Chapter 5: Neonatal Resuscitation

Apgars:

- Given at 1 and 5 minutes
  - Repeat every 5 minutes until 20 minutes of life if the score is less than 7 at five minutes.

SIGN	0	1	2
Color	Blue or Pale	Acrocyanotic	Completely Pink
Heart Rate	Absent	<100 bpm	>100 bpm
Reflex irritability	No Response	Grimace	Cry or Active Withdrawal
Muscle Tone	Limp	Some Flexion	Active Motion
Respiration	Absent	Weak Cry; Hypoventilation	Good, Crying

- Infants <35 weeks- Initiate resuscitation with 30% blended oxygen and adjust as needed
- Infants ≥35 weeks- Initiate resuscitation with 21% and adjust as needed
- All infants requiring prolonged PPV or if you're considering intubation (or LMA) should have EKG leads placed
- All infants should have pulse oximetry with probe on right upper extremity (wrist/hand) if:
  - –Evidence of cyanosis
  - –Needs oxygen, CPAP, or PPV

CPAP/PEEP

- Use T piece from Panda warmer or Neopuff
- Start at 5 mmHg

PPV Positive Pressure ventilation

- Give 40-60 breaths per minute
- Start with PIP at 20
- Consider placing OG if PPV for more than few minutes

Chest Compressions

- Thumbs between the nipple line and the xiphoid process

- Compress to a depth of 1/3 of the anterior-posterior diameter of the chest
- 90 compressions + 30 breaths in one minute
  –"One–and Two–and Three–and–Breathe–and"

Endotracheal Intubation

- Tube depth (cm at the lip) = Nasal-tragal length + 1
- Tube size
  – <1 kg/<28 weeks = 2.5 mm
  – 1-2 kg/28-34 weeks = 3.0 mm
  – >2 kg/>34 weeks = 3.5 mm
- Use CO_2 detector to determine if intubation is successful. It will change from purple to yellow (note: If there's no cardiac output, the color will not change. Also, contamination from esophageal fluids may cause color change).

LMA

- Use size 1 for neonates > 2kg
- Inflate cuff after placement with 2-4 ml of air

Medications

- Normal saline 10 mL/kg over 5-10 minutes,
- Epinephrine 0.1 mg/mL (flush with 3mL normal saline)
  – Via ETT 1 mL/kg (0.1mg/kg)
  – Via UVC/IV 0.2 mL/kg (0.02mg/kg)

Delayed Cord Clamping

- Cord clamping should be delayed for 60 seconds for most term and preterm infants. Exclusions include abruption, bleeding placenta previa, cord avulsion.

Special Circumstances

- Infants <29 weeks (see Micropremie Section)
- Pneumothorax
  – 18-20 gauge needle (angiocath or butterfly) into fourth intercostal space at the anterior axillary line or the second intercostal space at the mid-clavicular line

Cord Gases

- Consider obtaining if prolonged/significant resuscitation, abnormal tone, peripartum abnormalities
  – Normal pH >7.2 (7.15-7.38), pCO_2 <60 mmHg (35-70), pO_2 > 20, base excess

< -10 (-2 to -9)

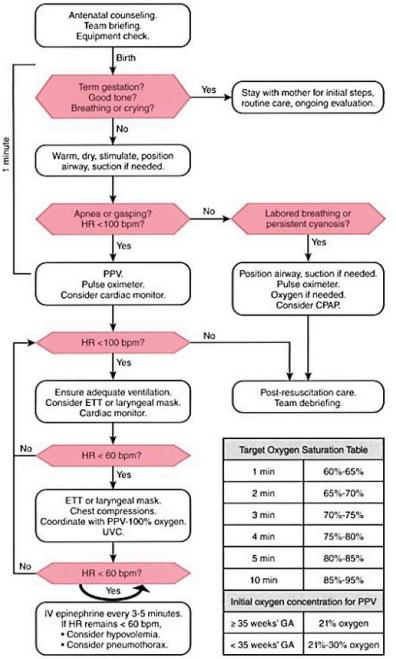
- Abnormal: pH <7.0 or base excess ≥12 at risk for neonatal encephalopathy and may qualify for whole body cooling (see HIE Section)

eferences:

1. AAP Textbook of Neonatal Resuscitation 8th Edition

Neonatal Resuscitation Program®, 8th Edition - Reference Chart

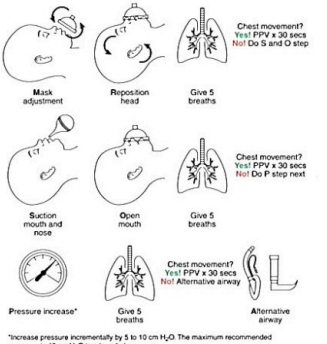
The most important and effective step in neonatal resuscitation is ventilation of the baby's lungs.



Target Oxygen Saturation Table	
1 min	60%-65%
2 min	65%-70%
3 min	70%-75%
4 min	75%-80%
5 min	80%-85%
10 min	85%-95%
Initial oxygen concentration for PPV	
≥ 35 weeks' GA	21% oxygen
< 35 weeks' GA	21%-30% oxygen

Ventilation Corrective Steps (MR. SOPA)

When a MR. SOPA step results in chest movement, ventilate for 30 seconds and reassess heart rate.



*Increase pressure incrementally by 5 to 10 cm H_2O. The maximum recommended pressure is 40 cm H_2O in a term baby.

Endotracheal Intubation

Gestation	ET Insertion Depth at Lips (cm)	Approximate Weight (kg)	ET size (ID, mm)
23–24 weeks	5.5	0.5–0.6	2.5
25–26 weeks	6.0	0.7–0.8	2.5
27–29 weeks	6.5	0.9–1.0	2.5–3.0
30–32 weeks	7.0	1.1–1.4	3.0
33–34 weeks	7.5	1.5–1.8	3.0
35–37 weeks	8.0	1.9–2.4	3.5
38–40 weeks	8.5	2.5–3.1	3.5
41–43 weeks	9.0	3.2–4.2	3.5–4.0

Shaded table adapted from Kempley ST, Moreiras JW, Petrone FL. Endotracheal tube length for neonatal intubation. *Resuscitation*. 2008;77(3):369–373.

Neonatal Code Medications

Drug	Dose*	0.5 kg	1 kg	2 kg	3 kg	4 kg	Administration
Epinephrine IV/IO Concentration: 0.1 mg/mL 1 mg/10 mL	0.02 mg/kg Equal to 0.2 mL/kg	IV Dose: 0.01 mg Volume: 0.1 mL	IV Dose: 0.02 mg Volume: 0.2 mL	IV Dose: 0.04 mg Volume: 0.4 mL	IV Dose: 0.06 mg Volume: 0.6 mL	IV Dose: 0.08 mg Volume: 0.8 mL	IV/IO rapid push. Flush with 3 mL NS. Repeat every 3-5 minutes if heart rate less than 60 bpm.
Epinephrine ETT Concentration: 0.1 mg/mL 1 mg/10 mL	0.1 mg/kg Equal to 1 mL/kg	ET Dose: 0.05 mg Volume: 0.5 mL	ET Dose: 0.1 mg Volume: 1 mL	ET Dose: 0.2 mg Volume: 2 mL	ET Dose: 0.3 mg Volume: 3 mL	ET Dose: 0.4 mg Volume: 4 mL	May administer while vascular access is being established. ETT rapid push. No need for flush. Provide PPV breaths to distribute into lungs.
Normal Saline IV 0.9% NaCl	10 mL/kg	5 mL IV	10 mL IV	20 mL IV	30 mL IV	40 mL IV	Give over 5-10 min.

*The recommended dose range for intravenous or intraosseous administration is 0.01 to 0.03 mg/kg (equal to 0.1 to 0.3 mL/kg).
The recommended dose range for endotracheal administration is 0.05 to 0.1 mg/kg (equal to 0.5 to 1 mL/kg).

These suggested epinephrine doses are based on a desire to simplify dosing for educational efficiency and do not endorse any particular dose within the recommended dosing range. Additional research is needed to ascertain the ideal epinephrine dose.

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The recommendations in this publication do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.