

# Evaluation and Management of the Critically Ill Neonate

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- **-Identify sick baby**
  - **-The initial stabilization of these infants**
  - **-Identify differential diagnoses that should be considered**

# Physical Examination

- **Inspection and an overall observation of the neonate's condition.**
- **The presenting symptoms and signs can be nonspecific and common to a variety of diseases including sepsis, heart failure, and metabolic diseases.**

# Inspection :

- **Posture**
- **Color**
- **Level of consciousness**
- **Pattern of respiration**
- **Abnormal movements**
- **Gross anomalies**

## Color :

- **Pink**
- **Cyanosis (acro cyanosis-central cyanosis)**
- **Icteric**
- **Mottling**
- **Dusky**
- **Plethoric**
- **Pallor**

# ACROCYANOSIS



**Figure 3-1** Acrocyanosis in a newborn.

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# Central cyanosis:



# Mottling:





## Posture :

- **A flexed posture with spontaneous movements and pink perfusion is reassuring.**
- **A flaccid posture**

posture:



# Level of consciousness in neonates

- **Alert**
- **Lethargic**
- **Coma**

# Movements:

- **Decreased spontaneous movements.**
- **Asymmetry in movements**
- **Abnormal movements :seizure ,jitteriness**

## Vital sign in neonates:


- **Respiratory rate:30-60 bpm**
- **Heart rate:120-160 bpm**
- **Temperature axillary:36.5-37.7**
- **Blood pressure : systolic :65-75 diastolic :40-50 mmHg(mean blood pressure < gestational age : hypotension)  
BP > 100/60 in term , > 80/60 in preterm :  
hypertension( cuff is nt too small or large)  
four extrimity blood pressure**
- **Oxygen saturation :85-95%**

- **Inspection, palpation, and auscultation of the infant should occur **from head to toe**:**
  - ***The head*** should be palpated and carefully inspected for trauma in the encephalopathic neonate.
  - **The fontanelle** should be auscultated to assess for a cranial bruit, especially if the neonate is hemodynamically unstable as this may be a sign of a cerebral arterio-venous malformation.


- **Pupils** : Fixed and dilated pupils with a persistent oculocephalic response : lidocaine ( recent history of a circumcision or other medical procedure.)
- hypoxic ischemic encephalopathy (midriasis, myosis)
- red reflexes
- The mouth, neck, shoulders, and arms should be assessed
- Brachial pulses should be palpated and compared with femoral pulses to rule out a significant coarctation of the aorta

- Examination of **the chest** may reveal a pronounced cardiac murmur, unequal breath sounds, or significant subcostal retractions.
- A distended, tender, and tympanic **abdomen** should prompt surgical consultation and a focused diagnostic search.
- A scaphoid abdomen (congenital diaphragmatic hernia , esophagal atresia)



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- **The genitalia** should be inspected:
    - Testicular torsion
    - incarcerated inguinal hernias
    - Ambiguous genitalia in a female infant - hyperpigmented scrotum in a male infant (congenital adrenal hyperplasia, CAH)

- **Bloody stools:** may suggest gastrointestinal necrosis.
- **All extremities** should be palpated to ensure that bony structures are intact.
- A **neurologic examination** including evaluation of the primitive neonatal reflexes (rooting, sucking, gag, Moro) should be done.

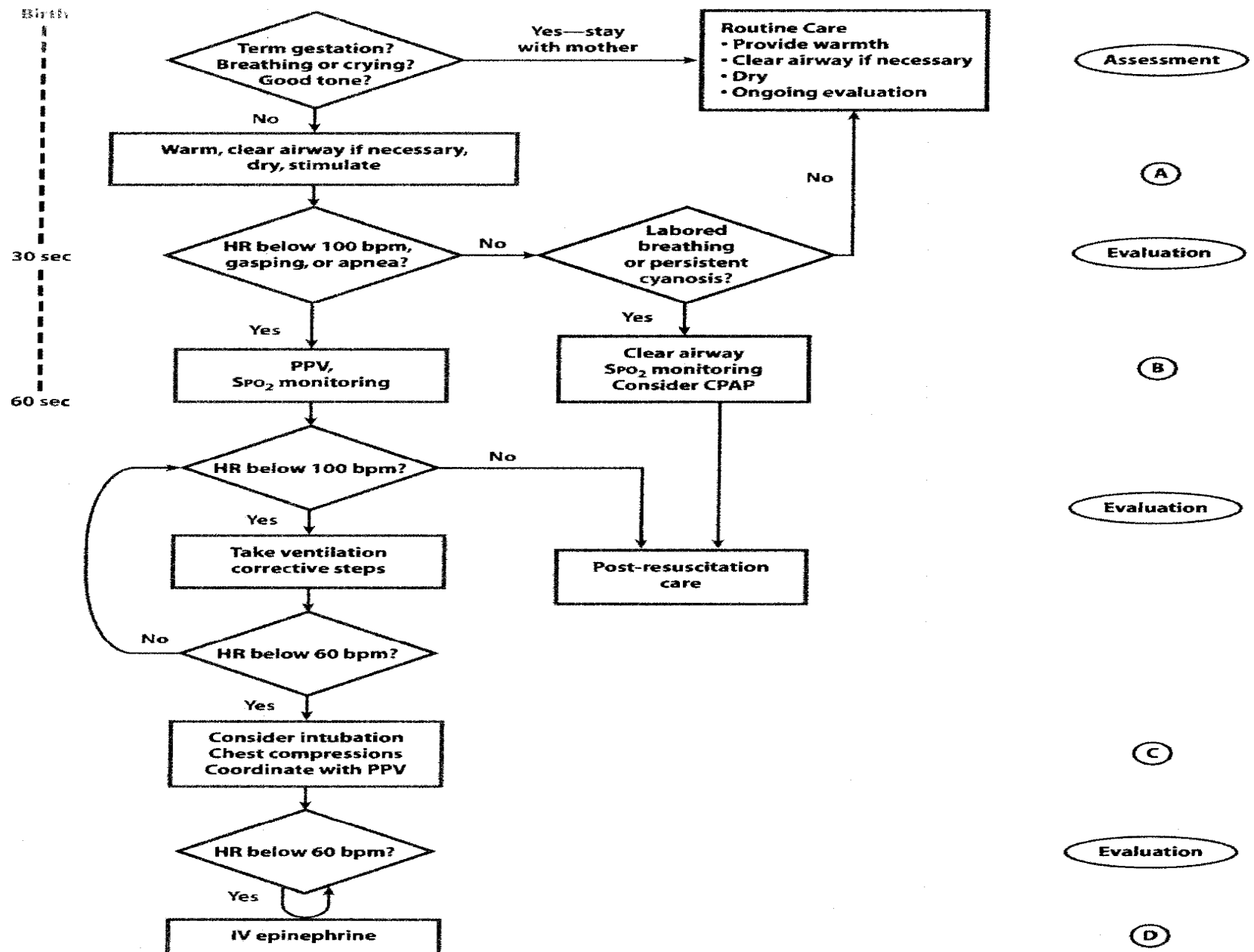
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- **Achieving physiologic stability of the neonate is the first priority.**
  - **Maintaining the airway, breathing, and circulation(A,B,C)**
  - **Thermoregulation**

# Initial Stabilization

- **stabilization prioritizes securing the airway, then establishing breathing and maintaining adequate circulation. (A,B,C)**
- **Endotracheal intubation and fluid resuscitation are usually required in critically ill neonates, and these procedures, if indicated, should not be delayed while waiting for diagnostic evaluation.**

## **ABCs of resuscitation:**

- **Airway (position and clear)**
- **Breathing (stimulate to breathe)**
- **Circulation (assess heart rate and oxygenation)**



# Physiologic Challenges in the preterm infant in thermoregulation

- **Heat regulation unstable**
  - **Body temperature may be normal but it fluctuates**
  - **Higher ratio of body surface in proportion to body weight.**
  - **Lack of subcutaneous fat**
  - **Poor capillary response to environmental changes.**
  - **Decreased brown fat**
  - **Thinner skin**

## Signs of Inadequate Thermoregulation

- **Axillary temperature <36.3 or >36.9 degrees C**
- **Abdominal skin temperature <36 or >36.5 degrees C**
- **Poor feeding or feeding intolerance**
- **Irritability**
- **Lethargy**
- **Weak cry or suck**
- **Decreased muscle tone**
- **Cool skin temperature**
- **Skin pale, mottled, or acrocyanotic**
- **Signs of hypoglycemia**
- **Signs of respiratory difficulty**
- **Poor weight gain**



# Thermoregulation

## **GOAL: Neutral thermal environment.**

- **Incubator or radiant warmer**
- **Warm surfaces**
- **Warm humidified oxygen**
- **Warm ambient humidity**
- **Warm feedings**
- **Keep skin dry and head covered**




## Isolette / Incubator



## Radiant Warmer/ Open Warmer



- **Measures must be taken to promote thermo neutrality because this is essential for successful stabilization of acritically ill neonate.**
- **A critically ill neonate who is hypoxic, hypoglycemic, or adrenally suppressed will be unable to maintain a normal body temperature and will become hypothermic.**

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- **The cold stressed infant may present with:**
    - **peripheral vasoconstriction to maintain heat,**
    - respiratory distress to increase oxygenation,**
    - metabolic acidosis due to hypoglycemia, and**
    - anaerobic metabolism if hypoxia persists,****which further worsens.**

## Warming of neonates:

- **Rapid warming can result in apnea, hypotension, and shock.**
- **To prevent overheating of the neonate, use the servo-control option on the radiant warmer, set the skin temperature to 36.5°C, and apply the skin probe to the anterior abdomen of the neonate.**

## Warming of neonates:

- **Oxygen consumption will increase as the infant's core temperature returns to normal.**
- **If the infant remains hypoxic because of respiratory or cardiac insufficiencies, rewarming may worsen tissue hypoxia**

## Rewarming process:

- **slowed by resetting the servo-control skin temperature to 1°C above the neonate's core temperature.**
- **until the neonate attain core temperature of 36.5°C.**

## Rewarming process:

- **Care should be taken to avoid hyperthermia in neonates with suspected hypoxic ischemic encephalopathy because elevated core temperature can exacerbate neurologic injury in these cases**



# Management :

- **Withhold enteral feeding**
- **Iv access**
- **intravenous (IV) fluids and resuscitation may be required in the gravely ill neonate. In neonates with shock and dehydration**
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# Physiologic Challenges- Fluid & Electrolyte Balance

## Dehydration


- **Urine output <2 ml/kg/hour**
- **Urine specific gravity >1.020**
- **Weight loss greater than expected**
- **Dry skin and mucous membranes**
- **Sunken anterior fontanel**
- **Poor tissue turgor**
- **Blood: Elevated sodium, protein, and hematocrit levels**

## Overhydration

- **Urine output >5 ml/kg/hour**
- **Urine specific gravity <1.001**
- **Edema**
- **Weight gain greater than expected**
- **Bulging fontanel**
- **Blood: Decreased sodium, protein, and hematocrit levels**
- **Moist breath sounds**
- **Difficulty breathing**

# FLUID THERAPY:

- **An initial bolus of 10 ml/kg of isotonic fluid (0.9 NS) should be given over 10 to 15 minutes and repeated if necessary.(in shocks)**
- **If the umbilical stump is still present, this fluid may be given through an umbilical venous catheter**
- **In very preterm infant avoid very fast iv therapy(IVH)**
- **Continue IV fluid (DW10%) with control of blood suger, and parenteral nutrition until sufficient enteral feeding**
- **Consider to heart failure**

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- **Empiric use of IV broad-spectrum anti-biotics**
  - **Treatment of electrolyte and acid base imbalance as needed**
  - **Transfusion of blood components as needed**
  - **Respirator therapy**
  - **Oxygen therapy**

# Surgical emergencies:

- **Bilious emesis and/or abdominal distention in the neonate should be treated as a surgical emergency and should be promptly evaluated with appropriate diagnostic tests and surgical consultation.**
- **Neonates with enteric emergencies often require additional fluid resuscitation as well as decompression of the gastrointestinal tract with a large bore tube.**
- **Two-view abdominal radiographs should be done to assess**

# Laboratory Evaluation

- **Laboratory evaluation of a critically ill neonate can be directed toward a specific etiology if suspected.**
- **In absence of a clear etiology, laboratory samples are also frequently obtained to help determine diagnosis and management.**



routine laboratory work in a critically ill neonate consists of a:

- **complete blood count with a differential,**
- **CRP**
- **blood and urine cultures, urinalysis,**
- **LP(after stabilization)**
- **electrolytes including blood urea nitrogen and creatinine, glucose, Ca, P, mg**
- **arterial blood gas**

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- **lactate and pyruvate , amonia and other metaolic screening in special cases**
  - **Imaging :CXR-abdominal X-ray ,CTS ,MRI**



# Antenatal history :

- **maternal history,**
- **maternal antenatal laboratory tests (status of rubella, hepatitis B, syphilis, human immunodeficiency virus group B streptococcus [GBS] screens, and blood type),**
- **Medications**
- **, complications during pregnancy**
- **maternal illnesses.**

# Birth history :

- **the gestational age at delivery**
- **indication for delivery (maternal pregnancy induced hypertension, fetal distress, etc)**
- **the route of delivery including any instrumentation,**
- **complications during delivery, birth weight, and resuscitation required.**

# The immediate neonatal course:

- **difficulties in transitioning to extrauterine life:  
such as:**
- **respiratory distress**
- **Hypoglycemia**
- **feeding difficulties**
- **Jaundice**
- **length of hospital stay**

# The neonate's medical history :

- **the time from discharge from the birth hospital.**
- **Details on the infant's oral intake including the amount of water used to mix formula or any additives used should be obtained.**
- **The infant's urine output as well as stooling habits should also be assessed**



# Differential Diagnoses

