Passive Cooling for Neonatal Encephalopathy

Dr Deborah Harris, Nurse Practitioner
Objectives

- Recognition of neonatal encephalopathy
- Therapeutic hypothermia (Cooling)
- Passive cooling
What is Neonatal Encephalopathy?

Clinically defined syndrome, of disturbed neurological function within the first week of life in the term (≥ 37 weeks) infant, manifested by difficulty in initiating and maintaining respiration, depression of tone and reflexes, subnormal level of consciousness and often seizures.

PMMRC Neonatal encephalopathy working group definition
Sarah: Day 1
Which babies

- **Perinatal asphyxia:**
  - Apgar score < 6 at 10 minutes
  - Ongoing resuscitation requirement including positive pressure ventilation after 10 minutes
  - Cord blood gas pH < 7.0 or BE > -12 mmol/l
  - Blood gas within 1 h after birth pH < 7.0 or BE > -12 mmol/l

- Clinical signs consistent with moderate or severe neonatal encephalopathy
Clinical signs of moderate or severe encephalopathy

<table>
<thead>
<tr>
<th>Seizures or up to three of the following</th>
<th>Moderate</th>
<th>Severe</th>
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</thead>
<tbody>
<tr>
<td>Level of consciousness</td>
<td>Lethargy</td>
<td>Stupor or coma</td>
</tr>
<tr>
<td>Spontaneous activity</td>
<td>Decreased</td>
<td>None</td>
</tr>
<tr>
<td>Posture</td>
<td>Arms flexed – legs extended</td>
<td>Arms and legs extended</td>
</tr>
<tr>
<td>Tone</td>
<td>Hypotonia</td>
<td>Flaccid</td>
</tr>
<tr>
<td>Reflexes</td>
<td>Weak suck, incomplete moro</td>
<td>No suck or moro</td>
</tr>
<tr>
<td>Autonomic system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupils</td>
<td>Constricted</td>
<td>Dilated / Non-reactive</td>
</tr>
<tr>
<td>Heart rate</td>
<td>Bradycardic</td>
<td>Variable heart rate</td>
</tr>
<tr>
<td>Respirations</td>
<td>Periodic</td>
<td>Apnoea</td>
</tr>
</tbody>
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*Modified Sarnat Criteria*
Neuroprotective effects of therapeutic hypothermia, if commenced within 6 hours of birth

- Less babies die or survive with major disability at 18 - 22 months corrected age
- Less babies surviving with cerebral palsy
- Improved cognitive outcomes
- Improved motor outcomes
What is happening in New Zealand?

Babies total n = 227  (2010 n = 82, 2011 n = 67, 2012 n = 78)
Passive cooling for neonatal encephalopathy

Probable neonatal encephalopathy

Contact Level III consultant
Does the baby meet the criteria for moderate or severe neonatal encephalopathy?
Baby ≥ 36 weeks gestation and < 6 hours after birth

Yes
Commence passive cooling and prepare for transport to Level III nursery

No
Maintain normothermia

Nurse baby naked with the nappy unfastened on radiant warmer with the heating off
Measure rectal temperature* – aim for 33.5 to 34.5 °C

Measure the baby’s temperature every 30 minutes

Yes
Is baby’s temperature falling?

No
Baby’s temperature > 34 °C

Baby’s temperature > 33 °C

*If rectal temperature monitoring is not available use axilla temperature recordings

If two temperatures > 34 °C contact Level III consultant to seek advice about commencing active cooling
Example

Baby 1

Arrival of transport team (turn off radiant warmer)

Arrival at NICU

Temperature (°C)

Age (minutes)
Sarah: Day 6
Take home messages

• Recognise neonatal encephalopathy
• Call for help
• Start cooling as soon as possible

\textit{it makes a difference}


8th Annual Report of PMMRC
### Temperature Algorithm

Aim for 33.5 to 34.5°C

<table>
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<tr>
<th>Temperature Algorithm</th>
<th>Number of cool packs</th>
<th>Areas to apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 35.5 °C</td>
<td>2</td>
<td>under shoulders and across chest</td>
</tr>
<tr>
<td>34.0 - 35.5 °C</td>
<td>1</td>
<td>across chest</td>
</tr>
<tr>
<td>&lt; 34.0 °C</td>
<td>0</td>
<td>none</td>
</tr>
</tbody>
</table>

More than 2 cool packs prevents radiant heat loss and makes cooling more difficult
