Seed
GLOBAL HEALTH

A's and B's

SEED GLOBAL HEALTH ECHO SESSION 11/11/2022

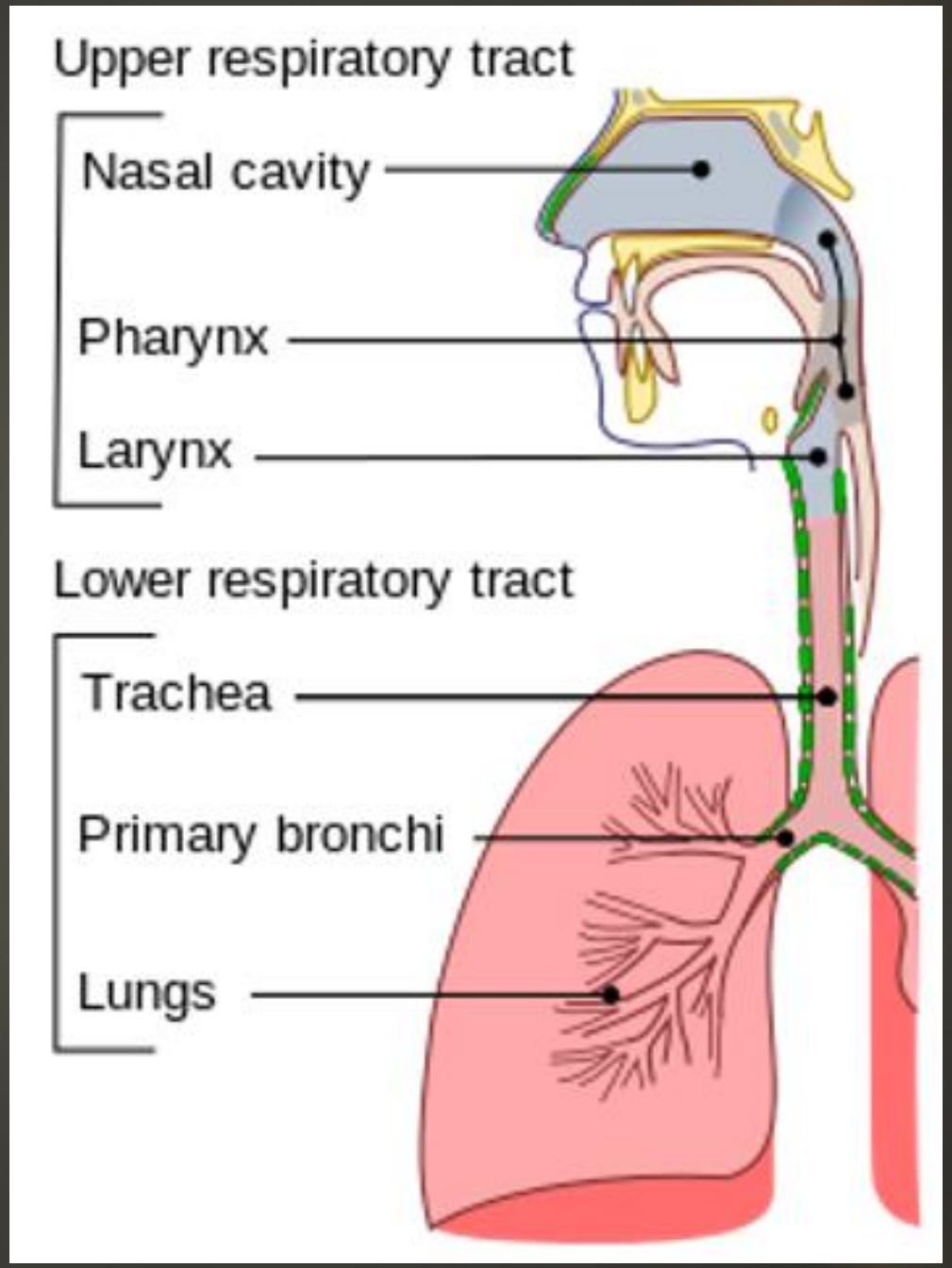
Rapid Airway and Breathing Assessment and Interventions

- Function
- Anatomy
- Rapid assessment of airway
- Rapid assessment of breathing
- Airway interventions and equipment
- Breathing interventions and equipment
- Specific conditions

Function

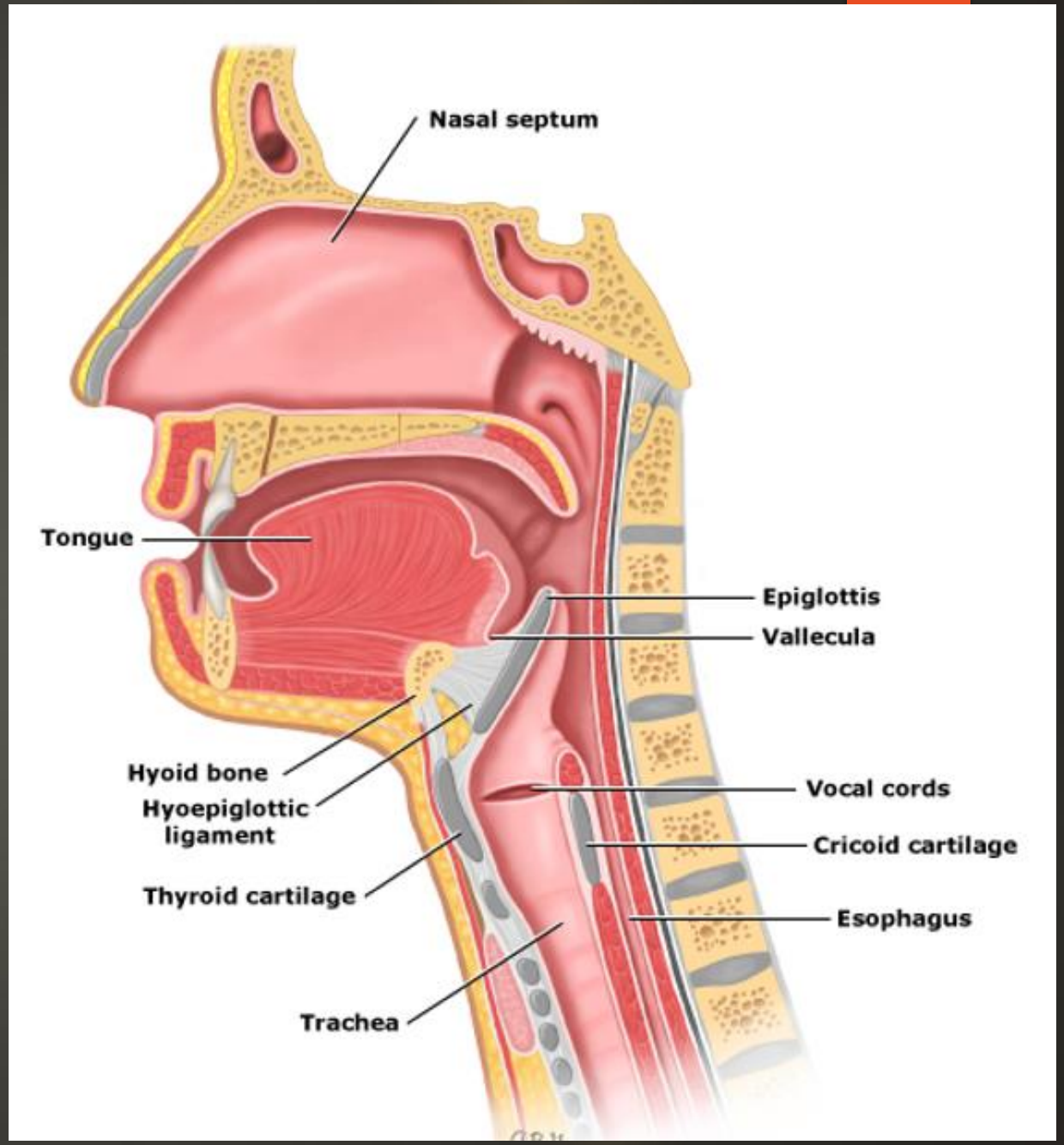
- Exchanging external air with gases in the blood stream
- Oxygenation – bringing O2 into the system
- Ventilation – taking CO2 out of the system

Anatomy


Upper respiratory tract
Nasal cavity
Pharynx
Larynx
Lower respiratory tract
Trachea
Primary bronchi
Lungs

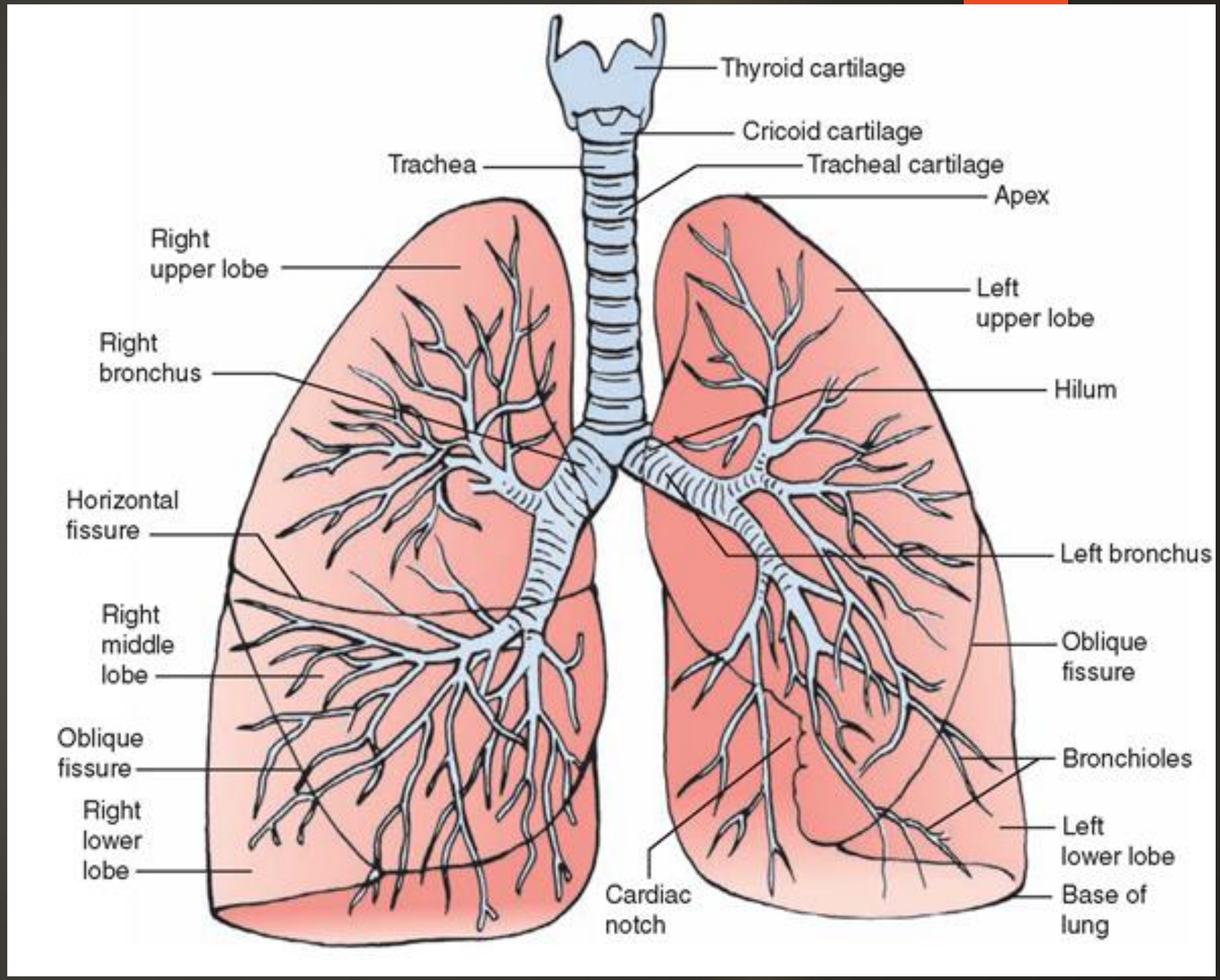
Upper respiratory tract

- Conducts air down to lungs
- Nose/Sinuses
- Mouth
- Pharynx
- Larynx
- Epiglottis
- Trachea



Lower Respiratory Tract

- Conducts air and then participates in gas exchange
- Trachea
- Main bronchus
- Right and left bronchi
- Lung lobes with bronchi, bronchioles and alveoli



Other important systems involved

- Brainstem – stimulation for inspiration and expiration
- Spinal cord and vagal and phrenic nerves
- Diaphragm
- Chest wall and intercostal muscles
- Cardiovascular system

Anatomy

- Any of these sites can get trauma, infection, swelling, tumors, foreign body or other diseases
- This blocks or alters air conduction and gaseous exchange

Assessment of Airway and Breathing

Assessment of Airway

- Look at the patient. Do they appear to be choking?
- Start by speaking with the patient. Simple to ask their name
- Listen to the quality of their voice. Does it sound muffled?
- Listen to air movement through their upper airways. Do they have stridor? Do they have gurgling?
- Visually inspect. Do they have obvious swelling? Do they have obvious foreign body? Do they have blood or other secretions? Is there any trauma?

Assessment of Breathing

- Visually inspect work of breathing
  - Are they using accessory muscles? Intercostals, sternocleidomastoid, or abdominal breathing, tracheal tugging, nasal flaring, head bobbing
  - Do they have shallow or inadequate respirations?
  - Respiratory rate
  - Are they tiring or slowing?
- Visual inspection
  - Look for tracheal deviation, distended neck veins, chest trauma, unequal chest expansion

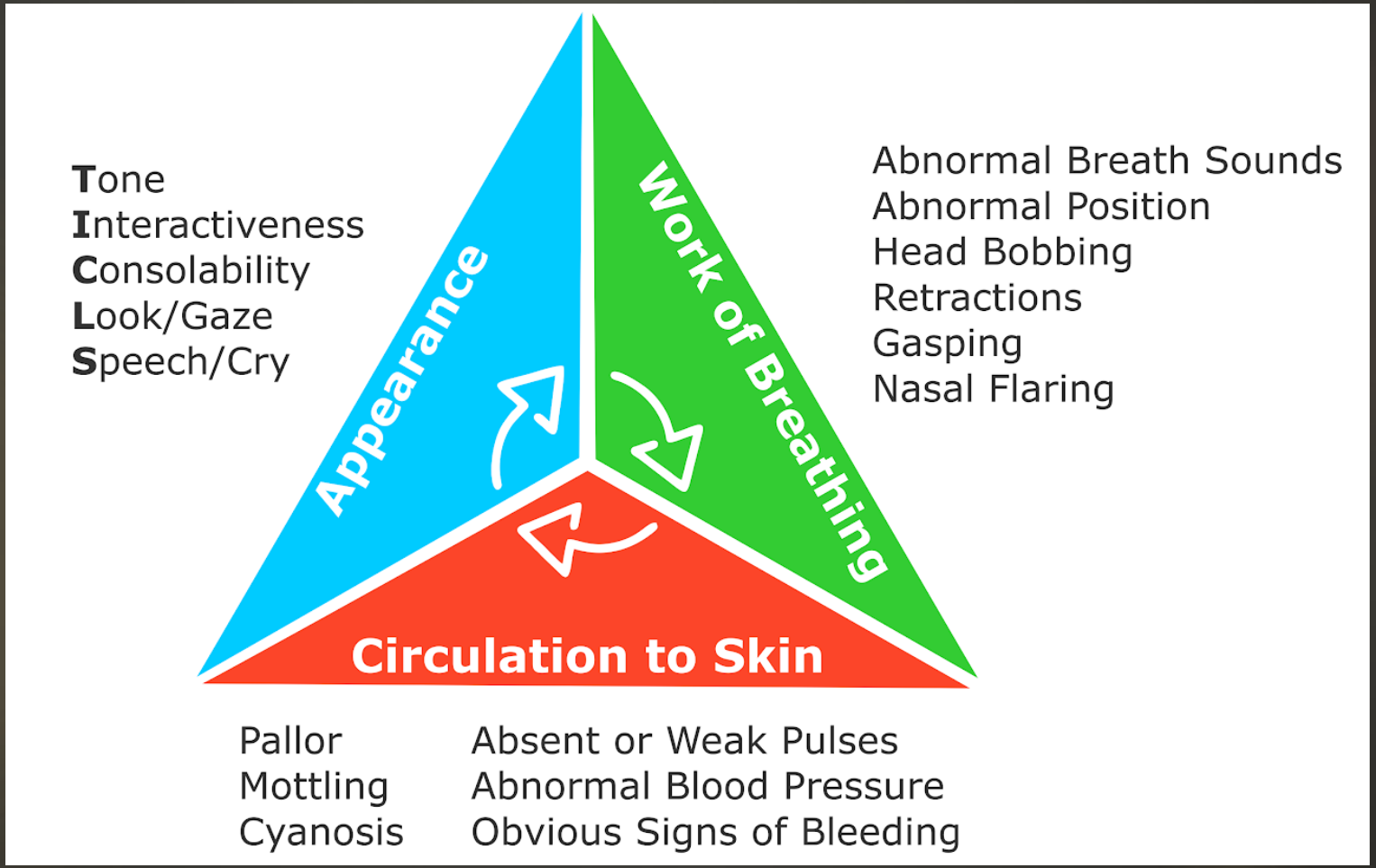
Assessment of Breathing

- Pulse Oximetry
  - Many limitations but essential to obtain
- Listen
  - Auscultate breath sounds bilaterally
  - Are there breath sounds bilaterally? Equal?
  - Listen to all lung fields for crackles, wheezes
- Touch
  - Palpate chest wall, percussion of lung fields

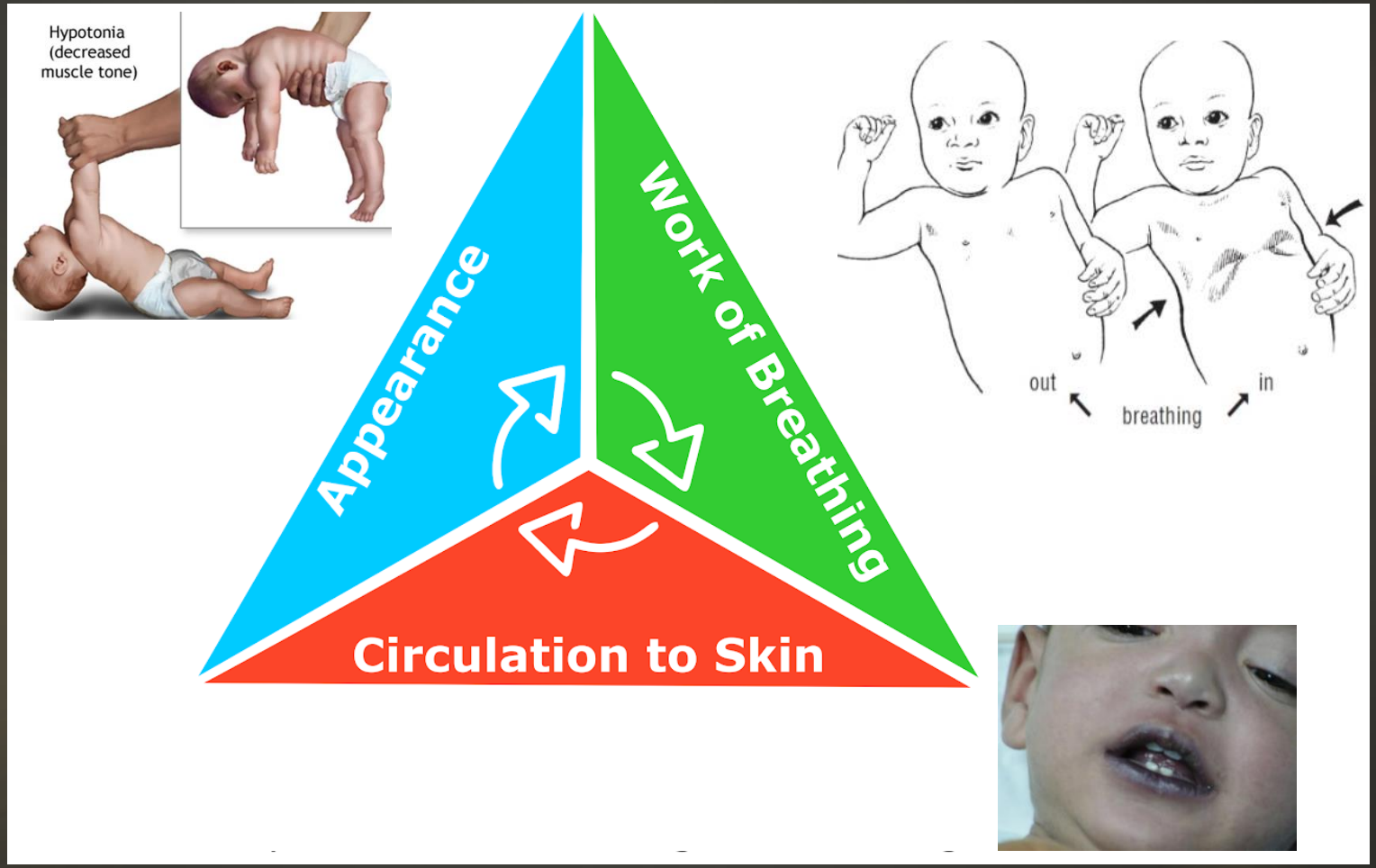
Assessment of Breathing

- Other systems/Other causes of respiratory failure
  - Listen to heart sounds – are they muffled, tachycardic, irregular etc
  - Check blood pressure and heart rate – looking for shock, arrhythmia etc
  - Check neurologic status – do they have altered mental status, is this affecting their breathing
  - Expose - look for cyanosis, diaphoresis, trauma, limb swelling, pulses in all extremities

Pediatric Assessment Triangle

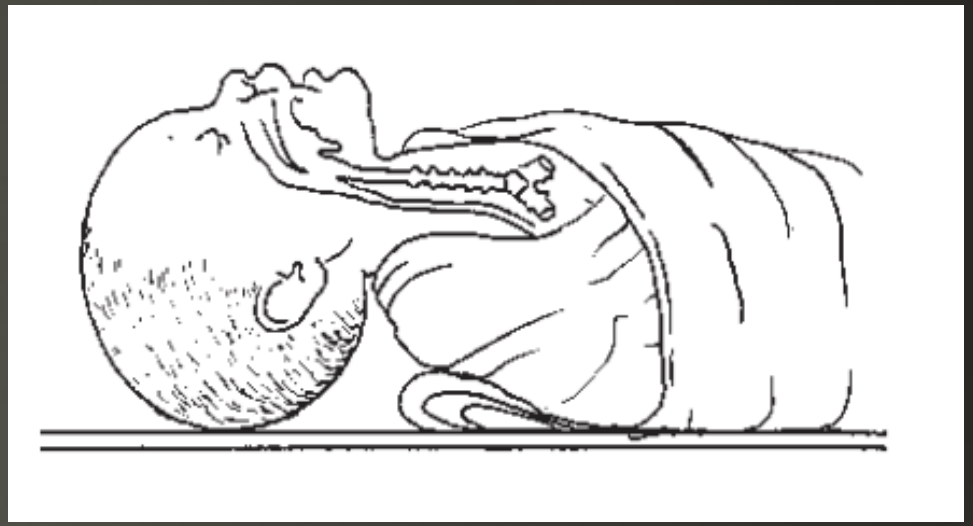


Pediatric Assessment Triangle



General Pediatric Anatomical Differences:

- Large head compared to body size
- Large tongue compared to mouth
- Smaller airway
- More anterior airway



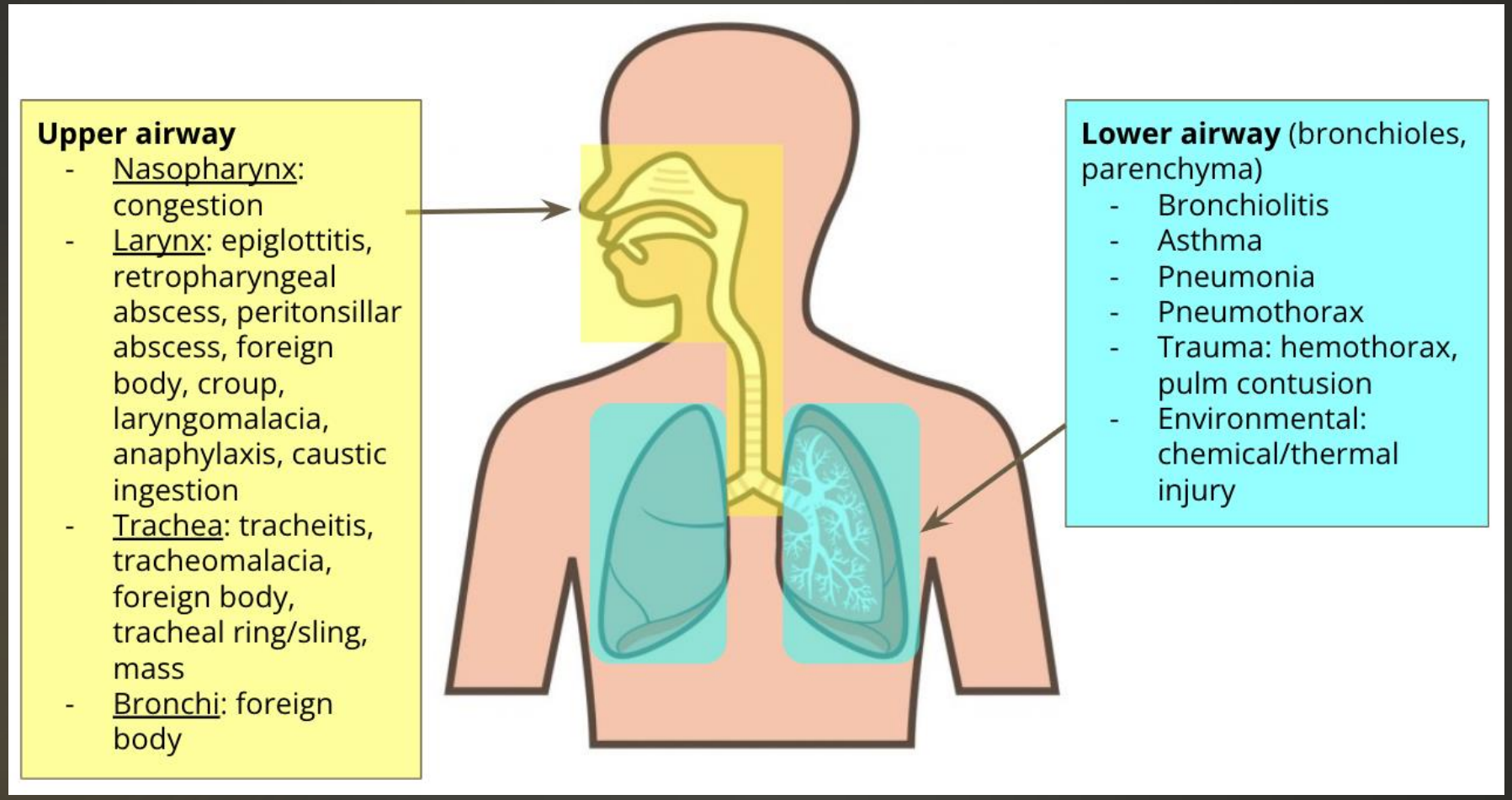
Pediatric Respiratory Rates

Age	Breaths per minute
Infant	30-50
1-3 years	20-40
3-5 years	20-30
5-12 years	15-25
> 12 years	12-20

Unique Features of the Pediatric Respiratory Tract

Feature	Consequence
Nose: infants <4 mo preferential nose breathers	Nasal congestion → respiratory distress
Larynx: higher, softer, more elastic	Intubation considerations, easily collapsible
Trachea: shorter and ⅓ diameter of adult at birth	ETT easy to dislodge, narrower → increased resistance
Alveoli: elastic fibers less developed	Alveoli more collapsible → ventilation/perfusion (VQ) mismatch
Lungs: smaller capacity	Smaller reserve
Chest wall: more compliant, immature muscles	More severe retractions, more easily fatigued

Differential Diagnosis Map



Interventions

Airway Interventions

- Choking interventions
  - Abdominal thrusts
  - Back slaps

CONSCIOUS CHOKING

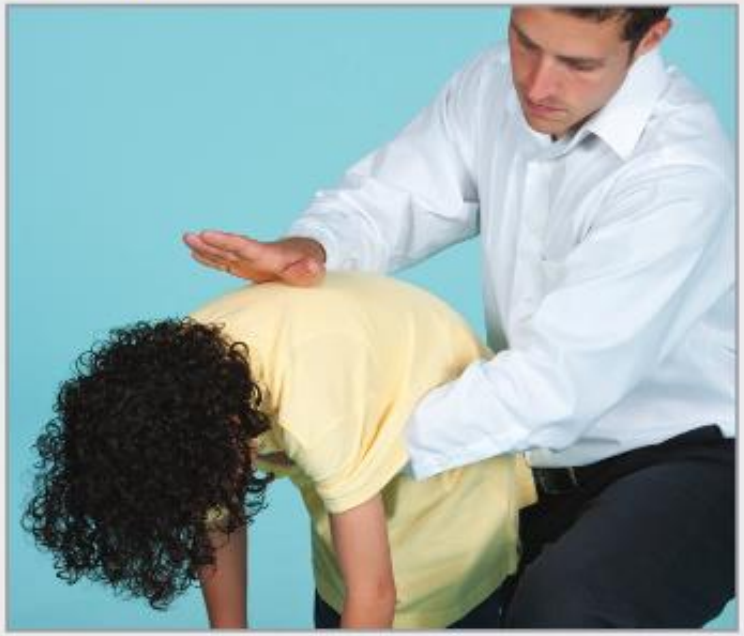
Cannot Cough, Speak, Cry or Breathe

After checking the scene for safety and the injured or ill person, have someone CALL 9-1-1 and get consent. For children and infants, get consent from the parent or guardian, if present.

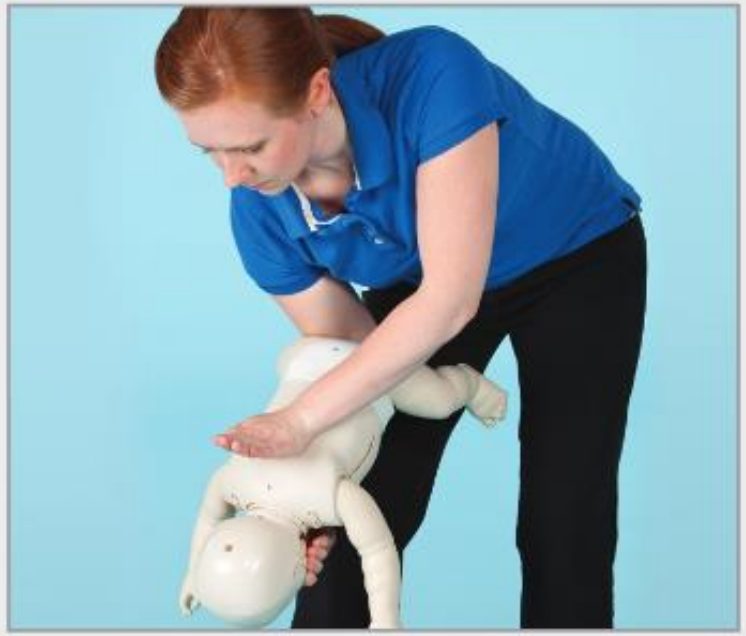
1 GIVE 5 BACK BLOWS

- **Adult:**

- **Child:**



- **Infant:**



2 GIVE 5 ABDOMINAL THRUSTS

- **Adult:**

- **Child:**

- **Infant:** (chest thrusts for infant)

TIP: *For infants, support the head and neck securely. Keep the head lower than the chest.*

3 REPEAT STEPS 1 AND 2 UNTIL THE:

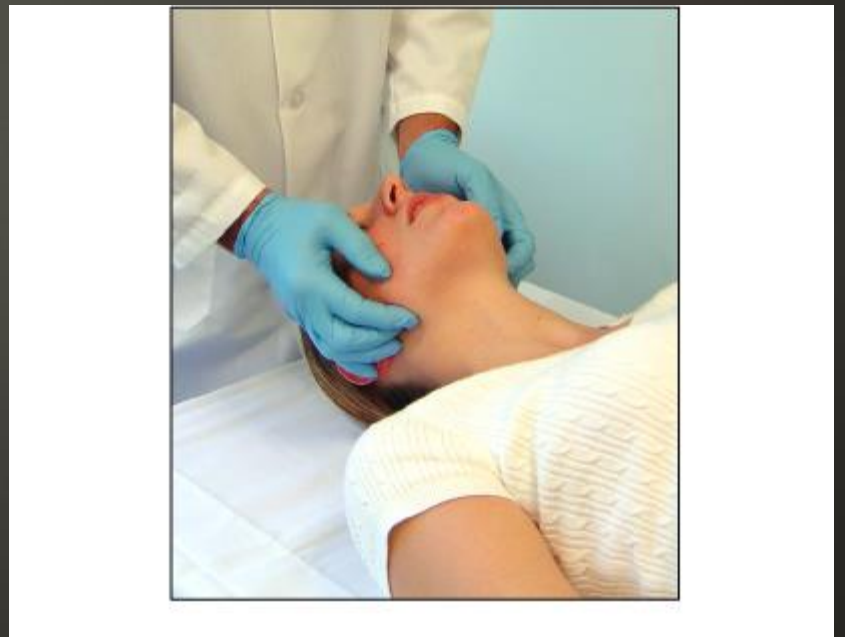
- Object is forced out.
- Person can cough forcefully or breathe.
- Person becomes unconscious.

Airway Intervention

- Foreign body removal
  - Only if object can be visualized
  - If it is past pharynx expert help will be needed

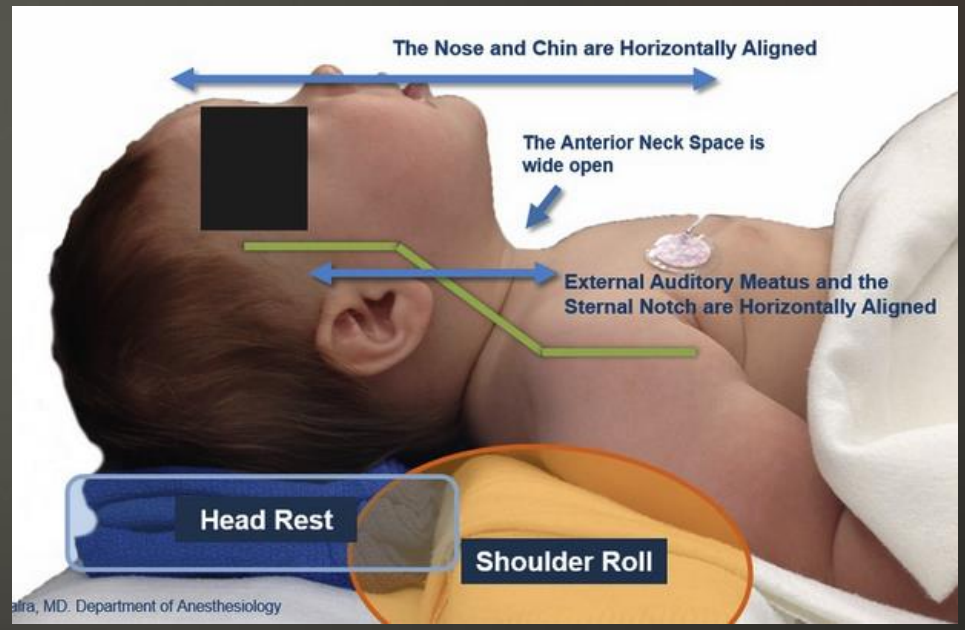
Airway Intervention

- Airway Positioning
  - Sit patient upright
  - Head tilt/chin lift
  - Jaw thrust



Pediatric Positioning Considerations

- Shoulder or neck roll to improve airway alignment
- "Sniffing position"



Airway Intervention

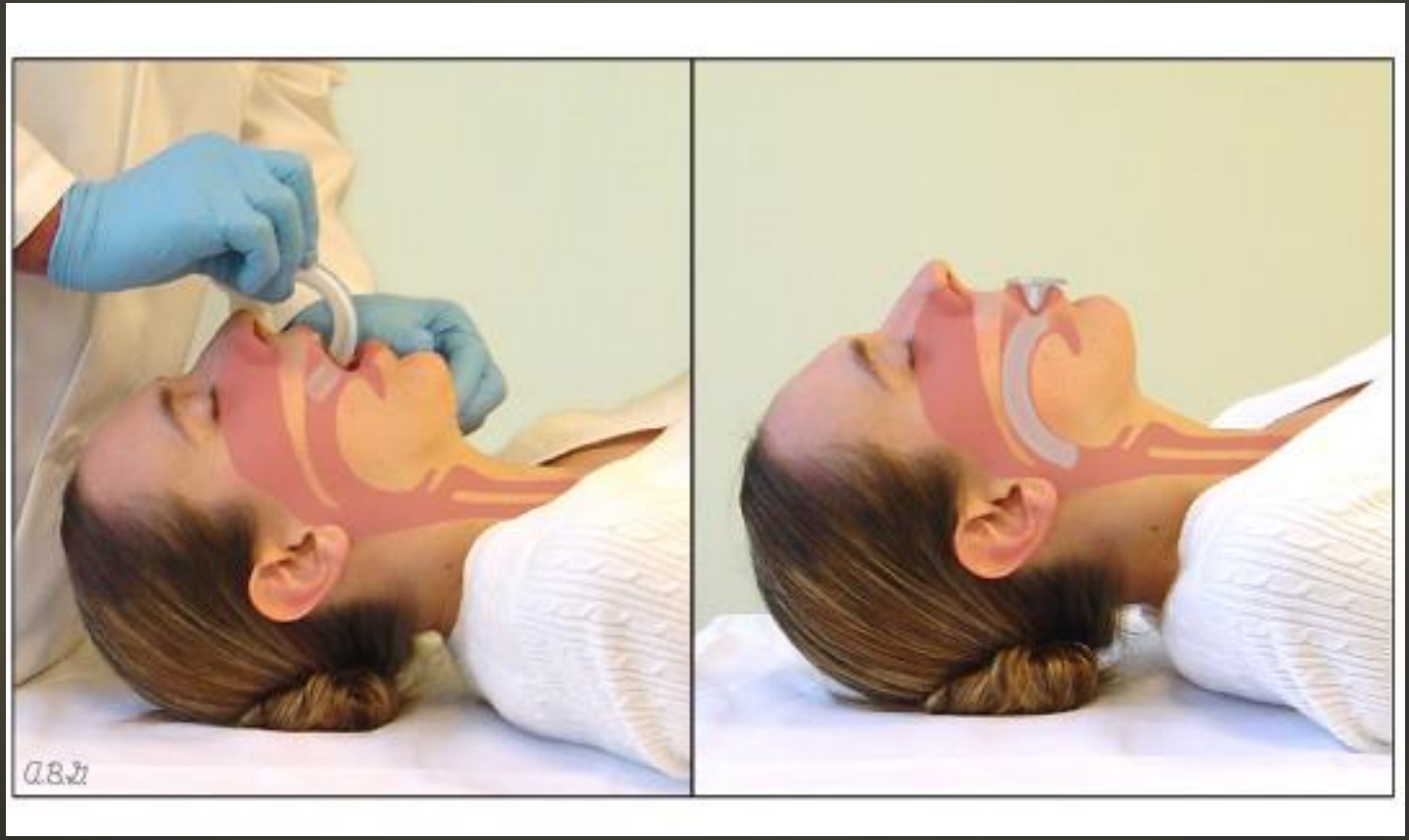
- Suctioning
  - Oropharyngeal
  - Nasopharyngeal

Airway Intervention

- Oropharyngeal Airway
  - Useful for keeping posterior pharynx open
  - Correct sizing important

Airway Intervention

- Oropharyngeal airway insertion



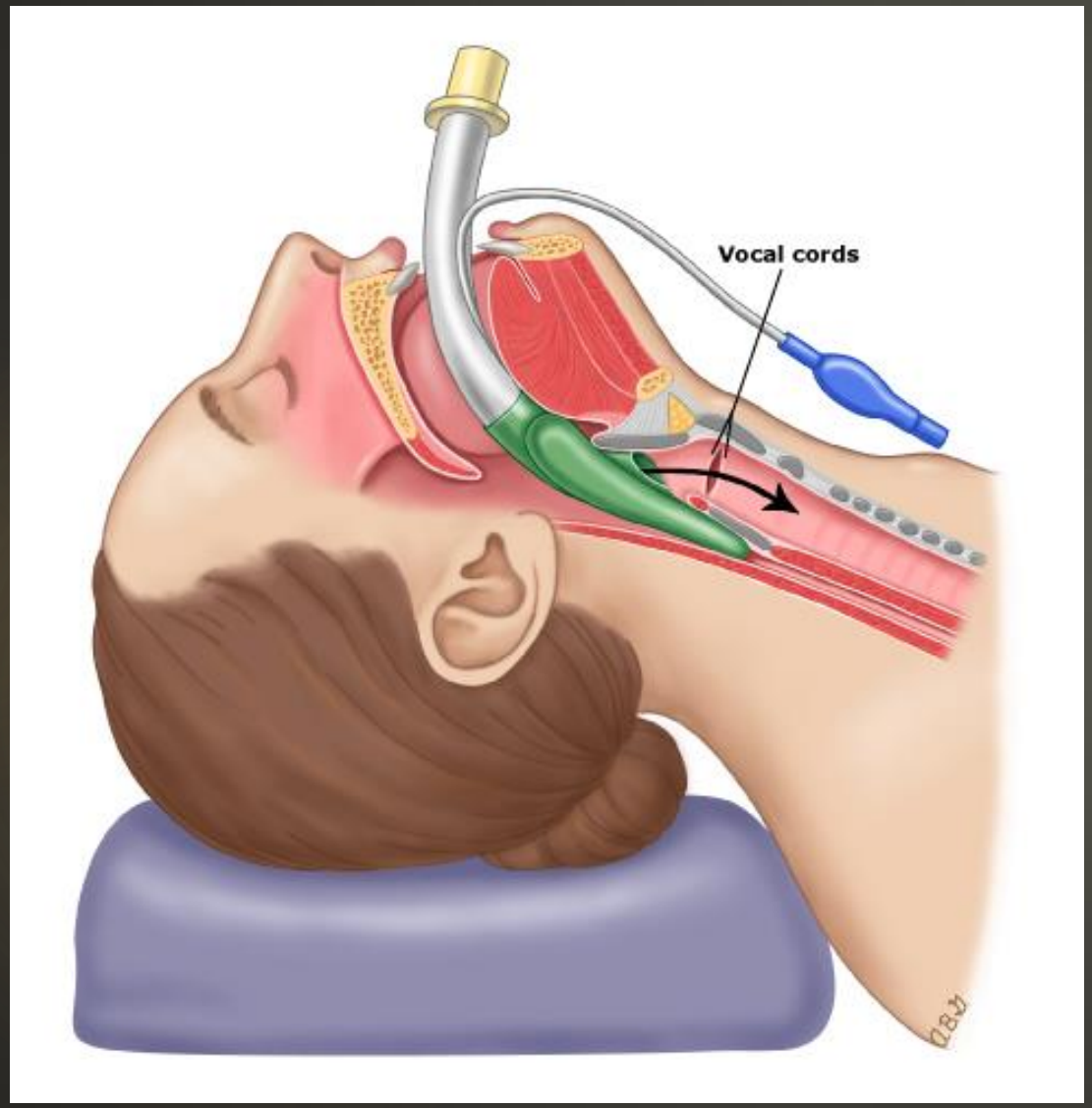
Airway Intervention

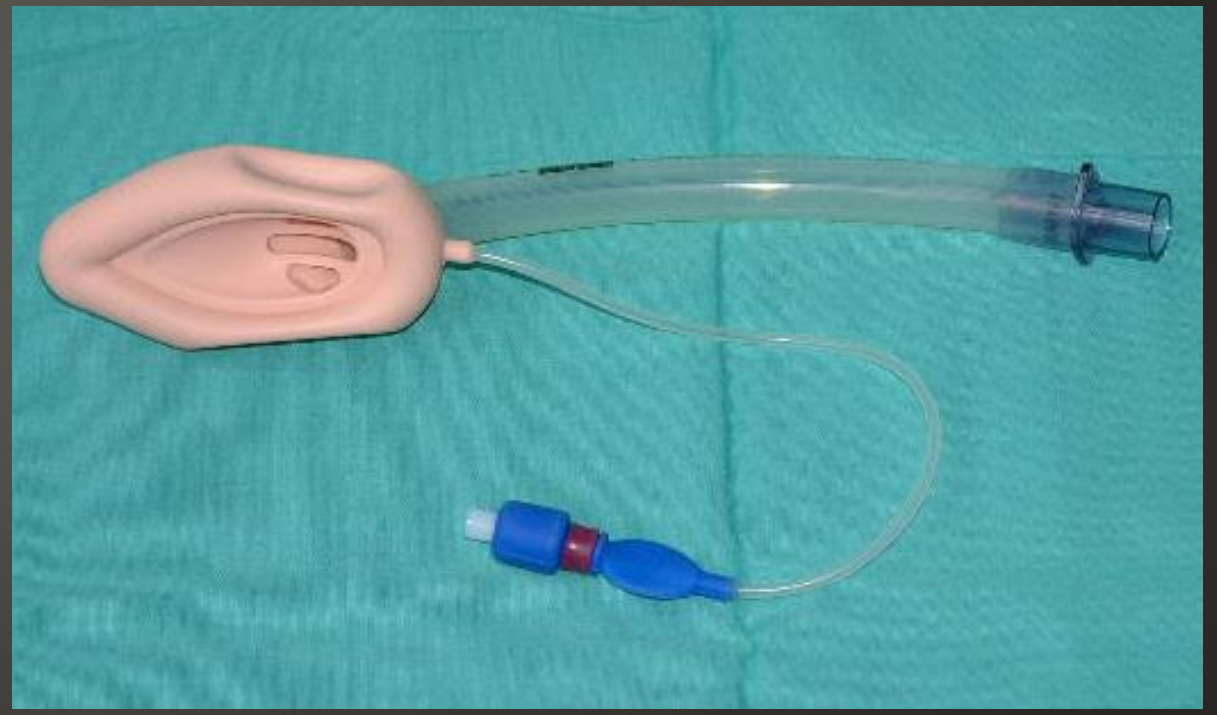
- Nasopharyngeal airway
  - Also useful for opening posterior pharynx, especially if conscious patient or clenching jaw
  - Use lubrication

Airway Interventions

- Extraglottic Devices
  - Sit outside of the glottis
  - Provide direct air flow into the lower airways
  - Protect the airway minimally, not definitive
  - **Used as a bridge to intubation**
  - Improve oxygenation and ventilation
  - For use in cardiac arrest
  - Include laryngeal mask airways, king airways

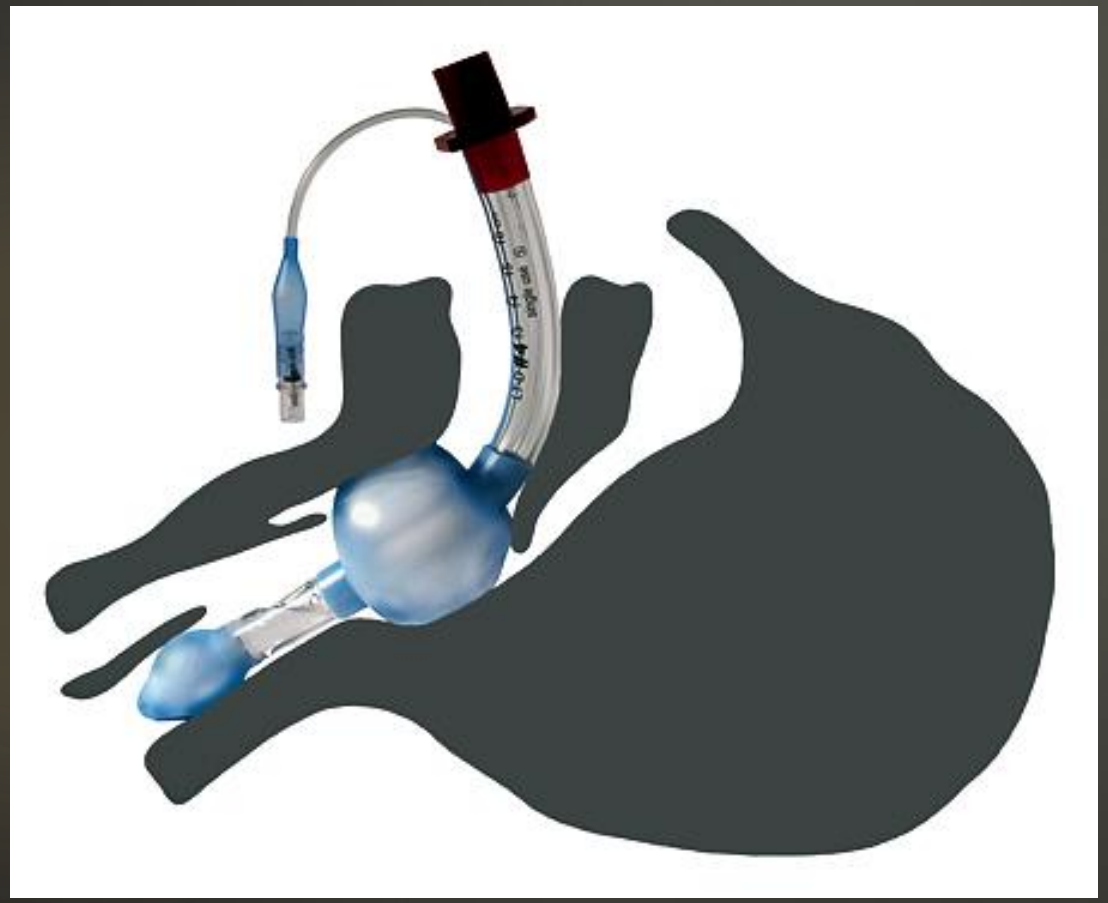
Airway Interventions – LMA





Airway intervention

- King Airway



Airway Intervention

- Adrenaline 0.3mg intramuscular if signs of anaphylaxis
- Steroids for allergy or infection swelling
- Antihistamines
- Other medications or surgical interventions depending on the condition

Airway Intervention

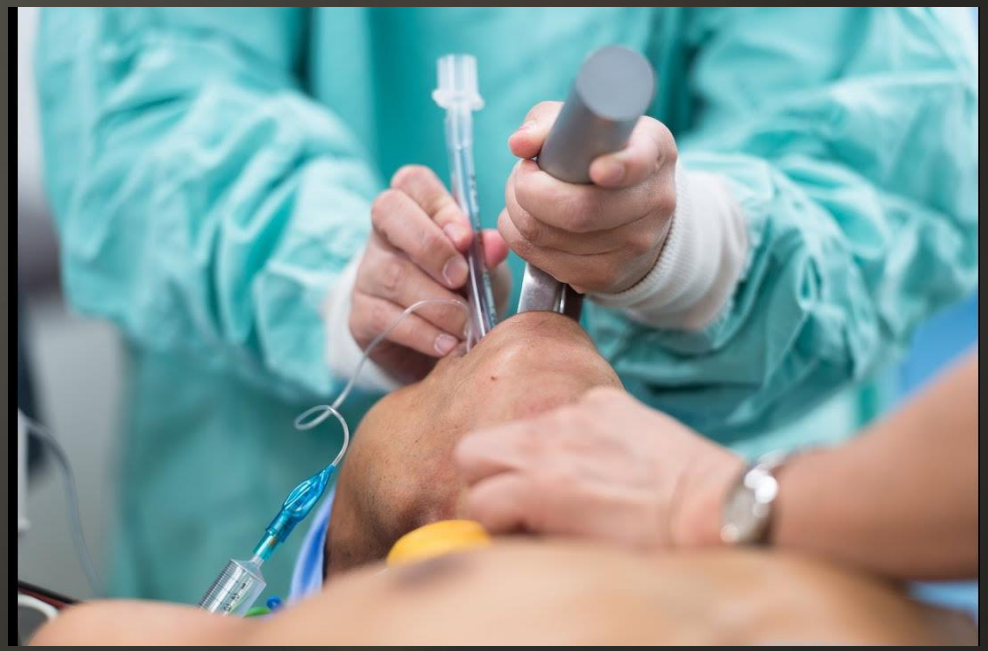
- Airway protection if signs of rapidly progressing swelling or inability to protect
- Endotracheal intubation definitive

Airway Intervention
Endotracheal Intubation

- Indications
  - Definitive airway needed because
    - Aspiration risk due to inability to protect airway
    - Risk of obstruction from swelling, infection etc
  - Breathing indications
    - Need for positive pressure ventilation because of failure in oxygenation or ventilation

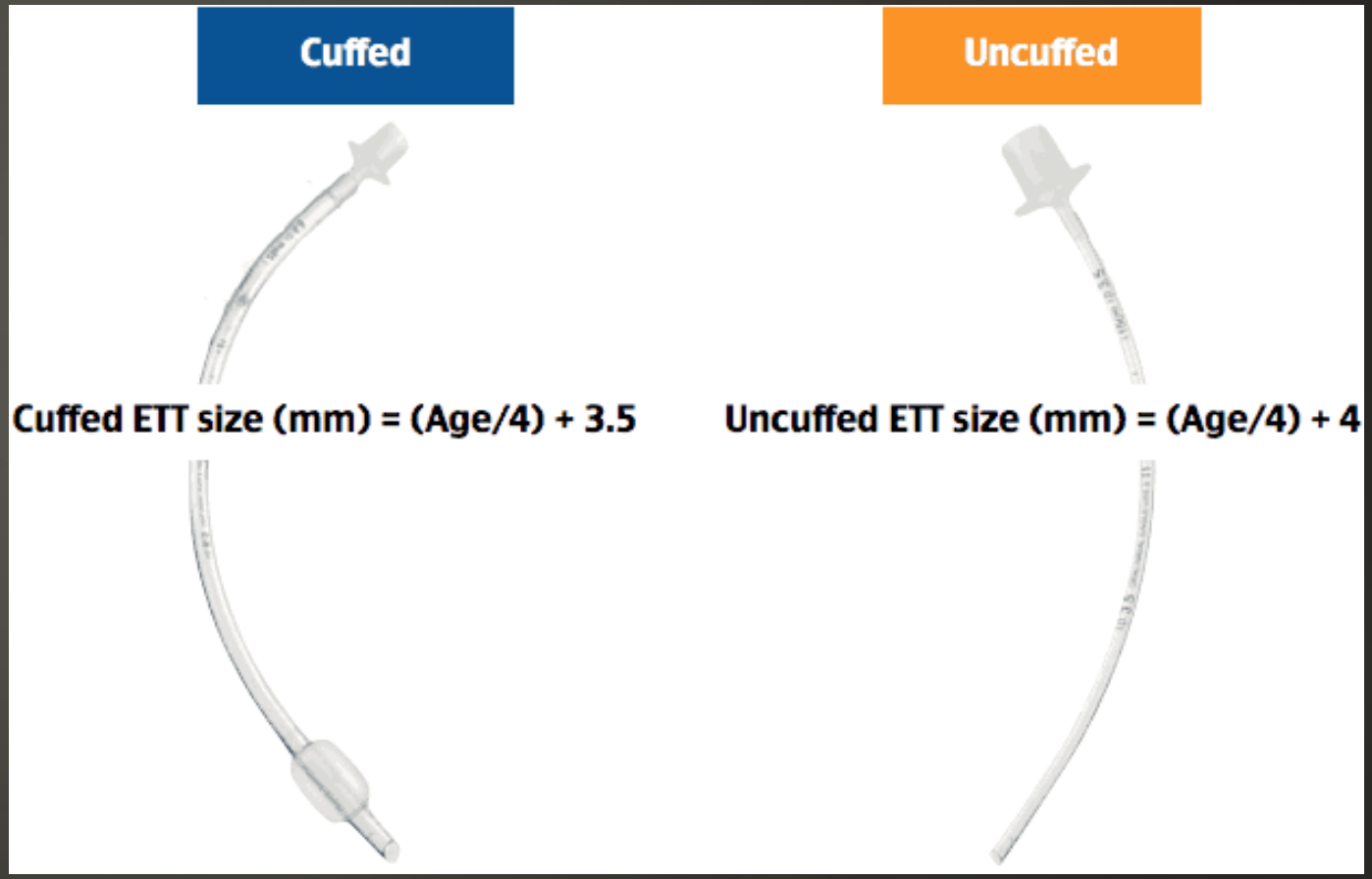
Airway Intervention Endotracheal Intubation

- Disadvantages
  - Technically difficult
  - Stimulates the pharynx
  - Requires high level of resources
  - Requires patient to be sedated and paralyzed



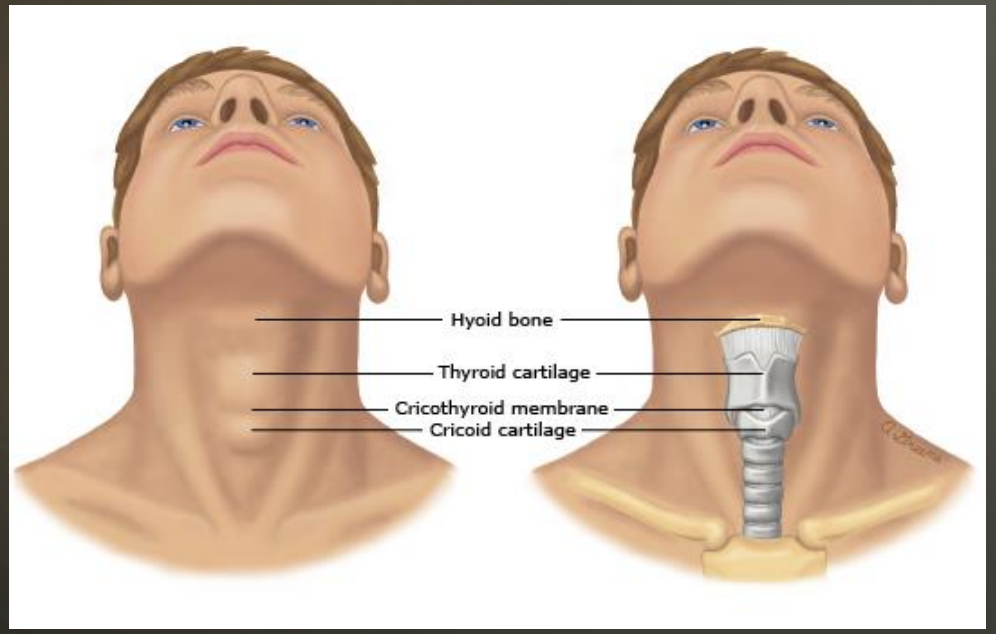
Pediatric Endotracheal Intubation:

- Laryngoscope Selection:
- Straight blade (Miller) for younger or smaller patients (newborns, infants, generally under 2 years old)
- Curved blade (Mac) for larger, older patients



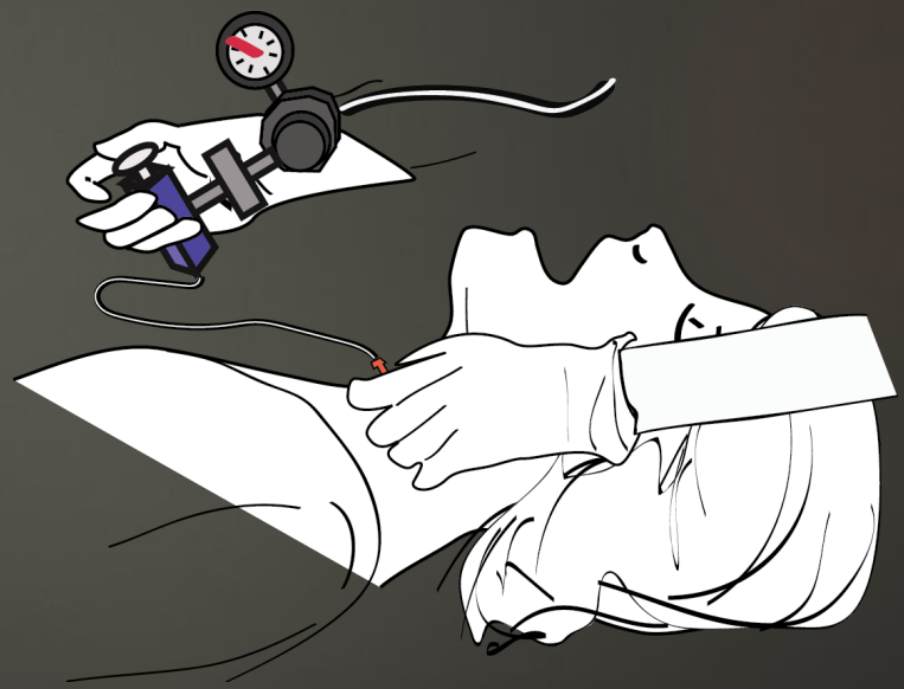
Airway Intervention

- Cricothyrotomy
  - Can't intubate, can't ventilate scenario



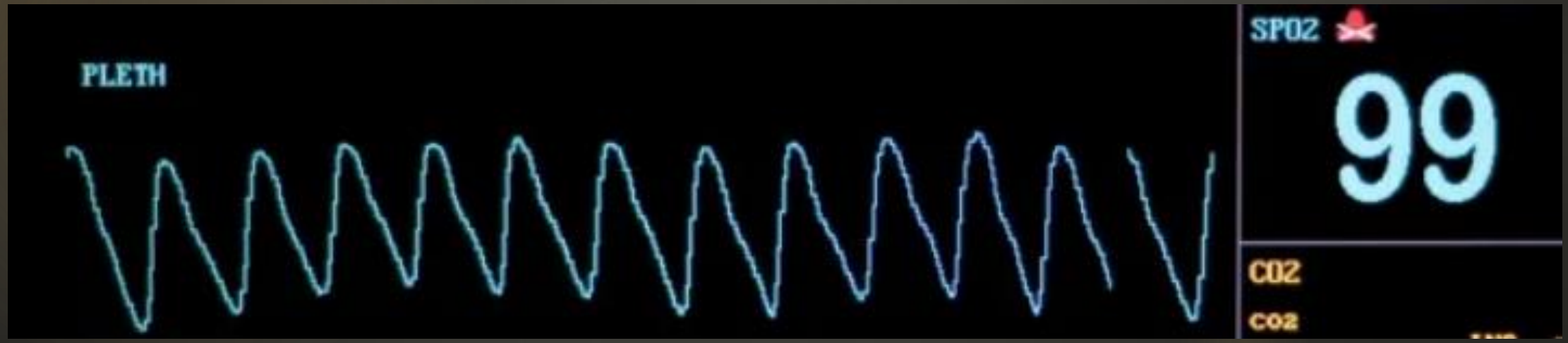
Airway Intervention: Pediatric Needle Cricothyrotomy

- Pediatric Needle Cricothyrotomy:
  - Indications: surgical airway of choice for children <12 (smaller airway, risk of injury)
- Use 14 gauge IV catheter
- Percutaneous Transtracheal Jet Ventilation
  - Ventilation system that can provide oxygen through a small diameter
  - Manual triggering of oxygen flow



Breathing interventions

- Oxygen
- Goal SPO2 92-99% (88-92% for COPD patients)
  - Avoid too much oxygen
  - Add oxygen if oxygenation < goal



Breathing interventions

- Oxygenation
  - Nasal cannula
    - 2-6 liters per minute
    - 24-40% fiO2

Breathing Interventions

- Oxygenation
  - Simple mask
    - Flow 5-10 liters/min
    - 30-60 fiO2%

Breathing Interventions

- Oxygenation
  - Non-rebreather mask
    - Flow 10-15 liters/min
    - 85-95 fiO2%

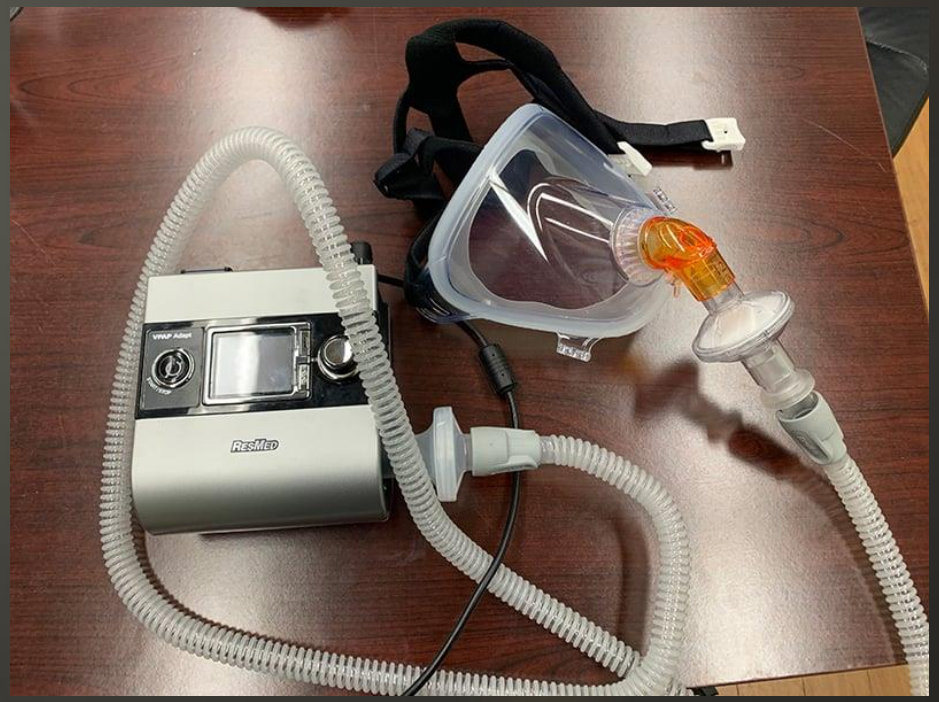
Breathing Interventions

- Oxygenation
  - High flow nasal cannula
    - Flow 10-60 liters/min
    - Up to 100 fiO2%
    - Some pressure delivered

Breathing Interventions

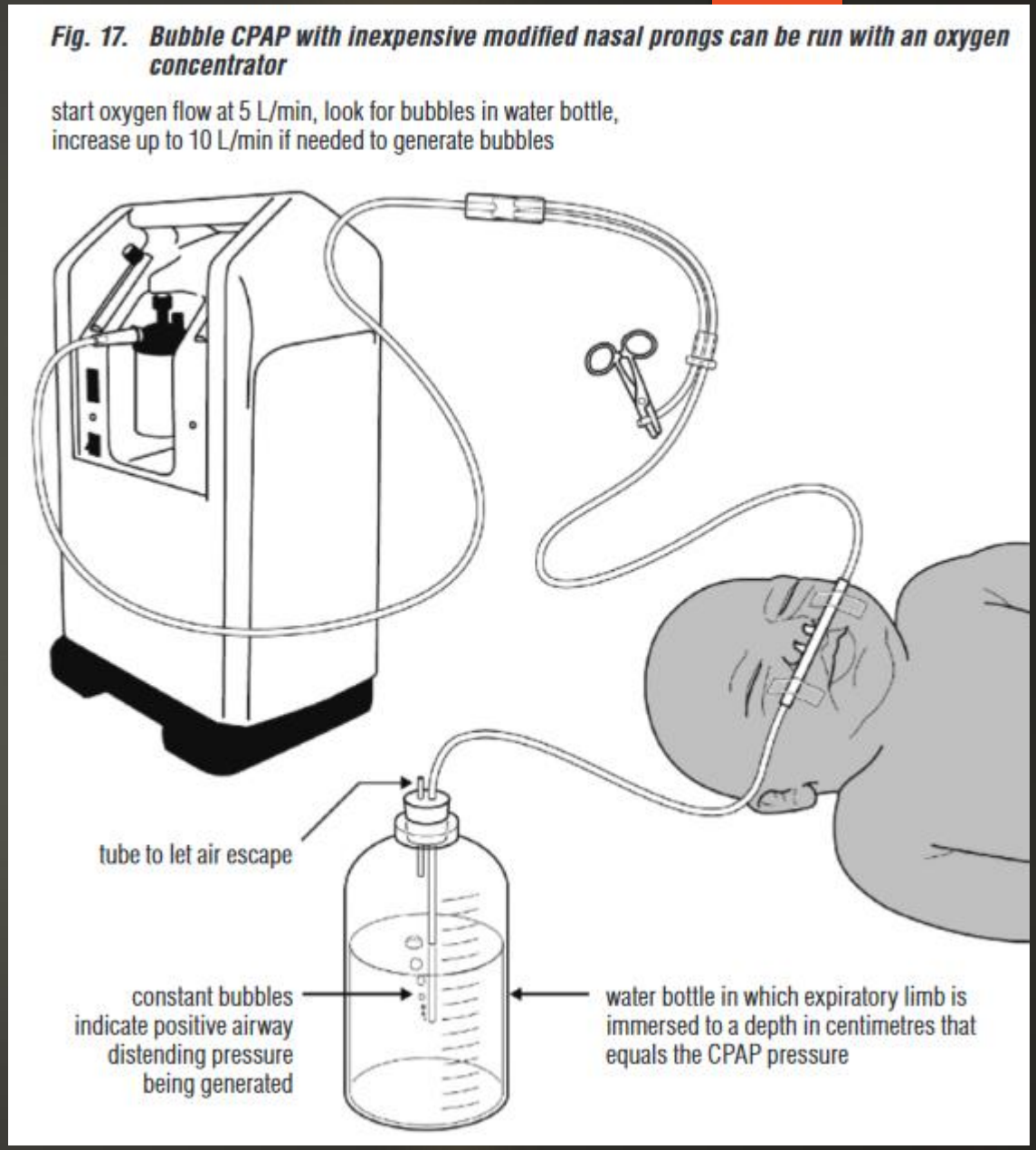
Non-invasive positive pressure ventilation

- Bilevel (Bipap) or Continuous (CPAP) Positive Airway Pressure



Pediatric Bubble CPAP

- Breathing circuit that delivers humidified oxygen
- Expiratory circuit portion immersed in water to create PEEP
- Can be used with wall oxygen or concentrator
- Used in infants



Breathing Interventions

- Bag Valve Mask
  - For temporary use in apnea or inadequate respirations
  - Bridge to intubation
  - Assists with oxygenation and ventilation
  - Does not secure the airway

Breathing Interventions

- Bag Valve Mask
  - Use OPA or NPA
  - One hand technique – C E method

Breathing Interventions

- Bag Valve Mask
  - Two hand technique

Breathing interventions

- Intubation
  - As noted above – if definitive airway needed or failure of oxygenation or ventilation

Breathing interventions

- Treat the underlying condition!
  - Pneumonia – antibiotics
  - Asthma/COPD – steroids, bronchodilators
  - Pulmonary Embolism – blood thinners
  - Heart failure – nitroglycerin, diuresis, inotropes
  - Pneumothorax – chest tube
  - Pleural effusion – thoracentesis
  - Tense ascites – paracentesis
  - Tamponade – pericardiocentesis
  - Opiate overdose - naloxone

Specific Threatened Airway Conditions

Angioedema

- Rapid swelling of face, lips, tongue, epiglottis
- Can be hereditary, allergy mediated, or a non-allergic reaction to medication (ACE inhibitors)
- Often becomes an airway emergency if it involves tongue or pharynx
- Treat as anaphylactic if there is any suspicion that it may be allergic

Ludwigs Angina

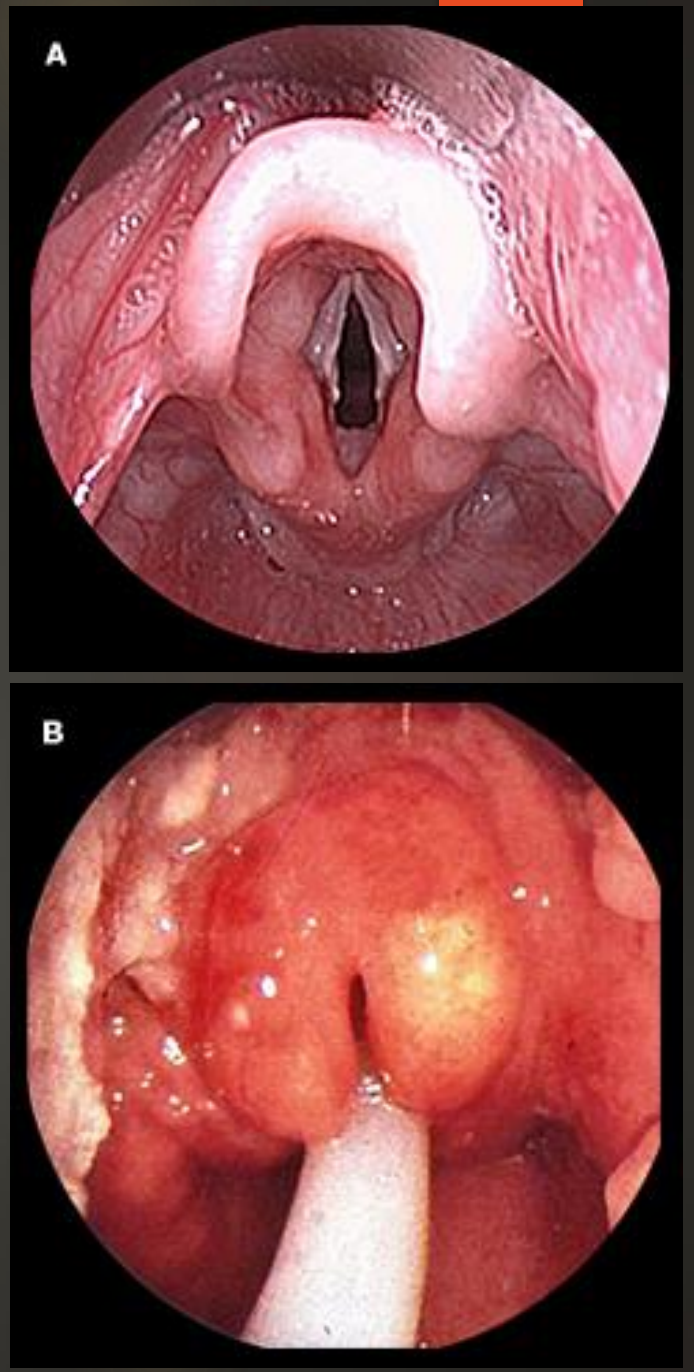
- Infection of the space underneath the tongue and mandible
- Can rapidly swell and block the airway
- Needs stat surgical drainage, antibiotics
- Airway may need early intervention with intubation

Croup

- Common cause of stridor in children < 3 years
- Viral infection causes inflammation and swelling of larynx
- Barking cough may be present
- Rarely causes complete obstruction
- Steroids and cool humidified air are first line treatment
- Nebulized adrenaline in moderate to severe cases
- Must be sure it is not epiglottitis or foreign body

Epiglottitis

- Infectious inflammation and swelling of the epiglottis
- Airway can rapidly become obstructed
- Three D's – drooling, dysphagia, distress
- Stridor and a muffled voice are often present



Epiglottitis

- Have suspicion in unvaccinated patients with stridor
- Most often caused by strep, staph, H. flu
- Treat with emergency ENT consult, antibiotics, steroids, nebulized adrenaline and airway control
- If ENT unavailable and failure of oxygenation or ventilation will need endotracheal intubation with planning for possible cricothyrotomy

Foreign Body

- Suspect in any pediatric patient with sudden onset stridor or difficulty breathing
- Adults will often adopt choking pose
- Use abdominal thrust/ back blows if there is no air movement
- If foreign body is visible may remove with finger sweep
- If patient is stable enough for xray it may help
- Specialist consultation (ENT, pulmonology, surgery, emergency)