

Neonatal Resuscitation Program 2015 Guidelines

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- On October 15, 2015, the American Heart Association (AHA) and American Academy of Pediatrics released new 2015 Guidelines for CPR and ECC of the neonate. The guidelines serve as the foundation for the (NRP) 7th edition materials that were released in 2016 and must be instituted January 1, 2017.



- ILCOR went through a 5 year rigorous evidence based review and the NRP Steering Committee then prepared the guidelines for the changes of which the full list can be found online at eccguidelines.heart.org



- These guidelines apply primarily to newly born infants transitioning from intrauterine to extrauterine life. They are also applicable to neonates who have completed newborn transition and require resuscitation during the first few weeks of life. The terms newborn and neonate apply to any infant during the initial hospitalization and newly born specifically to the infant at birth. Practitioners who resuscitate these infants should consider following these guidelines.

- The approximate 10% of Newborns who will require some assistance to begin breathing at birth and less than 1% who will require extensive resuscitation measures has not changed. Although most newly born infants transition successfully without help, they can be successfully identified with 3 questions...

3 Pre Assess Questions

- Term Gestation ?
- Good Tone ?
- Breathing or Crying ?



- If the answer to ALL 3 questions is "YES," the newly born infant may stay with mother for Routine Care.
- Routine Care means dried, placed skin to skin, and covered with dry linen to maintain normal ongoing temperature (36.5 - 37.5) (97.7 - 99.5)
- Observation of breathing, activity, and color must be ongoing.

Delayed Cord Clamping

- New guideline: If also no resuscitation is required, so routine care, it is reasonable to Delay Cord Clamping.

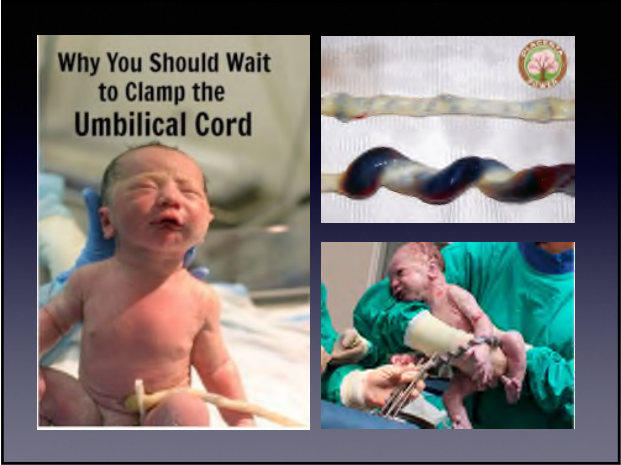


- If the answer to any of these assessment questions is "NO," the infant should be moved to a radiant warmer (a warm environment) to receive 1 or more of the following 4 actions IN SEQUENCE:
- Initial Steps
- Ventilate and Oxygenate
- Initiate Chest Compressions
- Administers Epi and/or Volume

- Approximately 60 seconds are allotted for completing the initial steps, reevaluating, and beginning ventilation if required. The 60 seconds mark is not precisely defined in science, it is important to NOT unnecessarily delay the key step of ventilation for the successful resuscitation of the newborn.
- The decision to progress beyond the initial steps is determined by the simultaneous assessment of 2 vital signs: Respirations and Heart Rate
- Once PPV or Supplemental O2 is initiated you must add the 3rd vital sign of Oxygen Saturation.

The most sensitive indicator of a successful response to each step is an increase in Heart Rate!

Umbilical Cord Management



- Until recent years, a common practice has been to clamp the umbilical cord soon after birth to quickly transfer the infant to the Neo (delivery) team for stabilization. Deemed particularly important for infants at high risk and likely to require resuscitation, such as preterm infants.
- During the 2010 CoSTR review, evidence began to emerge that delayed cord clamping (DCC) may be beneficial for infants who don't need immediate resuscitation at birth.

Benefits of DCC

Preterm infants 24–37 weeks
Providing additional placental blood to the preterm baby by delaying cord clamping by 30–120 seconds resulted in
Fewer babies needing transfusions for anemia
Better circulatory stability
Reduced risk of intraventricular hemorrhage (all grades)
Reduced risk of necrotizing enterocolitis
Reduced late-onset sepsis

Benefits of DCC

Term infants >37 weeks

- Delaying cord clamping for at least one minute
- Higher early hemoglobin concentration
- Increased iron reserves up to 6 months after birth
- No difference in PPH rates
- Higher birth weight
- No statistically significant increase in jaundice or polycythemia

- In summary, current evidence suggests that DCC should be at least 30-60 seconds for most routine term and preterm newborns who do not require resuscitation at birth. If placental circulation is not intact, such as placental abruption or cord avulsion, the cord should be clamped immediately.
- There is insufficient evidence to recommend an approach to cord clamping for infants who require resuscitation at birth.

Initial Steps

- Maintaining normal temperature of the infant
- Open and maintain the airway of the infant
- Clear secretions, if needed, from open airway
- Dry the infant (unless preterm)
- Stimulate the infant to breathe



Temperature

- It has long been recognized that admission temps of newly born nonasphyxiated infants can be a strong predictor of mortality. Preterms especially vulnerable. Hypothermia associated with morbidities as increased IVH, respiratory issues, hypoglycemia, and late onset sepsis.
- Therefore the guideline recommendation for newly born nonasphyxiated infants be maintained between 36.5 and 37.5 through stabilization.

Maintaining Temp in the Delivery Room(Delivery)

- Radiant Warmers
- Increased Environment Temperatures
- Thermal Mattresses
- Warm Humidified Resuscitation Gases
- Various combinations for preterm less than 32 weeks of gestation

- Slower rewarming is preferable to faster rewarming to avoid complications such as apnea and arrhythmias.
- However there is insufficient evidence to recommend a preference to rapid(0.5C/h or greater) or slow (less than 0.5C/h) of unintentional hypothermic newborns at admission.
- However Hyperthermia (greater than 38.0C) should be avoided due to associated risks.

- Maternal Hyperthermia is also associated with adverse effects to the neonates.
- Increased Mortality, Neonatal Seizures, Encephalopathy.
- Maternal hypothermia in labor has not been shown to have such adverse effects on the neonate at time of birth.
- There is insufficient evidence to make a recommendation on management of Maternal Hyperthermia.

- Maintaining temperature in resource limited settings after birth can be a significant challenge
- Dose dependent increases in mortality for temperatures below 36.5C. Preterm at higher risk than term. Simple interventions to prevent hypothermia during transition (birth until 1-2 hrs of life) reduce mortality.

- Guidelines for 2015: maintaining normothermia in resource limited settings during transition in well newborn infant, it is reasonable to place them in a clean food grade plastic bag up to the level of the neck and swaddle them after drying.
- Another option is to place newborn skin to skin with mom or Kangaroo.
- There is no data for this evidence during resuscitation.

Open/Clear Airway

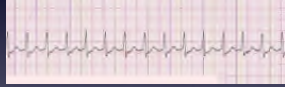
- UNCHANGED: Routine suctioning whether with a bulb syringe or suction catheter immediately after birth may be considered only if the airway is obstructed or PPV is needed. (Clear Fluids)
- UNCHANGED: Vigorous infant with good resp effort and muscle tone may stay with mom and receive initial steps and gentle clearing of the meconium from mouth and nose with bulb/syringe if needed.

- CHANGED: However if newborn is nonvigorous with meconium stain the initial steps should be completed under the radiant warmer (warm environment) and routine intubation for tracheal suctioning in this setting is NOT suggested. There is insufficient evidence to continue this practice.
- Greater value is placed on the Importance of NOT delaying Ventilation within the first minute of life!

- Every infant is individual and appropriate intervention has to be made for ventilation and oxygenation and may include intubation and suction if the airway is obstructed.

Assessment of HR

- During Resuscitation increase in the HR is the most sensitive indicator of a successful response to each intervention
- Clinical Assessment found to be unreliable and inaccurate by both auscultation and palpation. Studies found ECG more reliable and faster than pulse oximetry.



- During resuscitation of term and preterm newborns, the use of 3-lead ECG for rapid and accurate measurement of the newborn's HR may be reasonable. The use of the ECG does not replace the need for pulse oximetry to evaluate the newborn's oxygen.

Oxygen Need and Admin

- UNCHANGED: If resuscitation is anticipated, PPV is administered, central cyanosis persists beyond the first 5-10 minutes of life, or supplemental oxygen is administered, then it is recommended that oximetry is used.
- UNCHANGED: Infants greater than or equal to 35 weeks gestation can be resuscitated with 21% oxygen. Less than 35 weeks of gestation begin with 21-30% oxygen. Target preductal sats during the transition time.

Targeted Pre-ductal SpO ₂ 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%

Target Sats

- If newborn is breathing and HR is greater than 100 and the sats are not in the target range then you may give supplemental oxygen. Begin by free flow at 30% with the flow meter at 10L/min.
- While free flow cannot be given reliably thru a self inflating bag it can be given thru the tail of the reservoir.

PPV



- UNCHANGED: If after the initial steps the HR is less than 100 and/or the newborn is apneic or gasping PPV is indicated.
- HR greater than 100 and newborn breathing but unable to keep sats in the target range despite supplemental oxygen and unable to deliver CPAP may give trial of PPV.

PPV settings

- For PPV set flow at 10L/min
- Initial ventilation pressure is 20-25 cm H₂O, when PEEP is used the recommendation is 5 cm H₂O
- If PPV is needed for resuscitation of the preterm it is preferable to use a device that can provide PEEP at 5 cm H₂O
- If using PPV an ECG is the recommendation for HR monitoring (which is the best indicator for successful PPV)
- When starting PPV after the first 15 secs reassess HR

- If the HR is NOT increasing then the PPV is evidenced by CHEST MOVEMENT with ventilation
- After intubation or LMA placement, inflation of the lungs is assessed by CHEST MOVEMENT and BILATERAL BREATH SOUNDS with ventilation
- If you are attempting PPV (prior to intubation) and the newborn is not responding you should initiate the corrective steps of MR.SOPA

MR.SOPA

Corrective Steps		
M	Mask adjustment	Reapply the mask. Consider the 2-hand technique.
R	Reposition airway	Place head neutral or slightly extended. <i>Try PPV and reassess chest movement.</i>
S	Suction mouth and nose	Use a bulb syringe to suction catrater.
O	Open mouth	Open the mouth and lift the jaw forward. <i>Try PPV and reassess chest movement.</i>
P	Pressure increase	Increase pressure in 5 to 10 cm H ₂ O increments, maximum 40 cm H ₂ O. <i>Try PPV and reassess chest movement.</i>
A	Alternative Airway	Place an endotracheal tube or laryngeal mask. <i>Try PPV and assess chest movement and breath sounds.</i>

Alternative Airways

- Intubation is strongly recommended prior to beginning chest compressions. If intubation is not successful or feasible, a laryngeal mask may be used. A LMA is recommended during resuscitation of term and preterm newborns at 34 weeks or more gestation when ET intubation is unsuccessful or not feasible. However they have not been evaluated during chest compressions or med administrations.

- Intubation with an endotracheal tube is recommended if unable to ventilate with PPV and prior to chest compressions.
- New Guideline: Preterm less than 28 weeks, size 2.5 ETT, Preterm 28 - 34 weeks, size 3.0 ETT, Newborn greater than 34 weeks or 2kg, size 3.5 ETT. The 4.0 ETT has been removed for newborns.
- New Guideline: Measurement for ETT securing at the vocal cord guide is a estimate so the new Guideline is the (NTL).
- Nasal Septum to the Tragus plus 1cm for ETT depth.

Chest Compressions

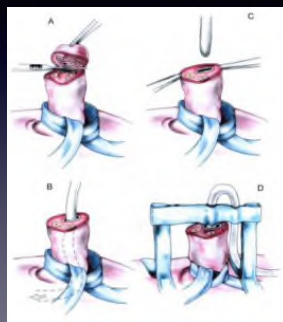
- Because chest compressions are likely to compete with effective ventilations rescuers should ENSURE that EFFECTIVE VENTILATIONS are being delivered before starting compressions
- Chest compressions are indicated when the HR is than 60 bpm after 30 secs of PPV that inflates the lungs

- ECG is the preferred method for assessment of the HR during chest compressions
- Chest compressions are done for 60 secs prior to reassessing which should be a HR
- The preferred technique is the 2 thumb technique, which generates higher blood pressure and CPP with less rescuer fatigue
- The 2 thumb technique also is done from the head of the bed which also allows for the placement of the UVC.

- The 3:1 ratio is still the recommendation for neonatal resuscitation due to the gas exchange compromise
- Due to the gas exchange compromise 100% oxygen is recommended during compressions
- As soon as the HR recovers rescuers should wean the O2 to the target range

Medications

- If the HR remains less than 60 bpm despite effective ventilation with 100% O2 with an ETT and chest compressions, administration of Epi and/or volume is indicated



- Epi is indicated if the newborn's HR remains less than 60 bpm after 30 secs of effective PPV with chest movement and 60 secs of chest compressions with PPV and 100% oxygen.
- Epi is NOT indicated before the lungs are effectively ventilated.
- The first dose of Epi may be given via the ETT route while establishing the UVC.
- There was no change in the recommendations for dosing of Epi

- Epi given via the ETT route: 0.05 mg/kg to 0.1 mg/kg (0.5 ml/kg to 1ml/kg)
- Epi given via the IV/IO route: 0.01 mg/kg to 0.03 mg/kg (0.1 ml/kg to 0.3 ml/kg)
- Both routes always 1:10,000 Epi

- New Guideline: Volume Expansion did have a change for 2015. If after chest compressions and meds there is no change still in the newborn the recommendation is for volume. The change is however no longer for LR Only NS or type O RH neg blood.
- The recommended dose of 10ml/kg over at least 10 min is unchanged.

- There is currently no evidence to support the routine use of either sodium bicarbonate or narcan in the newborn

