

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

احیای ریوی قلبی نوزادان

دکتر صدرالدین مهدی پور

فوق تخصص نوزادان

1400

کار گروهی

- ❖ نشست گروه پیش از احیا
- ❖ شایع ترین علت ریشه ای مرگ های بالقوه قابل پیشگیری در اتاق زایمان کار گروهی غیر موثر و ناتوانی در برقراری ارتباط می باشد.
- ❖ در هر گروه نقش هر کسی در احیا باید مشخص باشد. (چک لیست خلبان پیش از پرواز)
- ❖ هر گروه احیا نیاز به یک رهبر دارد.
- ❖ تعیین عوامل خطر پیش از تولد، تعیین مسوولیت هر فرد، تعیین فرد مسوول ثبت وقایع، امتحان تجهیزات و وسایل و چگونگی فراخوان نیروی کمکی



Table 2-1. Perinatal Risk Factors Increasing the Likelihood of Neonatal Resuscitation

Antepartum Risk Factors	
Gestational age less than 36 0/7 weeks Gestational age greater than or equal to 41 0/7 weeks Preeclampsia or eclampsia Maternal hypertension Multiple gestation Fetal anemia Polyhydramnios	Oligohydramnios Fetal hydrops Fetal macrosomia Intrauterine growth restriction Significant fetal malformations or anomalies No prenatal care
Intrapartum Risk Factors	
Emergency cesarean delivery Forceps or vacuum-assisted delivery Breech or other abnormal presentation Category II or III fetal heart rate pattern* Maternal general anesthesia Maternal magnesium therapy Placental abruption	Intrapartum bleeding Chorioamnionitis Narcotics administered to mother within 4 hours of delivery Shoulder dystocia Meconium-stained amniotic fluid Prolapsed umbilical cord

Warm	• Preheated warmer
	• Warm towels or blankets
	• Temperature sensor and sensor cover for prolonged resuscitation
	• Hat
	• Plastic bag or plastic wrap (<32 weeks' gestation)
	• Thermal mattress (<32 weeks' gestation)
Clear airway	• Bulb syringe
	• 10F or 12F suction catheter attached to wall suction, set at 80 to 100 mm Hg
	• Meconium aspirator
Auscultate	• Stethoscope
Ventilate	• Flowmeter set to 10 L/min
	• Oxygen blender set to 21% (21%-30% if <35 weeks' gestation)
	• Positive-pressure ventilation (PPV) device
	• Term- and preterm-sized masks
	• 8F feeding tube and large syringe
Oxygenate	• Equipment to give free-flow oxygen
	• Pulse oximeter with sensor and cover
	• Target oxygen saturation table

Intubate	• Laryngoscope with size-0 and size-1 straight blades (size 00, optional)
	• Stylet (optional)
	• Endotracheal tubes (sizes 2.5, 3.0, 3.5)
	• Carbon dioxide (CO ₂) detector
	• Measuring tape and/or endotracheal tube insertion depth table
	• Waterproof tape or tube-securing device
	• Scissors
	• Laryngeal mask (size 1) and 5-mL syringe
Medicate	Access to
	• 1:10,000 (0.1 mg/mL) epinephrine
	• Normal saline
	• Supplies for placing emergency umbilical venous catheter and administering medications
	• Electronic cardiac (ECG) monitor leads and ECG monitor

وقتی نوزاد بدنیا آمد

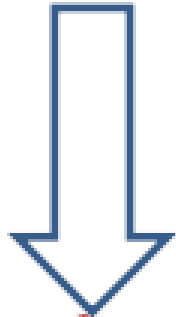
سه سوال مهم:

❖ آیا نوزاد ترم است؟

❖ آیا تنفس می کشد و گریه می کند؟

❖ آیا تون عضلانی نوزاد خوب است و دست و پا می زند؟

Birth



Term gestation?
Clear amniotic fluid?
Breathing or crying?
Good tone?

Yes - stay
with mother



Routine care

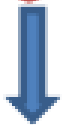
Provide warmth

Clear airway if necessary

Dry

Ongoing evaluation

No

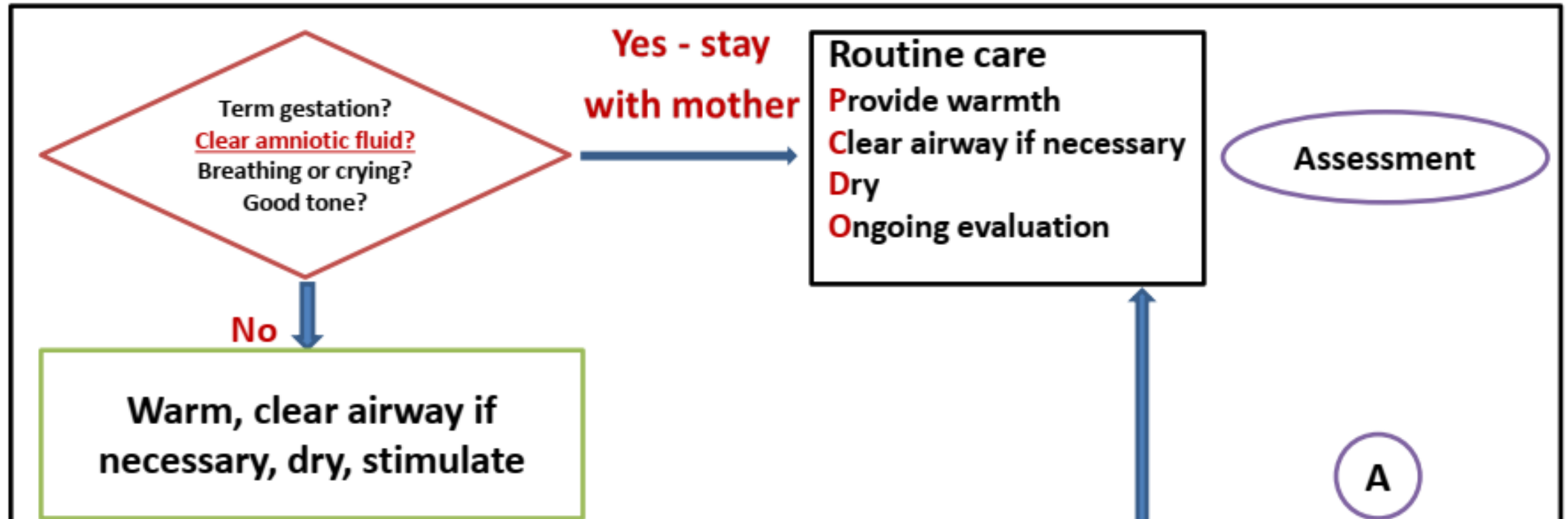


Assessment

Routine Care

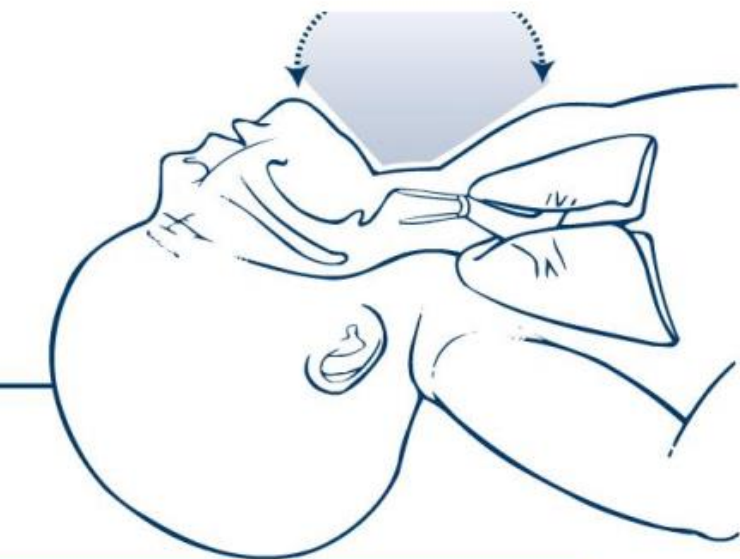
- **Do not separate the baby from the mother.**
- **Establish direct skin-to-skin contact with the mother.**
- **Clear the upper airway as necessary by wiping the baby's mouth and nose.**
- **Dry the baby and cover her with dry linen.**
- **Ongoing observation of breathing, activity, and color.**



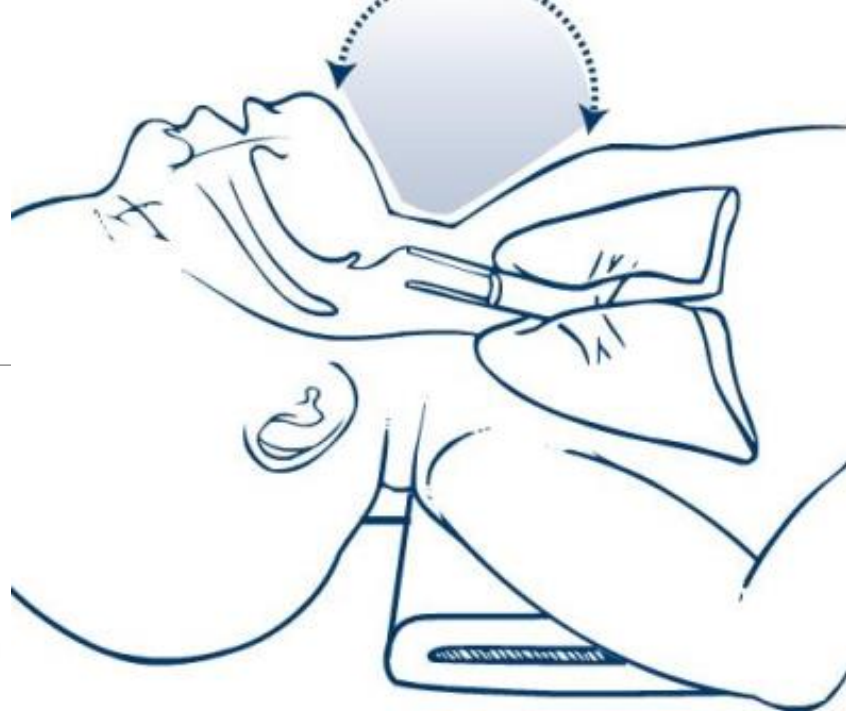


A Block A (Airway)

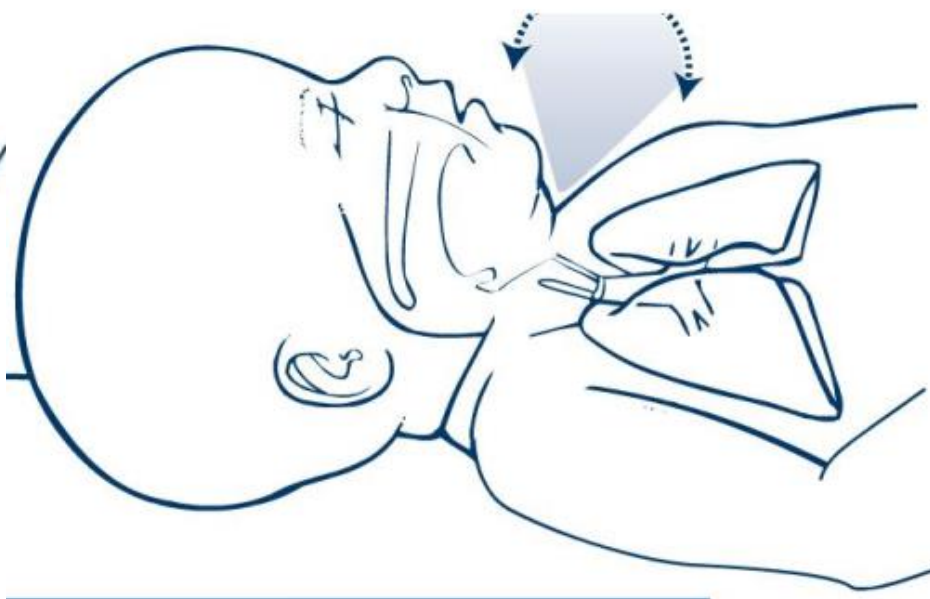
- **Provide warmth.**
- **Position; clear airway if necessary.**
- **Dry, stimulate, reposition.**



Incorrect
(hyperextension)

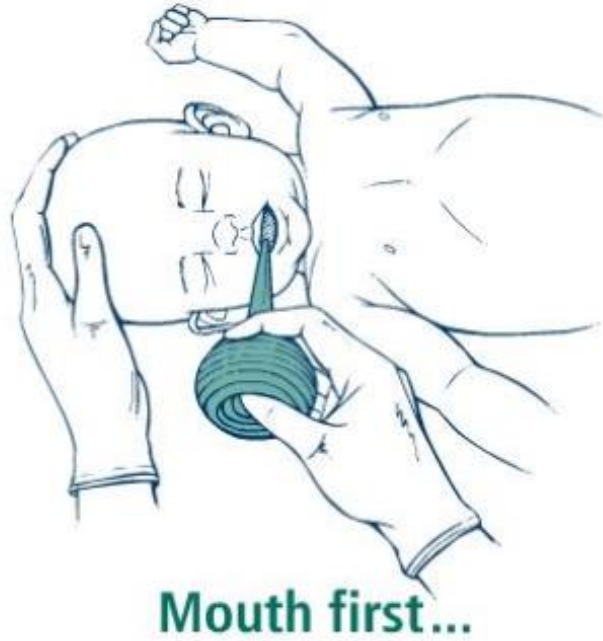


Correct



Incorrect
(flexion)

Clear Airway



Dry, Stimulate to Breathe, Reposition

Dry thoroughly



Remove wet linen



Reposition the head





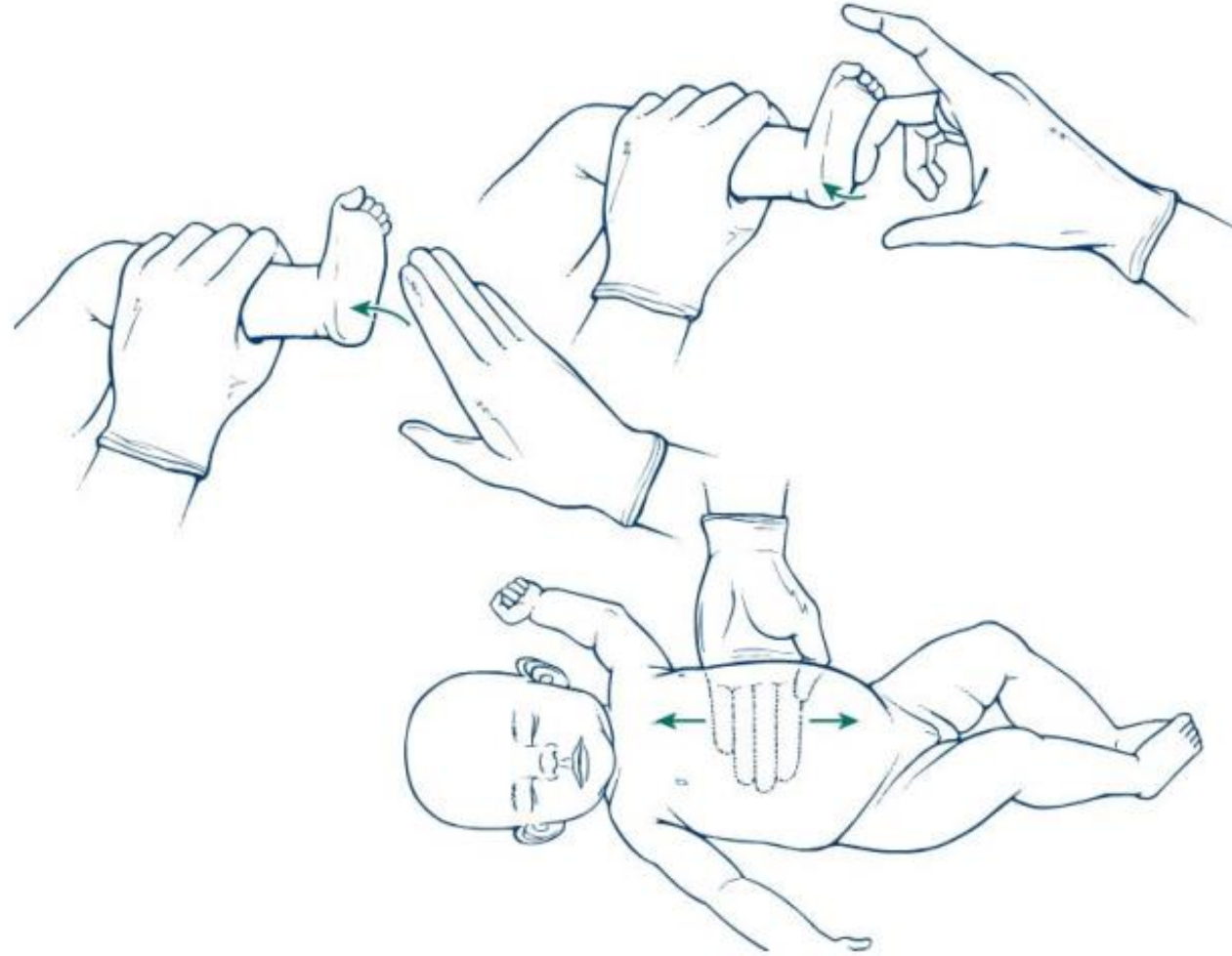
A



B



Tactile Stimulation



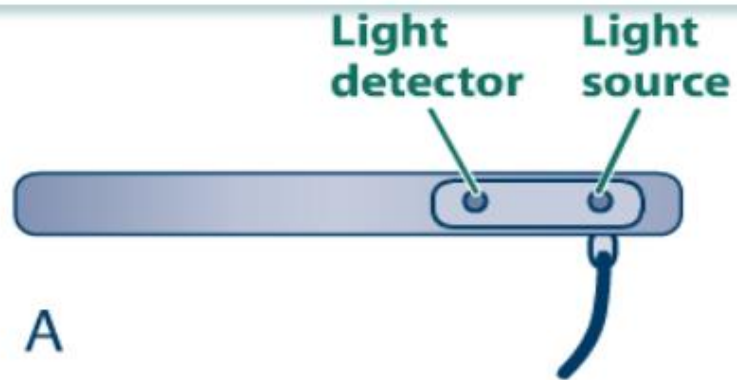
Evaluation

Evaluation occurs after initiation of each action and is based on primarily the following 3 signs:

- Respirations
- Heart rate
- Assessment of oxygenation (color or, preferably, **oximetry** reading).

Targeted Pre-ductal SpO₂ 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%

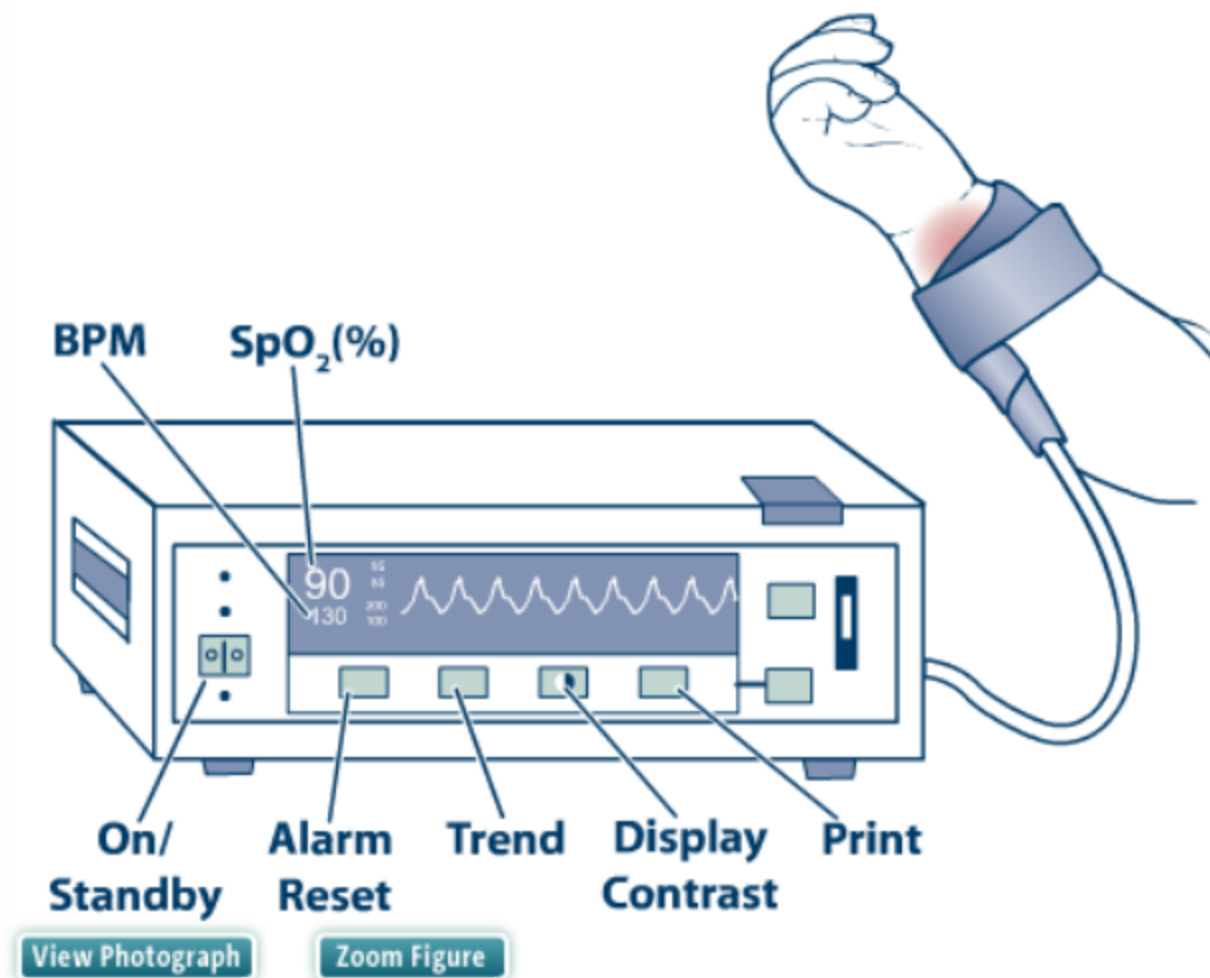


A



B

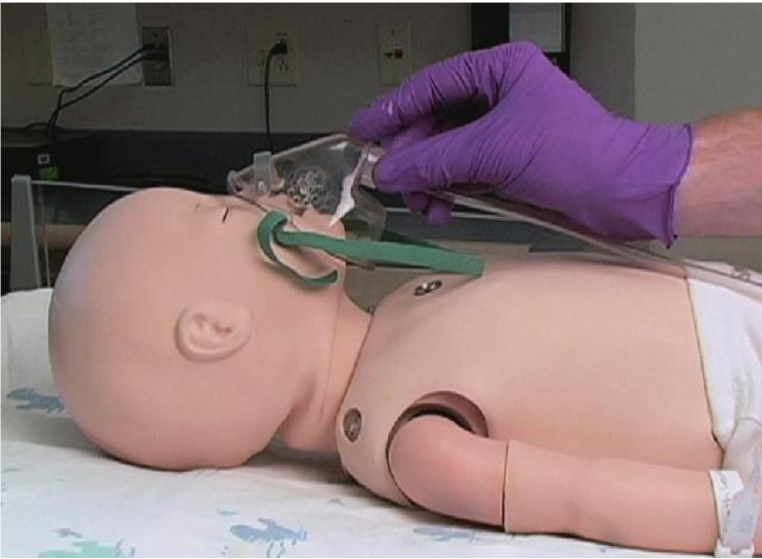
Figure 2.16. Oximeter probe (A) attached to a baby's hand on the hypothenar eminence



[View Photograph](#)

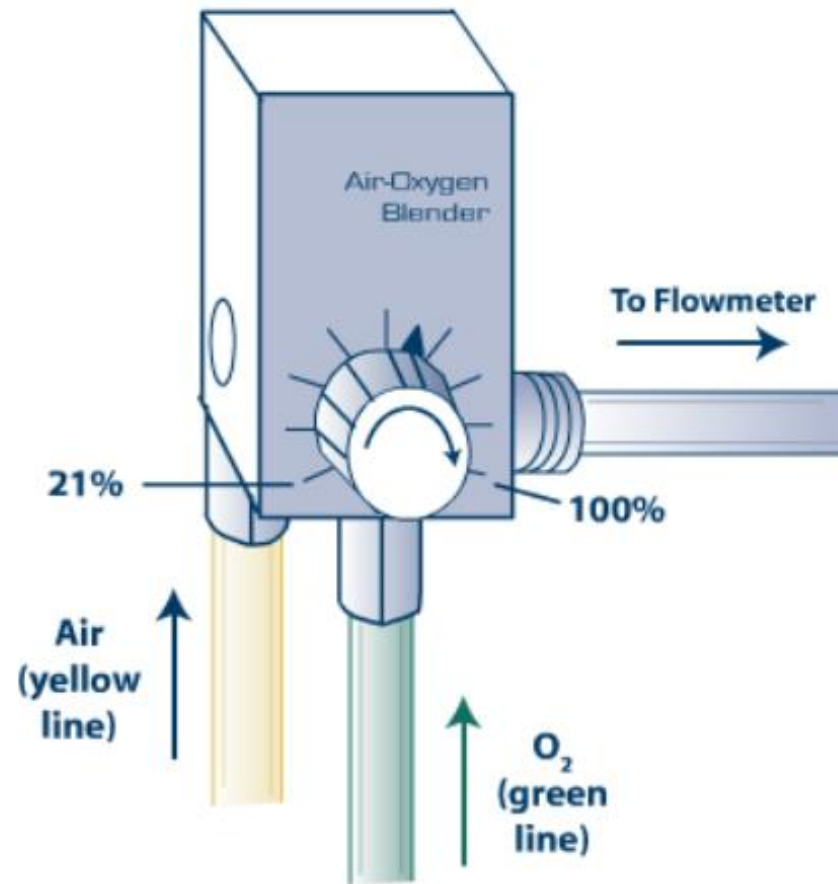
[Zoom Figure](#)

Free-flow Oxygen Given Via Oxygen Mask





Use a Blender to Give Different Concentrations of Oxygen



**If the baby is breathing and the
HR>100 bpm, but:**

- **Respirations are labored,**
- or**
- **The baby has persistent cyanosis**



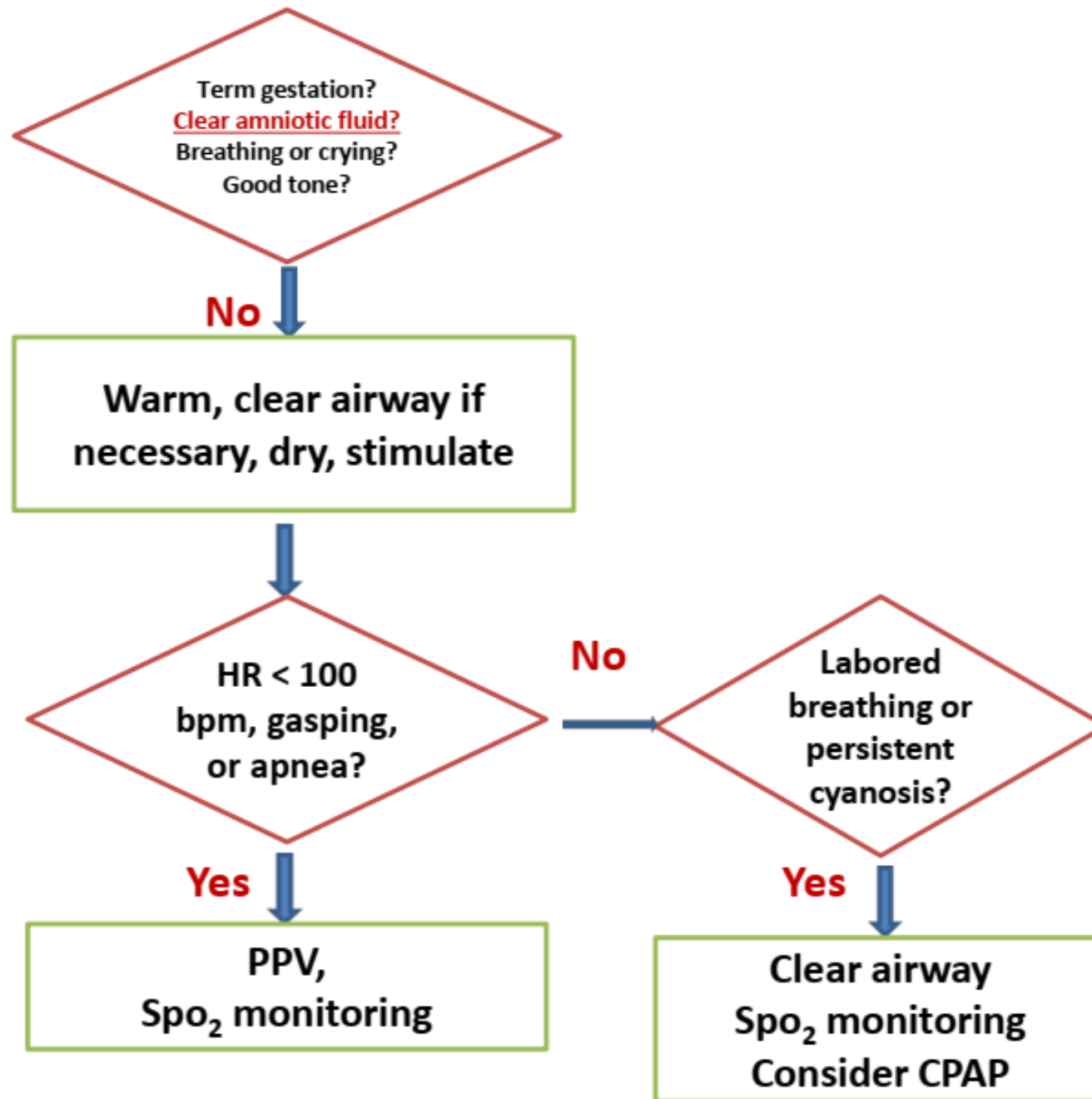
CPAP by face mask

You should also attach an **oximeter to assess the efficacy of your action and the possible need for **supplemental O₂**.**

Birth

30 sec

60 sec



B

What to Do Before Beginning PPV

- **Call for a second person.**
- **Select appropriate-sized mask.**
- **Be sure airway is clear.**
- **Position baby's head.**
- **Position yourself at baby's side or head.**



Correct



Incorrect



Incorrect

Position Yourself at the Baby's Head





A



B

Figure 4.13. (A) Cup the chin in the mask. (B) Bring the mask over the mouth and nose.





What concentration of oxygen should be used to start positive-pressure ventilation?

For the initial resuscitation of *newborns greater than or equal to 35 weeks' gestation, set the blender to 21% oxygen*

For the initial resuscitation of newborns *less than 35 weeks' gestation, set the blender to 21% to 30% oxygen.*

Set the flowmeter to **10 L/minute**

An assistant should place a pulse oximeter sensor on the right hand or wrist as soon as possible after PPV is started

Breathe....
(squeeze)



Two... ..Three... ..
(release... ..)



Breathe....
(squeeze)



Two... ..Three... ..
(release... ..)



Adequate Ventilation

The best indications of adequate ventilation are:

- **Rising heart rate**
- **Rising SpO₂**
- **Audible bilateral breath sounds**
- **Chest movement with each ventilation ?**
(not necessarily in preterm babies)

Ineffective Ventilation

After delivering 20 cm H₂O pressure, if HR and oximetry do not improve within the first 5 to 10 breaths:

- Look for the presence of chest movement with each PPV, **and**
- Ask your assistant to listen for bilateral breath sounds.

If the chest is not moving and there are poor breath sounds, begin the ventilation corrective sequence.

**First Assessment
Heart Rate After 15 Seconds of PPV**

Increasing

- Announce *"Heart rate is increasing."*
- Continue PPV.
- Second HR assessment after another 15 seconds of PPV.

**Not Increasing
Chest IS Moving**

- Announce *"Heart rate NOT increasing, chest IS moving."*
- Continue PPV that moves the chest.
- Second HR assessment after another 15 seconds of PPV that moves the chest.

**Not Increasing
Chest NOT Moving**

- Announce *"Heart rate NOT increasing, chest is NOT moving."*
- Ventilation corrective steps until chest movement with PPV.
 - Intubate or laryngeal mask if necessary.
- Announce when chest is moving.
- Continue PPV that moves the chest.
- Second HR assessment after 30 seconds of PPV that moves the chest.

	Corrective Steps	Actions
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 or suction catheter.
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>		

Second Assessment

Heart Rate After 30 Seconds of PPV That Moves the Chest

**At least
100 beats per minute (bpm)**

- Continue PPV 40–60 breaths/min until spontaneous effort.

60–99 bpm

- Reassess ventilation.
- Ventilation corrective steps if necessary.

<60 bpm

- Reassess ventilation.
- Ventilation corrective steps if necessary.
- Insert an alternative airway.
- If no improvement, 100% oxygen and chest compressions.

Table 5-1. Endotracheal tube size for babies of various weights and gestational ages

Weight (g)	Gestational Age (wks)	Endotracheal Tube Size (mm ID)
Below 1,000	Below 28	2.5
1,000-2,000	28-34	3.0
Greater than 2,000	Greater than 34	3.5



C. Measuring the NTL

Table 5-4. Initial endotracheal tube insertion depth ("tip to lip") for orotracheal intubation

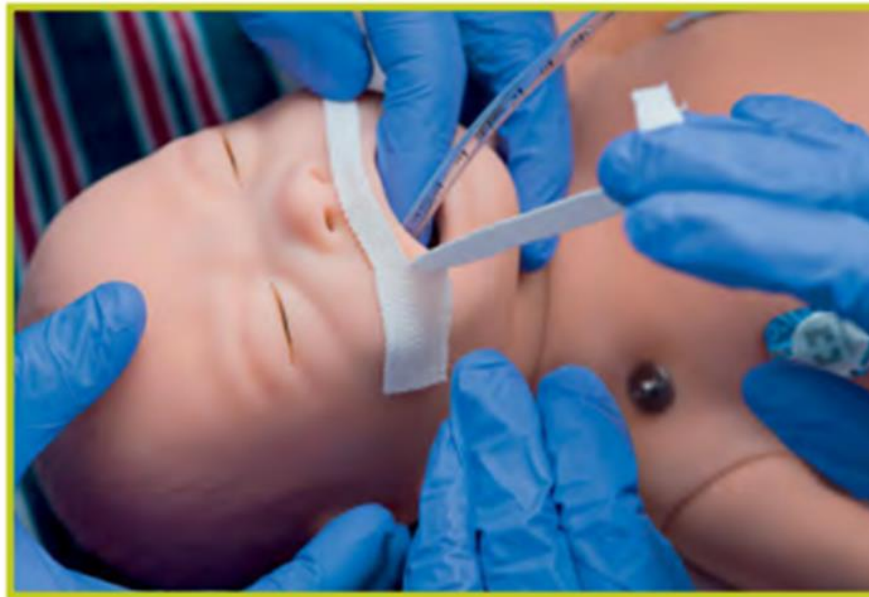
Gestation (weeks)	Endotracheal tube insertion depth at lips (cm)	Baby's Weight (grams)
23-24	5.5	500-600
25-26	6.0	700-800
27-29	6.5	900-1000
30-32	7.0	1,100-1,400
33-34	7.5	1,500-1,800
35-37	8.0	1,900-2,400
38-40	8.5	2,500-3,100
41-43	9.0	3,200-4,200



Figure 5.27. Note the marking adjacent to the upper lip.



A



B





Avoid using the clavicles as a landmark because their location varies depending upon the baby's position and the angle that the x-ray is taken.

Figure 5.29. Correct placement of endotracheal tube with tip adjacent to the second thoracic vertebra

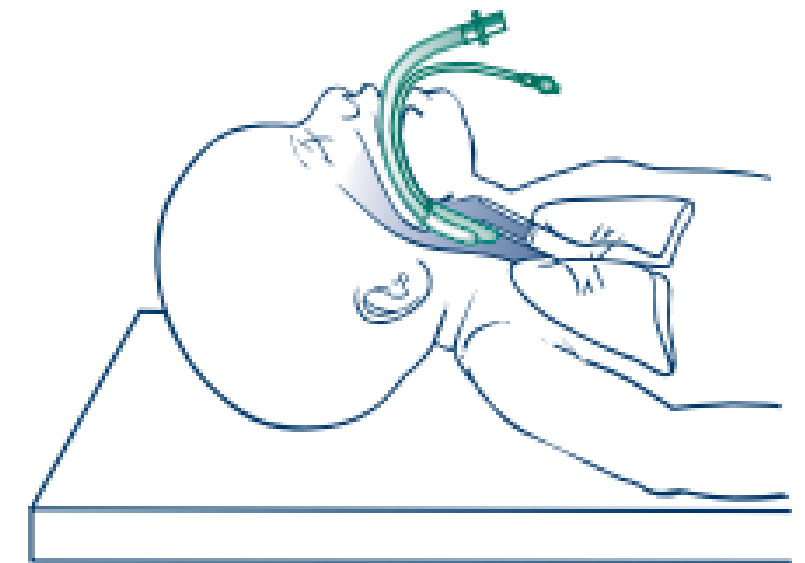
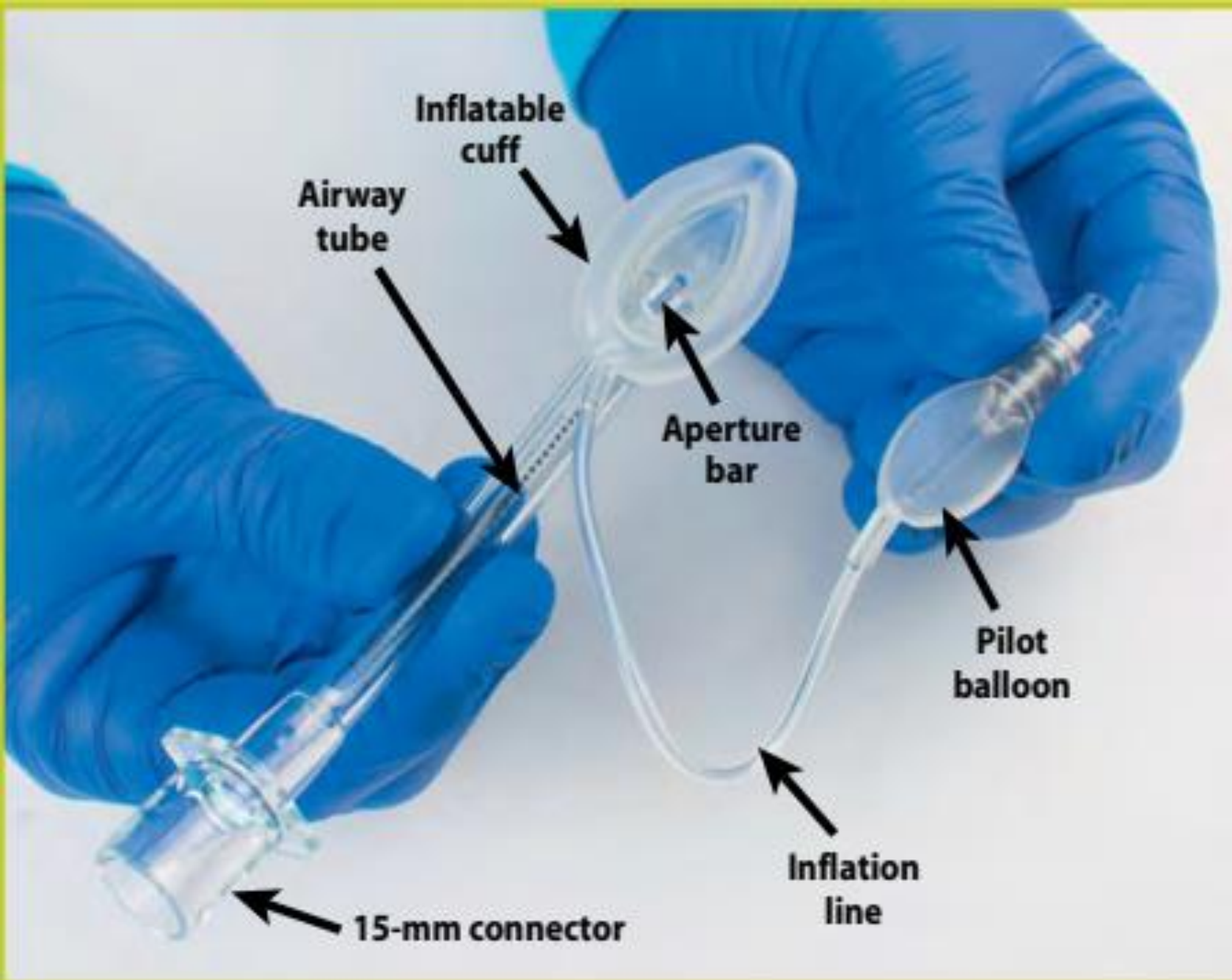


Figure 5.33. Laryngeal mask forming a seal over the glottis



What problems should you consider if a baby's condition **worsens after endotracheal intubation**?

Table 5-5. Sudden deterioration after intubation

The <i>DOPE</i> mnemonic	
D	Displaced endotracheal tube
O	Obstructed endotracheal tube
P	Pneumothorax
E	Equipment failure

Indications for Chest Compressions

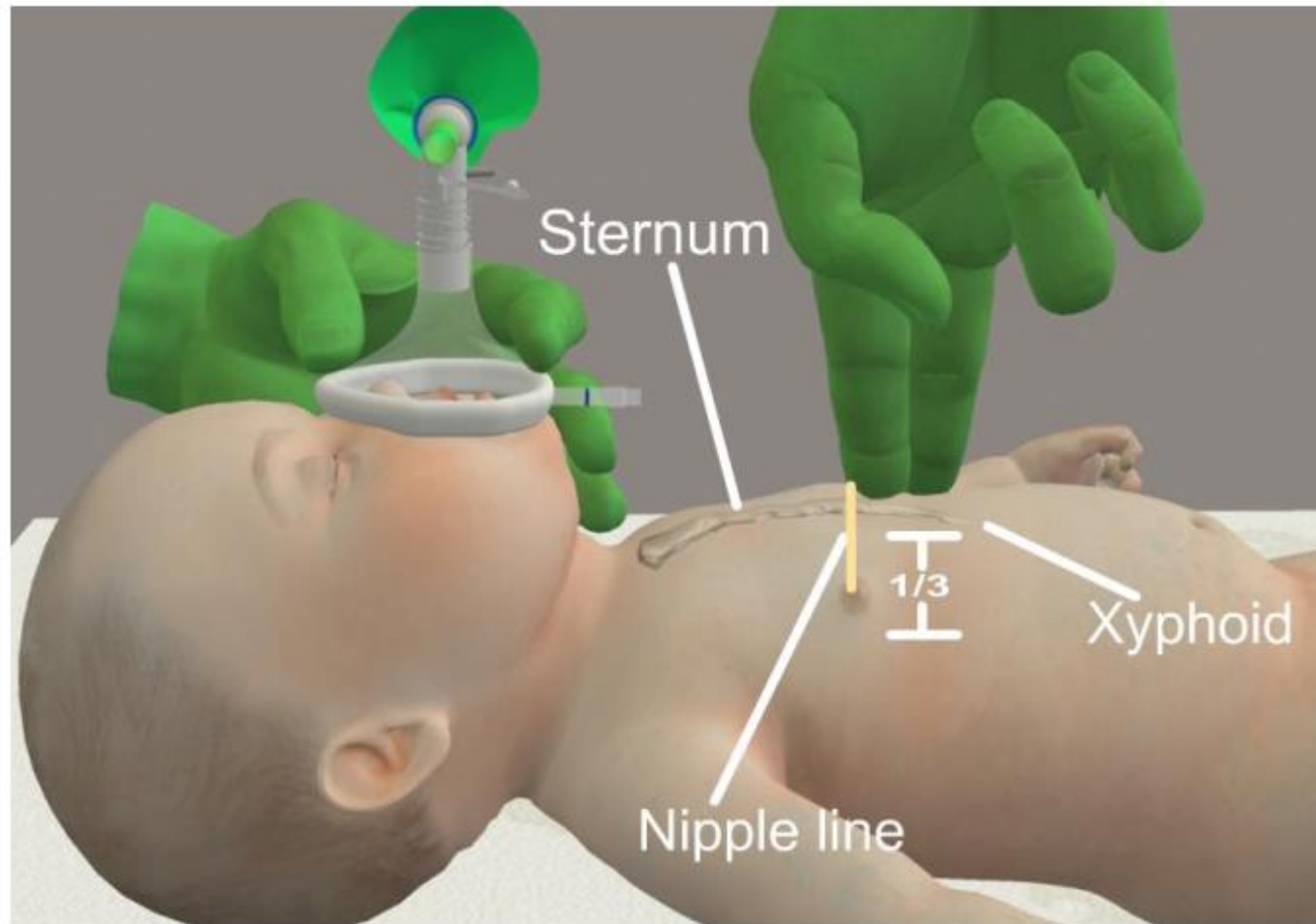
- Chest compressions are indicated when the heart rate remains **less than 60 bpm** after at least 30 seconds of PPV that inflates the lungs, as evidenced by chest movement with ventilation.
- In most cases, you should have given at least 30 seconds of ventilation through a properly inserted endotracheal tube or laryngeal mask.



2-Finger Technique



Compression Pressure and Depth



Newborn Not Improving

If the baby's condition continues to deteriorate or fails to improve, and the HR is below 60 bpm despite 30 sec of effective PPV, the next step will be:

- **Chest compressions and 100% O₂**

When the HR rises above 60 bpm, **adjust** the O₂ concentration to meet the target saturation range.

Epinephrine

Recommended dose

Intravenously: 0.1-0.3 mL/kg.

Endotracheally: 0.5-1 mL/kg.

(may dilute with normal saline to 1 to 2 mL if giving endotracheally).

Concentration

1:10,000 epinephrine (0.1 mg/mL)

Epinephrine Summary

Concentration

1:10,000 epinephrine (0.1 mg/mL)

Route

Intravenous (preferred) or Intraosseous

Option: Endotracheal only while intravenous or intraosseous access is being obtained

Preparation

Intravenous or Intraosseous = 1-mL syringe labeled "Epinephrine-IV"

Endotracheal = 3- to 5-mL syringe labeled "Epinephrine-ET only"

Dose

Intravenous or Intraosseous = 0.1 to 0.3 mL/kg

Endotracheal = 0.5 to 1 mL/kg

Administration

Rapidly—as quickly as possible

Intravenous or Intraosseous: Flush with 0.5 to 1 mL normal saline

Endotracheal: PPV breaths to distribute into lungs

Repeat every 3 to 5 minutes if heart rate remains less than 60 bpm.





Identify the insertion site. For term newborns, the preferred site is the flat surface of the lower leg, approximately 2 cm below and 1 to 2 cm medial to the tibial tuberosity (the bony bulge below the knee cap) (Figure 7.15).

Figure 7.15. Needle insertion site along the flat anteromedial surface of the tibia



Figure 7.13. Examples of intraosseous needles. Some needles are inserted with a drill (left) and others are inserted manually (right).



Figure 7.17. Insertion using an intraosseous drill



Volume Expanders

Recommended solution

Normal saline.

Recommended rate of administration

Over 5-10 minutes.

Recommended dose

10 mL/kg.

Volume Expander Summary

Solution

Normal saline (0.9% NaCl)

Suspected anemia: O-negative packed red blood cells

Route

Intravenous or Intraosseous

Preparation

30- to 60-mL syringe (labeled)

Administration

Over 5 to 10 minutes

(Use caution with preterm newborns less than 30 weeks' gestation.)

هر نفسی که فرو می رود مد حیات است و چون بر می آید
مفرح ذات، پس در هر نفسی دو نعمت موجود است و بر هر
نعمتی شکر می واجب

سعدی

