NEWBORN THERMOREGULATION

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Objectives

- Describe strategies to reduce newborn heat loss
- Describe the benefits of skin-to-skin contact during the golden hour
- List interventions recommended to maintain safety during skin-to-skin
- Describe risk factors associated with Sudden Unexpected Postnatal Collapse of the Newborn (SUPCN)
- Define event(s) that prompt the need for therapeutic hypothermia
- Describe therapeutic hypothermia
- Identify newborns who might benefit from newborn cooling

Goals of the Golden Hour

The Golden Hour Overview

STABLE NEWBORNS

- Immediate Skin-to-Skin
- Delayed Cord Clamping
- Establish Early Feeding
- Defer Interventions until after 1st feeding
  - Erythromycin, Vit K, Hepatitis B Vaccine, Weight & Measurements
  - Assess APGARS during STS

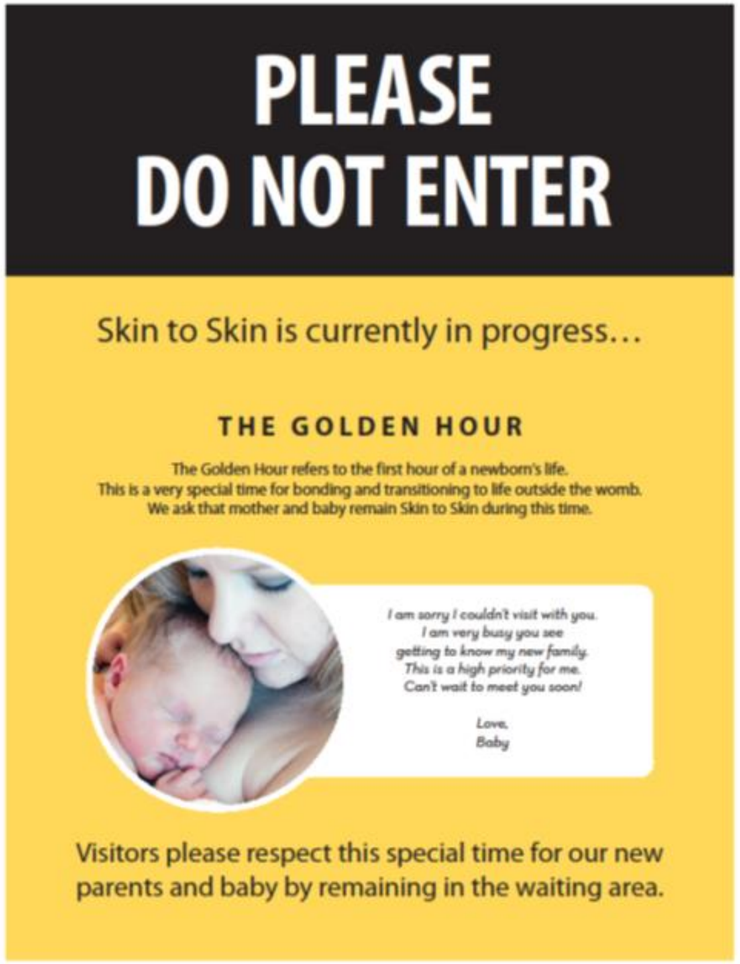
Skin to Skin

May you be sweet like your mother

Benefits to Mom

Benefits to Baby

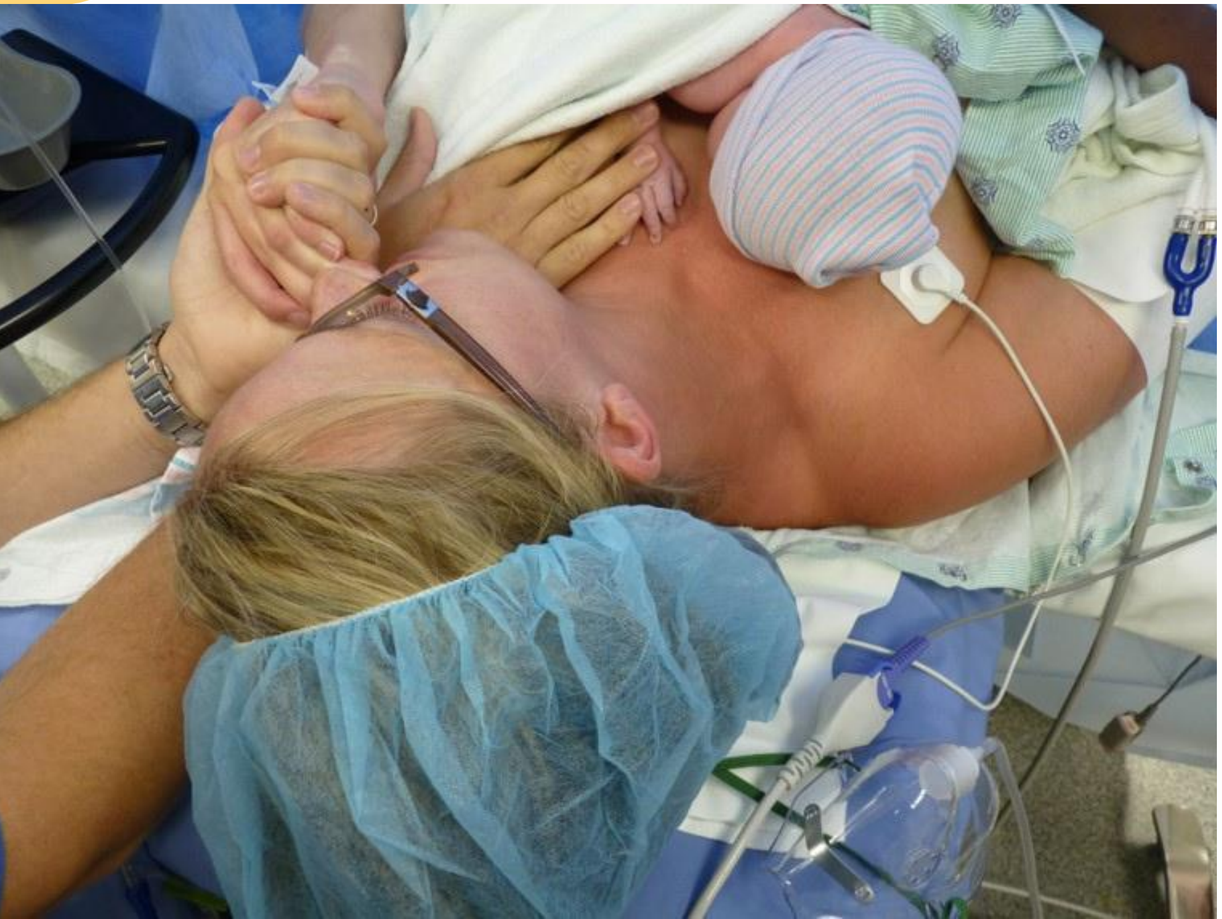
Barriers pre/post Covid



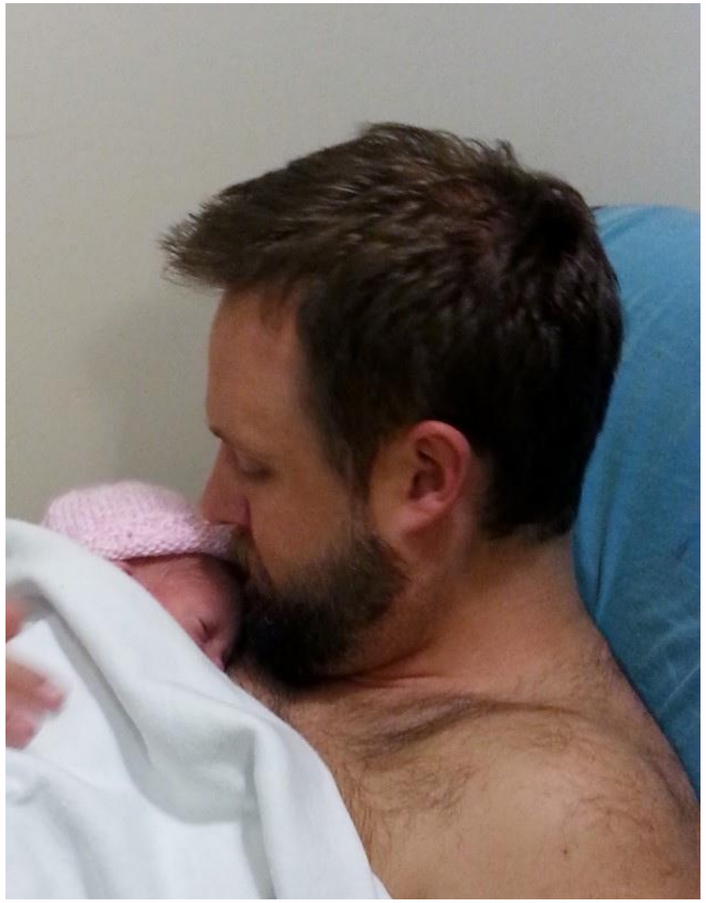
Communication is key

Skin to Skin in the OR

- Physician
- Anesthesia
- Parent / Support
- Supervision



Special Considerations



Sudden Unexpected Postnatal Collapse of the Newborn

S.U.P.C.N.

Possible Risk Factors

- Primiparous mother
- First breastfeeding
- Newborn in prone position
- Mother in supine position during skin-to-skin
- Lack of surveillance by health care staff
- Parental distraction, such as with smartphones
- Maternal opiate analgesia/regional or general anesthesia
- Magnesium sulfate
- Maternal BMI > 25 kg/m2

What to do about S.U.P.C.N

Cold Stress

Preterm/SGA

- Less Brown Fat and insulating white fat
- Greater surface area in relation to body weight
- Thinner skin

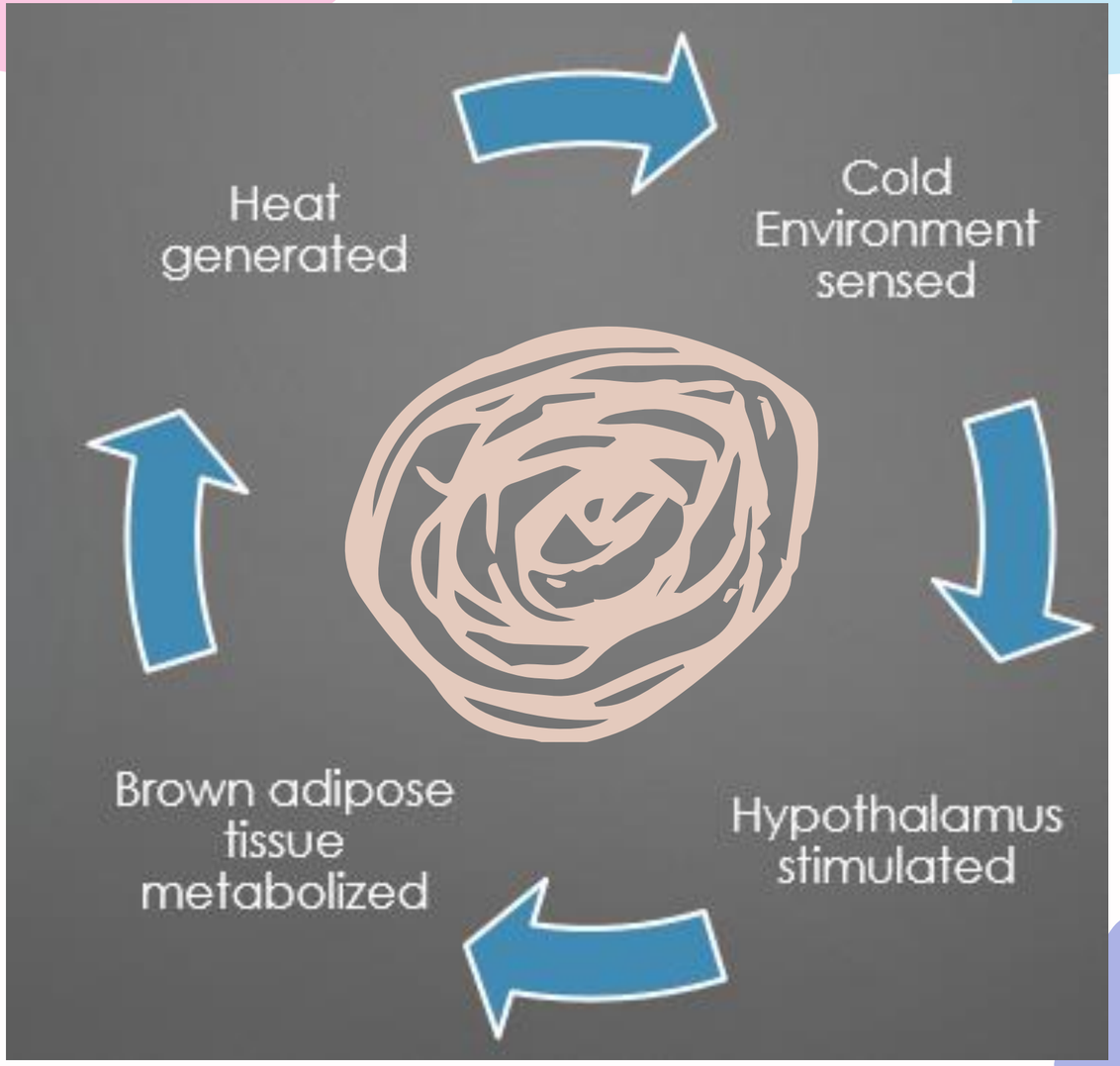
Sick Babies

- Stress on metabolism related to increased oxygen and calorie use

Babies with open defects

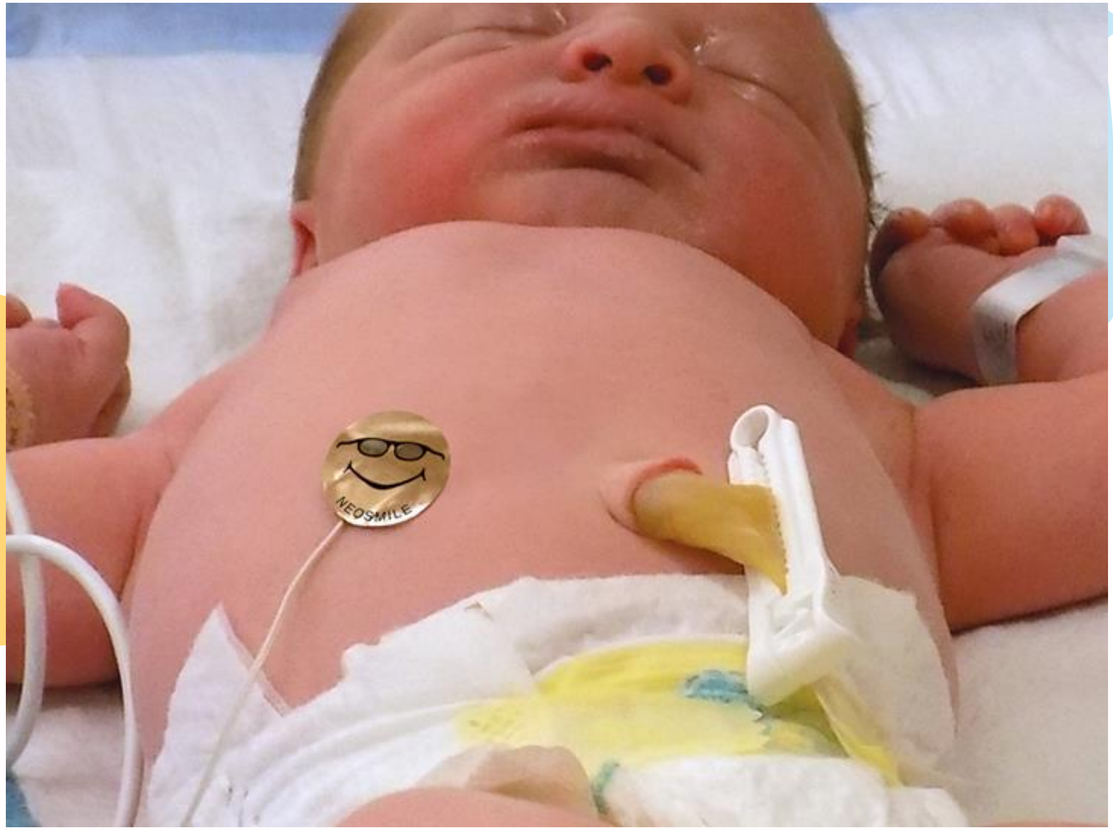
Interventions to Reduce Heat Loss?

Non-Shivering Thermogenesis



Radiant Warmer

- Probe placed on abdomen, typically RUQ
- Set Servo at 36.5C



Delivery Room Temperature

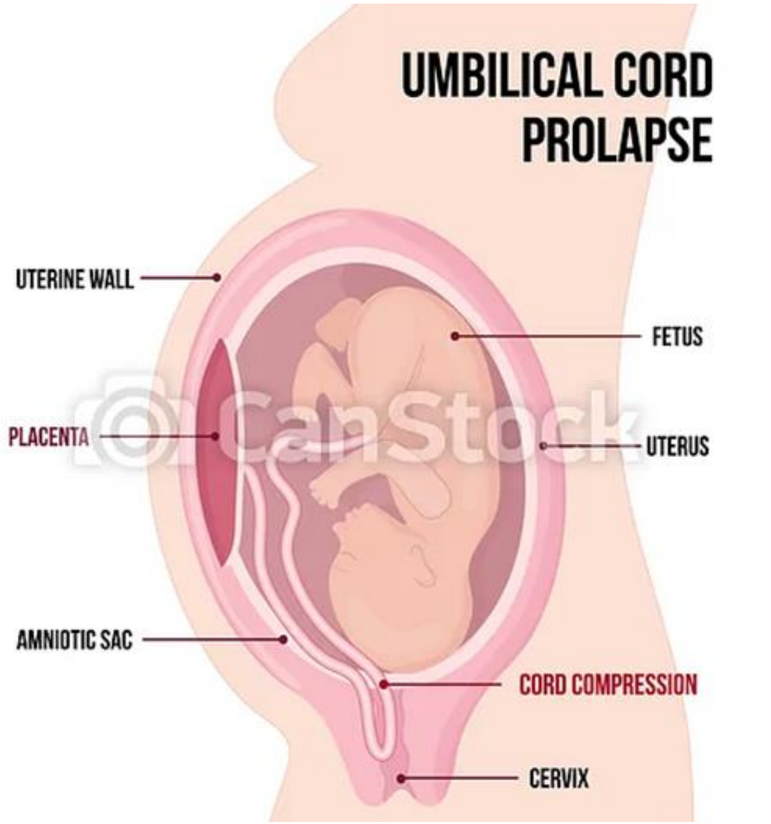
- Term: 72-78 F (AAP)
- Preterm: 74-77 F (NRP)
- WHO suggests 77-82 F

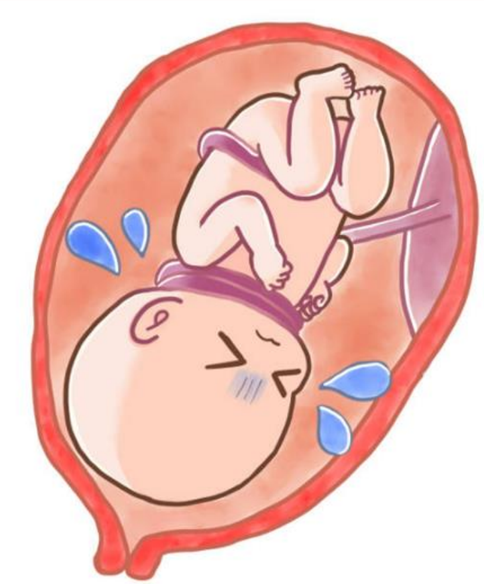
Operating Room

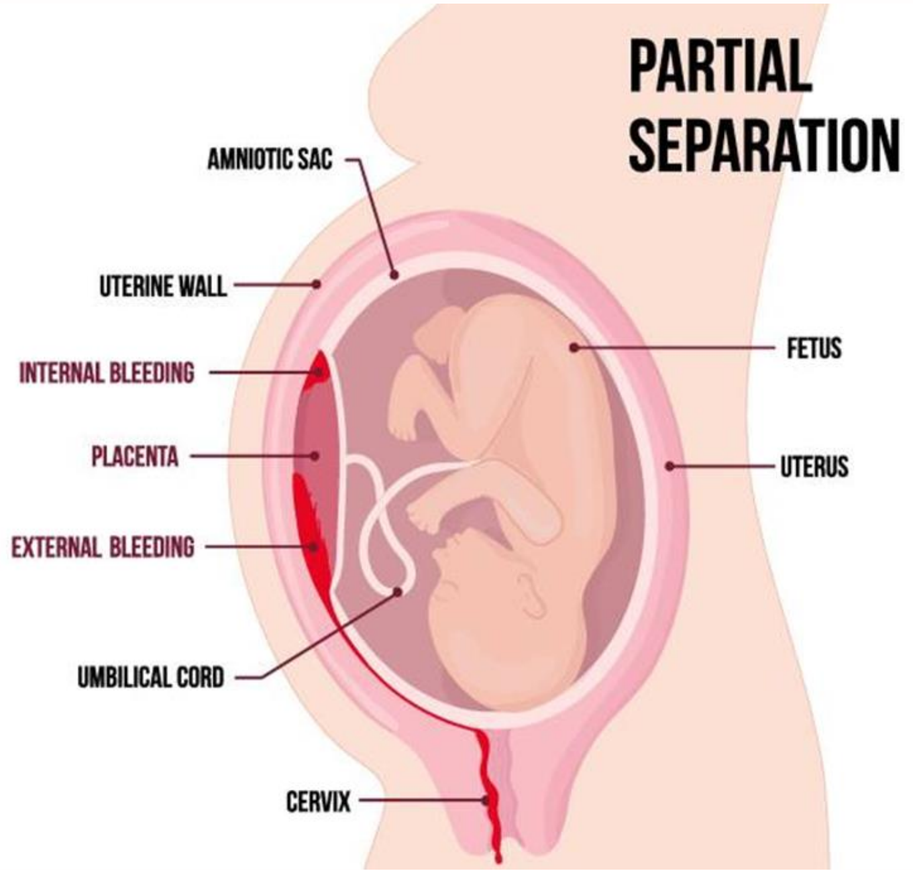
The recommended temperature range in an operating room is between **68°F and 75°F**. Collaborate with infection prevention, and facility engineers when determining temperature ranges. Each facility should determine acceptable ranges for temperature in accordance with regulatory and accrediting agencies. (AORN)

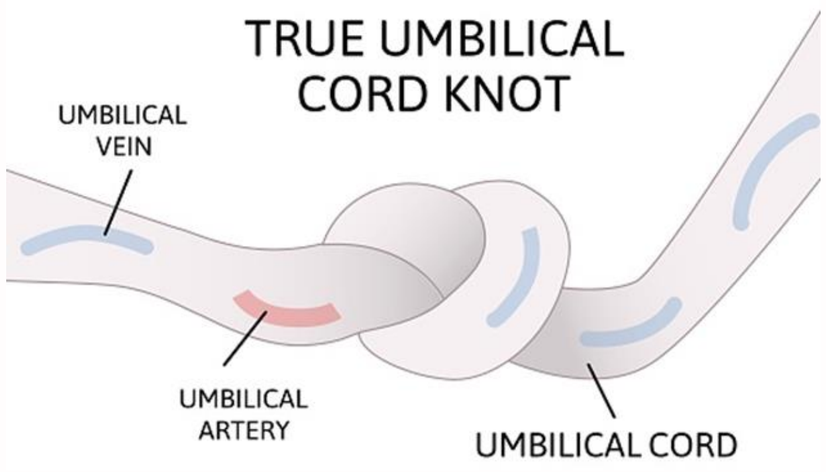
Special Considerations: The Premature Infant

Acute Perinatal Events


UMBILICAL CORD PROLAPSE
UTERINE WALL
FETUS
PLACENTA
UTERUS
AMNIOTIC SAC
CORD COMPRESSION
CERVIX

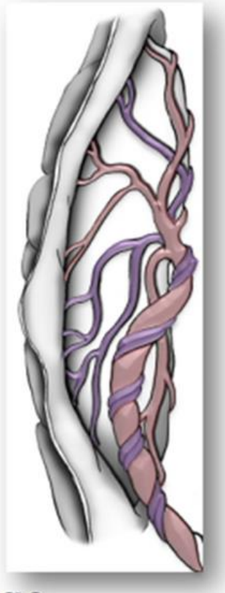



PARTIAL SEPARATION
AMNIOTIC SAC
UTERINE WALL
FETUS
INTERNAL BLEEDING
PLACENTA
UTERUS
EXTERNAL BLEEDING
UMBILICAL CORD
CERVIX


TRUE UMBILICAL CORD KNOT
UMBILICAL VEIN
UMBILICAL ARTERY
UMBILICAL CORD

CODE BLUE

Acute Perinatal Events



Impaired Placental – Fetal Perfusion

- Causes → placental abruption, uterine rupture, prolapsed / ruptured cord, maternal collapse requiring CPR
- Results in ↓↓ fetal cardiac output → poor perfusion and oxygenation of fetal organs and brain → *ischemic injury*

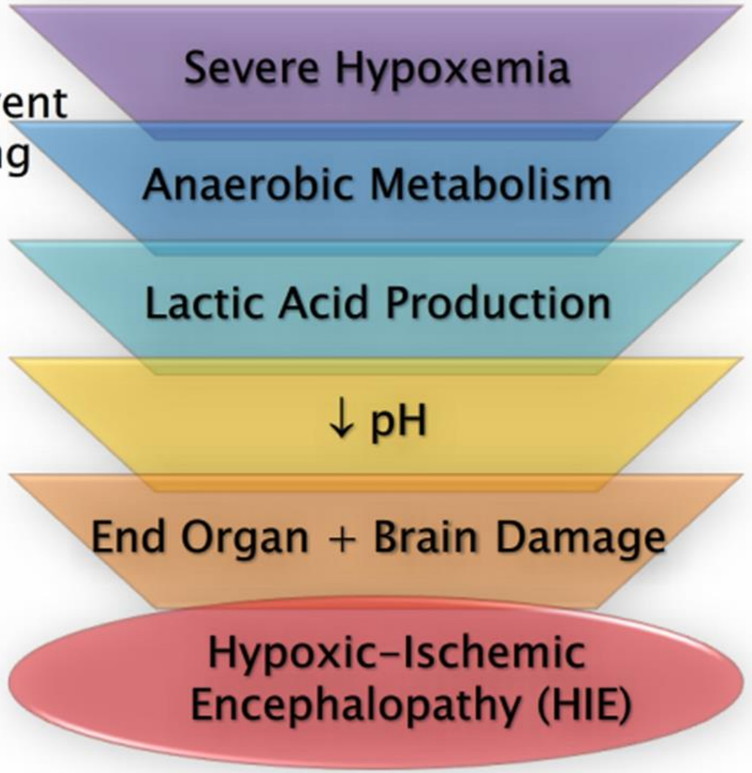
Asphyxia

- Term used to describe impaired gas exchange that results in hypoxemia and hypercarbia

Acute Perinatal Events

Birth Asphyxia

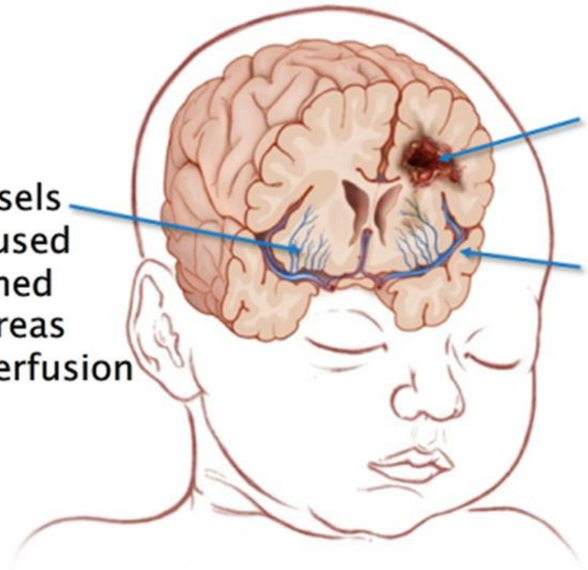
- Known perinatal event capable of impairing perfusion and O_2 delivery
- Results in hypoxia, acidemia and metabolic acidosis



Acute Perinatal Events

Hypoxic-Ischemic Encephalopathy (HIE)

- Initial ischemic insult → cascade of events leading to neuronal death



Diffuse white matter injury

Striate vessels underperfused → watershed injury to areas of distal perfusion

Perinatal event disrupts brain perfusion and oxygenation → severely hypoxemi blood → causes br hypoxia and ischer

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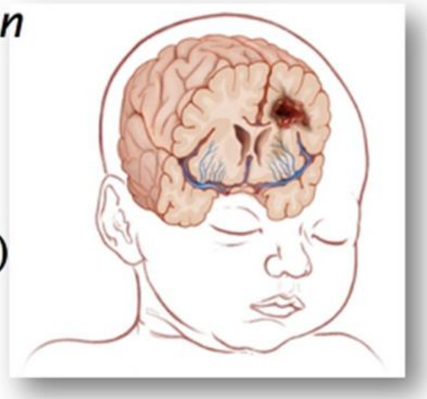
Hypoxic Ischemic Encephalopathy

Resuscitation and stabilization factors associated with worsened neurologic outcomes

- Hyperthermia
  - *Prevent* hyperthermia at all times
  - *Treat* fever quickly
- Hypoglycemia → low glucose is not uncommon
  - *Be vigilant! Evaluate glucose often*
  - Aggressively treat with $D_{10}W$ bolus if low
  - Maintain the blood sugar 50 – 110 mg/dL (2.8 – 6 mmol/L)



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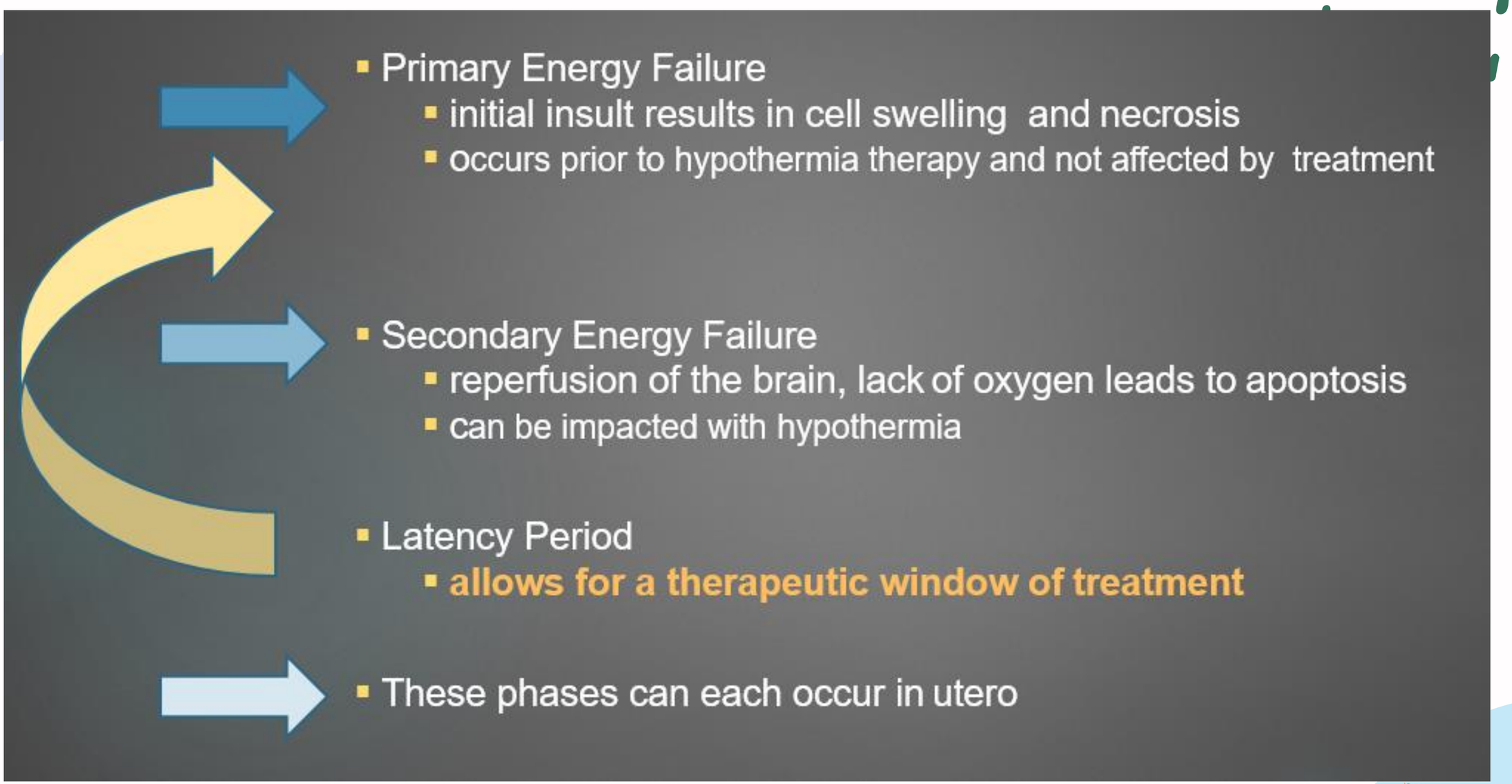
Phases of HIE

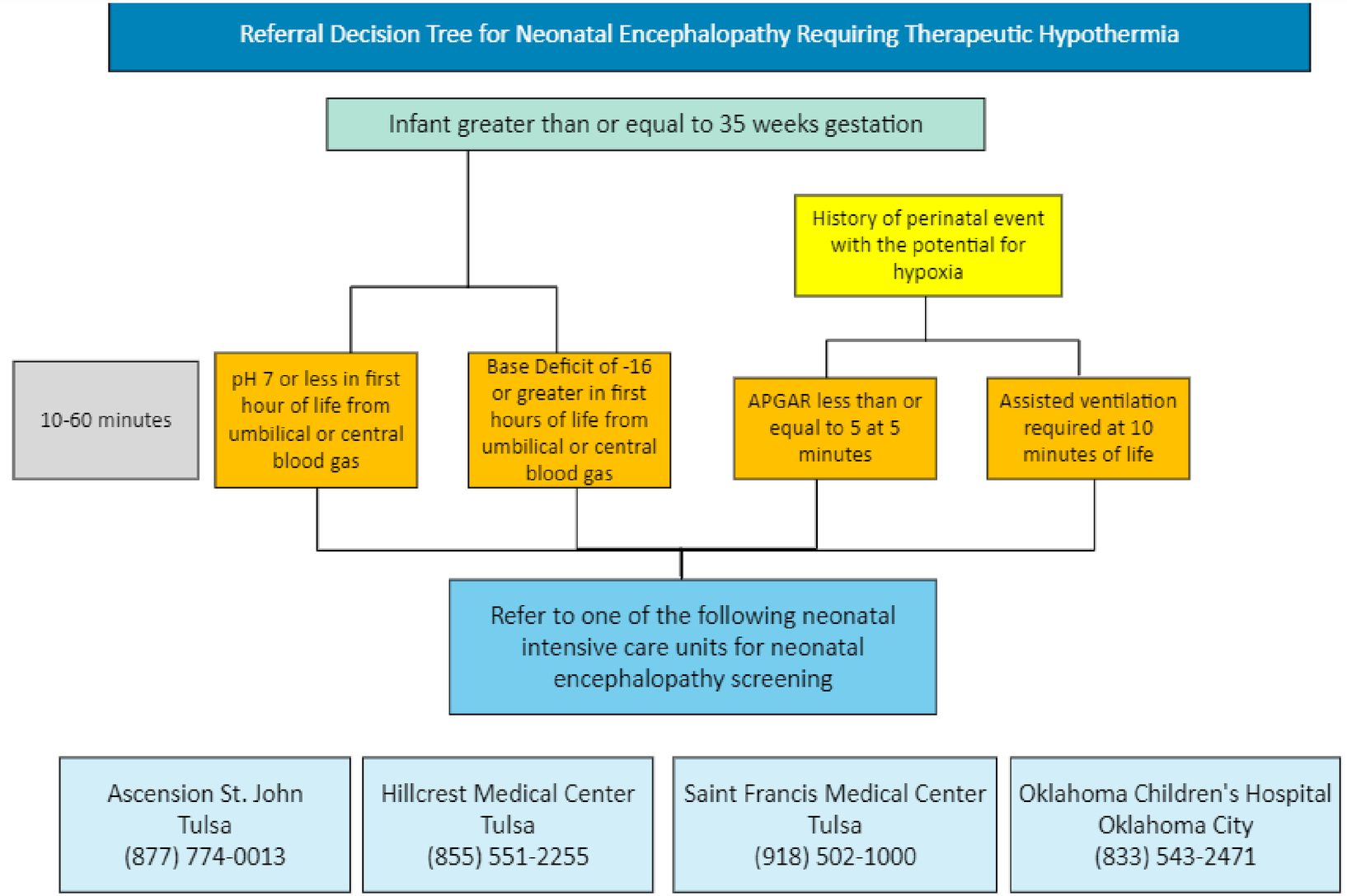
- Primary Energy Failure
  - initial insult results in cell swelling and necrosis
  - occurs prior to hypothermia therapy and not affected by treatment
- Secondary Energy Failure
  - reperfusion of the brain, lack of oxygen leads to apoptosis
  - can be impacted with hypothermia
- Latency Period
  - period between these two phases that **allows for a therapeutic window of treatment**
- These phases can each occur in utero

Phases of HIE



Therapeutic / Neuroprotective Hypothermia for treatment of Hypoxic Ischemic Encephalopathy

Oklahoma HIE Task Force



Passive Cooling

- Turning off radiant warmer - no external heat applied to newborn
- Place newborn on un-activated heating mattress
- Initiates cooling earlier
- Performed ONLY under the direction of a neonatologist or clinician from a receiving physician

QUESTIONS?

- THE GOLDEN HOUR
- SKIN TO SKIN
- SUPCN
- COLD STRESS
- ACUTE PERINATAL EVENTS
- HIE

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