Neonatal Resuscitation Guidelines

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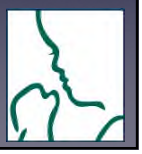

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Objectives

- Understand the updated NRP guidelines
- Understand and verbalize the significance of ventilation in the newborn
- Application of these guidelines in the prehospital arena

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- In October of 2020, the AHA and the American Academy of Pediatrics released new Guidelines for the resuscitation of the neonate. The guidelines serve as the foundation for NRP.
- New guidelines are continually updated
- The guideline changes can be found fully online at eccguidelines.heart.org

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- The guidelines apply primarily to the newly born.
- The “newly born” period extends from birth to the end of resuscitation and stabilization.
- However, the guidelines may be applied to newborns in the neonatal phase.
- Healthcare providers who resuscitate neonates should follow these guidelines.

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Key Concepts

- Newborn resuscitation is usually due to respiratory failure
- Anticipation and teamwork are key
- ABC’s **not** CAB
- Each algorithm step must be effectively performed before moving to the next step

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Respiratory

- Ventilation of the newborn’s lungs is the single most important and effective step in neonatal resuscitation

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Anticipation and Teamwork

- Gather information to anticipate situation (4 questions) prebirth questions
- GA, Risk Factors, Amniotic fluid color, & Cord plan
- Discuss equipment needed
- Discuss the algorithm steps
- Do you need additional resources

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ABC's not CAB

- Ventilation, ventilation, ventilation…
- All steps are to improve neonate's respiratory effort

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Algorithm Steps

- Each algorithm step must be effectively performed before moving to the next step
- Seconds to minutes can lapse before next action

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- Most newborns transition successfully
- They can be successfully identified with 3 questions...

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Rapid Evaluation Questions

- Term?
- Tone?
- Breathing or Crying?

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- If the answer to ALL 3 questions is "YES," the newborn may stay with mother for Initial Steps.
- Consider birth/cord plan
- If “NO” to any of the questions, Initial Steps completed away from mother
- Observation and assessment of breathing, activity, and HR must be ongoing.

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Initial Steps

- Warm, Dry, and Stimulate
- Open and position the airway
- Suction and clear secretions, if needed

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- 30-60 seconds for Initial Steps
- It is important to NOT unnecessarily delay the key step of ventilation
- The decision to progress beyond the Initial Steps is determined by the simultaneous assessment of HR and Respirations
- Once PPV or Supplemental O2 is initiated add Pulse oximetry

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

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Warm, Dry, & Stimulate

- Warm neonate with available equipment
- Dry neonate with blankets/towels
- Stimulate simultaneously

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Open/Position Airway

- Neonate's head in sniffing position
- Open airway
- No pressure to bridge between eyes with mask

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Suction/Clear Airway

- No routine suctioning
- Clear secretions if needed
- Least invasive to more invasive

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- Vigorous newborns with good resp effort and tone may stay with mother during initial steps.
- Preterm and non-vigorous newborns have the initial steps completed in a warm environment away from mother.
- Importance is NOT delaying Ventilation within the first minute of life!

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Temperature

- It has long been recognized temps of neonates can be a strong predictor of mortality. Preterm especially vulnerable. Hypothermia associated with an increase in respiratory issues, hypoglycemia, IVH and sepsis.
- The guideline recommendation for a neonate's temp is between 36.5 and 37.5 C (97.7- 99.5 F).

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Maintaining Temperature

- Increased Environment Temperatures (24-25 C)
- Towels/blankets/hats
- Skin to Skin
- Thermal pads
- Dry
- Various combinations for preterm less than 32 weeks of gestation

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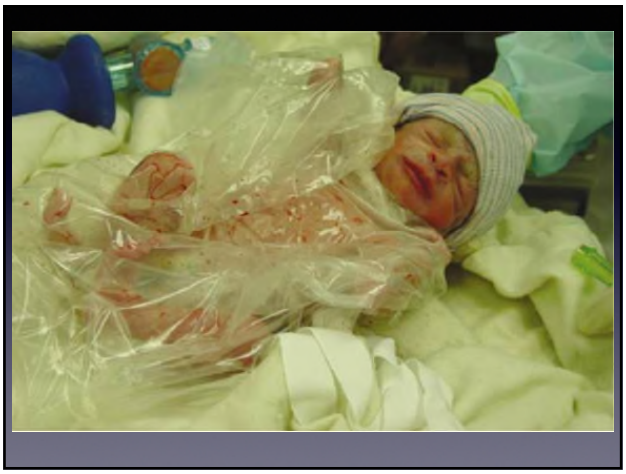

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Cord Management

- Until recent years, a common practice has been to clamp the umbilical cord soon after birth
- Studies and evidence now indicate timed cord clamping is beneficial for newborns who don't need immediate resuscitation at birth.

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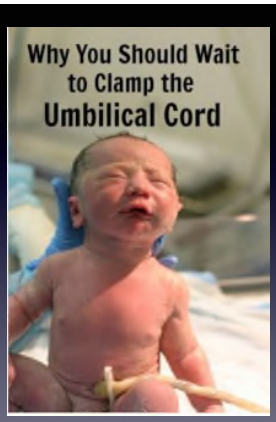
Cord Management



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Benefits of TCC

- Optimal time is 60 seconds
- Maternal blood flow to an intact placenta provides warm additional oxygenated blood to the newborn
- Term neonates evidence higher Hgb concentration and increased iron stores.
- Preterm neonates evidence increased circulatory stability, reduced risk of IVH, and NEC

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- 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 timed cord clamping for infants who require resuscitation at birth.

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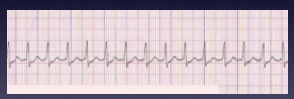
Assessment of HR

- 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 with both auscultation and palpation. Studies found ECG most reliable and faster than pulse oximetry.



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- During resuscitation of term and preterm newborns, the use of a 3-lead ECG for rapid and accurate measurement of the newborn's HR is the guideline.
- Pulse oximetry is utilized with ECG

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Oxygen Need and Admin

- If resuscitation is needed anticipate PPV
- Newborns 35 weeks gestation or greater start PPV with 21% oxygen. Less than 35 weeks gestation begin with 21-30% oxygen. Target preductal sats during the transition time
- What to do when unable to blend oxygen

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- If the newborn is breathing, HR is greater than 100 and sats are not in the target range, provide supplemental oxygen.
- Administer free flow at 10L/min
- Use oxygen tubing held to newborn mouth and nose

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Target Pre-ductal Sats

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

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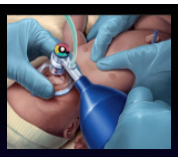
PPV



- If after the initial steps the HR is less than 100 and/or the newborn is apneic or gasping, PPV is indicated.
- PPV may be delivered with a BVM or a T-piece resuscitator

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PPV settings

- For PPV set flow at 10L/min
- Peak inspiratory pressure (PIP) is 20-25 cm H2O, PEEP is set at 5 cm H2O
- If PPV is needed for resuscitation, especially of the preterm newborn, a device that can monitor PIP and provide PEEP should be used
- If providing PPV an ECG is the recommendation for HR monitoring

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PPV rate

- Ventilation of 40-60 bpm for the newborn
- Cadence: “Breathe, two, three; breathe, two, three”
- Continually

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- Upon starting PPV assess chest rise and fall/HR after 10-15 secs.
- If the chest is rising and falling and the HR is increasing within 10-15 secs, cont. PPV for 30 secs total.
- If the HR is NOT increasing after 15 secs but the chest is rising and falling, cont. for another 15 secs and reassess
- If the HR is NOT increasing after 15 secs, no chest rise and fall, initiate MR.SOPA

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MR.SOPA

- M&R: mask adjustment and reposition head
- S&O: suction mouth and nose, open the mouth
- Pressure: increase PIP, max 30-preterm and 30-40 term
- Alternative airway: LMA or ETT
- Ventilate with each corrective step for 5 breaths

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MR.SOPA success

- After performing a corrective step for 5 breaths, if the newborn has chest rise and fall, provide effective ventilation for 30 secs and reassess HR
- HR above 60 continue PPV, HR above 100 consider stopping if target sats are achieved

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Alternative Airways

- Intubation with an endotracheal tube is recommended if unable to ventilate with PPV, HR < 100 with PPV, and prior to chest compressions
- LMA's are recommended as an AA for term and preterm newborns, new guidelines
- Remember, "Breathe, two, three; breathe, two, three"

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AA sizes

Gest age	ETT	approx. wt.
< 28 weeks	2.5	< 1 kg
28-34 weeks	3.0	1-2 kg
> 34 weeks	3.5	2-3 kg

LMA size wt. based

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- Guideline to measure for depth and placement of the ETT is the nasal tragus length (NTL) plus 1cm.
- Secure here and document

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Chest Compressions

- ENSURE that EFFECTIVE VENTILATIONS are being delivered before starting compressions
- Chest compressions are indicated when the HR <60 bpm after 30 secs of effective PPV

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- ECG is the preferred method for assessment of the HR during chest compressions
- Chest compressions are done for 60 secs prior to reassessing the HR
- The preferred technique is the 2-thumb technique at the head of the patient

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- 3:1 ratio is the recommendation for neonatal resuscitation due to the ventilation need
- Cadence: “One and two and three and breathe and…”
- Due to the gas exchange compromise 100% oxygen is recommended during compressions
- HR > 100, rescuers should wean the oxygen to target pre-ductal saturations

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Medication/Epi

- Epi is indicated if the newborn's HR remains less than 60 bpm after 30 secs of effective PPV and 60 secs of chest compressions with PPV using100% oxygen.
- Epi is NOT indicated before the lungs are effectively ventilated.
- The first dose of Epi should be given via the ETT while establishing the UVC.

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- Epi dose via ETT route: 0.05 mg/kg - 0.1 mg/kg (0.5 ml/kg to 1ml/kg)
- Recommended dose: 0.1 mg/kg (1 ml/kg)
- Epi dose via UVC/IV/IO route: 0.01 mg/kg - 0.03 mg/kg (0.1 ml/kg to 0.3 ml/kg)
- Recommended dose: 0.02 mg/kg (0.2 ml/kg)
- The ***only*** Epi concentration used in NRP is 0.1mg per 1ml

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Volume

- NS flushes should be 3 ml for all newborn ages
- Promotes availability
- If after chest compressions and Epi, the HR is still less than 60 and signs of shock, volume is recommended. Only NS
- Recommended dose is10ml/kg over 5-10 min

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- There is currently insufficient evidence to support the routine use of Narcan in the newborn.
- Effective airway management and ventilation support are the key interventions

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Top 10 Takeaways from NRP

1) Newborn resuscitation requires anticipation and preparation by providers who train individually and as teams.
2) Most newly born infants do not require immediate cord clamping or resuscitation and can be evaluated and monitored during skin-to-skin contact with their mothers after birth.
3) Inflation and ventilation of the lungs are the **priority** in newly born infants who need support after birth.
4) A rise in heart rate is the most important indicator of effective ventilation and response to resuscitative interventions.
5) Pulse oximetry is used to guide oxygen therapy and meet oxygen saturation goals

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Top 10 Take aways

- 1) Chest compressions are provided if there is a poor heart rate response to appropriate ventilations after ventilation corrective steps, which preferably include endotracheal intubation.
- 2) The heart rate response to chest compressions and medications should be monitored electrocardiographically.
- 3) If the response to chest compressions is poor, it is reasonable to provide epinephrine, preferably via the intravenous route.
- 4) Failure to respond to epinephrine in a newborn with history or examination consistent with blood loss may require volume expansion.
- 5) If all these steps of resuscitation are effectively completed and there is no heart rate response by 20 minutes, redirection of care should be discussed with the team and family

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