0	1	Trunk
33.0-34.0	0	Nil

3. When rectal temp <33.0, set radiant warmer on manual and gradually adjust heater output to maintain rectal temp at 33.0 – 34.0⁰ Celsius. Turn off the heater once temperature reaches 33.5.
4. **Maintain rectal temperatures between 33.0⁰ and 34.0⁰Celsius**
5. If infant ventilated, leave ventilation humidity at normal temperature
6. Cooling should not be stopped earlier than the 72 hour period. If the attending neonatal consultant decides to stop cooling earlier the reason must be documented in the medical records.
7. All other documentation/care/treatment should be as per routine care of infant requiring transport.
8. Advise/reassure parents re: appearance, cool to touch

Caution: watch temperature range more closely in infants treated with anticonvulsants or muscle relaxants as they may cool much quicker

PART 3 – GUIDELINE FOR REFERRING HOSPITALS

SYSTEMIC COOLING FOR NEUROPROTECTION IN NEONATES ≥ 35 WEEKS GESTATION WITH HYPOXIC ISCHAEMIC ENCEPHALOPATHY (HIE)

Dear Doctor/Nurse/Midwife

The following guidelines are intended for cooling asphyxiated neonates with HIE who are waiting to be transported to Princess Margaret or King Edward Memorial Hospitals for ongoing management. All neonates who need cooling should be transported to the neonatal intensive care units at Princess Margaret Hospital or King Edward Memorial Hospital, Perth. Do not attempt to manage these sick neonates at your hospital. In addition to cooling, the rest of medical management is the same as any asphyxiated neonate with HIE. Please discuss with the senior registrar or neonatal consultant at Princess Margaret Hospital for overall management of these neonates.

This guideline is only for neonates ≥35 weeks gestation at birth. Cooling is not advisable for preterm neonates.

SUMMARY

HIE following perinatal asphyxia contributes significantly to neonatal mortality and morbidity including long-term neurodevelopmental sequelae in up to 25%-60% of survivors.

Evidence from high quality studies indicates that cooling of neonates with moderate to severe HIE is safe and reduces the risk of death or disability at 18 to 22 months of age.

If you think, the neonate you are caring for meets all or some of the criteria for cooling, please discuss with the neonatologist or senior registrar on call at Princess Margaret Hospital.

Essential: the following four inclusion criteria should be met to be eligible for cooling

1. ≥35 weeks gestational age
2. < 6hrs post birth.
3. Evidence of asphyxia as defined by the presence of at least two of the following four criteria:
 - a) Apgar <6 at 10 min or continued need for resuscitation with positive pressure ventilation +/- chest compressions at 10mins
 - b) Any acute perinatal event that may result in HIE (ie. abruption of placenta, cord prolapse, severe FHR abnormality etc)
 - c) Cord pH <7.0 or base deficit of 12 or more
 - d) If cord pH is not available, arterial pH <7.0 or BE >12mmol/l within 60mins of birth (if able to do gas).
4. Presence of moderate or severe hypoxic ischaemic encephalopathy, based on the criteria in the table below.

If a neonate meets eligibility criteria 1, 3, and 4 but is 6-12 hours of age, delayed initiation of cooling may be considered at the discretion of the attending neonatologist at Princess Margaret Hospital.

The presence of moderate/severe HIE is defined as seizures **OR** presence of signs in at least three of the six categories given below:

Category	Moderate encephalopathy	Severe encephalopathy
Level of consciousness	Lethargic	Stupor/coma
Spontaneous activity	Decreased activity	No activity
Posture	Distal flexion, full extension	Decerebrate
Tone	Hypotonia	Flaccid
Primitive reflexes	Weak suck, incomplete Moro	Absent suck, absent Moro
Autonomic system		
Pupils	Constricted	Dilated /non - reactive
Heart rate	Bradycardia	Variable heart rate
Respirations	Periodic breathing	Apnoea

Exclusion criteria

1. <35 weeks gestation

If you are considering a neonate at your institution to fulfil inclusion criteria for cooling, please consult with the attending NETS consultant at Princess Margaret Hospital prior to initiation of cooling. After this discussion, if the neonate meets eligibility criteria for cooling, please follow the guidelines below.

Management

1. If the decision is made to initiate cooling at your institution after consultation with the NETS Team & prior to the arrival of the NETS Team, cooling should commence as soon as possible and within 6 hrs of birth.
2. Give the information sheet to parents and discuss with them the benefits of cooling
3. Nurse the infant on a radiant warmer with warmer off, do not nurse in incubator (=PASSIVE cooling). Many asphyxiated babies have poor temperature control, and overheating the baby may worsen existing brain damage. Thus, pay particular attention to avoid body temperature > 36.5⁰ Celsius
4. Do not nurse on a sheepskin
5. Do not dress (=PASSIVE cooling)
6. Leave nappy unfastened
7. Full cardiopulmonary monitoring

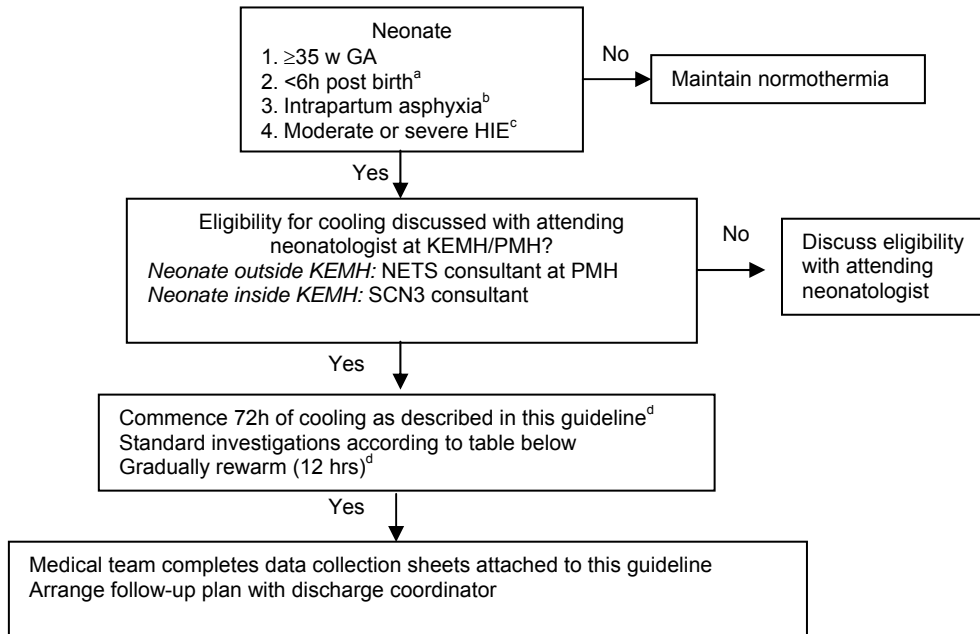
8. If staffing and resources for monitoring and management are sufficient **and** if retrieval by the NETS team will be more than 6 hours following birth, continue passive COOLING and initiate ACTIVE cooling as per **algorithm**, if the axillary temperature after 1 hr of passive cooling is still $>35.0^{\circ}$ Celsius.
9. Use cold packs from the fridge, **never** frozen
10. Always put cold packs in cotton bags or wrap in a cotton cover or Chux.

Temperature algorithm	Number of cool packs to be applied	Areas to apply
>37.0	4	Head, shoulders, neck, trunk
36.1 – 37.0	3	Shoulders, neck, trunk
35.1 -36.0	2	Shoulders, trunk
34.1 – 35.0	1	Trunk
33.0-34.0	0	Nil

11. Monitor axillary temperatures every 15 minutes
12. WATCH TEMPERATURE CLOSELY. If axillary temp drops to <33 , set radiant warmer on manual and gradually adjust heater output to maintain axillary temp at 33.0 – 34.0 . Turn off the heater once temperature reaches 33.5.
13. Aim is to achieve target temperature range within 1 hour but more importantly continue to manage airway, breathing, circulation.
14. If ventilated, leave ventilation humidity at normal temperature
15. All other documentation/care/treatment should be the same as in any asphyxiated infant waiting for transport to PMH/KEMH.
16. Advise/reassure parents re: appearance, cool to touch
17. Transfer them at the earliest to PMH/KEMH.
18. The transport team will bring all the necessary equipment to continue the cooling process during transport.
19. For further information on cooling please see the entire protocol.



Part 4: – flow chart outlining management and standard investigations



^a If a neonate meets eligibility criteria 1, 3, and 4 but is 6-12 hours of age, delayed initiation of cooling may be considered at the discretion of the attending neonatologists; ^b See page 2 of this guideline; ^c See list below* and pages 2 - 3 of this guideline; ^d See pages 3 - 5 of this guideline

Standard Investigations	Day 1	Day 2	Day 3	Day 4
Full blood picture	Y	Y	Y	Y
U & E's, Creatinine, Ca	Y	Y	Y	Y
Lactate	Y	Y	Y	N
PT, PTT	Y	Y	Y	Y
Glucose	Y	Y	Y	Y
Neuro assessment & Modified Sarnat staging*	Y	Y	Y	Y
ABG/CBG	Y	Y	Y	Y
LFT's	Y	Y	Y	N
12 lead ECG (only if concerns)	-	-	-	-
Brainz Monitor	Y	Y	Y	-
EEG (usually at 72hr)	-	-	Y	-
MRI (before day 8, ideally on day 4)	-	-	-	Y

***Modified Sarnat staging of HIE:**

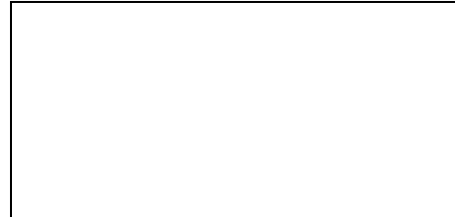
- Mild:** hyperalertness, hyper-reflexia, dilated pupils, tachycardia, absence of seizures.
- Moderate:** lethargy, hyper-reflexia, miosis, bradycardia, seizures, hypotonia with weak suck & Moro reflex.
- Severe:** stupor, flaccidity, small to midposition pupils which react poorly to light, decreased stretch reflexes, hypothermia, absent Moro reflex.

PART 5 – DATA COLLECTION FORM

COOLING DATA COLLECTION FORM

BASELINE DATA

Infant's details (use sticker):



Date of birth:

Time of birth:

Sex:

Place of birth:

Maternal ID:

Maternal age:

G P

Significant maternal history:

Gestation: wks days

Birth weight: g

Apgars (1/5/10 min):

Cord arterial blood pH:

Cord arterial lactates:

Cord arterial base deficit:

Lowest pH within first 60 min of life:

Highest base deficit within first 60 minutes of life:

Highest lactate level within first 60 minutes after birth:

Position (e.g., vertex, breech, etc):

Delivery by (e.g., SVD, ECS, NELUSCS, Vacuum, Forceps, etc):

Sentinel event (e.g., APH, cord accident, shoulder dystocia, etc):

Cooling initiated on the basis of the following:

a. Evidence of asphyxia as follows (≥ 2 criteria):

b. HIE stage at enrolment (modified Sarnat): II	<input type="checkbox"/>	III	<input type="checkbox"/>
Cooling initiated before arrival at PMH/KEMH?	Yes <input type="checkbox"/>	No	<input type="checkbox"/>
Age at arrival in the nursery:	minutes		
Age (-minutes) at initiation of cooling:	minutes		
Arterial line inserted:	Yes <input type="checkbox"/>	No	<input type="checkbox"/>
BRAINZ monitor installed:	Yes <input type="checkbox"/>	No	<input type="checkbox"/>
Seizures?:	No <input type="checkbox"/>	Clinically <input type="checkbox"/>	Electrically <input type="checkbox"/>
Total days on respiratory support:	d (Ventilation	d; CPAP	d)
First suck feed initiated on day:	d		
Full feeds established on day:	d		
Total days at PMH/KEMH:	d		
First MRI done on day:	d		
Infant died during hospitalisation:	Yes <input type="checkbox"/>	No	<input type="checkbox"/>

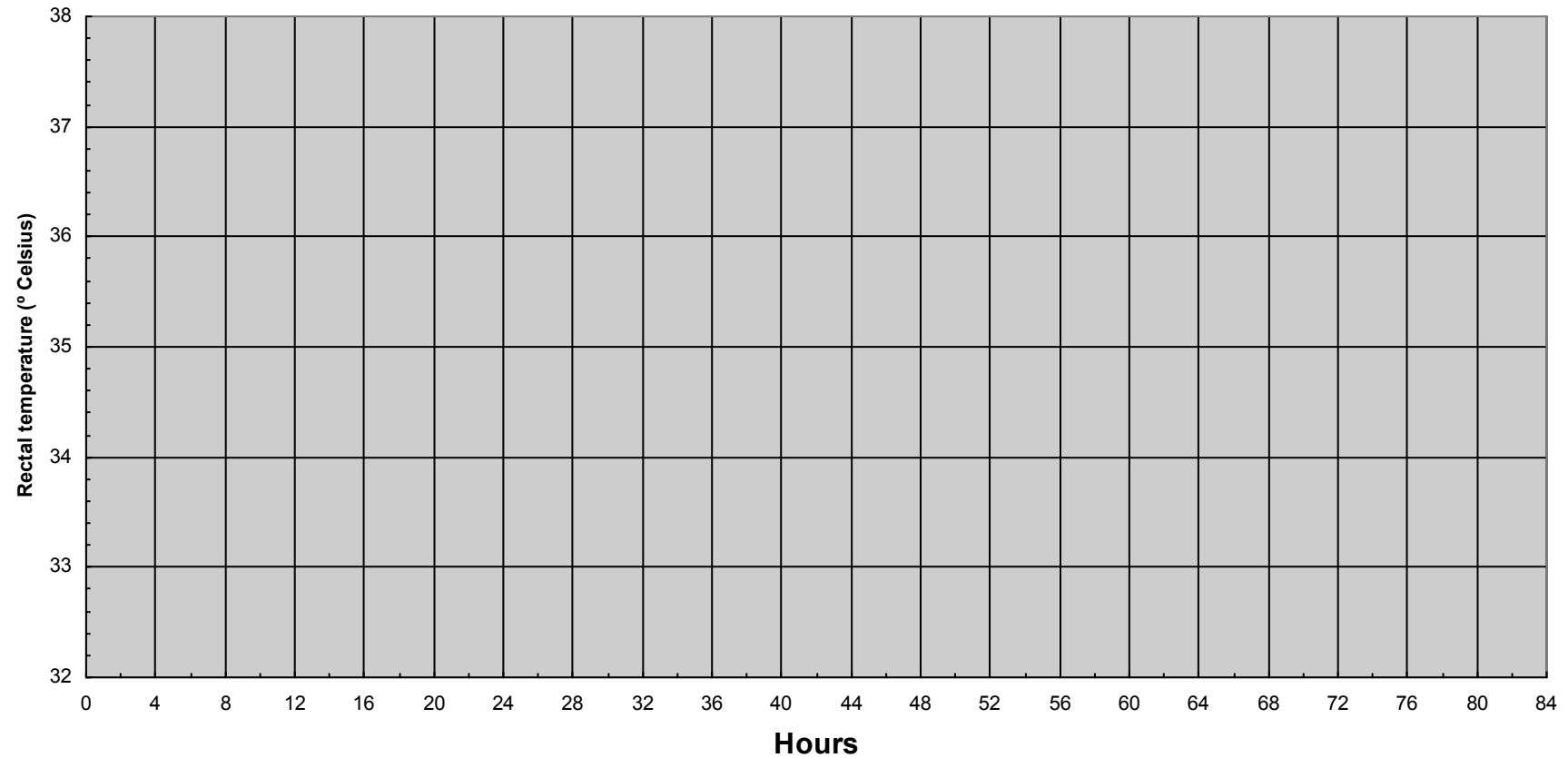
Individual eligibility criteria checklist:

- | | |
|-------------------------------------------|---------------------------------|
| - GA ≥ 35 weeks | Yes/no |
| - Apgar <6 at 10 minutes | Yes/no |
| - Need for assisted ventilation at 10 min | Yes/no |
| - Cord pH/postnatal pH <7 | Yes/no |
| - Cord or postnatal base deficit > 12 | Yes/no |
| - Level of consciousness | Awake/ lethargy/ stupor/ coma |
| - Spontaneous activity | Normal/ reduced/ no activity |
| - Posture | Normal/decerebrate/decorticate |
| - Tone | Normal/hypotonia/hypertonia |
| - Suck reflex | Normal/ weak/ absent |
| - Moro's reflex | Normal/ weak/ absent |
| - Pupils | Normal/ constricted/ dilated/NR |
| - Heart rate | Normal/bradycardia/variable |
| - Respirations | Normal/ periodic/ apnea |
| - Seizures | Yes/no |
| - Congenital anomaly | Yes/no |
| - Chromosomal anomaly | Yes/no |
| - Severe IUGR (BW <1800g) | Yes/no |
| - In extremis | Yes/no |
| - Ano-rectal anomaly | Yes/no |
| - Suspected head trauma or ICH | Yes/no |

OUTCOME

- natural death on (dd/mm/YYYY, hh/mm):
- death due to withdrawal of life sustaining technology on (dd/mm/YYYY, hh/mm):
- discharged home on (dd/mm/YYYY):
- transferred to other hospital on (dd/mm/YYYY, name of hospital):

Temperature control during cooling (0-72 h) and rewarming (72-84 h)



(Zero hours is the time of initiation of cooling)

Were there any issues in

temperature control? No Yes as follows:

monitoring? No Yes as follows:

Was cooling terminated prematurely? No Yes because of:

ADVERSE EVENTS

Where there any adverse events/serious events?

Events	Adverse events	Date Dd/mm/yyyy
Major cardiac arrhythmia		
Major venous thrombosis		
Severe hypotension		
EKG evidence of arrhythmia		
Coagulopathy – clinical		
Coagulopathy – biochemical		
Thrombocytopenia		
Difficulty achieving hypothermia		
Difficulty in rewarming		
Skin breakdown/necrosis/sclerema		
Death		

LABORATORY FINDINGS (attach printout from Clinical Manager including the following data):

INVESTIGATIO NS	Day 1 (admission day)	Day 2	Day 3	Day 4
Blood gases	Y	Y	Y	Y
Lactate	Y	Y	Y	-
FBP	Y	Y	Y	Y
PT, PTT	Y	Y	Y	Y
Glucose	Y	Y	Y	Y
LFT's	Y	Y	Y	-
U's & E's	Y	Y	Y	Y
Creat & Ca	Y	Y	Y	Y

NEUROLOGICAL EXAMINATION:

Item	Baseline	24 hours	72 hours	7 days
Consciousness				
Activity				
Posture				
Tone				
Moro				
Suck				
Rooting				
DTR				
Seizures				

EEG (attach report or state report summary):

MRI (attach report or state report summary)

PART 6 – PARENT INFORMATION SHEET

‘COOLING BABIES TO PROTECT THEIR BRAIN’

About one in a thousand newborn babies suffer from the effects of reduced blood flow or oxygen supply to their brain around the time of birth. This can result in brain damage. In addition, the ongoing chain of harmful metabolic changes in the brain that occur subsequently can also contribute to worsening brain damage.

Approximately 40% of those babies who survive with moderate to severe damage to their brain will develop long-term disabilities like cerebral palsy and mental retardation.

In the past there were no treatments to reduce the severity of brain damage in these newborn babies. However, evidence from recently concluded high quality studies has shown that cooling such babies minimizes the brain damage, increases the chances of survival and reduces the severity of possible long-term disability.

Your baby needed significant resuscitation at birth to help him/her breathe. He/she appears to have suffered from the effects of lack of oxygen and blood supply to the brain. Hence cooling will be offered to him/her in addition to the standard intensive care support. His/her body temperature will be slowly lowered and kept between 33.0 to 34.0⁰ Celsius for 72 hours.

This cooling will be achieved using cold packs. Subsequently he/she will be gradually re-warmed to normal temperature of 36.5⁰ Celsius.

If you need further information please do not hesitate to ask any of the nurses or doctors caring for your baby.