

Wheezin' Season: Pediatric Airway and Respiratory Emergencies

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No relevant financial relationships
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Why Is This Topic Important?

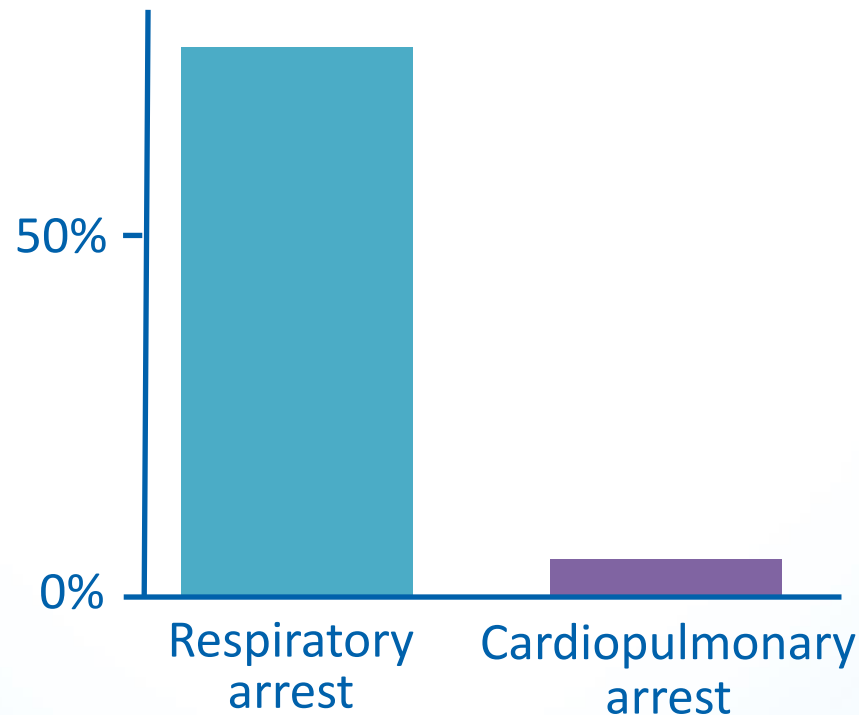


- Respiratory arrest is the most common cause of cardiopulmonary arrest in children
- Failure to manage airway is the leading cause of preventable death
- Early recognition is key
- Simple Interventions can work

Survival Following Respiratory Arrest vs. Cardiopulmonary Arrest in Children



Survival Rate





Objectives

- Discuss options for early interventions to increase success in managing pediatric patient in respiratory distress
- Discuss anatomic factors specific to the pediatric airway and signs of respiratory distress in pediatric patients
- Discuss how if unrecognized, respiratory distress will lead to respiratory failure
- Review selected upper vs lower respiratory emergencies





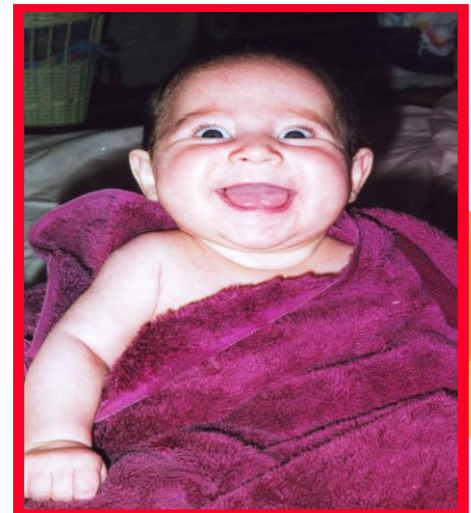
Pediatric Keys to Success

Prevent **HYPOXEMIA** !!

Basic treatments save lives:

STAY CALM!

- Get Vital Signs (no matter how young)
- Intervene and **Reassess**
 - **Remember kids can change**
- Decide where intervention should occur



Airway Management Options



- Suction
- Positioning/calming
- Supplemental oxygen
- Nebulized medications
- Oral or nasal airways
- Bag-mask ventilation
- Positive Pressure Treatment
- Advanced airway
- Rescue Techniques



**Nasal suction=
LIFESAVER**



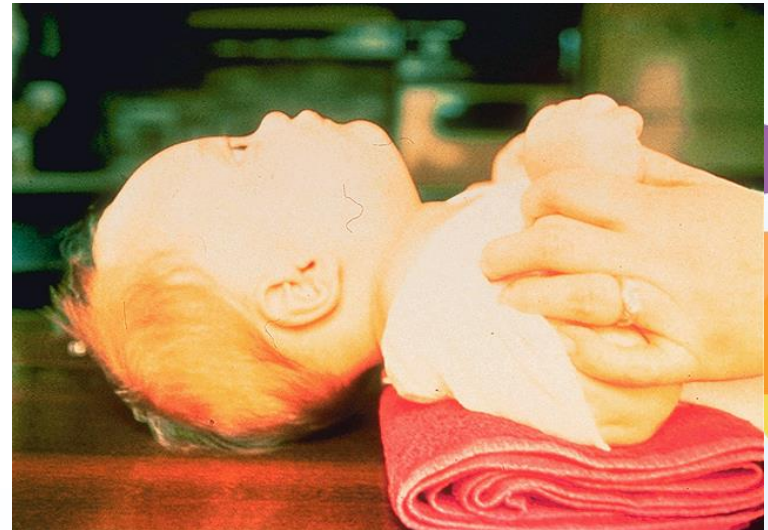
Positioning



Proportionally larger head, particularly the occiput (up to ~8yrs)

Laying flat will obstruct the airway

Positioning with towel rolls can straighten the neck and open the airway





Positioning

- Put head of bed up if helps
 - Tripod position
- Place in car seat
- Sit on parent's lap (calm patient)
 - Position of comfort



Supplemental Oxygen



Nasal Cannula



Simple mask



Non-rebreather





Nebulized Medications

- Albuterol
- Atrovent
- Epinephrine
- Mist



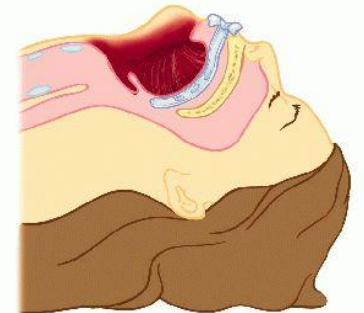


Airway Adjuncts

Oral Airway

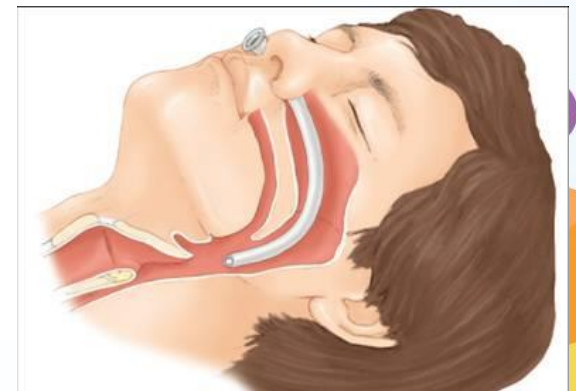
Keeps tongue
out of the way

Only in
unconscious
patients



Nasal Airway

Great for children with
copious secretions but
breathing on their
own.





Bag-Mask Ventilation

THE single most important life-saving skill

C-E technique/2 hand Thenar technique/v-clamp

Jaw thrust

Not as easy as it looks- PRACTICE!

Always observe for chest rise





Positive Pressure Options

Heated Hi-Flow

BiPAP

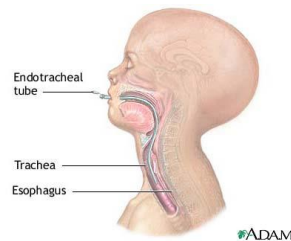
CPAP





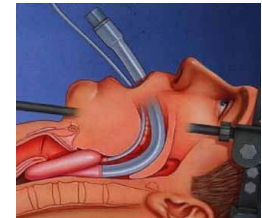
Advanced Airways

Endotracheal Tube -ETT



Pediatric sizes based on **age**
Only way to provide high pressure ventilation
Takes time and direct visualization
Prevents aspiration

Laryngeal Mask Airway-LMA



Pediatric sizes based on **weight**.
Easy, blind insertion
Easier to maintain than BMV
Faster than ETI and better success rate
Does not definitively protect airway



Advanced Airways

I-Gel



Pediatric sizes based on **weight**.

Easy, blind insertion

Easier to maintain than BMV

King's



Faster than ETI and better success rate

Does not definitively protect airway

Signs of Respiratory Distress

Early Signs

↑ RR

- Nasal flaring
- Intercostal, supraclavicular, and subcostal retractions
- Neck muscle use
- Audible noises: stridor, wheezing
- “see-saw” respirations

Late Signs

- RR >60
- Cyanosis
- Decreased muscle tone
- Severe accessory muscle use (sternal retractions)
- Poor peripheral perfusion
- Altered mental status
- Grunting
- Head bobbing





Children's Hospital
Colorado



Late Signs of Respiratory Distress

Respiratory Distress & Failure

Distress:

State of increased **respiratory rate** and increased **respiratory effort**:

- Tachypnea
- Nasal flaring
- Retractions



Respiratory Distress & Failure

Failure:

Inadequate gas exchange by the respiratory system

*Usually follows period of distress

Most common pathway to cardiopulmonary arrest!!!



Pediatric Respiratory Emergencies

Upper Airway

- Distress occurs when structures of upper airway are occluded
 - Edema
 - Secretions
 - Foreign bodies
 - Anatomical defects
- Examples
 - Croup
 - Epiglottitis
 - Bacterial tracheitis
 - FB obstruction
 - Anaphylaxis

Lower Airway

- Distress occurs when lower airway structures are occluded
 - Edema
 - Bronchoconstriction
- Examples
 - Asthma
 - Bronchiolitis
 - Pertussis
 - Pneumonia
 - Anaphylaxis

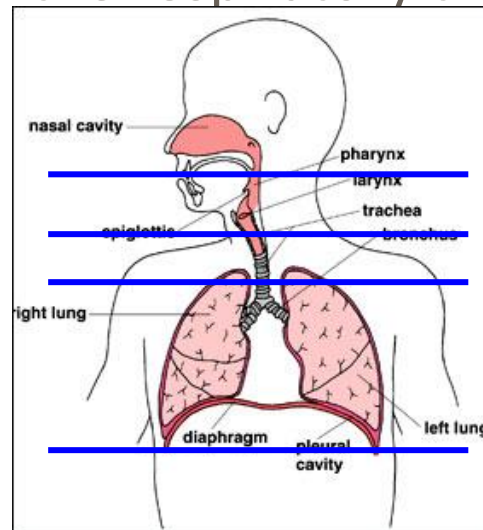




Define the Problem





Is this a primary respiratory problem?

Which part of the respiratory tree is involved?





Airway Resistance

	<u>Normal</u>	<u>Edema</u>	<u>Δ diameter</u>	<u>Δ resistance</u>
Infant	 4 mm	 2 mm	\downarrow 50 %	\uparrow 16 \times
Adult	 8 mm	 6 mm	\downarrow 25 %	\uparrow 3 \times



3 y/o trouble breathing

6 year old child presented to PCP office with respiratory distress

Sx: 1 day of barky cough, audible wheezing, retractions, drooling

Pt received Albuterol neb x1 with minimal improvement

EMS transferred child from PCP office to CHCO

EMS reports child was in respiratory distress

- Gave Duoneb and Racemic Epi x1 en route





3 year old trouble breathing

- Upon arrival in ED:
- T 98.4, RR: 32, HR 153, BP 123/88 and 95% RA
- Awake, alert, no drooling, + barky cough with stridor at rest
- HEENT: + congestion , MMM, slightly red throat
- CV: Tachycardic, RR, no m/r/g, pulses 2+
- Lungs: Suprasternal retractions, good aeration, symmetric, no crackles, wheezing, rales, rhonchi



Thoughts?

Differential?

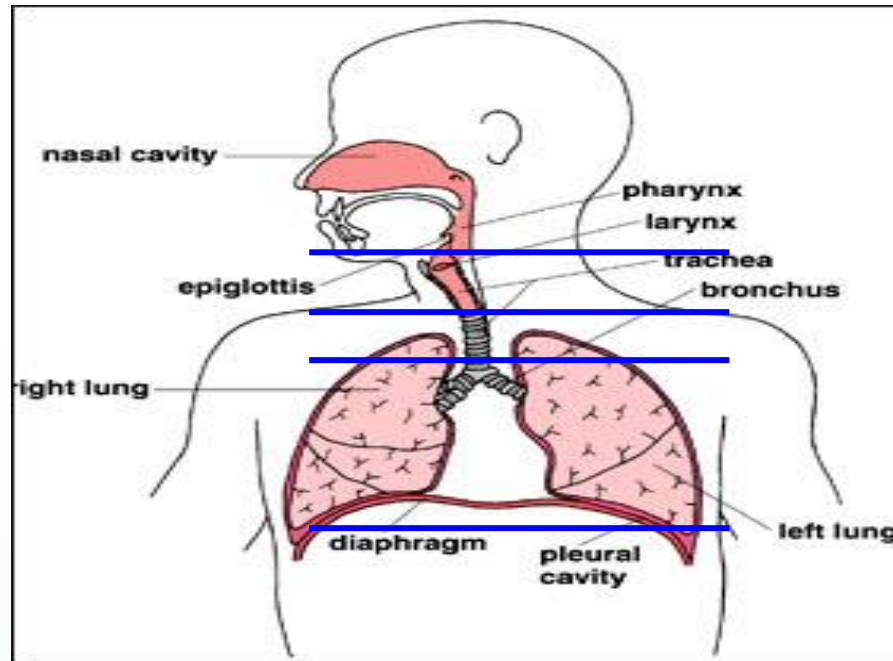
What to you want to do?





Define the Problem

Which part of the respiratory tree is involved?







Stridor

- Harsh, high pitched airway sound
- Characteristic of significant upper airway obstruction from swelling





Differential of Stridor

Infection

Croup

Bacterial tracheitis

Retropharyngeal abscess

Foreign Body-(especially starting in middle of the day)

Laryngomalacia/Tracheomalacia

Less common causes:

vocal cord paresis,

subglottic hemangioma,

- causes rapidly progressing stridor, sometimes associated with a facial hemangioma

vascular ring, vascular sling, fixed mediastinal mass

Croup



Accounts for over 90% of stridor with fever

Common illness: ages 6 months- 5 years

More common in spring to summer and summer to fall

Subglottic stenosis secondary to edematous, inflamed mucosa

NOT SMOOTH MUSCLE ISSUE

Most commonly caused by parainfluenza>>>RSV, adenovirus, and influenza

With different waves of Covid, we saw large number of Covid+ croup with more recent variants



Croup-Symptoms

- Signs/symptoms: barky cough, hoarse voice, fever, inspiratory/exp stridor, tachypnea, tachycardia, retractions
- **Sick vs not sick**= inspiratory/exp stridor and increased WOB
- **Stridor at rest**



Croup- Interventions

#1 Rule...

Don't piss them off!!

Croup- Interventions



Treatment:

Mild-Barky cough, no stridor at rest

- Decadron: standard dose 0.6mg/kg (max 8mg)
Studies have shown as doses as low as 0.2 mg/kg are just as affective
No studies have shown benefit from 2nd dose
- Cool mist-no study to show this is beneficial





Croup- Interventions

- Position of comfort
- Monitor O2 sats- cover up the probe!!
- Encourage cold fluids





Croup- Interventions

#1 Rule...

Don't piss them off!!

Unless you have to...

Croup- Interventions



Treatment:

Mild-Barky cough, no stridor at rest

- Decadron: standard dose 0.6mg/kg (max 16 mg)*
Studies have shown as doses as low as 0.2 mg/kg are just as affective
No studies have shown benefit from 2nd dose
- Cool mist-no study to show this is beneficial

Severe-Stridor at rest and/or severe distress

- **Racemic epinephrine(0.5 ml of 0.25% solution dissolved in 2.5ml of NS)**
Watch for 2-3 hours after treatment
- **Heliox-Use limited by hypoxia**

Pt with significant hypoxia with croup are worrisome for severe disease/critical airways

Albuterol does not help bc not a smooth muscle issue





Case #1- ED Interventions

- Racemic Epi neb over 15 minutes
- Dexamethasone
- Cardiac monitor and pulse ox
- Observation x 3 hours- watch for rebound
- Popsicle and juice, then discharged home





Questions?





7 y/o male trouble breathing

1405 – 911 call ;

“My son is having trouble breathing”

“We are in the car going to the hospital”

14:07 - EMS finds car on road, car does not stop

14:11 - EMS follows car to ED ambulance bay

Find male in backseat apneic, pale, poor tone

MOC reports “He had a ball in his mouth and then started having trouble breathing”

EMS provider performs abdominal thrusts as he carries patient in to the hospital

.



7 y/o male trouble breathing

14:13 – Arrives in CHCO ED being held around the abdomen by EMS provider

awake, insp/exp stridor, hoarse voice: RR 28,





Thoughts?

Differential?

What to you want to do?





7 y/o male trouble breathing

14:13 – Arrives in CHCO ED being held around the abdomen by EMS provider

awake, insp/exp stridor, hoarse voice: RR 28,

Pt is placed in a sitting up positioning and placed on oxygen

14:15 - ENT consulted, imaging ordered





7 y/o male trouble breathing

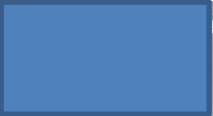
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14:25 - ENT asks for 2nd image





7 y/o male with trouble breathing



14:13 – Arrives in CHCO ED being held around the abdomen by EMS provider

awake, insp/exp stridor, hoarse voice: RR 28, sat up and placed on oxygen

14:15 - ENT consulted, imaging ordered

14:25 - ENT asks for 2nd image

14:42 - Pt transferred to OR for removal



7 y/o trouble breathing

After removal in OR,
patient admitted to PICU

He went home the next
day and is doing fine





Upper Airway-Foreign Body Obstruction

- True medical emergency
- Usually in children <3 years old
- Size of object determines severity
- Most often caused by food

Hot dogs

Round candy

Peanuts

Plastic/glass beads

Buttons

Coins

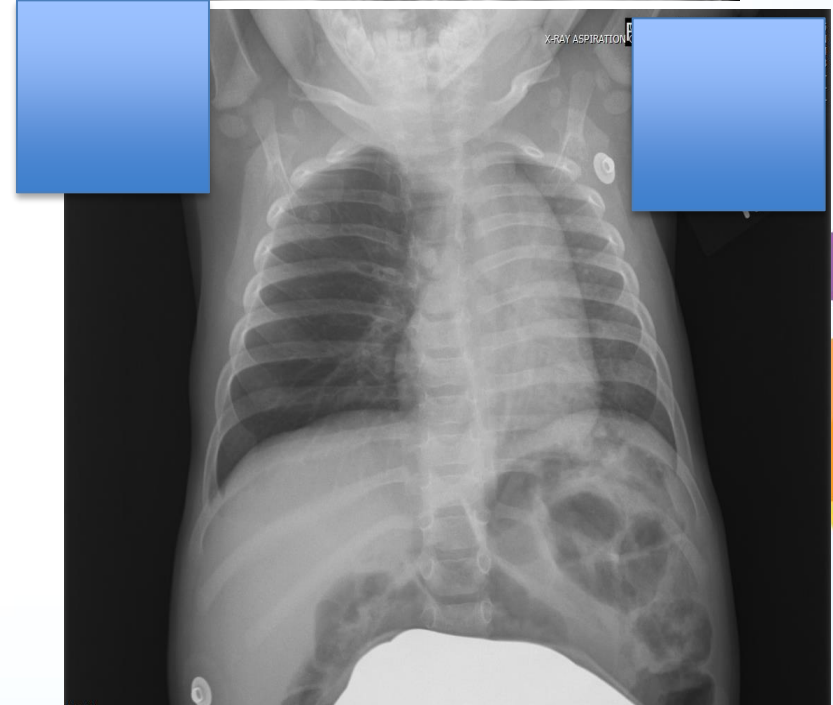
Disc batteries





Foreign body obstruction-symptoms

- Drooling
- Stridor
- Wheezing
- Unequal breath sounds
- Chest pain



Airway FB - Aspiration Management/Interventions



CAB/ABCs

Intervention if needed

Blind finger sweep not indicated

If visible, can be removed with Magill Forceps





Airway FB interventions

If coughing, gagging let child clear without interventions –
POSITION

NO noise, no sound - **INTERVENE**

<1 y/o old, 5 back blows, 5 chest blows

Head down

>1 y/o, abdominal thrusts indicated

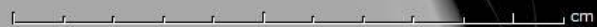
If unconscious, start CPR

After 30 chest compressions, open AW, check for FB, remove if
able

NO BLIND FINGER SWEEPS



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Questions?

