



## NEONATAL RESUSCITATION

Recognition:

Newly born infant meeting any of the following criteria:

- Less than term gestation (37 weeks gestation)
- Not crying/breathing
- Heart Rate < 100 bpm
- Poor muscle tone
- Labored breathing/gasping or persistent central cyanosis (5-10 min)

### BASIC EMT

- **Routine patient care - Perform the following within the first 60 seconds of delivery:**
  - Warm the infant and maintain normothermia.
  - Position the infant to establish and maintain a patent airway.
  - Clear airway secretions by suctioning with a bulb syringe or suction catheter only if secretions are copious and/or obstructing the airway or positive pressure ventilation is required.
  - Stimulate the infant.
  - Assess breathing and heart rate (HR) [HR should be assessed by auscultation of the apical pulse or by palpating the base of the umbilical cord].
- **If the infant's HR is >100 bpm, *but* breathing is labored or there is persistent central cyanosis:**
  - Reposition and clear the airway as indicated.
  - Utilize pulse oximetry to assess oxygenation (SpO<sub>2</sub> should be measured utilizing the right hand [pre-ductal]).
  - Provide supplemental oxygen if needed to achieve targeted preductal oxygen saturations as outlined in Table 1 below.
  - Monitor and reassess.
  - If the infant becomes apneic, begins gasping or the HR decreases to < 100 bpm, manage as below.
- **If the infant is/becomes apneic, or gasping or the HR < 100 bpm:**
  - Provide positive pressure ventilation (PPV) at a rate of 40-60 bpm.
  - In term infants (>37 weeks), initial PPV may be provided with room air.
  - In infants of < 35 weeks gestation, initial PPV should be provided with low concentrations of Oxygen (1-4 lpm). Titrate supplemental oxygen to achieve targeted preductal oxygen saturations in Table 1 below.



## NEONATAL RESUSCITATION cont.

- Continue to monitor HR and provide PPV until the HR > 100
- Supplemental Oxygen should be titrated down as soon as possible.
- **If the HR is < 60 bpm:**
  - Provide PPV with supplemental Oxygen at a rate of 40-60 bpm for a period of 30 seconds. If the HR increases to > 60 bpm, but is < 100 bpm, monitor HR and continue to provide PPV until the HR is > 100 bpm.
  - If the HR remains < 60 bpm after 30 seconds of PPV, provide external chest compressions following current AHA Guidelines for CPR at a 3:1 ratio of compressions to ventilations (90 compressions and 30 breaths to achieve approximately 120 events/minute). *Infants requiring continued chest compressions should receive PPV with high concentration (100%) oxygen.*
  - Reassess the HR every 60 seconds. If the heart rate fails to increase, check for adequate chest rise and take corrective actions as indicated.
- All critically ill neonates should have their blood glucose determined.
- Calculate and document a 1 and 5 minute APGAR Scores (calculation of APGAR scores should not delay resuscitation) see Table 2 below.
- Transport patient to the nearest appropriate Hospital Emergency Facility.

### ADVANCED EMT

- Consider IV access if patient not improving to prepare for medication administration.
- For patients requiring continued chest compressions
  - Administer Epi (1:10,000) 0.01 mg/kg IV, repeat every 4 min.
- If hypovolemia is suspected (pale skin, poor perfusion, weak pulse, HR unresponsive to resuscitative measures above)
  - Consider Normal Saline at 10 ml/kg over 5-10 minutes (may repeat x1)
- If hypoglycemia is present (blood glucose <50 mg/dl), administer D10% dose at 5 ml/kg at a rate of 1ml/min and recheck the blood glucose level.



## NEONATAL RESUSCITATION cont.

### PARAMEDIC

- Provide advanced airway management only if patient's airway cannot be managed by BLS means.

#### Targeted Preductal SpO<sub>2</sub> After Birth

1 min	60%-65%
2 min	65%-70%
3 min	70%-75%
4 min	75%-80%
5 min	80%-85%
10 min	85%-95%

### APGAR Scoring System

Sign	0	1	2
Appearance (Skin Color)	Blue, pale	Body pink, blue extremities	Completely pink
Pulse Rate (Heart Rate)	Absent	Less than 100/minute	Greater than 100/minute
Grimace (Irritability)	No response	Grimace	Cough, sneeze, cry
Activity (Muscle Tone)	Limp	Some flexion	Active motion
Respirations (Breathing Effort)	Absent	Slow, irregular	Good, crying

### NEONATAL PEARLS:

- Patients not meeting the above criteria should remain with the mother and be provided routine post-partum newborn infant care as outlined in the Obstetrics Protocol.
- Pulse oximetry is inaccurate in determining heart rate during the first few minutes of life and should not be used for this purpose.
- In uncompromised neonates, blood oxygen levels may not reach extra uterine levels until approximately 10 minutes after birth.
- Preductal oxygen saturations are more representative of brain oxygenation.



## NEONATAL RESUSCITATION cont.

- Peripheral cyanosis affects the hands and feet and is caused by peripheral vasoconstriction. It is a common benign condition in the newborn.
- Central cyanosis affects the mucous membranes, lips, skin, and nailbeds, should be considered pathological until proven otherwise.
- Initiating resuscitation with high oxygen concentrations ( $\geq 65\%$ ) is not recommended and to reduce the risks associated with hyperoxia, supplemental oxygen concentrations should be weaned as soon as possible.
- Infants born through meconium-stained amniotic fluid who are vigorous with good respiratory effort and muscle tone may stay with the mother to receive the initial steps of newborn care.
- Routine intubation for tracheal suctioning in the presence of meconium staining is not recommended.
- When providing PPV, a manometer should be used to monitor the positive inspiratory pressure (PIP) delivered. An initial inflation pressure of 20 cmH<sub>2</sub>O may be effective, but  $\geq 30$ -40 cmH<sub>2</sub>O may be required in some term infants without spontaneous breathing.
- Risk for hypoglycemia include prematurity, small for gestational age, infant of a diabetic mother, stress or sickness.
- A general rule of thumb for normal neonatal blood pressure is that the MAP should equal the gestational age in weeks.
- Rapid administration of large volumes of resuscitation fluids neonates has been associated with intraventricular hemorrhage. Resuscitation fluids should be administered over 5-10 minutes.
- A Micro-Preemie neonate is one weighing under 1 lb. or  $< 26$  weeks gestation. These neonates should not be dried and stimulated. Initial care should focus on temperature control and ventilatory support along with gentle handling.