KAISER PERMANENTE® RIVERSIDE SERVICE AREA **NEONATAL INTENSIVE CARE UNIT (NICU) POLICIES AND PROCEDURES**			**Number:**	SC.RSA.NICU.2499
			Effective Date:	8/16
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Title:	Passive Cooling for Hypoxic Ischemic Encephalopathy		**Revision:**	8/18, 1/25
Policy Owner:	Clinical Manager, NICU			
Approved By:	Executive Committee: 3/25		**Page(s):**	1 of 6

SCAL Regional Guidelines 12-2024

PURPOSE:
To standardize the care of infants who meet criteria for therapeutic hypothermia. This policy addresses passive cooling measures by outlining the process for initiating and monitoring passive therapeutic hypothermia for the treatment hypoxia-ischemic encephalopathy (HIE) of the newborn.

SCOPE/COVERAGE
Infants greater than or equal to 35 weeks gestation diagnosed with Hypoxic-Ischemic Encephalopathy (HIE) are treated with whole body cooling to a core temperature of 33.5 degrees Celsius, as a neuro protective therapy. Initiation of active cooling should occur ideally before 6 hours of age, at a designated cooling center. The cool body temperature is maintained for 72 hours and then the infant is re-warmed over a 6-hour period (re-warming period may be extended due to instability).

This procedure will take place in the Neonatal Intensive Care Unit (NICU) with licensed physicians and nurses, who are trained and competent in this process. Decision to proceed with active therapeutic hypothermia will be at the discretion of the designated cooling center/receiving medical center.

Infants will not be actively cooled. Only passive cooling will be done while the baby is waiting transport to appropriate facility.

DEFINITIONS
Hypoxic ischemic encephalopathy (HIE) – Birth asphyxia

Neonatal encephalopathy (NE) – A "clinically defined syndrome of disturbed neurologic function in the earliest days of life in the full-term infant, manifested by difficulty with initiating and maintaining respiration, depression of tone and reflexes, subnormal level of consciousness and often seizures".

POLICY STATEMENT:

A. Eligibility: See Hypothermia Protocol (Attachment A) and information outlined below

Neonatologist to determine whether the infant meets criteria to initiate therapeutic hypothermia. If therapeutic hypothermia is being utilized outside of the set criteria, the risks and benefits will be discussed with the family prior to using this treatment modality.

1. Infants will be evaluated for therapeutic hypothermia therapy based on inclusion criteria of:
    a. Gestational age greater than or equal to 35 weeks
    b. Birth weight equal to or greater than1800 grams
    c. Equal to or less than six hours of age - infants older than six hours of age based on the neonatologist's discretion
    d. Absence of an obvious and apparent disorder incompatible with survival
    e. Physiologic criteria including a major perinatal event – Refer to Attachment A

f. Neurologic exam criteria – Refer to Attachment A

2. Exclusion Criteria for initiating therapeutic hypothermia includes:
   a. Inability to initiate therapeutic hypothermia by 6 hours of age, or per neonatologist's discretion.
   b. Gestational age less than 35 weeks.
   c. Birth weight less 1,800 grams.
   d. Presence of known chromosomal anomalies or severe congenital anomalies/syndromes/known metabolic disorders, as determined by the neonatologist.
   e. Evidence of head trauma or skull fracture causing major intracranial hemorrhage.
   f. Intractable coagulopathy with active bleeding.
   g. Parent refusal.

B. **Management of Infants Eligible for Passive Cooling born at <u>Non-Cooling</u> Medical Centers**

Calling for Transport – Transports for potential/actual therapeutic hypothermia are emergent. Inform the transport team whether the neonatologists have decided to begin passive cooling or whether the baby is being transported only for consultation purposes.

1. Call the identified Kaiser Permanente cooling center for any infant that has a history of acute perinatal event / at risk for HIE according to the hypothermia protocol sheet (refer to Attachment A). The referring Neonatologist will speak directly to the receiving Neonatologist to explain in detail the condition of the baby.
   a. Kaiser Downey - Phone (562) 657-7550, Tie Line 8-327
   b. Kaiser LAMC – Phone (323) 783-9411, Tie Line 8-363
   c. Kaiser Panorama City – Phone (818) 375-2822, Tie Line 8-350
   d. SDMC – Phone (858) 266-2400, Tie Line 6340
   e. OCA – Phone (714) 644-7040, Tie Line 8-215
   f. Hawaii – Phone (808) 432-8540

2. Document core (rectal/esophageal) temperature every 15 minutes. The temperature goal is 33.5°C – 34.0°C. Continuous rectal/esophageal monitoring can be performed with a soft probe inserted into the patient and attached to the monitor.
   a. Core probe placement
      i. Esophageal probe
         1. Measure from nares, to earlobe, to xiphoid process; then subtract 3 cm
         2. Insert to desired depth
         3. Confirm esophageal probe placement via ex-ray
            a. Mark probe at nares once placement is confirmed via x-ray
            b. Probe should terminate in the distal third of esophagus
      ii. Rectal probe
         1. Insert lubricated 5cm into the rectum
         2. Tape to infant's upper inner thigh to secure
      iii. Monitor core probe (esophageal or rectal) placement Q1 hour

3. For passive cooling measures: once resuscitation measures are complete, the heat source should be adjusted to achieve the core temperature goal of 33.5°C – 34.0°C. Ensure continuous temperature monitoring is in place via rectal/esophageal core probe and document every 15 minutes. Active warming devices (radiant heater or incubator) can be turned off to maintain temperature between 33.5°C - 34.0°C.
4. If the patient temperature is < 33.0°C add a blanket or increase set temperature by 0.5°C at a time. If the patient temperature is > 34°C and is not falling, remove any blankets and ensure heat source is off.

5. Do not let patients shiver. Counter-warm extremities as needed by wrapping the extremities with a cloth blanket. Consider the use of morphine for individual babies who continue to shiver or who are uncomfortable/agitated.
6. Obtain IV access. UAC/UVC or PAL access preferred.
7. Laboratory / blood work: ABG (corrected for temperature), CBC with Diff, Electrolytes, Calcium, Magnesium, Glucose, Blood culture, ALT, AST, BUN, Creatinine, APTT, INR, PT, Lactic Acid, Ammonia, Troponin, and Fibrinogen.
8. Respiratory support – many babies on morphine drip or receiving morphine boluses need some form of respiratory support. This can be obtained through nasal continuous positive airway pressure (with or without a rate) or through invasive mechanical ventilation. Maintain humidity & temperature of respiratory circuit as standard
9. Medical management as needed including normal saline bolus, vasopressors, acidosis management, blood products, ventilator management, antibiotics, seizure control (1st choice agent is Phenobarbital).
10. Required documentation, in addition to routine charting:
    a. Identify on the hypothermia flow sheet, the time when passive cooling is implemented.
    b. Identify in the vital sign flow sheet the exact time that the baby reaches 33.5°C, if applicable.

PRACTICE GUIDELINE: THERAPEUTIC HYPOTHERMIA

1. **Passive Cooling Prior to the Initiation of Therapeutic Hypothermia (e.g., within Labor and Delivery)**
    a. **Begin passive cooling process as equipment and supplies are obtained and assembled.**
    b. **Begin passive cooling after heart rate and airway have been stabilized. This includes turning off/down the radiant warmer and closely monitoring infant's core temperature (esophageal/rectal probe) every 15 minutes. Goal temperature is 33.5°C - 34.0°C**

Caution: Cooled babies have depressed metabolism, so generate less heat. Avoid over cooling.

ELIGIBILITY CRITERIA FOR THERAPEUTIC HYPOTHERMIA

Neonatologist to determine whether the infant meets criteria to initiate therapeutic hypothermia. If therapeutic hypothermia is being utilized outside of the set criteria, the risks and benefits will be discussed with the family prior to using this treatment modality.

Inclusion Criteria

- Eligible infants must meet both physiologic and neurologic criteria, without meeting exclusion criteria.
- Infants must meet either criteria A1 **OR** A2, **AND** criteria B to be eligible for therapeutic hypothermia.

Exclusion Criteria

- Inability to initiate therapeutic hypothermia by 6 hours of age, or per neonatologist's discretion.
- Gestation age less than 35 weeks.
- Birth weight less than 1800 grams.
- Presence of known chromosomal anomaly or severe congenital anomalies/syndromes/known metabolic disorders, as determined by the neonatologist.
- Evidence of head trauma or skull fracture causing major intracranial hemorrhage.
- Intractable coagulopathy with active bleeding.
- Parent refusal.

All infants will be evaluated for the following:

1. History of an acute perinatal event
   - abruptio placenta
   - cord prolapse
   - severe FHR abnormality: variable or late decelerations
2. Apgar score
   - $\leq$ 5 at 10 minutes.
3. Cord pH or first postnatal blood gas pH at <1 hour
   - pH $\leq$ 7.0.
4. Base deficit on cord gas or first postnatal blood gas at <1 hour
   - $\geq$ −16 mEq/L (Negative 16 or more).
5. Continued need for ventilation initiated at birth and continued for at least 10 minutes.

Criteria A: Clinical and Biochemical Evaluation

IF BLOOD GAS IS AVAILABLE:	IF BLOOD GAS IS NOT AVAILABLE OR pH between 7.01 and 7.15, OR BASE DEFICIT −10 to −15.9 mEq/L

A1 - Infant should have: # 3 or 4 from above that is: • Cord pH or first postnatal blood gas within 1 hour with pH ≤7.0 **OR** • Base deficit on cord gas or first postnatal Blood gas within 1 hour at ≥ −16 mEq/L	**A2 - Infant should have: #1 and 2 or # 1 and 5 from above that is:** Acute perinatal event **AND** • An Apgar score <5 at 10 minutes **OR** • Continued need for ventilation initiated at birth and continued for at least 10 minutes

Criteria B: Neurologic examination

- Presence of electrical (noted on EEG) or clinical seizures.

OR

- Moderate to severe encephalopathy - presence of one or more signs in 3 of 6 categories of moderate to severe encephalopathy (Table 1 – Neurological Examination Criteria).

Table 1. Neurological Examination Criteria

Category	Moderate Encephalopathy	Severe Encephalopathy
1. Level of consciousness	Lethargic	Stupor or coma
2. Spontaneous Activity	Decreased activity	No activity
3. Posture	Distal flexion, complete extension	Decerebrate
4. Tone	Hypotonia (focal or general)	Flaccid
5. Primitive Reflexes		
• Suck	Weak	Absent
• Moro	Incomplete	Absent
6. Autonomic System		
• Pupils	Constricted	Deviated, dilated, non-reactive to light
• Heart rate	Bradycardia	Variable HR
• Respirations	Periodic breathing	Apnea

Attachment A: Passive Cooling Packet

REFERENCES:

California Perinatal Quality Care Collaborative. (2015). Early Screening and Identification of Candidates for Neonatal Therapeutic Hypothermia Toolkit.

Department of Health Care Services, State of California—Health and Human Services Agency. (2016, November 17). Numbered Letter: 06-1116: Program Requirements for Providing Neonatal Therapeutic Hypothermia.