WHY WE COOL
(33.5 X 72 HOURS BEFORE 6 HOURS)

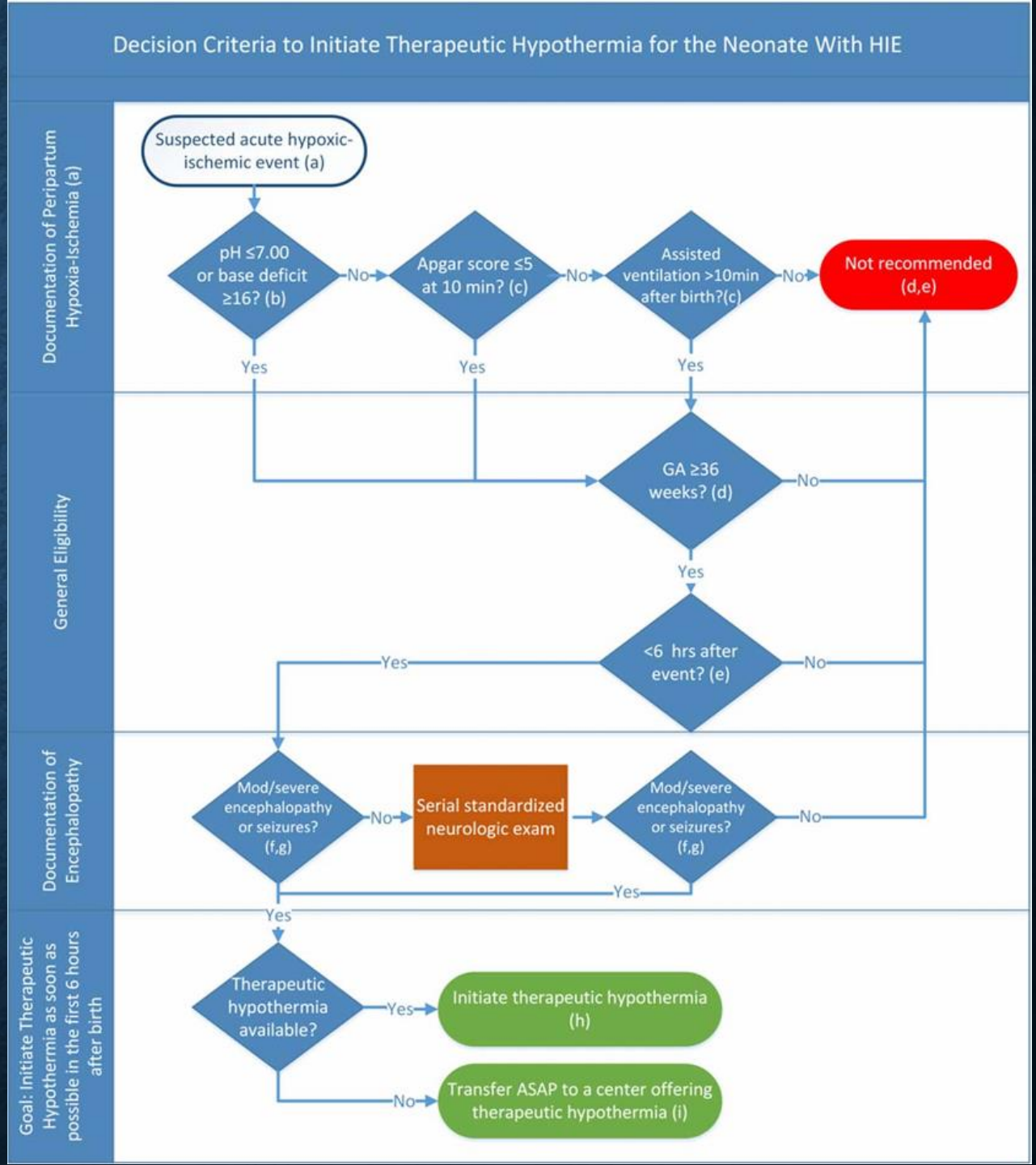
Multiple RCT demonstrated:

- Reduces Mortality 9-12%
- Reduced Severe disability from 30% to 20%
- Combined death/disability decreased from 44% to 29% (NICHD optimization trial)
- NNT 6 for moderate encephalopathy and NNT 7-8 for severe encephalopathy

New AAP recommendations

Therapeutic Hypothermia forNeonatal Hypoxic-IschemicEncephalopathy: Clinical Report
Santina A. Zanelli, MD, et al Committee on Fetus and Newborn; and Section on Neurology
Pediatrics (2026) 157 (2)

This flow diagram should be posted in offices and should be on the website under neuro.



WHO DO WE EVALUATE FOR POSSIBLE TH?

Suspected hypoxic event with one of the following:

1)Ph $\leq$ 7 or less or deficit $\geq$ 16 (any gas within 1 hr)
2)Apgar $\leq$5 at 10 minutes
3)Assisted ventilation >10 min

WHO DO WE EVALUATE FOR POSSIBLE TH?

If they meet acidosis/ventilation criteria, what gestations?

- Infants > than 35 weeks.
- **Consider 35 weeks-iffy data either way**
- Do not cool < 35 weeks – 75% increased risk of death or disability.

This form is also available under Neuro

Neurological Exam To Evaluate Eligibility For Cooling

Time of Birth:		Current Age (in hours/minutes) Hours:		Minutes:	Determination (0, 1, 2, or 3)
Circle findings for each domain. Patient is eligible for cooling if 3 or more domains with findings in stages 2 or 3.					
Stage	**Normal (0)**	**Mild (1)**	**Moderate (2)**	**Severe (3)**	
Spontaneous Activity	Normal/active	Jittery/increased	Decreased	No activity	= _____
Posture	Normal (moves around and does not maintain only one position)	Slight extension of arms and legs, and/or slight flexion of wrists, ankles, fingers, or toes	Extension of arms and legs (including a "frog-legged" position) and/or strong flexion of the wrists, ankles, fingers or toes	Decerebrate (all extremities rigidly extended)	= _____
Level of Consciousness	Normal (arouses to an awake state and responds to external stimuli)	Hyperalert or inconsolable/irritable	***Lethargic*** Can elicit a response with stimulation, but may be delayed	***Stupor/Comatose*** Unresponsive or barely responsive to touch/ external stimuli	= _____
Tone	Normal (resists passive motion)	Slightly increased	Hypertonic or hypotonic/ floppy	Flaccid (like a rag doll)	= _____
Primitive Reflexes *(select the **worst** item for suck or moro)*	**Suck:** strong/rhythmic **Moro:** normal (extension of limbs, opening of hands, followed by adduction of upper extremities)	**Suck:** effective but uncoordinated **Moro:** hyperreactive (low threshold to elicit)	**Suck:** weak or biting **Moro:** incomplete	**Suck:** absent **Moro:** absent	Select ***highest*** stage for primitive reflex for determination = _____
Autonomic Nervous System [ANS] (vital signs) *Select the **worst** for the ANS findings. Ex: if infant is intubated, circle the severe respirations item (column 3)*	**Respirations:** regular respiratory rate and spontaneous breathing with no abnormal pauses **Heart rate:** normal range for age and variable with movement, crying	**Respirations:** tachypnea **Heart rate:** tachycardia	**Respirations:** periodic or irregular breathing **Heart rate:** <100 bpm, but variable up to 120 bpm	**Respirations:** intubated or receiving PPV via mask or laryngeal mask airway (LMA) **Heart rate:** little variability in rate, may be irregular, may be bradycardic	Select ***highest*** stage of the 3 ANS for determination = _____
ANS (pupils)	**Pupils:** normal size, reactive to light	**Pupils:** mild dilation, but reactive to light	**Pupils:** constricted, but reactive to light	**Pupils:** dilated and either fixed or sluggishly reactive; asymmetric	

Seizures: if the infant is <6 hours old and meets the gestation, weight, and blood gas criteria and has a clinically recognized and/or electrographic seizure, the patient is eligible for cooling regardless of the rest of the exam findings. However, complete the entire neurological exam to establish a baseline exam.

Observe infant first | Hands on exam

.SARNAT in progress note/H+P or procedure note

Modified Sarnat Exam

Is patient having seizures? Yes **No**

Seizures are classified as moderate encephalopathy.

Sedation used? Yes **No**

Paralytic agent used? Yes **No**

Maternal sedative administered? Yes **No**

	Normal	Mild encephalopathy	Moderate encephalopathy	Severe encephalopathy
Level of consciousness	Alert when awake	**Hyperalert or irritable**	Lethargic	Comatose
Spontaneous activity	Spontaneous movement	Slightly decreased activity	**Decreased activity**	No activity
Posture	Normal flexion	Mild distal flexion	**Distal flexion with complete extension**	Decerebrate posturing
Tone	Normal tone	Hypertonic	Alterations in tone	Flaccid
Primitive reflexes	Suck normal	**Suck normal**	Weak suck	Absent suck
	Complete Moro	**Moro with low threshold to elicit**	Incomplete Moro	Absent Moro
Autonomic system	Reactive pupils	**Dilated pupils**	Constricted pupils	Deviated, dilated, or non-reactive pupils
	Normal heart rate	Tachycardia	Bradycardia	**Variable heart rate**
	Regular breathing	**Regular breathing**	Periodic irregular breathing	Apnea
Total moderate/severe categories:	3			

My Note

Progress Notes • Neonatology • 11/12/2025 10:44 AM

HIE Sarnat Exam

Insert SmartText

Modified Sarnat Exam

No seizure activity present.
Patient is not sedated and not chemically paralyzed.
No maternal sedation administered.

Level of Consciousness: Hyperalert or irritable (mild)
Spontaneous Activity: Decreased activity (moderate)
Posture: Distal flexion with complete extension (moderate)
Primitive Reflexes: Normal suck and Moro with low threshold to elicit (mild)
Autonomic System: Dilated pupils and regular breathing (mild) Variable heart rate (severe)

Total moderate/severe categories: 3

.SARNATaddendum added

Comments: BB Brooke Justesen was born at Gestational Age: 33w1d
Date/Time of Birth: 11/4/2025, 6:53 AM

APGARs
1 Min: 9
5 Min: 9
10 Min:

Blood gases
No results for input(s): "POCPH", "POCPHV", "POCPCO2", "POCPCO2V", "POCPO2", "POCPO2V", "POCHCO3"

Infant with suspected perinatal asphyxia related to ***
Initial neurological exam performed at *** minutes of life.
Initial gas obtained at *** minutes of life via *** sample.
Infant with/without evidence of moderate/severe HIE and does/does not meet criteria for therapeutic hypothermia.

SHOULD WE CONSIDER COOLING "MILD HIE" OR KIDS JUST SHORT OF QUALIFICATION?

- Mild HIE patients have abnormalities
  - (16% had mod-severe disability, 40% had Bayley III scores < 2 SD—PRIME Study)
- Unclear if TH helps in mild HIE
- AAP recommends not unless in a study
- 2 large scale on going studies (COOL PRIME AND COMET TRIALS)

MILD ENCEPHALOPATHY POSSIBLE APPROACH

- Total Sarnat Score may help define "Worse" mild HIE (> 5 suggestive)

- Use stat EEG to assess Baseline background
  1) normal<excessively discontinuous<severely abnormal
  2) 20% of excessively discontinuous had severe HIE despite not making criteria otherwise restrospectively
- Serial Exams before 6 hours

- Count worst exam after 60 minutes of life?

SHOULD WE COOL….

- Longer than 72 hours- NO – increased death with OR 2.5
- Colder than 33.5 –NO benefit
- Initiation delayed between 6-24 hours -76% posterior probability of benefit but very small benefit of death/disability of 24.4% vs 27.9 %- individual discussion
- OF NOTE: < 3 hours pts do better than initiation at 3-6 hours

COCHRANE REVIEW 2022

PHARMACOLOGICAL INTERVENTIONS FOR PAIN AND SEDATION MANAGEMENT IN NEWBORN INFANTS UNDERGOING THERAPEUTIC HYPOTHERMIA (REVIEW) BÄCKE ET AL COCHRANE DATABASE OF SYSTEMATIC REVIEWS 2022, ISSUE 11. ART. NO.: CD015023.

"We found no studies that met our inclusion criteria and hence there is no evidence to recommend or refute the use of pharmacological interventions for pain and sedation management in newborn infants undergoing therapeutic hypothermia.."

- Do what you want was their conclusion

SEDATION RECOMMENDATIONS

Sedation and PainManagement in Neonates Undergoing Therapeutic Hypothermia for Hypoxic-Ischemic Encephalopathy

Artemiy Kokhanov 1 et al Children **2025**, 12, 25

- Whatever drug you use, adjust for decreased renal and liver clearance
- Probably should use morphine/fentanyl or precede/clonidine but avoid Benzos due to increased aberrant neuronal and synaptic development

	Pros	Cons
Morphine	Strongest basis in evidence Safety established May be beneficial	Cardiovascular, Respiratory, GI effects
Precedex	Anti-shivering May have Neuroprotection effect Less Resp/CV effects	Bradycardia/hypotension in already bradycardic infant Not well enough studied with some authors recommending not using unless further studied

FEEDING WHILE ON THERAPEUTIC HYPOTHERMIA

To feed or not to feed during therapeutic hypothermia in asphyxiated neonates: a systematic review and meta-analysis Kumar et al

RESEARCHPublished: 04 April 2023Volume 182, pages 2759–2773, (2023)

- Six studies ((two (RCTs) and four nonrandomized studies of intervention (NRSIs)) N = 3693 included.
- Incidence of stage II/III NEC was very low (0.6%).
- There was no significant difference in the incidence of stage II/III NEC in RCTs (2 trials, 192 participants; RR, 1.20; 95% CI: 0.53 to 2.71, I^2, 0%) and NRSIs (3 studies, no events in either group).
- In the NRSIs, infants in the enteral feeding group had significantly lower sepsis rates and lower all-cause mortality but this was not born out in RCTS
- Infants in the enteral feeding group achieved full enteral feeding earlier, had higher breastfeeding rates at discharge, received parenteral nutrition for a shorter duration, and had shorter hospital stays than the control group.

ENTERAL FEEDINGS DURING THERAPEUTIC HYPOTHERMIA

- CONCLUSION

Overall, initiation of enteral feedings at trophic volumes barring any significant hemodynamic instability appears safe

Trophic feed as you would otherwise for an infant with HIE with consideration for acidosis, hypotension, third spacing etc.

THE END