Wheezing, sneezing, coughing and squeaking (respiratory distress in kids – a practical approach)

Parker EMS Education
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Kristin M. Kim, MD, PhD
Pediatric Emergency Medicine, CHCO

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No disclosures

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Case 1: Fred

- Dispatch: 2 year old boy, mother reports difficulty breathing that worsened yesterday and continued overnight
- On scene:
  - Todder aged child, pale appearing
  - Not crying when you approach but appears ill
  - Respiratory rate is fast
  - You notice nasal flaring and tracheal tugging
- What next?

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Rapid Pediatric Assessment

Appearance

Work of breathing

Circulation / skin appearance

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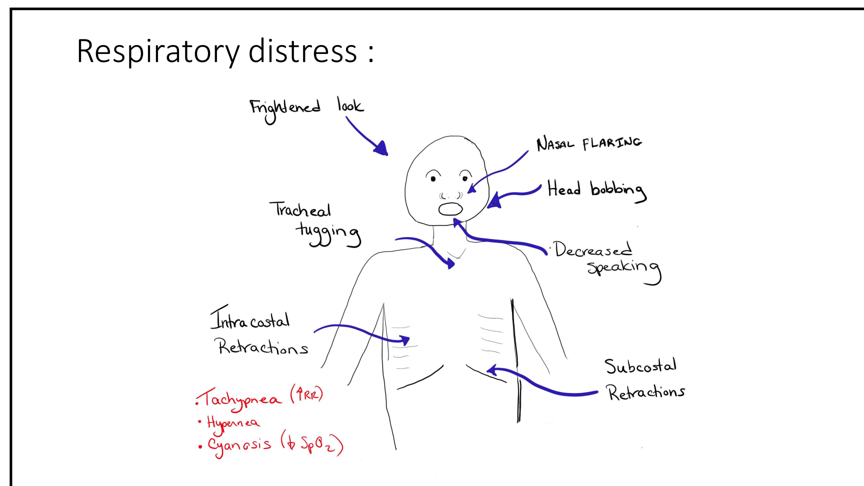

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Initial intervention in respiratory distress

- Keep patient calm (in parent's arms)
- Good lung exam – listen for:
  - How well is air moving?
  - Rate?
  - Any noises? – stridor (which phase?), wheezing? Crackles? Nothing?
- Obtain vital signs – RR, HR, SpO2, temp (BP can wait here)
- A quick history
  - Preceding symptoms (URI?, playing with a toy?, eating? Hives? Fever?)
  - Any other past medical history (tracheostomy, laryngomalacia, asthma?)
- Provide respiratory support
  - Supplemental O2
  - Consider suctioning
  - Medications?
  - Positioning

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Back to Fred

- Appearance – looks sick
- Breathing – breathing fast, + tracheal tugging with abdominal retractions, occasional inspiratory squeak
- VS: RR 50, HR 140, pulse ox 95%
- Quick History:
  - Had URI symptoms x 1 day, much worse overnight and found in severe distress this morning
  - Otherwise healthy, immunized pt
- Diagnosis?

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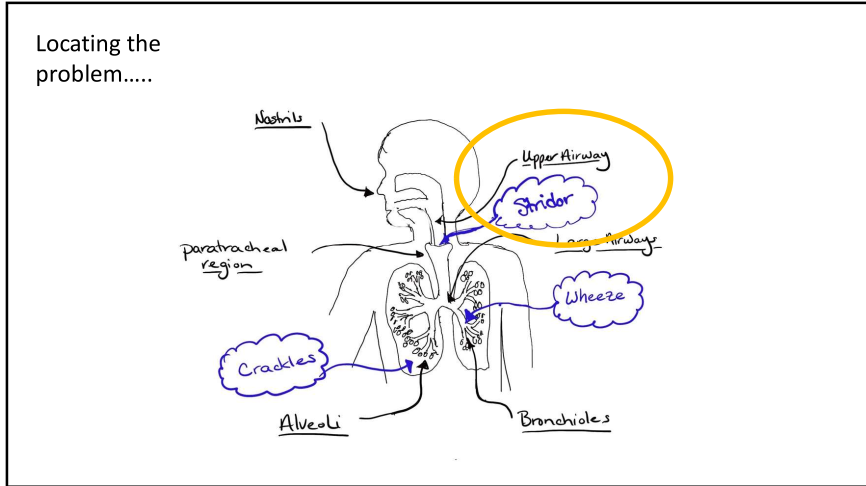

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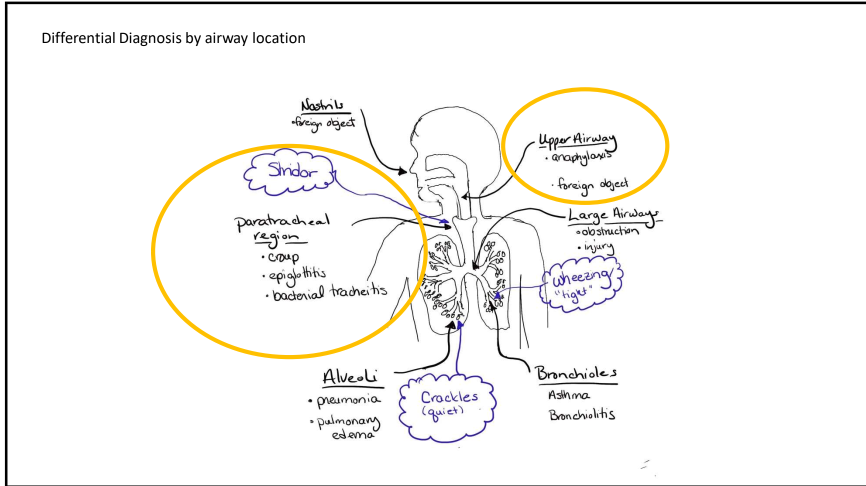

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Croup - presentation

- Viral infection of the upper airway – parainfluenza, RSV, COVID
- Often but not always preceded by URI symptoms
- Often rapid onset of distress
- "croup always gets worse at night"
- Typical symptoms:
  - Barky cough (like a seal, not dog)
  - Stridor (inspiratory squeaking noise)
  - +/- fever
- Inflammation of the upper airway / laryngiotracheitis

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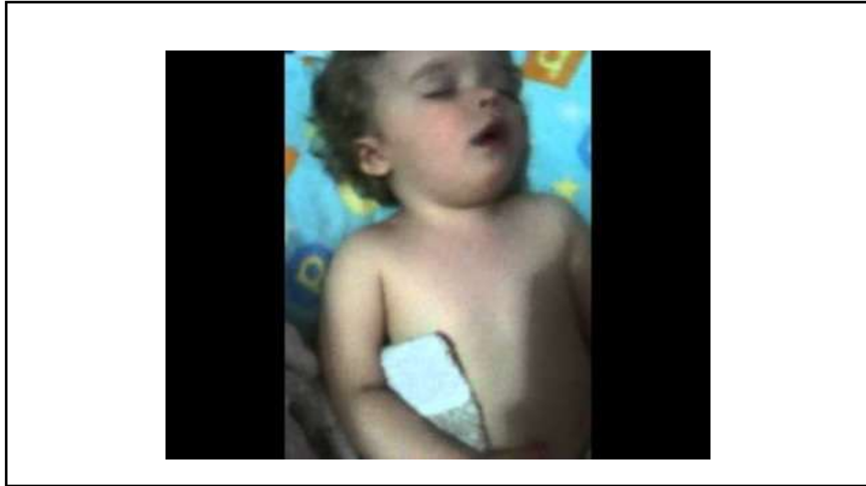

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Croup - Treatment

- Home remedies – cold air (works sometimes), warm shower (not really),
- Treat the inflammation to open the upper airway
  - Keep calm
  - If stridor at rest or respiratory distress → Racemic Epinephrine
  - Steroids eventually (onset of improvement is about 4-6 hours)
  - CPAP/BiPAP
- In the ED – racemic epi, heliox, decadron
- This is not a happy intubation!

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Other upper airway issues

- Foreign body (consider airway maneuvers)
- Epiglottitis
  - This is a DIFFICULT airway
  - Unvaccinated younger kids
  - Keep them calm (no IV, minimal interventions)
- Bacterial tracheitis – looks like croup but sicker…
- Anaphylaxis –
  - If suspected – consider IM epinephrine if respiratory distress
  - Can have wheezing, stridor, decreased breath sounds
- Can be at baseline

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Back to Fred

- You appropriately diagnose him with croup
- As you head out to the ambulance – into the cold air – he gets a bit better
- He still has some retractions and stridor so you appropriately give:
- Racemic Epinephrine
- ED arrival – He's much better, gets his dose of decadron, we watch about 2-3 hours and he goes home

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Things that scare me with croup:

- No improvement with racemic epinephrine
  - COVID croup seems more severe
- High fever
- Unimmunized kids with croup → much higher risk of epiglottitis or bacterial tracheitis
- Abnormal airway at baseline
- Any decreased O2 sat

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Maria

- Dispatch: 12 year old girl – acute onset of difficulty breathing at school
- On scene with teachers:
  - "She seemed okay this morning but had a bit of a cough, now she's much worse and can't speak well"
  - 12 yo girl – very quiet, looks very scared
  - Respiratory rate looks a little fast
  - She answers questions with 1-2 words only
  - No recent fevers
- On initial exam – very diminished breath sounds – maybe an occasional wheeze,
- Working pretty hard – you notice that she seems to be using her shoulders to breathe…
- What next?

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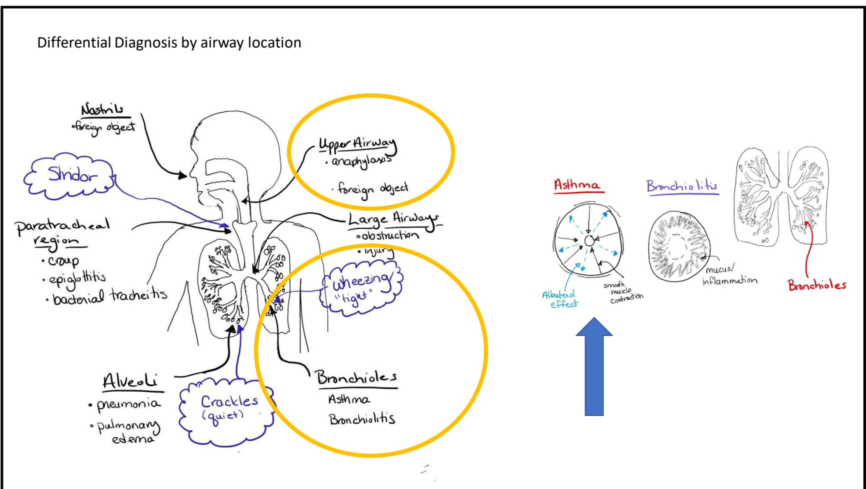
Differential Diagnosis by airway location



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Asthma - presentation

- Acute bronchoconstriction of the small airways – smooth muscle contracts & inflammation of the small airways
- Presentation
  - Typically acute onset with early worsening
  - Can wheeze, cough or just go silent
  - Often history of prior wheeze/persistent cough or episodes of trouble breathing
  - May have inciting trigger – URI, allergen, smoke
  - Oxygenation usual adequate – if abnormal – this is severe asthma
  - Tachypnea, retractions, wheezing
  - Diminished lung sounds with increased expiratory phase

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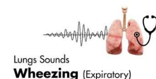
- https://www.youtube.com/watch?v=T4qNgi4Vrvo



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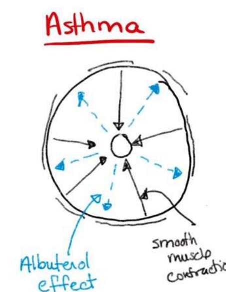
Asthma - treatment

- Inhaled Albuterol (+/-) ipratropium
  - Relaxes the smooth muscle
  - Works quickly (onset 1-2 minutes, peak 30 minutes)
- Steroids
  - Decrease the inflammation
  - Work slowly (4-6 hours)
- In the ED
  - Magnesium (smooth muscle relaxant)
  - Terbutaline/etc
  - BiPAP – with continuous albuterol
  - Avoid intubation!!!



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Maria - continued

- Hx – no formal asthma diagnosis, but she's had wheezing in the past and needed to be in the hospital before. She started coughing last night and tried cough medicine without improvement
- Exam
  - RR – 30, HR 120, SpO2 96%
  - Can't hear lung sounds at all – faint expiratory noise
  - Can only speak 1-2 words at a time
- Intervention:
  - Albuterol NMT (or MDI)
  - Re-evaluation – now wheezing heard throughout
  - Continue more Albuterol, transport
- In the ED:
  - She receives another 1 hour of continuous albuterol, decadron and improves
  - Goes home with inhaler and education

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Things that scare me with asthma

- Acute onset of severe symptoms
- Altered mental status
- Teenagers with respiratory distress
- Kids with "tight" variant asthma (no wheeze as warning signs)
- Prior need for intubation or ICU
- Current hypoxemia

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Rosie

- Dispatch: 15 mo with worsening difficulty breathing – Mom says "she doesn't look right and can't breathe"
- On scene:
  - Appearance – limp but awake
  - Breathing – Too fast, too hard
  - Circulation – pale but not blue
- History –
  - 2 days of URI symptoms, now seems to be breathing faster and harder,
  - Decreased PO intake today
  - Immunized
- Exam
  - Copious nasal discharge
  - Lungs – RR 60, decreased air entry, + retractions (abdominal, tracheal, intracostal), wheezing and crackles diffusely
  - Skin is well perfused with strong pulses
  - VS - RR 60, HR 150, SpO2 – 86%

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- On scene:
  - Appearance – limp but awake
  - Breathing – Too fast, too hard
  - Circulation – pale but not blue
- History – 2 days of URI symptoms, now seems to be breathing faster and harder, hasn't been eating well today. No PMHx
- Exam –
  - Copious nasal discharge
  - Lungs – RR 60, decreased air entry, + retractions (abdominal, tracheal, intracostal), wheezing and crackles diffusely
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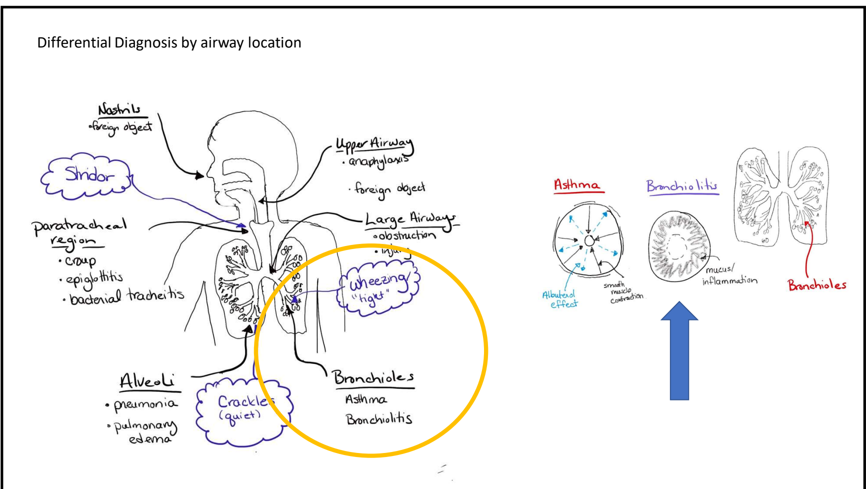

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Bronchiolitis

- Viral infection of the upper and lower airways
  - – RSV, Parainfluenza, Covid
  - Copious mucus production with some bronchospasm
  - Initial symptoms - URI (cough, congestion, rhinorrhea +/- fever)
  - Symptoms worsens over 4-6 days then improve
- Presentation
  - Lots of mucus
  - Poor feeding
  - Changing lung exam with crackles, wheezing, decreased breath sounds
  - Respiratory distress with increased WOB – retractions, nasal flaring
  - Hypoxemia
  - Dehydration

Bronchiolitis
mucus/ inflammation
Bronchioles

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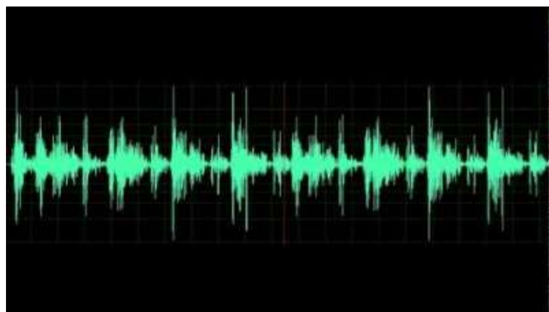
Bronchiolitis (rice krispies, washing machine, coarse crackles, variable exam)



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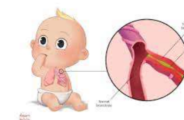
Bronchiolitis - treatment

- REST is BEST
- Supportive care only
  - Nasal suctioning (no evidence for deep suctioning)
  - Control fevers
  - Supplemental O2 if needed
  - Non-invasive positive pressure ventilation
  - IVF if not drinking well
- Albuterol doesn't help (most of the time)
- Racemic epinephrine doesn't help
- X-rays don't really help
- Steroids don't help



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Rosie - continued

- You quickly suction her nose – get lots out
- She still has increased RR but looks more comfortable
- O2 placed (NC at 2-3 L) – improved O2 sats
- You treat her fever with ibuprofen and give her a bottle
- Transport to the ED
- In the ED – we continue O2, suction again and admit for O2. She spends 2-3 days in the hospital and recovers well

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Things that scare me with bronchiolitis:

- Altered mental status
- Hypoxemia not improving with O2
- Need for increasing support over several hours
- "Is this bronchiolitis or something else?"

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Matias

- Dispatch: 8 yo with worsening illness, can't breathe
- On scene –
  - Appearance – Ill appearing but awake
  - Breathing – Slightly increased rate with apparent dyspnea
  - Circulation – Pale
- History
  - Had URI symptoms for the past 3-4 days, now with high fever and worsening cough over past day. Now having c/o dyspnea
  - No PMHx
- Exam
  - RR 30, HR 120, SpO2 85%
  - Lungs – no wheezing, no stridor, few fine crackles – R side lower lobe

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Differential Diagnosis by airway location

Nostrils
- foreign object

Stridor

Paratracheal region
- croup
- epiglottitis
- bacterial tracheitis

Upper Airway
- anaphylaxis
- foreign object

Large Airway
- obstruction
- injury

Wheezing "tight"

Alveoli
- pneumonia
- pulmonary edema

Crackles (quiet)

Bronchioles
Asthma
Bronchiolitis

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Pneumonia

- Viral/bacterial infection of the airspaces / alveoli
- Presentation
  - Fever, cough, dyspnea
  - Often preceded by URI
  - Lung sounds – fine crackles, focal area of decreased sounds
  - May have tachypnea, retractions but might not
  - Hypoxemia
- Diagnosis
  - Clinical exam
  - CXR
- Can be complicated by empyema (fluid/pus in the pleural space)

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Pneumonia - treatment

- O2 support – supplementation
- Respiratory support (HHFNC, BiPAP, intubation)
- Antibiotics if bacterial
- Time

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Matias - continued

- You astutely recognize need for supplemental O2 – improved with NC at 4L
- He still looks ill and you have a long transport time (1 hour)
  - Consider IVF bolus
  - Consider glucose check
  - Treat fever
- ED arrival – Improved after a bit of fluid but still needs O2, CXR shows a RLL pneumonia – treated with amoxicillin and admission

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Things that worry me about pneumonia

- Multiple lobes involved
- Worsening despite treatment
- Severe O2 need or respiratory distress
- Signs of sepsis
- Unimmunized kids

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Diego

- Dispatch: 3 yo boy, apparent choking episode now with difficulty breathing
- On scene:
  - Appearance – awake, appears frightened
  - Breathing – increased WOB, intermittent stridor
  - Circulation – well perfused
- History:
  - Was eating and playing with legos at the table – sudden onset of difficulty breathing, appeared to be choking
  - Still having difficulty
- Exam:
  - Respiratory distress – rate 30, poor lung sounds

40

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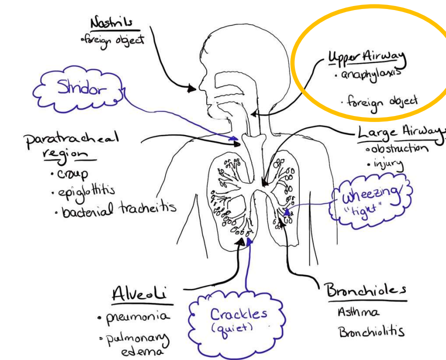

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Airway foreign objects

- Can partially or completely obstruct the airway
- Food, toys
- Might not have any history of ingestion/aspiration
- Go back to the basics:
  - Heimlich / abdominal thrusts / back blows
  - If unresponsive and not working – DL to visualize
    - Pull it out
    - Push it down
    - Try to intubate around it…
    - Needle cricothyrotomy

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Back to Diego:

- You quickly recognize the need for back blows/abdominal thrusts
- After 2 back blows – out pops a lego
- Much improved
- Transport given continued complaints of pain and coughing

- Bronchoscopy much later pulls out another tiny Lego from the R mainstem…

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Difficulty breathing that isn't respiratory:

DKA
- Kusmaul breathing
- Deep, slow breathing
- Hx of DM, weight loss, thirst

Toxins
- Opioids – slow shallow breathing
- Aspirin

Cardiomyopathy/myocarditis
- Cough, wheeze, dyspnea
- Clear lungs

Abdominal pain or infection
- Tender abdomen
- Distended abdomen
- Clear lung sounds

Sepsis
- Fever
- Ill appearing

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Jennifer

- Dispatch: 3 yo girl with severe respiratory distress at home
- On scene –
  - Appearance – limp, not moving
  - Breathing – Occasional gasping respirations
  - Circulation – cyanotic, pulses adequate HR 90, SpO2 70% on RA
- Now what?

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Respiratory failure – Airway Positioning

- Jaw thrust
- Towel roll
- Consider FB

Infant.
Small child.
Old child/adult
Line traversing external auditory canal crossing anterior to the shoulder
Extension of the head of the infant and small child
Hyper-extension of the head in older child or adults

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Respiratory Failure: Breathing

- Add O2
- Consider positive pressure
- BVM ventilation
- Intubation?

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To Intubate… or Not to Intubate…?

- If ventilation and oxygenation is adequate with BVM:
  - Don't intubate
  - Prepare just in case…
  - Consider an NG to suction for gastric decompression
  - Multiple studies show no benefit for intubation in the field (some show harm)

Effective BVM ventilation saves lives….

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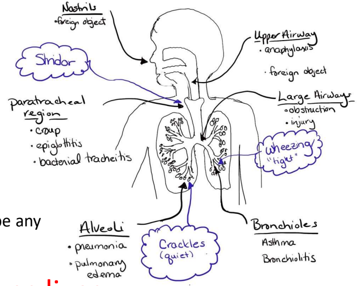
If you remember just a few things:

- Stridor
  - think croup, anaphylaxis, FB
  - Racemic Epi
- Wheezing (or very diminished lung sounds)
  - Think asthma, bronchiolitis
  - If Asthma → Albuterol
  - If bronchiolitis → suctioning
  - Not sure? Trial and re-evaluate
- Quiet hypoxemia – with lung sounds
  - Think pneumonia
  - Supplement with O2
- Not all that breathes fast is respiratory
- If you can't hear breath sounds – there might not be any



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Thank you

- Questions? Comments?

Kristin.kim@childrenscolorado.org

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