Pediatric Airway Differences

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Physiologic Considerations

Pediatric patients are more prone to rapid desaturation and respiratory complications

Alveoli continue to develop until age 8, leaving infants with **less surface area** and **collateral ventilation channels**

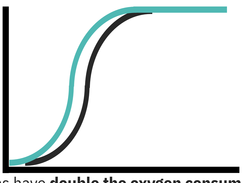
Respiratory illnesses have a greater chance of producing **atalectasis and lung hypoventilation**

Children have an **increased metabolism**, **decreased functional residual capacity (FRC),** and **decreased small airway diameter**

Small airway diseases like **asthma** and **bronchiolitis** can cause a **significant increase in work of breathing**

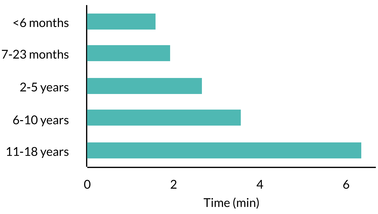
Children have more cartilage in their chest wall, which **increases chest wall compliance** and **minimizes elastic recoil**

Maintaining tidal volume requires increased work at baseline. **Supine positioning** for airway management **can cause hypoxemia and intrapulmonary shunting**



Newborns have **double the oxygen consumption** per kg as adults. This is due to the presence of **HbF**, causing a **left shift** in the hemoglobin dissociation curve

Mean time to 90% O2 Desat



Infants **desaturate** at a **significantly faster time** than older children and adults. **Preoxygenation** is **critical** before intubation to avoid hypoxemia

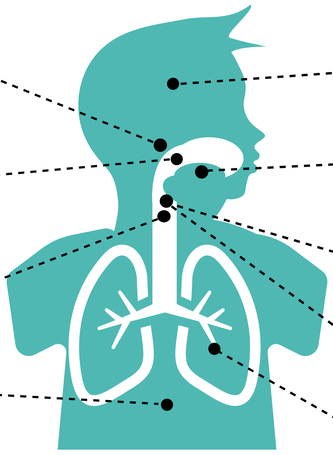
Anatomic Considerations

Large adenoids and tonsils can obstruct ET Tubes and bleed. Avoid blind nasotracheal intubation during acute resuscitation in children <10 yrs

High anterior airways restrict visualization of vocal cords. Properly positioned beforehand, and alternate laryngoscope depth to visual cords

Small cricothyroid membrane makes surgical cricothyrotomies difficult. Needle cricothyrotomies recommended for infants when surgical airway needed

Diaphragmatic excursion required for ventilation. Insufflation of the stomach can compromise this: decompress with a orogastric or nasogastric tube



Large head and occiput causes neck to be flexed on a stretcher. Use a shoulder roll to properly position

Large tongue can occlude the airway in unconscious patients. Use a jaw thrust and nasopharyngeal airway to maintain ventilation

Upper airway and subglottic region prone to inflammation and collapse. Use an uncuffed ET tube, or carefully monitor cuff pressure in micro-cuffed ET tubes.

The subglottic region is the narrowest part of the pediatric airway

Decreased small airway diameters which are **less cartilaginous** and **more prone to collapse** during crying and respiratory distress

Management

Endotracheal Tube Sizing

Use Both:

Broselow-Luten Tape

Uses patient length to estimate ET tube size

- Requires **no calculations**, minimizing cognitive load
- Available in **app-based formats** like **Pedi STAT**

Age-Based Rule

ETT Size = [Age in years/4] + 4

- Estimates **uncuffed** size. **Subtract 0.5 for cuffed size**
- Valid in patients aged **1-16 years**
- **ETT Size** in **infants <1 year** = **gestational age (weeks)/10**

Other Considerations

LMA's and other supraglottic devices are the **preferred rescue airway**

Cuffed ET tubes preferred when **high inflation pressure needed**. Use a **size one half smaller** than estimated uncuffed

Needle cricothyroidotomy is the preferred surgical airway for young children. However, it is **not a definitive airway** as it allows for **oxygenation** and **not ventilation**

RSI Medications

Pretreatment

Atropine may be **considered** in infants <1 year with pre-procedure bradycardia due to exaggerated vagal response. **Routine use is not recommended**

Sedatives

Sedatives should be selected based on **efficacy, adverse effects, and clinical situation**. i.e. **Ketamine** is preferred for septic shock as it maintains MAP

NMBA's

Rocuronium should be used **extremely cautiously** if anticipating a **can't intubate can't ventilate situation**

Succinylcholine can cause **arrest, hyperkalemia,** and in rare cases **bradycardia.** Preferred for status epilepticus

REFERENCES:
Rosen's Emergency Medicine: Concepts and Clinical Practice - 9th ed. 2017: Chapter 161 Airway Management for the Pediatric Patient

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