

Local Guideline and Procedure



John Hunter
Children's Hospital
CHILDREN. YOUNG PEOPLE AND FAMILIES



Health
Hunter New England
Local Health District

Cooling for Hypoxic Ischemic Encephalopathy (HIE)

Sites where Local Guideline and Procedure applies	Neonatal Intensive Care Unit, JHCH
This Local Guideline and Procedure applies to:	
1. Adults	No
2. Children up to 16 years	No
3. Neonates – less than 29 days	Yes
Target audience	NICU clinical staff who provide care to neonatal patients who meet the criteria for cooling following Hypoxic Ischaemic Encephalopathy
Description	Provides information to the clinician about criteria for cooling and procedure to cool and infant

[Hyperlink to Procedure](#)

Keywords	Active and passive cooling, Asphyxia, cooling, encephalopathy, hypoxia, sarnat
Document registration number	JHCH_NICU14.03
Replaces existing document?	Yes Moderate systemic hypothermia for the treatment of neonatal hypoxic ischemic encephalopathy (HIE)
Registration number and dates of superseded documents	5.8.9
Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:	<ul style="list-style-type: none"> NSW Health Policy Directive 2014_036 Clinical Procedure Safety http://www0.health.nsw.gov.au/policies/pd/2014/pdf/PD2014_036.pdf NSW Health Policy Directive 2010_006 Whole Body Cooling - Neonates Suspected Moderate or Severe Hypoxic Ischaemic Encephalopathy(HIE) http://www0.health.nsw.gov.au/policies/pd/2010/PD2010_006.html
Prerequisites (if required)	N/A
Local Guideline and Procedure note	This document reflects what is currently regarded as safe and appropriate practice. The guideline section does not replace the need for the application of clinical judgment in respect to each individual patient but the procedure/s require mandatory compliance . If staff believe that the procedure/s should not apply in a particular clinical situation they must seek advice from their unit manager/delegate and document the variance in the patients' health record.
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This document contains advice on therapeutics	No

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Note: Over time links in this document may cease working. Where this occurs please source the document in the PPG Directory at: <http://ppg.hne.health.nsw.gov.au/>

RISK STATEMENT

This local guideline has been developed to provide guidance to clinical staff in NICU to assist in the cooling management of neonatal encephalopathy. It ensures that the risks of harm to the infants whilst caring for an infant cooled for the treatment of neonatal encephalopathy are identified and managed.

Any unplanned event resulting in, or with the potential for injury, damage or other loss to infants/staff/family as a result of this management must be reported through the Incident Information management System and managed in accordance with the Ministry of Health Policy Directive: Incident management PD2007_061. This would include unintended injury that results in disability, death or prolonged hospital stay.

Risk Category: Clinical Care & Patient Safety

Cooling for Hypoxic Ischaemic Encephalopathy - One Page Summary and Checklist

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GUIDELINE

Cooling process

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Cooling of infants after moderate to severe encephalopathy due to intra-partum hypoxia has the ability to reduce the severity of damage that has occurred. Refer to the guideline 'Neonatal encephalopathy management in NICU', JHCH_NICU_14.02 for further information.

Passive cooling

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This is a process of allowing the infant to cool down of their own accord through the removal of the usual interventions undertaken to keep infants warm. The eventual goal is a rectal temperature between 33°C and 34°C. To achieve this, follow these steps:

- Use continuous rectal temperature monitoring.
- Insert rectal thermistor/probe into rectum at least 5cm:

- tape at the 10cm (first) mark to the upper inner thigh. It is very important that the probe is in at least this far to accurately measure the baby's core temperature – the probe is designed for this purpose and will not cause mucosal trauma
- Record time of commencement of passive cooling and record rectal temperature every 15 minutes.
- Nurse the infant on a radiant warmer with warmer off. Do not nurse in incubator.
- Do not nurse on a sheepskin.
- Nurse infant naked. Do not dress, use a hat or use any form of wrap (plastic or cloth).
- Leave nappy unfastened.
- If rectal temp drops below 33.5°C, set radiant warmer on manual and gradually adjust heater output to maintain rectal temp in the range 33°C to 34°C.

Active cooling

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- Use whole body cooling to 33.0-34.0°C, with a target of 33.5°C.
- It is important to discuss the cooling and rewarming procedure with the parents as soon as possible to reduce anxiety
- Use continuous rectal temperature monitoring.
- Insert rectal thermistor/probe into rectum at least 5cm: tape at the 10cm (first) mark to the upper inner thigh. It is very important that the probe is in at least this far to accurately measure the baby's core temperature – the probe is designed for this purpose and will not cause mucosal trauma
- Record time of commencement of active cooling, check rectal temperature every 15 minutes and record hourly.
- The '**Arctic Sun**' is a cooling system designed to automatically modulate water temperature to achieve a set patient target temperature for the management of infants with HIE
- Connect Arctic Sun to main power supply and switch on the button at the rear of the unit-note: All fluid delivery lines are permanently attached to the back of the unit. The system has a prefilled water reservoir therefore does not require water to be added to the system prior to use.
- Wait for the system self-test
- Select "**Power on**" (unit will automatically default to hospital settings, but if required can be changed by selecting the "advanced set up" screen)
- **Place pad under the torso of the baby.** –should only be used on **intact skin**. Select pad size according to size of the baby (1 each size on Arctic Sun)-large size for infants >3.5kg and small size for infants 2.5kg -3.5kg. The pad is radiolucent therefore suitable for all radiological investigations.
- Place the **fluid delivery line at the foot of the bed and connect fluid delivery lines on the pad to the Arctic Sun's fluid delivery line.**
- Ensure temperature probe is connected into the back of the unit and then **connect rectal probe to this.**
- From Patient selection main screen, **select Hypothermia.**



Arctic Sun



Hypothermia Screen of Arctic Sun

- Settings will be displayed in the “ **therapy control window**” at the bottom of the screen
- **Visually verify the target temperature and duration settings required.**
- **Press the green start button.** The Arctic Sun will automatically modulate the water temperature to achieve the target temperature.
- The “**Cool Patient Window**” will **blink to confirm therapy** is in progress-adjustments can be made using the Up/Down arrows.

If Arctic Sun unavailable to cool, apply cool packs (around 10°C)

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- Up to 2 ‘Cold/Hot’ packs (‘ICE’ packs) can be placed under the shoulders/upper back, under the head or across the chest/body:
- Record the number of packs on nursing chart with routine hourly observations
- Use packs from the refrigerator only (NEVER the freezer)
- Use cotton covers
- When rectal temperature < 34.5°C, reduce cooling by removing 1 or 2 ‘ICE’ packs
- When rectal temperature < 34°C, stop active cooling by removing all ‘ICE’ packs
- If temperature falls below 33.5°C, set radiant warmer on manual and gradually adjust heater output to maintain rectal temperature at around 33.5°C
- Active cooling will also be reduced if the inspired oxygen increases by more than 20% or if the infant is treated with anticonvulsants or muscle relaxants, until the temperature response to these is observed.
- Record the time and number of ICE packs that are applied and removed

Cooling will be stopped if there is persistent hypoxaemia in 100% oxygen, a life threatening coagulopathy, an arrhythmia requiring medical treatment (not sinus bradycardia) and/or after mutual discussion between parents and senior clinicians.

Rewarming

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Rewarming is started at 72 hours after the start of active cooling with the Arctic Sun.

- An **alert will sound** when the rewarming phase is initiated.

- **Press the green start button to confirm.** A tone and voice will confirm rewarming and the “**Rewarming Patient Screen**” will blink.
- At the **end of rewarming phase of 12 hours the time will indicate 00:00**

When rewarming phase is finished, remove the pad from under the infant ,disconnect the pad from the unit and dispose in the bin. The **water reservoir does not** require water to be **drained** as an antibacterial solution has been added and the water is recirculated

If Arctic Sun unavailable to rewarm, follow these directions

- Re-warming will occur at a rate not exceeding 0.5°C every 2 hours
- Apply skin probe and turn the radiant warmer on with the servo set at 34.5°C.
- Increase the set temperature by no more than 0.5°C every 2 hours until set at ~36.8°C and rectal temperature is ~37°C.
- It should take up to 12 hours for rewarming.

Rectal temperature should be closely monitored during the rewarming phase, which includes observing every 15 minutes and recording hourly until normothermia is achieved, to prevent the detrimental effects of rebound hyperthermia.

Nursing Implications

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The preferred method of temperature monitoring during hypothermia is by continuous monitoring with a rectal probe place 5cms into the rectum and secured as described to the upper thigh of the infant.

This probe is then attached to the Arctic Sun cooling device and core temperature is recorded continuously. This is supplemented by intermittent axilla temperature at least 4th hourly. Sinus bradycardia and hypotension may be more frequently observed in the active cooling of an infant.

The infant must be nursed on an open care bed with full cardiopulmonary monitoring throughout the procedure.

Ventilated infants must receive warm and humidified gases therefore **do not** turn heating off on respiratory support devices.

Record the commencement of cooling phase and reheating phase on flow chart.

Hourly recording of Arctic Sun temperature must be recorded on the patient flow chart.

Axilla temperature should be undertaken at least 4th hourly to ensure core temperature correlates with Arctic Sun temperature.

All infants who meet the eligibility criteria should be considered for cooling.

New User Training Option- for further information prior to using the Arctic Sun select the New User Training button at the bottom right of the screen when the monitor initially turns on. This will provide information on the system overview, treating patients, advanced set up and setup & maintenance.



Initial screen of Arctic Sun monitor turned on- access New User Training

References

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Bard Medical, Arctic sun 5000. Setting a new standard for whole body cooling. Accessed on 6/1/2016 < <http://www.bardmedical.com/media/768825/ttm-neonatal-brochure.pdf> >

Jacobs SE, Berg M, Hunt R, Tarnow-Mordi WO, Inder TE, Davis PG. Cooling for newborns with hypoxic ischaemic encephalopathy. Cochrane Database Syst Rev. 2013 Jan 31;1:CD003311

Whole Body Cooling - Neonates Suspected Moderate or Severe Hypoxic Ischaemic Encephalopathy (HIE); NSW health policy directive 2010, PD2010_006

FEEDBACK

Any feedback on this document should be sent to the Contact Officer listed on the front page.

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