بسم الله الرحمن الرحيم

Newborn Care and Resuscitation

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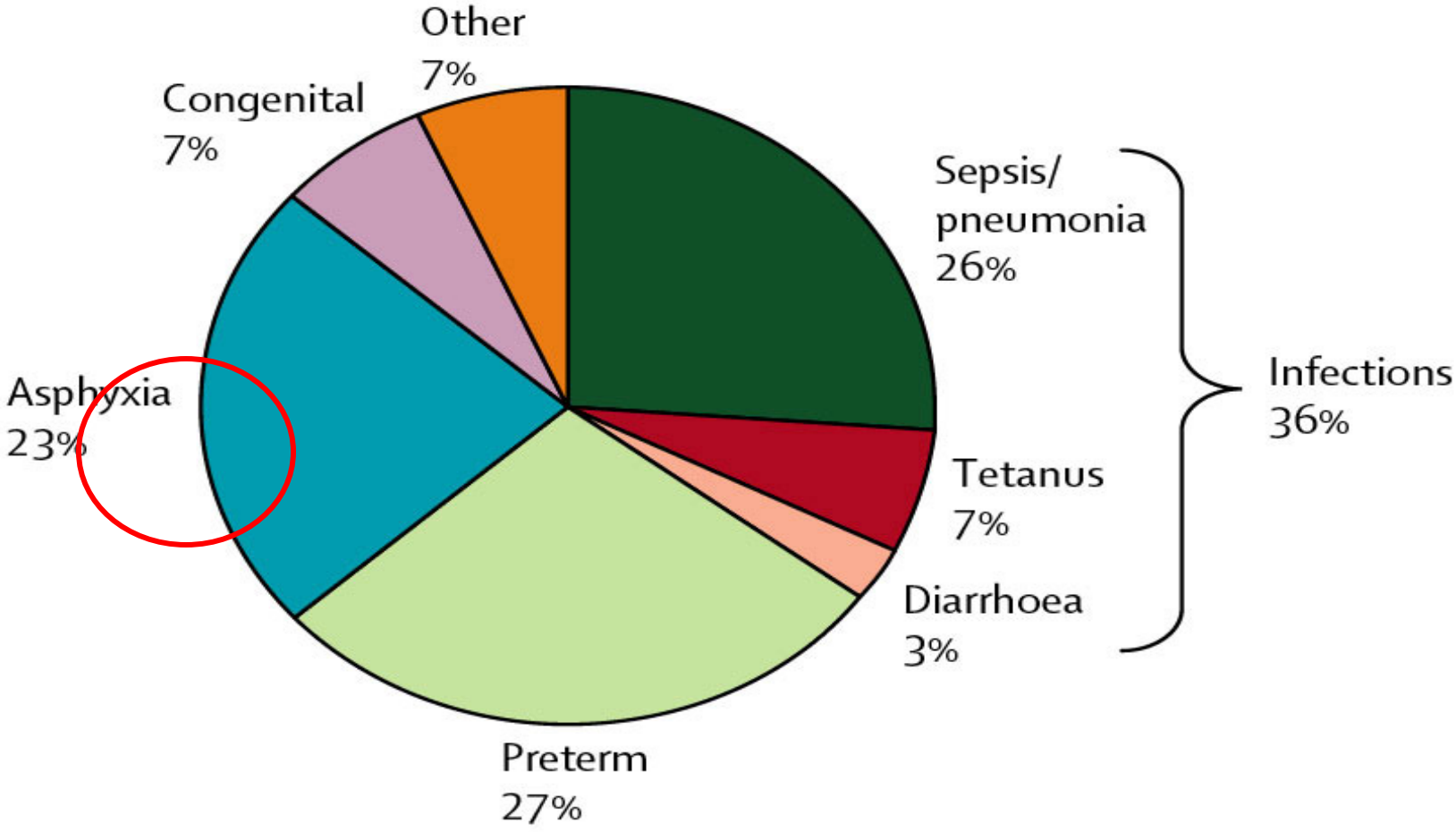
Dr.shafie mohamed jimale

Newborn Care and Resuscitation

- Newborn – within first few hours of birth
- Neonate – within first 30 days of delivery
- Pre-term – less than 37 weeks of gestation
- Term – 38 to 42 weeks of gestation
- Post-term (post-date) – greater than 42 weeks of gestation

4 million newborn deaths – Why?
almost all are due to preventable conditions

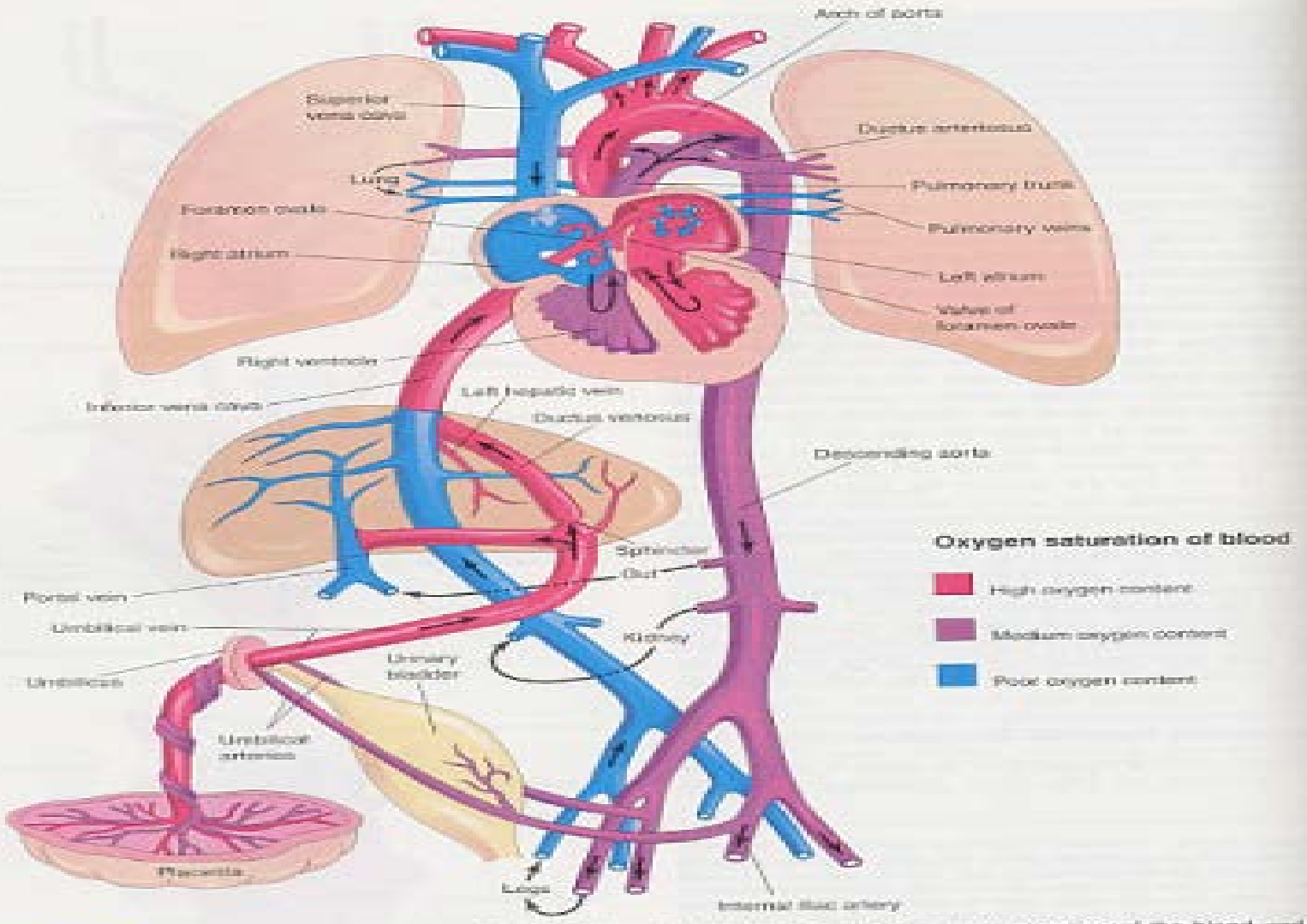


Neonatal resuscitation

- Approximately 10% of newborns require some assistance to begin breathing at birth. Less than 1% require extensive resuscitative measures.
- Rate of complication increases as the newborn weight and gestational age decrease

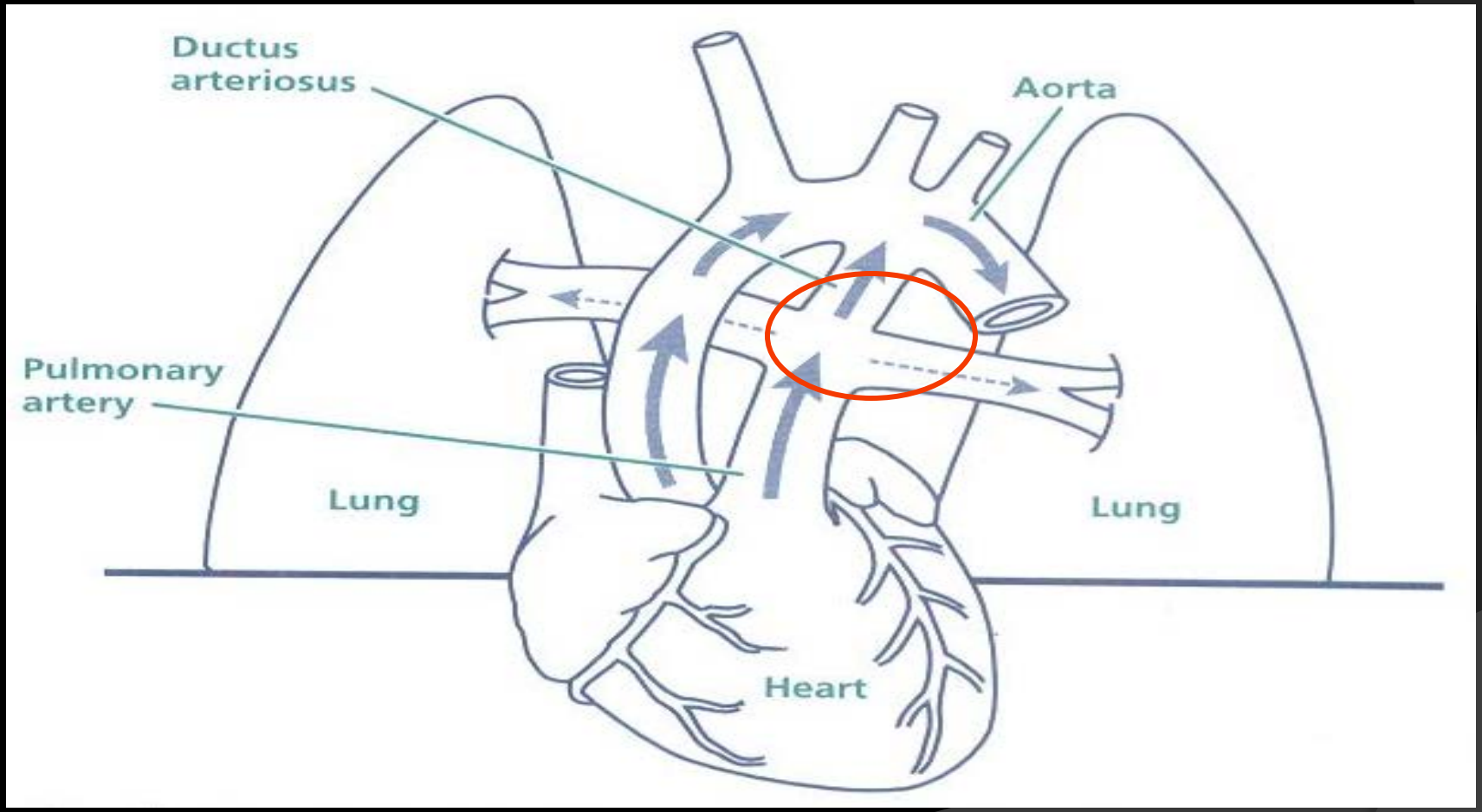
Before birth

- Gas exchange in placenta
- Lung receives very little blood
- Alveoli are fluid filled



■ **Figure 15–37.** Schematic illustration of the fetal circulation. The colors indicate the oxygen saturation of the blood, and the arrows show the course of the blood from the placenta to the heart. The organs are not drawn to scale. Observe that fetal shunts permit most of the blood to bypass the liver and lungs: (1) ductus venosus, (2) foramen ovale, and (3) ductus arteriosus. The poorly oxygenated blood returns to the placenta for oxygen and nutrients through the umbilical arteries.

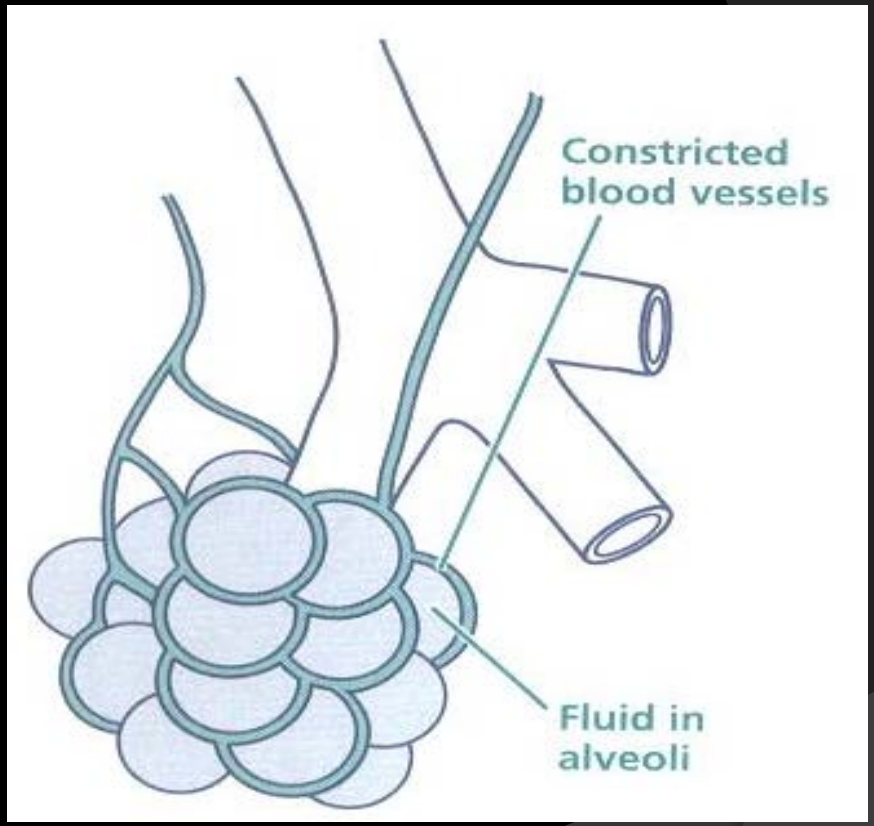
Very little flow to lungs



Before birth

Blood vessels are constricted

Alveoli are fluid filled



Before birth

- Pulm arterioles constricted
- Umbilical arteries feeding low pressure placenta circulation
- High pressure in pulmonary circuit
- Low pressure in systemic circuit
- Very little pulmonary blood flow

After birth

Umbilical arteries and veins are clamped

Sudden increase in systemic blood pressure

After birth Circulation

- With first breaths decrease in PVR
- With chord clamping increased SVR
- Adult circulation begins
  - Decreased R→L shunting across PDA
  - Increased blood flow to pulm vasculature
  - Increased LA pressure → closure of Foramen Ovale

After birth

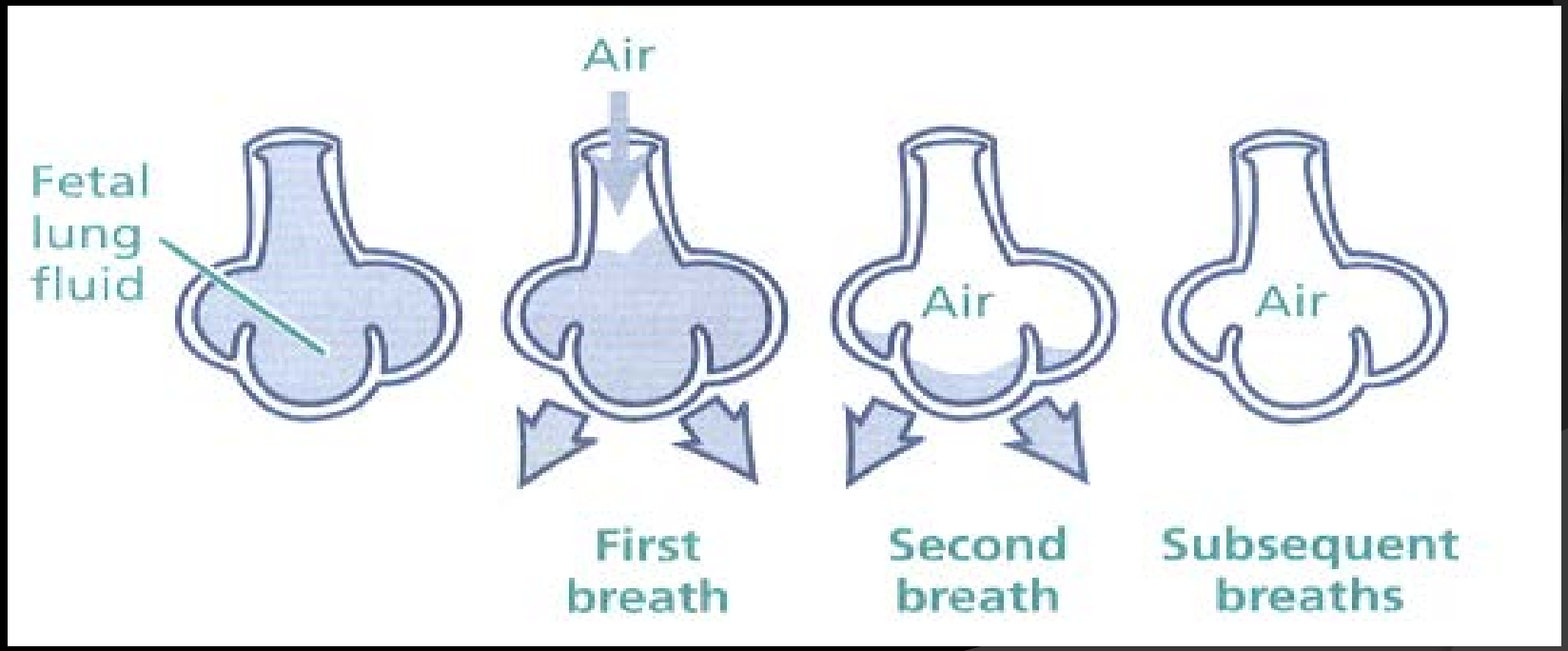
- Pulm arterioles dilate
- Umbilical arteries and veins are clamped
- Low pressure in pulmonary circuit
- High pressure in systemic circuit
- *Dramatic increase in pulmonary blood flow*

After birth

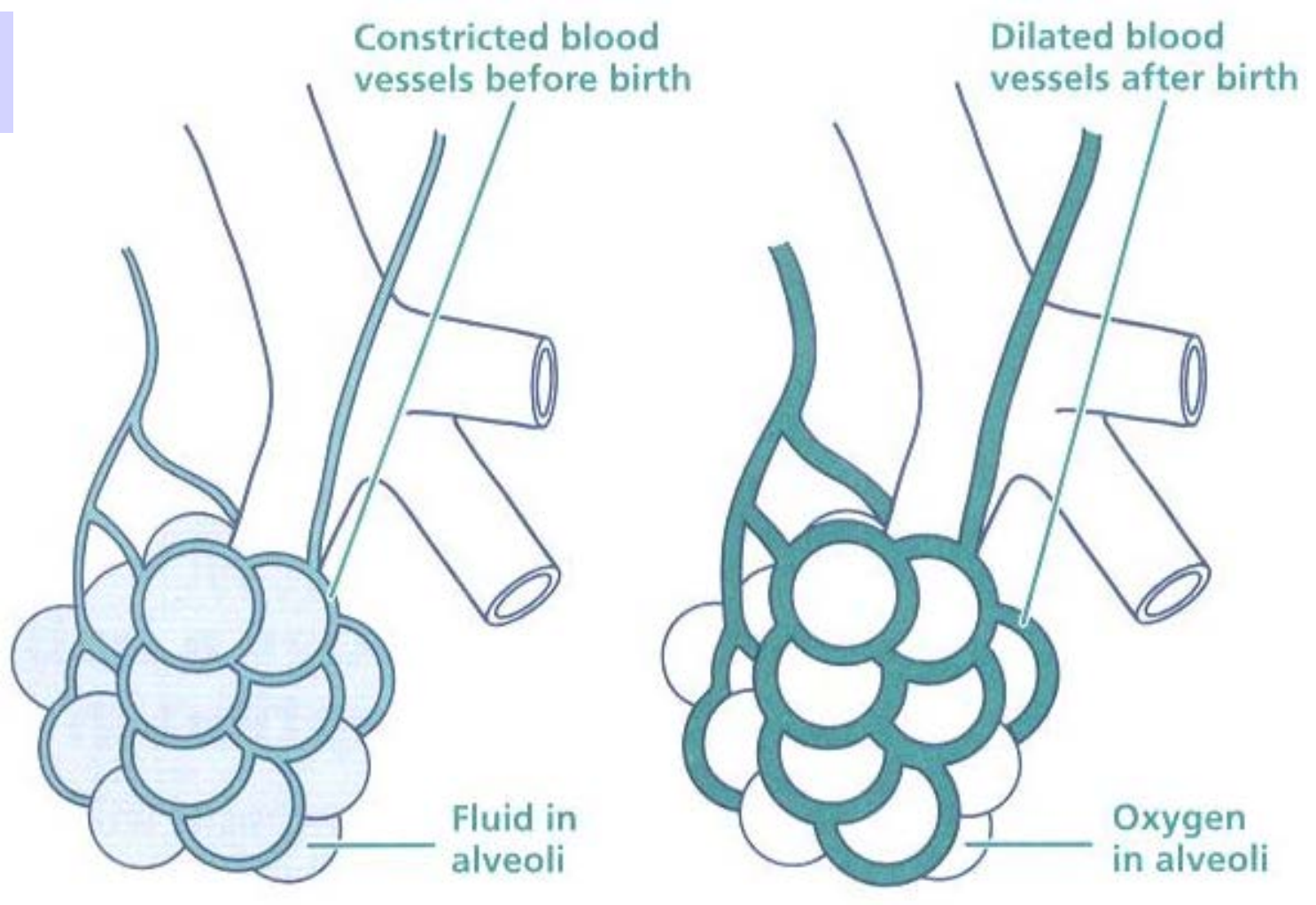
- Fluid in the alveoli is absorbed

Alveoli

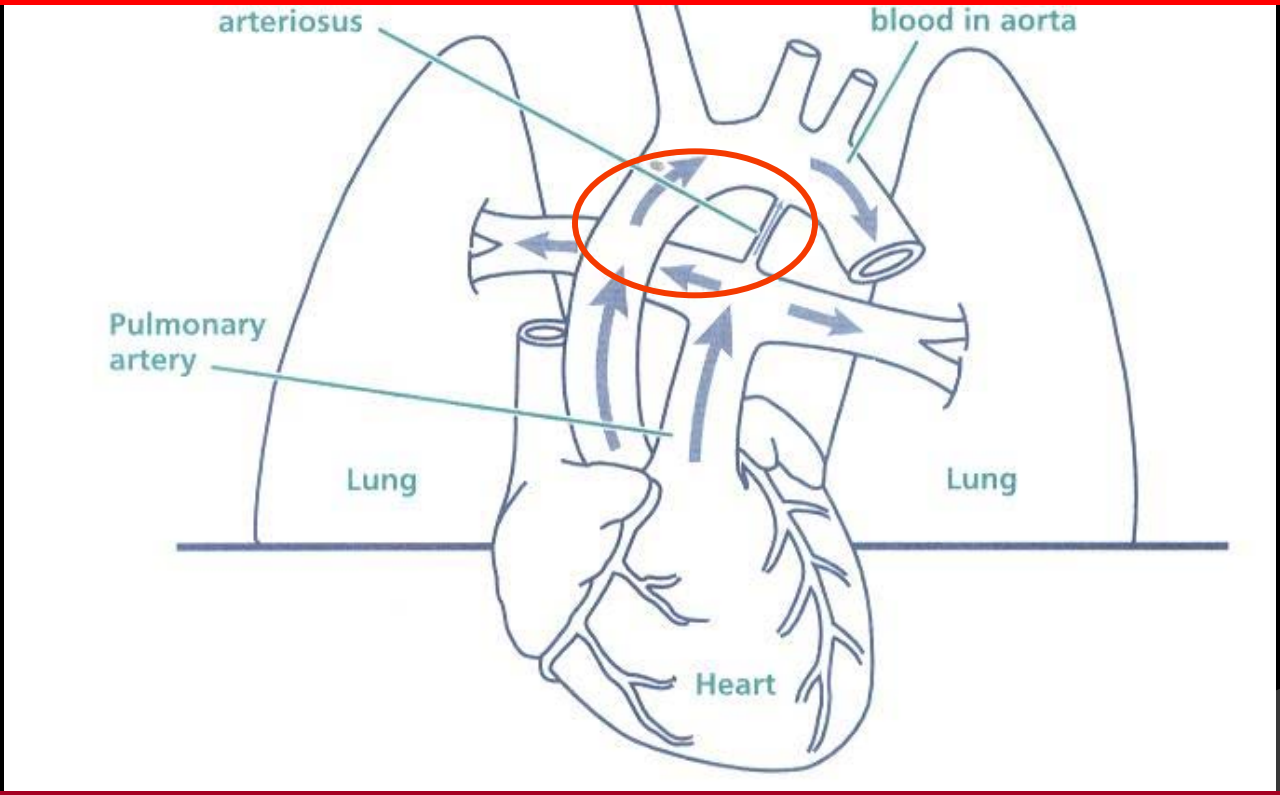
- EXPAND
- GET FILLED WITH AIR (O_2)



Pulmonary vessels dilate, causing increased blood flow to lungs



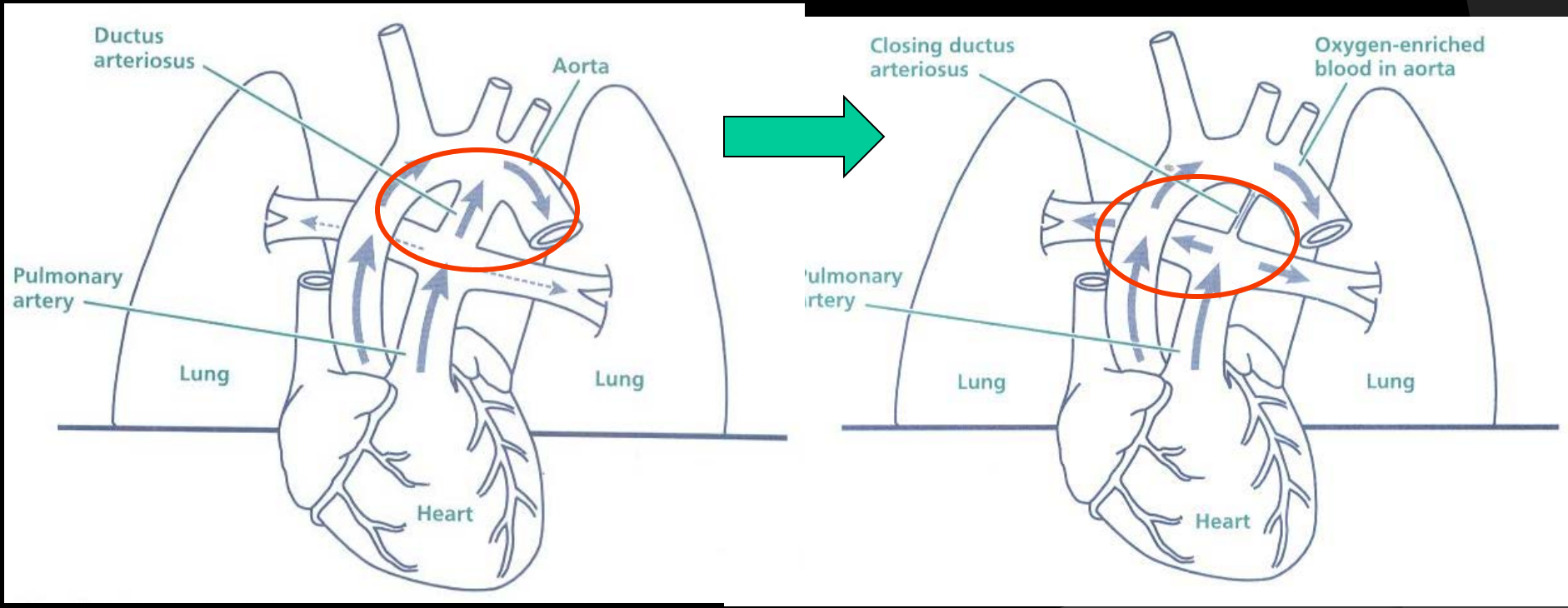
Ductus arteriosus constricts



- Increased oxygen in blood
- Increased pulmonary blood flow

Before

After



Causes of Delayed Fetal Transition

- Hypoxia
- Meconuium aspiration
- Blood aspiration
- Acidosis
- Hypothermia
- Pneumonia
- Hypotension

Antepartum Risk Factors

- Multiple gestation
- Pregnant patient <16 or >35 years of age
- Post-term >42 weeks
- Preeclampsia, HTN, DM
- Polyhydraminos
- Premature rupture of amniotic sac (PROM)
- Fetal malformation
- Inadequate prenatal care
- History of prenatal morbidity or mortality
- Maternal use of drugs or alcohol
- Fetal anemia
- Oligohydraminos

Intrapartum Risk Factors

- Premature labor
- PROM >24 hours
- Abnormal presentation
- Prolapsed cord
- Chorioamnionitis
- Meconium-stained amniotic fluid
- Use of narcotics within 4 hours of delivery
- Prolonged labor
- Precipitous delivery
- Bleeding
- Placenta previa

Premature babies

1. May be surfactant deficient
2. Immature brain, poor resp drive
3. Weak muscles, not able to breathe
4. More prone to hypothermia
5. More likely to be infected
6. Prone to intraventricular hemorrhage
7. Small blood volume, prone to hypovolemia
8. Immature tissues, prone to oxygen toxicity

What can go wrong

- Inadequate breathing hence lung fluid not absorbed
- Meconium may block airway
- Blood loss may occur
- Persistence of constricted pulmonary vessels
- Myocardium may be depressed
- Organ systems may be affected by hypoxia/ischemia

The most important and effective action is to **ventilate** the baby's lungs

Consequences of interrupted transition

1. Low muscle tone
2. Resp depression (apnea / gasping)
3. Tachypnea
4. Bradycardia
5. Hypotension
6. Cyanosis

Assessment: Then

- Appearance
- Pulse
- Grimace
- Activity
- Respirations

APGAR SCORE

APGAR SCORE

	0	1	2
Heart Rate	Absent	Slow < 100/min	> 100/min
Respiratory Rate	Absent	Slow, weak cry	Good cry
Muscle tone	Flaccid	Some flexion of extremities	Well flexed
Reflex, irritability	No response	Grimace	Cry
Color	Blue, pale	Body pink, extremities blue	Completely pink

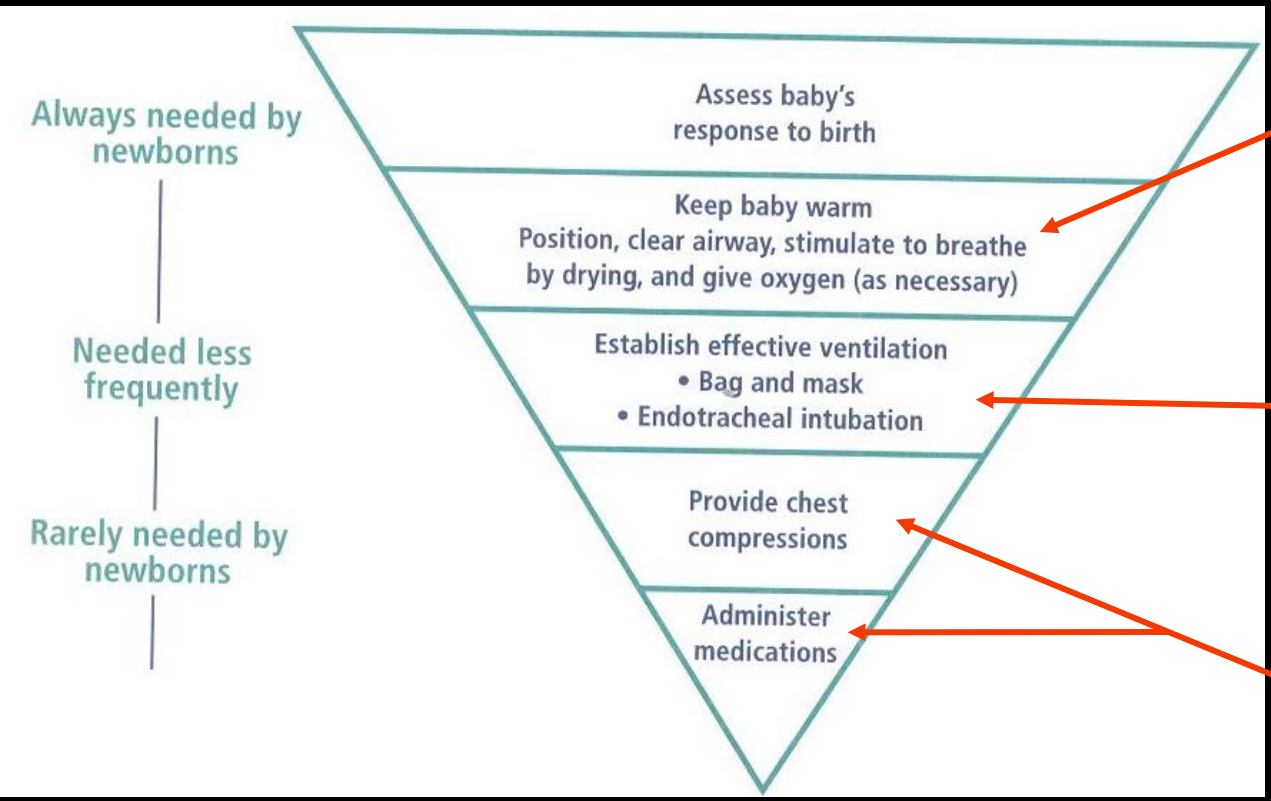
Score _____

AT 1min, 5 min, 10 min

Neonatal resuscitation

- Airway
- Breathing
- Circulation

Neonatal resuscitation



- **A**irway
- **B**reathing
- **C**irculation
- **D**

Assessment: Now

Physiologic Parameters (Apgar's best)

- Breathing
- Heart Rate
- Color

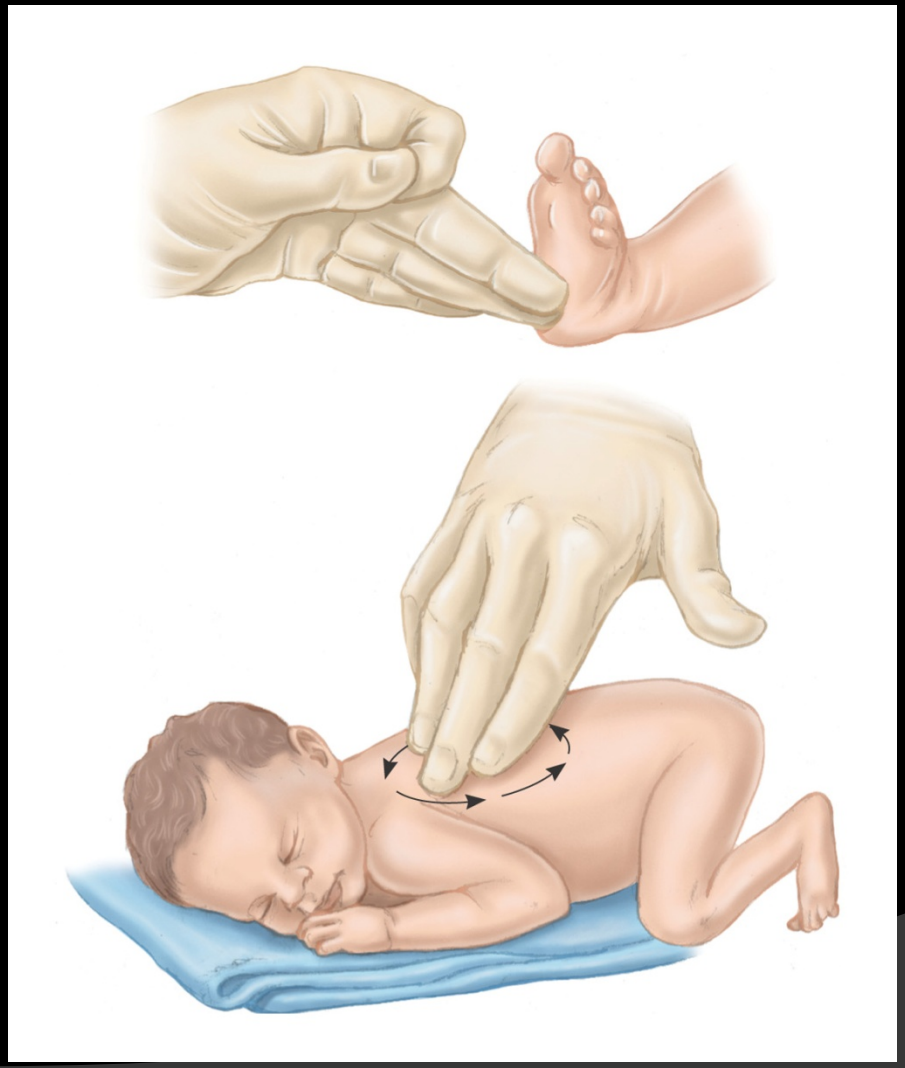
Questions to ask yourself

- Clear of Meconium?
- Breathing or Crying?
- *Good Muscle tone?*
- Color Pink?
- Term Gestation?

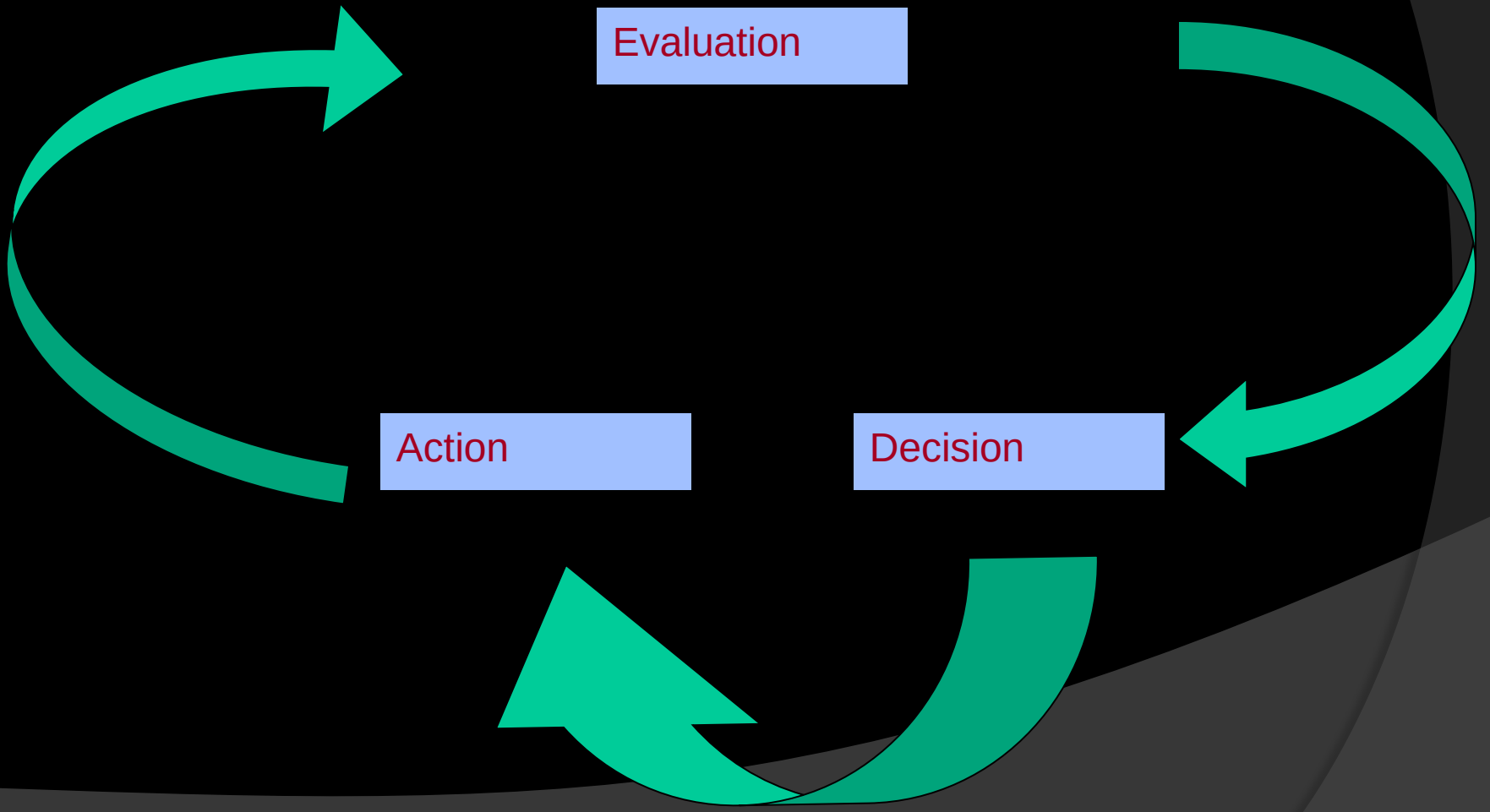
Initial Steps (Golden Minute)

- Approximately 60 seconds to complete, reevaluate, and ventilate if necessary
  - Provide warmth
  - Clear airway
  - Dry
  - Stimulate
  - Position - sniffing

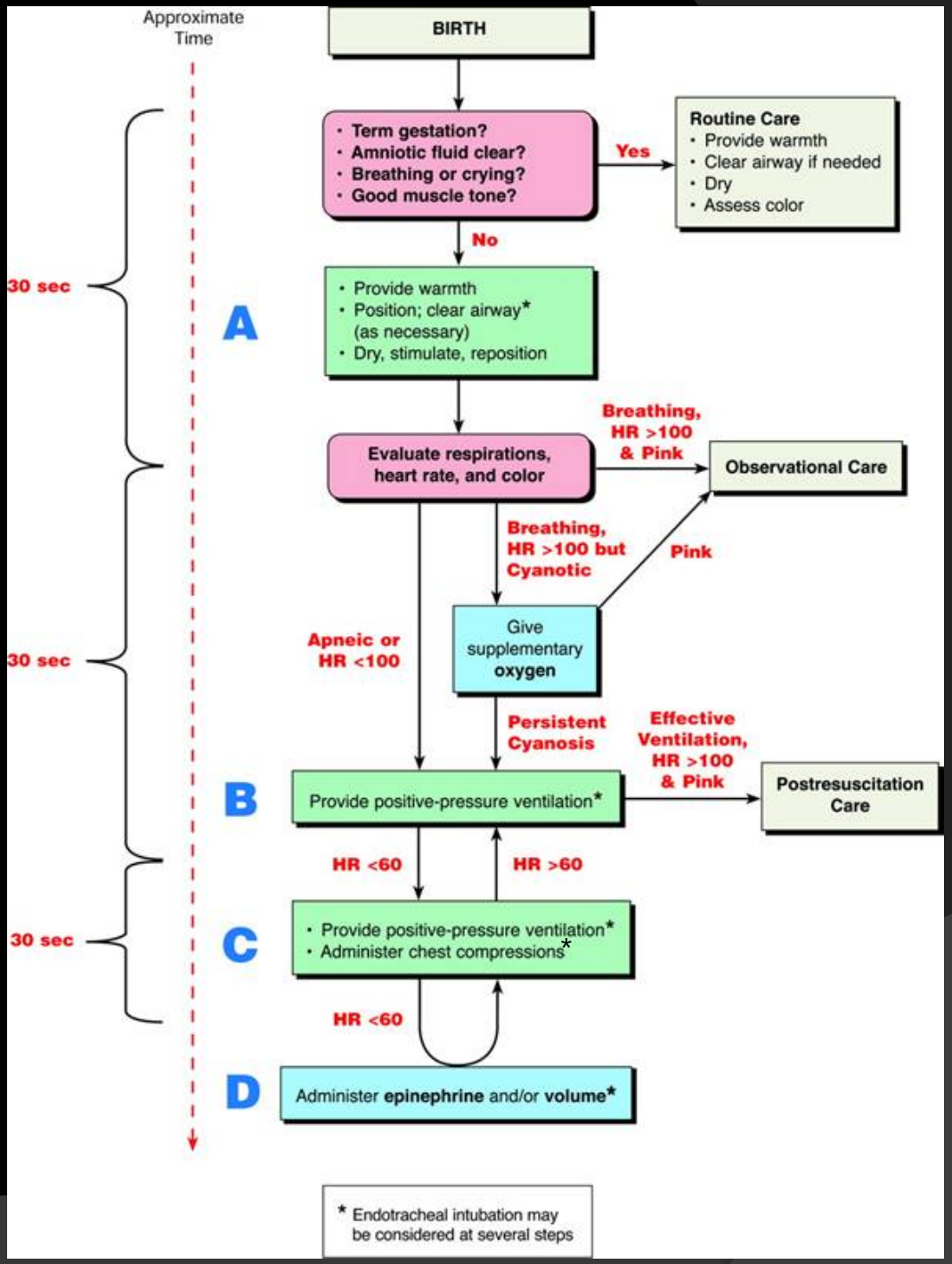
Stimulate



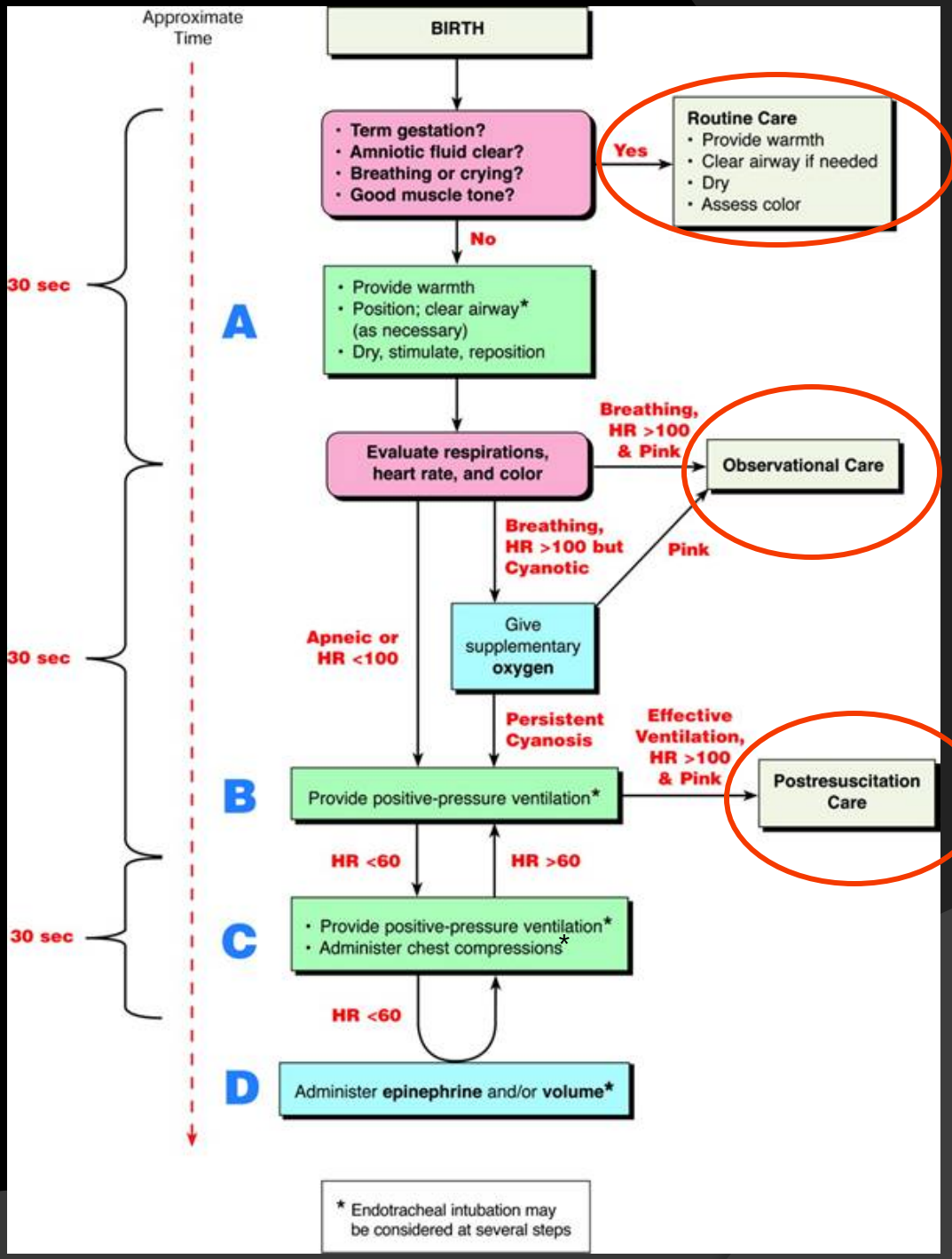
Evaluation-Decision-Action cycle

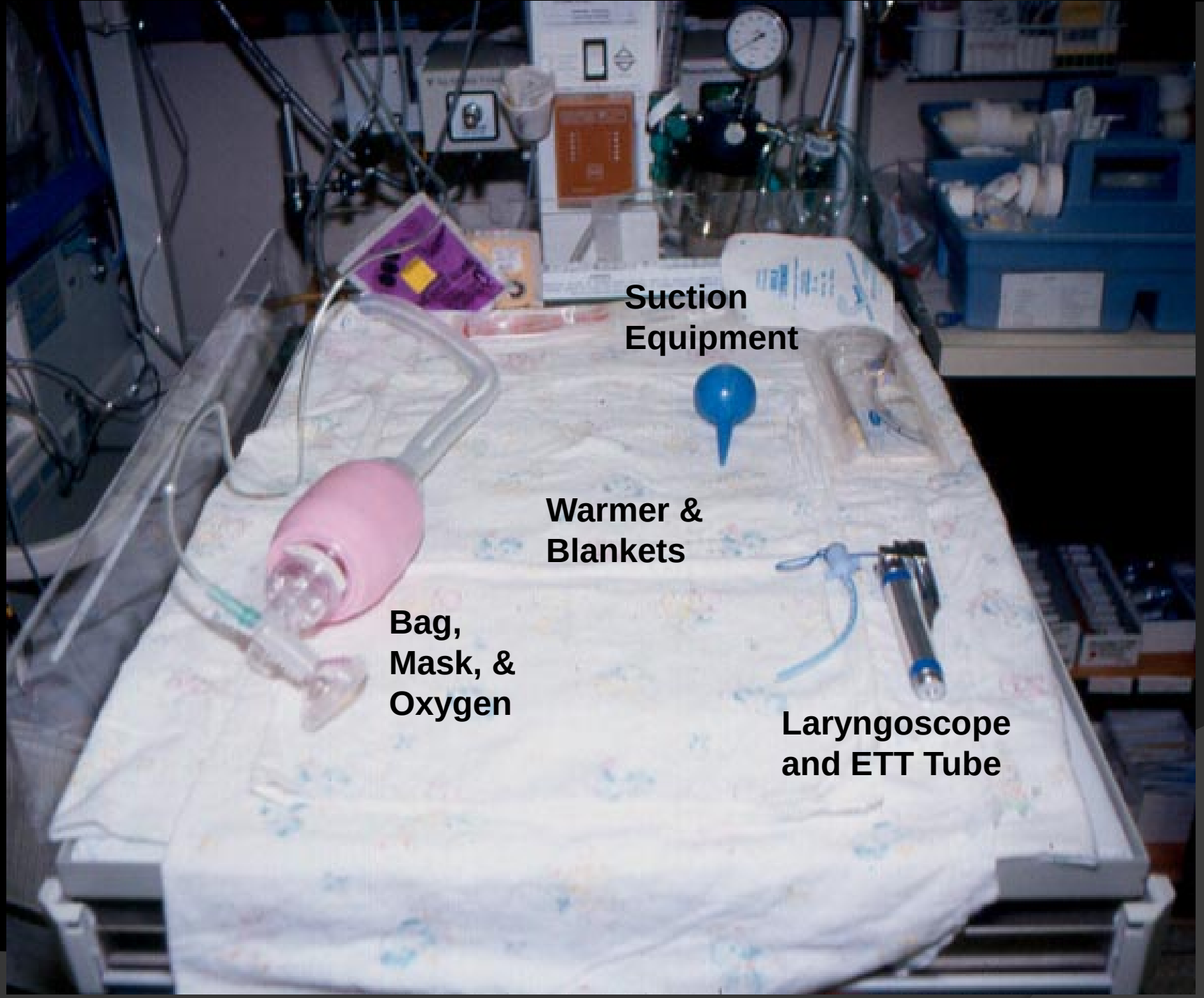


- The resuscitation flow diagram

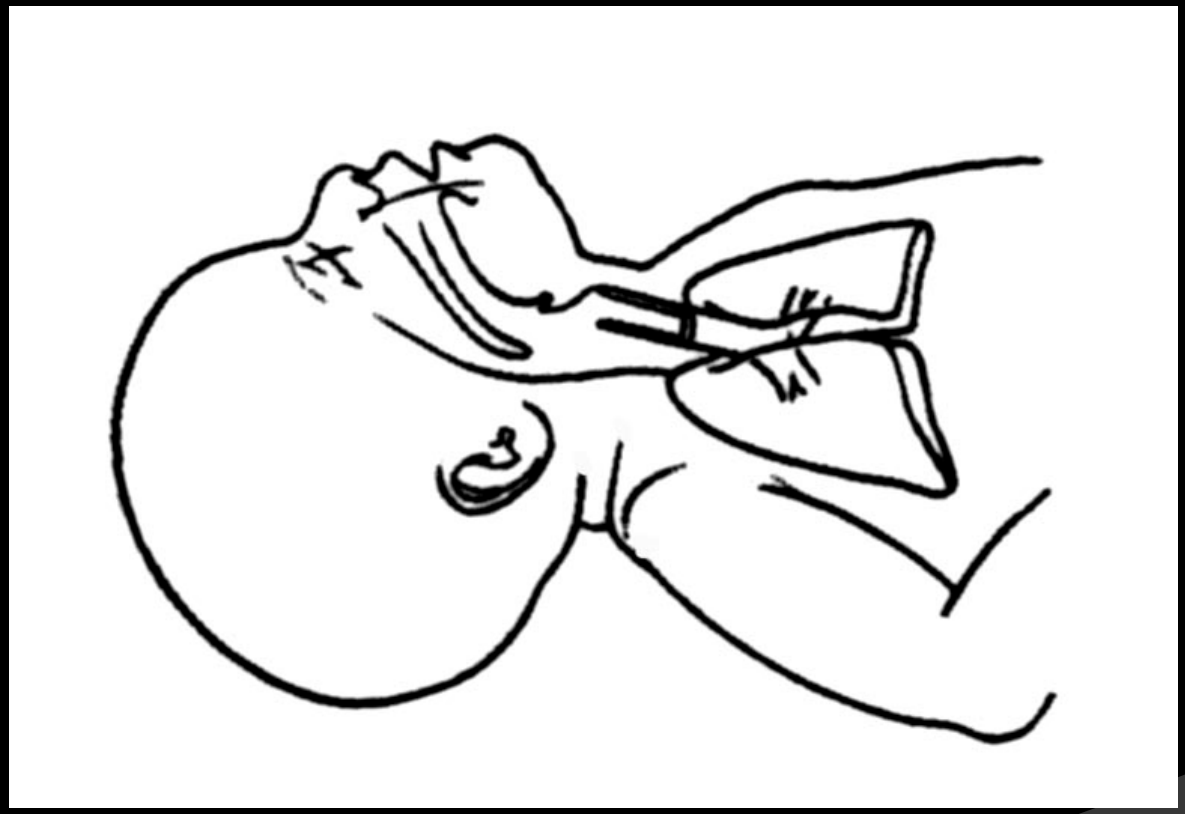


Care after resuscitation




Suction Equipment
Warmer & Blankets
Bag, Mask, & Oxygen
Laryngoscope and ETT Tube

Positioning: Sniffing



The “Trusty” Bulb Syringe

POSITIVE PRESSURE VENTILATION

INDICATIONS:-

- Neonate is apneic and gasping.
- HR<100/min.
- Persistent cyanosis despite O_2 administration.

***Bag and Mask ventilation contraindicated in Meconium aspiration**

Targeted SpO2 After Birth

1 minute	60 to 65%
2 minutes	65 to 70%
3 minutes	70 to 75%
4 minutes	75 to 80%
5 minutes	80 to 85%
10 minutes	85 to 95%

- Make sure the airway is clear
- Lift the baby's jaw into the mask
- Keep the mouth slightly open

Incorrect ways to hold a mask

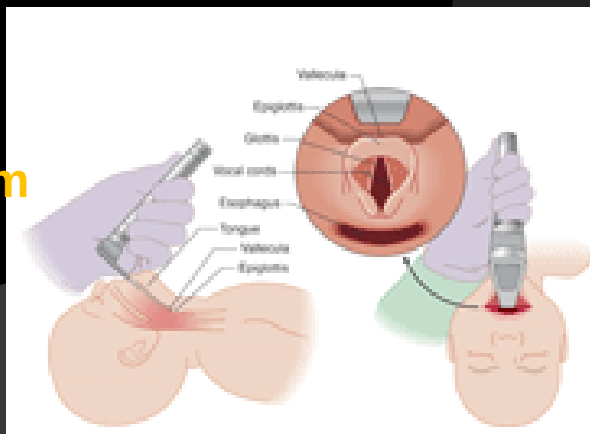
The two point top hold

ENDOTRACHEAL INTUBATION

INDICATIONS:-

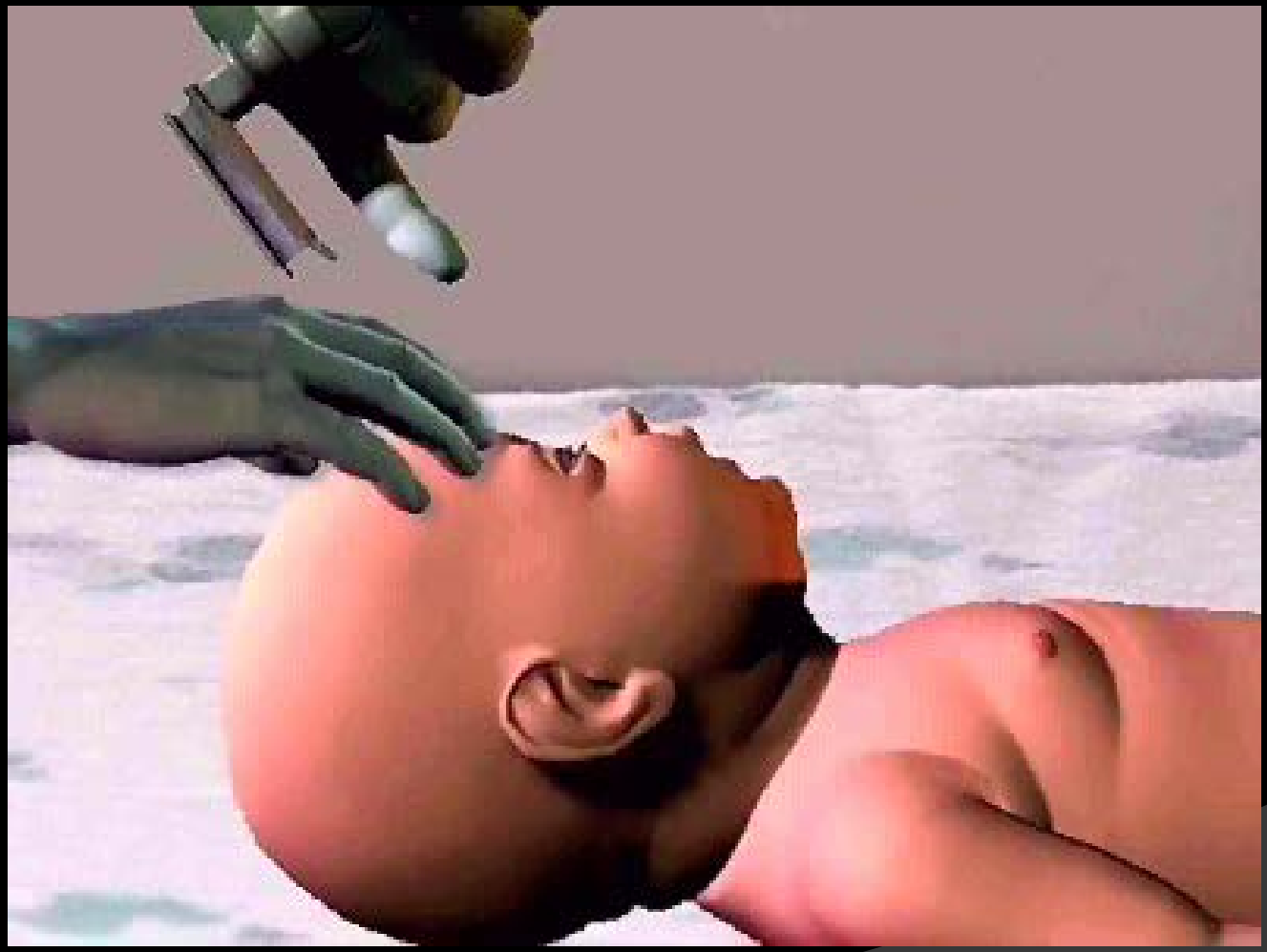
- Bag and mask fails after 30 seconds
- Meconium aspiration(non vigorous)
- Congenital diaphragmatic hernia
- For administering rescue medications
- Chest compression required

WEIGHT(gms)	ET SIZE(mm
<1000	2.5
1000-2000	3.0
2000-3000	3.5
>3000	4.0




Miller 0
Miller 1

Intubation Technique

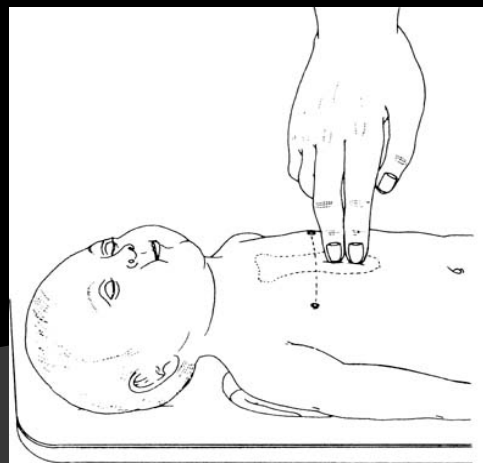


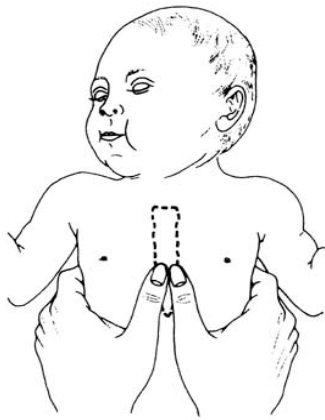
Lip reference mark: (6 + weight in kilos) cm

CHEST COMPRESSION

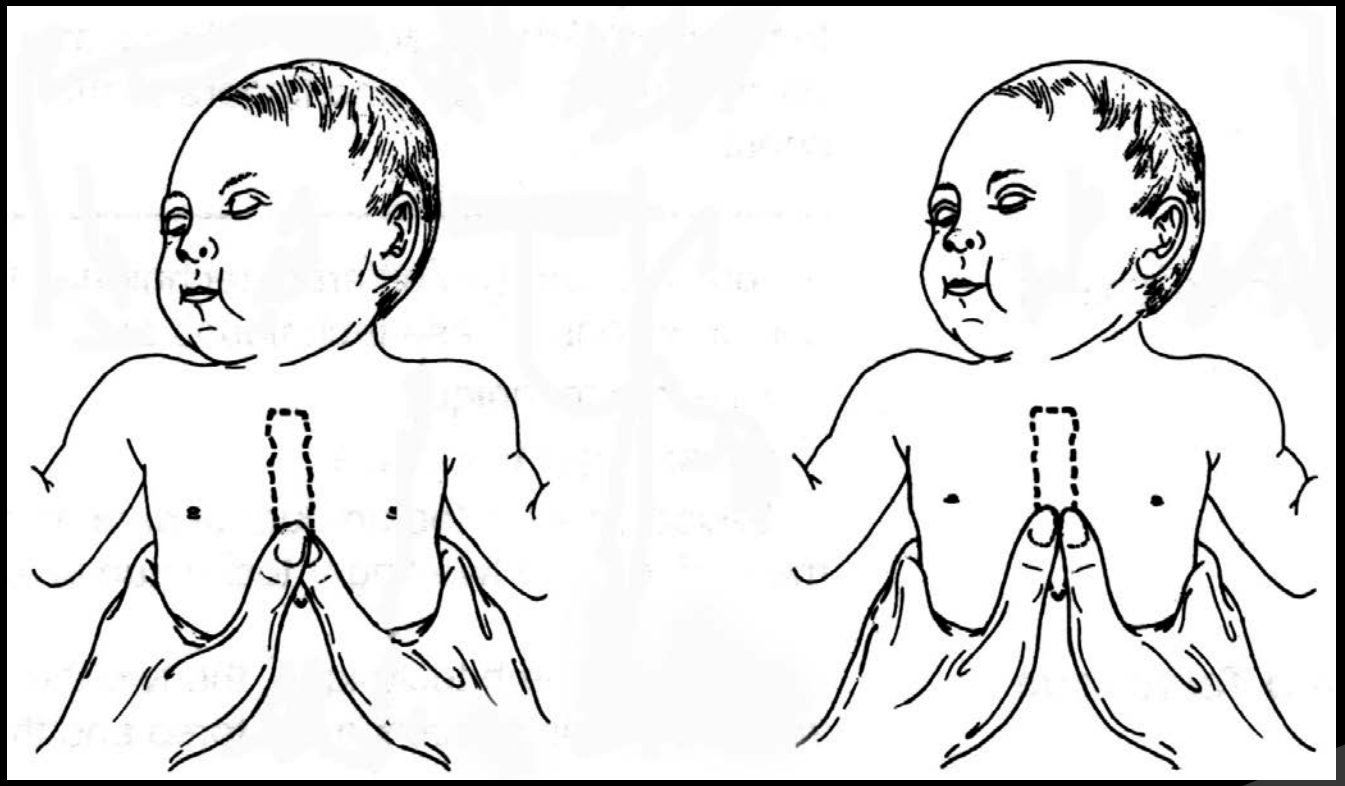
- Heart rate below 60/min after 30 seconds ventilation with oxygen
- Lower 1/3rd of sternum
- Depth 1/3rd of chest diameter
- 2 techniques – 2 thumb encircling chest
- - 2 finger technique
- First method – better peak systolic pressure

One and Two and Three and Breathe





Compressions



2 thumb technique preferred

Medications: Epinephrine

- Indication: Heart rate <60 after 30 sec of coordinated ventilation and compressions
- Intravenous route is recommended only
  - 0.01 to 0.03 mg/kg
  - 1:10,000 dilution
- If ET route is used
  - 0.05 to 0.1 mg/kg
  - 1:10,000 dilution
  - 1ml Term
  - 0.5ml Preterm
  - 0.25ml Extreme preterm

Sodium Bicarbonate

- Indication: Documented or assumed metabolic acidosis
- Concentration: 4.2% $NaHCO_3$ (0.5meq/ml)
- Dose: 2meq/kg
- Route: IV (Umbilical vein)

Naloxone (Narcan)

- Indication: Severe respiratory depression after PPV has restored a normal HR and color and…
- Dose: 0.1mg/kg of 1mg/ml solution
- Route: ETT, IV, IM, SQ

Special Situations

Respiratory Distress or Inadequacy

- HR < 100 bpm = hypoxia
- Periodic breathing (20 second or longer period of apnea)
- Intercostal retractions
- Nasal flaring
- Grunting

Meconium Stained Amniotic Fluid (MSAF)

- 10 to 15% of deliveries
- High risk of morbidity
- Passage may occur before or during delivery
- More common in post-term infants and neonates small for the gestational age
- Fetus normally does not pass stool prior to brith

Meconium Stained Amniotic Fluid

- Complications if aspirated – Meconium Aspiration Syndrome (MAS)
  - Atelectasis
  - Persistent pulmonary hypertension
  - Pneumonitis
  - Pneumothorax

Meconium Stained Amniotic Fluid

- Determine if fluid is thin and green or thick and particulate
- If baby is crying vigorously – use standard resuscitation criteria
- If baby is depressed
  - DO NOT dry or stimulate
  - Intubate trachea
  - Attach a meconium aspirator
  - Apply suction to endotracheal tube
  - Dry and stimulate
  - Continue with standard resuscitation

Apnea

- Common in infants delivered before 32 weeks of gestation

- Risk factors
  - Prematurity
  - Infection
  - Prolonged or difficult labor and delivery
  - Drug exposure
  - CNS abnormalities
  - Seizures
  - Metabolic disorders
  - Gastroesophageal reflux

Apnea

- Pathophysiology
  - Prematurity due to underdeveloped CNS
  - Gastroesophageal reflux can trigger a vagal response
  - Drug-induced from CNS depression
- Bradycardia is key assessment finding

Premature and Low Birth Weight Infants

- Delivered before 37th week of gestation
- Less than 2,500 grams
- Premature labor
  - Genetic factors
  - Infection
  - Cervical incompetence
  - Abruption
  - Multiple gestations (twins, triplets)
  - Previous premature delivery
  - Drug use
  - Trauma

Premature and Low Birth Weight Infants

- Low birth weight
  - Chronic maternal HTN
  - Smoking
  - Placental anomalies
  - Chromosomal abnormalities
- Born <24 weeks and less than 1 lb – poor chance of survival

Premature and Low Birth Weight Infants

- Physical appearance
  - Skin is thin and translucent
  - No cartilage in the outer ear
  - Small breast nodule size
  - Fine thin hair
  - Lack of creases in soles of feet

Premature and Low Birth Weight Infants

- High risk for respiratory distress and hypothermia
  - Surfactant deficiency
  - Thermoregulation is mandatory
- Use minimum pressure with PPV
- Brain injury may result from hypoxemia, rapid change in blood pressure
- Retinopathy from abnormal vascular development of retina
  - May be worsened by long term oxygen administration

Hypoglycemia

- BGL <40 mg/dL
- May not be symptomatic until BGL reaches 20 mg/dL
- Fetus received glycogen stores from mother in utero
  - Liver
  - Heart
  - Lung
  - Skeletal muscle

Hypoglycemia

- Glycogen stores sufficient for 8 to 12 hours after birth
- Disorders related to
  - Poor glycogen storage
    - Small birth weight
    - Prematurity postmaturity
  - Increased glucose use
    - Infant of DM mother
    - Large for gestational age
    - Hypoxia
    - Hypothermia
    - Sepsis

Hypoglycemia

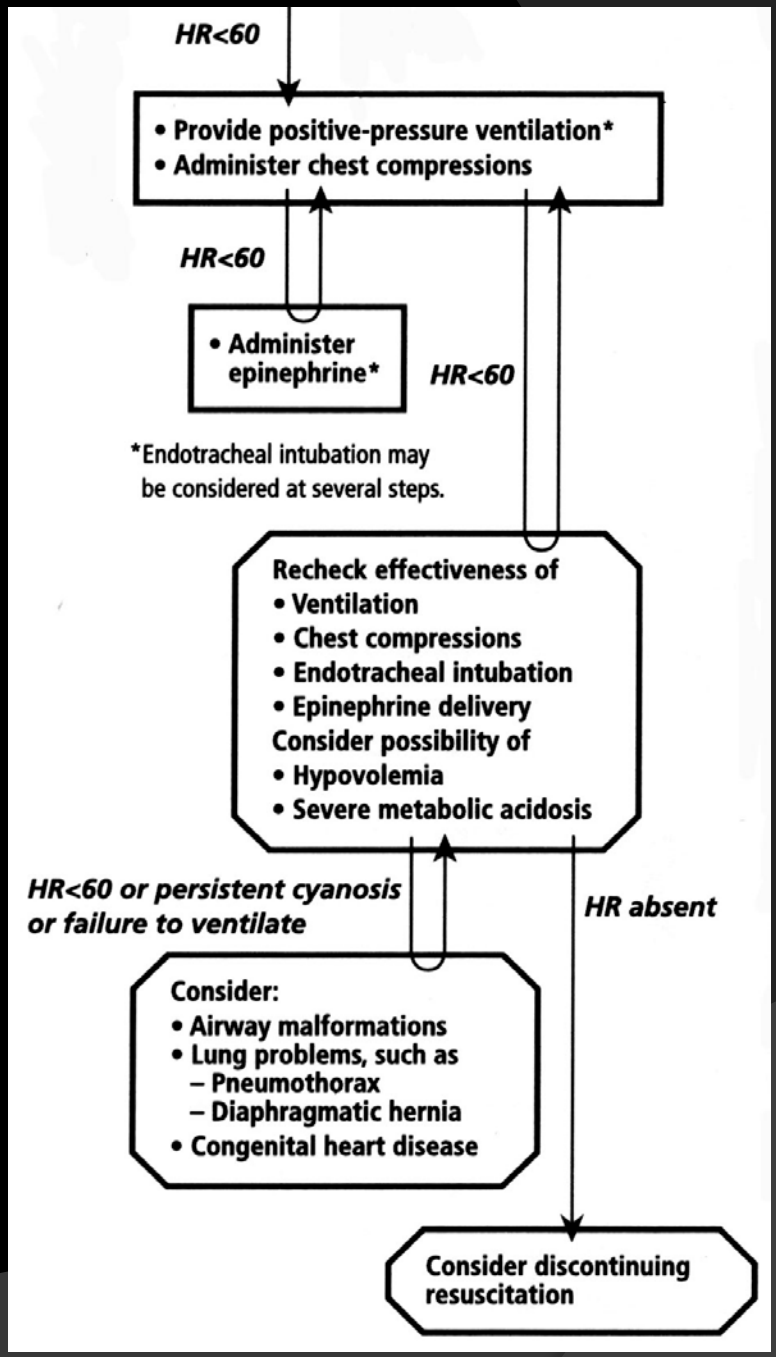
- Symptoms
  - Cyanosis
  - Apnea
  - Irritability
  - Poor sucking or feeding
  - Hypothermia
  - Lethargy
  - Tremors
  - Twitching or seizures
  - Coma
  - Tachycardia
  - Tachypnea
  - Vomiting

Hypoglycemia

- Check BGL – heel stick
- Establish good airway, ventilation, oxygenation, and circulation
- D10W -10% dextrose
  - 2 mL/kg IV if BGL <40 mg/dL
  - IV infusion of D10W – 60-100 mL/kg

Extended Algorithm

- Endotracheal Intubation if not already accomplished
- Discontinue efforts if no heart rate after 15 minutes

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